SOIL SURVEY REPORT

I-49 MISSOURI
ROUTE H TO ARKANSAS STATE LINE
McDONALD COUNTY, MISSOURI
MoDOT Project No. J7P0601

FOR

MISSOURI DEPARTMENT OF TRANSPORTATION

BY

HNTB CORPORATION

FEBRUARY 2004

HNTB

SOIL SURVEY REPORT

I-49 MISSOURI
ROUTE H TO ARKANSAS STATE LINE
McDONALD COUNTY, MISSOURI
MoDOT Project No. J7P0601

FOR

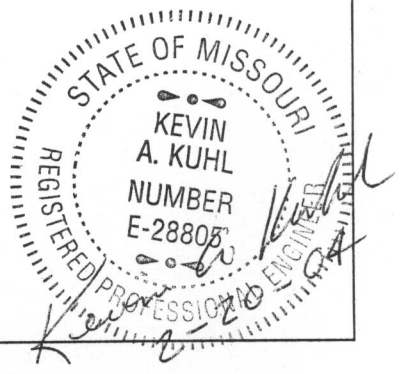
MISSOURI DEPARTMENT OF TRANSPORTATION

BY

HNTB CORPORATION

FEBRUARY 2004

HNTB



SOIL SURVEY REPORT

I-49 MISSOURI
ROUTE H TO ARKANSAS STATE LINE
McDONALD COUNTY, MISSOURI
MoDOT Project No. J7P0601

FOR

MISSOURI DEPARTMENT OF TRANSPORTATION

BY

HNTB CORPORATION

FEBRUARY 2004

HNTB

TABLE OF CONTENTS

1.0 INTRODUCTION – PROJECT DESCRIPTION

The I-49 project is located in McDonald County, Missouri beginning south of Pineville, Missouri extending south to the Missouri/Arkansas State Line. Beginning at Station 723+96 and ending at Station 988+32, this portion of roadway extends approximately 5.1 miles in length. Immediately north of this project is the MoDOT project Job No. J7P0601. A copy of the Soil Survey and Plans were made available to HNTB. These documents were used in the current analysis and portions of the recommendations included in the following paragraphs.

Proposed construction consists of grading and paving for four lanes of fully-controlled access highway on a complete relocation. The two southbound and two northbound lanes will be separated by a 60-foot wide median. The following bridge structures are as follows:

- Route I-49 Northbound over U.S. 71 Southbound (Bridge No. A6380)
- Existing Route 90 over Route I-49 (Bridge No. 7000)
- Three Box Bridges located at Project Centerline Stations 794+88, 936+98, 986+85

For these bridge structures, recommendations are provided in separate reports. These recommendations include foundation type, depth, and allowable bearing capacities.

The project will also require drainage structures such as box culverts, reinforced concrete pipes (RCP's) and median drains to reestablish drainage.

This report covers the roadway portion of the project which includes grading, drainage structure, roadway slope, and pavement design recommendations.

The field investigations for this soil survey were performed October 2002 through August 2003. The drilling, sampling, and testing were performed under a subcontract with Terracon Consultants, Inc., Springdale, Arkansas.

As-drilled boring coordinates are included in Section 9.0 along with the boring logs. Boring logs for the above listed bridges are included in their respective reports.

The following page contains a vicinity map showing the proposed construction (bolded lines). Shown also is the MoDOT project just north of that contained in this report.

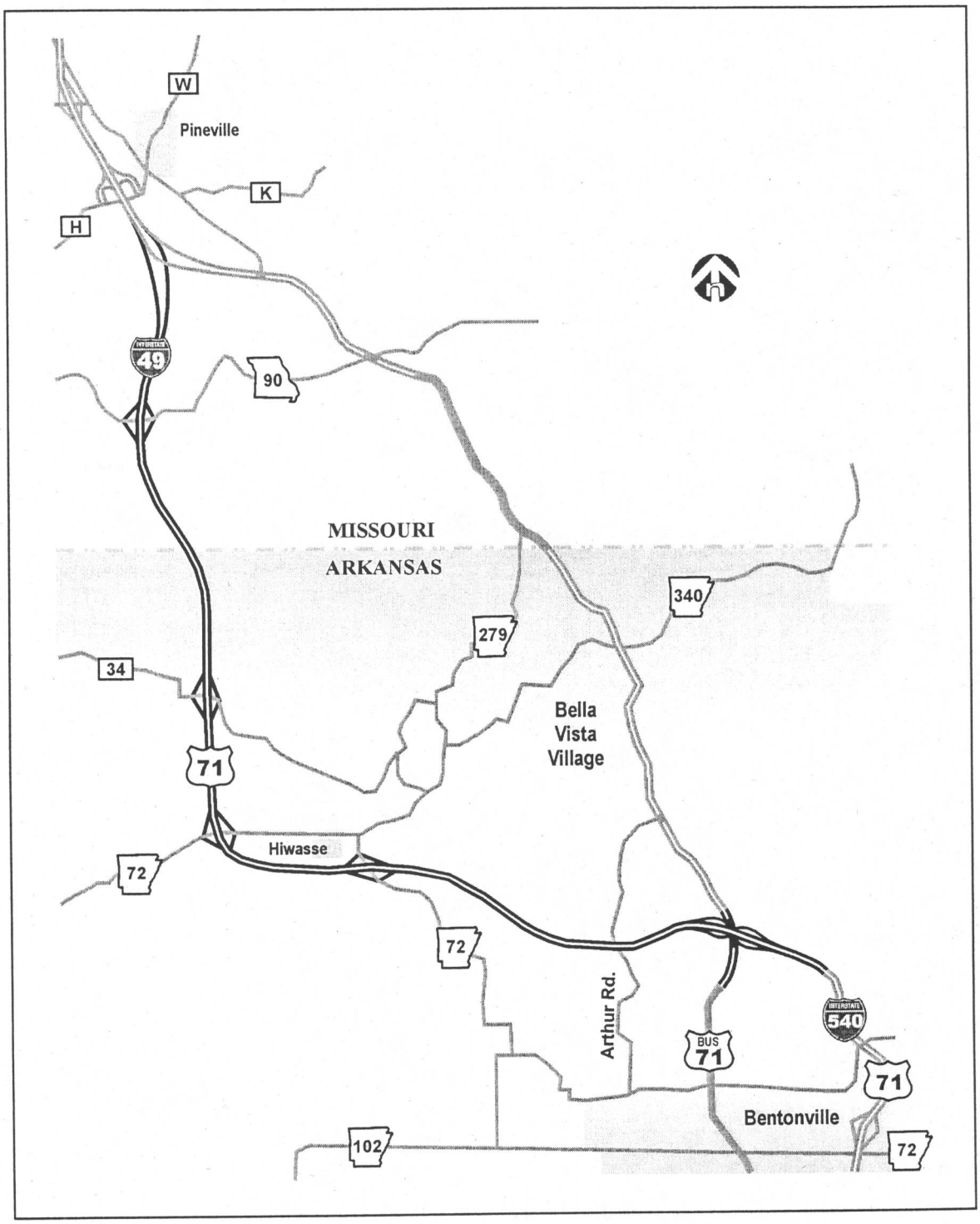


Figure 1: Vicinity Map

2.0 SOIL TYPES AND GEOLOGIC FORMATIONS

The Clarksville Stony Loam and Gravelly Loam Soil Series; residual soils derived from cherty limestone were encountered in this survey. A thin A horizon consisting of silts and chert gravel with some organics present, exists along the alignment, but these soils were limited. The A Horizon total thickness ranges from 0 to 12 inches. The C horizon beneath the A Horizon ranges from light brown to reddish brown clayey gravel and sand to fat clays (CH) and lean clays (CL) with differing percentages of residual sand and gravel content. Chert gravel content ranges from 4 to 90 percent. The thickness of the residual soil overlying rock ranges from 1.5 to 65 feet, with an average thickness of 16.7 feet. General group index of the soils ranges from 0 to 19, based on the MHTD Geology and Soils Manual (1962).

Representative samples were selected for testing at locations along the proposed route of I-49. Test assignments were made by HNTB Corporation and tested by Terracon Consultants, Inc. in general accordance with AASHTO and/or ASTM Standards. A total of 91 moisture content tests were performed with results ranging from 0.7 to 34.8 percent. Six dry density tests were performed with results ranging from 94 pcf to 110.2 pcf. Sixty Atterberg Limit tests were performed with liquid limits ranging from 20 to 56 and plastic limits ranging from 16 to 34. A total of 13 standard proctor tests were performed with optimum moisture contents ranging from 9.4 to 23.7 percent and maximum dry densities ranging from 94.2 pcf to 124.2 pcf. Thirty-eight sieve analysis tests were performed. Gradation curves, test data sheets, and summary table are contained in Section 10.0. Included on the summary table are AASHTO classifications.

Corrosivity testing including pH and conductivity or resistivity was performed on twelve random soil samples. Based on these results, the site soils are considered to be non-corrosive where bridge piles are installed, and a non-aggressive environment for concrete.

The project is underlain by three Mississippian Age bedrock units, the Reeds Spring Formation also known as the Boone Formation, St. Joe Group, and Chattanooga Formation. Most of the roadway cuts will encounter the Reeds Spring Formation which is known to contain Karstic features and caves, cavities, sinkholes, and springs are possible. The Reeds Spring Formation, St. Joe Group, and Chattanooga Formation are generally described as:

Reeds Spring Formation

The Reeds Spring Formation consists of nearly equal parts of alternating bands of hard, finely crystalline, gray or bluish-gray, slightly argillaceous limestone and chert. The chert is nodular and irregularly bedded and is characteristically colored a bluish-black with a distinctive light gray border. However, much of the chert in the formation is colored light tan or mottled tan and gray. Chert is most abundant in the upper part of the formation and makes up from 1/3 to 2/3 of the formation. The thickness in the southernmost part of the state is reportedly 225 feet.

St. Joe Group

Above the Chattanooga is the Compton-Pierson or St. Joe Group. This formation forms many of the prominent bluff and overhangs in the area and can be described as a gray, carbonate, fossiliferous limestone relatively chert free. The thickness reported in the literature ranges from 30 up to 110 feet in thickness. Many of the karstic features are associated with this layer of rock.

Chattanooga Formation

The Chattanooga is a fissile, gray to dark gray, carbonaceous shale. Local concentrations of pyrite nodules and concretions are common. Fresh exposures exhibit a jointed structure giving the shale a tendency to break into prismatic blocks. The formation breaks down quickly and is covered in most areas. In McDonald County, the shale reportedly has a maximum thickness of 20 to 30 feet. Chattanooga shale was encountered at elevations ranging from 1060.1 to 996.5, the lower elevation occurring at the southern end of the project.

3.0 FIELD INVESTIGATIONS

Boring locations were staked in the field by the Missouri Department of Transportation (MoDOT). A series of three borings were taken generally every 200 feet along the alignment through each cut. One boring was drilled at approximate centerline, one offset approximately 120 feet right and one 120 feet left. These borings were advanced by auger to rock. The bedrock was cored to 10 feet below planned grade in at least one boring in each cut area.

For each planned culvert location, borings were generally drilled at the centerline of the alignment and one drilled at the inlet and outlet of the culvert based on preliminary locations. Changes have been made in the location of these structures, therefore the as-drilled boring locations are some distance from the revised locations.

Borings were accomplished using either a tracked CME 850, a truck mounted CME 75, or a track mounted CME 55 drill rig. All borings were logged in the field by a geologist or geotechnical engineer using ASTM visual/manual methods. Logs for these borings are included as Section 9.0 of this report.

Site features located during field operations included identifying rock outcrops, and springs and ponds. Rock outcrops were encountered near station 734+00 (borings MC-18 and MC-19). Photos including a geologic description of the outcrops are included in Roadway Structure Boring Logs, Section 9.0. The noted springs are shown on Figures 3 and 5 at Stations and Offsets of 755+80, 150 feet right of centerline and 768+60, 390 feet right of centerline. Boring MC-85 was drilled at the edge of a pond as shown on Figure 7. This pond extends from approximate Station 805+10 to 806+20.

During field investigations a cave was encountered which was positioned within the alignment. The cave was situated in that portion of the original alignment south of Route 90. The current alignment has been altered from the original location in order to miss the cave. During the subsurface investigations, other karstic features were not

encountered. The borings labeled with suffix of A or B were drilled to provide recommendations for the current alignment.

4.0 GRADING RECOMMENDATIONS

Placement procedures as covered in the MoDOT Standard Specifications are recommended. Embankments should be compacted to at least 95% maximum density near optimum moisture. The laboratory results indicate that the in-situ soil moisture contents are below optimum moisture, therefore, moisture addition will be required to achieve adequate compaction. Lift thickness and compaction requirements for both soil and rock are covered under MoDOT Standard Specifications

The A soil horizon and topsoil contain organics, are poorly drained and exhibit unstable conditions. After clearing and grubbing the area should be stripped according to MoDOT standard specifications. The stripped materials should be stockpiled and used as final cover on slopes to facilitate growth of vegetation.

Where rock outcrops in fill areas, or in other areas where water or wet conditions are present, it is recommended that at least a 2-foot thick rock fill blanket be placed at the base of fills. This will provide a "bleeder blanket" to allow passage of any seepage waters, and should extend and daylight from outside slope to outside of slope. The rock fill material is available from the limestone and chert cuts and should meet the requirements of Section 611.10 of the Standard Specifications.

Where fill is to be placed on existing slopes that are steeper than 3 to 1 (H:V), the fills shall be benched into the soils as stated in the MoDOT Standards or as the Engineer deems necessary.

It is recommended that all limestone or chert excavated from the project be considered as Class C excavation and allowed for use in the 2-foot thick rock fill base under pavements and fills. Some of the limestone or chert may be found to be too weathered and deteriorated during excavation for this use. The rock fill base should extend from ditch to ditch, or be connected to underdrains if daylighting of the rock base is not possible. Personnel skilled in the identification and characterization of rock materials should be consulted during construction on the proper use of Class C rock materials as pavement base. It appears there is sufficient quantity of Rock Fill Base Material available from Class C excavation, although some staging or stockpiling may be necessary. Design estimates should verify the quantity. If sufficient quantities are not available, a provision should be included for contractor furnished material. The rock fill base should consist of locally excavated Class C material placed according to the present standards of Rock Fill Base (Standard Specification 303).

In cut excavations, undergrading in rock and soil should include the removal and replacement of two feet below final pavement subgrade. Undergraded areas should be replaced with Rock Fill Base.

4.1 Earthwork Factors

Shrinkage as taken from the MoDOT Soils and Geology Manual for Clarksville Horizon C soils ranges from 0.98 to 1.28 which depends on the percentage of gravel.

Based on review of the laboratory data, past experience on similar projects, and consideration of other factors involved with large earthwork projects such as erosion, stripping, internal consolidation, and external consolidation an earthwork factor of 0.80 for soil is recommended.

Rock materials, on the other hand, swell in volume when taken from cut to fill. A swell factor of 1.20 is recommended.

Earthwork Summary

- Soil - 0.80 (1 cubic yard of soil cut equals 0.8 cubic yards of embankment)
- Rock - 1.20 (1 cubic yard of rock excavation equals 1.2 cubic yards of embankment)

5.0 SLOPES

5.1 Fill Slopes

Project borings indicate excavations will be Class A soil material and Class C rock. Class C consists of limestone and chert.

Highly plastic clays (CH classification soils) are considered the most challenging of the soil types. Laboratory tests indicated CH soils are present throughout the soil profile. Most of the fills range in thickness from 40 to 70 feet, but can extend to 115 feet. Utilizing the CH soil, all fill slopes should not be constructed steeper than 3:1 (H:V). If steeper slopes are desired, Class C rock can be placed in fill slopes not steeper than 2:1 (H:V), however the entire embankment should be constructed of the Class C rock material.

It is assumed there will be no sorting of soil and rock materials in the fills other than the rock blanket at the base of the embankments and the 2-foot rock fill pavement base, therefore composite fills should be constructed no steeper than 3:1 (H:V). Care should be taken during construction to avoid internal pockets of rock material surrounded by relatively impervious clay on all sides prohibiting drainage of moisture.

5.2 Cut Slopes

5.2.1 Soil

Soil backslopes along the alignment should be cut no steeper than 3:1 (H:V). Where pinnacled rock is encountered within the primarily soil cuts, the rock can be cut back as for a soil or placed as for rock cuts if stable. To prevent erosion and promote stability, ditches along the top and descending down around the sides of cut slopes should be provided to prevent flow down the face of the cuts.

5.2.2 Rock

Rock encountered in cuts can be excavated with maximum 30-foot heights at a ¼:1 (H:V) slope. Every 30 feet, a 10-foot wide bench should be constructed. Benches should be graded back from the rock face at a 2% down slope. Benching should be constructed horizontally along the project alignment at the elevations given in the following report section. At the interface of the rock cut slope and soil, the soil should be cut 10 feet back from the face of the rock cut slope and cut no steeper than 3:1 (H:V).

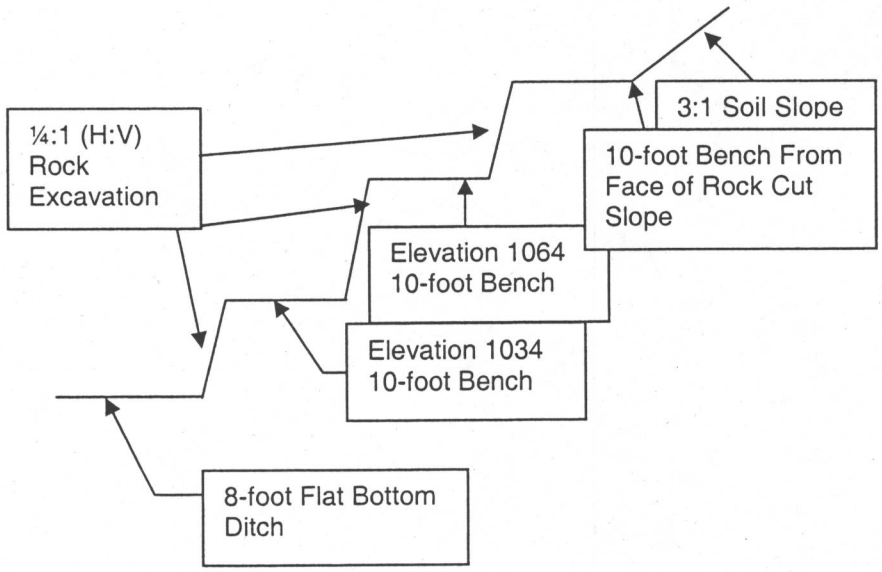
A minimum eight-foot flat bottom ditch width is to be used at the toe of all cuts. The ditch depth of four feet from the shoulder should be sufficient to contain rock fall. Presplit

blasting is recommended at all final rock faces to promote long term stability, safety, and reduced maintenance.

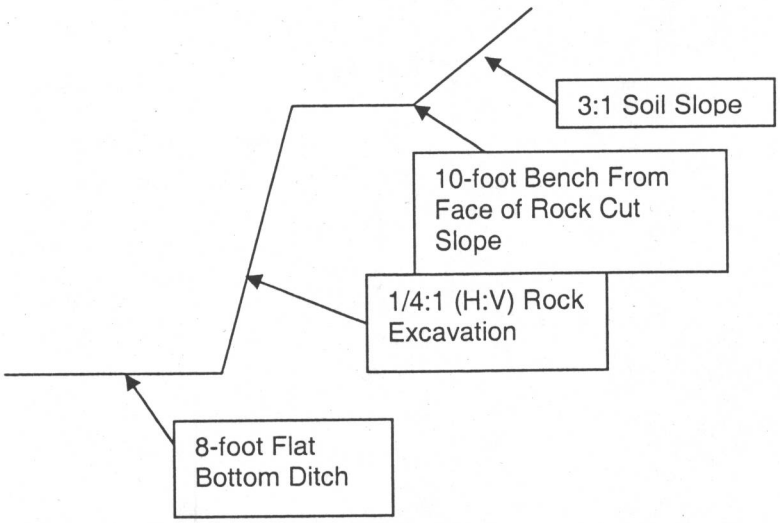
The I-49 Northbound Bridge over US-71 Southbound spill slopes are anticipated to be in rock cut. End Bents 1 and 4 were set back from the toe of slope at a 2:1 (H:V). Benching of the spill slopes should be constructed according to MoDOT project J7P0601C soil survey report which indicates ¼:1 (H:V) rock cuts with benches in rock cuts over 30 feet at approximately half the depth of cut. Minimum width of benches recommended in the soil survey is 15 feet.

Recommended Cut Slopes

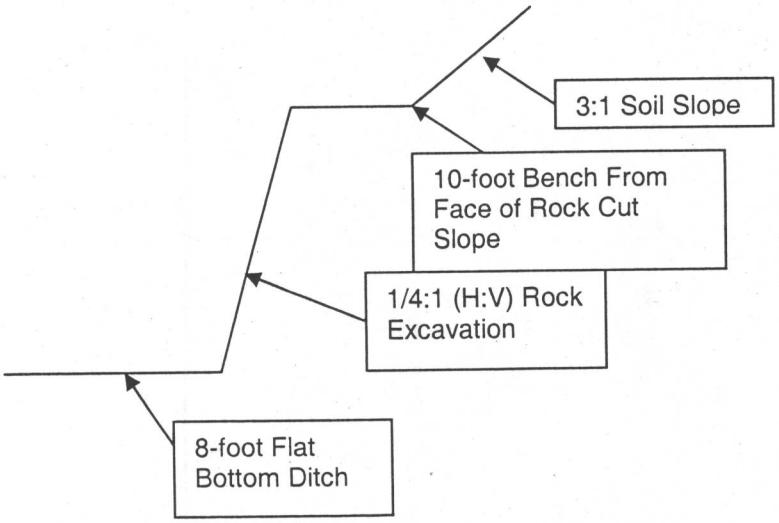
Cut – Northbound Lanes – Station 730 to 740
Rock to be cut at ¼:1 (H:V) from ditch, 10-foot wide benches at Elevations 1034 and 1064, and 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At the rock cut interface with the soil slope, the soil should be cut 10 feet back from the face of the rock cut slope.



Cut – Northbound Lanes – Station 751 to 756
Rock to be cut at ¼:1 (H:V) from ditch, and 3:1 (H:V) soil backslope. No bench within the rock face is necessary. At the rock cut interface with the soil slope, the soil should be cut 10 feet back from the face of the rock cut slope.

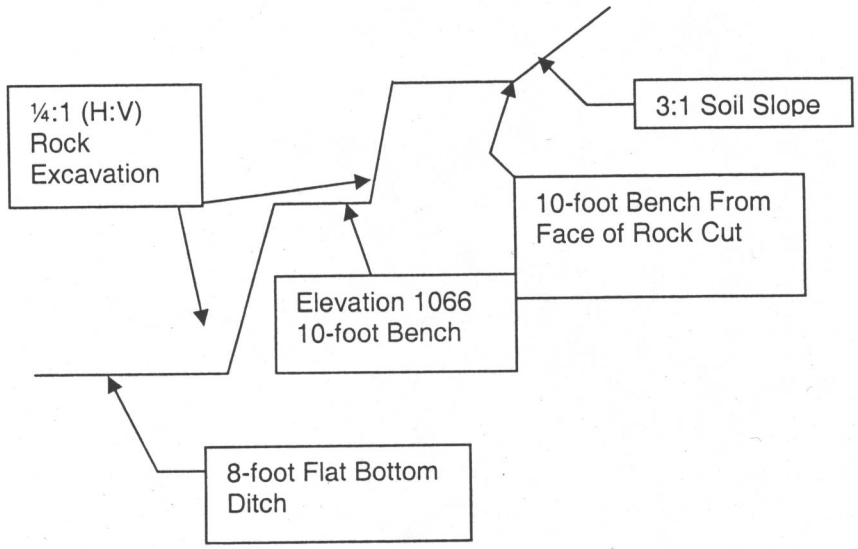


Cut – Southbound Lanes – Station 730 to 738
Rock to be cut at ¼:1 (H:V) from ditch, and 3:1 (H:V) soil backslope. No bench within the rock face is necessary. At the rock cut interface with the soil slope, the soil excavation should be cut 10 feet back from the face of the rock cut slope.

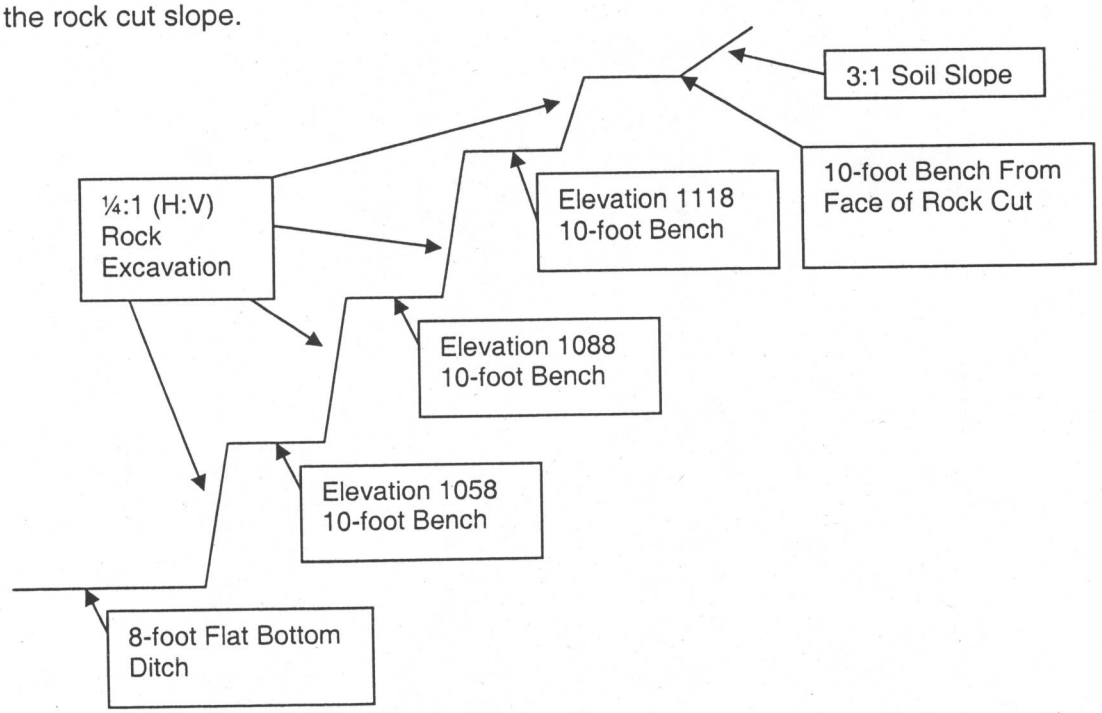


Cut – I-49 Mainline – Station 773 to 793
Rock to be cut at ¼:1 (H:V) from ditch, a 10-foot wide bench at Elevation 1066, and 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At

the rock cut interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.

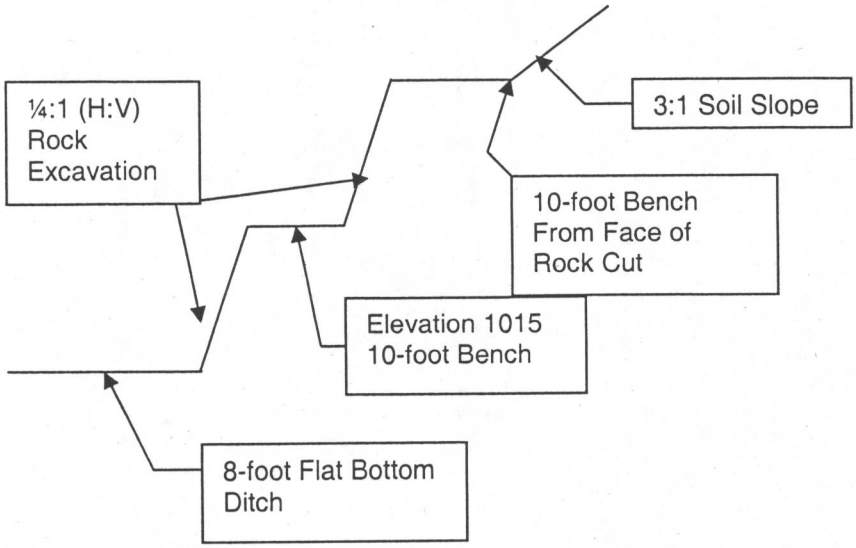


Cut – I-49 Mainline – Station 798 to 817
Rock to be cut at ¼:1 (H:V), 10-foot wide benches at Elevations 1058, 1088 and 1118, and 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At the interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.



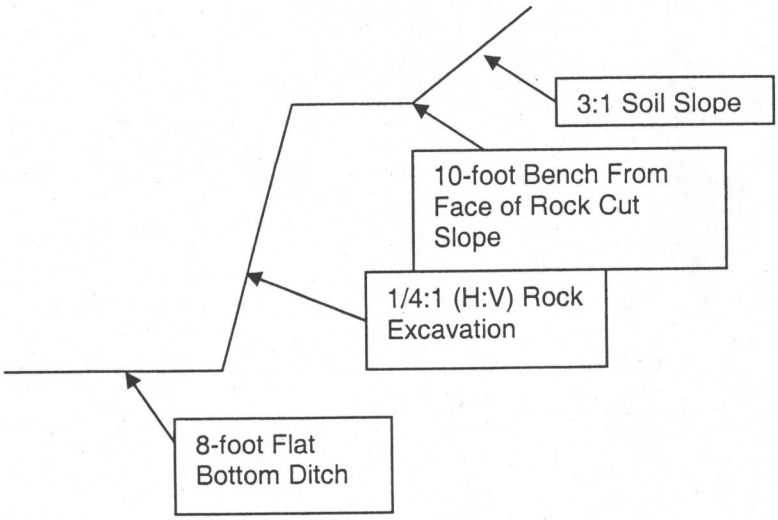
Cut – I-49 Mainline – Station 819 to 830
Rock to be cut at ¼:1 (H:V), a 10-foot wide bench at Elevation 1015, and 3:1 (H:V) soil backslope. The bench shall be down sloped at 2% from the rock face. At the rock cut

interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.

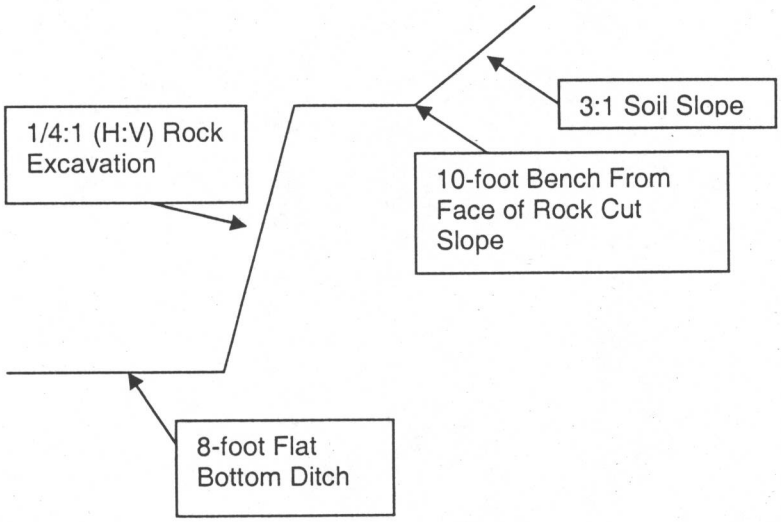


Cut – I-49 Mainline – Station 836 to 840

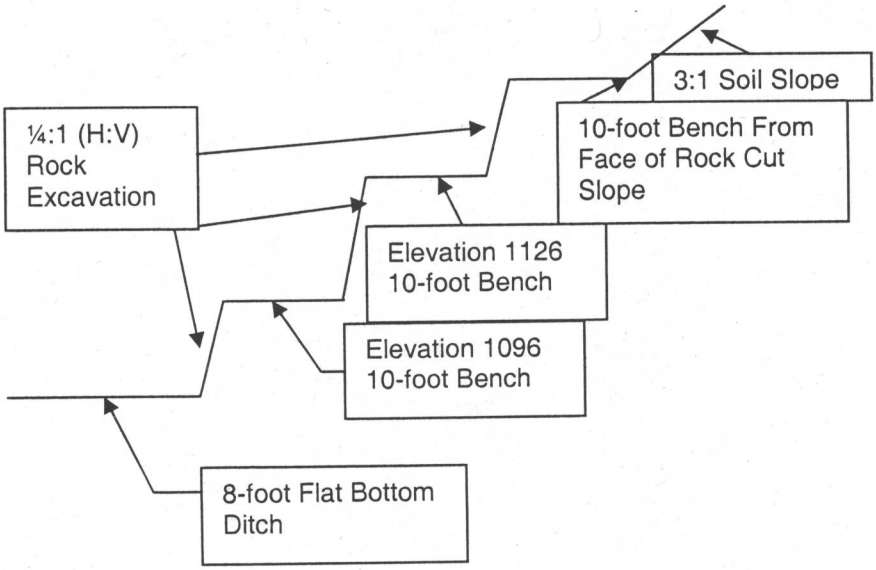
Rock to be cut at ¼:1 (H:V) from ditch, and 3:1 (H:V) soil backslope. No bench within the rock face is necessary. At the rock cut interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.



Cut – I-49 Mainline – Station 903 to 907
Rock to be cut at ¼:1 (H:V) from ditch, and 3:1 (H:V) soil backslope. No bench within the rock face is necessary. At the rock cut interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.

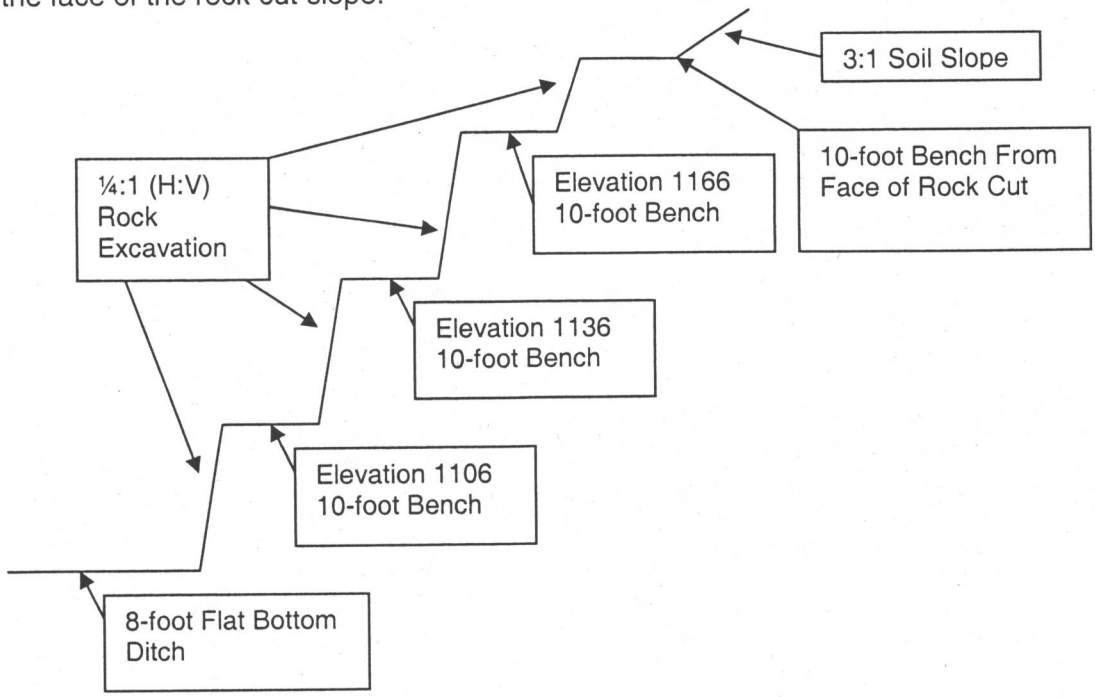


Cut – I-49 Mainline – Station 912 to 935
Rock to be cut at ¼:1 (H:V) from ditch, 10-foot wide benches at Elevations 1096 and 1126, and 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At the rock cut interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.



Cut – I-49 Mainline – Station 939 to 980

Rock to be cut at ¼:1 (H:V), 10-foot wide benches at Elevations 1106, 1136 and 1166, and a 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At the rock cut interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.



6.0 ROADWAY DRAINAGE STRUCTURES

To reestablish drainage, box culverts, reinforced concrete pipe (RCP's), and median drainpipes are planned.

Review of the roadway structure borings indicates top of rock or shale to range from 1.5 to 25.5 feet below present site grade. This suggests that rock or shale may be encountered during excavation for the drainage structures. Rock excavation should be anticipated.

For box culverts, based upon the subsurface conditions, bottom slabs should be required. Standard Specification Section 206 applies to box culvert construction.

For reinforced concrete pipe culverts, backfilling and bedding material are important factors in long term performance. These items are covered under MoDOT Standard Specification 726.

7.0 PAVEMENT RECOMMENDATIONS

The new I-49 will be 4 lanes in width, and divided by a median. A roadway which crosses I-49 is Route 90 which is two lanes in width. Alternative flexible and rigid pavement sections as well as values used in the design of these pavements, are presented.

Each lane of I-49 is 12 feet wide, 24 feet in each direction, and separated by a 60-foot wide median. Interior shoulder widths are typically 4 feet and exterior shoulder widths are typically 10 feet. The total roadway width in each direction including shoulders is typically 38 feet.

Route 90 generally consists of two 12-foot wide lanes and two 8-foot shoulders for a total roadway width of 40 feet.

Chapter 6 of the MoDOT "Pavement Development Manual", roadway borings, and laboratory data were used in the following analysis. Pavement sections were determined utilizing DARWin 3.1, a program based on the "AASHTO Guide for Design of Pavement Structures".

7.1 Traffic Information

Traffic loading projections for design were based on information provided by Missouri Department of Transportation. The two-directional average daily traffic (ADT) was determined to be 17,200 vehicles per day (VPD) for the year 2007, truck traffic making up 22% of this volume. A 20-year design life was used to determine the anticipated 18-kip Equivalent Single Axle Loads (ESAL's). The value used for annual truck volume growth rate is 3.3 percent based on back-calculation of the traffic information provided. Section 11.0 contains a copy of the design traffic information provided by MoDOT.

7.2 Pavement Subgrade Evaluation

Roadbed soil resilient modulus for pavement design was derived by correlation with laboratory California Bearing Ratio (CBR) values. Other testing performed along with the CBR tests were standard compaction, sieve analyses, Atterberg limits, and moisture content. These results are included in Section 10.0.

Project uncorrected CBR's ranged from 1.7 to 9.5 at 0.1 inches of penetration. The higher CBR's are associated with the soils that behave more like sands than clays. Representative samples of the site materials were selected for testing and include Fat Clays, Sandy Lean Clays, and Clayey Sands with varying percentages of sand and gravel.

A design CBR value of 2.4 was selected for use in the pavement designs for I-49 and Route 90. This chosen based upon field boring information, laboratory data, correlation with data provided in the "Project Development Manual", and experience with similar soils.

7.3 Structural Coefficients and Material Values

For design of flexible pavements, the following coefficients were used:

- Reliability = 90%
- Standard Deviation = 0.45
- Initial Serviceability = 4.5
- Terminal Serviceability = 2.5

- Resilient Modulus = 3600 psi (based on a laboratory CBR-value of 2.4 for 0.1" penetration)
- Layer Coefficient for Surface Course Material = 0.44
- Layer Coefficient for Base Course Material = 0.36
- Drainage Coefficient = 1.15

For design of rigid pavement, the following structural coefficients were used:

- Reliability = 90%
- Standard Deviation = 0.35
- Initial Serviceability = 4.5
- Terminal Serviceability = 2.5
- Modulus of Subgrade Reaction = 76 psi/in (based on laboratory CBR-value of 2.4 for 0.1" penetration)
- 28-day Mean Modulus of Elasticity (PCCP) = 3,122,018 psi
- 28-day Mean Modulus of Rupture (PCCP) = 550 psi (assuming 3000 psi concrete)
- Load Transfer (J) = 2.8 (assume plain concrete with doweled joints)

7.4 Pavement Section Alternatives

7.4.1 I-49 Pavement Alternatives

Two pavement alternatives were evaluated: one rigid and one flexible. 1) The rigid alternate is a Portland Cement Concrete Pavement (PCCP) with a 2-foot thick rock base. 2) The flexible alternate is an Asphaltic Cement Concrete (ACC) pavement with a 2-foot thick rock base.

The following table presents the summary of pavement design thickness for both the flexible and rigid alternatives.

ITEM	NRPCCP*	ACC**
Design E-18's (20-year one way)	29,350,709	16,771,334
Resilient Modulus, M_R (psi)	N/A	3600
Modulus of Subgrade Reaction, k (psi/in)	76	N/A
Flexible Structural Number, SN (inches)	N/A	6.37
Pavement Thickness, inches	12.0	
Asphalt Surface Course, inches		1.75
Asphalt Base Course, inches		13.25

* NRPCCP—Non-reinforced Portland Cement Concrete Pavement

** ACC—Asphaltic Cement Concrete

7.4.2 Route 90 Pavement Alternatives

Two pavement alternatives were evaluated: one rigid and one flexible. 1) The rigid alternate is a Portland Cement Concrete Pavement (PCCP) with a 4-inch thick Type 5 Base. 2) The flexible alternate is an Asphaltic Cement Concrete (ACC) pavement with a 4-inch thick Type 5 Base.

The following table presents the summary of pavement design thickness for both the flexible and rigid alternatives.

ITEM	NRPCCP*	ACC**
Design E-18's (20-year one way)	1,303,599	744,914
Resilient Modulus, M_R (psi)	N/A	3600
Modulus of Subgrade Reaction, k (psi/in)	76	N/A
Flexible Structural Number, SN (inches)	N/A	4.17
Pavement Thickness, inches	8.0	
Asphalt Surface Course, inches		1.75
Asphalt Base Course, inches		8.0
Type 5 Base, inches	4	4

* NRPCCP—Non-reinforced Portland Cement Concrete Pavement

** ACC—Asphaltic Cement Concrete

8.0 FIGURES
FIGURES 1 THROUGH 20 – As-Drilled Boring Location Plan and Roadway Profiles

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	3

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

STA. 729+60.88 END PROJ. J7P0601C
BEGIN PROJ. J7P0601

1/4 SECTION LINE

EXIST. R/W

PC
STA. 727+42.03

MC-1
MC-2
MC-3
MC-4
MC-5
MBS-1
MB1-1
MB1-2
MBS-2
MB1-3
MB1-4
MBS-3

N.B.L. US 71 (2)
N.B.L. I-49

1050 FT
1000 FT
950 FT
735
730
740

MC-16
MC-17
MC-18
MC-19
MC-20
MC-21
MC-22
MS-23
MS-24

S.B.L. I-49
S.B.L. US 71 (2)
S26°25'15"E

1/4 1/4 SECTION LINE +45

PT
STA. 722+77.90

STA. 723+95.71 END PROJ. J7P0601C
BEGIN PROJ. J7P0601

GOODIN HOLLOW CREEK

℄ RELOCATED GOODIN HOLLOW CREEK

739+59.85
776.13

NEW R/W

736+64.03
574.41

EXIST. R/W

SECTION LINE

NOTES:
(1) R/W TO BE ACQUIRED FOR PROJECT J7P0601C
(2) WORK TO BE COMPLETED UNDER CONTRACT FOR PROJECT J7P0601C

LEGEND

AS-DRILLED BORING LOCATION

FIGURE 1

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	4

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

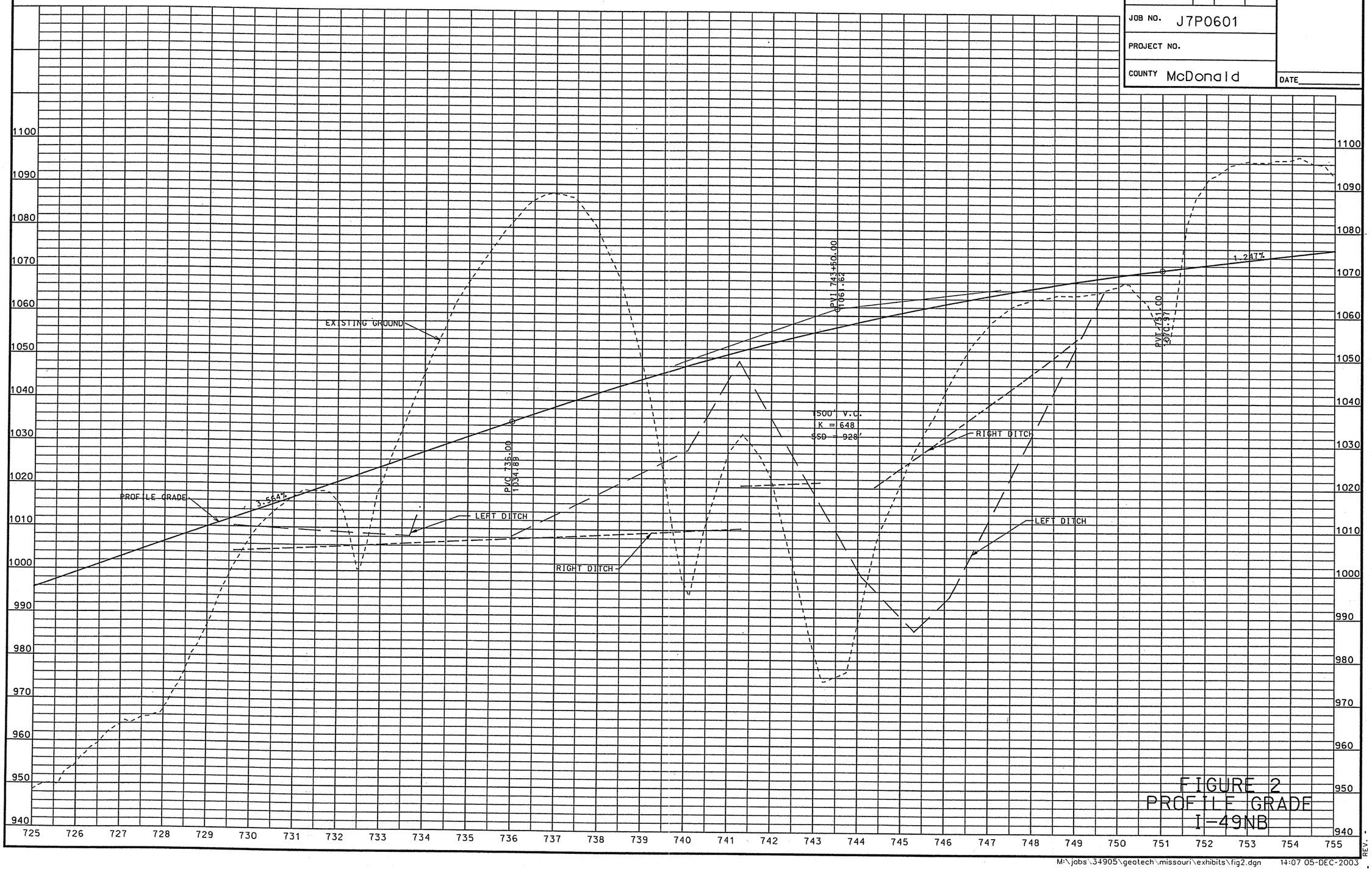


FIGURE 2
PROFILE GRADE
I-49NB

REV. -

M:\jobs\34905\geotech\missouri\exhibits\fig2.dgn 14:07 05-DEC-2003

USER NAME = dlow , DATE 05-DEC-2003 14:07
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highalf.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig2.dgn
JP PROJ NO. NONE
, SCALE 202.866670ul000000

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	6

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

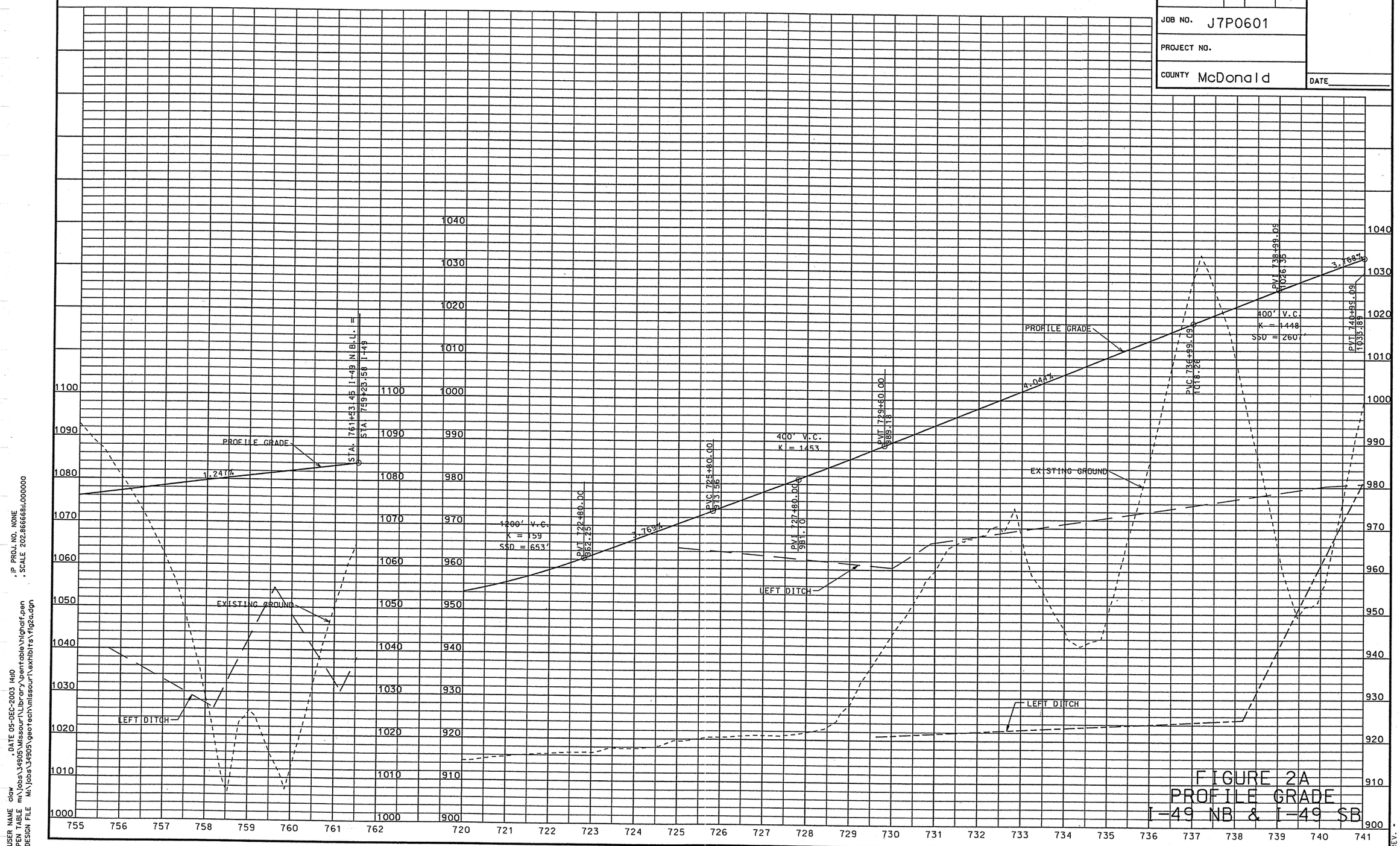


FIGURE 2A
PROFILE GRADE
I-49 NB & I-49 SB

USER NAME clow , DATE 05-DEC-2003 14:10 , IP PROJ.NO. NONE
PEN TABLE m:\jobs\34905\Missouri\library\pentable\vhighalf.pen , SCALE 202.866668\.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig2a.dgn

M:\jobs\34905\geotech\missouri\exhibits\fig2a.dgn 14:10 05-DEC-2003

REV.

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	5

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

1 W. H. ALUMBAUGH
9.55 AC. NEW R/W
30.44 AC. REMAINING

2 RONALD PARMLEY ET. AL.
12.42 AC. NEW R/W
27.59 AC. REMAINING

3 EUGENE GARDNER
13.41 AC. NEW R/W
67.41 AC. REMAINING

4 LOREN DALE GARDNER
8.84 AC. NEW R/W
71.97 AC. REMAINING

I-49 NB
P.I. 738+62.34
P.C. 727+42.03
P.T. 748+77.89
Δ = 42°43'02"(RT.)
D 2°00'00"
L 2135.86'
T 1120.31'
R 2864.79'
SE 6.3%

I-49 SB
P.I. 750+22.67
P.C. 740+85.45
P.T. 759+23.58
Δ 27°34'19"(RT.)
D 1°30'00"
L 1838.13'
T 937.22'
R 3819.72'
SE 4.9%

P.T. STA. 748+77.89

P.C. STA. 740+85.45

STA. 761+53.45 I-49 N.B.L. =
STA. 759+23.58 I-49 30° LT.

P.T. STA. 759+23.58 I-49 S.B.L. =
STA. 759+23.58 I-49 54° RT.

N.B.L. I-49

S.B.L. I-49

TENTATIVE R/W

NEW R/W

EXIST. R/W

APPROXIMATE SPRING LOCATION

1/4 SECTION LINE +28(

1/4 1/4 SECTION LINE +25

1/4 SECTION LINE

1/4 1/4 SECTION LINE

MC-10 SECTION MC-11 MC-13 MC-29 MC-32 MC-30 MC-27 MC-25 MC-31 MC-28 MC-26 MC-33 MC-37 MC-35 MC-38 MC-40 MC-36 MC-39 MS-41 MS-42 MS-24 MS-23 MS-43

1100 FT. 1050 FT. 1000 FT. 950 FT.

745 750 755 760 765

LEGEND

AS-DRILLED BORING LOCATION

FIGURE 3

USER NAME CLow , DATE 12-FEB-2004 09:04
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\Fig3.dgn
, IP PROJ. NO. NONE
, SCALE 202.866665\1.000000

M:\jobs\34905\geotech\missouri\exhibits\Fig3.dgn 09:04 12-FEB-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	7

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

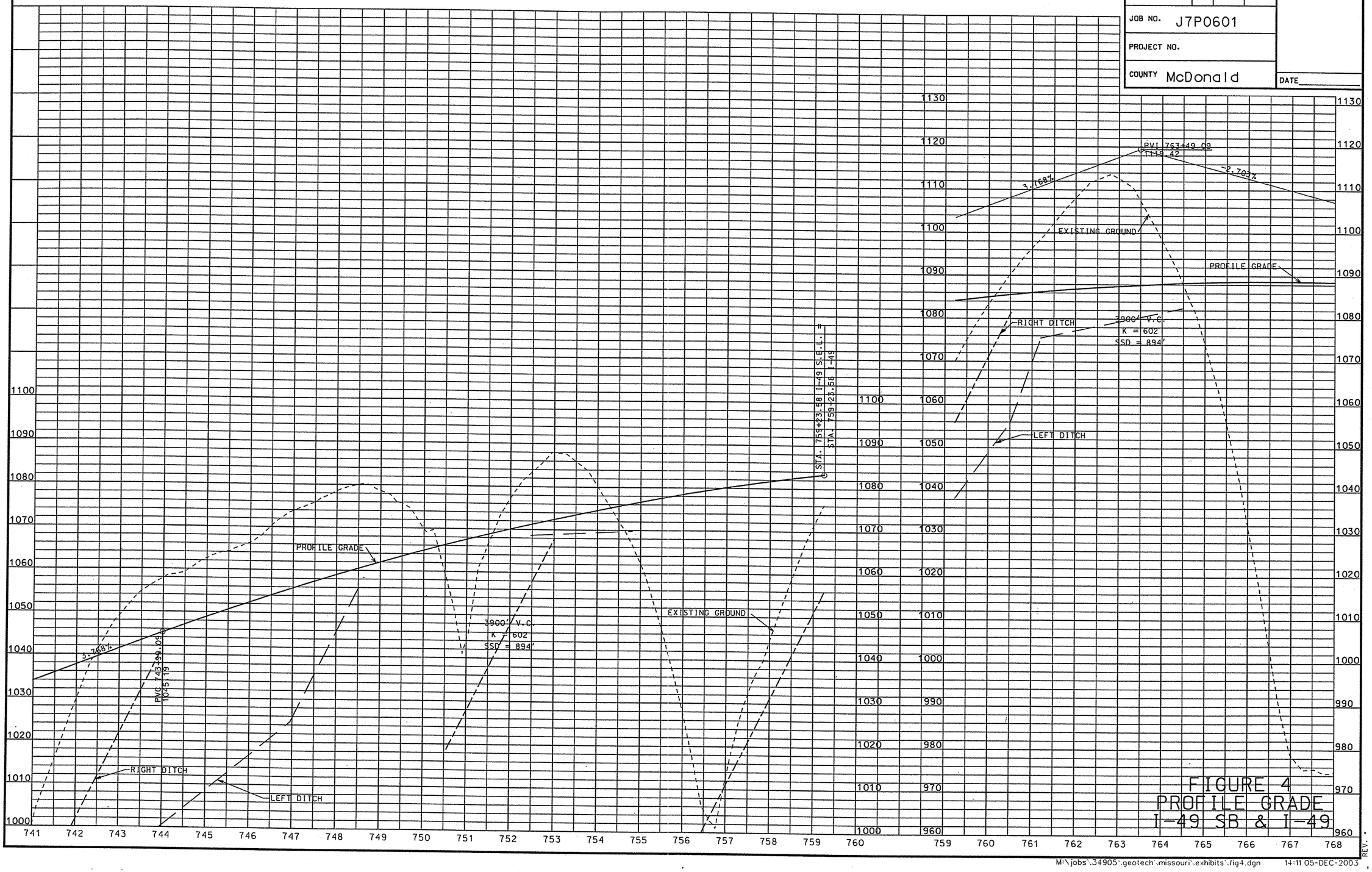


FIGURE 4
PROFILE GRADE
I-49 SB & I-49

USER NAME = , DATE 05-DEC-2003 14:11
PEN TABLE M:\jobs\34905\Missouri\Library\pentable\highdf.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig4.dgn
JP PROJ NO. NONE
SCALE 202.866668:1.000000

M:\jobs\.34905\.geotech\.missouri\.exhibits\.fig4.dgn 14:11 05-DEC-2003

REV.

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	9

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

② RONALD PARMLEY ET. AL.
12.42 AC. NEW R/W
27.59 AC. REMAINING

⑤ RUSSELL VAN ELK
3.58 AC. NEW R/W
1.82 AC. REMAINING

⑥A MARK & CYNTHIA WATKINS
0.22 AC. NEW R/W
4.79 AC. REMAINING

⑥ JOHN M. BROWN
9.38 AC. NEW R/W
90.51 AC. REMAINING

⑦ MARY LOU DURBAN
7.85 AC. NEW R/W
2.08 AC. REMAINING

④ LOREN DALE GARDNER
8.84 AC. NEW R/W
71.97 AC. REMAINING

⑧ Clarence Gardner
33.38 AC. NEW R/W
135.80 AC. REMAINING RT
72.47 AC. REMAINING LT

SECTION LIN
1/4 SECTION LINE +70
NEW R/W
TENTATIVE R/W
APPROXIMATE SPRING LOCATION
1000 FT
1050 FT
1100 FT
770
775
780
785
790
795

MS-41 MS-42 MS-43 MS-59 MS-60 MS-72 MS-73
MC-44 MC-45 MC-46 MC-47 MC-48 MC-49 MC-50 MC-51 MC-52 MC-53 MC-54 MC-55 MC-56 MC-57 MC-58 MC-61 MC-62 MC-63 MC-64 MC-65 MC-66 MC-67 MC-68 MC-69 MC-70 MC-71

LEGEND
AS-DRILLED BORING LOCATION

FIGURE 5

USER NAME CLaw , IP PROJ NO. NONE
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen , SCALE 202.866664t.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig5.dgn , DATE 12-FEB-2004 09:10

M:\jobs\34905\geotech\missouri\exhibits\fig5.dgn 09:10 12-FEB-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	10

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

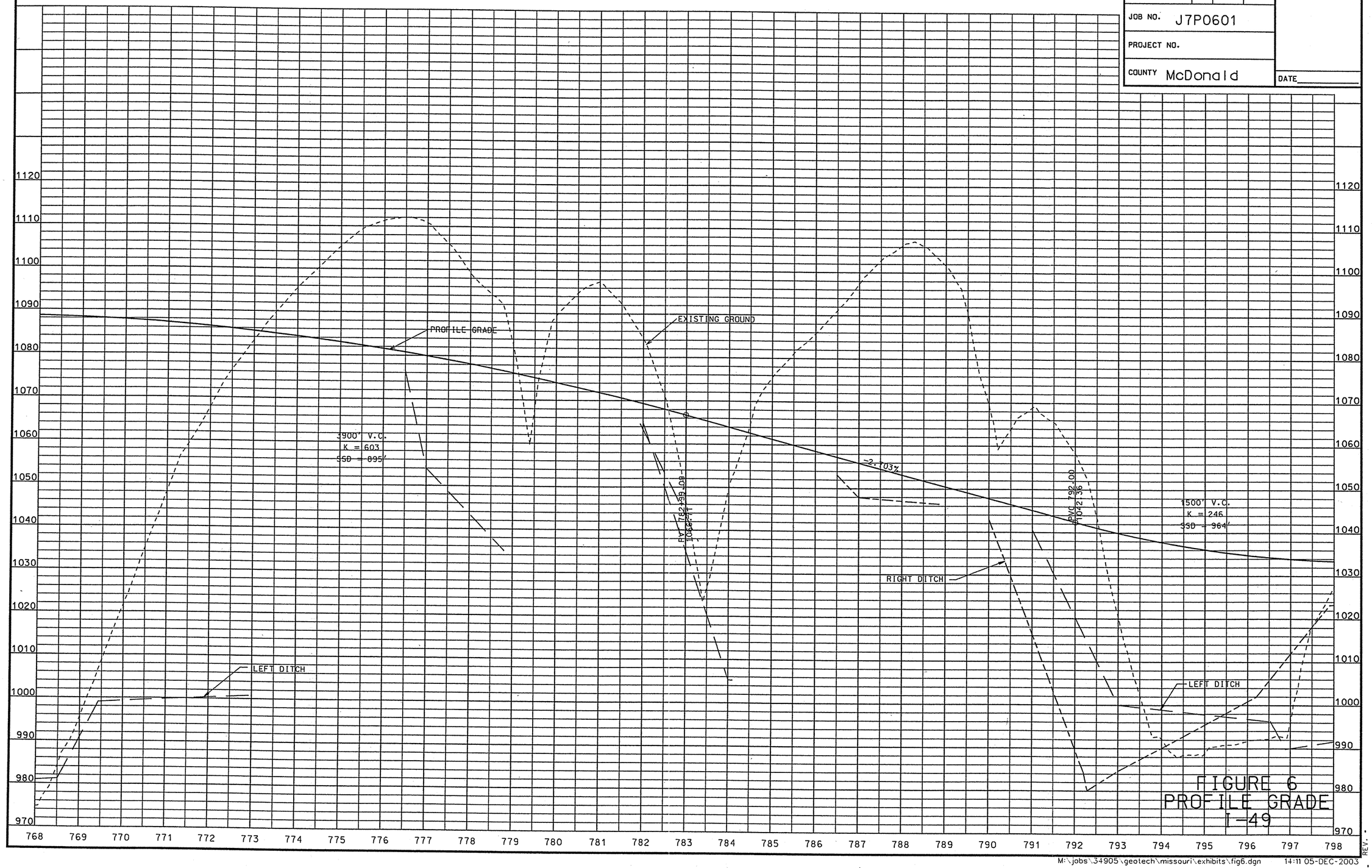


FIGURE 6
PROFILE GRADE
I-49

USER NAME clow , DATE 05-DEC-2003 14:11
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highclf.pen , IP PROJ.NO. NONE
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig6.dgn , SCALE 202.866664d1.000000

M:\jobs\34905\geotech\missouri\exhibits\fig6.dgn 14:11 05-DEC-2003

REV.

HNTB

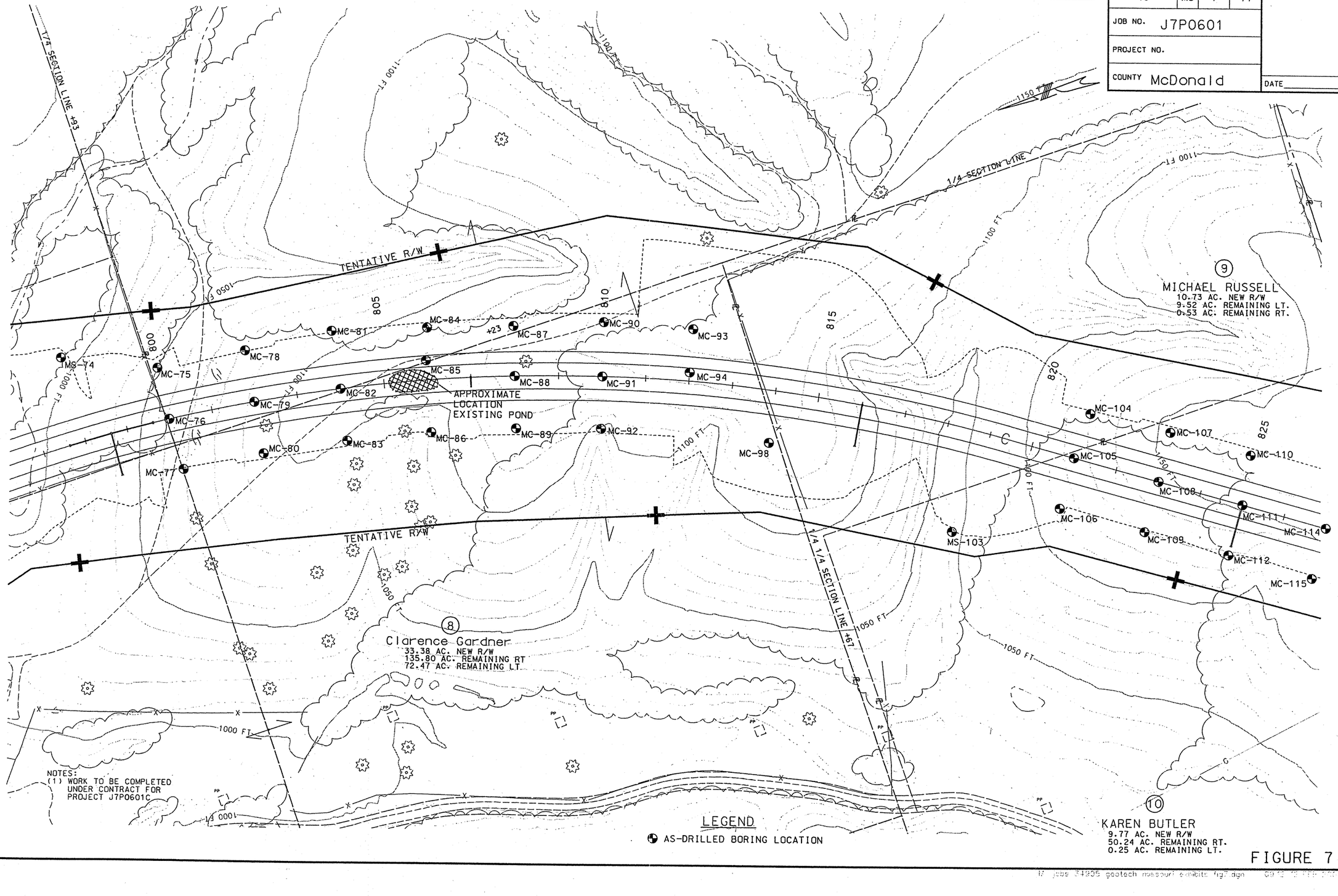
ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	11

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE



NOTES:
(1) WORK TO BE COMPLETED UNDER CONTRACT FOR PROJECT J7P0601C

LEGEND

AS-DRILLED BORING LOCATION

FIGURE 7

USER NAME CLow , DATE 12-FEB-2004 09:12 , IP PROJ. NO. NONE
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen , SCALE 202.866660:1.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig7.dgn

M:\jobs\34905\geotech\missouri\exhibits\fig7.dgn 09-12-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	12

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

EXISTING GROUND

PROFILE GRADE

1500' V.C.
K = 246
SSD = 964'

PVI 807+00
1047.50

3.389%

-2.703%

3.389%

PVI 799+50.00
1022.09

9000' V.C.
K = 1436
SSD = 1381'

PVC 820+50.00
1083.25

LEFT DITCH

RIGHT DITCH

1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060 1050 1040 1030 1020

798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828

REV.

FIGURE 8
PROFILE GRADE
I-49

M:\jobs\34905\geotech\missouri\exhibits\fig8.dgn 14:12 05-DEC-2003

USER NAME clow
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highdef.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig8.dgn
DATE 05-DEC-2003 14:12
IP PROJ.NO. NONE
SCALE 202.866667:1.000000

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	13

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

CAUTION:
16" H.P. GAS
LINE

SECTION LINE +38

1/4 1/4 SECTION LINE+38

1/4 1/4 SECTION LINE+56

1150 FT

1100 FT

1050 FT

100 FT

(11)
C.W. SUMNER
59.43 AC. NEW R/W
39.28 AC. REMAINING RT.
62.41 AC. REMAINING LT.

(10)
KAREN BUTLER
9.77 AC. NEW R/W
50.24 AC. REMAINING RT.
0.25 AC. REMAINING LT.

P.C.
STA.832+18.39

P.T.
STA.850+47.32

MC-110 MC-113 MC-116 MC-114 MC-117 MC-115 MC-118 MC-119 MC-120 MC-121 MC-122 MC-123 MC-124 MC-125 MC-126 MC-127 MS-129 MS-130 MS-131 MC-132 MC-133 MC-134 MC-135 MC-136 MC-137 MC-138 MC-139

825 830 835 840 845 850

GOODIN HOLLOW ROAD (1)

NOTES:
(1) WORK TO BE COMPLETED UNDER CONTRACT FOR FOR J7P0601C

LEGEND
AS-DRILLED BORING LOCATION

FIGURE 9

USER NAME CLow DATE 12-FEB-2004 09:14
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig9.dgn
IP PROJ. NO. NONE
SCALE 202.866662:1.000000

M:\jobs 34905 geotech missouri exhibits fig9.dgn 09:14 12-FEB-2004

REV.

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	14

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

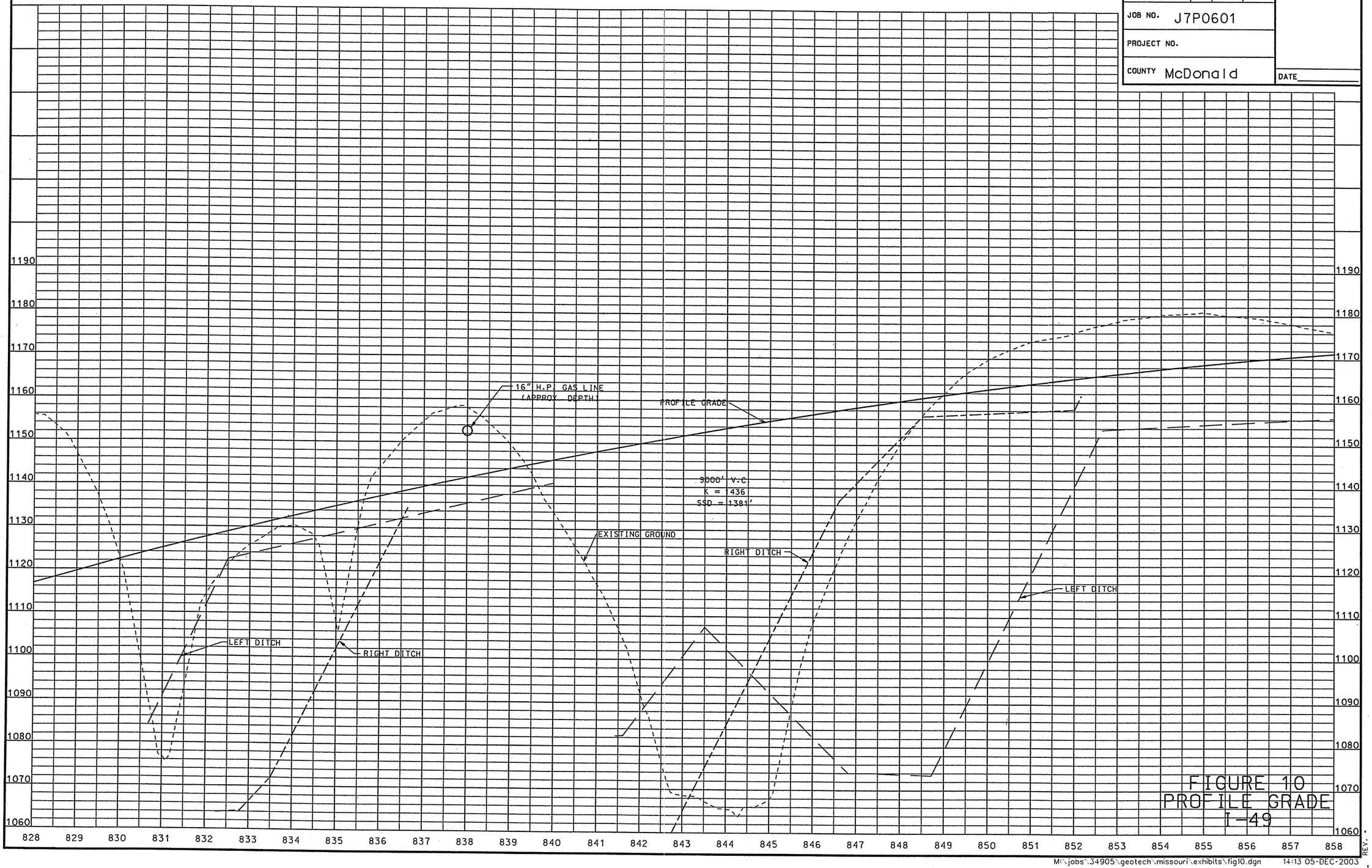


FIGURE 10
PROFILE GRADE
I-49

M:\jobs\34905\geotech\missouri\exhibits\fig10.dgn 14:13 05-DEC-2003

REV.

USER NAME clow
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highdf.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig10.dgn
, DATE 05-DEC-2003 14:13
, IP PROJ. NO. NONE
, SCALE 202.866671\1.000000

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	15

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

(12A) JERRY W. WATKINS
1.26 AC. NEW R/W
2.14 AC. REMAINING

(11) C.W. SUMNER
59.43 AC. NEW R/W
39.28 AC. REMAINING RT.
39.28 AC. REMAINING RT.

(13) WALTER KELLEY
38.43 AC. NEW R/W
0.77 AC. TEMP. EAS'T.
2.67 AC. REMAINING RT.
39.94 AC. REMAINING LT.

(14) LLOYD SUMNER
1.04 AC. NEW R/W

1/4 SECTION LINE+89

1/4 1/4 SECTION LINE

1/4 1/4 SECTION LINE+29

SECTION LINE

TYPE I DRWY. RT. STA. 42+20.00

TENTATIVE R/W

NEW R/W

MC-139 MC-140 MC-141 MC-142 MC-143 MC-144 MC-145 MC-146 MC-147 MC-148 MC-149 MC-150 MC-151 MC-152 MC-153 MC-154 MC-155 MC-156 MC-157 MC-158 MC-159 MC-160 MC-161 MC-163 MC-164 MC-165 MC-166 MC-167 MC-168

MB3-1 MB3-2 MB3-3 MB3-4 MB3-5 MB3-7 MB3-8 MB3-9 MB3-10

1150 FT 1100 FT 1200 FT

LEGEND

AS-DRILLED BORING LOCATION

FIGURE 11

USER NAME CLow , DATE 12-FEB-2004 08:57 , IP PROJ. NO. NONE
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen , SCALE 202.866667ft.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig11.dgn

m:\jobs\34905\geotech\missouri\exhibits\fig11.dgn 08:57 12-FEB-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	16

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

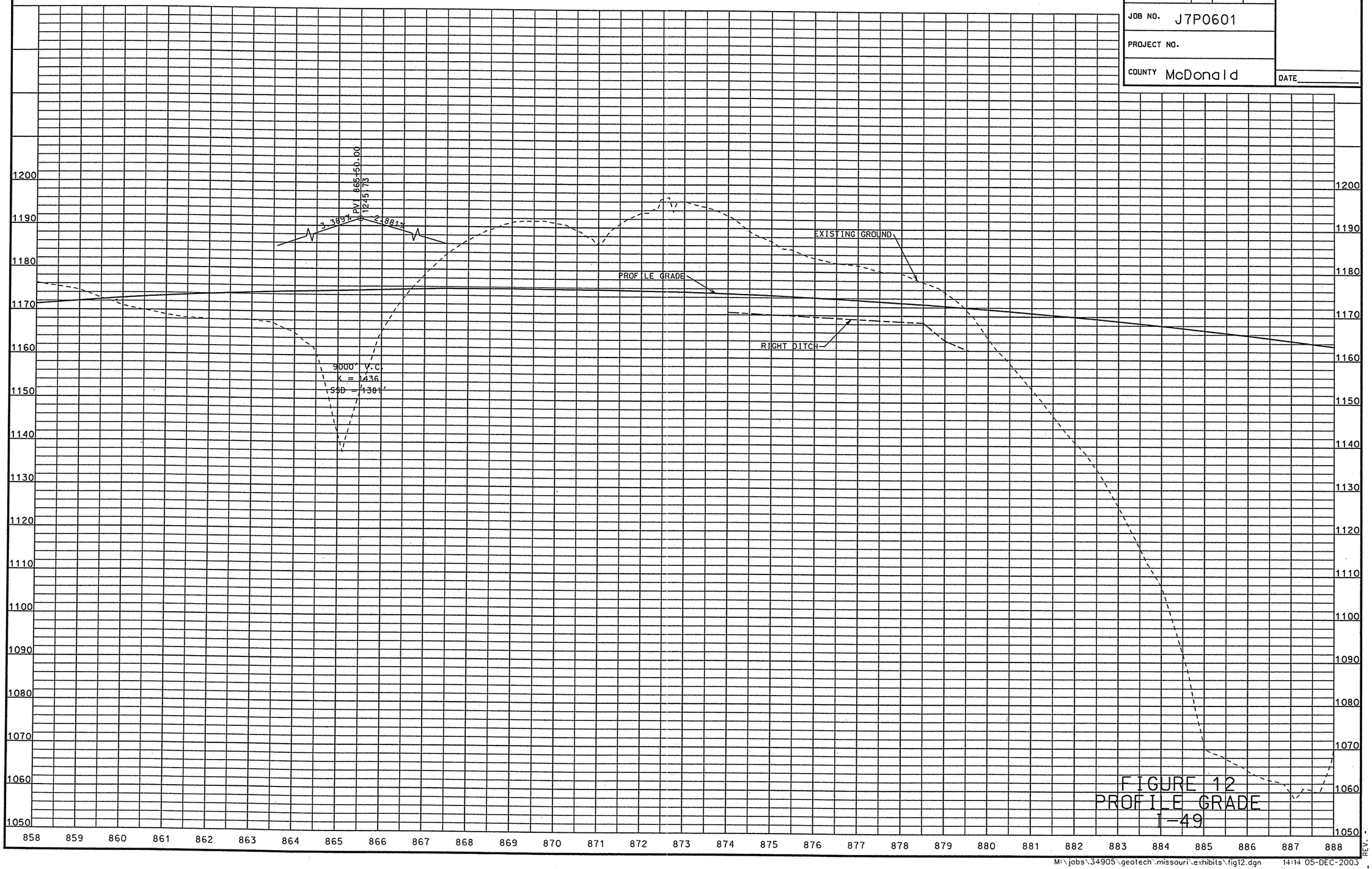


FIGURE 12
PROFILE GRADE
I-49

USER NAME = wow DATE 05-DEC-2003 14:14
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highdf.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig12.dgn

IP PROJ. NO. NONE
SCALE 202.866675:1,000000

REV.

M:\jobs\34905\geotech\missouri\exhibits\fig12.dgn 14:14 05-DEC-2003

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	17

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

RICHARD E. O'BRIEN
20.26 AC. NEW R/W
0.95 AC. TEMP. EAS'T.
13.60 AC. REMAINING RT.
7.32 AC. REMAINING LT.

TENTATIVE R/W

SECTION LINE+69

SECTION LINE

1/4 1/4 SECTION LINE+90

1/4 SECTION LINE+10

MS-168 MS-169 MS-170 MS-173 MS-174 MS-175 MS-181A MS-182 MS-183 MS-84

MC-170A MC-170B MC-171 MC-172 MC-175A MC-175B MC-176 MC-177 MC-178 MC-178A MC-178B MC-179 MC-180 MC-181 MC-184A MC-184B MC-185

1150 FT 1100 FT 1050 FT

LEGEND

AS-DRILLED BORING LOCATION

FIGURE 13

USER NAME CLow , DATE 12-FEB-2004 09:16
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen , IP PROJ. NO. NONE
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig13.dgn , SCALE 202.866666L000000

M:\jobs\34905\geotech\missouri\exhibits\fig13.dgn 09:16 12-FEB-2004

REV.

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	18

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

EXISTING GROUND

PROFILE GRADE

9000' V.C.
K = 1436
SSD = 1381

LEFT DITCH

RIGHT DITCH

LEFT DITCH

RIGHT DITCH

PVT 910+50.00
1116.09

-2.88%

1180 1170 1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060 1050 1040

888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918

FIGURE 14
PROFILE GRADE
I-49

REV.

USER NAME clow ,DATE 05-DEC-2003 14:15
PEN TABLE m:\jobs\34905\Missouri\library\pentable\highalf.pen ,IP PROJ.NO. NONE
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig14.dgn ,SCALE 202.866668:1.000000

M:\jobs\34905\geotech\missouri\exhibits\fig14.dgn 14:15 05-DEC-2003

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	20

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

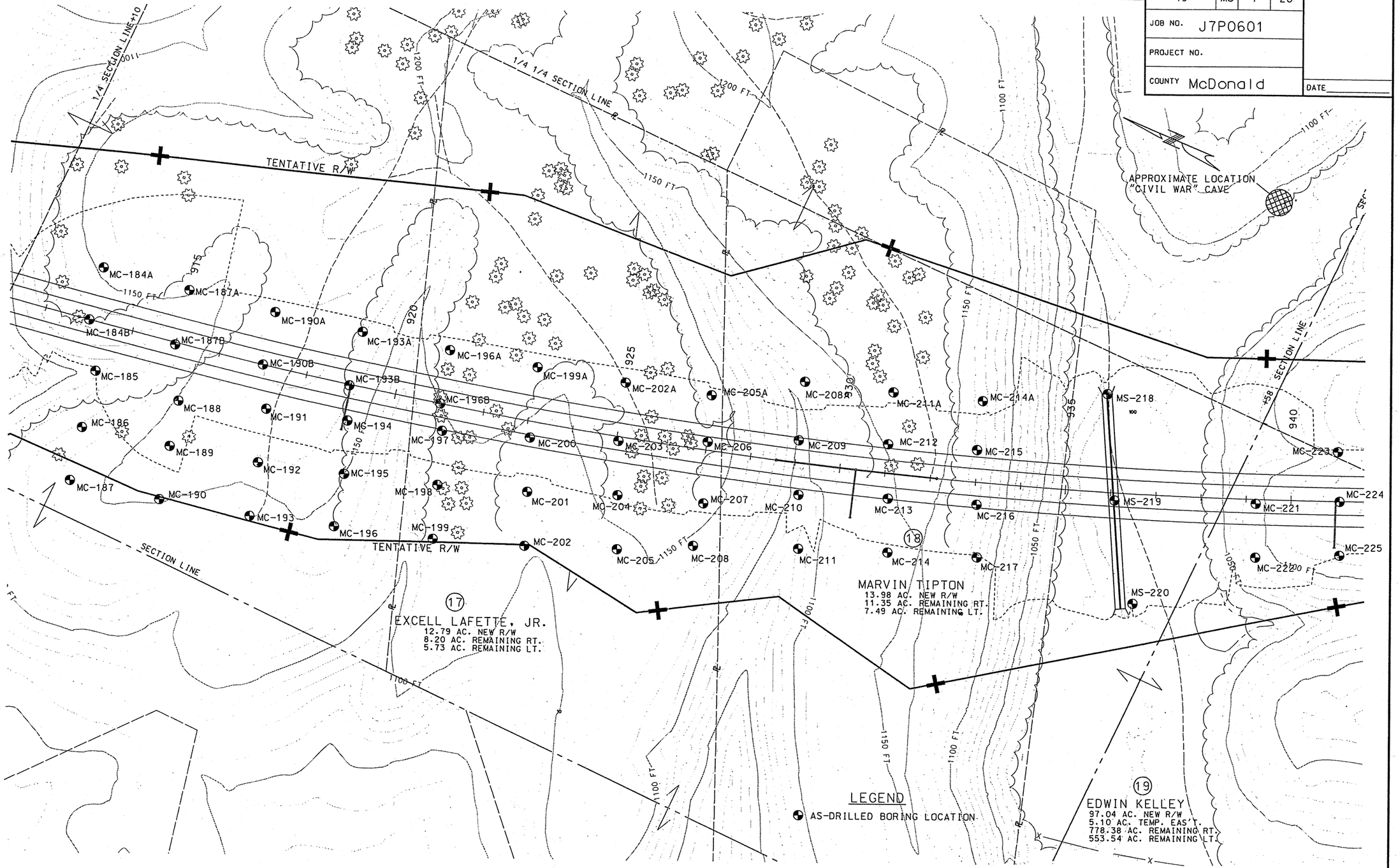


FIGURE 15

USER NAME CLow , DATE 12-FEB-2004 09:18
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen , IP PROJ. NO. NONE
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig15.dgn , SCALE 202.866672:1.000000

M:\jobs\34905\geotech\missouri\exhibits\fig15.dgn 09:16 12-FEB-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	21

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

1180 1170 1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060 1050 1040 1030 1020 1010

EXISTING GROUND

PVC 922+20.00
1082.58

-2.881%

RIGHT DITCH

1200' V.C.
K = 273
SSD = 1058'

PVI 928+20.00
1065.10

LEFT DITCH

PVT 934+20.00
1074.22

PROFILE GRADE

1.520%

918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948

REV.

FIGURE 16
PROFILE GRADE
I-49

M:\jobs\34905\geotech\missouri\exhibits\fig16.dgn 14:16 05-DEC-2003

USER NAME clow , IP PROJ. NO. NONE
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highalf.pen , SCALE 202.86667il.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig16.dgn , DATE 05-DEC-2003 14:16

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	22

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

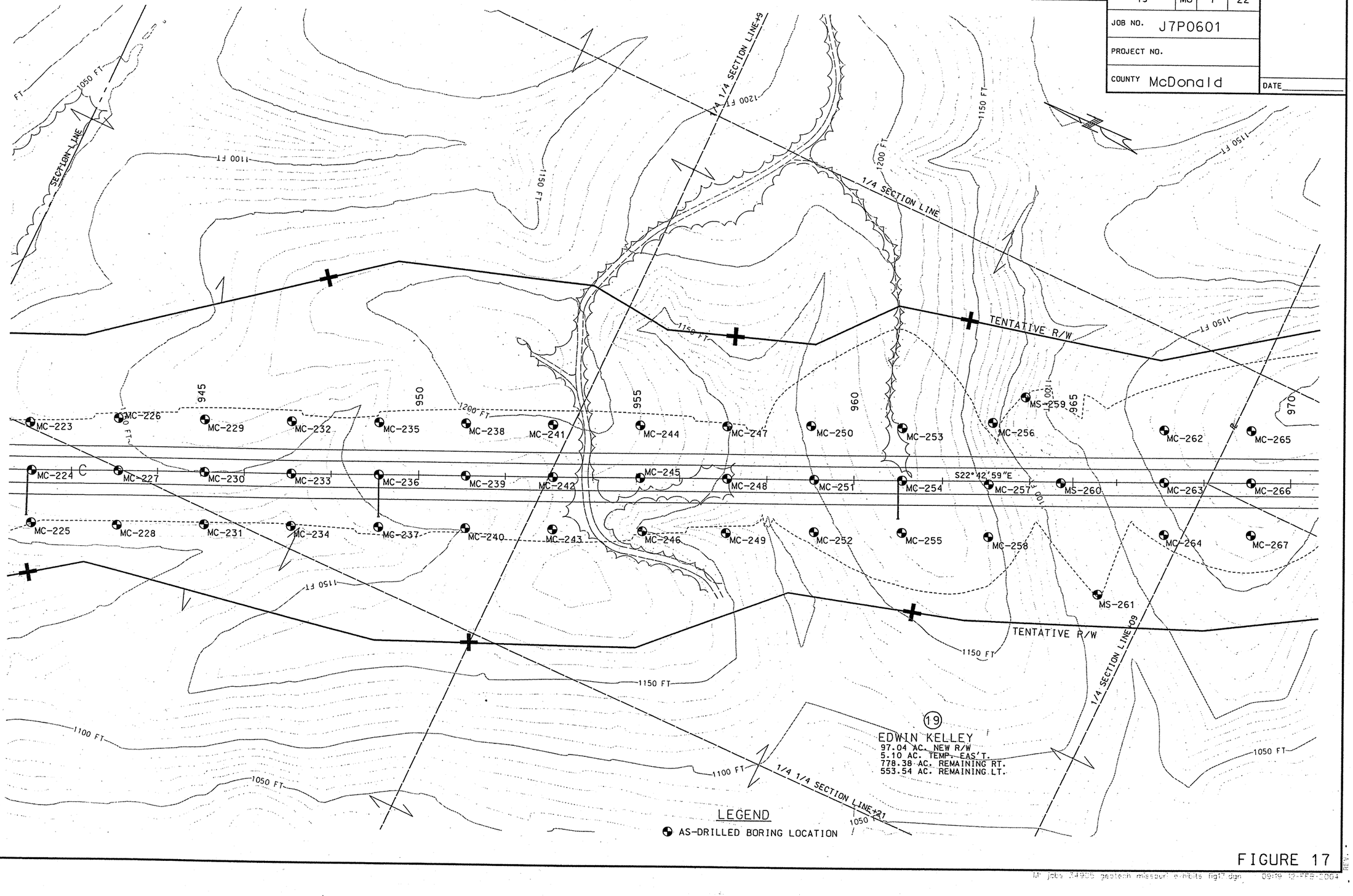


FIGURE 17

USER NAME Clow , IP PROJ. NO. NONE
PEN TABLE m:\jobs\34905\Missouri\library\pentable\GEOTECH.pen , SCALE 202.866663a1.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig17.dgn DATE 12-FEB-2004 09:19

M:\jobs\34905\geotech\missouri\exhibits\fig17.dgn 09:19 12-FEB-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	23

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

1200 1190 1180 1170 1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060

948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978

EXISTING GROUND

PROFILE GRADE

1.520%

RIGHT DITCH

PVI 957+10.00
1118.14

LEFT DITCH

PVI 960+60.00
1128.01

1300' V.C.
K = 58C
SSD = 878'

RIGHT DITCH

0.720%

PVT 976+10.00
1123.33

FIGURE 18
PROFILE GRADE
I-49

REV.

M:\jobs\34905\geotech\missouri\exhibits\fig18.dgn 14:17 05-DEC-2003

USER NAME clow , IP PROJ.NO. NONE
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highalf.pen , SCALE 202.866672±1.000000
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig18.dgn , DATE 05-DEC-2003 14:17

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	24

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

22

BARBARA CHANCE TRUST
55.67 AC. NEW R/W
7.00 AC. REMAINING RT.
54.48 AC. REMAINING LT.

1200 FT
1150 FT
1100 FT
1050 FT
1000 FT
TENTATIVE R/W
MISSOURI
ARKANSAS
989+01.95
395.97
970
975
980
985
415
420
50
55
14 SECTION LINE+68
MC-268
MC-271
MC-274
MC-277
MC-280
MC-283
MC-286
MC-269
MC-272
MC-275
MC-278
MC-281
MC-284
MC-287
MC-270
MC-273
MC-276
MC-279
MC-282
MC-285
MS-288
MS-289
MS-290
END OF PROJECT STA. 987+40.49
MODOT J7P0601
BEGINING OF PROJECT STATION 410+00.64
AHTD 090115
LINE 40

LEGEND
AS-DRILLED BORING LOCATION

FIGURE 19

USER NAME Clow
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\GEOTECH.pen
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig19.dgn
DATE 12-FEB-2004 09:29
IP PROJ. NO. NONE
SCALE 202.866663\1.000000

M:\jobs\34905\geotech\missouri\exhibits\fig19.dgn 09:29 12-FEB-2004

HNTB

ROUTE	STATE	DISTRICT	SHEET NO.
49	MO	7	25

JOB NO. J7P0601

PROJECT NO.

COUNTY McDonald

DATE

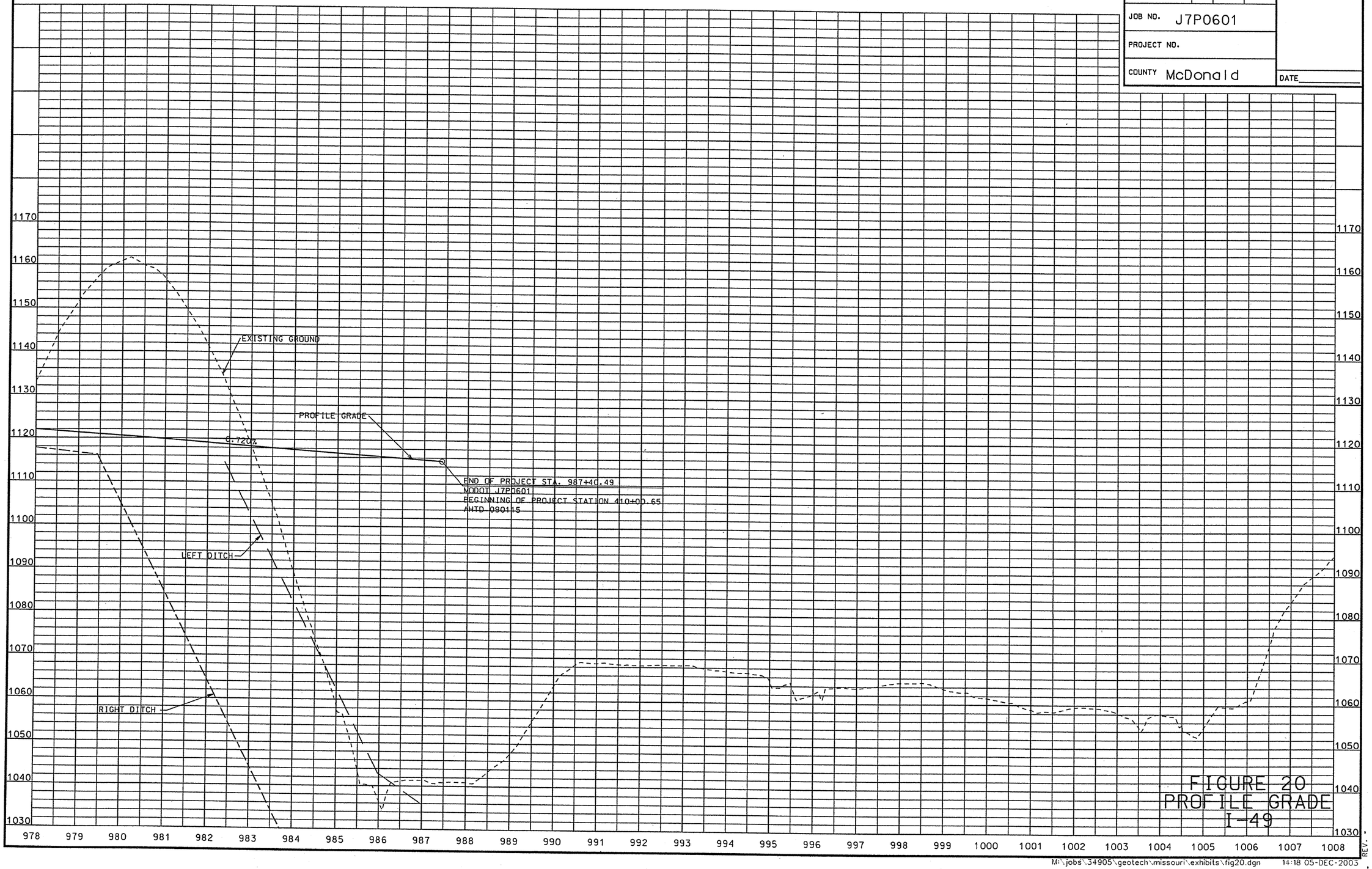


FIGURE 20
PROFILE GRADE
I-49

REV.

M:\jobs\34905\geotech\missouri\exhibits\fig20.dgn 14:18 05-DEC-2003

USER NAME clow , DATE 05-DEC-2003 14:18
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\highalf.pen , IP PROJ. NO. NONE
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig20.dgn , SCALE 202.866663:1.000000

9.0 BORING LOGS

9.1 As-Drilled Boring Coordinates

AS-DRILLED BORING COORDINATES
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Northing	Easting
I-49 NBL OVER US-71 SBL		
MBS-1	145647.8928	2823511.4875
MBS-2	145467.1907	2823581.4382
MBS-3	145284.0427	2823635.6887
MB1-1	145572.9041	2823516.2888
MB1-2	145483.4773	2823596.0160
MB1-3	145385.7638	2823602.7771
MB1-4	145294.0607	2823674.6218
MISSOURI RTE. 90 OVER I-49		
MB3-1	132121.2337	2821227.4738
MB3-2	132157.3745	2821225.7835
MB3-3	132123.5270	2821200.4192
MB3-4	132155.3995	2821203.2722
MB3-5	132138.8169	2821065.4988
MB3-6	132170.5197	2821069.8505
MB3-7	132160.4487	2820931.4426
MB3-8	132191.9111	2820937.2834
MB3-9	132166.5062	2820899.7996
MB3-10	132197.9014	2820905.9918
ROADWAY BORINGS		
MC-1	145965.8950	2823426.1438
MC-2	145898.0872	2823327.1382
MC-3	145798.3235	2823537.5422
MC-4	145729.2687	2823434.3019
MC-5	145678.3784	2823334.2956
MC-10	143924.5029	2823781.7847
MC-11	143809.4859	2823781.4742
MC-13	143609.5062	2823778.4563
MC-16	145660.8487	2822994.3017
MC-17	145481.3052	2823077.9264
MC-18	145427.9097	2822970.4605
MC-19	145302.1953	2823166.9188
MC-20	145248.7998	2823059.4529
MC-21	145123.0854	2823255.9113
MC-22	145069.6899	2823148.4454
MS-23	144846.7426	2823063.8082
MS-24	144781.6274	2823348.5203
MC-25	144343.9793	2823483.9276
MC-26	144309.4449	2823390.0799
MC-27	144143.0985	2823537.9834
MC-28	144124.9865	2823452.5254
MC-29	143986.5833	2823699.1182

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MC-30	143962.0480	2823602.1748
MC-31	143937.5127	2823505.2315
MC-32	143569.8489	2823679.8517
MC-33	143555.5813	2823580.8747
MC-35	142763.5295	2823775.4619
MC-36	142768.2610	2823639.5295
MC-37	142565.1786	2823890.5007
MC-38	142570.7090	2823764.5863
MC-39	142573.1196	2823644.6106
MC-40	142376.6478	2823765.6883
MS-41	142058.7756	2824154.3813
MS-42	142080.8079	2823754.7432
MS-43	142082.6480	2823314.6914
MC-44	141468.5204	2823862.4655
MC-45	141470.9310	2823742.4897
MC-46	141473.3416	2823622.5139
MC-47	141268.5608	2823858.4479
MC-48	141270.9713	2823738.4721
MC-49	141273.3819	2823618.4963
MC-50	141068.6012	2823854.4303
MC-51	141071.0117	2823734.4545
MC-52	141072.4225	2823614.4587
MC-53	140861.6429	2823850.2721
MC-54	140871.0521	2823730.4369
MC-55	140873.4626	2823610.4612
MC-56	140668.6819	2823846.3952
MC-57	140671.0924	2823726.4193
MC-58	140673.5030	2823606.4436
MS-59	140532.1067	2823873.6572
MS-60	140451.1196	2823473.9497
MC-61	140268.7626	2823838.3600
MC-62	140271.1732	2823718.3842
MC-63	140277.5829	2823598.4887
MC-64	140068.8029	2823834.3424
MC-65	140071.2135	2823714.3667
MC-66	140073.6240	2823594.3908
MC-67	139868.8433	2823830.3248
MC-68	139879.2522	2823710.5097
MC-69	139873.6644	2823590.3732
MC-70	139669.0443	2823818.3089
MC-71	139671.2942	2823706.3315

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MS-72	139648.3218	2823455.8195
MS-73	139322.3647	2823699.3208
MS-74	139057.3878	2823887.6677
MC-75	138857.2942	2823786.6502
MC-76	138872.7323	2823667.6475
MC-77	138882.2775	2823548.8840
MC-78	138653.5133	2823754.7696
MC-79	138675.1583	2823636.7378
MC-80	138696.8033	2823518.7061
MC-81	138451.2280	2823727.5779
MC-82	138479.4728	2823595.5304
MC-83	138507.2655	2823478.7932
MC-84	138244.4346	2823656.9238
MC-85	138273.5132	2823587.3090
MC-86	138320.0762	2823429.0154
MC-87	138057.7234	2823591.1778
MC-88	138095.9060	2823482.7016
MC-89	138135.7488	2823369.5091
MC-90	137861.4592	2823526.9647
MC-91	137909.0760	2823411.3895
MC-92	137954.7882	2823300.4373
MC-93	137674.7779	2823438.8050
MC-94	137717.6582	2823348.4652
MC-98	137604.9413	2823134.3806
MS-103	137287.0148	2822796.3632
MC-104	136892.4407	2822936.8163
MC-105	136963.9105	2822855.3481
MC-106	137035.2823	2822758.8801
MC-107	136737.3534	2822832.0264
MC-108	136803.1306	2822736.3950
MC-109	136874.5024	2822639.9271
MC-110	136583.5995	2822717.0277
MC-111	136642.3507	2822617.4420
MC-112	136713.7225	2822520.9741
MC-113	136410.1990	2822594.9569
MC-114	136481.5707	2822498.4890
MC-115	136552.9426	2822402.0211
MC-116	136249.4191	2822476.0039
MC-117	136320.7908	2822379.5360
MC-118	136392.1627	2822283.0680
MS-119	136067.4887	2822425.9904

AS-DRILLED BORING COORDINATES
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MS-120	136139.8808	2822240.7139
MS-121	136224.4826	2821964.9558
MC-122	135849.4415	2822182.4128
MC-123	135917.7062	2822083.7218
MC-124	135604.2227	2822026.6619
MC-125	135664.5339	2821922.9192
MC-126	135733.6522	2821842.8600
MC-127	135446.6051	2821960.3711
MS-129	135459.3857	2821396.8704
MS-130	135031.5443	2821628.7029
MS-131	134611.7497	2821842.7816
MC-132	134452.1104	2821471.5000
MC-133	134474.3322	2821353.5755
MC-134	134255.1777	2821436.6127
MC-135	134275.9370	2821318.4220
MC-136	134037.4338	2821520.2047
MC-137	134058.1932	2821402.0140
MC-138	134078.9524	2821283.8232
MC-139	133840.4492	2821485.6059
MC-140	133861.2086	2821367.4152
MC-141	133881.9678	2821249.2244
MC-142	133643.4647	2821451.0071
MC-143	133664.2240	2821332.8163
MC-144	133684.9832	2821214.6256
MC-145	133446.4801	2821416.4083
MC-146	133467.2394	2821298.2176
MC-147	133249.4956	2821381.8095
MC-148	133052.5110	2821347.2107
MC-149	132640.3774	2821381.4300
MC-150	132679.3011	2821159.8223
MC-151	132700.0604	2821041.6316
MC-152	132416.5788	2821499.4942
MC-153	132433.8782	2821401.0019
MC-154	132482.3165	2821125.2236
MC-155	132503.0758	2821007.0328
MC-157	132104.6103	2821830.5164
MC-158	132178.9977	2821406.9996
MC-159	132285.3319	2821090.6247
MC-160	132337.2302	2820795.1479
MC-161	132146.3003	2820726.0767
MC-163	131989.8551	2821038.7266

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MC-164	132010.6143	2820920.5358
MC-165	131792.8703	2821004.1288
MC-166	131831.1992	2820907.2985
MC-167	131595.8899	2820969.3627
MS-168	130997.2290	2821372.0335
MS-169	130709.4553	2820813.8343
MS-170	130462.3502	2820353.7482
MC-170A	130002.8087	2820833.7677
MC-170B	130004.2797	2820743.7797
MC-171	129904.7125	2820798.7309
MC-172	129920.8074	2820679.8152
MS-173	129552.9678	2820884.2582
MS-174	129466.4499	2820637.4774
MS-175	129364.5877	2820243.6730
MC-175A	129103.3198	2820966.6095
MC-175B	129103.2764	2820854.3931
MC-176	129123.9468	2820747.9346
MC-177	129122.8775	2820627.7851
MC-178	129123.0207	2820508.5692
MC-178A	128910.6097	2820991.4119
MC-178B	128903.7817	2820868.5653
MC-179	128927.9378	2820752.3228
MC-180	128922.8044	2820632.3639
MC-181	128918.7825	2820512.3217
MS-181A	128616.6836	2821144.5184
MS-182	128622.8146	2820940.7284
MS-183	128555.2166	2820659.2452
MS-184	128470.2212	2820332.6687
MC-184A	128224.9678	2821064.3449
MC-184B	128208.1353	2820945.5313
MC-185	128150.3095	2820846.7474
MC-186	128128.8502	2820720.5223
MC-187	128107.4605	2820602.3728
MC-187A	128029.2711	2821093.8138
MC-187B	128010.5679	2820970.2170
MC-188	127953.9102	2820858.8116
MC-189	127932.4849	2820758.9581
MC-190	127907.2087	2820642.5109
MC-190A	127834.1184	2821126.6936
MC-190B	127813.1497	2821008.5398
MC-191	127766.9503	2820921.3102

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MC-192	127737.9055	2820805.3753
MC-193	127708.3697	2820689.0282
MC-193A	127639.5693	2821162.9742
MC-193B	127619.1027	2821042.6662
MC-194	127592.4889	2820969.4151
MC-195	127552.9825	2820857.9511
MC-196	127527.0524	2820742.7945
MC-196A	127445.6831	2821202.6447
MC-196B	127417.4607	2821084.9442
MC-197	127391.5653	2821031.1812
MC-198	127353.6175	2820917.6317
MC-199	127316.4114	2820803.9359
MC-199A	127252.5187	2821245.6928
MC-200	127206.5101	2821096.2294
MC-201	127165.6840	2820983.5639
MC-202	127123.5822	2820871.2165
MC-202A	127060.1350	2821292.1057
MC-203	127024.6620	2821166.9757
MC-204	126979.0335	2821055.7482
MC-205	126933.3152	2820945.6011
MC-205A	126873.6280	2821341.5499
MC-206	126841.1177	2821243.6333
MC-207	126796.0069	2821114.9404
MC-208	126779.8202	2821019.8754
MC-208A	126694.5460	2821452.6249
MC-209	126656.6612	2821328.2518
MC-210	126609.9042	2821216.8511
MC-211	126563.1497	2821106.5087
MC-211A	126505.8587	2821508.7442
MC-212	126472.1142	2821398.8065
MC-213	126425.3774	2821287.6330
MC-214	126378.6997	2821177.5009
MC-214A	126318.1797	2821568.1480
MC-215	126287.2166	2821463.5961
MC-216	126241.4452	2821352.3045
MC-217	126194.5028	2821244.5608
MS-218	126069.2269	2821690.7392
MS-219	125964.2187	2821480.7662
MS-220	125837.0922	2821285.2135
MC-221	125672.9346	2821596.5091
MC-222	125628.0667	2821486.2733

AS-DRILLED BORING COORDINATES
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MC-223	125549.2596	2821773.5472
MC-224	125503.2797	2821673.4941
MC-225	125456.2536	2821563.0741
MC-226	125365.2597	2821861.7402
MC-227	125318.9195	2821751.0488
MC-228	125271.5708	2821635.3592
MC-229	125180.7740	2821938.9740
MC-230	125134.4338	2821828.2826
MC-231	125088.0936	2821717.5912
MC-232	124996.2884	2822016.2077
MC-233	124949.9482	2821905.5162
MC-234	124903.6079	2821794.8249
MC-235	124811.8027	2822093.4413
MC-236	124765.4625	2821982.7500
MC-237	124719.1223	2821872.0586
MC-238	124627.3171	2822170.6751
MC-239	124580.9768	2822059.9837
MC-240	124534.6367	2821949.2923
MC-241	124442.8314	2822247.9087
MC-242	124396.4912	2822137.2174
MC-243	124350.1510	2822026.5260
MC-244	124258.3458	2822325.1425
MC-245	124212.0056	2822214.4511
MC-246	124159.3584	2822104.2318
MC-247	124073.8602	2822402.3762
MC-248	124027.5199	2822291.6848
MC-249	123980.1712	2822175.9951
MC-250	123896.9900	2822479.6740
MC-251	123843.0342	2822368.9185
MC-252	123796.6941	2822258.2271
MC-253	123704.8888	2822556.8436
MC-254	123658.5486	2822446.1522
MC-255	123612.2084	2822335.4608
MC-256	123520.2750	2822649.3083
MC-257	123474.1271	2822515.7704
MC-258	123427.4007	2822404.1566
MS-259	123473.8768	2822732.6942
MS-260	123321.6262	2822583.9502
MS-261	123144.7468	2822381.5554
MC-262	123151.4319	2822788.5447
MC-263	123105.0917	2822677.8533

Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED		
MC-264	123058.7514	2822567.1619
MC-265	122966.9462	2822865.7784
MC-266	122920.6060	2822755.0870
MC-267	122874.2658	2822644.3957
MC-268	122782.4606	2822943.0121
MC-269	122740.5824	2822832.6209
MC-270	122697.3957	2822721.6934
MC-271	122597.9749	2823020.2458
MC-272	122551.6347	2822909.5544
MC-273	122505.2945	2822798.8631
MC-274	122413.4893	2823097.4795
MC-275	122367.1491	2822986.7882
MC-276	122330.6554	2822876.3109
MC-277	122220.8519	2823175.9577
MC-278	122174.8978	2823066.1887
MC-279	122127.5492	2822950.4991
MC-280	122037.6748	2823253.7277
MC-281	122003.3262	2823138.0161
MC-282	121947.2254	2823032.4950
MC-283	121860.0323	2823329.1807
MC-284	121819.0226	2823222.6732
MC-285	121771.7498	2823115.7136
MC-286	121669.6260	2823407.8089
MC-287	121635.5993	2823300.6352
MS-288	121356.7147	2823735.0284
MS-289	121304.5117	2823431.6542
MS-290	121244.0068	2823131.7557

Boring No.	Northing	Easting

9.2 Roadway Boring Logs

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-1	731+00	120 ft. Left	1045.6			See Roadway Core Boring Logs						
(Location Referenced to Northbound Ramp)												
MC-2	731+00	Centerline	1016.7						CSK	10/15/2002		
(Location Referenced to Northbound Ramp)				0.0	5.0	Light grayish brown, cherty silt, dry	AS-1	ML-GM				
				5.0	10.0	Reddish brown, weathered chert, with clay seams	AS-2	GC				
				10.0	12.0	Reddish brown, lean clay, moist	AS-3	CL				
				12.0	15.0	Reddish brown, weathered chert, with clay seams, moist	AS-4	GC				
						Bottom of Boring / Auger refusal at 15.0 feet						
						Boring backfilled with cuttings at completion						
MC-3	732+93	124 ft. Left	1042.7						CSK	10/14/2002		
(Location Referenced to Northbound Ramp)				0.0	5.0	Light grayish brown, silty chert gravel, dry	AS-1	GM			Dry AB	
				5.0	10.0	Light brown, sandy (weathered) chert gravel, with silt, dry to moist	AS-2	GM				
				10.0	16.3	Light brown, sandy (weathered) chert gravel, with silt, trace clay seams, dry to moist	AS-3	GM				
						Bottom of Boring / Auger refusal at 16.3 feet	BULK-4	(5 to 16.3 feet)				
						Boring backfilled with cuttings at completion						
MC-4	733+00	Centerline	1019.9						CSK	10/14/2002		
(Location Referenced to Northbound Ramp)				0.0	5.0	Light brown, silt, scattered chert gravel, dry	AS-1	ML			Dry AB	
				5.0	10.0	Reddish brown, sandy lean clay, abundant chert gravel, moist	AS-2	CL				
						Bottom of Boring at 10.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-5	732+93	112 ft. Right	1028.9						CSK	10/14/2002		
(Location Referenced to Northbound Ramp)				0.0	5.0	Light reddish brown, chert gravel, with silt and sand, dry	AS-1	GP-GM			Dry AB	
				5.0	10.0	Reddish brown, clayey chert gravel, with sand, moist	AS-2	GC				
				10.0	17.0	Reddish brown, clayey chert gravel, abundant sand, moist	AS-3	GC				
				17.0	17.8	Light brown, weathered chert, with clay seams, moist	AS-4	GC				
						Bottom of Boring / Auger refusal at 17.8 feet						
						Boring backfilled with cuttings at completion						
MC-6						Deleted - Access Denied						
MC-7						Deleted - Access Denied						
MC-8						Deleted - Access Denied						
MC-9						Deleted - Access Denied						
MC-10	751+76	40 ft. Right	1084.4						SPB	4/15/2003		
(Location Referenced to Northbound Ramp)				0.0	5.0	Light brown, lean clay, trace sand and gravel, moist	AS-1	CL			Dry AB	
				5.0	10.0	Reddish brown, lean clay, with sand, moist	AS-2	CL				
						with thin chert seams below 6 feet						
					10.0	White chert	AS-3					
						Bottom of Boring / Auger Refusal at 10.0 feet						
						Boring backfilled with cuttings at completion						
MC-11	752+91	38 ft. Right	1089.7			See Roadway Core Boring Logs						
(Location Referenced to Northbound Ramp)												

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-12						Deleted - Access Denied						
MC-13	754+91	37 ft. Right	1091.6						SPB	11/13/2002		
(Location Referenced to Northbound Ramp)				0.0	5.0	White and light reddish brown, chert gravel, with clay, dry	S-1	GC			Dry AB	
				5.0	10.0	White and brown, clayey chert gravel, abundant chert seams, moist	S-2	GC				
				10.0	15.0	White and brown to reddish brown, clayey chert gravel, abundant chert seams, moist	S-3	GC				
				15.0	19.0	White and brown, broken chert with clayey gravel seams, moist	S-4	GP				
				19.0	19.5	White and light brown, chert	BULK-5					
						Bottom of Boring / Auger Refusal at 19.5 feet						
						Boring backfilled with cuttings at completion						
MS-14						Deleted - Access Denied						
MS-15						Deleted - Access Denied						
MC-16	731+02	125 ft. Left	995.4						CSK	10/15/2002		
(Location Referenced to Southbound Ramp)				0.0	3.0	Light brown, silty chert gravel, dry	AS-1	GM			Dry AB	
				3.0	4.0	Chert, hard						
						Bottom of Boring / Auger refusal at 4.0 feet on limestone						
						Boring backfilled with cuttings at completion						
MC-17	733+00	120 ft. Left	1018.7						CSK	10/15/2002		
(Location Referenced to Southbound Ramp)				0.0	3.0	Light grayish brown, chert gravel, trace silt, dry	AS-1	GP			Dry AB	
				3.0	8.0	Light brown, weathered chert, with clay seams and silt, dry	AS-2	GC				
						Bottom of Boring / Auger refusal at 8.0 feet	BULK-3	(3 to 8 feet)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-18	733+00	Centerline	1001.7			See Roadway Core Boring Logs for Outcrop Log						
(Location Referenced to Southbound Ramp)												
MC-19	735+00	120 ft. Left	1024.3						CSK	10/15/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Light grayish brown, chert gravel, with silt, dry	AS-1	GM			Dry AB	
				5.0	10.0	Light reddish brown and gray, weathered chert, trace clay and silt seams, dry	AS-2	GC				
				10.0	15.5	Light reddish brown and gray, weathered chert, with clay seams, dry	AS-3	GC				
						Bottom of Boring / Auger refusal at 15.5 feet	BULK-4	(5 to 15.5 feet)				
						Boring backfilled with cuttings at completion						
MC-20	735+00	Centerline				Rock Outcrop - See MC-18						
MC-21	737+00	120 ft. Left	1052.5			See Roadway Core Boring Logs						
MC-22	737+00	Centerline	1028.1						CSK	10/15/2002		
(Location Referenced to Southbound Ramp)				0.0	3.5	Light grayish brown, silty chert gravel, dry	AS-1	GM			Dry AB	
						Bottom of Boring / Auger refusal at 3.5 feet on chert						
						Boring backfilled with cuttings at completion						
MS-23	738+62	175 ft. Right	943.6			See Roadway Structure Boring Logs						
MS-24	740+47	51 ft. Left	963.2			See Roadway Structure Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-25	745+00	Centerline	1061.7						CSK	10/17/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Light reddish brown, silt, with chert gravel and sand, dry	AS-1	ML			Dry AB	Dry 24 hr AB
				4.0	10.0	Reddish brown and white, chert, with clay seams, moist	AS-2	SC				(hard chert layer from 3 to 4 feet)
				10.0	15.0	Reddish brown and white, chert, with clay seams, moist	AS-3	SC				
				15.0	19.5	Reddish brown and white, chert, scattered clay seams, moist	AS-4	SC				
						Bottom of Boring / Auger refusal at 19.5 feet						
						Boring backfilled with cuttings at completion						
MC-26	745+00	100 ft. Right	1066.4						CSK	10/17/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Light brown, silt, abundant chert gravel, dry	AS-1	ML			Dry AB	Dry 24hr AB
				5.0	7.5	Light reddish brown and white, weathered chert with clay seams, moist	AS-2	GC				
						Bottom of Boring / Auger refusal at 7.5 feet						
						Boring backfilled with cuttings at completion						
MC-27	747+08	13 ft. Right	1076.0						SPB	11/13/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	White and light brown, chert gravel, with clay and sand, dry	S-1	GP			Dry AB	
				5.0	7.5	Light brown and white, chert gravel, with clay and sand, trace chert seams, dry	S-2	GP				
						Bottom of Boring / Auger Refusal at 7.5 feet						
						Boring backfilled with cuttings at completion						
MC-28	747+00	100 ft. Right	1080.5			See Roadway Core Boring Logs						

52

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-29	749+00	100 ft. Left	1075.4						SPB	11/13/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	White and light brown, chert gravel and cobbles, with sand and clay, trace chert seams, dry	S-1	GP			Dry AB	
				5.0	6.4	White and reddish brown, chert gravel, with lean clay, dry	S-2	GP				
						Bottom of Boring / Auger Refusal at 6.4 feet						
						Boring backfilled with cuttings at completion						
MC-30	749+00	Centerline	1078.4						SPB	11/13/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Reddish brown and white, clayey chert gravel, with chert seams, dry	S-1	GC			Dry AB	
						Bottom of Boring / Auger Refusal at 5.0 feet	BULK-2	(0 to 5.0 feet)				
						Boring backfilled with cuttings at completion						
MC-31	749+00	100 ft. Right	1066.7						SPB	11/13/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Brown and white, chert gravel and cobbles, with sand and clay, trace chert seams below 1 ft, dry	S-1	GP				
				5.0	10.0	White and brown, chert gravel, with clay, abundant chert seams, dry to moist	S-2	GP				Chert layer from 5 to 5.5 feet
				10.0	13.5	White to light gray, broken chert/chert layers (6-12" thick) with clay seams, moist	S-3					Difficult drilling
						Bottom of Boring / Auger Refusal at 13.5 feet						
						Boring backfilled with cuttings at completion						
MC-32	753+00	Centerline	1087.5						SPB	11/13/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Brown and white, clayey chert gravel, with cobbles in top 2 feet, dry	S-1	GP			Dry AB	
				5.0	7.3	White and brown, chert gravel, with clay, with chert seams, dry	S-2	GP				
						Bottom of Boring / Auger Refusal at 7.3 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-33	753+00	100 ft. Right	1077.4						SPB	11/13/2002		
(Location Referenced to Southbound Ramp)				0.0	5.0	Brown and white chert gravel and cobbles with sand and clay	S-1	GP			Dry AB	
				5.0	5.5	White chert	BULK-2	(0 to 5.5 feet)				Difficult drilling
						Bottom of Boring / Auger Refusal at 5.5 feet						
						Boring backfilled with cuttings at completion						
MS-34						Deleted - Access Denied						
MC-35	761+07	7 ft. Left	1096.9						SPB	11/11/2002		
				0.0	1.0	Dark brown, silty lean clay, with chert gravel, dry	S-1	CL/ML			Dry AB	
				1.0	5.0	White and light reddish brown, clayey chert gravel, with chert seams, dry	S-2	GC				
				5.0	10.0	White and reddish brown, chert gravel, few clay, abundant chert seams, dry	S-3	SP				Chert layer from 10-10.5ft
				10.0	15.0	White and reddish brown, chert seams/broken chert, scattered fat clay seams, moist	S-4					Hard drilling to 12.5 ft
				15.0	16.0	White and reddish brown, chert seams/broken chert, scattered fat clay seams, moist	S-5					Hard drilling from 13.5 to 16 feet
						Bottom of Boring / Auger Refusal at 16.0 feet						
						Boring backfilled with cuttings at completion						
MC-36	761+05	129 ft. Right	1107.7						SPB	11/11/2002	Dry AB	
				0.0	5.0	Reddish brown and white, clayey chert gravel, with chert seams, dry	S-1	GC				
				5.0	9.0	Reddish brown and white, clayey chert gravel, abundant chert seams, dry	S-2	GC				
				9.0	9.0	Sample from auger head	S-3	GC				
						Bottom of Boring / Auger Refusal at 9.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-37	763+03	126 ft. Left	1097.8						SPB	11/11/2002		
				0.0	5.0	Light reddish brown, lean clay, with chert gravel, dry	S-1	CL			Dry AB	
				5.0	5.5	Light reddish brown, lean clay, with chert gravel, dry	S-2	CL				Hard drilling at 5.5 ft
						Bottom of Boring / Auger Refusal at 5.5 feet						
						Boring backfilled with cuttings at completion						
MC-38	763+00	Centerline	1112.8						SPB	11/11/2002		
				0.0	5.0	Reddish brown and white, clayey chert gravel, dry	S-1	GC			Dry AB	
				5.0	10.0	White and reddish brown, clayey chert gravel, with chert seams, dry	S-2	GC				
				10.0	15.0	White and light reddish brown, clayey chert gravel, with chert seams, dry	S-3	GC				
				15.0	20.0	White to light reddish brown, chert gravel, scattered clay, dry	S-4	GP				
				20.0	25.0	White and reddish brown, broken chert, with clay seams, dry	S-5	GP				
				25.0	30.0	White and reddish brown, chert, with clay seams, dry	S-6	GP				
				30.0	35.8	White and reddish brown, broken chert, with clay seams, moist	S-7	GP				Clay from 31 to 31.5 feet
						Bottom of Boring / Auger Refusal at 35.8 feet						Soft clay layer from 35 to 35.8 feet
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-39	763+00	120 ft. Right	1114.9						SPB	11/14/2002		
				0.0	2.0	Dark brown, gravel and cobbles, with sand and silt, dry	S-1	GP				
				2.0	5.0	Light reddish brown and white, chert gravel, with sand, dry	S-2	GP				
				5.0	10.0	White and reddish brown, chert gravel, with clay, dry	S-3	GP				
				10.0	15.0	White and reddish brown, chert gravel, with clay, trace chert seams, dry	S-4	GP				
				15.0	20.0	White and light reddish brown, chert gravel, with clay, scattered chert seams, dry	S-5	GP				
				20.0	25.0	White and light reddish brown, chert gravel, with clay, scattered chert seams, dry	S-6	GP				Softer clay layer from 24 to 26 ft
				25.0	30.0	White and light reddish brown, chert gravel, with clay, trace chert seams, dry	S-7	GP				
				30.0	35.0	White and light reddish brown, chert gravel, with clay, trace chert seams, dry	S-8	GP				Chert layer from 32.5 to 33 ft
				35.0	39.5	White and brown, clayey gravel, moist	S-9	GC				
						Bottom of Boring at 39.5 feet	BULK-10	(2 to 35 feet)				
						Boring backfilled with cuttings at completion						
MC-40	764+94	5 ft. Left	1076.7						SPB	11/11/2002		
				0.0	5.0	Light brown and white, chert gravel, with clay and scattered chert seams, dry	S-1	GP			Dry AB	Hard drilling below 4 feet
				5.0	9.0	Light brown and white, chert gravel, with clay and scattered chert seams, dry	S-2	GP				
						Bottom of Boring / Auger Refusal at 9.0 feet						
						Boring backfilled with cuttings after completion						
MS-41	768+04	400 ft. Left	995.1			See Roadway Structure Boring Logs						
MS-42	767+90	Centerline	977.6			See Roadway Structure Boring Logs						
MS-43	767+97	440 ft. Right	966.0			See Roadway Structure Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-44	774+00	120 ft. Left	1081.2						CSK	10/21/2002		
				0.0	5.0	Light reddish brown, silt, few chert gravel, dry	AS-1	ML			Dry AB	
				5.0	10.5	Reddish brown, silt with sand, scattered chert gravel, dry to moist	AS-2	ML				White chert at 10.0 feet
						Bottom of Boring / Auger refusal at 10.5 feet	BULK-3	(0 to 10.5 feet)				
						Boring backfilled with cuttings at completion						
MC-45	774+00	Centerline	1096.0						CSK	10/21/2002		
				0.0	5.0	Light brown, silt, trace chert gravel, dry	AS-1	ML			Dry AB	Dry 72 hrs AB
				5.0	10.0	Light brown, silt, scattered chert gravel, dry	AS-2	ML				Hard seams at 7.0 and 9.0 feet
				10.0	15.0	Light brown, silt, scattered chert gravel, dry	AS-3	ML				
				15.0	20.0	Light brown, silt, scattered chert gravel, dry	AS-4	ML				Hard drilling at 20.0 feet
						Bottom of Boring / Auger refusal at 20.0 feet on possible limestone						
						Boring backfilled with cuttings at completion						
MC-46	774+00	120 ft. Right	1097.1						CSK	10/17/2002		
				0.0	4.5	Light brown, silt, abundant chert gravel, dry	AS-1	ML			Dry AB	Dry 24hr AB
				4.5	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	15.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				Hard chert layer from 10.0 to 13.0 feet
				15.0	20.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-4	CL				Hard chert layer from 16.0 to 17.0 feet
						Bottom of Boring / Auger refusal at 20.0 feet						
						Boring backfilled with cuttings at completion						
MC-47	776+00	120 ft. Left	1102.1						CSK	10/21/2002		
				0.0	4.5	Light brown, silt, with chert gravel, dry	AS-1	ML			Dry AB	Dry 72 hr AB
						Bottom of Boring / Auger refusal at 4.5 on possible limestone						Hard drilling at 4.5 feet
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-48	776+00	Centerline	1112.1						CSK	10/22/2002		
				0.0	5.5	Light reddish brown, silt, abundant chert gravel and sand, dry	AS-1	ML			Dry AB	Dry 24 hr AB
				5.5	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	16.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				
				16.0	20.0	Light brown, sandy chert gravel, moist	AS-4	GW				
				20.0	25.0	Brown, cherty lean clay, with sand, moist	AS-5	CL				
				25.0	30.0	Brown, cherty lean clay, with sand, moist	AS-6	CL				
				30.0	35.0	Brown lean clay, with sand, abundant chert gravel, moist	AS-7	CL				
				35.0	40.0	Brown, cherty lean clay, with sand, moist	AS-8	CL				Hard chert seam at 38.0 feet
				40.0	45.0	Brown, cherty lean clay, with sand, moist	AS-9	CL				
						Bottom of Boring at 45.0 feet						
						Boring backfilled with cuttings at completion						
MC-49	776+00	120 ft. Right	1107.2						CSK	10/17/2002		
				0.0	4.0	Light reddish brown, silty lean clay, with chert gravel, dry	AS-1	CL			Dry AB	Dry 24 hr AB
				4.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	15.0	Light reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				
				15.0	20.0	Light reddish brown, sandy lean clay, with chert gravel, wet	AS-4	CL				
						Bottom of Boring / Auger refusal at 20.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-50	778+00	120 ft. Left	1110.1						CSK	10/18/2002		
				0.0	5.0	Light brown silt, with chert gravel, dry	AS-1	ML			Dry AB	Dry 72 hr AB
				5.0	6.0	Reddish brown, lean clay with chert, with chert gravel, moist	AS-2	CL				Hard drilling at 6.0 feet
						Bottom of Boring / Auger refusal at 6.0 feet on possible limestone						
						Boring backfilled with cuttings at completion						
MC-51	778+00	Centerline	1100.0						CSK	10/18/2002		
				0.0	5.0	Light brown silt, trace chert gravel, dry	AS-1	ML			Dry AB	Dry 72 hr AB
				5.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	12.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				Hard chert at 12.0 feet
						Bottom of Boring / Auger refusal at 12.0 feet						
						Boring backfilled with cuttings at completion						
MC-52	778+01	120 ft. Right	1087.5						CSK	10/17/2002		
				0.0	1.0	Light brown, silty chert gravel, dry		GM			Dry AB	
				1.0	6.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-1	CL				Hard chert layer from 4.0 to 6.0 feet
				6.0	8.0	Light brown, clayey chert gravel, with sand, moist	AS-2	GC				
				8.0	11.0	Weathered chert						
						Bottom of Boring / Auger refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-53	780+07	120 ft. Left	1098.0						CSK	10/21/2002		
				0.0	5.0	Light brown silt, with chert gravel, dry	AS-1	ML			Dry AB	
				5.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				Hard chert seam at 5.0 feet
				10.0	15.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				Hard chert seam at 12.0 feet
				15.0	19.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-4	CL				Hard chert seam at 15.0 feet
						Bottom of Boring / Auger refusal at 19.0 feet on possible limestone						
						Boring backfilled with cuttings at completion						
MC-54	780+00	Centerline	1089.3						CSK	10/21/2002		
				0.0	5.0	Light brown silt, trace chert gravel, dry	AS-1	ML			Dry AB	
				5.0	10.0	Light reddish brown, silt, trace chert gravel, dry to moist	AS-2	ML				Hard chert seams at 7.0 and 9.0 feet
				10.0	15.0	Light reddish brown, sandy silt, with chert gravel, trace clay seams, moist	AS-3	SM				
				15.0	19.0	Light brown, sandy silt, with chert gravel, trace clay seams, moist	AS-4	SM				
						Bottom of Boring / Auger refusal at 19.0 feet	BULK-5	(5 to 19 feet)				
						Boring backfilled with cuttings at completion						
MC-55	780+00	120 ft. Right	1082.1						CSK	10/17/2002		
				0.0	1.0	Light brown, cherty silt, dry		ML			Dry AB	
				1.0	5.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-1	CL				
				5.0	7.0	Reddish brown, cherty lean clay, with sand, moist	AS-2	CL				
				7.0	10.0	Light reddish brown, clayey chert gravel, with sand, wet	AS-3	GC				
				10.0	15.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-4	CL				
				15.0	20.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-5	CL				Hard chert at 20.0 feet
						Bottom of Boring / Auger refusal at 20.0 feet						
						Boring backfilled with cuttings at completion						

09

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-56	782+00	120 ft. Left	1087.9						CSK	10/22/02	Dry AB	Dry 24 Hr AB
				0.0	6.0	Light brown silt, scattered chert gravel, dry	AS-1	ML				
				6.0	11.0	Light reddish brown, clayey sand, with chert gravel, moist	AS-2	SC				Hard chert seam at 9.0 feet
						Bottom of Boring / Auger refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						
MC-57	782+00	Centerline	1084.6						CSK	10/22/02		
				0.0	5.5	Light brown to light reddish brown silt with chert gravel and sand, dry	AS-1	ML			Dry AB	Dry 24 Hr AB, hard chert seam at 4.5 feet
				5.5	6.6	Shelby Tube - 13" recovery	ST-2					
				6.6	6.8	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				Hard drilling at 6.6 feet
						Bottom of Boring / Auger refusal at 6.8 feet	BULK-4	(0 to 6.8 feet)				
						Boring backfilled with cuttings at completion						
MC-58	782+00	120 ft. Right	1085.3						CSK	10/17/2002		
				0.0	1.5	Light brownish gray, cherty silt, dry		ML			Dry AB	
				1.5	4.0	Reddish brown and white, chert gravel, with clay seams, moist	AS-1	GC				
						Bottom of Boring / Auger refusal at 4.0 feet						
						Boring backfilled with cuttings at completion						
MS-59	783+36	150 ft. Left	1034.3			See Roadway Structure Boring Logs						
MS-60	784+25	248 ft. Right	1010.4			See Roadway Structure Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-61	786+00	120 ft. Left	1101.4						CSK	10/22/2002		
				0.0	5.0	Light brown, silt, with chert gravel, dry	AS-1	ML			Dry AB	Dry 24 Hr AB
				5.0	10.0	Reddish brown, clayey chert gravel, with sand, moist	AS-2	GC				
				10.0	15.0	Reddish brown, clayey chert gravel, abundant sand	AS-3	GC				Hard chert seam at 10.0 feet
				15.0	19.5	Reddish brown clayey chert gravel with sand	AS-4	GC				Hard chert seam at 15.0 feet
						Bottom of Boring / Auger refusal at 19.5 feet						Hard drilling at 19.0 feet
						Boring backfilled with cuttings at completion						
MC-62	786+00	Centerline	1086.6						CSK	10/22/2002		
				0.0	5.0	Light brown, silt, with chert gravel, dry	AS-1	ML			Dry AB	Dry 24 Hr AB
				5.0	7.0	Light brown, silty chert gravel, dry	AS-2	GM				Hard drilling at 6.5 feet
						Bottom of Boring / Auger refusal at 7.0 feet						
						Boring backfilled with cuttings at completion						
MC-63	785+96	120 ft. Right	1064.0						CSK	10/17/2002		
				0.0	5.0	Light reddish brown, silty chert gravel, dry	AS-1	GM			Dry AB	Dry cave-in to 3.0 feet
				5.0	10.0	Gray, chert gravel, trace silt seams, dry	AS-2	GP				
				10.0	15.5	Gray, chert gravel, trace silt seams, dry	AS-3	GP				Hard drilling
						Bottom of Boring / Auger refusal at 15.5 feet						
						Boring backfilled with cuttings at completion						
MC-64	788+00	120 ft. Left	1117.4			See Roadway Core Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-65	788+00	Centerline	1106.4						CSK	10/22/2002		
				0.0	5.0	Light brown, silty chert gravel, dry	AS-1	GM			Dry AB	Dry 24 Hr AB
				5.0	10.0	Light brown, silty chert gravel, dry	AS-2	GM				Hard chert seam at 5.0 feet
				10.0	15.0	Light reddish brown, silty chert gravel, with hard chert seams, dry	AS-3	GM				
				15.0	20.0	Light reddish brown, silty chert gravel, with sand and hard chert seams	AS-4	GM				
				20.0	25.0	Reddish brown, silty chert gravel, with hard chert seams and sand	AS-5	GM				
				25.0	30.0	Reddish brown, silty chert gravel, with hard chert seams and sand	AS-6	GM				
				30.0	35.0	Reddish brown, silty chert gravel, with hard chert seams and sand	AS-7	GM				
				35.0	37.0	Reddish brown, silty chert gravel, with hard chert seams and sand		GM				Hard chert at 37.0 feet
						Bottom of Boring / Auger refusal at 37.0 feet	BULK-8	(0 to 25 feet)				
						Boring backfilled with cuttings at completion						
MC-66	788+00	120 ft. Right	1099.7						CSK	10/17/2002		
				0.0	2.5	Light brown, silt, with chert gravel, dry	AS-1	ML			Dry AB	Dry 24 hr AB
				2.5	10.0	Light brown, silty chert gravel, with clay and hard chert seam, moist	AS-2	GM				
				10.0	15.0	Light brown, silty chert gravel, with clay and hard chert seam, moist	AS-3	GM				
				15.0	20.0	Light brown, silty chert gravel, with clay and hard chert seam, moist	AS-4	GM				More silt
				20.0	25.0	Reddish brown, clayey chert gravel, with sand, moist	AS-5	GC				
				25.0	30.0	Reddish brown, sandy lean clay, trace chert gravel, moist	AS-6	CL				
				30.0	33.0	Reddish brown, sandy lean clay, trace chert gravel, moist						Hard drilling at 33 feet
						Bottom of Boring / Auger refusal at 33.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-67	790+00	120 ft. Left	1098.1						CSK	10/22/2002		
				0.0	4.0	Light brown, silt, with chert gravel, dry	AS-1	ML			Dry AB	
				4.0	10.0	Reddish brown, cherty lean clay with sand, moist	AS-2	CL				Hard chert seam at 4.0 feet
				10.0	10.5	Hard chert at 10.0'						
						Bottom of Boring / Auger refusal at 10.5 feet						
						Boring backfilled with cuttings at completion						
MC-68	789+92	Centerline	1073.2						CSK	10/22/2002		
				0.0	3.5	Light brown, silty chert gravel, dry	AS-1	GM			Dry AB	Fill for drilling pad
				3.5	10.0	Light reddish brown, silt, abundant chert gravel, dry	AS-2	ML				
				10.0	12.5	Light reddish brown, silt, abundant chert gravel, dry	AS-3	ML				Hard drilling at 12.0 feet
						Bottom of Boring / Auger refusal at 12.5 feet						
						Boring backfilled with cuttings at completion						
MC-69	790+00	120 ft. Right	1082.3						CSK	10/17/2002		
				0.0	5.0	Light reddish brown, silt, with sand, trace chert gravel and clay seams, dry to moist	AS-1	ML			Dry AB	Dry 24 hr AB
				5.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	12.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				
				12.0	13.5	White, chert, hard						
						Bottom of Boring / Auger refusal at 13.5 feet						
						Boring backfilled with cuttings at completion						
MC-70	792+00	112 ft. Left	1057.4						CSK	10/22/2002		
				0.0	3.5	Light brown and gray, chert gravel/broken chert, with silt, dry	AS-1	GM			Dry AB	
						Bottom of Boring / Auger refusal at 3.5 feet	BULK-2	(0 to 3.5 feet)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-71	792+00	Centerline	1058.3						CSK	10/22/2002		
				0.0	5.0	Light brown and gray, chert gravel, trace silt, dry	AS-1	GP			Dry AB	
				5.0	7.5	Light brown and gray, chert gravel/broken chert, trace silt, dry	AS-2	GP				
						Bottom of Boring / Auger refusal at 7.5 feet						
						Boring backfilled with cuttings at completion						
MS-72	792+28	250 ft. Right	979.8			See Roadway Structure Boring Logs						
MS-73	795+49	Centerline	990.4			See Roadway Structure Boring Logs						
MS-74	797+99	200 ft. Left	994.0			See Roadway Structure Boring Logs						
MC-75	800+00	120 ft. Left	1050.5						DCP	10/15/2002	Dry AB	
				0.0	7.0	Light brown, chert gravel, with silt and clay	AS-1	GC				
				7.0	10.0	Reddish brown, cherty fat clay, with sand	AS-2	CH				
				10.0	14.3	Reddish brown, cherty fat clay, with sand	AS-3	CH				Hard drilling at 13.7 feet
						Bottom of Boring / Auger Refusal at 14.3 feet						
						Boring backfilled with cuttings at completion						
MC-76	800+00	Centerline	1061.6						DCP	10/15/2002	Dry AB	
				0.0	5.0	Light brown, silt, with chert gravel, trace sand and clay	AS-1	ML				
				5.0	10.0	Light brown, gravel, trace sand	AS-2	GP				
				10.0	15.0	Light brown, gravel, trace sand	AS-3	GP				
				15.0	32.0	Light brown, gravel, trace sand		GP				No cuttings returned from below 20 feet
						Bottom of Boring / Auger Refusal at 32.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-77	800+06	119 ft. Right	1068.5						DCP	10/15/2002	Dry AB	
				0.0	4.5	Light brown, chert gravel/weathered chert, with sand, dry	AS-1	GP				
				4.5	10.0	Reddish brown to light brown, weathered chert with chert gravel, trace clay	AS-2	GP				
				10.0	15.0	Reddish brown to light brown, weathered chert with chert gravel, trace clay	AS-3	GP				
				15.0	42.5	Reddish brown to light brown, weathered chert with chert gravel, trace clay						No cuttings returned from below 15 feet
						Bottom of Boring / Auger Refusal at 42.5 feet						3 augers lost in hole
						Boring backfilled with cuttings at completion						
MC-78	802+00	120 ft. Left	1082.2						DCP	10/15/2002	Dry AB	
				0.0	5.0	Light brown, gravel, with silt, dry	AS-1	GM				
				5.0	10.0	Reddish brown, gravelly sand, dry	AS-2	SP				
				10.0	14.5	Reddish brown, chert gravel	AS-3	GP				
						Bottom of Boring / Auger Refusal at 14.5 feet						
						Boring backfilled with cuttings at completion						
MC-79	802+00	Centerline	1092.9						DCP	10/15/2002	Dry AB	
				0.0	5.0	Light brown to reddish brown, silt, with chert gravel	AS-1	ML				
				5.0	12.5	Reddish brown, gravelly fat clay, with sand, dry	AS-2	CH				
				12.5	15.0	Reddish brown, gravelly fat clay, with sand, moist	AS-3	CH				
				15.0	20.0	Reddish brown, fat clay, with chert gravel, moist to wet	AS-4	CH				Wet at 18.0 feet
				20.0	23.5	Reddish brown, fat clay, with chert gravel, wet	AS-5	CH				
						Bottom of Boring / Auger Refusal at 23.5 feet	BULK-6	(0 to 23.5)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-80	802+00	120 ft. Right	1096.3						DCP	10/15/2002	22 ft AB	
				0.0	5.0	Light brown, chert gravel, with silt, dry	AS-1	GM				
				5.0	10.0	Reddish brown, gravelly fat clay, with sand, dry	AS-2	CH				
				10.0	15.0	Reddish brown, gravelly fat clay, with sand, dry to moist	AS-3	CH				Moist at 11.0 feet
				15.0	20.0	Reddish brown to light brown, gravelly fat clay, with sand, moist	AS-4	CH				
				20.0	25.0	Reddish brown to light brown, gravelly fat clay, with sand, moist to wet	AS-5	CH				Wet at 22.0 feet
				25.0	26.5	Reddish brown to light brown, gravelly fat clay, with sand, wet	AS-5	CH				
						Bottom of Boring / Auger Refusal at 26.5 feet						
						Boring backfilled with cuttings at completion						
MC-81	803+97	135 ft. Left	1098.0						DCP	10/16/2002		No AB reading
				0.0	5.0	Light brown to reddish brown, gravel, with silt, trace clay	AS-1	GM				
				5.0	9.0	Reddish brown, gravelly fat clay, trace sand, moist	AS-2	CH				
						Bottom of Boring / Auger refusal at 9.0 feet						
						Boring backfilled with cuttings at completion						
MC-82	804+00	Centerline	1107.6			See Roadway Core Boring Logs						
MC-83	804+00	120 ft. Right	1098.8						DCP	10/16/2002	Dry AB	
				0.0	7.0	Light brown to reddish brown, chert gravel with sand, trace clay, dry	AS-1	GP				
				7.0	10.0	Reddish brown, fat clay, with chert gravel and sand, dry	AS-2	CH				
				10.0	13.0	Reddish brown, gravelly fat clay, moist	AS-3	CH				
				13.0	13.5	Reddish brown, gravelly fat clay, moist	AS-4	CH				
						Bottom of Boring / Auger refusal at 13.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-84	806+08	120 ft. Left	1106.1						DCP	10/16/2002	24 ft AB	
				0.0	6.0	Light brown to reddish brown, sandy gravel, trace clay	AS-1	GP				
				6.0	9.0	Reddish brown, fat clay, with chert gravel, moist	AS-2	CH				
				9.0	15.0	Reddish brown fat clay, with chert gravel, moist	AS-3	CH				more moisture below 11 ft
				15.0	20.0	Light brown, gravelly fat clay, trace sand, moist	AS-4	CH				
				20.0	25.0	Light brown, gravelly fat clay, trace sand, wet	AS-5	CH				
				25.0	27.0	Light gray, weathered limestone	AS-6					
						Bottom of Boring / Auger refusal at 27.0 feet						
						Boring backfilled with cuttings at completion						
MC-85	806+00	45 ft. Left	1113.6						DCP	10/16/2002	18 ft AB	
				0.0	3.0	Light brown to reddish brown, sandy gravel, trace clay, dry	AS-1	GP				
				3.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				15.0	20.0	Reddish brown, fat clay, with sand, trace chert gravel, wet	AS-4	CH				
				20.0	25.0	Reddish brown, fat clay, with chert gravel, wet	AS-5	CH				
				25.0	30.0	Light brown, fat clay, with chert gravel, wet	AS-6	CH				
						Bottom of Boring / Auger refusal at 30.0 feet						
						Boring backfilled with cuttings at completion						
MC-86	806+00	120 ft. Right	1090.4						CSK	10/18/2002		
				0.0	5.0	Light brown and gray, chert gravel, trace silt, dry	AS-1	GP			Dry AB	Dry 72 hr AB
				5.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	15.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				More moisture
				15.0	18.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-4	CL				Hard drilling from 17.0 to 18.0 feet
						Bottom of Boring / Auger refusal at 18.0 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-87	808+00	115 ft. Left	1119.7						DCP	10/16/2002	Dry AB	
				0.0	6.0	Light brown to reddish brown, sandy chert gravel, dry	AS-1	GP				
				6.0	13.0	Reddish brown, fat clay, with chert gravel, moist	AS-2	CH				
				13.0	16.5	Light brown, chert gravel/weathered chert, trace sand and clay, dry	AS-3	GP				
				16.5	17.5	Gray, chert gravel/weathered chert, trace sand and clay	AS-4	GP				
						Bottom of Boring / Auger refusal at 17.5 feet						
						Boring backfilled with cuttings at completion						
MC-88	808+00	Centerline	1123.9						DCP	10/16/2002		No AB Reading
				0.0	4.0	Light brown to reddish brown, sandy chert gravel, dry	AS-1	GP				
				4.0	11.5	Reddish brown, sandy fat clay, with chert gravel	AS-2	CH				
				11.5	13.0	Red, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				13.0	19.0	Red, gravelly fat clay, trace sand, moist	AS-4	CH				
				19.0	20.0	Light brown, fat clay, with chert gravel, trace sand, moist		CH				
						Bottom of Boring / Auger refusal at 20.0 feet	BULK-5	(0 to 20 feet)				
						Boring backfilled with cuttings at completion						
MC-89	808+00	120 ft. Right	1117.7						DCP	10/16/2002	Dry AB	
				0.0	6.0	Light brown to reddish brown, sandy chert gravel, dry	AS-1	GP				
				6.0	9.0	Reddish brown to light brown, sandy chert gravel, with clay, moist	AS-2	GP-GC				
						Bottom of Boring / Auger refusal at 9.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-90	810+00	125 ft. Left	1133.0						DCP	10/16/2002	Dry AB	
				0.0	3.0	Light brown to reddish brown, sand, with chert gravel, dry	AS-1	SP				
				3.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				15.0	22.0	Red, fat clay, with chert gravel	AS-3	CH				
				22.0	25.5	Red, fat clay, with chert gravel, wet						
						Bottom of Boring / Auger refusal at 25.5 feet						
						Boring backfilled with cuttings at completion						
MC-91	810+00	Centerline	1126.1						DCP	10/16/2002	Dry AB	
				0.0	3.5	Light brown to reddish brown, silty sand, with chert gravel, dry	AS-1	SM				
				3.5	10.0	Reddish brown, fat clay, with chert gravel and sand, dry to moist	AS-2	CH				
				10.0	15.0	Light brown to reddish brown, gravelly fat clay, with sand, moist	AS-3	CH				
				15.0	19.0	Light brown to reddish brown, gravelly fat clay, with sand, moist	AS-4	CH				
						Bottom of Boring / Auger refusal at 19.0 feet						
						Boring backfilled with cuttings at completion						
MC-92	810+00	120 ft. Right	1097.7						CSK	10/18/2002		
				0.0	1.0	Silty chert gravel (fill for drilling pad)					Dry AB	Dry 72 hr AB
				1.0	6.0	Light reddish brown, silty lean clay, scattered chert gravel, dry to moist	AS-1	CL				
				6.0	7.0	Light reddish brown, silty lean clay, scattered chert gravel, dry to moist	AS-2	CL				Hard drilling on chert or limestone at 7.0 feet
						Bottom of Boring / Auger refusal at 7.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-93	812+00	120 ft. Left	1145.5						DCP	10/17/2002	Dry AB	
				0.0	1.0	Light brown, sandy chert gravel, dry	AS-1	GP				
				1.0	5.0	Red, fat clay, trace sand and chert gravel		CH				
				5.0	10.0	Red, fat clay, with chert gravel, moist	AS-2	CH				
				10.0	18.0	Red, fat clay, with chert gravel, moist	AS-3	CH				
				18.0	18.5	Gray, weathered limestone/chert						
						Bottom of Boring / Auger Refusal at 18.5 feet						
						Boring backfilled with cuttings at completion						
MC-94	812+00	20 ft. Left	1134.4						DCP	10/16/2002	Dry AB	
				0.0	1.0	Light brown, sand with chert gravel, dry	AS-1	SP				
				1.0	5.0	Reddish brown, fat clay, with chert gravel, moist		CH				
				5.0	9.5	Reddish brown, fat clay, with chert gravel, moist	AS-2	CH				
						Bottom of Boring / Auger refusal at 9.5 feet	BULK-3	(0 to 9.5 feet)				
						Boring backfilled with cuttings at completion						
MC-95						Deleted - Access Denied						
MC-96						Deleted - Access Denied						
MC-97						Deleted - Access Denied						
MC-98	814+00	120 ft. Right	1123.4						CSK	10/18/2002		
				0.0	4.5	Light brown, cherty silt, dry	AS-1	ML			Dry AB	Dry 72 hr AB
				4.5	10.0	Light reddish brown, silty chert gravel, dry	AS-2	GM				
				10.0	15.0	Light reddish brown, silty chert gravel, trace clay seams, dry	AS-3	GM				
				15.0	18.5	Light reddish brown, silty chert gravel, trace clay seams, dry	AS-4	GM				Hard chert at 18.0 feet
						Bottom of Boring / Auger refusal at 18.5 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-99						Deleted - Access Denied						
MC-100						Deleted - Access Denied						
MC-101						Deleted - Access Denied						
MS-102						Deleted - Access Denied						
MS-103	818+71	239 ft.. Right	1039.7			See Roadway Structure Boring Logs						
MC-104	821+09	108 ft.. Left	1129.3						SPB	4/16/2003	Dry AB	
				0.0	5.0	Brown, gravel and cobbles, moist	AS-1	GP				
				5.0	10.0	Reddish brown and white, clayey gravel, with thin chert seams, moist to dry, hard seam at 7 ft, 8 ft & 10 ft.	AS-2	GC				
				10.0	15.0	Light reddish brown and white, clayey gravel, with chert seams, dry	AS-3	GC				
				15.0	17.0	Light reddish brown and white, clayey gravel, with chert seams, dry		GC				
						Bottom of Boring / Auger refusal at 17.0 feet						
						Boring backfilled with cuttings at completion						
MC-105	821+00	Centerline	1123.7						SPB	4/16/2003	Dry AB	
				0.0	2.0	Brown, gravel and cobbles with sand, dry	AS-1	GP				
				2.0	7.0	Reddish brown and white, clayey gravel, scattered chert seams, moist	AS-2	GC				
						Bottom of Boring / Auger refusal at 7.0 feet	BULK-3	(2.0 - 7.0 feet)				
						Boring backfilled with cuttings at completion						
MC-106	821+00	120 ft.. Right	1111.3						SPB	4/16/2003	Dry AB	
				0.0	3.0	Brown to light brown, gravel and cobbles, trace clay and sand, dry	AS-1	GP				
				3.0	10.0	Reddish brown and white, clayey gravel with sand, moist, with chert seams below 5 feet	AS-2	GC				
				10.0	12.5	White and light reddish brown, clayey gravel, wet	AS-3	GC				
						Bottom of Boring / Auger refusal at 12.5 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-107	822+96	116 ft.. Left	1152.5						SPB	4/16/2003	Dry AB	
				0.0	4.0	Brown to reddish brown, clayey gravel, trace cobbles, moist	AS-1	GP				
					4.0	White chert	AS-2					
						Bottom of Boring / Auger refusal at 4.0 feet						
						Boring backfilled with cuttings at completion						
MC-108	823+00	Centerline	1147.3						SPB	4/16/2003	Dry AB	
				0.0	5.0	Brown to reddish brown, clayey gravel, trace cobbles, moist	AS-1	GC				
						Bottom of Boring / Auger refusal at 5.0 feet	BULK-2	(0 to 5 feet)				
						Boring backfilled with cuttings at completion						
MC-109	823+00	120 ft.. Right	1128.8						SPB	4/16/2003	Dry AB	
				0.0	5.0	Light brown, gravelly lean clay, moist	AS-1	CL				
				5.0	7.0	Light brown and white, clayey gravel, moist	AS-2	GC				
						Bottom of Boring / Auger refusal at 7.0 feet						
						Boring backfilled with cuttings at completion						
MC-110	824+88	115 ft.. Left	1163.7			See Roadway Core Boring Logs						
MC-111	825+00	Centerline	1153.8						SPB	4/16/2003	Dry AB	
				0.0	3.0	Dark brown, gravel and cobbles, dry	AS-1	GP				
				3.0	5.0	Light brown, sandy lean clay, trace gravel, with chert seams, moist	AS-2	CL				
				5.0	8.5	Light brown, sandy lean clay, with chert seams, dry, difficult drilling	AS-3	CL				
						Bottom of Boring / Auger refusal at 8.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-112	825+00	120 ft.. Right	1127.7						SPB	4/16/2003	Dry AB	
				0.0	5.0	Brownish gray to light brown, sandy lean clay, trace gravel, moist	AS-1	CL				
				5.0	6.0	Brownish gray to light brown, sandy lean clay, trace gravel, moist	AS-2	CL				
						Bottom of Boring / Auger refusal at 6.0 feet						
						Boring backfilled with cuttings at completion						
MC-113	827+00	120 ft.. Left	1165.1						SPB	4/16/2003	Dry AB	
				0.0	5.0	Brown, gravel and cobbles, dry to moist	AS-1	GP				
				5.0	7.0	Reddish brown, fat clay, moist	AS-2	CH				
				7.0	10.0	White and light reddish brown, chert seams, trace clay seams, dry	AS-3					
				10.0	24.0	White and light reddish brown, chert seams, trace clay seams, dry, difficult drilling	AS-4	GC				
						Bottom of Boring / Auger refusal at 24.0 feet						
						Boring backfilled with cuttings at completion						
MC-114	827+00	Centerline	1153.2						SPB	4/17/2003	Dry AB	
				0.0	5.0	Light brown, sandy lean clay, with gravel, moist	AS-1	CL				
				5.0	10.0	Light reddish brown and white, clayey gravel, with chert seams, dry, difficult drilling	AS-2	GC				
				10.0	13.0	Chert with clay seams, white and light reddish brown, very slow drilling	AS-3					
						Bottom of Boring / Auger refusal at 13.0 feet						
						Boring backfilled with cuttings at completion						
MC-115	827+00	120 ft.. Right	1136.8						BKM	5/5/2003	Dry AB	
				0.0	3.0	Light brown and brown, lean clay, scattered chert fragments, moist	AS-1	CL				
				3.0	9.0	Reddish brown, lean clay, scattered gravel, trace chert seams, moist	AS-2	CL				
				9.0	26.5	Light reddish brown, lean clay, scattered gravel, cobbles and chert seams, dry	AS-3	CL				
						Bottom of Boring / Auger refusal at 26.5 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-116	829+00	120 ft. Left	1144.8						SPB	10/24/2002		
				0.0	5.0	White and light gray, chert gravel, abundant chert layers, dry	AS-1	GP			Dry AB	No 24 hr AB
				5.0	10.5	White and light reddish brown, broken chert/chert layers, few clay seams, dry	AS-2					Hard drilling below 5 feet
				10.5	15.0	White and reddish brown, chert gravel, with fat clay, few chert seams, dry	AS-3	GC				
				15.0	20.0	Light brown, lean clay, abundant chert gravel, trace chert seams, moist	AS-4	CL				
				20.0	21.0	Light brown lean clay, abundant chert gravel, trace chert seams, moist	AS-5	CL				
						Bottom of Boring / Auger refusal at 21.0 feet						
						Boring backfilled with cuttings at completion						
MC-117	829+00	Centerline	1146.7						BKM	5/5/2003	Dry AB	
				0.0	1.0	Light brown and brown, lean clay, trace gravel, moist		CL				
				1.0	8.0	Reddish brown, lean clay, little gravel, moist	AS-1	CL				
				8.0	14.0	Light reddish brown, lean clay, scattered gravel and cobbles, dry	AS-2	CL				
						Bottom of Boring / Auger refusal at 14.0 feet	BULK-3	(1 to 13.5 feet)				
						Boring backfilled with cuttings at completion						
MC-118	829+00	120 ft. Right	1139.0						BKM	5/5/2003	Dry AB	
				0.0	1.0	Light brown to brown, lean clay, trace gravel, dry	AS-1	CL				
				1.0	6.0	Reddish brown, lean clay, scattered gravel, moist	AS-2	CL				
				6.0	16.0	Light reddish brown, lean clay, scattered gravel and cobbles, dry	AS-3	CL				
						Bottom of Boring / Auger refusal at 16.0 feet						
						Boring backfilled with cuttings at completion						
MS-119	830+76	188 ft. Left	1086.3			See Roadway Structure Boring Logs						
MS-120	831+28	4 ft. Right	1077.7			See Roadway Structure Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MS-121	832+24	276 ft. Right	1062.7			See Roadway Structure Boring Logs						
MC-122	834+00	120 ft. Left	1150.2						SPB	10/24/2002		
				0.0	5.0	Brown and reddish brown, lean clay, with chert sand and fine gravel, dry	AS-1	CL			Dry AB	No 24 hr AB
				5.0	10.0	Reddish brown, fat clay, abundant fine chert gravel, dry to moist	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, abundant fine chert gravel, moist	AS-3	CH				
				15.0	20.0	Reddish brown, fat clay, abundant fine chert gravel, moist	AS-4	CH				
				20.0	25.0	Reddish brown, fat clay, scattered fine chert gravel, trace very thin chert seams, moist	AS-5	CH				
				25.0	28.0	Reddish brown, fat clay, scattered fine chert gravel, trace very thin chert seams, moist	AS-6	CH				Hard chert layer from 27.0 to 28.0 feet
						Bottom of Boring 28.0 feet						
						Boring backfilled with cuttings at completion						
MC-123	834+00	Centerline	1129.7						SPB	10/24/2002		
				0.0	5.0	Reddish brown and brown, lean clay, abundant chert gravel, dry	AS-1	CL				No 24 hr AB
				5.0	7.5	Light reddish brown lean clay with chert sand and gravel, moist	AS-2	CL				Chert layer from 7.0 to 7.5 feet, hard drilling
				7.5	11.0	Light brown, lean clay, with chert sand and gravel, wet	AS-3	CL				Chert layer from 11.0 to 11.5 feet
				11.0	15.0	Light brown, lean clay, with chert sand and gravel, wet	AS-4	CL				Chert layer from 14.0 to 14.5 feet
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						
MC-124	837+00	120 ft. Left	1169.5			See Roadway Core Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-125	837+00	Centerline	1155.1						SPB	10/24/2002		
				0.0	1.0	Dark brown, silt, with chert gravel (4" Topsoil), dry	AS-1A	ML				No 24 hr AB
				1.0	6.0	Reddish brown, fat clay, scattered chert gravel, dry	AS-1	CH				
				6.0	6.8	Reddish brown, fat clay, dry	ST-2A	CH				
				6.0	10.0	Reddish brown, fat clay, dry	AS-2	CH				
				10.0	15.0	Reddish brown fat clay, moist	AS-3	CH				
				15.0	20.0	Reddish brown fat clay, moist	AS-4	CH				
				20.0	25.0	Reddish brown fat clay, moist	AS-5	CH				
						Bottom of Boring 25.0 feet	BULK-6	(1 to 25 feet)				
						Boring backfilled with cuttings at completion						
MC-126	836+81	104 ft. Right	1144.5						SPB	10/24/2002		
				0.0	1.0	Dark brown, silt, with chert gravel, dry (4" Topsoil)		ML			Dry	No 24 hr AB
				1.0	5.0	Reddish brown, fat clay, scattered chert gravel, dry	AS-1	CH				
				5.0	7.5	Reddish brown, fat clay, scattered chert gravel, dry	AS-2	CH				
				7.5	8.3	Light gray and white, chert, dry						
						Bottom of Boring / Auger refusal at 8.3 feet						
						Boring backfilled with cuttings at completion						
MC-127	838+76	138 ft. Left	1166.0						SPB	10/24/2002		
				0.0	5.0	Light brown and white, chert gravel, with clay, few chert seams, dry	AS-1	GC			Dry AB	No 24 hr AB
				5.0	10.0	Reddish brown and white, fat clay, abundant chert gravel, few chert seams, moist	AS-2	CH				
				10.0	15.0	Reddish brown and white, fat clay, abundant chert gravel, few chert seams, moist	AS-3	CH				
				15.0	17.0	Reddish brown and white, fat clay, abundant chert gravel, few chert seams, moist	AS-4	CH				
				17.0	18.0	White chert						
						Bottom of Boring / Auger Refusal at 18.0 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-128						Deleted - Access Denied						
MS-129	841+03	375 ft. Right	1052.7			See Roadway Structure Boring Logs						
MS-130	843+99	Centerline	1064.3			See Roadway Structure Boring Logs						
MS-131	847+53	328 ft. Left	1074.4			See Roadway Structure Boring Logs						
MC-132	850+00	Centertine	1168.2						DCP	10/18/2002	Dry AB	
				0.0	3.0	Light brown, sand, with chert gravel, dry	AS-1	SP				
				3.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				15.0	22.0	Reddish brown, fat clay, with chert gravel, trace sand, moist		CH				
				22.0	25.0	Reddish brown to brown, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
				25.0	30.0	Reddish brown to brown, fat clay, with chert gravel, trace sand, moist		CH				
				30.0	35.0	Reddish brown to brown, fat clay, with chert gravel, trace sand, moist	AS-5	CH				
				35.0	40.0	Reddish brown to brown, fat clay, with chert gravel, trace sand, moist		CH				
						Bottom of Boring 40.0 feet	BULK-6	(0 to 40.0 feet)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-133	850+00	120 ft. Right	1175.7						DCP	10/18/2002	Dry AB	
				0.0	2.0	Light brown, chert gravel, with sand, dry	AS-1	GP				
				2.0	8.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				8.0	9.5	Reddish brown, fat clay, with chert gravel, trace sand, moist	ST-3	CH				pushed 12 inches, recovered 12 inches
				9.5	15.0	Reddish brown, gravelly fat clay, trace sand, moist	AS-4	CH				
				15.0	20.0	Reddish brown, gravelly fat clay, trace sand, moist	AS-5	CH				
				20.0	23.0	Reddish brown, gravelly fat clay, trace sand, moist		CH				
						Bottom of Boring 23.0 feet						
						Boring backfilled with cuttings at completion						
MC-134	852+00	Centerline	1165.5						DCP	10/18/2002	Dry AB	
				0.0	3.5	Light brown to reddish brown, sand, with chert gravel, dry	AS-1	SP				
				3.5	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				15.0	20.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
						Bottom of Boring 20.0 feet	BULK-5	(0 to 20.0 feet)				
						Boring backfilled with cuttings at completion						
MC-135	852+00	120 ft. Right	1177.9						DCP	10/18/2002	Dry AB	
				0.0	2.0	Light brown to reddish brown, sand, with chert gravel, dry	AS-1	SP				
				2.0	11.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				11.0	15.0	Red, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				15.0	20.0	Red, fat clay with chert gravel, trace sand, moist	AS-4	CH				
						Bottom of Boring / Auger refusal at 20.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-136	854+00	120 ft. Left	1167.2						CSK	10/23/2002		
				0.0	5.0	Light reddish brown, silty lean clay, abundant chert gravel, dry	AS-1	CL			Dry AB	
				5.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				10.0	15.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						
MC-137	854+00	Centerline	1179.8						DCP	10/19/2002	Dry AB	
				0.0	3.0	Light brown to reddish brown, sand, with chert gravel, trace clay, dry	AS-1	SP				
				3.0	4.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	ST-2	CH				pushed 12 inches, recovered 12 inches
				4.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
				15.0	22.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-5	CH				
				22.0	24.0	Reddish brown, fat clay, with chert gravel, trace sand, moist		CH				
						Bottom of Boring 24.0 feet						
						Boring backfilled with cuttings at completion						
MC-138	854+00	120 ft. Right	1179.4						DCP	10/18/2002	Dry AB	
				0.0	3.5	Light brown, sand, with chert gravel, dry	AS-1	SP				
				3.5	12.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				12.0	15.0	Red, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				15.0	20.0	Red, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
				20.0	22.0	Red, fat clay with chert gravel, trace sand, moist		CH				
						Bottom of Boring 22.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-139	856+00	120 ft. Left	1172.3						DCP	10/18/2002	Dry AB	
				0.0	4.0	Light brown silty sand with chert gravel, dry	AS-1	SM				
				4.0	10.0	Reddish brown fat clay with chert gravel, trace sand, moist	AS-2	CH				
				10.0	13.0	Reddish brown fat clay with chert gravel, trace sand, moist	AS-3	CH				
						Bottom of Boring 13.0 feet						
						Boring backfilled with cuttings at completion						
MC-140	856+00	Centerline	1178.5						DCP	10/18/2002	Dry AB	
				0.0	4.0	Light brown, sand, with chert gravel, dry	AS-1	SP				
				4.0	8.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				8.0	8.5	Reddish brown, fat clay, with chert gravel, trace sand, very stiff	ST-3	CH				pushed 6 inches, recovered 6 inches
				8.5	15.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-4	CH				
				15.0	19.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-5	CH				
						Bottom of Boring 19.0 feet	BULK-6	(0 to 19.0 feet)				
						Boring backfilled with cuttings at completion						
MC-141	856+00	120 ft. Right	1174.4						DCP	10/18/2002	Dry AB	
				0.0	4.0	Light brown, sandy silt, with chert gravel, dry	AS-1	ML				
				4.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-142	858+00	120 ft. Left	1172.9						DCP	10/18/2002	Dry AB	
				0.0	4.0	Light brown, silty sand, with chert gravel, dry	AS-1	SM				
				4.0	8.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-2	CH				
				8.0	9.5	Reddish brown, fat clay, with chert gravel, trace sand, very stiff, moist	ST-3	CH				pushed 18 inches, recovered 15 inches
				9.5	12.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-4	CH				
						Bottom of Boring 12.0 feet	BULK-7	(0 to 12 feet)				
						Boring backfilled with cuttings at completion						
MC-143	858+00	Centerline	1175.2						DCP	10/19/2002	Dry AB	
				0.0	4.5	Light brown to reddish brown, sand, with chert gravel, trace clay	AS-1	SP				
				4.5	10.0	Red, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	15.0	Red, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						
MC-144	858+00	120 ft. Right	1164.5						DCP	10/19/2002	Dry AB	
				0.0	4.5	Light brown to reddish brown, sand, with chert gravel, trace clay, dry	AS-1	SP				
				4.5	10.0	Reddish brown, fat clay, with chert gravel	AS-2	CH				
						Bottom of Boring 10.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-145	860+00	120 ft. Left	1176.4						DCP	10/18/2002	Dry AB	
				0.0	4.0	Light brown, sand, with chert gravel, dry	AS-1	SP				
				4.0	8.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				8.0	9.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	ST-3	CH				attempted tube, no recovery
				9.0	13.5	Reddish brown fat clay, with chert gravel, trace sand, moist	AS-4	CH				
						Bottom of Boring 13.5 feet	BULK-5	(0 to 13.5 feet)				
						Boring backfilled with cuttings at completion						
MC-146	860+00	Centerline	1169.9						DCP	10/19/2002	Dry AB	
				0.0	4.0	Light brown, sandy chert gravel, dry	AS-1	GP				
				4.0	10.0	Reddish brown, fat clay, with chert gravel	AS-2	CH				
						Bottom of Boring 10.0 feet						
						Boring backfilled with cuttings at completion						
MC-147	862+00	120 ft. Left	1178.1						DCP	10/18/2002	Dry AB	
				0.0	3.0	Light brown to reddish brown, sand, with chert gravel	AS-1	SP				
				3.0	12.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				12.0	15.0	Red, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-148	864+00	120 ft. Left	1179.0						DCP	10/18/2002	Dry AB	
				0.0	3.5	Light brown, sand, with chert gravel, dry	AS-1	SP				
				3.5	8.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-2	CH				
				8.0	9.5	Reddish brown, fat clay, with chert gravel, trace sand, very stiff	ST-3	CH				pushed 18 inches, recovered 16 inches
				9.5	12.5	Reddish brown, fat clay, with chert gravel, trace sand	AS-4	CH				
				12.5	15.0	Red fat clay, with chert gravel, trace sand, very stiff	AS-5	CH				
						Bottom of Boring 15.0 feet	BULK-6	(0 to 15 ft)				
						Boring backfilled with cuttings at completion						
MC-149	868+00	225 ft. Left	1193.2						DCP	10/19/2002	Dry AB	
				0.0	4.0	Light brown, sand, with chert gravel, dry	AS-1	SP				
				4.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-3	CH				
				15.0	16.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-4	CH				
						Bottom of Boring 16.0 feet						
						Boring backfilled with cuttings at completion						
MC-150	868+00	Centerline	1186.5						DCP	10/19/2002	Dry AB	
				0.0	2.5	Light brown, sand, with chert gravel	AS-1	SP				
				2.5	10.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-2	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-3	CH				
				15.0	20.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-4	CH				
						Bottom of Boring 20.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-151	868+00	120 ft. Right	1177.6						DCP	10/19/2002	Dry AB	
				0.0	5.0	Light brown, sand, with chert gravel	AS-1	SP				
				5.0	10.0	Reddish brown, fat clay, with chert gravel	AS-2	CH				
				10.0	12.0	Reddish brown, fat clay, with chert gravel	AS-3	CH				
						Bottom of Boring 12.0 feet						
						Boring backfilled with cuttings at completion						
MC-152	870+00	380 ft. Left	1211.2						DCP	10/19/2002	Dry AB	
				0.0	4.0	Light brown, sand, with chert gravel, dry	AS-1	SP				
				4.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	16.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				16.0	20.0	Red, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
				20.0	25.0	Red, fat clay, with chert gravel, trace sand, moist	AS-5	CH				
				25.0	28.0	Red, fat clay, with chert gravel, trace sand, moist						
						Bottom of Boring 28.0 feet	BULK-6	(0 to 28 feet)				
						Boring backfilled with cuttings at completion						
MC-153	870+00	280 ft. Left	1208.8						CSK	10/23/2002	Dry AB	
				0.0	4.0	Light brown to reddish brown, silty lean clay, trace chert gravel, dry to moist	AS-1	CL				
				4.0	8.5	Reddish brown, lean clay, trace chert gravel, moist	AS-2	CL				
				8.5	9.4	Reddish brown, lean clay, trace chert gravel, moist	ST-3					Shelby tube 10" recovery
				9.4	15.0	Red, sandy lean to fat clay, abundant chert gravel	AS-4	CL/CH				
				15.0	25.0	Red, sandy lean to fat clay, abundant chert gravel	AS-5	CL/CH				
				25.0	30.0	Red, sandy lean to fat clay, few chert gravel	AS-6	CL/CH				
						Bottom of Boring 30.0 feet	BULK-7	(4.0 to 30.0 feet)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-154	870+00	Centerline	1190.4						DCP	10/19/2002	Dry AB	
				0.0	2.0	Light brown to reddish brown, sand, with chert gravel and clay, dry	AS-1	SP				
				2.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	16.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				16.0	20.0	Red, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
				20.0	25.0	Red, fat clay, with chert gravel, trace sand, moist	AS-5	CH				
						Bottom of Boring 25.0 feet						
						Boring backfilled with cuttings at completion						
MC-155	870+00	120 ft. Right	1168.8						CSK	10/23/2002	Dry AB	
				0.0	5.0	Light brown, silty chert gravel, dry	AS-1	GM				
				5.0	10.0	Reddish brown, sandy lean clay, abundant chert gravel, moist	AS-2	CL				
				10.0	15.0	Reddish brown, sandy lean clay, abundant chert gravel, moist	AS-3	CL				
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						
MC-156						Deleted - Access Denied						
MC-157	872+50	760 ft. Left	1199.3						DCP	10/19/2002	Dry AB	
				0.0	4.0	Light brown to reddish brown, sand with chert gravel, trace clay, dry	AS-1	SP				
				4.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-2	CH				
				10.0	14.0	Reddish brown, fat clay, with chert gravel, trace sand		CH				
						Bottom of Boring 14.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-158	872+50	330 ft. Left	1197.3						DCP	10/19/2002	Dry AB	
				0.0	3.0	Light brown to reddish brown, sand, with chert gravel, trace clay	AS-1	SP				
				3.0	5.0	Reddish brown, fat clay, with chert gravel, trace clay	ST-2	CH				pushed 24 inches, recovered 16 inches
				5.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-3	CH				
				10.0	15.0	Reddish brown, fat clay, with chert gravel, trace sand	AS-4	CH				
				15.0	18.0	Reddish brown, fat clay, with chert gravel, trace sand		CH				
						Bottom of Boring 18.0 feet	BULK-5	(0 to 18 ft)				
						Boring backfilled with cuttings at completion						
MC-159	872+00	Centerline	1193.0						DCP	10/19/2002	Dry AB	
				0.0	2.0	Light brown to reddish brown, sand, with chert gravel, trace clay, dry	AS-1	SP				
				2.0	10.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-2	CH				
				10.0	17.0	Reddish brown, fat clay, with chert gravel, trace sand, moist	AS-3	CH				
				17.0	20.0	Red, fat clay, with chert gravel, trace sand, moist	AS-4	CH				
				20.0	25.0	Red, fat clay, with chert gravel, trace sand, moist	AS-5	CH				
				25.0	28.0	Red, fat clay, with chert gravel, trace sand, moist		CH				
						Bottom of Boring 28.0 feet						
						Boring backfilled with cuttings at completion						
MC-160	872+00	300 ft. Right	1198.1						CSK	10/23/2002	Dry AB	
				0.0	4.5	Light brown, silty chert gravel, dry	AS-1	GM				
				4.5	10.0	Reddish brown, sandy lean clay, abundant chert gravel, moist	AS-2	CL				
				10.0	15.0	Reddish brown, sandy lean clay, abundant chert gravel, moist	AS-3	CL				
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-161	874+00	335ft. Right	1199.3						BMK	12/22/2002	Dry AB	
				0.0	1.0	Brown, lean clay, trace chert gravel with rootlets, moist						
				1.0	15.0	Reddish brown, fat clay, trace chert gravel, moist	AS-1	CH				
				3.5	4.5		ST-2	CH				Pushed 12 inches, recovered 13 inches
						Bottom of Boring 15.0 feet						Chert layer broken fractured 9-10.5 feet
						Boring backfilled with cuttings at completion						
MC-162						Deleted - Access Denied						
MC-163	875+00	Centerline	1186.6						BMK	12/22/2002	Dry AB	
				0.0	0.7	Brown, lean clay, trace chert with rootlets, moist		CL				
				0.7	23.0	Reddish brown, fat clay, scattered chert gravel, moist, becoming wet below 17.5 feet	AS-1	CH				6" chert layer at 17 feet, highly fractured
						Bottom of Boring at 23.0 feet						
						Boring backfilled with cuttings at completion						
MC-164	875+00	120 ft. Right	1195.9						BMK	12/22/2002	Dry AB	
				0.0	1.0	Brown lean clay with rootlets, moist		CL				
				1.0	32.0	Reddish brown fat clay, scattered chert gravel, moist to wet	AS-1	CH				Fractured chert layer from 4.5 - 5 feet
						Bottom of Boring at 32.0 feet	BULK-2 (1 to 32 ft)					Moist to about 22 feet, wet below 22 feet
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-165	877+00	Centerline	1181.2						BMK	12/22/2002	Dry AB	
				0.0	0.6	Brown, lean clay, trace chert gravel and rootlets, dry to moist		CL				
				0.6	6.0	Reddish brown, fat clay, with to abundant chert gravel, moist	AS-1	CH				
				6.0	15.5	Reddish brown, fat clay, with chert gravel, moist to wet with two highly weathered chert seams		CH				Pushed 12 inches, recovered 7 inches
				15.5	16.5	Light gray to tan, slightly to moderately weathered limestone						
						Bottom of Boring / Auger refusal at 16.5 feet	BULK-2	(0.6 - 14.0 ft)				
						Bottom of Boring at 16.5 feet						
						Boring backfilled with cuttings at completion						
MC-166	876+79	102 ft. Right	1187.3						BMK	12/22/2002	Dry AB	
				0.0	0.6	Brown, lean clay, trace chert gravel, with rootlets, dry		CL				
				0.6	12.5	Reddish brown, fat clay, with abundant chert gravel, dry	AS-1	CH				
				12.5	24.0	Reddish brown, fat clay, with trace chert gravel, moist	AS-2	CH				
						Bottom of Boring at 24.0 feet						
						Boring backfilled with cuttings at completion						
MC-167	879+00	2 ft. Right	1175.2						BKM	12/22/2002	Dry AB	
				0.0	0.5	Brown, lean clay, trace chert gravel, with rootlets, moist		CL				
				0.5	15.0	Reddish brown, fat clay, scattered chert gravel, moist	AS-1	CH				Moisture content increasing with depth
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						
MS-168	884+52	476 ft. Left	1074.6			See Roadway Structure Boring Logs						
MS-169	887+97	53 ft. Right	1056.7			See Roadway Structure Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MS-170	890+67	496 ft. Right	1145.8			See Roadway Structure Boring Logs						
MC-170A	895+00	Centerline	1154.3						BRO	10/9/2003	Dry AB	
				0.0	5.0	Light brown and gray, sandy gravel, dry	AS-1	GP				
				5.0	6.0	Light brown and gray, sandy gravel, dry	AS-2	GP				
						Bottom of Boring 6.0 feet	BULK-3	(0 to 6 feet)				
						Boring backfilled with cuttings at completion						
MC-170B	895+00	90 ft. Right	1156.3						BRO	10/9/2003	Dry AB	
				0.0	5.0	Light brown and gray, sandy gravel, dry	AS-1	GP				
				5.0	8.0	Light brown and gray, sandy gravel, dry	AS-2	GP				
						Bottom of Boring 8.0 feet						
						Boring backfilled with cuttings at completion						
MC-171	895+83	34 ft. Right	1148.8						BRO	10/9/2003	Dry AB	
				0.0	5.0	Light brown and gray, sandy gravel, dry	AS-1	GP				
				5.0	9.0	Light brown and gray, sandy gravel, dry	AS-2	GP				
						Bottom of Boring 9.0 feet						
						Boring backfilled with cuttings at completion						
MC-172	895+83	153 ft. Right	1155.4						BRO	10/9/2003	Dry AB	
				0.0	5.0	Light brown, sandy gravel, dry	AS-1	GP				
				5.0	10.0	Light brown, sandy gravel, dry	AS-2	GP				
				10.0	15.0	Light brown, sandy gravel, dry	AS-3	GP				finer gravel below 10 ft
						Bottom of Boring 15.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MS-173	899+51	49 ft. Left	1089.1			See Structural Boring Log						
MS-174	900+30	200 ft. Right	1068.1			See Structural Boring Log						
MS-175	901+16	597 ft. Right	1030.0			See Structural Boring Log						
MC-175A	904+07	112 ft. Left	1170.5						BRO	6/5/2003	Dry AB	
				0.0	5.5	Light brown and red, lean clay, abundant gravel, dry	AS-1					
				5.5	6.0	Gray limestone, hard						
						Bottom of Boring / Auger Refusal at 6.0 feet						
						Boring backfilled with cuttings at completion						
MC-175B	904+00	Centerline	1161.8						BRO	6/5/2003	Dry AB	
				0.0	3.0	Red, lean clay, abundant gravel, moist	AS-1	CL				
				3.0	4.0	Light gray chert, hard						
						Bottom of Boring / Auger Refusal at 4.0 feet						
						Boring backfilled with cuttings at completion						
MC-176	903+73	105 ft. Right	1146.8						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	0.5	Brown, silty lean clay, with shale gravel	AS-1	CL				
				0.5	10.5	Light reddish brown, sandy fat clay, with to abundant chert gravel, dry	AS-2	CH				Chert layer from 8.5 to 9.5 feet
						Bottom of Boring / Auger Refusal at 10.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-177	903+67	225 ft. Right	1148.4						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	13.0	Light brown to light reddish brown, sandy fat clay, abundant chert gravel, dry	AS-1	CH				
						Bottom of Boring / Auger Refusal at 13.0 feet	BULK-2 (0 - 13 ft)					Frequent chert seams (2-4" thick every 4-6 inches) from 5 to 13 ft
						Boring backfilled with cuttings at completion						
MC-178	903+60	344 ft. Right	1144.2						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	14.0	Light brown to light reddish brown, sandy fat clay, abundant chert gravel, dry - becoming wetter below 10 ft	AS-1	CH				
						Bottom of Boring / Auger Refusal at 14.0 feet						Frequent chert seams (2-4" thick every 4-6 inches) from 4 to 14 ft
						Boring backfilled with cuttings at completion						
MC-178A	906+03	123 ft. Left	1161.5						BRO	6/5/2003	Dry AB	
				0.0	8.0	Light brown and red, lean clay, with gravel, moist	AS-1	CL				
				8.0	13.0	Red, lean clay, abundant gravel, moist	AS-2	CL				
				13.0	18.0	Red and gray, chert gravel, abundant clay, moist	AS-3	GC				
				18.0	21.0	Light gray and gray chert, hard						
						Bottom of Boring / Auger Refusal at 21.0 feet						
						Boring backfilled with cuttings at completion						
MC-178B	906+00	Centerline	1164.9						BRO	6/5/2003	Dry AB	
				0.0	8.0	Red and gray, chert gravel, with sand and clay, moist	AS-1	GP-GC				
				8.0	18.0	Red and gray, sandy gravel, abundant clay, moist	AS-2	GP-GC				
				18.0	20.0	Red and gray, sandy gravel, abundant clay, moist	AS-3	GP-GC				
				20.0	21.0	Light gray and gray chert, hard						
						Bottom of Boring / Auger Refusal at 21.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-179	905+67	114 ft. Right	1163.7			See Roadway Core Boring Logs						
MC-180	905+63	234 ft. Right	1158.4						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	16.5	Light brown to light reddish brown, sandy fat clay, abundant chert gravel, abundant chert seams, dry	AS-1	CH				
						Bottom of Boring / Auger Refusal at 16.5 feet						Chert layer from 5 to 6.5 feet
						Boring backfilled with cuttings at completion						
MC-181	905+58	354 ft. Right	1153.6						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	13.5	Light brown to light reddish brown, sandy fat clay, abundant chert gravel, abundant chert seams, dry	AS-1	CH				
						Bottom of Boring at 13.5 feet						Chert layer from 10 to 10.5 feet
						Boring backfilled with cuttings at completion						
MS-181A	909+15	248 ft. Left	1057.0			See Roadway Structure Boring Logs						
MS-182	908+87	46 ft. Left	1048.1			See Roadway Structure Boring Logs						
MS-183	909+24	241 ft. Right	1044.8			See Roadway Structure Boring Logs						
MS-184	909+71	575 ft. Right	1033.5			See Roadway Structure Boring Logs						
MC-184A	913+00	120 ft.. Left	1153.0						BRO	6/6/2003	Dry AB	
				0.0	4.0	Gray and light brown, gravel, trace clay, dry	AS-1	GP				
				4.0	9.0	Red and light brown, gravel, with clay, moist	AS-2	GP-GC				
				9.0	14.0	Dark brown and dark gray, gravel, abundant clay, moist	AS-3	GC				
				14.0	19.0	Dark brown to red, lean clay, abundant gravel, moist	AS-4	CL				
				19.0	20.0	Gray limestone, hard						
						Bottom of Boring at 20.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-184B	913+00	Centerline	1134.1						BRO	6/6/2003	Dry AB	
				0.0	5.0	Light brown and gray, gravel, trace clay, moist	AS-1	GP				
				5.0	8.0	Light reddish brown, gravel, with clay, moist		GC				
				8.0	9.0	Gray limestone, hard						
						Bottom of Boring at 9.0 feet						
						Boring backfilled with cuttings at completion						
MC-185	913+43	106 ft. Right	1104.3						CSK	1/14/2003	Dry AB	
				0.0	5.0	Brown and reddish brown, clayey chert gravel, with sand, moist	AS-1	GC				
				5.0	10.0	Brown and reddish brown, clayey chert gravel, with sand, moist	AS-2	GC				
						Bottom of Boring / Auger Refusal at 10.0 feet						
						Boring backfilled with cuttings at completion						
MC-186	913+46	234 ft. Right	1132.7						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	4.0	Brown, chert gravel, with clay, dry	BULK-1	GC				
				4.0	9.8	Light brown, sandy fat clay, abundant chert gravel, with chert seams	BULK-2	CH				
						Bottom of Boring at 9.8 feet						
						Boring backfilled with cuttings at completion						
MC-187	913+50	354 ft. Right	1144.0						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	0.5	Light brown, lean clay, abundant chert gravel, dry						
				0.5	8.5	Reddish brown, sandy fat clay, scattered chert gravel, dry to moist	AS-1	CH				
				8.5	14.8	Light brown to light reddish brown, sandy fat clay, abundant chert seams	AS-2	CH				
						Bottom of Boring / Auger Refusal at 14.8 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-187A	915+00	120 ft. Left	1153.4						BRO	6/6/2003	Dry AB	
				0.0	3.0	Brown and gray, gravel, moist	AS-1	GP				
				3.0	7.5	Brown and gray, gravel, moist	AS-2	GP				
				7.5	8.0	Gray limestone, hard	AS-3					
						Bottom of Boring / Auger Refusal at 8.0 feet						
						Boring backfilled with cuttings at completion						
MC-187B	914+99	5 ft. Right	1139.7						BRO	6/6/2003	Dry AB	
				0.0	1.0	Dark brown, silty lean clay / topsoil	AS-1	CL-ML				
				1.0	5.0	Light reddish brown, gravel, trace clay, moist	AS-2	GP				
				5.0	10.0	Light brown, gravel, trace clay, moist	AS-3	GP				
				10.0	14.0	Light brown, gravel, trace clay, moist	AS-4	GP				
				14.0	14.5	Gray limestone, hard						
						Bottom of Boring / Auger Refusal at 14.5 feet						
						Boring backfilled with cuttings at completion						
MC-188	915+37	124 ft. Right	1151.0						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	1.0	Light brown, chert gravel, with fat clay, dry		GC				
				1.0	3.0	Light brown to light reddish brown, sandy fat clay, with chert gravel, dry	AS-1	CH				
				3.0	7.0	Light brown to light reddish brown, sandy fat clay, with chert gravel and chert layers, dry	AS-2	CH				
				7.0	19.5	Brown, sandy fat clay, with chert gravel and chert layers, moist becoming wet below 17 feet						
						Bottom of Boring / Auger Refusal at 19.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-189	915+42	226 ft. Right	1156.2						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	2.0	Light brown, chert gravel, with fat clay, dry	AS-1	GC				
				2.0	7.0	Light brown to reddish brown, sandy fat clay, with chert gravel, dry	AS-2	CH				
				7.0	22.8	Light brown, sandy fat clay, with chert layers, (no chert layers from 12 to 15 feet)	AS-3	CH				
						Bottom of Boring / Auger Refusal at 22.8 feet	BULK-4	(0 to 22.8 feet)				
						Boring backfilled with cuttings at completion						
MC-190	915+48	345 ft. Right	1152.1						BKM	12/19/2002	Dry AB	Dry 24 hr AB
				0.0	0.5	Light brown, lean clay, with rootlets, moist						
				0.5	4.0	Light brown to light reddish brown, sandy fat clay, with chert gravel, dry	AS-1	CH				
				4.0	5.0	Light brown, sandy lean clay, abundant chert gravel, dry	AS-2	CL				
				5.0	10.2	Brown to reddish brown, sandy fat clay, with chert gravel and chert seams	AS-3	CH				With chert seams every 4 to 6"
						Bottom of Boring / Auger Refusal at 10.2 feet						
						Boring backfilled with cuttings at completion						
MC-190A	917+00	120 ft. Left	1173.9						BRO	6/6/2003	Dry AB	
				0.0	4.0	Light reddish brown, gravel, scattered sand and clay, moist	AS-1	GP				
				4.0	9.0	Light brown, gravel, abundant sand, trace clay, moist	AS-2	GP				
				9.0	14.0	Red and light brown, lean clay, abundant sand, with gravel, moist	AS-3	CL				
				14.0	19.0	Light brown to brown, gravel, with sand, scattered clay, moist	AS-4	GP				
				19.0	24.0	Red to light brown, lean clay, abundant gravel, moist	AS-5	CL				
				24.0	25.0	Gray limestone, hard	AS-6					
						Bottom of Boring / Auger Refusal at 25.0 feet						
						Boring backfilled with cuttings at completion						

96

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-190B	917+00	Centerline	1170.5						BRO	6/6/2003	Dry AB	
				0.0	4.0	Light brown, sandy gravel, trace clay, moist						
				4.0	9.0	Light brown, sandy gravel, trace clay, moist						
				9.0	14.0	Light brown and gray, sandy gravel, trace clay, moist						
				14.0	23.0	Gravel, trace sand and clay, light brown and gray, moist						
					at 23.0	Gray limestone, hard						
						Bottom of Boring / Auger Refusal at 23.0 feet						
						Boring backfilled with cuttings at completion						
MC-191	917+30	94 ft. Right	1168.7			See Roadway Core Boring Logs						
MC-192	917+38	213 ft. Right	1158.2						BKM	12/20/2002	Dry AB	Dry 24 hr AB
				0.0	0.5	Brown, lean clay, with rootlets, moist		CL				
				0.5	5.0	Light brown to light reddish brown, sandy fat clay, with chert gravel, dry	AS-1	CH				
				5.0	13.5	Light brown to light reddish brown, sandy fat clay, with chert gravel and chert seams, dry		CH				Chert layer from 5 to 5.5 feet
						Bottom of Boring / Auger Refusal at 13.5 feet						
						Boring backfilled with cuttings at completion						
MC-193	917+46	333 ft. Right	1139.7						BKM	12/20/2002	Dry AB	Dry 24 hr AB
				0.0	1.5	Brown chert gravel with clay, dry		GC				
				1.5	10.5	Light brown to light reddish brown sandy fat clay, with to abundant chert gravel, dry	AS-1	CH				
				10.5	15.0	Tan to light brown sandy fat clay, abundant chert gravel and chert seams, dry	AS-2	CH				Chert seams every 6 to 8"
						Bottom of Boring / Auger Refusal at 15.0 feet	BULK-3 (0 to 15 ft)					
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-193A	919+00	120 ft. Left	1170.1						BRO	6/6/2003	Dry AB	
				0.0	3.0	Brown gravel, scattered clay, moist	AS-1	GP				
				3.0	8.0	Red, lean clay, scattered sand and gravel, moist	AS-2	CL				
				8.0	11.0	Gray limestone, hard	AS-3					
						Bottom of Boring / Auger Refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						
MC-193B	918+97	2 ft. Right	1162.0						BRO	6/6/2003	Dry AB	
				0.0	3.0	Light brown and gray, gravel, trace clay, moist	AS-1					
				3.0	8.0	Light brown and red, sandy gravel, with clay, moist	AS-2					
				8.0	13.0	Light brown and red, sandy gravel, scattered clay, moist	AS-3					
				13.0	18.0	Reddish brown, gravel, with sand and clay, moist	AS-4					
						Bottom of Boring / Auger Refusal at 18.0 feet						
						Boring backfilled with cuttings at completion						
MC-194	919+09	79 ft. Right	1150.0						BKM	12/20/2002	Dry AB	Dry 24 hr AB
				0.0	1.0	Brown, chert gravel with clay, dry, angular, poorly graded		GP				
				1.0	4.0	Tan to light brown, gravelly fat clay, dry	AS-1	CH				
				4.0	15.5	Light brown to light reddish brown, sandy fat clay, with chert gravel and chert seams, dry to moist below 10 ft	AS-2	CH				Chert layer from 4 to 6 feet
						Bottom of Boring / Auger Refusal at 15.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-195	919+26	196 ft. Right	1151.2						BKM	12/21/2002	Dry AB	Dry 24 hr AB
				0.0	0.5	Brown clayey chert gravel, dry		GC				
				0.5	8.2	Light brown to light reddish brown sandy fat clay, with chert seams	AS-1	CH				Chert seams to 7 feet
						Bottom of Boring / Auger Refusal at 8.2 feet						
						Boring backfilled with cuttings at completion						
MC-196	919+29	314 ft. Right	1144.8						BKM	12/21/2002	Dry AB	Dry 24 hr AB
				0.0	0.5	Brown, lean clay, abundant chert gravel, with rootlets, dry		GC				
				0.5	11.0	Light brown to light reddish brown, sandy fat clay, with chert seams	AS-1	CH				With chert seams every 8 to 12"
						Bottom of Boring / Auger Refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						
MC-196A	921+00	120 ft. Left	1163.2						BRO	6/6/2003	Dry AB	
				0.0	4.0	Light brown to red, lean clay, abundant sand, with gravel, moist	AS-1	CL				
				4.0	9.0	Light brown and red, sandy gravel, with clay, moist	AS-2	GP-GC				
				9.0	12.0	Reddish brown, gravel, trace clay, moist	AS-3	GP-GC				
				12.0	12.5	Gray limestone, hard						
						Bottom of Boring / Auger Refusal at 12.5 feet						
						Boring backfilled with cuttings at completion						
MC-196B	921+03	1 ft. Right	1151.2						BRO	6/6/2003	Dry AB	
				0.0	2.0	Dark brown, gravel, scattered clay and silt, trace roots, moist	AS-1	GP				
				2.0	5.0	Reddish brown, gravel, scattered clay, moist	AS-2	GP				
				5.0	10.0	Reddish brown, gravel, trace clay, dry	AS-3	GP				
				10.0	12.0	Brown, gravel, trace clay, dry	AS-4	GP				
						Bottom of Boring / Auger Refusal at 12.0 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-197	921+17	59 ft. Right	1146.4						BKM	12/21/2002	Dry AB	
				0.0	0.5	Brown, lean clay, trace chert gravel, dry		CL				
				0.5	17.0	Light brown to reddish brown, sandy fat clay, abundant chert gravel, with chert seams, dry	AS-1	CH				Chert seams spaced 1 to 2 feet apart
						Bottom of Boring / Auger Refusal at 17.0 feet	BULK-2	(0.5-17.0 ft)				
						Boring backfilled with cuttings at completion						
MC-198	921+30	178 ft. Right	1134.7						BKM	12/21/2002	Dry AB	
				0.0	0.3	Brown, lean clay, trace chert gravel, with rootlets, dry		CL				
				0.3	3.5	Chert gravel, abundant sandy fat clay		GC				
				3.5	13.5	Light brown to light reddish brown, sandy fat clay, with chert gravel, with chert seams below 5 feet	AS-1	CH				Seams 2-4" thick spaced 1-2' apart
						Bottom of Boring / Auger Refusal 13.5 feet						
						Boring backfilled with cuttings at completion						
MC-199	921+42	297 ft. Right	1132.9						BKM	12/21/2002	Dry AB	
				0.0	0.3	Brown lean clay, trace chert gravel, with rootlets, dry		CL				
				0.3	3.5	Light brown to light reddish brown, sandy gravelly fat clay, dry		GP-CH				
				3.5	16.0	Light brown to light reddish brown, sandy fat clay, with chert gravel, dry, with chert seams	AS-1	CH				Seams 2-4" thick spaced 1-2' apart
						Bottom of Boring / Auger Refusal at 16.0 feet						
						Boring backfilled with cuttings at completion						
MC-199A	923+00	120 ft. Left	1169.4						BRO	6/6/2003	Dry AB	
				0.0	4.0	Light brown and red, sandy gravel, scattered clay, moist	AS-1	GP				
				4.0	6.0	Light brown and red, lean clay, with sand and gravel, moist	AS-2	CL				
				6.0	7.5	Red, light brown and brown, lean clay, abundant sand, moist	AS-3	CL				
						Bottom of Boring / Auger Refusal at 7.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-200	923+11	36 ft. Right	1139.4						CSK	1/14/2003	Dry AB	
				0.0	2.5	Reddish brown and gray, chert gravel, with silt, dry	AS-1	GP-GM				
						Bottom of Boring / Auger Refusal at 2.5 feet						
						Boring backfilled with cuttings at completion						
MC-201	923+25	155 ft. Right	1113.7						CSK	1/14/2003	Dry AB	
				0.0	10.0	Reddish brown and gray, chert gravel, trace silt, dry	AS-1	GP				
				10.0	16.0	Reddish brown and gray, chert gravel, trace silt, dry		GP				
						Bottom of Boring / Auger Refusal at 16.0 feet						
						Boring Backfilled with cuttings at completion						
MC-202	923+40	274 ft. Right	1101.7						CSK	1/14/2003	Dry AB	
				0.0	10.0	Light reddish brown, silt, with chert gravel, dry	AS-1	ML				
				10.0	15.5	Light reddish brown, silty chert gravel, dry	AS-2	GM				
						Bottom of Boring / Auger Refusal at 15.5 feet						
						Boring backfilled with cuttings at completion						
MC-202A	925+00	120 ft. Left	1173.8						BRO	6/6/2003	Dry AB	
				0.0	3.0	Light brown, sandy gravel, with clay, moist	AS-1	GP				
				3.0	6.5	Light brown, sandy gravel, with clay, moist	AS-2	GP				
						Bottom of Boring / Auger Refusal at 6.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-203	925+04	10 ft. Right	1165.6						BKM	12/21/2002	Dry AB	
				0.0	9.0	Light brown to light reddish brown, sandy fat clay, with chert gravel and chert seams, dry	AS-1	CH				
				9.0	25.0	Brown with reddish brown fat clay, scattered limestone gravel, with chert seams, dry	AS-2	CH				Chert seams spaced 2-4' apart
						Bottom of Boring / Auger Refusal at 25.0 feet						
						Boring backfilled with cuttings at completion						
MC-204	925+21	129 ft. Right	1158.9						BMK	12/21/2002	Dry AB	
				0.0	3.0	Light brown to light reddish brown, sandy fat clay, with chert gravel, dry		CH				
				3.0	5.0	Dark reddish brown, fat clay, trace chert gravel, moist		CH				
				5.0	21.5	Brown to reddish brown, fat clay, with trace limestone gravel, with chert layers, dry to moist	AS-1	CH				Chert seams 2 to 3 feet apart
						Bottom of Boring / Auger Refusal at 21.5 feet	BULK-2	(0.5-21.5 ft)				
						Boring backfilled with cuttings at completion						
MC-205	925+38	247 ft. Right	1150.0						BKM	12/21/2002	Dry AB	
				0.0	15.5	Light brown, sandy fat clay, abundant chert gravel, scattered chert seams, dry	AS-1	CH				Chert seams 2-3' apart
						Bottom of Boring / Auger Refusal at 15.5 feet						
						Boring backfilled with cuttings at completion						
MC-205A	926+95	121 ft. Left	1155.9						BRO	6/6/2003	Dry AB	
				0.0	1.0	Dark brown to brown, gravel, trace sand and clay, dry	AS-1	GP				
				1.0	5.0	Light brown, sandy gravel, abundant clay, moist	AS-2	GP-GC				
				5.0	9.5	Light brown, sandy gravel, with clay, moist	AS-3	GP-GC				
				9.5	11.0	Light brown, sandy gravel, with clay, moist	AS-4	GP-GC				
						Bottom of Boring / Auger Refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-206	927+01	18 ft. Left	1159.7						BKM	12/21/2002	Dry AB	Dry 24 hr AB
				0.0	2.0	Light brown to light reddish brown, sandy fat clay, abundant chert gravel, dry	AS-1	CH				
				2.0	7.0	Brown and reddish brown, fat clay, trace chert gravel, scattered chert seams	AS-2	CH				
				7.0	8.0	Reddish brown, fat clay, trace chert gravel, moist	AS-3	CH				
				8.0	11.0	Brown fat, clay, trace chert gravel, scattered chert seams, dry to moist	AS-4	CH				Chert seams every 1 to 2 feet
						Bottom of Boring / Auger Refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						
MC-207	927+11	118 ft. Right	1154.0						BKM	12/21/2002	Dry AB	Dry 24 hr AB
				0.0	2.0	Light brown to light reddish brown, sandy fat clay, with chert gravel, dry	AS-1	CH				
				2.0	8.5	Brown, fat clay, trace chert gravel, with chert seams, dry	AS-2	CH				Chert seams every 1 foot
						Bottom of Boring / Auger Refusal at 8.5 feet						
						Boring backfilled with cuttings at completion						
MC-208	927+02	214 ft. Right	1149.2						BKM	12/22/2002	Dry AB	
				0.0	1.0	Light brown to reddish brown, sandy fat clay, with chert gravel, dry		CH				
				1.0	14.5	Brown to light brown, fat clay, with chert gravel, dry	AS-1	CH				Chert seams from 4.5 to 14.5 feet
						Bottom of Boring / Auger Refusal at 14.5 feet	BULK-2	(1-14.5 ft)				Chert seams 1 to 3 feet apart
						Boring backfilled with cuttings at completion						
MC-208A	929+00	180 ft. Left	1119.9						BRO	7/8/2003	Dry AB	
				0.0	3.5	Light brown and dark brown, gravel, dry	AS-1	GP				
				3.5	8.5	Light brown and dark brown, gravel, dry	AS-2	GP				
				8.5	11.5	Light brown and dark brown, gravel, dry	AS-3	GP				
						Bottom of Boring / Auger Refusal at 11.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-209	929+02	50 ft. Left	1094.2						CSK	1/14/2003	Dry AB	
				0.0	2.5	Light reddish brown, silty chert gravel, with sand, dry	AS-1	GM				
						Bottom of Boring / Auger Refusal at 2.5 feet						
						Boring backfilled with cuttings at completion						
MC-210	929+16	70 ft. Right	1092.4						CSK	1/14/2003	Dry AB	
				0.0	2.0	Dark brown, gravelly silt, with clay, moist	AS-1	ML				
						Bottom of Boring / Auger Refusal at 2.0 feet						
						Boring backfilled with cuttings at completion						
MC-211	929+30	189 ft. Right	1082.2						CSK	1/14/2003	Dry AB	
				0.0	7.0	Light reddish brown, silty chert gravel, dry	AS-1	GM				
						Bottom of Boring / Auger Refusal at 7.0 feet						
						Boring backfilled with cuttings at completion						
MC-211A	931+00	180 ft. Left	1158.1						BRO	7/8/2003	Dry AB	
				0.0	3.5	Light brown and dark brown, gravel, dry	AS-1	GP				
				3.5	6.0	Light brown and dark brown, gravel, dry	AS-2	GP				
						Bottom of Boring / Auger Refusal at 6.0 feet						
						Boring backfilled with cuttings at completion						
MC-212	931+00	65 ft. Left	1151.7			See Roadway Core Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-213	931+12	55 ft. Right	1148.1						BKM	12/22/2002	Dry AB	
				0.0	0.8	Brown, lean clay, trace chert gravel, dry		CL				
				0.8	5.0	Light brown to light reddish brown, sandy fat clay, with scattered chert gravel, with chert seams, dry	AS-1	CH				
				5.0	18.2	Reddish brown, fat clay, with chert gravel and chert seams, moist		CH				
						Bottom of Boring / Auger Refusal at 18.2 feet	BULK-2	(0.8-18.2')				
						Boring backfilled with cuttings at completion						
MC-214	931+24	174 ft. Right	1148.4						BKM	12/22/2002	Dry AB	
				0.0	0.6	Brown, lean clay, trace chert gravel , dry		CL				
				0.6	18.4	Light brown to light reddish brown, sandy fat clay, abundant chert gravel, with chert seams, dry to moist	AS-1	CH				Chert seams 0.5-1.5' apart
						Bottom of Boring / Auger Refusal at 18.4 feet						1-ft thick chert layer at 7.5 feet
						Boring backfill with cuttings at completion						
MC-214A	933+00	180 ft. Left	1134.7						BRO	7/8/2003	Dry AB	
				0.0	3.5	Light brown, gravel, dry	AS-1	GP				
				3.5	5.0	Light brown, gravel, dry	AS-2	GP				
						Bottom of Boring / Auger Refusal at 5.0 feet						
						Boring backfill with cuttings at completion						
MC-215	932+97	71 ft. Left	1138.7						CSK	1/14/2003	Dry AB	
				0.0	8.5	Light reddish brown, silty chert gravel, dry	AS-1	GM				
						Bottom of Boring / Auger Refusal at 8.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-216	933+06	49 ft. Right	1136.8						CSK	1/14/2003	Dry AB	
				0.0	9.0	Light brown and gray, silty chert gravel, dry	AS-1	GM				
						Bottom of Boring/ Auger Refusal at 9.0 feet						
						Boring backfilled with cuttings at completion						
MC-217	933+17	166 ft. Right	1122.5						CSK	1/14/2003	Dry AB	
				0.0	8.5	Brown to light reddish brown, silty chert gravel, moist	AS-1	GM				
						Bottom of Boring / Auger Refusal at 8.5 feet						
						Boring backfilled with cuttings at completion						
MS-218	935+80	216 ft. Left	1020.8			See Structural Boring Log						
MS-219	936+09	17 ft. Right	1024.0			See Structural Boring Log						
MS-220	936+62	244 ft. Right	1020.3			See Structural Boring Log			BKM	12/20/2002	Dry AB	
MC-221	939+24	129 ft. Right	1094.0						CSK	1/18/2003	Dry AB	
				0	11.0	Light brown, silty chert gravel, dry	AS-1	GP-SM				
						Bottom of Boring / Auger Refusal at 11.0 feet						
						Boring backfilled with cuttings at completion						
MC-222	939+22	10 ft. Right	1084.8						CSK	1/18/2003	Dry AB	
				0.0	8.0	Gray and brown, chert gravel, scattered silt, dry	AS-1	GP				
						Bottom of Boring/ Auger Refusal at 8.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-223	941+03	109 ft. Left	1112.1						CSK	1/17/2003	Dry AB	
				0.0	6.0	Reddish brown sandy lean clay, few chert gravel, moist	AS-1	CL				
						Bottom of Boring / Auger Refusal at 6.0 feet						
						Boring backfilled with cuttings at completion						
MC-224	941+08	1 ft. Right	1124.7						CSK	1/17/2003	Dry AB	
				0.0	10.0	Reddish brown, silty chert gravel, with sand, dry to moist	AS-1	GM				
						Bottom of Boring / Auger Refusal at 10.0 feet	BULK-2	(0-10 ft)				
						Boring backfilled with cuttings at completion						
MC-225	941+10	121 ft. Right	1114.3						CSK	1/18/2003	Dry AB	
				0.0	8.0	Brown and gray, chert gravel, with silt, moist	AS-1	GP-GM				
				8.0	11.0	Reddish brown, silty sand, with chert gravel, dry	AS-2	SM				
						Bottom of Boring / Auger Refusal at 11.0 feet						
						Boring backfilled with cuttings completion						
MC-226	943+08	120 ft. Left	1148.5						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown, silty sand, with chert gravel, dry	AS-1	SM				
				10.0	14.5	Reddish brown, gravelly lean clay with sand, moist	AS-2	CL				
						Bottom of Boring / Auger Refusal at 14.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-227	943+08	Centerline	1141.6						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown, silty sand, with chert gravel, dry	AS-1	SM				
				10.0	20.0	Light brown, silty sand, with chert gravel, dry	AS-2	SM				
				20.0	25.5	Light brown, silty sand, with chert gravel, dry		SM				
						Bottom of Boring / Auger Refusal at 25.5 feet	BULK-3	(0-25.5 ft)				
						Boring backfilled with cuttings at completion						
MC-228	943+07	125 ft. Right	1117.2						CSK	1/18/2003	Dry AB	
				0	3.0	Light reddish brown, sandy silt, with chert gravel, moist	AS-1	ML				
						Bottom of Boring / Auger Refusal at 3.0 feet						
						Boring backfilled with cuttings at completion						
MC-229	945+08	120 ft.. Left	1169.5			See Roadway Core Boring Logs						
MC-230	945+08	Centerline	1150.2						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown, sandy silt, with chert gravel, dry	AS-1	ML				
				10.0	16.5	Light brown, clayey sand, scattered chert gravel, moist	AS-2	SC				
						Bottom of Boring / Auger Refusal at 16.5 feet						
						Boring backfilled with cuttings at completion						
MC-231	945+08	120 ft. Right	1129.2						CSK	1/18/2003	Dry AB	
				0.0	10.0	Light reddish brown, silty sand with chert gravel, dry	AS-1	SM				
				10.0	11.5	Light reddish brown, silty sand with chert gravel, dry						
						Bottom of Boring / Auger Refusal at 11.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-232	947+08	120 ft. Left	1162.7						BKM	5/8/2003	Dry AB	Dry 24 hr AB
				0.0	3.0	Brown and light reddish brown, lean clay, with gravel, dry	AS-1	CL				
				3.0	11.0	Reddish brown, lean clay, scattered gravel and chert seams, dry	AS-2	CL				
				11.0	18.5	Brown and light reddish brown, lean clay, with gravel, moist	AS-3	CL				
				18.5	26.0	Light brown, lean clay, scattered to with gravel and chert seams, moist	AS-4	CL				
				26.0	26.5	Gray limestone, hard						
						Bottom of Boring / Auger Refusal at 26.5 feet						
						Boring backfilled with cuttings at completion						
MC-233	947+08	Centerline	1138.4						CSK	1/18/2003	Dry AB	
				0.0	9.5	Light brown to light reddish brown, silty sand, with chert gravel (highly weathered chert), dry	AS-1	SM				
						Bottom of Boring / Auger Refusal at 9.5 feet						
						Boring backfilled with cuttings at completion						
MC-234	947+08	120 ft. Right	1117.9						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown, gravelly silt, with sand, dry	AS-1	ML				
				10.0	17.5	Light reddish brown and white, silty gravel, dry	AS-2	GM				
						Bottom of Boring / Auger Refusal at 17.5 feet						
						Boring backfilled with cuttings at completion						
MC-235	949+08	120 ft. Left	1168.0						CSK	1/17/2003	Dry AB	
				0.0	5.0	Light reddish brown, silt, with sand, trace gravel, dry to moist	AS-1	ML				
				5.0	9.5	Reddish brown, sandy silt, with chert gravel, dry	AS-2	SM				
						Bottom of Boring / Auger Refusal at 9.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-236	949+08	Centerline	1160.3						CSK	1/17/2003	Dry AB	
				0.0	6.5	Light reddish brown, silty sand, with chert gravel, dry	AS-1	SM				
						Bottom of Boring / Auger Refusal at 6.5 feet						
						Boring backfilled with cuttings at completion						
MC-237	949+08	120 ft. Right	1144.3						CSK	1/17/2003	Dry AB	
				0.0	8.0	Light reddish brown, silty lean clay, with sand and chert gravel, moist	AS-1	CL/ML				
				8.0	14.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
						Bottom of Boring / Auger Refusal at 14.0 feet						
						Boring backfilled with cuttings at completion						
MC-238	951+08	120 ft. Left	1195.9						CSK	1/17/2003	Dry AB	
				0	8.0	Light reddish brown and white, silty chert gravel, dry	AS-1	GM				
				8.0	10.5	Reddish brown, sandy lean clay, with chert seams	AS-2	CL				
						Bottom of Boring / Auger Refusal at 10.5 feet						
						Boring backfilled with cuttings at completion						
MC-239	951+08	Centerline	1176.3						CSK	1/17/2003	Dry AB	
				0.0	10.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-1	CL				
				10.0	19.5	Light brown, clayey sand, with chert gravel, moist	AS-2	SC				
						Bottom of Boring / Auger Refusal at 19.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-240	951+08	120 ft. Right	1151.4						CSK	1/18/2003	Dry AB	
				0.0	5.0	Brown to reddish brown, silty lean clay, with sand, few chert gravel, moist	AS-1	CL/ML				
				5.0	15.0	Reddish brown, clayey sand, with chert gravel, moist	AS-2	SC				
				15.0	21.5	Reddish brown, clayey gravel, with sand, moist	AS-3	GC				
						Bottom of Boring / Auger Refusal at 21.5 feet	BULK-4	(5.0 to 21.5 feet)				
						Boring backfilled with cuttings at completion						
MC-241	953+08	120 ft. Left	1197.7						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown sandy silt with chert gravel, dry	AS-1	SM				
				10.0	11.5	Light reddish brown sandy silt with chert gravel, dry, with chert seams	AS-2	SM				
						Bottom of Boring / Auger Refusal at 11.5 feet						
						Boring backfilled with cuttings at completion						
MC-242	953+08	Centerline	1180.7						CSK	1/15/2003	Dry AB	
				0.0	5.0	Reddish brown, clayey sand, with chert gravel, moist	AS-1	SC				
				5.0	15.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-2	CL				
				15.0	20.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				Possible void from 20 to 22.5 feet
				20.0	26.0	Reddish brown, sandy lean clay, with chert gravel, moist		CL				
						Bottom of Boring / Auger Refusal at 26.0 feet	Boring backfilled with cuttings at completion					
MC-243	953+08	120 ft. Right	1183.5						CSK	1/15/2003	Dry AB	
				0.0	5.0	Reddish brown, clayey chert gravel, moist	AS-1					
				5.0	15.0	Light reddish brown and white, highly weathered chert, with clay seams, dry	AS-2					
				15.0	25.0	Light reddish brown and white, highly weathered chert, with clay seams, dry	AS-3					
				25.0	30.0	Light reddish brown and white, highly weathered chert, with clay seams, dry						Possible void from 28 to 30 feet
						Bottom of Boring / Auger Refusal at 30.0 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-244	955+08	120 ft. Left	1188.7						CSK	1/17/2002	Dry AB	
				0.0	9.0	Light reddish brown and white, silty sandy chert gravel, dry	AS-1	GM				
						Bottom of Boring / Auger Refusal at 9.0 feet						
						Boring backfilled with cuttings at completion						
MC-245	955+08	Centerline	1179.6						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown, sandy silt, with chert gravel, dry	AS-1	SM				
				10.0	20.0	Light reddish brown and white, silty chert gravel, with sand, dry	AS-2	GM				With clay seams below 15 feet
				20.0	23.0	Light reddish brown and white, silty chert gravel, with sand, dry						
						Bottom of Boring / Auger Refusal at 23.0 feet	BULK	(0-20.0 ft)				
						Boring backfilled with cuttings at completion						
MC-246	955+14	122 ft. Right	1147.6						CSK	1/17/2003	Dry AB	
				0.0	2.5	Brown and white, chert, with silt	AS-1					
						Bottom of Boring / Auger Refusal at 2.5 feet						
						Boring backfilled with cuttings at completion						
MC-247	957+08	120 ft. Left	1152.0						CSK	1/17/2003	Dry AB	
				0.0	8.5	Light reddish brown, sandy silt, with chert gravel, dry	AS-1	SM				
						Bottom of Boring / Auger Refusal at 8.5 feet						
						Boring backfilled with cuttings at completion						
MC-248	957+08	Centerline	1146.3						CSK	1/17/2003	Dry AB	
				0.0	10.0	Light reddish brown, sandy silt, with chert gravel, dry to moist	AS-1	SM				
				10.0	11.5	Light reddish brown, sandy silt, with chert gravel and chert seams, dry to moist, with clay seams		SM				
						Bottom of Boring / Auger Refusal at 11.5 feet	Boring backfilled with cuttings at completion					

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-249	957+07	125 ft. Right	1117.9						CSK	1/17/2003	Dry AB	
				0.0	7.5	Brown and white, weathered chert, with silt seams, dry	AS-1					
						Bottom of Boring / Auger Refusal at 7.5 feet						
						Boring backfilled with cuttings at completion						
MC-250	959+01	123 ft. Left	1157.0						CSK	1/19/2003	Dry AB	
				0.0	5.0	Light reddish brown, silty sand, scattered chert gravel, dry	AS-1	SM				
				5.0	15.0	Light reddish brown, silty sand, scattered chert gravel, dry, with chert seams	AS-2	SM				
				15.0	21.5	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				Hard rock at 20.0 feet
						Bottom of Boring / Auger Refusal at 21.5 feet						
						Boring backfilled with cuttings at completion						
MC-251	959+08	Centerline	1150.1						CSK	1/19/2003	Dry AB	
				0.0	10.0	Light reddish brown, silty sand, with chert gravel, dry	AS-1	SM				Hard chert seam 6.5-8.0 feet
				10.0	14.0	Reddish brown, sandy gravel, with silt, dry	AS-2	GP				
				14.0	20.0	Reddish brown, sandy lean clay, with chert gravel, moist	AS-3	CL				
						Bottom of Boring / Auger Refusal at 20.0 feet						
						Boring backfilled with cuttings at completion						
MC-252	959+08	120 ft. Right	1133.3						CSK	1/19/2003	Dry AB	
				0.0	10.0	Light brown and light reddish brown, silty chert gravel, dry	AS-1	GM				Hard chert seam 5-6.0 feet
				10.0	20.0	Gray and light reddish brown, chert gravel, with silt, dry	AS-2	GP				
				20.0	28.0	Gray and light reddish brown, chert gravel, with silt, dry	AS-3	GP				
						Bottom of Boring / Auger Refusal at 28.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-253	961+08	120 ft. Left	1183.4			See Roadway Core Boring Logs						
MC-254	961+08	Centerline	1180.4						CSK	1/16/2003	Dry AB	
				0.0	9.0	Light reddish brown, silty chert gravel, dry	AS-1	GM				
						Bottom of Boring / Auger Refusal at 9.0 feet						
						Boring backfilled with cuttings at completion						
MC-255	961+08	120 ft. Right	1173.5						CSK	1/16/2003	Dry AB	
				0.0	10.0	Light reddish brown and white, sandy silt, with chert gravel/highly weathered chert, dry	AS-1	SM				
				10.0	20.0	Reddish brown, sandy silt, with chert gravel/highly weathered chert, dry	AS-2	SM				
						Bottom of Boring / Auger Refusal at 20.0 feet						
						Boring backfilled with cuttings at completion						
MC-256	963+14	134 ft. Left	1108.2						CSK	1/19/2003	Dry AB	
				0.0	1.0	Gray, chert and limestone	AS-1					
						Bottom of Boring / Auger Refusal at 1.0 foot						
						Boring backfilled with cuttings at completion						
MC-257	963+05	7 ft. Right	1144.8						CSK	1/19/2003	Dry AB	
				0.0	7.0	Gray and light brown, chert gravel, with silt and sand, dry	AS-1	GP				
						Bottom of Boring / Auger Refusal at 7.0 feet	BULK-2	(0-7.0 feet)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-258	963+05	128 ft. Right	1158.7						CSK	1/19/2003	Dry AB	
				0.0	6.0	White and light reddish brown, weathered chert, with silt seams, dry	AS-1	GP-GM				
				6.0	14.0	Light reddish brown and gray, chert gravel, scattered silt, dry	AS-2	GP				
				14.0	21.5	Reddish brown, sandy gravel, with silt, moist	AS-3	GP-GM				
						Bottom of Boring / Auger Refusal at 21.5 feet						
						Boring backfilled with cuttings at completion						
MS-259	963+89	193 ft. Left	1075.1			See Roadway Structure Boring Logs						
MS-260	964+72	3 ft. Right	1070.1			See Roadway Structure Boring Logs						
MS-261	965+57	258 ft. Right	1058.5			See Roadway Structure Boring Logs						
MC-262	967+08	120ft. Left	1166.1						CSK	1/21/2003	Dry AB	
				0.0	10.0	Reddish-brown and white, sandy chert gravel, with fat clay seams, dry to moist	AS-1	GP				
				10.0	20.0	Light reddish-brown and white, sandy chert gravel with silt, dry	AS-2	GP				
				20.0	29.5	Light reddish-brown and white, sandy chert gravel, with silt, dry						No cuttings returned
						Bottom of Boring / Auger Refusal at 29.5 feet						
						Backfilled with cuttings at completion						
MC-263	967+08	Centerline	1155.6						CSK	1/21/2003	Dry AB	
				0.0	10.0	Light reddish-brown, silty sand, with chert gravel, dry	AS-1	SM				
				10.0	15.0	Reddish-brown, silty sand, with chert gravel, dry	AS-2	SM				
				15.0	19.0	Reddish-brown, sandy lean clay, with chert gravel, moist	AS-3	CL				
						Bottom of Boring at 19.0 feet	BULK-4					
						Backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-264	967+08	120ft. Right	1138.9						CSK	1/21/2003	Dry AB	
				0.0	3.5	Light brown, silty chert gravel, dry		GM				
				3.5	10.0	Light reddish-brown, silty sand, with chert gravel, dry	AS-1	GM				
				10.0	20.0	White and light reddish-brown, chert gravel, with silt, dry	AS-2	GP-GM				
				20.0	30.0	White and light reddish-brown, chert gravel, with silt, dry	AS-3	GP-GM				
						Bottom of Boring at 30.0 feet						
						Backfilled with cuttings 1/21/03						
MC-265	969+08	120 ft. Left	1194.6						CSK	1/21/2003	Dry AB	Dry 8 days AB
				0.0	10.0	Light reddish-brown and white, silty sand/highly weathered chert, with chert gravel, dry	AS-1	SM	SPB	1/29/2003	Dry AB	Dry 24 hrs AB
				10.0	20.0	Light reddish-brown and white, silty sand/highly weathered chert, with chert gravel, dry	AS-2	SM				
				20.0	30.0	Light reddish-brown and white, silty sand, with chert gravel, less weathered, dry	AS-3	SM				
				30.0	40.0	White and brown, chert gravel, scattered silt , dry	AS-4	GP				
				40.0	55.0	White and brown, chert gravel, scattered silt, dry						no cuttings returned - forced into walls
				55.0	66.0	No cuttings returned to surface, forced into side walls, chert layer from 56 to 57 feet	AS-12					
						chert seam from 62.5 to 63.5 feet						
				66.0	71.5	Broken chert with clay seams, difficult drilling, augers skipping						
						Bottom of Boring / Auger Refusal at 71.5 feet						
						Boring backfilled with cuttings at completion						
MC-266	969+08	Centerline	1183.4						CSK	1/21/2003	Dry AB	
				0.0	10.0	Light reddish-brown, silty sand, with chert gravel/highly weathered chert, with clay seams, dry to moist	AS-1	SM				
				10.0	20.0	Light reddish-brown, silty sand, with chert gravel/highly weathered chert, with clay seams, dry to moist	AS-2	SM				
				20.0	24.0	Reddish-brown, clayey gravel, with sand, moist	AS-3	GC				
						Bottom of Boring / Auger Refusal at 24.0 feet	BULK-4	(0 to 24 feet)				
						Backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-267	969+08	120ft. Right	1167.7						CSK	1/21/2003	Dry AB	
				0.0	10.0	Light reddish-brown, silty sand, with chert gravel, dry	AS-1	SM				
				10.0	20.0	Reddish-brown, silty gravelly sand, dry	AS-2	SM				
				20.0	30.0	Reddish-brown, sandy lean clay, scattered chert gravel, moist	AS-3	CL				
				30.0	40.0	Reddish-brown, sandy lean clay, scattered chert gravel, moist	AS-4	CL				
				40.0	50.0	Reddish-brown, sandy lean to fat clay, scattered sand, moist	AS-5	CL/CH				
				50.0	55.0	Reddish-brown, sandy lean to fat clay, scattered sand, moist	AS-6	CL/CH				
						Bottom of Boring at 55.0 feet						
						Backfilled with cuttings at completion						
MC-268	971+08	120 ft. Left	1198.5						CSK	1/20/2003		
				0.0	10.0	Light reddish brown, silty sand, scattered chert gravel/highly weathered chert, dry	AS-1	SM			Dry AB	
				10.0	20.0	Light reddish brown, silty sand, scattered chert gravel/highly weathered chert, dry	AS-2	SM				
				20.0	27.0	Light reddish brown, silty sand, scattered chert gravel/highly weathered chert, dry	AS-3	SM				
						Bottom of Boring / Auger Refusal at 27.0 feet						
						Boring backfilled with cuttings at completion						
MC-269	971+04	2 ft. Left	1156.3						CSK	1/20/2003		
				0.0	10.0	Light brown and white, chert gravel, scattered silt, dry	AS-1	GP			Dry AB	
				10.0	14.5	Light brown and white, chert gravel, scattered silt, dry	AS-2	GP				
						Bottom of Boring / Auger Refusal at 14.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-270	971+01	117 ft. Right	1143.6						CSK	1/20/2003		
				0.0	10.0	Light reddish brown, silty chert gravel, dry	AS-1	GM			Dry AB	
				10.0	13.0	Hard chert layer						
				13.0	20.0	Reddish brown, silty sand, with chert gravel, dry to moist	AS-2	SM				
				20.0	30.0	Reddish brown, clayey sand, with chert gravel, moist	AS-3	SC				
				30.0	35.0	Reddish brown, chert gravel, with clay and clay seams, moist	AS-4	GP-GC				
						Bottom of Boring / Auger Refusal at 35.0 feet						
						Boring backfilled with cuttings at completion						
MC-271	973+08	120 ft. Left	1205.0			See Roadway Core Boring Logs			BRO	8/20/2003	Dry AB	Dry 24 hr AB
MC-272	973+08	Centerline	1188.8						CSK	1/20/2003		
				0.0	10.0	Light reddish brown, silty sand, with chert gravel/highly weathered chert, dry	AS-1	SM			Dry AB	
				10.0	13.5	White, silty sand, with chert gravel/highly weathered chert, dry	AS-2	SM				
						Bottom of Boring / Auger Refusal at 13.5 feet	BULK-3	(0-13.5 feet)				
						Boring backfilled with cuttings at completion						
MC-273	973+06	120 ft. Right	1177.6						CSK	1/20/2003		
				0.0	4.0	Reddish brown, sandy lean to fat clay, with chert gravel, moist	AS-1	CL/CH			Dry AB	
				4.0	10.0	White, silty sand, with chert gravel/highly weathered chert, dry	AS-2					
				10.0	13.5	Light reddish brown, silty sand, with chert gravel/highly weathered chert, dry	AS-3					
						Bottom of Boring / Auger Refusal at 13.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-274	975+08	120 ft. Left	1180.1						CSK	1/20/2003		
				0.0	10.0	Light reddish brown, silty sand, with chert gravel/highly weathered chert, dry	AS-1	SM				
						Bottom of Boring / Auger Refusal at 10.0 feet						
						Boring backfilled with cuttings at completion						
MC-275	975+08	Centerline	1154.5						CSK	1/20/2003		
				0.0	10.0	Reddish brown and white, silty chert gravel, dry	AS-1	GM			Dry AB	
				10.0	17.5	Light reddish brown, sandy silt, with chert gravel, dry	AS-2	SM				
						Bottom of Boring / Auger Refusal at 17.5 feet						
						Boring backfilled with cuttings at completion						
MC-276	974+99	116 ft. Right	1146.2						CSK	1/20/2003		
				0.0	10.0	Light reddish brown, silty sand, scattered chert gravel, dry	AS-1	SM			Dry AB	
				10.0	12.0	Light reddish brown, silty sand, scattered chert gravel, with clay seams, dry	AS-2	SM				
						Bottom of Boring / Auger Refusal at 12.0 feet						
						Boring backfilled with cuttings at completion						
MC-277	977+16	118 ft. Left	1131.7						SPB	1/28/2003		
				0.0	10.0	Light reddish-brown, brown and white, clayey chert gravel, dry	AS-1	GC			Dry AB	Dry 24 hrs AB
				10.0	12.5	Light reddish-brown, brown and white, clayey chert gravel, dry	AS-2	GC				
						Bottom of Boring / Auger Refusal at 12.5 feet	BULK-3	(0-12.5 feet)				
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-278	977+16	1 ft. Right	1122.9						SPB	1/28/2003		Dry AB
				0.0	5.0	Brown and light brown, chert gravel and cobbles, dry	AS-1	GP				Dry 24 hours AB
				5.0	10.0	Brown and dark gray, chert gravel, trace sand, with chert seams, dry	AS-2	GP				
				10.0	15.0	Brown and dark gray, chert gravel, trace sand, dry	AS-3	GP				Hard chert seam from 13.5 to 14 feet
				15.0	18.0	Reddish-brown and dark gray, fat clayey chert gravel, moist	AS-4	GC				Hard chert seam from 16 to 16.5 feet
						Bottom of Boring at 18.0 feet						
						Boring backfilled with cuttings at completion						
MC-279	977+15	126 ft. Right	1110.6						SPB	1/28/2003		Dry AB
				0.0	5.0	Dark gray and brown, chert gravel, with chert seams, trace clay, dry, chert layer from 5 to 6 feet	AS-1	GP				Dry 24 hrs AB
				5.0	10.0	Dark gray and brown, chert gravel, with chert seams and clay, moist	AS-2	GP-GC				
				10.0	12.0	Dark gray and brown, chert gravel, with chert seams and clay, moist						
						Bottom of Boring / Auger Refusal at 12.0 feet						
						Boring backfilled with cuttings at completion						
MC-280	979+15	119 ft. Left	1173.9						SPB	1/28/2003		Dry AB
				0.0	5.0	Light reddish-brown and white, clayey chert gravel, abundant chert seams, dry	AS-1	GC				Dry 24 hrs AB
				5.0	10.0	Light reddish-brown and white, clayey chert gravel, abundant chert seams, dry	AS-2	GC				
				10.0	15.0	Light reddish-brown and white, clayey chert gravel, abundant chert seams, dry	AS-3	GC				
				15.0	20.0	Beige and white chert gravel, with sand and clay, with chert seams, dry	AS-4	GP				
				20.0	25.0	White, chert gravel, dry	AS-5	GP				Chert layer from 25 to27 feet, few cuttings returning to surface
				25.0	30.0	Light brown and white, chert gravel, abundant chert layers and seams, dry	AS-6	GP				
				30.0	31.5	Light brown and white, chert gravel, dry		GP				
						Bottom of Boring / Auger Refusal at 31.5 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-281	979+02	1 ft. Right	1151.4						SPB	1/28/2003		Dry AB
				0.0	5.0	Reddish-brown, cherty lean clay, trace chert seams, dry	AS-1	CL				Dry 24 hrs AB
				5.0	10.0	Light reddish-brown and white, clayey chert gravel, abundant chert seams, dry	AS-2	GC				(Abundant chert seams (4-8" thick)
				10.0	15.0	Light reddish-brown and white, chert gravel, with sand and clay, dry	AS-3	GP-GC				
				15.0	20.0	Light reddish-brown and white chert gravel, with sand and clay, dry	AS-4	GP-GC				
				20.0	25.0	Reddish-brown and white, fat clayey chert gravel, with chert seams, dry to moist	AS-5	GC				
				25.0	30.0	Reddish-brown and white and gray fat clayey chert gravel, with chert seams, moist	AS-6	GC				
				30.0	35.0	Reddish-brown and white, chert gravel, with sand and clay, moist	AS-7	GP-GC				
				35.0	40.0	Reddish-brown and white, chert gravel, with sand and clay, moist	AS-8	GP-GC				
				40.0	46.5	Brown and gray, chert gravel with sand and clay, with chert seams, moist	AS-9	GP-GC				
						Bottom of boring / Auger refusal at 46.5 feet						
						Boring backfilled with cuttings at completion						
MC-282	979+13	120 ft. Right	1131.6						SPB	1/28/2003		Dry AB
				0.0	5.0	Reddish-brown and brown, lean clay, with chert gravel and sand, dry	AS-1	CL				Dry 24 hours AB
				5.0	10.0	Light reddish-brown and white, clayey chert gravel, with sand, dry	AS-2	GC				Chert layers from 6 to 7 feet and 8 to 9 feet
				10.0	15.0	Light reddish-brown and white, clayey chert gravel, with sand, dry	AS-3	GC				1-ft thick chert layer
				15.0	20.0	Reddish-brown, white and gray, chert gravel, with sand and clay, trace chert seams	AS-4	GP-GC				
				20.0	25.5	Reddish-brown, white and gray, chert gravel, with sand and clay, trace chert seams	AS-5	GP-GC				
						Bottom of Boring / Auger Refusal at 25.5 feet						
						Boring backfilled with cuttings at completion						
MC-283	981+08	120 ft. Left	1183.0			See Roadway Core Boring Logs						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-284	981+05	6 ft. Left	1155.7						SPB	1/28/2003		Dry AB
				0.0	2.0	Brown, lean clay, with chert gravel and cobbles, dry		CL				Dry 24 hrs AB
				2.0	5.0	Reddish-brown and white, lean clay, with sand, trace chert gravel, with chert seams, dry	AS-1	CL				
				5.0	10.0	Light reddish-brown and white, cherty lean clay, with chert seams, dry	AS-2	CL				
				10.0	13.0	Light reddish-brown and white, cherty lean clay, dry	AS-3	CL				
				13.0	20.0	Brown and white, clayey chert gravel, dry	AS-4	GC				
				20.0	25.0	Reddish-brown and white, cherty fat clay, moist	AS-5	CH				
				25.0	27.0	Reddish-brown and white, cherty fat clay, moist	ST-6	CH				pushed tube 20", recovered 22"
				25.0	40.0	Reddish-brown and white, fat clay, with sand and chert gravel, trace chert seams, moist	AS-7	CH			no cuttings recovered, possibly packing around augers	
				40.0	51.0	Reddish-brown and white, fat clay, with sand and chert gravel, trace chert seams, moist	AS-8	CH				cuttings returned below 40 feet
						Bottom of Boring at 51.0 feet	BULK-9	(20 to 51 feet)				
						Boring backfilled with cuttings at completion						
MC-285	981+07	111 ft. Right	1118.7						SPB	1/28/2003	Dry AB	Dry 24 hrs AB
				0.0	5.0	Brown and gray, lean clay, with sand and chert gravel, dry	AS-1	CL				
				5.0	10.0	Reddish-brown and white, lean clay, with sand and chert gravel, trace chert seams, dry	AS-2	CL				
				10.0	14.0	Reddish-brown, white and gray, lean clay, with sand and chert gravel, dry	AS-3	CL				Chert layer from 10 to 11 feet
						Bottom of Boring at 14.0 feet						
						Boring backfilled with cuttings at completion						

ROADWAY BORING LOGS
I 49 - MISSOURI
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft) From	Depth (Ft) To	Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
MC-286	983+14	119 ft. Left	1141.8						SPB	1/29/2003	Dry AB	Dry 24 hrs AB
				0.0	2.0	Light brown and white, clayey chert gravel, moist	AS-1	GC				
				2.0	5.0	Reddish-brown and white, fat clay, with chert gravel, moist	AS-2	CH				
				5.0	10.0	Reddish-brown and white, chert fat clay, trace chert layers, dry	AS-3	CH				
				10.0	15.0	Reddish-brown and white, chert fat clay, trace chert layers, dry	AS-4	CH				
				15.0	20.0	Reddish-brown and white, chert fat clay, trace chert layers, dry	AS-5	CH				
				20.0	25.0	Reddish-brown and white, fat clay, with sand and chert gravel, with chert seams, moist	AS-6	CH				Chert layer from 20.0 to 21.5 feet
				25.0	30.0	Reddish-brown and white, fat clay, with chert gravel and sand, abundant chert layers, moist	AS-7	CH				
				30.0	37.0	Reddish-brown, white and gray, clayey chert gravel, with chert seams, moist	AS-8	GC				
						Bottom of Boring at 37.0 feet						
						Boring backfilled with cuttings at completion						
MC-287	983+04	7 ft. Left	1118.4						SPB	1/27/2003	Dry AB	Dry 24 hrs AB
				0.0	5.0	Brown, light reddish-brown and white, chert cobbles and gravel, with clay and sand, dry	AS-1	GP-GC				
				5.0	10.0	Reddish-brown, white and gray, clayey chert gravel, dry	AS-2	GC				Gray chert layer from 5 to 6.5 feet
				10.0	14.0	Reddish-brown, white and gray, clayey chert gravel, dry	AS-3	GC				
						Bottom of Boring at 14.0 feet						
						Boring backfilled with cuttings at completion						
MS-288	987+29	300 ft. Left	1040.3			See Roadway Structure Boring Logs						
MS-289	986+60	Centerline	1041.9			See Roadway Structure Boring Logs						
MS-290	986+00	300 ft. Right	1038.0			See Roadway Structure Boring Logs						

9.3 Roadway Core Boring Logs
Boring Log
Geologic Log
Core Photograph

Geologic Log Legend

CT-Chert LS-Limestone SH-Shale
Solid lines represent joints and fractures
Dashed lines represent intact contacts between rock types

LOG OF BORING NO. MC-1

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 731+00, 120 Feet left of centerline

Approx. Surface Elev.: 1045.6 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY GRAVEL light grayish brown, dry	2	GM	1	AS						
	1043.6										
	GRAVEL, trace clay seams light gray and reddish brown, dry		GP								
		5	GP	2	AS						
	- with clay seams below 10 feet	10	GP	3	AS						
	14.5 1031.1										
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	15		RUN 1	DB	93%	RQD 63%				
		20									
		25		RUN 2	DB	100%	RQD 75%				
		30									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-15-02		
BORING COMPLETED	10-16-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-1.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-1

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	35		RUN 3	DB	100%	RQD 90%				
	38.5 1007.1										
	BOTTOM OF BORING AT 38.5 FEET BACKFILLED WITH CUTTINGS 10/15/02										
	++ Classification estimated from rock cores. Petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▼ DRY	WD	▼ DRY AB
WL	▼		▼
WL			

Terracon

BORING STARTED	10-15-02		
BORING COMPLETED	10-16-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-1.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-1

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	OVERBURDEN									
	14.5 1031.1									
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	15		RUN 1	DB	93%	RQD 63%			
	CT									
	REED SPRINGS FORMATION									
	LS									
	CT CLAY SEAM									
	CT, TR LS	20								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-15-02		
BORING COMPLETED	10-16-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED CSK		JOB #	J7P0601

BOREHOLE 99 MC-1.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-1

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid									
	CT									
	24.5 1021.1									
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	25		RUN 2	DB	100%	RQD 75%			
	CT									
	Continued Next Page	30								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	10-15-02		
BORING COMPLETED	10-16-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-1.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-1

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid CT									
	34.5 1011.1									
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid CT	35		RUN 3	DB	100%	RQD 90%			
	38.5 1007.1									

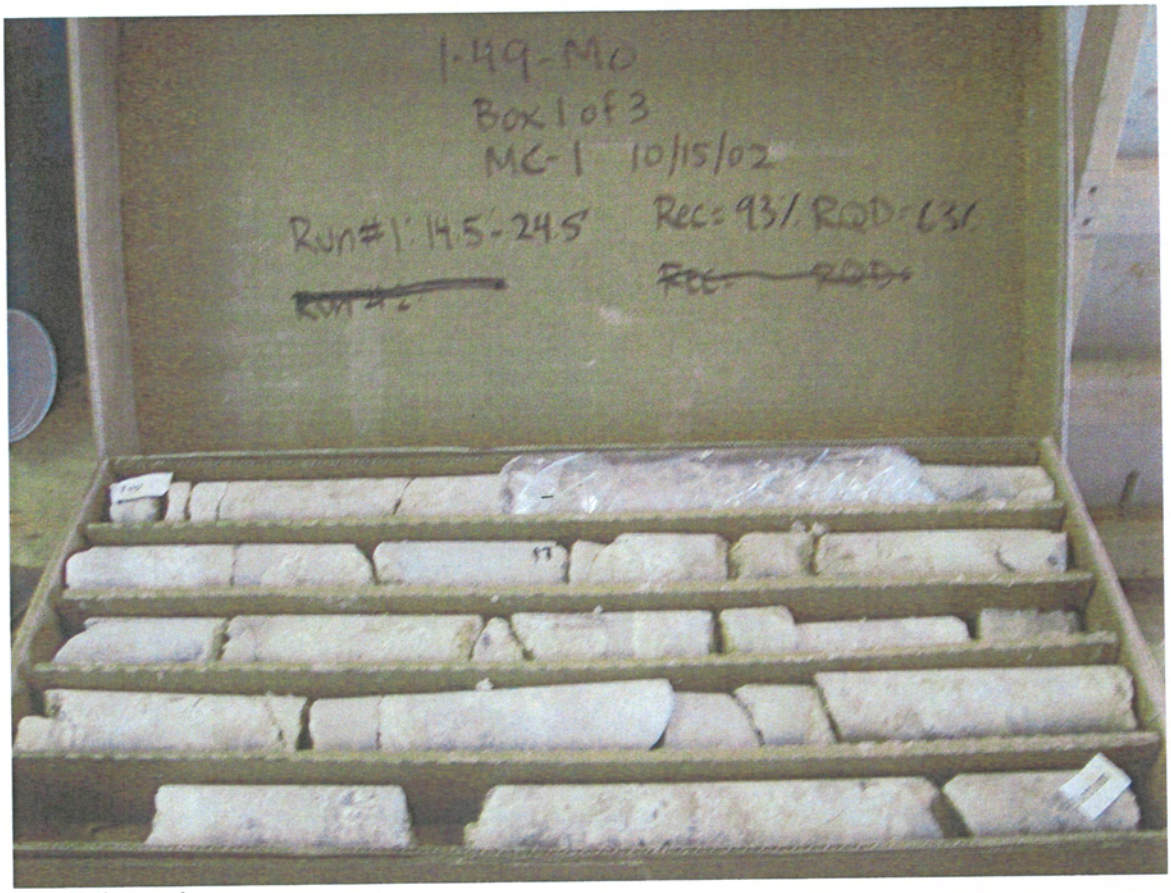
The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▽		▼
WL			

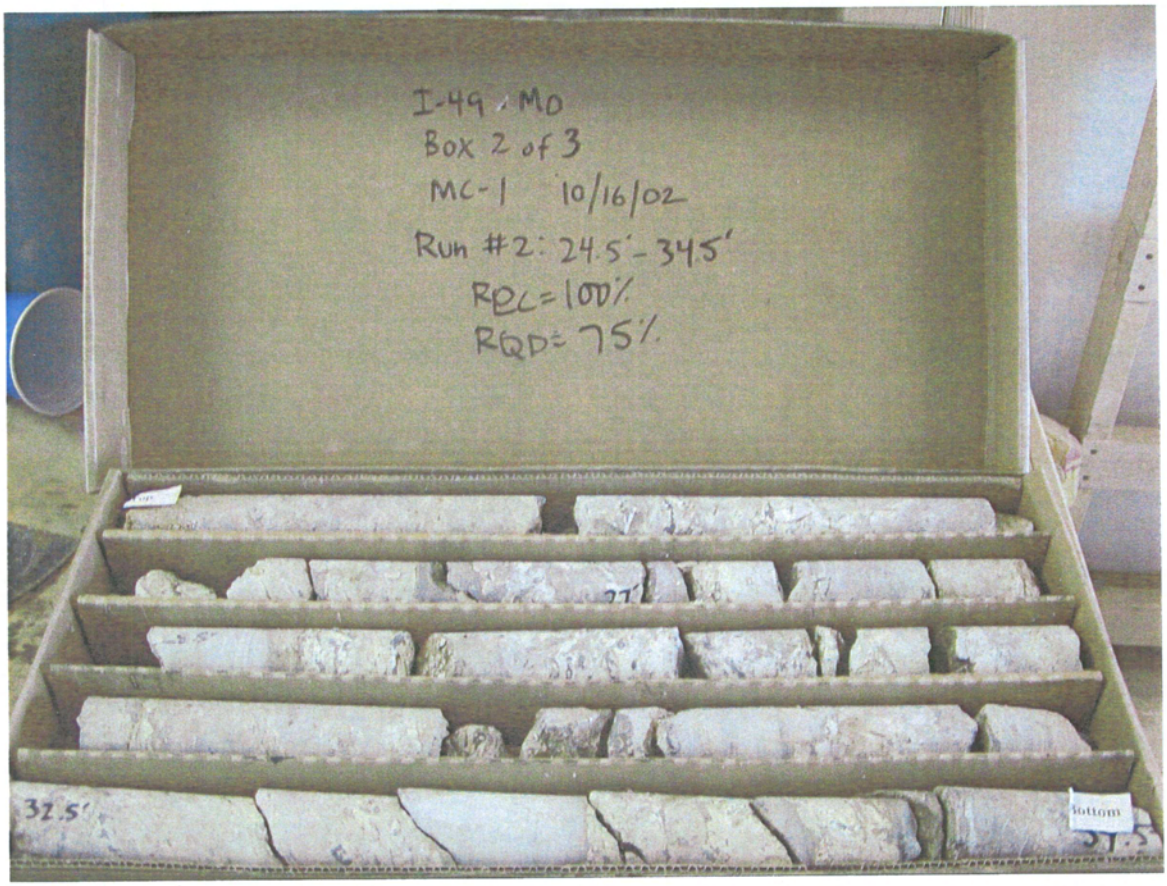
Terracon

BORING STARTED	10-15-02		
BORING COMPLETED	10-16-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

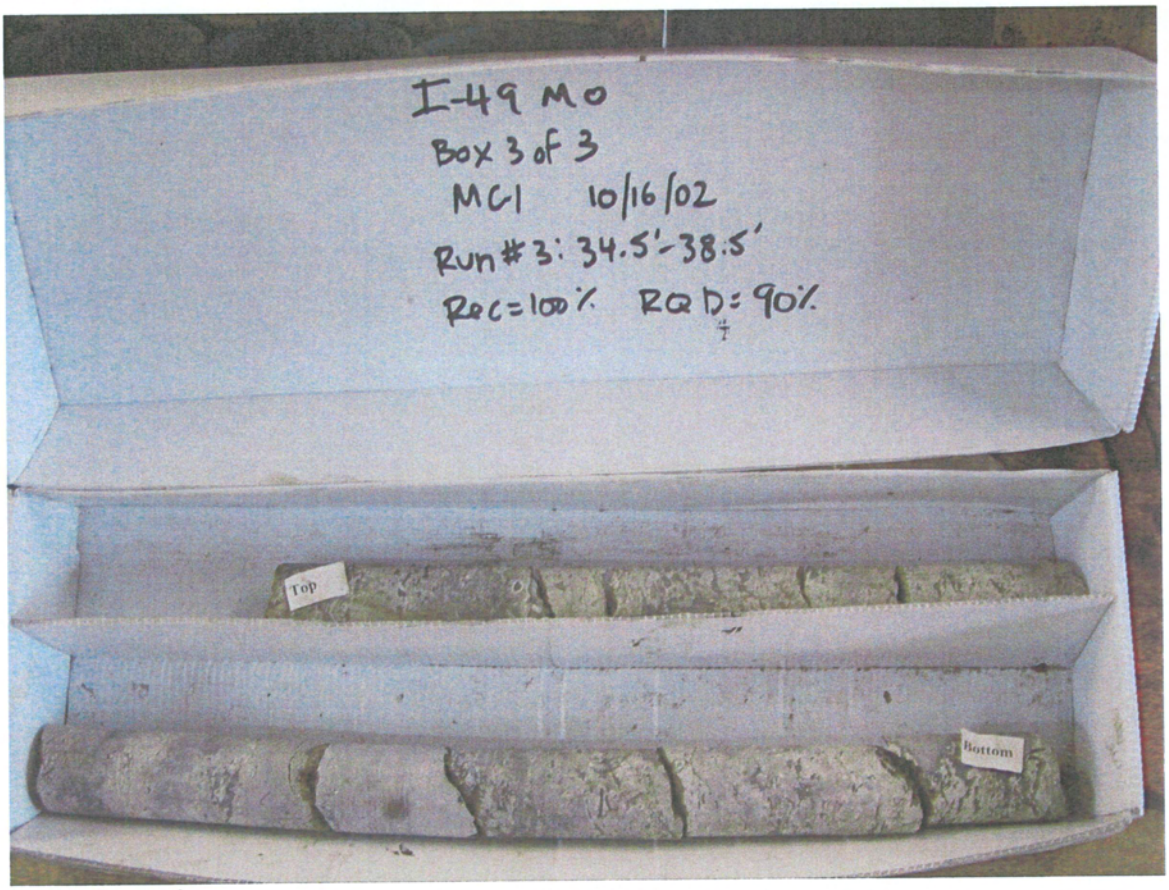
BOREHOLE 99 MC-1.GPJ TERRACON.GDT 12/5/03



I 49 Missouri
Missouri J7P0601
Boring MC-1
Run No. 1
14.5 Feet to 24.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-1
Run No. 2
24.5 Feet to 34.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-1
Run No. 3
34.5 Feet to 38.5 Feet

LOG OF BORING NO. MC-11

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 752+91, 38 Feet right of centerline

Approx. Surface Elev.: 1089.7 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
GRAVELLY LEAN CLAY light brown, dry to moist	3.5	CL	1	AS						
	1086.2									
LEAN CLAY, trace sand and gravel reddish brown, moist	5	CL	2	AS						
	9									
	1080.7									
CHERT++ stratified, abundant clay seams, white and reddish brown, thin bedded, very fine grained, highly weathered, medium hard to moderately hard, with vugs and cavities	10		RUN 1	DB	100%	RQD 10%				
	15		RUN 2	DB	91%	RQD 47%				
	17.5									
	1072.2									
CHERT++ stratified, trace limestone seams, white and light gray, thin bedded, very fine grained, weathered, moderately hard, with vugs (decreasing with depth)	20									
	25		RUN 3	DB	96%	RQD 79%				
BOTTOM OF BORING AT 29 FEET BACKFILLED WITH CUTTINGS 04/15/03										
++ Classification estimated from rock cores. Petrographic analysis may reveal other rock types.	29									
	1060.7									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	4-15-03		
BORING COMPLETED	4-15-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-11.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-11

CLIENT
HNTB

GEOLOGIC LOG

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 752+91, 38 Feet right of centerline

DESCRIPTION

Approx. Surface Elev.: 1089.7 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf

NO LOG
DRAWN
No original sketch

9 1080.7

	10		RUN 1	DB	100%	RQD 10%			

Continued Next Page

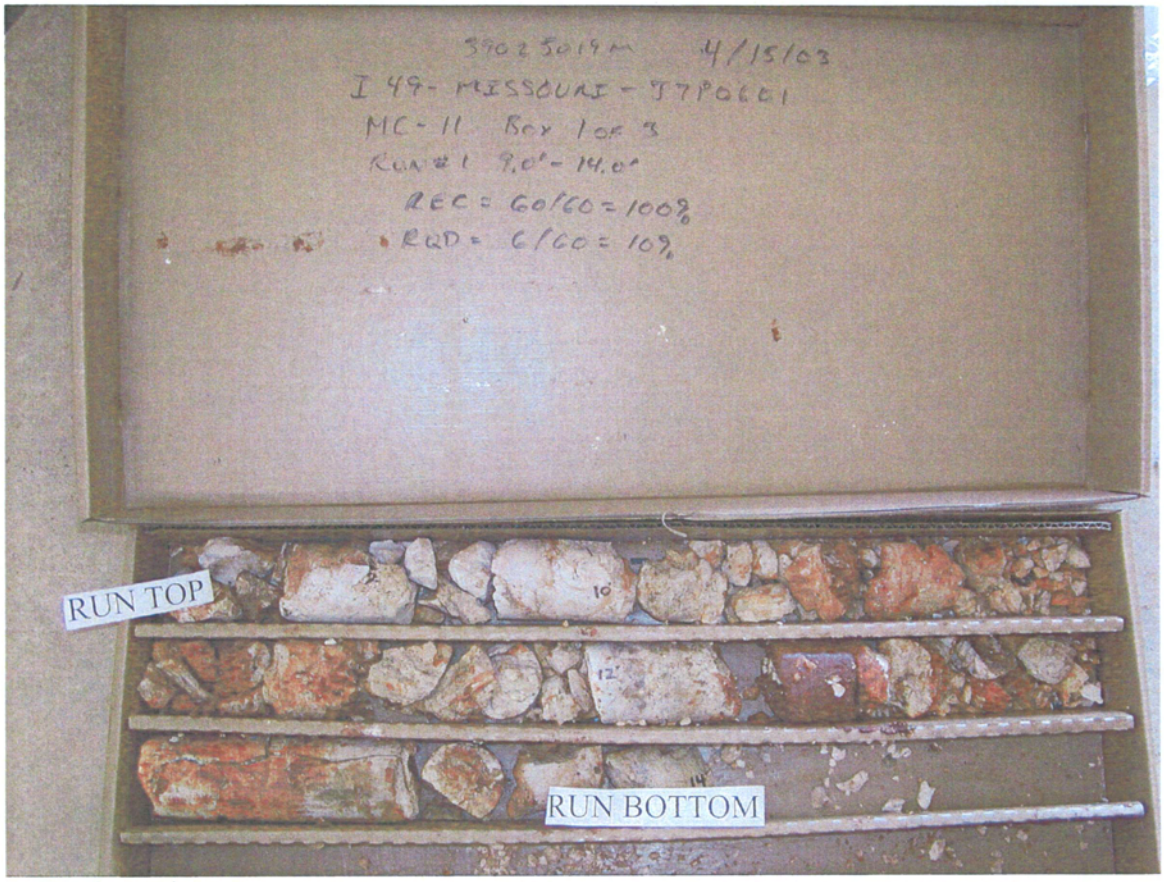
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

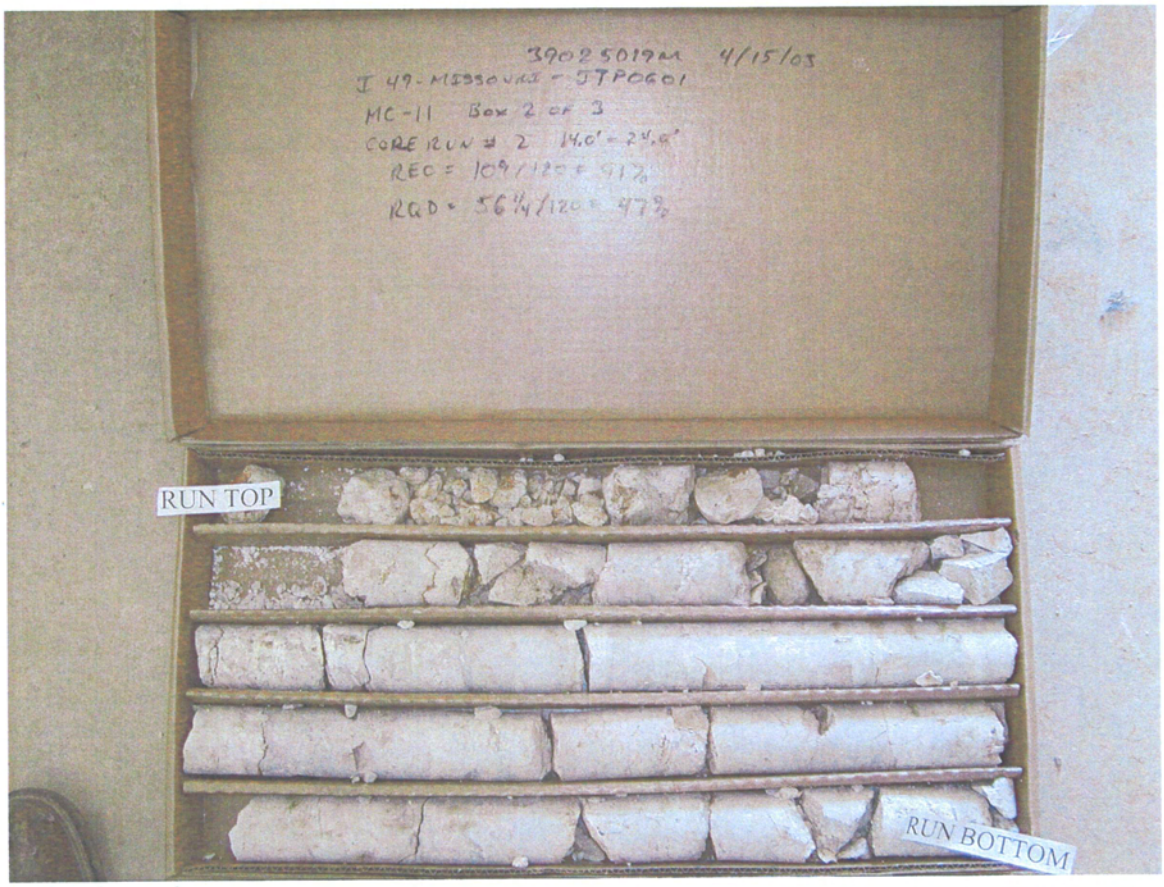
Terracon

BORING STARTED	4-15-03		
BORING COMPLETED	4-15-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-11.GPJ TERRACON.GDT 12/5/03



I 49 Missouri
Missouri J7P0601
Boring MC-11
Run No. 1
9.0 Feet to 14.0 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-11
Run No. 2
14.0 Feet to 24.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-11
Run No. 3
24.0 Feet to 29.0 Feet

LOG OF BORING NO. MC-18

CLIENT: HNTB

PROJECT: Measured Section

SITE: McDONALD COUNTY, MISSOURI

Boring Location: 733+00, Centerline

Approx. Surface Elev.: 1001.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	CHERT OUTCROPS thin beds exposed in vegetated gravel cover									
	18	983.7								
	EXPOSED BEDROCK interbedded limestone and chert with talus light gray and gray, medium bedded Photo 10									
	28	973.7								
	ROCK FACE interbedded limestone and chert light gray and gray, medium to thick bedded									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED	
BORING COMPLETED	
RIG	FOREMAN
Logged SPB	JOB # J7P0601

BOREHOLE 99 5019MC16.GPJ TERRACON.GDT 7/22/03

LOG OF BORING NO. MC-18

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: Measured Section

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	ROCK FACE interbedded limestone and chert light gray and gray, medium to thick bedded	35								
	36 MC-18 at bottom of rock face 965.7 **EXPOSED BEDROCK** interbedded limestone and chert with talus light gray and gray, medium bedded Photos 6, 7, 8, 9	40								
	51.5 950.2 **ROCK FACE** interbedded limestone and chert light gray and gray, medium to thick bedded Photos 3, 4, 5	45 50 55 60								
	62.5 939.2 **CHERT OUTCROPS** medium to thick beds exposed in vegetated gravel cover	65								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED

BORING COMPLETED

RIG | FOREMAN

Logged SPB | JOB # J7P0601

BOREHOLE 99 5019MC16.GPJ TERRACON.GDT 7/22/03

LOG OF BORING NO. MC-18

CLIENT: HNTB

PROJECT: Measured Section

SITE: McDONALD COUNTY, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	CHERT OUTCROPS medium to thick beds exposed in vegetated gravel cover	70								
		75								
	78.5 GRAVEL STREAM BED 923.2									
	BOTTOM OF MEASURED SECTION AT 78.5 FEET Photos 1 and 2 show cliff exposure at MC-18 and MC-20.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▽	▼
WL		

Terracon

BORING STARTED			
BORING COMPLETED			
RIG		FOREMAN	
Logged	SPB	JOB #	J7P0601

BOREHOLE 99 5019MC16.GPJ TERRACON.GDT 7/22/03

Photo 1: MC-18 & MC-20 Cliff Exposure
MC-18 is located on the leftmost rock exposure (gray). MC-20 is located in the trees on the right side of the photo. Both locations are approximately midway up the cliff. Photo was taken facing southeast.

Photo 2: MC-18 & MC-20 Cliff Exposure 2
Similar to Photo 1 – photo taken facing generally east. MC-18 is located on leftmost exposure and MC-20 is located in treed valley on right side of photo. A stream is present at the base of the exposure.

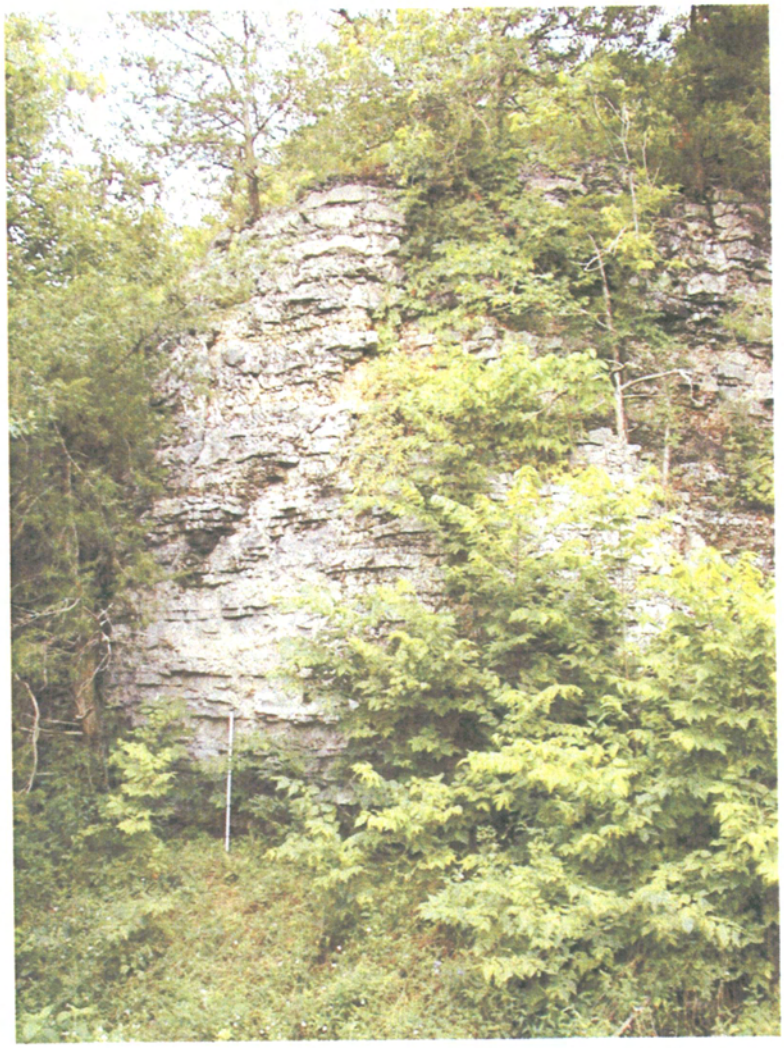


Photo 3: Basal rock outcrop
Exposure of interbedded limestone and chert. Jacob staff on bottom is 5 feet long for scale. Streambed is located at lower leftmost corner of photo.

Photo 4: Lower half of basal outcrop.
Detail of lower section of basal outcropping of interbedded chert and limestone. Blocky fracture layers are limestone beds. Angular fracture layers are chert beds. Jacob staff is 5 feet long with 1-foot divisions (gray) for scale.

Photo 5: Upper section of basal outcrop.
Detail of upper section of basal outcropping of interbedded chert and limestone. Top of exposure not shown. Blocky fracture layers are limestone beds. Angular fracture layers are chert beds. Jacob staff is 5 feet long with 1-foot divisions (gray) for scale.

Photo 6: Outcrops near MC-18.
Rock slope with outcropping limestone and chert beds looking south from MC-18. MC-18 is located in the lower center of the photo. MC-20 is located in the valley near trees shown in the upper right corner. Jacob staff is 5 feet long for scale.

Photo 7: Rock scree and outcrops near MC-18.
MC-18 is located near the fallen stake in center of photo. Surface consists of broken limestone and chert gravel and fractured rock shelves.

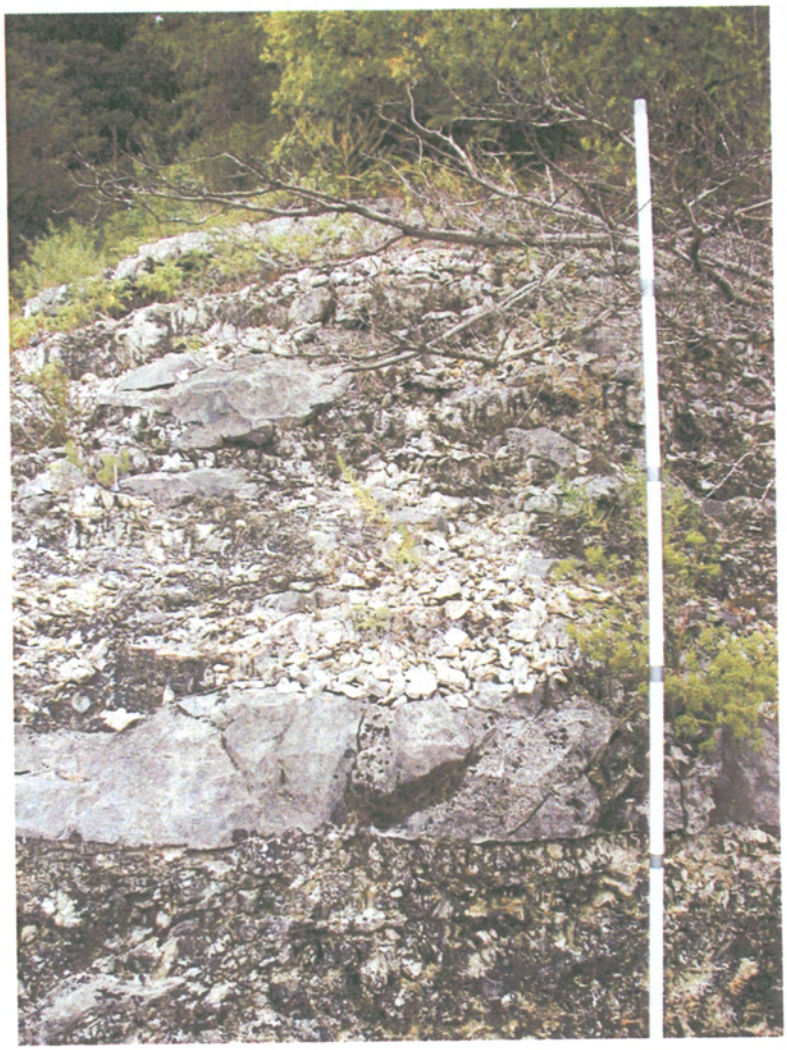


Photo 8: Detail of outcrop above MC-18.
Interbedded chert and limestone outcrop. Blocky fracture layers (gray) are limestone beds. Angular fracture layers (white and also black exposure in bottom of photo) are chert beds. Jacob staff is 5 feet long with 1-foot divisions (gray) for scale.

Photo 9: Staked location of MC-18.
MC-18 was marked with pink paint near the end of the wood lathe. Limestone and chert layers are exposed at the surface near left and right sides of the photo.

Photo 10: Rock outcrop near middle of exposure, below MC-18.
Shown are interbedded chert and limestone beds. This exposure is located approximately 30 feet south of the basal outcrop shown in Photos 1 through 3. The top of this outcrop is at a similar elevation as the top of the basal outcrop. Jacob staff is 5 feet long with 1-foot divisions (gray) for scale.

LOG OF BORING NO. MC-21

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 737+00, 120 Feet left of centerline

Approx. Surface Elev.: 1052.5 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY GRAVEL light grayish brown, dry	2	GM	1	AS						
	1050.5										
	GRAVEL, with sand, with clay seams light reddish brown and light gray, dry		GP GC	2	AS						
	1047.5	5									
	GRAVEL, with sand, with clay seams reddish brown and light gray, dry to moist		GP GC	3	AS						
		10	GP GC	4	AS						
		15	GP GC	5	AS						
	21.5 ▽ 1031.0	20									
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 1	DB	100%	RQD 64%				
		25									
		30		RUN	DB	100%	RQD				

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 21.5 WD	▽ DRY	AB
WL	▽	▽	
WL			

Terracon

BORING STARTED	10-16-02		
BORING COMPLETED	10-17-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-21.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-21

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	35		2			46%				
		40									
		45		RUN 3	DB	100%	RQD 95%				
		50		RUN 4	DB	100%	RQD 92%				
	55.5 997.0	55									
	BOTTOM OF BORING AT 55.5 FEET BACKFILLED WITH CUTTINGS 10/17/02										

++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 21.5 WD	▽ DRY AB	
WL	▽	▽	
WL			

Terracon

BORING STARTED	10-16-02		
BORING COMPLETED	10-17-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-21.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-21

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
	21.5 ▽ 1031.0									
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 1	DB	100%	RQD 64%			
	CT, TR LS									
	LS REED SPRINGS FORMATION									
	CT, TR LS									
		25								
		30								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 21.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	10-16-02		
BORING COMPLETED	10-17-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-21.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-21

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT, TR LS	**CHERT++** stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	31.5								
		1021.0								
CT, TR LS	**CHERT++** stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 2	DB	100%	RQD 46%			
		35								
CT, TR LS Ls		40								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 21.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	10-16-02		
BORING COMPLETED	10-17-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 MC-21.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-21

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT LS	**CHERT++** stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid									
41.5	1011.0									
CT, TR LS	**CHERT++** stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 3	DB	100%	RQD 95%			
CT, TR LS		45								
CT, TR LS		50								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 21.5	WD ▽ DRY	AB
WL	▽	▽	
WL			

Terracon

BORING STARTED	10-16-02		
BORING COMPLETED	10-17-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED CSK		JOB #	J7P0601

BOREHOLE 99 MC-21.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-21

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid CT, TR LS									
	51.5 1001.0									
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid CT, TR LS			RUN 4	DB	100%	RQD 92%			
	55.5 997.0	55								

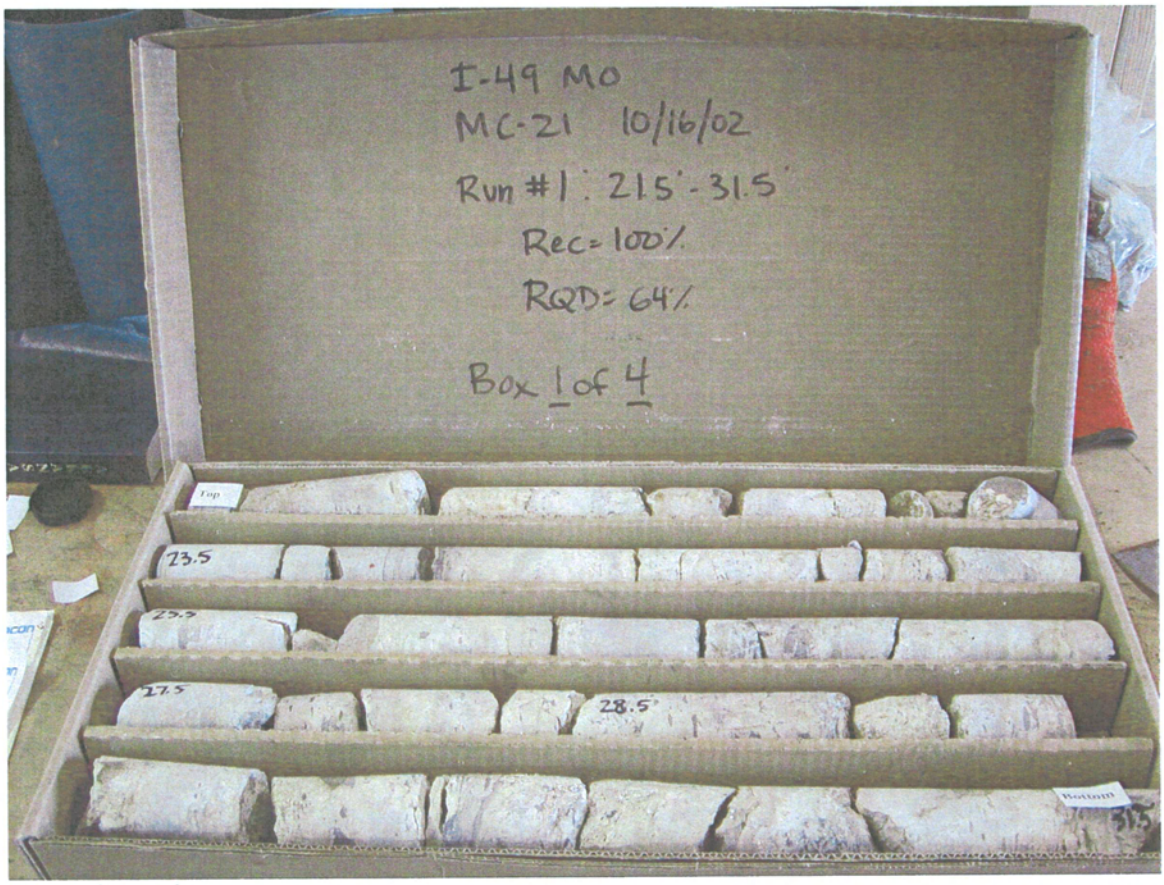
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 21.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

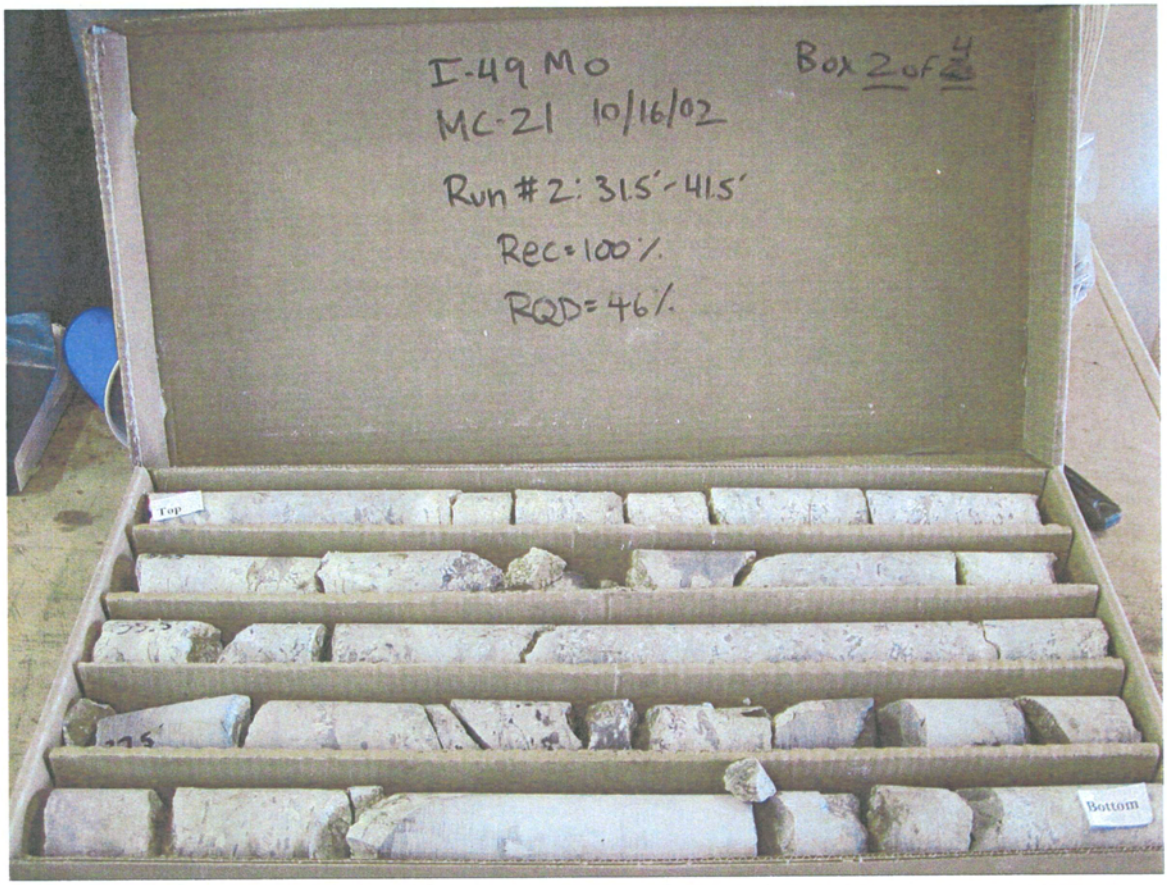
Terracon

BORING STARTED	10-16-02		
BORING COMPLETED	10-17-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

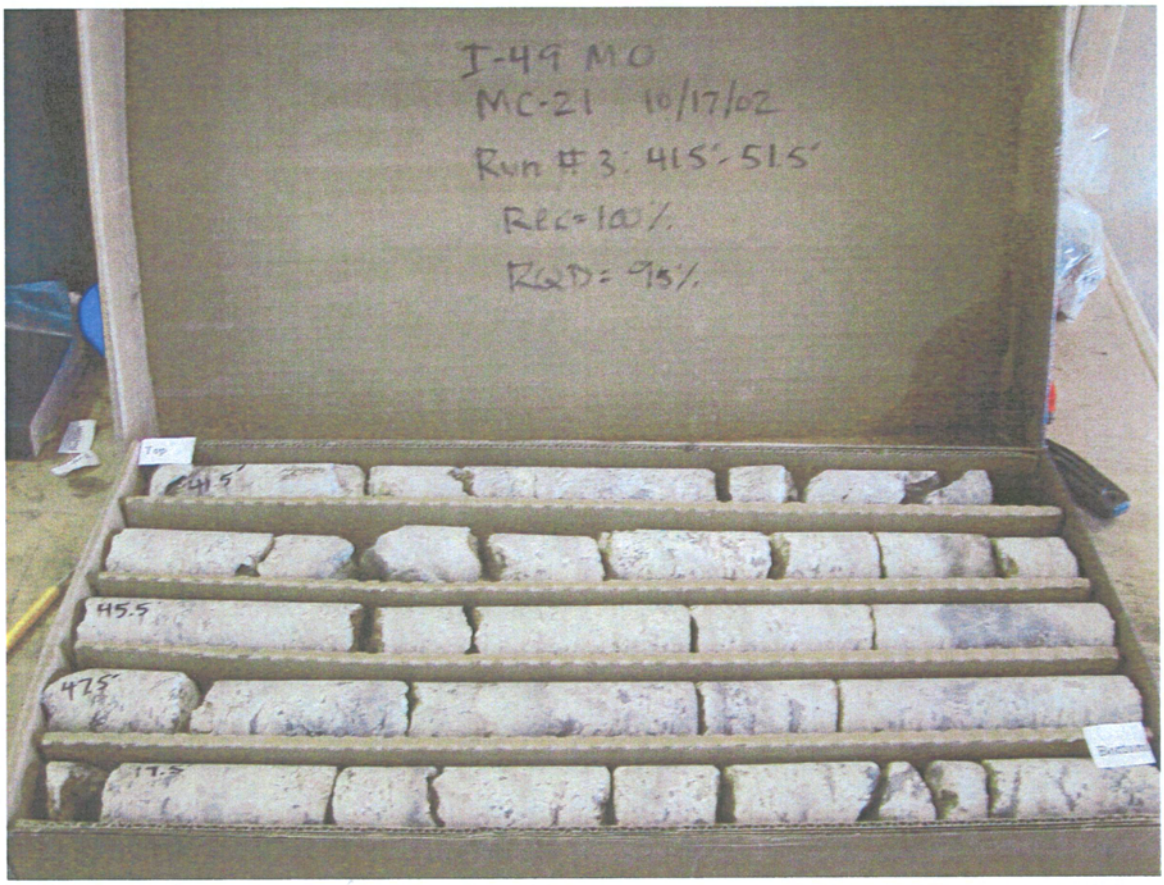
BOREHOLE 99 MC-21.GPJ TERRACON.GDT 12/5/03



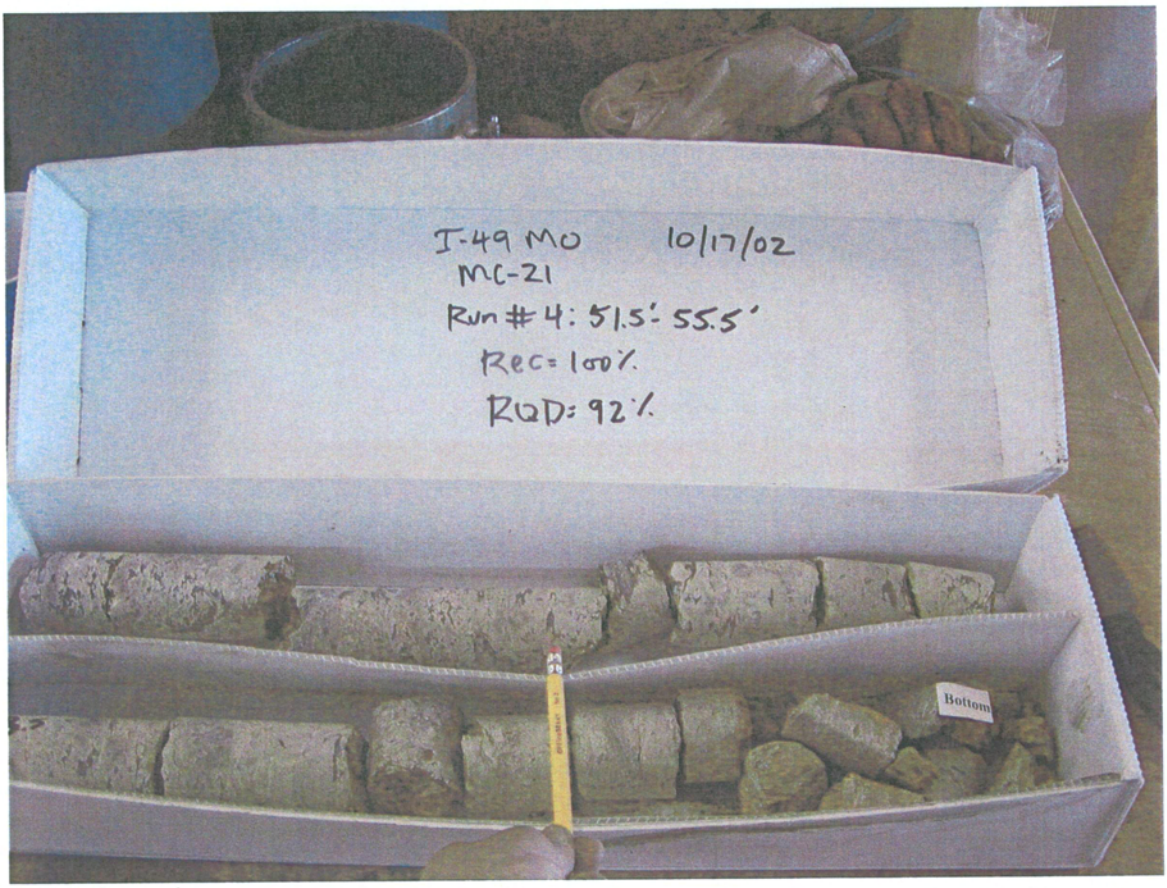
I 49 Missouri
Missouri J7P0601
Boring MC-21
Run No. 1
21.5 Feet to 31.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-21
Run No. 2
31.5 Feet to 41.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-21
Run No. 3
41.5 Feet to 51.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-21
Run No. 4
51.5 Feet to 55.5 Feet

LOG OF BORING NO. MC-28

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 747+00, 100 Feet right of centerline

Approx. Surface Elev.: 1080.5 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
GRAVEL AND COBBLES, with sand and clay dark brown and white, dry	2	GP	1	AS						
1078.5										
GRAVEL, with clay, with chert seams white and light reddish brown, dry	5	GP	2	AS						
1075.5										
CLAYEY GRAVEL, scattered chert seams white and reddish brown, moist	10	GC	3	AS						
		GC	4	AS						
1067.5	13									
SANDY GRAVEL, with clay, with chert seams light brown, moist to wet	15	GP	5	AS						
1060.5	20									
BROKEN CHERT, with clay seams, abundant chert seams and beds light brown and white, moist	20	GP	6	AS						
	25	GP	7	AS						
▽ 1052.5	28									
CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 1	DB	77%	RQD 58%				
	30		RUN 2	DB	100%	RQD 59%				

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 27.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED SPB		JOB #	J7P0601

BOREHOLE 99 MC-28.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-28

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
△ △ △ △ △ △	34.5 - weathered and vuggy below 33.5 feet 1046.0			RUN 3	DB	97%	RQD 39%				

BOTTOM OF BORING AT 34.5 FEET
BACKFILLED WITH CUTTINGS 11/13/02

++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 27.5	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-28.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-28

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
	LS GRAVEL									
	27.5 ▽ 1053.0	25								
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 1	DB	77%	RQD 58%			
	CT + LS – INTERBEDDED									
	REED SPRINGS FORMATION									
	LS									
	CT									
	30 1050.5	30								
	Continued Next Page									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 27.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-28.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-28

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT / LS	**CHERT++** stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 2	DB	100%	RQD 59%			
	32	1048.5								
CT / LS / CT	**CHERT++** stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid - weathered and vuggy below 33.5 feet dissolution - smooth, rounded			RUN 3	DB	97%	RQD 39%			
	34.5	1046.0								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 27.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-28.GPJ TERRACON.GDT 12/6/03

I 49 Missouri
Missouri J7P0601
Boring MC-28
Run No. 1
27.5 Feet to 30.0 Feet
Run No. 2
30.0 Feet to 32.0 Feet
Run No. 3
32.0 Feet to 34.5 Feet

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 788+00, 120 Feet left of centerline

Approx. Surface Elev.: 1117.4 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
SILT, trace gravel and sand, with clay seams light reddish brown, dry	5	ML	1	AS						
1112.4										
SANDY LEAN CLAY, with gravel reddish brown, moist	10	CL	2	AS						
1107.4										
SILTY GRAVEL AND SAND light reddish brown, dry	15	GP GM	3	AS						
	20	GP GM	4	AS						
	25	GP GM	5	AS						
1092.4										
CLAYEY GRAVEL, with chert seams and beds white and reddish brown, moist	30	GC	6	AS						
		GC	7	AS						

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽ Dry 24 hr	AB	▽
WL			

Terracon

BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-64.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	CLAYEY GRAVEL, with chert seams and beds white and reddish brown, moist	35									
			GC	8	AS						
		40	GC	9	AS						
	43 1074.4										
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid	45		RUN 1	DB	100%	RQD 43%				
		50		RUN 2	DB	85%	RQD 21%				
		55		RUN 3	DB	100%	RQD 25%				
		60									
		65		RUN 4	DB	99%	RQD 15%				

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▽ DRY	AB
WL	▽ Dry 24 hr	AB ▽	
WL			

Terracon

BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-64.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid	70		RUN 5	DB	100%	RQD 22%				
	75 1042.4	75									
	BOTTOM OF BORING AT 75 FEET BACKFILLED WITH CUTTINGS ON 10/25/02										

++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ Dry 24 hr	AB	▽	
WL				

Terracon

BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
43	1074.4									
CT LS CT CT CT CT CT LS CT CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid REED SPRINGS FORMATION	45		RUN 1	DB	100%	RQD 43%			
48 CT	1069.4									
CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid	50		RUN 2	DB	85%	RQD 21%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ Dry 24 hr AB	▽	
WL			

Terracon

BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED SPB		JOB #	J7P0601

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid									
Damaged	53.5	1063.9								
CT LS CT LS CT LS CT LS CT LS LS CT CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid	55		RUN 3	DB	100%	RQD 25%			
		60								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ Dry 24 hr	AB	▽	
WL				

Terracon

BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-64.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS, CHERTY LS, CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid CT w/LS - broken and recemented w/calcite, some crystals									
62.5	1054.9									
CT, LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid CT- highly fractured CT- highly fractured	65		RUN 4	DB	99%	RQD 15%			
68.5	1048.9									
LS, CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid highly fractured	70		RUN 5	DB	100%	RQD 22%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY	AB
WL	▽ Dry 24 hr AB	▽	
WL			

Terracon

BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-64.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-64

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
LS CT LS LS LS LS CT CT LS LS CT LS CT CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid CT - Lightly fractured	75								
	1042.4	75								

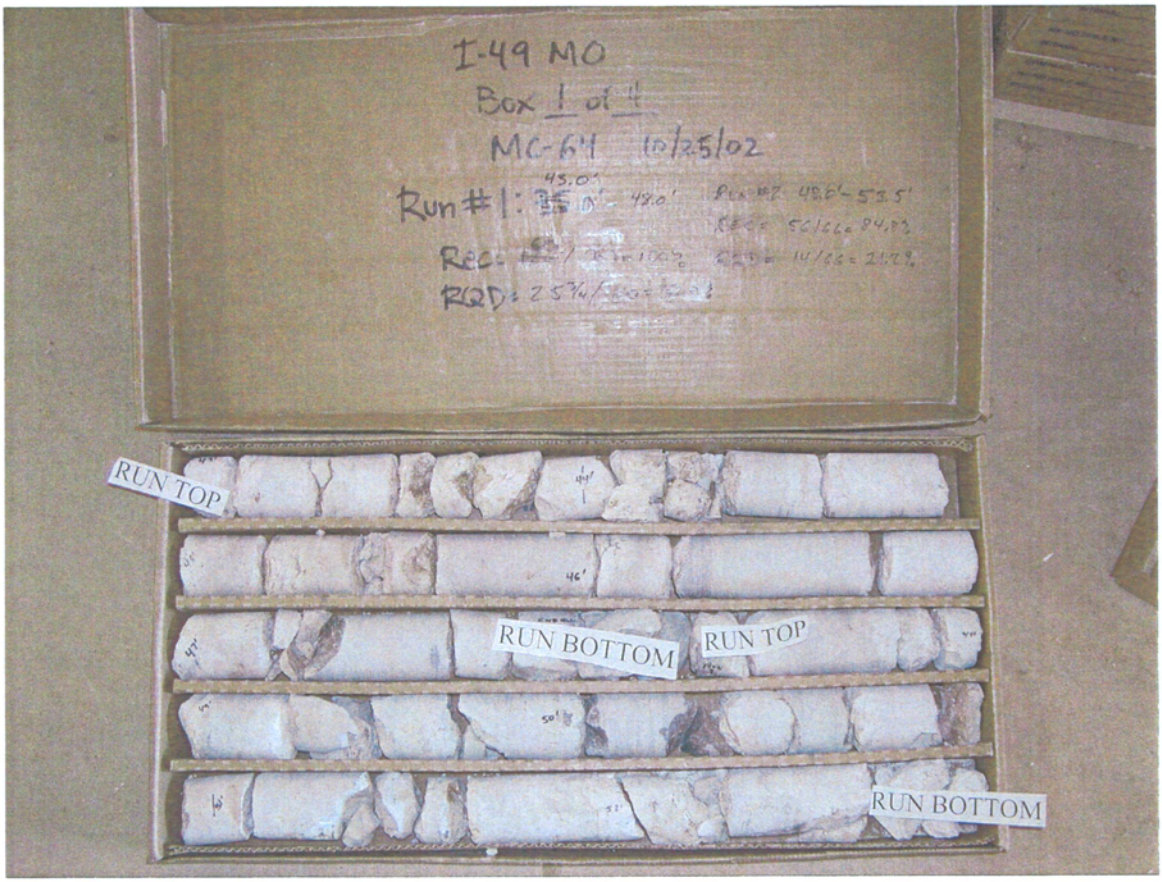
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ Dry 24 hr	AB	▽	
WL				

Terracon

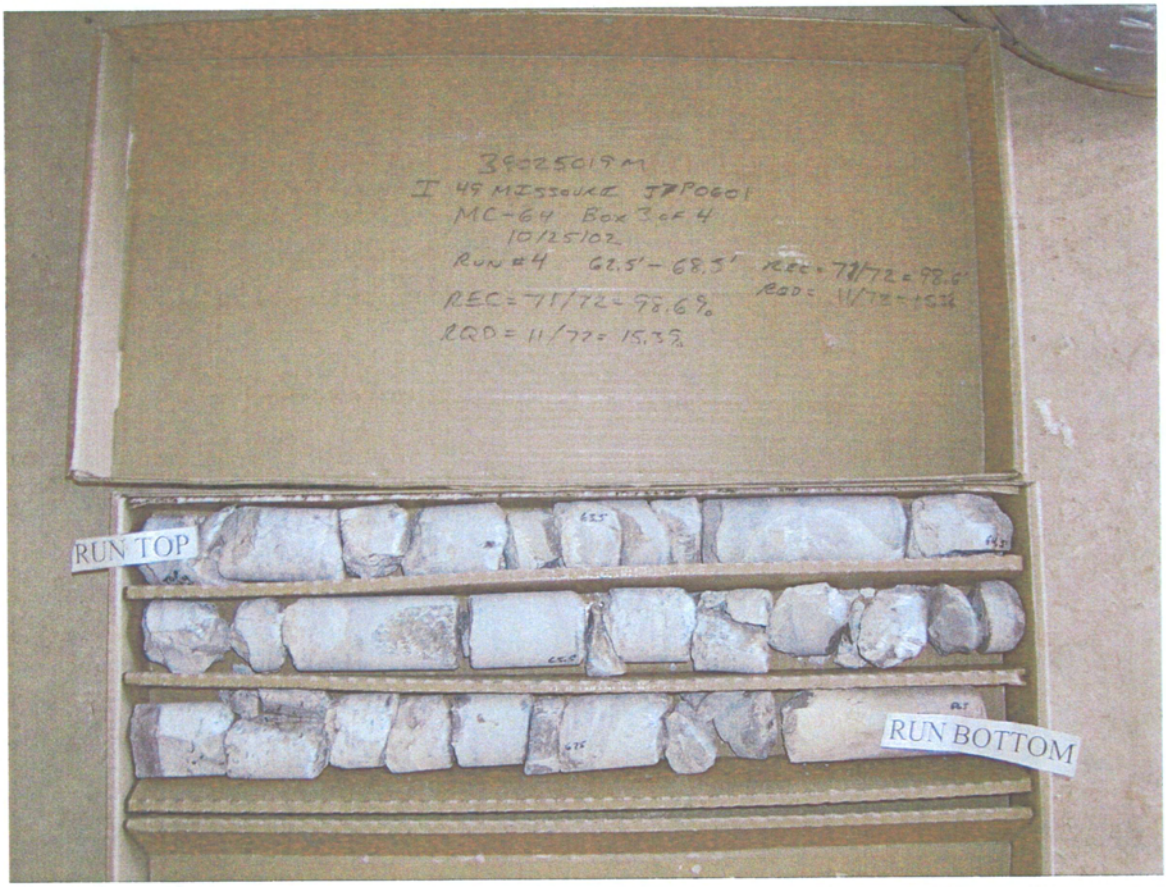
BORING STARTED	10-23-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-64.GPJ TERRACON.GDT 12/5/03

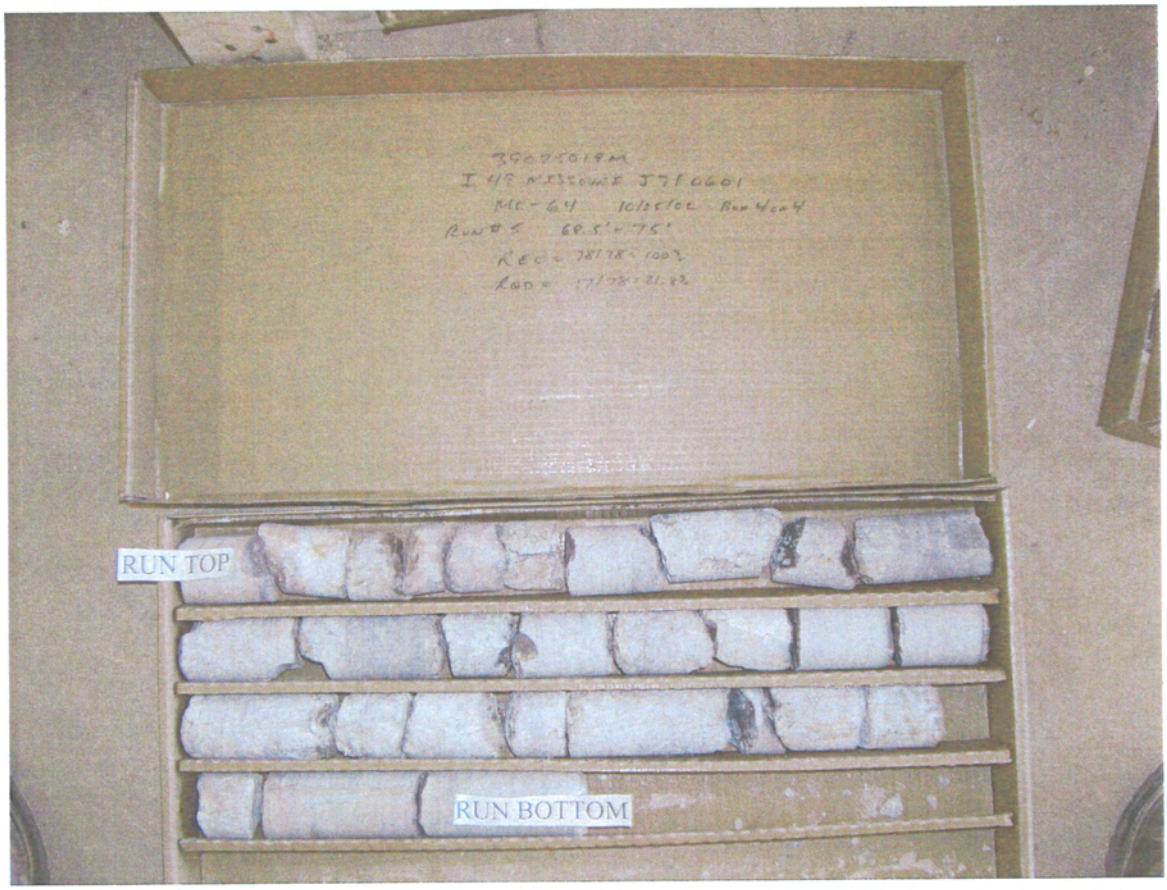


I 49 Missouri
Missouri J7P0601
Boring MC-64
Run No. 1
43.0 Feet to 48.0 Feet
Run No. 2
48.0 Feet to 53.5 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-64
Run No. 3
53.5 Feet to 62.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-64
Run No. 4
62.5 Feet to 68.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-64
Run No. 5
68.5 Feet to 75.0 Feet

LOG OF BORING NO. MC-82

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 804+00, Centerline

Approx. Surface Elev.: 1107.6 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SANDY GRAVEL, trace clay light brown to reddish brown, dry		GP	1	AS						
3	1104.6										
	GRAVELLY FAT CLAY, with sand light brown to reddish brown, moist		CH								
7	1100.6	5	CH	2	AS						
	FAT CLAY, with gravel, trace sand reddish brown, moist	10	CH	3	AS						
		15	CH	4	AS						
		20	CH	5	AS						
		25	CH	6	AS						
		30	CH	7	AS						

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	10-17-02		
BORING COMPLETED	10-17-02		
RIG CME-75, #219	FOREMAN	DB	
APPROVED DP	JOB #	J7P0601	

BOREHOLE 99 MC-82.GPJ TERRACON.GDT 11/12/03

180

LOG OF BORING NO. MC-82

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	33 1074.6 **GRAVELLY FAT CLAY**, with sand light brown, moist	35	CH	8	AS						
	37.4 1070.2 **LIMESTONE++** stratified, with chert seams and inclusions, gray, thin to medium bedded, fine grained, slightly weathered, hard, solid	40		RUN 1	DB	95%	RQD 13%				
				RUN 2	DB	97%	RQD 80%				
		45		RUN 3	DB	100%	RQD 77%				
		50		RUN 4	DB	92%	RQD 63%				
		55		RUN 5	DB	100%	RQD 82%				
		60		RUN 6	DB	100%	RQD 75%				
	62 1045.6	65									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	10-17-02		
BORING COMPLETED	10-17-02		
RIG CME-75, #219		FOREMAN	DB
APPROVED	DP	JOB #	J7P0601

BOREHOLE 99 MC-82.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-82

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	LIMESTONE++ stratified, abundant chert seams and inclusions, gray and dark gray, medium bedded, fine grained, slightly weathered, hard to very hard, solid			RUN 7	DB	100%	RQD 87%				
		70		RUN 8	DB	95%	RQD 73%				
		75		RUN 9	DB	100%	RQD 81%				
	78.6 1029.0										
	BOTTOM OF BORING AT 78.6 FEET BACKFILLED WITH CUTTINGS 10/17/02 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	10-17-02		
BORING COMPLETED	10-17-02		
RIG CME-75, #219	FOREMAN	DB	
APPROVED DP	JOB #	J7P0601	

BOREHOLE 99 MC-82.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-82

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	No LOG No original sketch	35								
	37.4 1070.2 **LIMESTONE++** stratified, with chert seams and inclusions, gray, thin to medium bedded, fine grained, slightly weathered, hard, solid			RUN 1	DB	95%	RQD 13%			
	40 1067.6	40								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	10-17-02		
BORING COMPLETED	10-17-02		
RIG CME-75, #219	FOREMAN	DB	
APPROVED DP	JOB #	J7P0601	

BOREHOLE 99 MC-82.GPJ TERRACON.GDT 12/5/03

I 49 Missouri
Missouri J7P0601
Boring MC-82
Run No. 1
37.4 Feet to 40.0 Feet
Run No. 2
40.0 Feet to 45.0 Feet
Run No. 3 (partial)
45.0 Feet to 50.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-82
Run No. 3(partial)
45.0 Feet to 50.0 Feet
Run No. 4
50.0 Feet to 55.0 Feet
Run No. 5 (partial)
55.0 Feet to 60.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-82
Run No. 5 (partial)
55.0 Feet to 60.0 Feet
Run No. 6
60.0 Feet to 65.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-82
Run No. 7
65.0 Feet to 70.0 Feet
Run No. 8 (partial)
70.0 Feet to 75.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-82
Run No. 8 (partial)
70.0 Feet to 75.0 Feet
Run No. 9
75.0 Feet to 78.6 Feet

LOG OF BORING NO. MC-110

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 824+88, 115 Feet left of centerline

Approx. Surface Elev.: 1163.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	1 **LEAN CLAY** light brown and brown, dry 1162.7		CL	1	AS						
	LEAN CLAY, trace gravel reddish brown, dry		CL	2	AS						
	4 1159.7										
	LEAN CLAY, scattered to with gravel light reddish brown, dry	5	CL	3	AS						
	19 1144.7	10									
	CHERT++ stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid	15									
		20			HS						
				RUN 1	DB	100%	RQD 92%				
		25		RUN 2	DB	97%	RQD 88%				
				RUN 3	DB	100%	RQD 85%				

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY	AB
WL	▼ DRY 24 hr AB	▼	
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

189

LOG OF BORING NO. MC-110

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	CHERT++ stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid										
				RUN 4	DB	100%	RQD 56%				
				RUN 5	DB	100%	RQD 88%				
				RUN 6	DB	100%	RQD 86%				
				RUN 7	DB	100%	RQD 95%				
				RUN 8	DB	100%	RQD 85%				
				RUN 9	DB	100%	RQD 100%				
	BOTTOM OF BORING AT 64.3 FEET BACKFILLED WITH CUTTINGS 05/06/03 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types. 64.3 1099.4										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY	AB
WL	▼ DRY 24 hr AB	▼	
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG ATV, #103E	FOREMAN	JW	
APPROVED BKM	JOB #	J7P0601	

BOREHOLE 99 MC-110.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-110

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
	22.3 1141.4									
CT LS	**CHERT++** stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid REED SPRINGS FORMATION			RUN 1	DB	100%	RQD 92%			
	24.3 1139.4									
CT LS	**CHERT++** stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid	25		RUN 2	DB	97%	RQD 88%			
CT LS	LS Inclusions LS CT LS - minor dissolution LS + CT - Interbedded									
	29.3 1134.4									
CT	CT LS Inclusions	30		RUN 3	DB	100%	RQD 85%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY	AB
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG ATV, #103E	FOREMAN	JW	
APPROVED BKM	JOB #	J7P0601	

BOREHOLE 99 MC-110.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-110

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid									
	34.3 / 1129.4									
	CHERT++ stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid	35		RUN 4	DB	100%	RQD 56%			
	39.3 / 1124.4									
	Continued Next Page	40		RUN 5	DB	100%	RQD 88%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▼ DRY 24 hr	AB	▼
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 MC-110.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-110

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT	**CHERT++** stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid									
LS										
CT										
LS										
CT	44.3 1119.4									
CT	**CHERT++** stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 6	DB	100%	RQD 86%			
LS - Inclusions		45								
CT										
LS - Inclusions										
CT										
CT	49.3 1114.4									
				RUN 7	DB	100%	RQD 95%			
		50								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽ DRY 24 hr	AB	▽
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

193

LOG OF BORING NO. MC-110

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid									
	CT									
	LS									
	CT									
	54.3 1109.4									
	CHERT++ stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid									
	LS - Inclusions									
	CT - highly fractured									
	CT	55		RUN 8	DB	100%	RQD 85%			
	LS									
	CT									
	LS									
	59.3 1104.4									
	CT	60		RUN 9	DB	100%	RQD 100%			
	LS									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG ATV, #103E	FOREMAN JW		
APPROVED BKM	JOB # J7P0601		

BOREHOLE 99 MC-110.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-110

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
LS	**CHERT++** stratified, with limestone seams, light gray									
CT	and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid									
LS										
CT										
LS	LS - Inclusions									
	64.3 1099.4									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

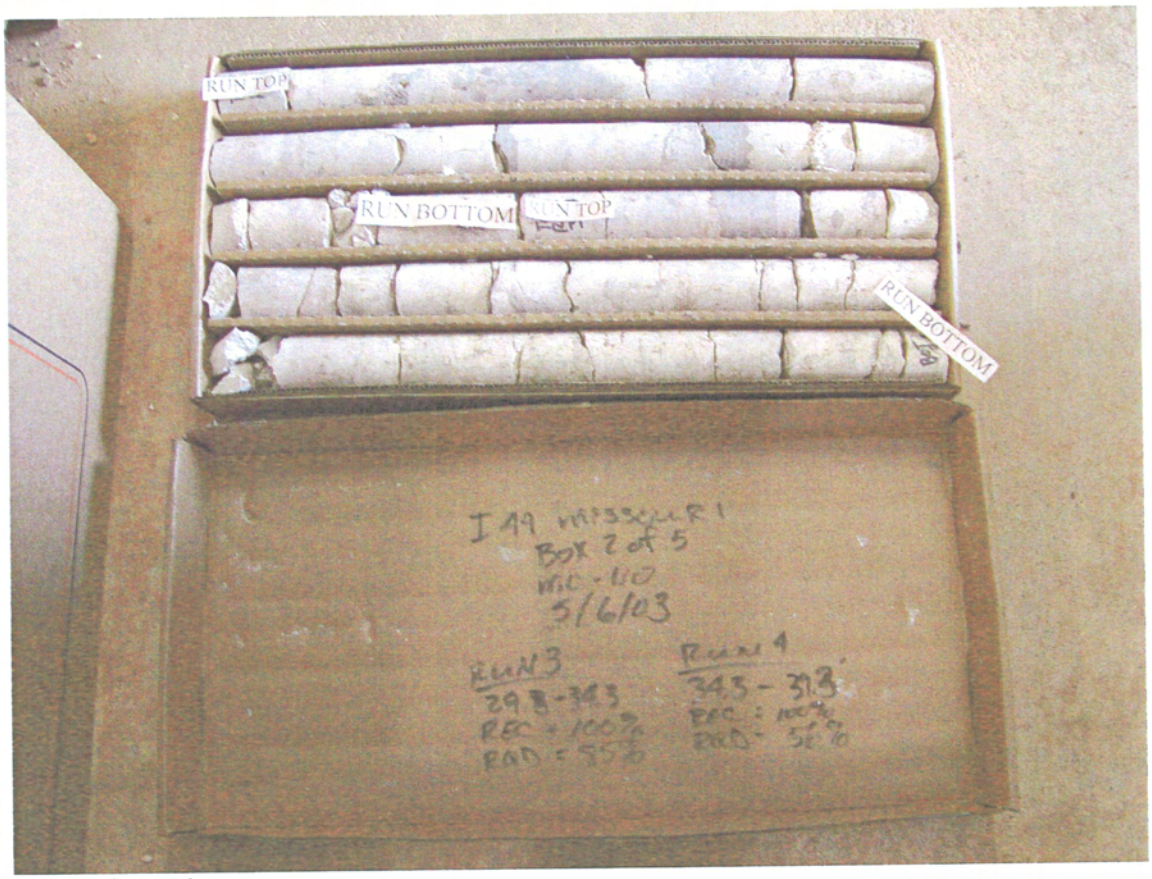
WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▽ DRY	AB
WL	▽ DRY 24 hr	AB ▽	
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-6-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 MC-110.GPJ TERRACON.GDT 12/6/03

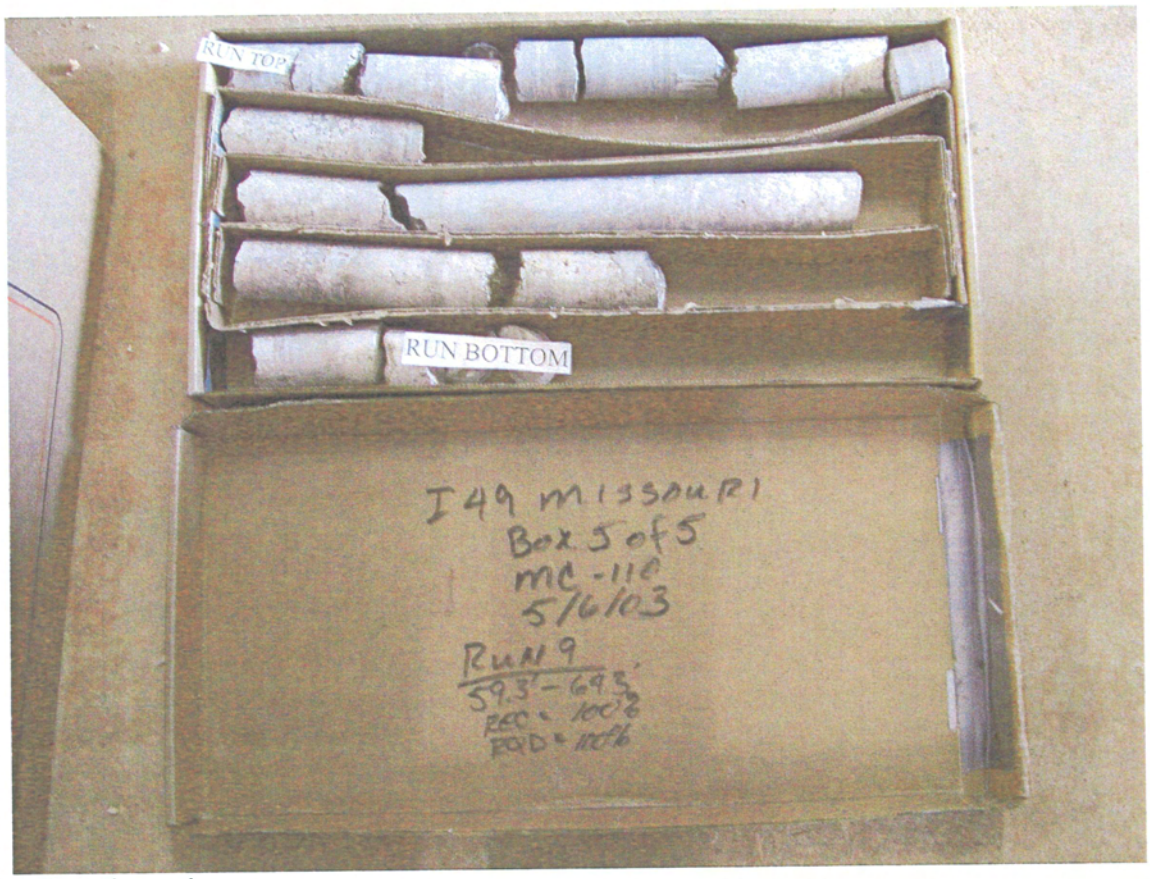
I 49 Missouri
Missouri J7P0601
Boring MC-110
Run No. 1
22.3 Feet to 24.3 Feet
Run No. 2
24.3 Feet to 29.3 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-110
Run No. 3
29.3 Feet to 34.3 Feet
Run No. 4
34.3 Feet to 39.3 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-110
Run No. 5
39.5 Feet to 44.5 Feet
Run No. 6
44.5 Feet to 49.5 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-110
Run No. 7
49.3 Feet to 54.3 Feet
Run No. 8
54.3 Feet to 59.3 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-110
Run No. 9
59.3 Feet to 64.3 Feet

LOG OF BORING NO. MC-124

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 837+00, 120 Feet left of centerline

Approx. Surface Elev.: 1169.5 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	GRAVEL, abundant clay brown and reddish brown, dense	5		1	AS					
	1164.5									
	FAT CLAY, abundant gravel, trace chert seams reddish brown, very stiff, moist	10		2	AS					
				3	AS					
	15 1154.5	15								
	FAT CLAY, with gravel reddish brown, stiff, moist			4	AS					
	18.5 1151.0									
	LIMESTONE++ stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid	20		RUN 1	DB	99%	RQD 88%			
		25								
		30		RUN 2	DB	98%	RQD 71%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-124.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-124

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LIMESTONE++ stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid	35								
		40		RUN 3	DB	100%	RQD 80%			
	40.5 1129.0									
	BOTTOM OF BORING AT 40.5 FEET BACKFILLED WITH CUTTINGS 10/24/02 ++ Classification estimated from core samples. Petrographic analsysis may reveal other rock types.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-124.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-124

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN	15								
	18.5 1151.0									
CT LS	**LIMESTONE++** stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid			RUN 1	DB	99%	RQD 88%			
LS	REED SPRINGS FORMATION	20								
LS	**Continued Next Page**									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED SPB		JOB #	J7P0601

LOG OF BORING NO. MC-124

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT LS LS LS CT LS CT CT CT LS LS LS LS	**LIMESTONE++** stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid									
28.2	1141.3	25								
LS CT CT CT LS CT LS	**LIMESTONE++** stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid			RUN 2	DB	98%	RQD 71%			
	Continued Next Page	30								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-124.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-124

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS, LS, CT, LS, LS, LS, LS, CT, LS, LS, CT, LS	**LIMESTONE++** stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid	35								
38.2	1131.3									
LS, CT, CT+LS, CT, LS	**LIMESTONE++** stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid	40		RUN 3	DB	100%	RQD 80%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY AB	
WL	▽	▼	
WL			

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-124.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-124

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	LS 40.5 1129.0									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

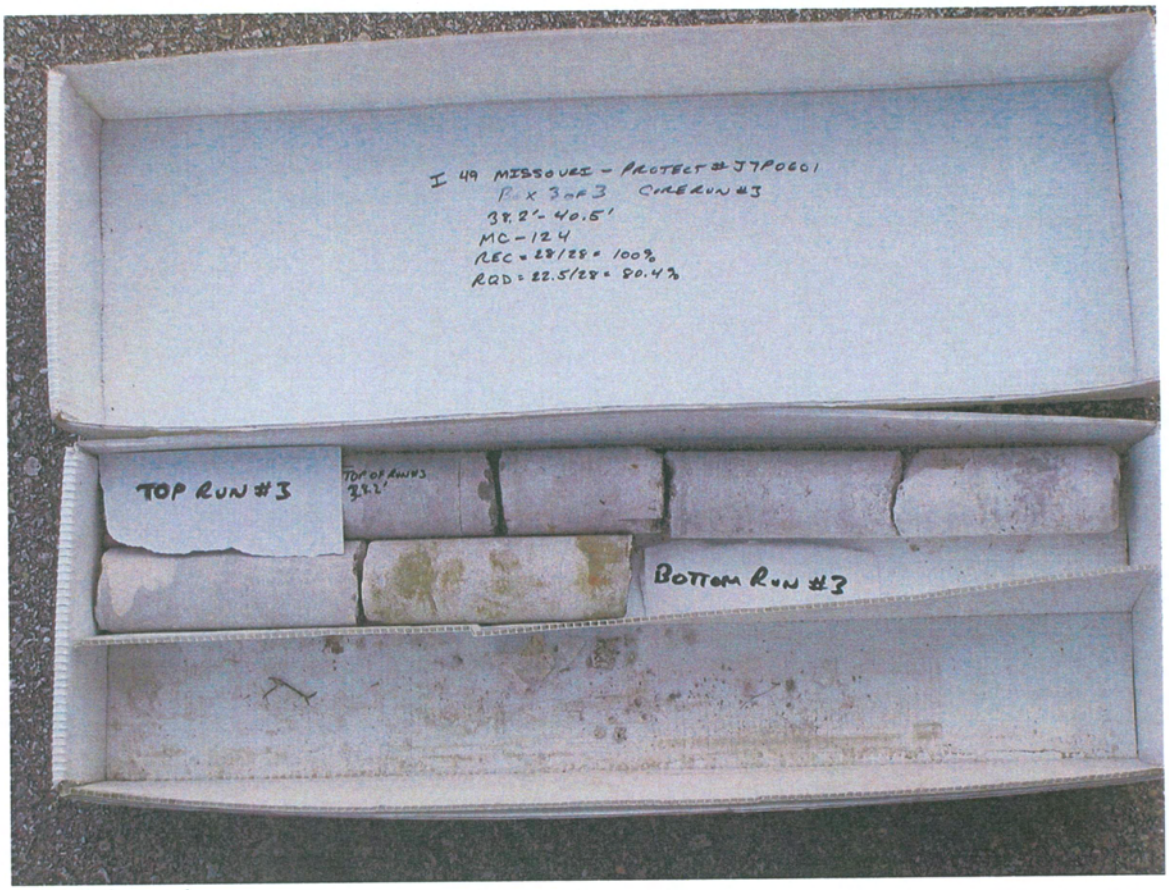
Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-124.GPJ TERRACON.GDT 12/5/03

I 49 Missouri
Missouri J7P0601
Boring MC-124
Run No. 1
18.5 Feet to 28.2 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-124
Run No. 2
28.2 Feet to 38.2 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 124
Run No. 3
38.2 Feet to 40.5 Feet

LOG OF BORING NO. MC-179

CLIENT
HNTB

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 905+67, 114 Feet right of centerline

Approx. Surface Elev.: 1163.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	1 **CLAYEY GRAVEL** 1162.7 light brown, dry		GC	1	AS					
	SANDY FAT CLAY, scattered gravel light brown to light reddish brown, dry		CH	2	AS					
	9.5 1154.2	5								
	SANDY FAT CLAY, with chert seams light brown to light reddish brown, moist	10	CH	3	AS					
		15								
		20								
	23.5 1140.2	25		RUN 1	DB	90%	RQD 37%			
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	30		RUN 2	DB	100%	RQD 45%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY	AB
WL	▽	▼	
WL			

Terracon

BORING STARTED	12-20-02		
BORING COMPLETED	12-20-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 MC-179.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-179

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	35								
	40.2 1123.5	40								
	BOTTOM OF BORING AT 40.2 FEET BACKFILLED WITH CUTTINGS 12/20/02 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▽		▼
WL			

Terracon

BORING STARTED	12-20-02		
BORING COMPLETED	12-20-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 MC-179.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-179

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
	24.5 1139.2									
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	25		RUN 1	DB	90%	RQD 37%			
CT	REED SPRINGS FORMATION									
LS										
CT+LS	- Interbedded									
LS										
CT										
LS										
CT										
LS		30								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY	AB
WL	▽	▽	
WL			

Terracon

BORING STARTED	12-20-02		
BORING COMPLETED	12-20-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 MC-179.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-179

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
LS	LS 30.4 1133.3									
CT / LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid			RUN 2	DB	100%	RQD 45%			
LS										
CT										
LS										
CT										
LS										
CT										
LS,		35								
LS w/ CT Inclusions										
LS - healed vertical joint										
CT										
LS										
CLAY SEAM / JOINT										
LS										
CT										
LS w/ CT INCLUSIONS		40								
	40.2 1123.5									

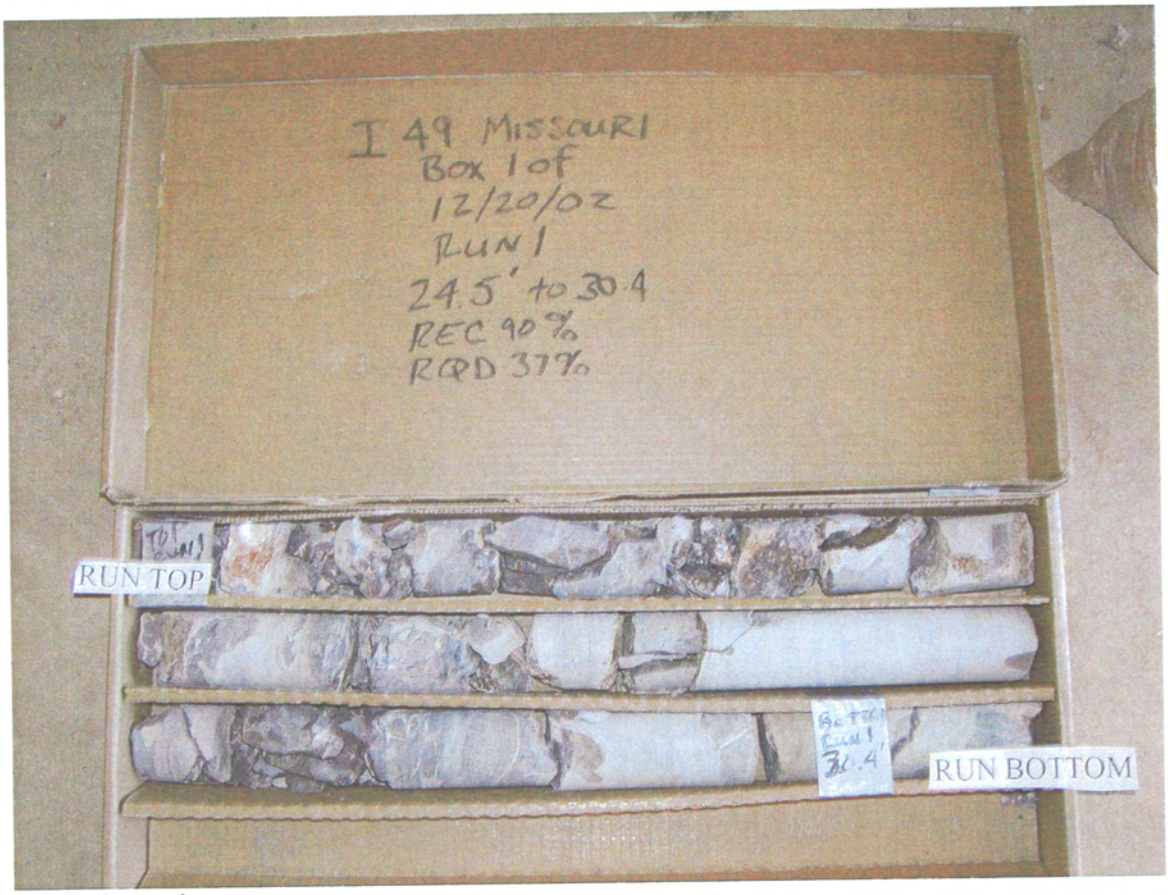
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	12-20-02		
BORING COMPLETED	12-20-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 MC-179.GPJ TERRACON.GDT 12/5/03



I 49 Missouri
Missouri J7P0601
Boring MC-179
Run No. 1
24.5 Feet to 30.4 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-179
Run No. 2
30.4 Feet to 40.2 Feet

LOG OF BORING NO. MC-191

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 917+30, 94 Feet right of centerline

Approx. Surface Elev.: 1168.7 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
CHERT GRAVEL AND COBBLES light brown and white, dry - trace clay below 3 feet	5	GP	1	AS					
1163.7									
CHERT GRAVEL, with clay and chert seams reddish brown and white, dense, dry to moist	10	GP GC	2	AS					
1158.7									
CLAYEY CHERT GRAVEL, abundant chert seams reddish brown and white, dense, moist	15	GC	3	AS					
1153.7									
CLAYEY CHERT GRAVEL, with chert seams reddish brown, white and gray, dense, moist - very soft clay seam at about 19 feet	20	GC	4	AS					
22.8		GC	5	AS					
1145.9									
CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	25		RUN 1	DB	100%	RQD 56%			
			RUN 2	DB	97%	RQD 53%			
			RUN 3	DB	100%	RQD 75%			
	30		RUN 4	DB	100%	RQD 76%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft					
WL	▽ DRY	WD	▼ DRY	AB	
WL	▼ DRY	24 hr	▼		
WL					

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-191

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	35		RUN 5	DB	94%	RQD 59%			
				RUN 6	DB	100%	RQD 53%			
		40		RUN 7	DB	100%	RQD 75%			
				RUN 8	DB	98%	RQD 81%			
		45		RUN 9	DB	100%	RQD 65%			
	- trace shale seams below 49.5 feet	50		RUN 10	DB	100%	RQD 29%			
		55		RUN 11	DB	100%	RQD 98%			
		60		RUN 12	DB	100%	RQD 84%			
		65								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY	24 hr	▼	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-191

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			RUN 13	DB	100%	RQD 90%			
		70		RUN 14	DB	100%	RQD 74%			
	73 1095.7									
	LIMESTONE++ stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid	75		RUN 15	DB	100%	RQD 100%			
	BOTTOM OF BORING AT 84.5 FEET BACKFILLED WITH CUTTINGS 02/08/03 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.	80		RUN 16	DB	100%	RQD 96%			
	84.5 1084.2									

NOTE:
Information from two borings was combined to produce this log.
Boring MC-191 was drilled to 21.9 feet and cored to 37.1 feet, where the boring caved in and was abandoned.

Boring MC-191A was moved 2 feet east of MC-191 and drilled to a depth of 22.8 feet and cored to 84.5 feet.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY	24 hr	▼	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-191

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
	22.8 1145.9									
CT LS CT LS CT CT LS LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid REED SPRINGS FORMATION			RUN 1	DB	100%	RQD 56%			
	25.3 1143.4	25								
CT LS CT LS CT LS 26.5 CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			RUN 2	DB	97%	RQD 53%			
	1142.2									
CT CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid LS W/ CT SEAMS			RUN 3	DB	100%	RQD 75%			
CT LS CT	29.5 LS 1139.2									
CT CT	**Continued Next Page**	30		RUN 4	DB	100%	RQD 76%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ DRY	24 hr	▽	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

219

LOG OF BORING NO. MC-191

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT CT CT LS LS CT CT LS CT LS CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid. Quartz filled vug. Open fracture.									
34.5 / 1134.2										
CT CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	35		RUN 5	DB	94%	RQD 59%			
36.2 / 1132.5										
CT CT LS CT CT CT LS CT CT CT CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			RUN 6	DB	100%	RQD 53%			
39.5 / 1129.2										
CT CT LS CT	**Continued Next Page**	40		RUN 7	DB	100%	RQD 75%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ DRY	24 hr	▽	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-191

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT LS LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid									
41	1127.7									
LS CT CT CT LS CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			RUN 8	DB	98%	RQD 81%			
44.5 LS	1124.2									
LS LS LS CT CT CT LS CT LS CT CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	45		RUN 9	DB	100%	RQD 65%			
49.5	1119.2									
CT LS CT	**Continued Next Page**	50		RUN 10	DB	100%	RQD 29%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ DRY	24 hr	▽	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-191

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT CT CT LS CT LS CT LS CT CT CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid									
54.5	1114.2									
LS CT CT SH SH LS CT SH LS Inclusion CT SH LS CT CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	55		RUN 11	DB	100%	RQD 98%			
59.5	1109.2									
CT LS	**Continued Next Page**	60		RUN 12	DB	100%	RQD 84%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ DRY	24 hr	▽	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-191

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT CT LS SH CT LS CT SH LS CT CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid									
64.5	1104.2									
CT LS CT LS CT SH CT SH LS CT LS LS Inclusion CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	65		RUN 13	DB	100%	RQD 90%			
69.5 LS	1099.2									
CT LS CT Inclusions SH	Continued Next Page	70		RUN 14	DB	100%	RQD 74%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ DRY	24 hr	▽	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

223

LOG OF BORING NO. MC-191

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT, LS, SH	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid. REED SPRINGS FORMATION. CT, LS Inclusion. 73									
	1095.7									
SH, LS	**LIMESTONE++** stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid. ST. JOE LIMESTONE MEMBER. 74.5									
	1094.2									
LS, SH	**LIMESTONE++** stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid. LS. 79.5	75		RUN 15	DB	100%	RQD 100%			
	1089.2									
SH, LS	**Continued Next Page**	80		RUN 16	DB	100%	RQD 96%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽ DRY	24 hr	▼	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-191

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
LS SH SH SH SH SH SH LS SH SH	**LIMESTONE++** stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid									
	84.5 1084.2									

NOTE:
Information from two borings was combined to produce this log.
Boring MC-191 was drilled to 21.9 feet and cored to 37.1 feet, where the boring caved in and was abandoned.

Boring MC-191A was moved 2 feet east of MC-191 and drilled to a depth of 22.8 feet and cored to 84.5 feet.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽ DRY	24 hr	▼	
WL				

Terracon

BORING STARTED	1-31-03		
BORING COMPLETED	2-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-191.GPJ TERRACON.GDT 12/5/03

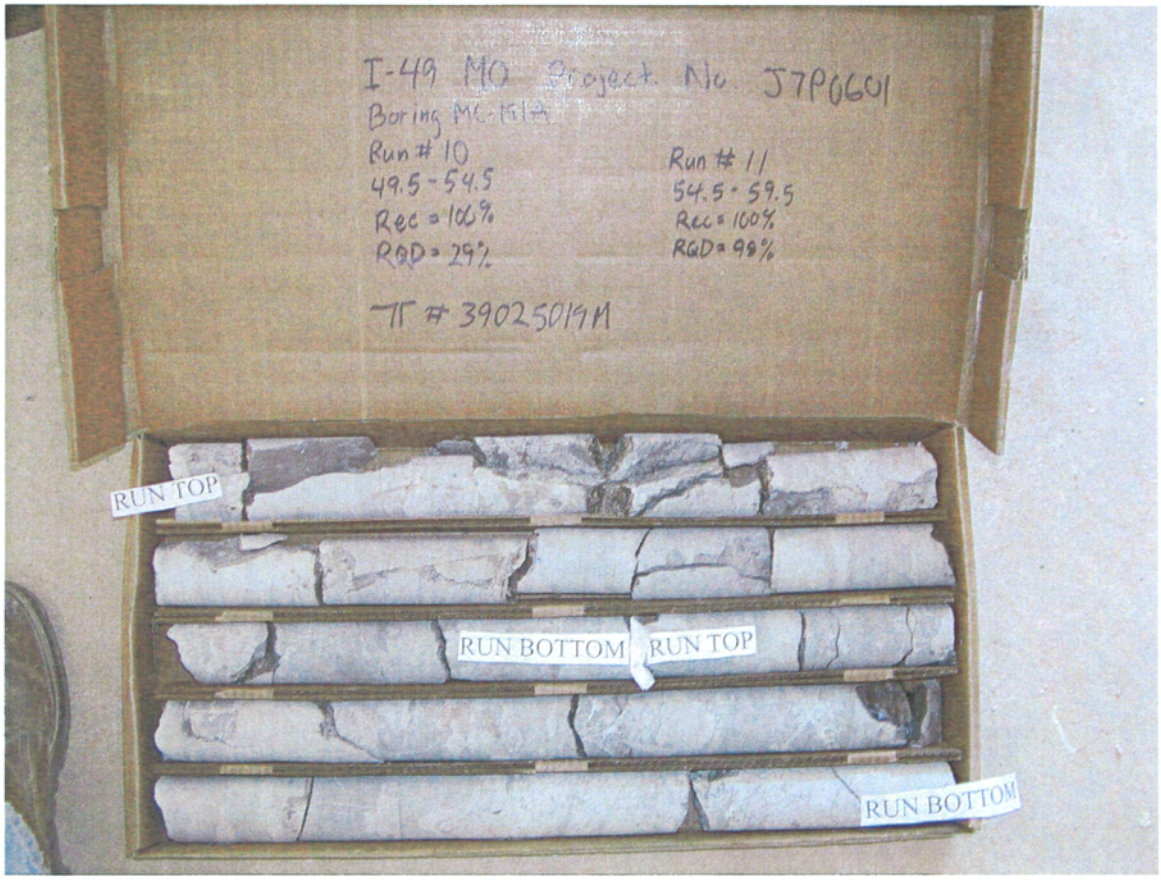
I 49 Missouri
Missouri J7P0601
Boring MC-191
Run No. 1
21.9 Feet to 25.2 Feet
Run No. 2
25.2 Feet to 30.2 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-191
Run No. 3
30.2 Feet to 35.2 Feet
Run No. 4
35.2 Feet to 37.1 Feet

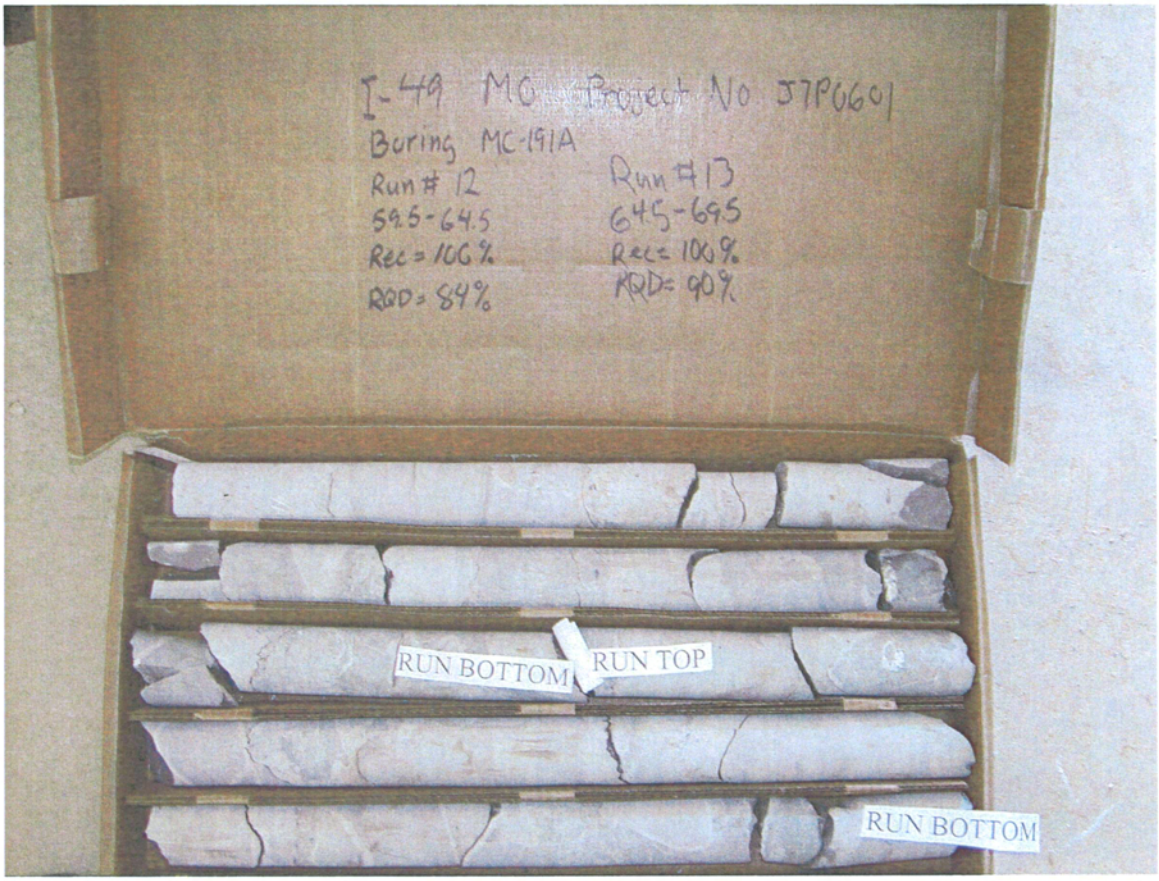
I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 1
22.8 Feet to 25.3 Feet
Run No. 2
25.3 Feet to 26.5 Feet
Run No. 3
26.5 Feet to 29.5 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 4
29.5 Feet to 34.5 Feet
Run No. 5
34.5 Feet to 36.2 Feet
Run No. 6
36.2 Feet to 39.5 Feet

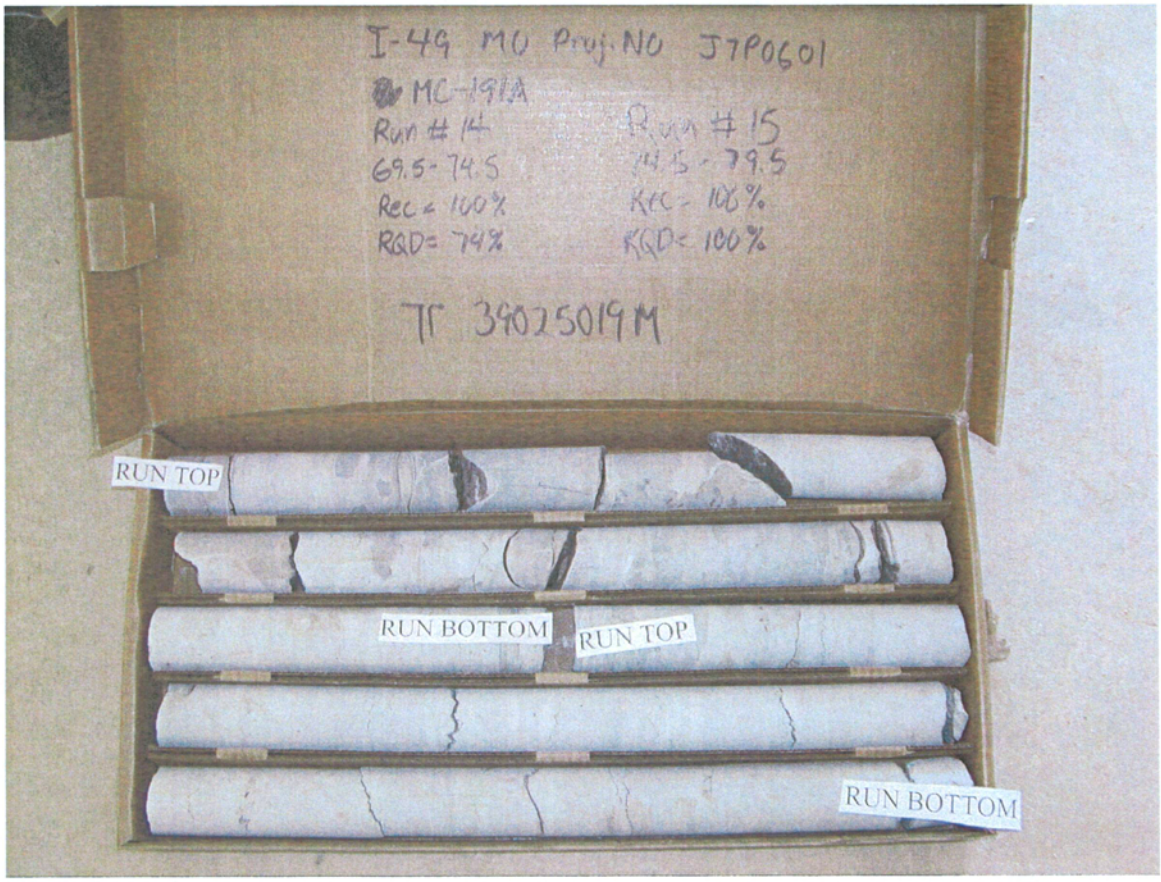
I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 7
39.5 Feet to 41.0 Feet
Run No. 8
41.0 Feet to 44.5 Feet
Run No. 9
44.5 Feet to 49.5 Feet



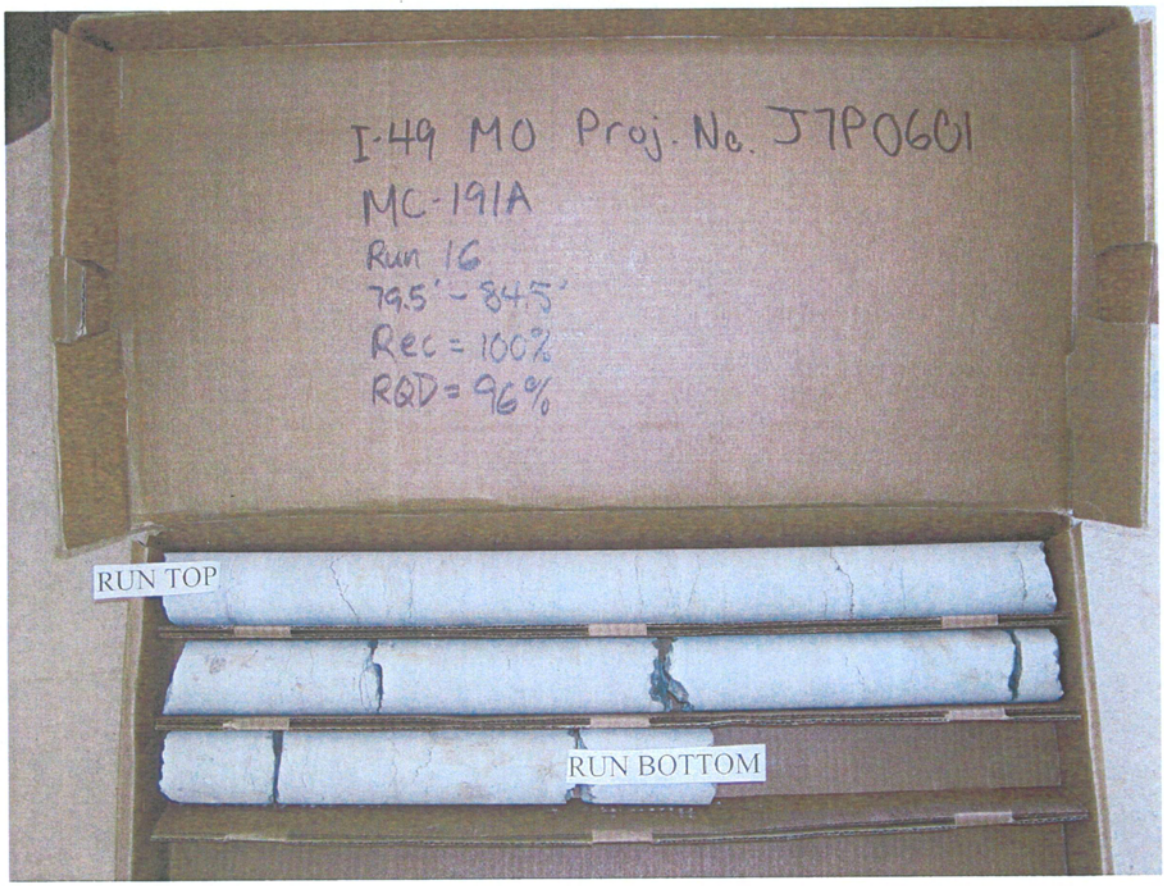
I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 10
49.5 Feet to 54.5 Feet
Run No. 11
54.5 Feet to 59.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 12
59.5 Feet to 64.5 Feet
Run No. 13
64.5 Feet to 69.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 14
69.5 Feet to 74.5 Feet
Run No. 15
74.5 Feet to 79.5 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-191A
Run No. 16
79.5 Feet to 84.5 Feet

LOG OF BORING NO. MC-212

CLIENT
HNTB

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 931+00, 65 Feet left of centerline

Approx. Surface Elev.: 1151.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LEAN CLAY, with gravel brown, stiff to very stiff, moist	5	CL	1	AS					
	1146.7									
	SANDY LEAN CLAY, with gravel, scattered chert seams brown to light reddish brown, very stiff, moist	10	CL	2	AS					
	1141.7									
	SANDY LEAN CLAY, with gravel, with chert seams light brown to brown, very stiff, moist	15	CL	3	AS					
	17 - soft clay layer from 16 to 17 feet 1134.7		CL	4	AS					
	LIMESTONE++ stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	20		RUN 1	DB	100%	RQD 93%			
		25		RUN 2	DB	100%	RQD 93%			
		30		RUN 3	DB	100%	RQD 98%			
				RUN 4	DB	100%	RQD 79%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY AB	
WL	▽	▼	
WL			

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG ATV, #103E		FOREMAN	KS
APPROVED SPB		JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LIMESTONE++ stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	35		RUN 5	DB	100%	RQD 83%			
		40		RUN 6	DB	100%	RQD 63%			
		45		RUN 7	DB	100%	RQD 72%			
		50		RUN 8	DB	100%	RQD 61%			
		55		RUN 9	DB	100%	RQD 84%			
		60		RUN 10	DB	100%	RQD 94%			
		65		RUN	DB	100%	RQD			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LIMESTONE++ stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			11			88%			
		70		RUN 12	DB	100%	RQD 95%			
		75		RUN 13	DB	100%	RQD 98%			
		80		RUN 14	DB	100%	RQD 100%			
		85		RUN 15	DB	100%	RQD 93%			
		90		RUN 16	DB	100%	RQD 100%			
	81 1070.7									
	LIMESTONE++ stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid									
	91 1060.7									
	BOTTOM OF BORING AT 91 FEET BACKFILLED WITH CUTTINGS 02/20/03									
	++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 11/12/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN	15								
	18 1133.7									
CT CT CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 1	DB	100%	RQD 93%			
LS	REED SPRINGS FORMATION									
20 LS	1131.7	20								
LS	**Continued Next Page**									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT, CT, LS, CT, CT, LS, CT, LS, CT, SH, 25 LS	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	1126.7		RUN 2	DB	100%	RQD 93%			
CT, CT, CT, CT, LS, LS, CT, CT, CT, LS, CT, 30 CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	1121.7		RUN 3	DB	100%	RQD 98%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LS CT CT+LS **LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 4	DB	100%	RQD 79%			
	CT LS CT+LS SH CT LS CT LS CT CT CT LS 34 CT	1117.7								
	LS LS CT CT+LS **LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	35		RUN 5	DB	100%	RQD 83%			
	CT LS CT+LS CT CT SH SH CT LS CT LS, CT Inclusion LS + CT w/ SH Laminations 39	1112.7								
	LS	40		RUN 6	DB	100%	RQD 63%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG ATV, #103E	FOREMAN	KS	
APPROVED SPB	JOB #	J7P0601	

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT CT CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid									
LS CT CT CT 44 LS	1107.7									
CT LS CT CT CT LS CT CT LS LS CT LS SH LS + CT CT LS 49 LS SH	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid 1102.7	45		RUN 7	DB	100%	RQD 72%			
CT LS + CT LS - leached joint CT	Continued Next Page	50		RUN 8	DB	100%	RQD 61%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT / LS / CT / LS / CT / CT+LS / LS / CT / LS / CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid									
54	1097.7									
LS / CT / LS / SH / CT / LS / CT / LS / CT+LS / LS / SH / LS / LS+CT / LS / SH / LS / SH / CS	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	55		RUN 9	DB	100%	RQD 84%			
59	1092.7									
LS / CT / CT / LS	hooked vertical joint	60		RUN 10	DB	100%	RQD 94%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS+CT, SH, LS+CT, SH, LS, LS+CT, LS+CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid									
64	1087.7									
CT+LS, LS, LS, LS, LS, LS+CT, SH, CT+LS, LS, LS, LS, LS+CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid — healed joints	65		RUN 11	DB	100%	RQD 88%			
69	1082.7									
CT, LS, CT, LS	Continued Next Page	70		RUN 12	DB	100%	RQD 95%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CT LS CT CT LS LS+CT SH CT SH LS LS CT **LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid 74 1077.7									
	CT+ LS SH CT CT LS CT CT SH LS+CT LS LS **LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid healed vertical joint healed vertical joint healed vertical joint 79 1072.7	75		RUN 13	DB	100%	RQD 98%			
	LS Continued Next Page	80		RUN 14	DB	100%	RQD 100%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG ATV, #103E		FOREMAN	KS
APPROVED SPB		JOB #	J7P0601

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	REED SPRINGS FORMATION									
LS	**LIMESTONE++** stratified, abundant chert seams and inclusions, trace shale laminations, white, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid									
81 LS		1070.7								
	LIMESTONE++ stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid									
LS	ST. JOE LIMESTONE MEMBER									
LS										
84		1067.7								
	LIMESTONE++ stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid	85		RUN 15	DB	100%	RQD 93%			
LS										
SH										
SH										
SH										
89		1062.7								
LS	**LIMESTONE++** stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid	90		RUN 16	DB	100%	RQD 100%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-212

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
LS SH 91 LS	**LIMESTONE++** stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid	1060.7								

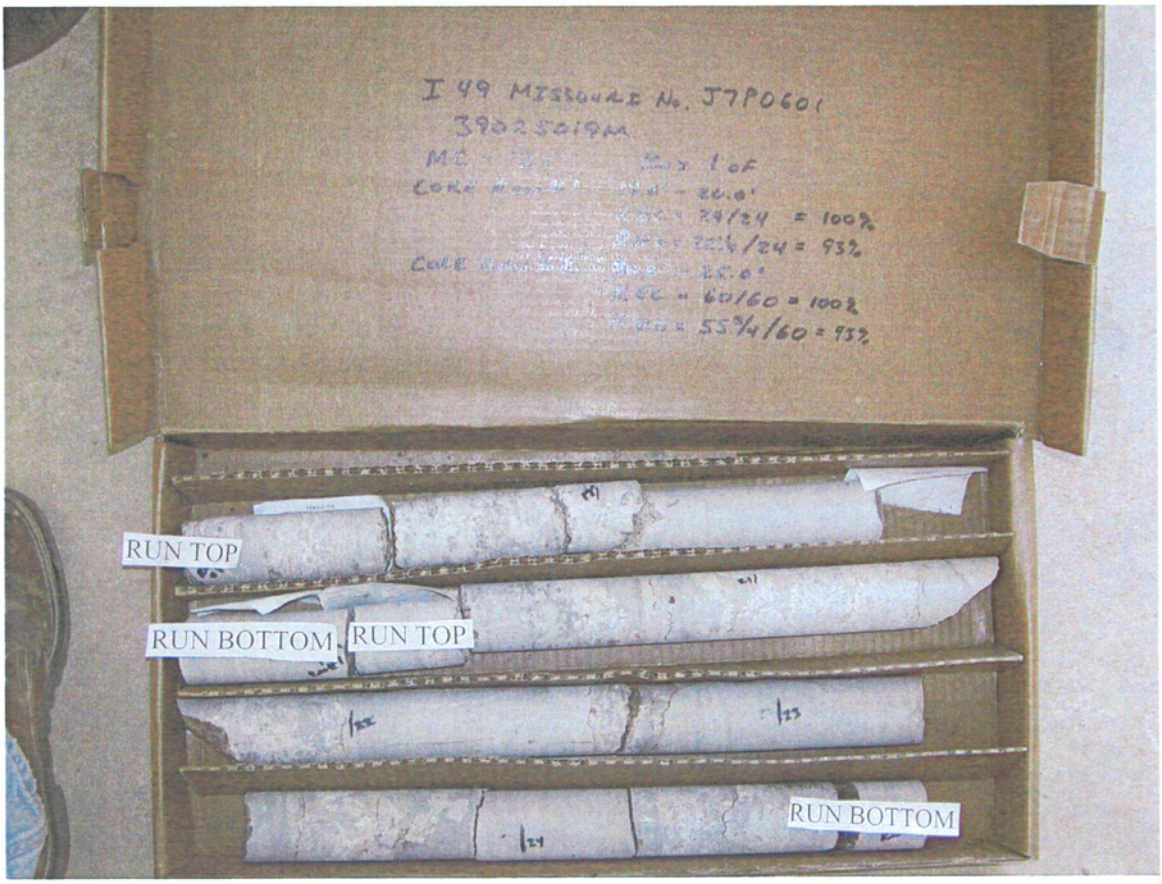
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

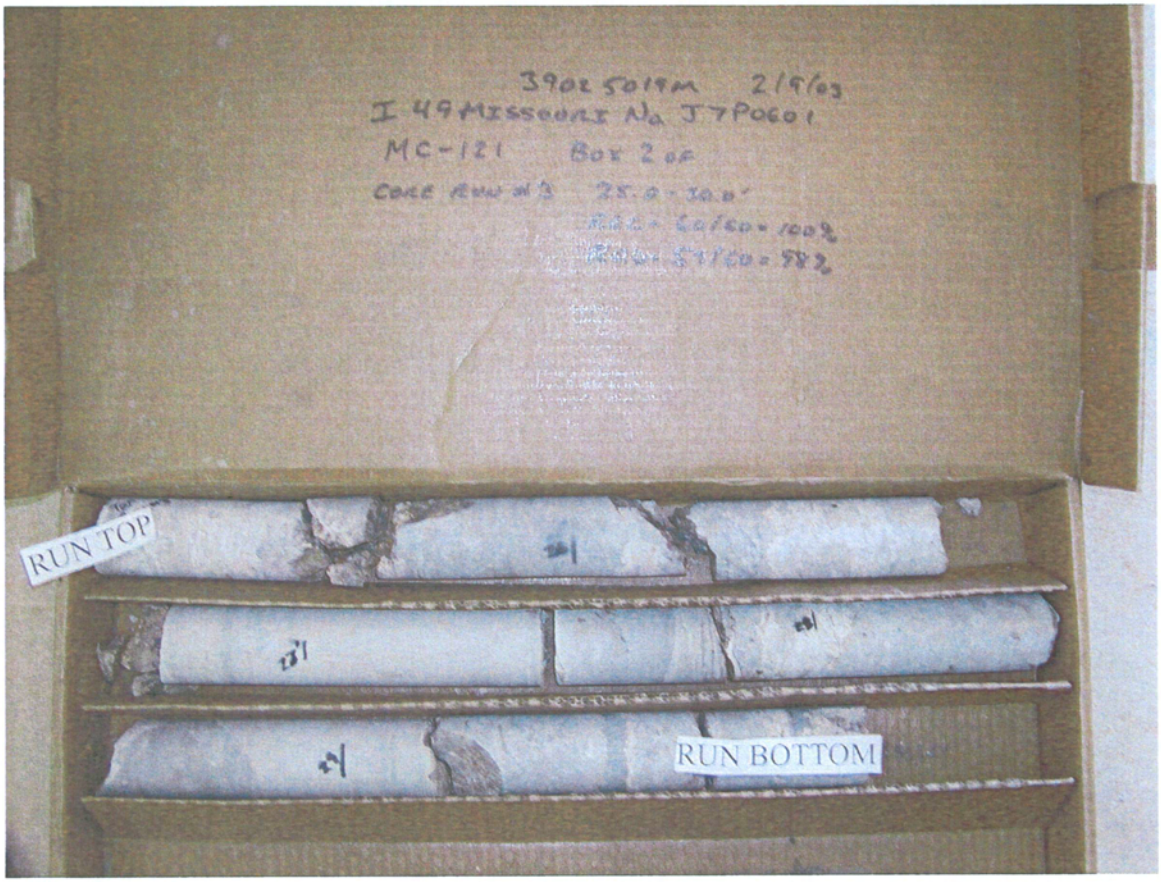
Terracon

BORING STARTED	2-9-03		
BORING COMPLETED	2-20-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 MC-212.GPJ TERRACON.GDT 12/6/03



I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 1
18.0 Feet to 20.0 Feet
Run No. 2
20.0 Feet to 25.0 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 3
25.0 Feet to 30.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 4
30.0 Feet to 34.0 Feet
Run No. 5
34.0 Feet to 39.0 Feet

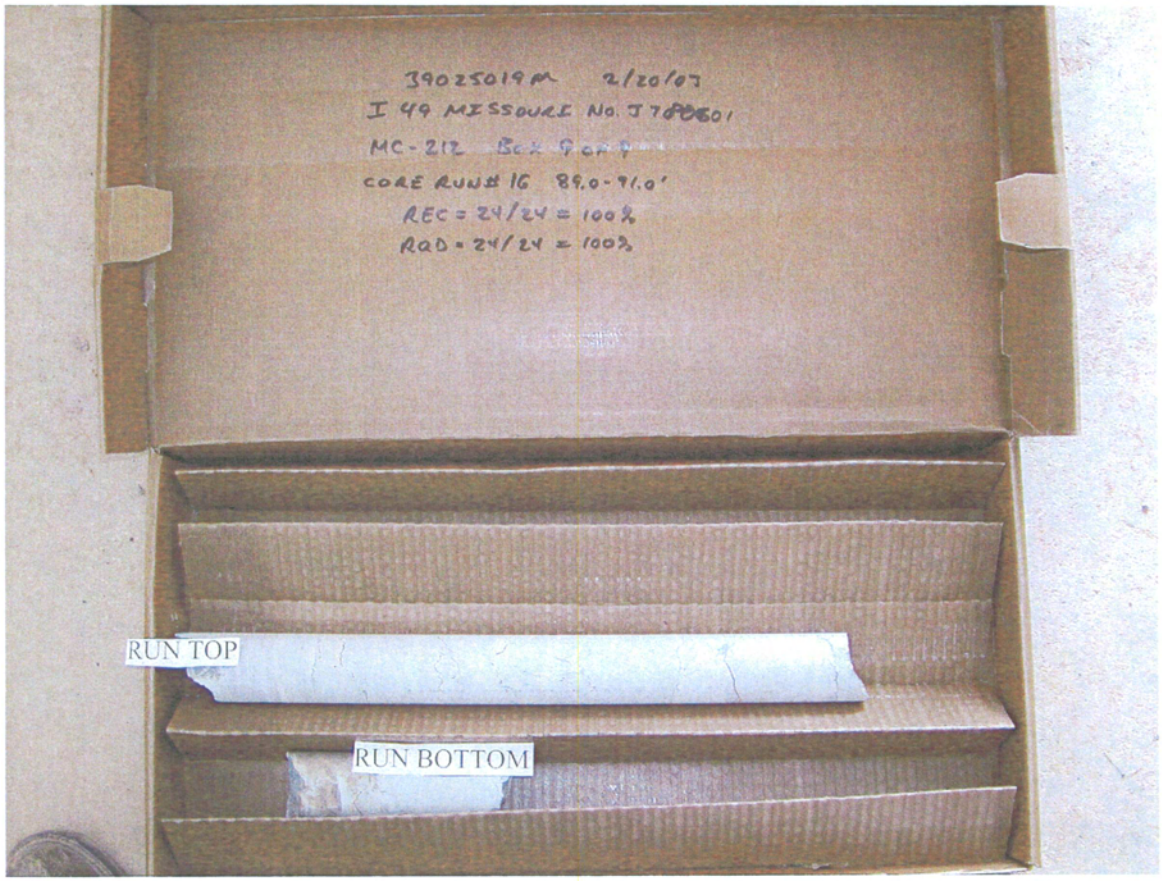
I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 6
39.0 Feet to 44.0 Feet
Run No. 7
44.0 Feet to 49.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 8
49.0 Feet to 54.0 Feet
Run No. 9
54.0 Feet to 59.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 10
59.0 Feet to 64.0 Feet
Run No. 11
64.0 Feet to 69.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 12
69.0 Feet to 74.0 Feet
Run No. 13
74.0 Feet to 79.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 14
79.0 Feet to 84.0 Feet
Run No. 15
84.0 Feet to 89.0 Feet



I 49 Missouri
Missouri J7P0601
Boring MC-212
Run No. 16
89.0 Feet to 91.0 Feet

LOG OF BORING NO. MC-229

CLIENT
HNTB

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 945+08, 120 feet left of centerline

Approx. Surface Elev.: 1169.5 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LEAN CLAY, with gravel brown, stiff, moist	0	CL	1	AS					
	5 1164.5	5								
	LEAN CLAY, scattered gravel reddish brown, stiff to very stiff, moist		CL	2	AS					
	20 1149.5	10								
	LEAN CLAY, with gravel brown, stiff, moist	15								
		20	CL	3	AS					
	- abundant chert seams below 31 feet	25								
		30								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	LEAN CLAY, with gravel brown, stiff, moist	35								
	36 1133.5									
	LIMESTONE++ stratified, abundant chert seams and inclusions, with clay seams, light gray and gray, thin bedded, fine grained, weathered, hard, possible cavities			RUN 1	DB	73%	RQD 59%			
	39.5 1130.0	40		RUN 2	DB	100%	RQD 95%			
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace vugs	45		RUN 3	DB	100%	RQD 81%			
				RUN 4	DB	100%	RQD 100%			
	49 1120.5	50		RUN 5	DB	98%	RQD 88%			
	CHERT++ stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs	55		RUN 6	DB	97%	RQD 79%			
					RB					
				RUN 7	DB	98%	RQD 83%			
		60		RUN 8	DB	100%	RQD 55%			
		65		RUN	DB	100%	RQD			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOUR

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs			9			60%			
		70		RUN 10	DB	95%	RQD 75%			
		75		RUN 11	DB	95%	RQD 94%			
		80		RUN 12	DB	97%	RQD 97%			
				RUN 13	DB	100%	RQD 98%			
		85		RUN 14	DB	100%	RQD 80%			
	BOTTOM OF BORING AT 88.5 FEET BACKFILLED WITH CUTTINGS ON 05/20/03 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types. 88.5 1081.0									

NOTE:
Boring MC-229 was drilled to 36 feet and cored to 49 feet. At this depth, the core bit would not cut the chert. The boring was abandoned until a different bit could be used.

Boring MC-229B was cored in the same boring as MC-229. The hole was cased to 42 feet and cored to 88.5 feet.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	36 1133.5	35								
CT / CLAY / LS / CT / LS / CT	**LIMESTONE++** stratified, abundant chert seams and inclusions, with clay seams, light gray and gray, thin bedded, fine grained, weathered, hard, possible cavities REED SPRINGS FORMATION			RUN 1	DB	73%	RQD 59%			
	39.5 1130.0									
LS / CT	**Continued Next Page**	40		RUN 2	DB	100%	RQD 95%			

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace vugs fractures									
CT										
LS										
CT										
CT										
LS										
CT										
LS										
CT										
44.5	1125.0									
LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace vugs	45		RUN 3	DB	100%	RQD 81%			
CT										
CT										
LS										
LS										
CT										
CT										
47.5 LS	1122.0									
CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace vugs			RUN 4	DB	100%	RQD 100%			
LS										
LS										
49	1120.5									
LS				RUN 5	DB	98%	RQD 88%			
CT										
CT		50								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽	▽	
WL			

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT LS CT LS CT LS CT LS 54 CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs									
	1115.5									
LS CT 56 LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs	55		RUN 6	DB	97%	RQD 79%			
	1113.5									
NO CORE 57	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs				RB					
	1112.5									
LS CT CT 59	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs			RUN 7	DB	98%	RQD 83%			
	1110.5									
LS CT CT	**Continued Next Page**	60		RUN 8	DB	100%	RQD 55%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

261

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT / LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs									
64		1105.5								
CT / LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs	65		RUN 9	DB	100%	RQD 60%			
69		1100.5								
LS / CT / LS / LS		70		RUN 10	DB	95%	RQD 75%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/6/03

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS LS CT LS LS CT LS CT LS CT 74 LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs	1095.5								
CT LS CT LS CT LS CT LS LS CT LS CT 79 LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs	1090.5		RUN 11	DB	95%	RQD 94%			
CT LS CT LS		80		RUN 12	DB	97%	RQD 97%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED			5-8-03
BORING COMPLETED			5-20-03
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/6/03

263

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT LS CT LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs									
81.5		1088.0								
CT CT LS CT CT LS CT	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs			RUN 13	DB	100%	RQD 98%			
84		1085.5								
LS CT LS LS LS CT LS LS	**CHERT++** stratified, abundant limestone seams, light gray and gray, medium to thick bedded, very fine to fine grained, slightly weathered to fresh, hard, solid, trace pits and vugs	85		RUN 14	DB	100%	RQD 80%			
88.5		1081.0								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

LOG OF BORING NO. MC-229

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	NOTE: Boring MC-229 was drilled to 36 feet and cored to 49 feet. At this depth, the core bit would not cut the chert. The boring was abandoned until a different bit could be used. Boring MC-229B was cored in the same boring as MC-229. The hole was cased to 42 feet and cored to 88.5 feet.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	5-8-03		
BORING COMPLETED	5-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7PO601

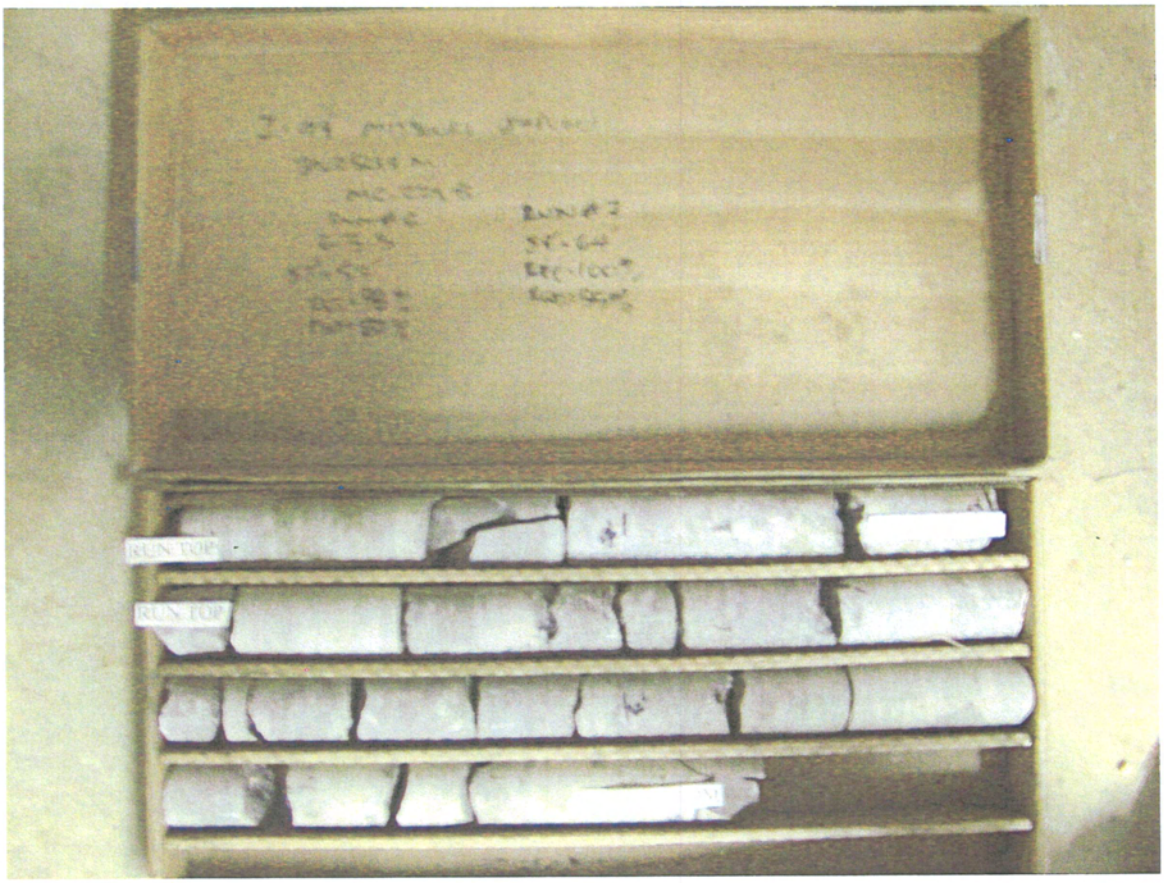
BOREHOLE 99 MC-229.GPJ TERRACON.GDT 12/6/03

I 49 Missouri
Missouri J7P0601
Boring MC-229
Run No. 1
36.0 Feet to 39.5 Feet
Run No. 2
39.5 Feet to 44.5 Feet

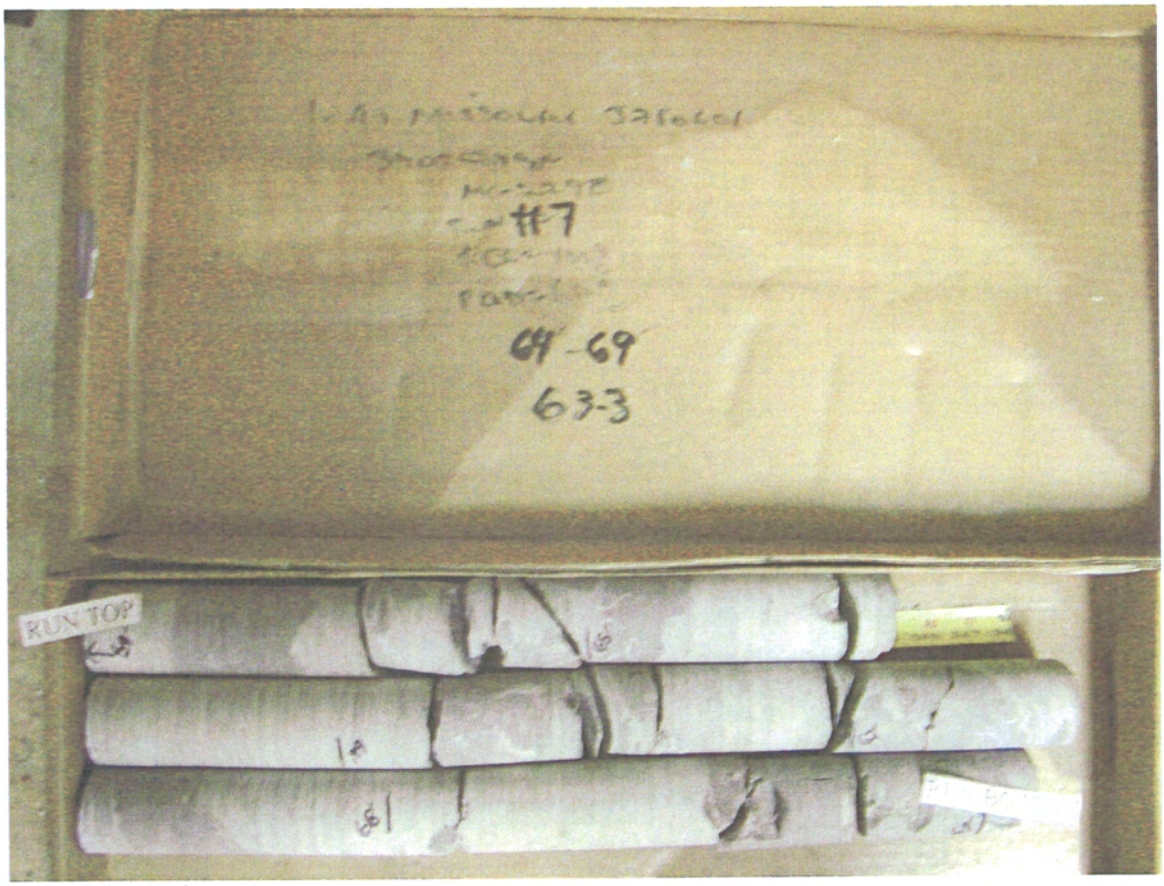
I 49 Missouri
Missouri J7P0601
Boring MC-229
Run No. 3
44.5 Feet to 49.0 Feet
Run No. 4
49.0 Feet to 51.5 Feet

I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 1
42.0 Feet to 44.0 Feet
Run No. 2
44.0 Feet to 47.5 Feet

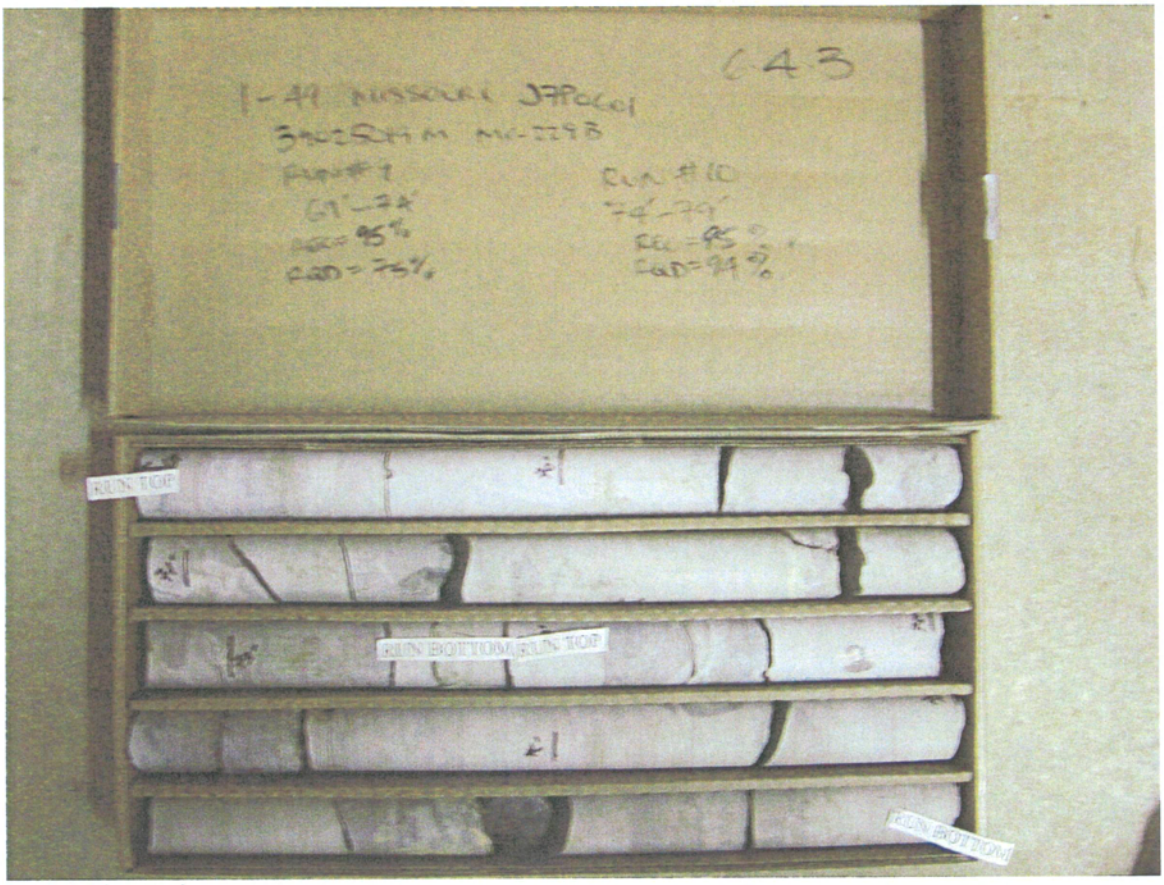
I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 3
47.5 Feet to 49.0 Feet
Run No. 4
49.0 Feet to 54.0 Feet
Run No. 5
54.0 Feet to 56.0 Feet



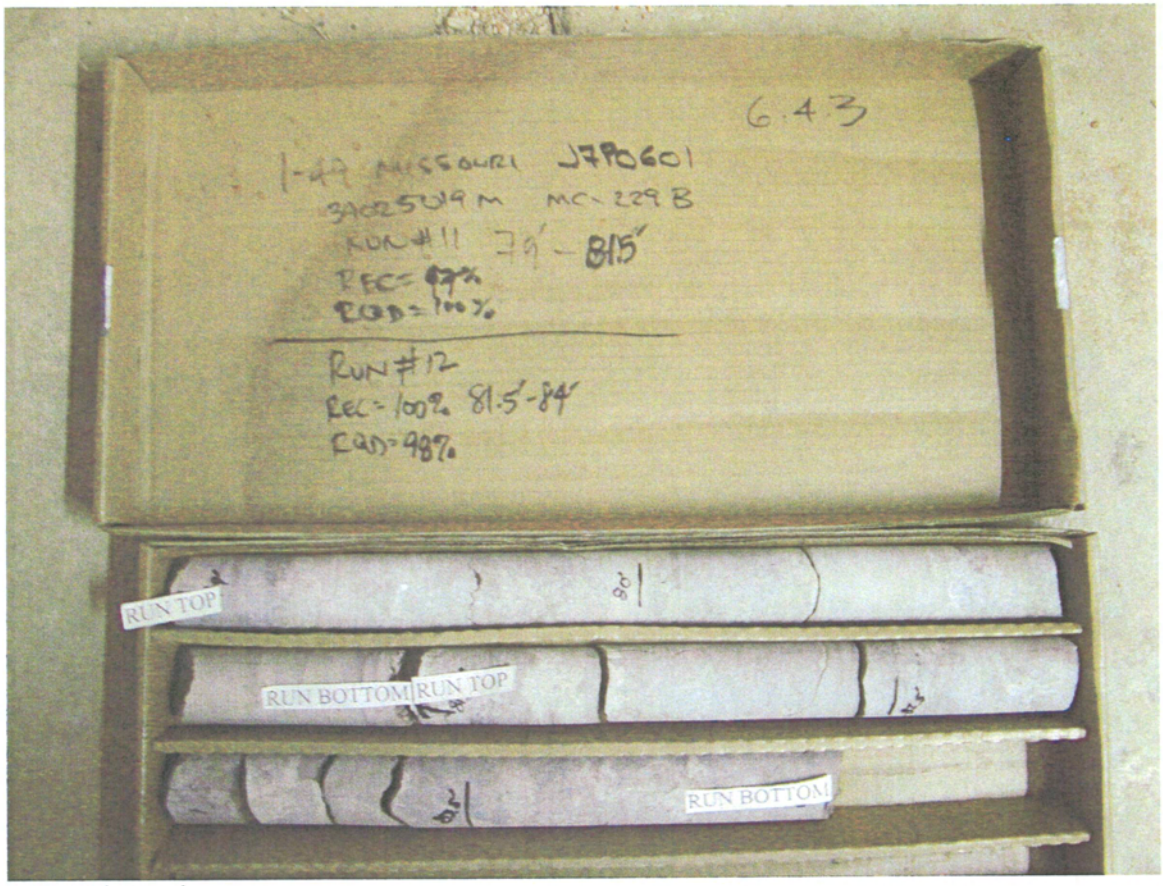
I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 6
57.0 Feet to 59.0 Feet
Run No. 7
59.0 Feet to 64.0 Feet



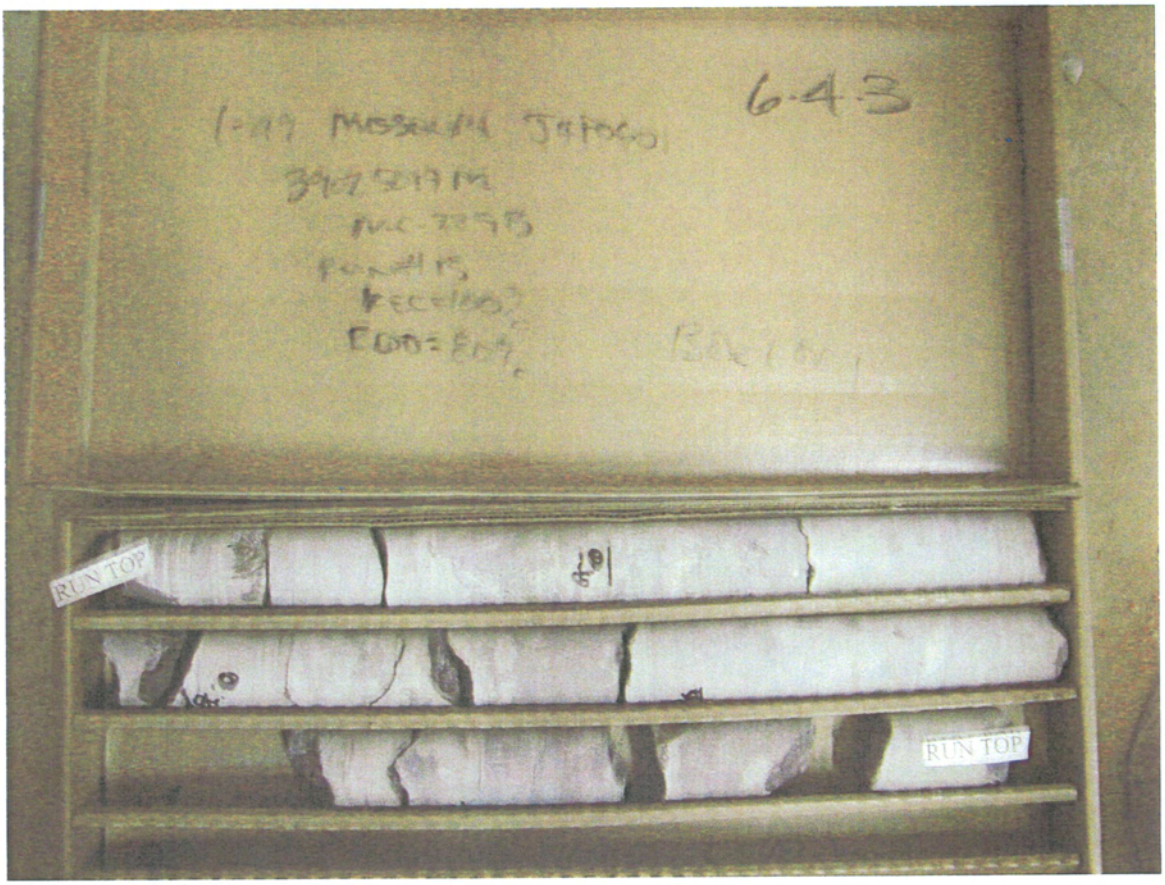
I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 8
64.0 Feet to 69.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 9
69.0 Feet to 74.0 Feet
Run No. 10
74.0 Feet to 79.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 11
79.0 Feet to 81.5 Feet
Run No. 12
81.5 Feet to 84.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 229B
Run No. 13
84.0 Feet to 88.5 Feet

LOG OF BORING NO. MC-253

CLIENT
HNTB

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 961+08, 120 feet left of centerline

Approx. Surface Elev.: 1183.4 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CLAYEY GRAVEL, with chert seams light brown and brown, dense, moist		GC		HS					
	17 1166.4	5								
	CLAYEY GRAVEL / HIGHLY WEATHERED CHERT, abundant chert seams light brown, very dense, moist	10	GC		RB					
	30 1153.4	15								
		20								
		25								
		30		RUN 1	DB	100%	RQD 32%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED			2-20-03
BORING COMPLETED			5-31-03
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/4/03

275

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs	35		RUN 2	DB	100%	RQD 42%			
		40		RUN 3	DB	100%	RQD 57%			
		45		RUN 4	DB	100%	RQD 82%			
				RUN 5	DB	100%	RQD 46%			
	50 1133.4	50		RUN 6	DB	100%	RQD 85%			
	CHERT++ stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			~~RUN 7~~ RUN 7	~~DB~~ DB	~~100%~~ 100%	~~RQD~~ RQD			
		55		RUN 8	DB	100%	85%			
				RUN 9			RQD 60%			
		60		RUN 10	DB	100%	RQD 75%			
		65								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	70		RUN 11	DB	100%	RQD 74%			
				RUN 12	DB	100%	RQD 74%			
	BOTTOM OF BORING AT 80 FEET BACKFILLED WITH CUTTINGS 05/31/03 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.	75		RUN 13	DB	100%	RQD 78%			
	80 1103.4	80								

NOTE:
Information from three borings was combined to produce this log.
Boring MC-253 was drilled to 7 feet and cored to 45 feet. At this depth, the boring caved in and was abandoned.

Boring MC-253A was moved 9 feet northwest of boring MC-253. MC-253A was drilled to 28 feet and cored to 49.5 feet, where the core barrel became stuck in the rock. The boring was abandoned.

Boring MC-253B was moved 9 feet northeast of boring MC-253. MC-253B was drilled to 30 feet and cored to 80 feet.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT LS CT LS CT LS CT LS CT	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs REED SPRINGS FORMATION	35		RUN 1	DB	100%	RQD 32%			
35	1148.4									
LS CT LS CT LS CT LS CT LS CT	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs	35		RUN 2	DB	100%	RQD 42%			
40	1143.4	40								
LS	**Continued Next Page**									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT CT LS CT CT LS CT LS CT	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs	45		RUN 3	DB	100%	RQD 57%			
45 1138.4										
CT CT LS	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs			RUN 4	DB	100%	RQD 82%			
47.3 1136.1										
CT LS CT LS	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs	50		RUN 5	DB	100%	RQD 46%			
50 1133.4										

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▽ DRY	AB
WL	▽	▽	
WL			

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT LS CT	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 6	DB	100%	RQD 85%			
53				RUN 7	DB	100%	RQD 100%			
1130.4										
CT LS CT	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 8	DB	100%	RQD 85%			
55		55								
1128.4										
LS CT CT CT LS LS CT CT LS LS	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 9	DB	100%	RQD 60%			
60		60								
1123.4										

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/5/03

280

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT LS LS CT LS CT LS CT LS CT LS CT LS CT LS LS LS LS 65 LS	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 10	DB	100%	RQD 75%			
	1118.4	65								
LS CT CT LS CT LS LS CT LS CT LS 70 LS	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid			RUN 11	DB	100%	RQD 74%			
	1113.4	70								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-253

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT CT LS CT CT CT LS LS CT Inclusions CT LS LS	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	75		RUN 12	DB	100%	RQD 74%			
1108.4										
LS CT CT LS LS CT	**CHERT++** stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid	80		RUN 13	DB	100%	RQD 78%			
1103.4										

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/5/03

282

LOG OF BORING NO. MC-253

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	NOTE: Information from three borings was combined to produce this log. Boring MC-253 was drilled to 7 feet and cored to 45 feet. At this depth, the boring caved in and was abandoned. Boring MC-253A was moved 9 feet northwest of boring MC-253. MC-253A was drilled to 28 feet and cored to 49.5 feet, where the core barrel became stuck in the rock. The boring was abandoned. Boring MC-253B was moved 9 feet northeast of boring MC-253. MC-253B was drilled to 30 feet and cored to 80 feet.									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

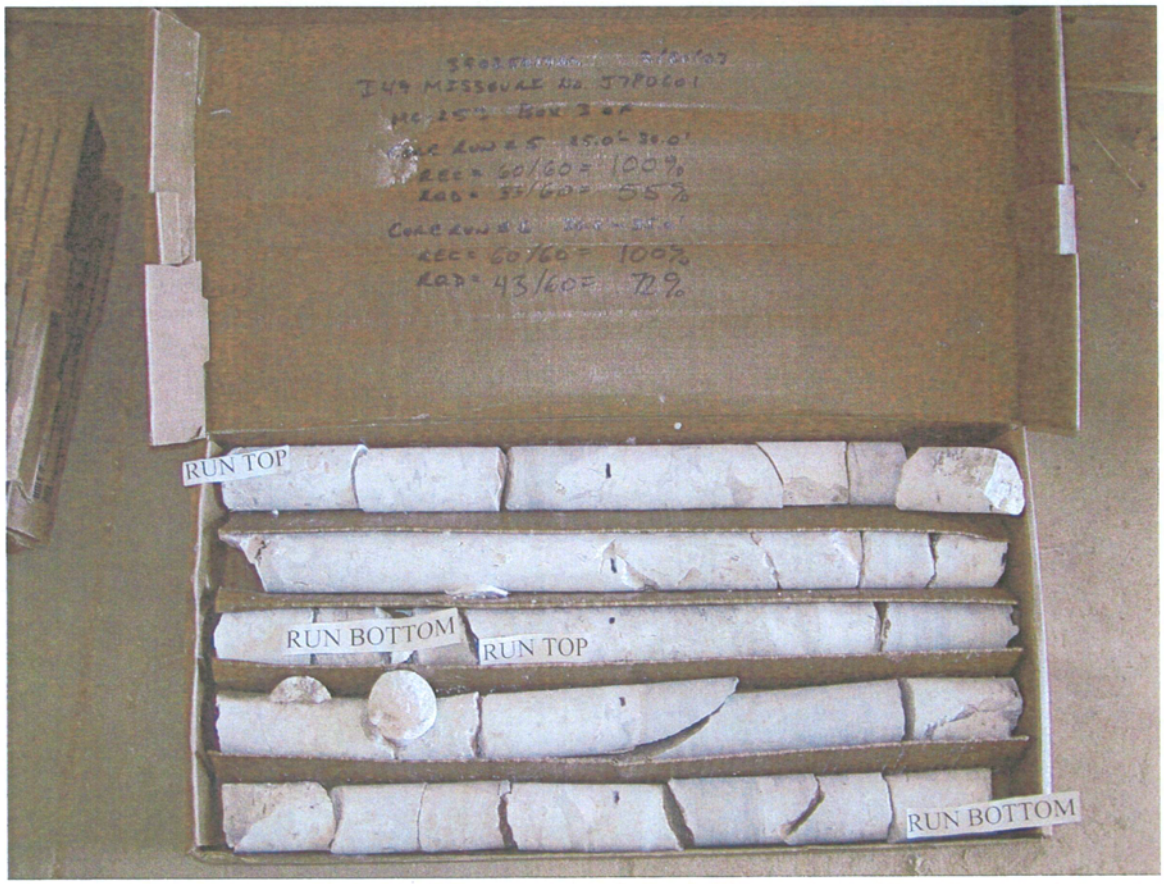
Terracon

BORING STARTED	2-20-03		
BORING COMPLETED	5-31-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-253.GPJ TERRACON.GDT 12/5/03

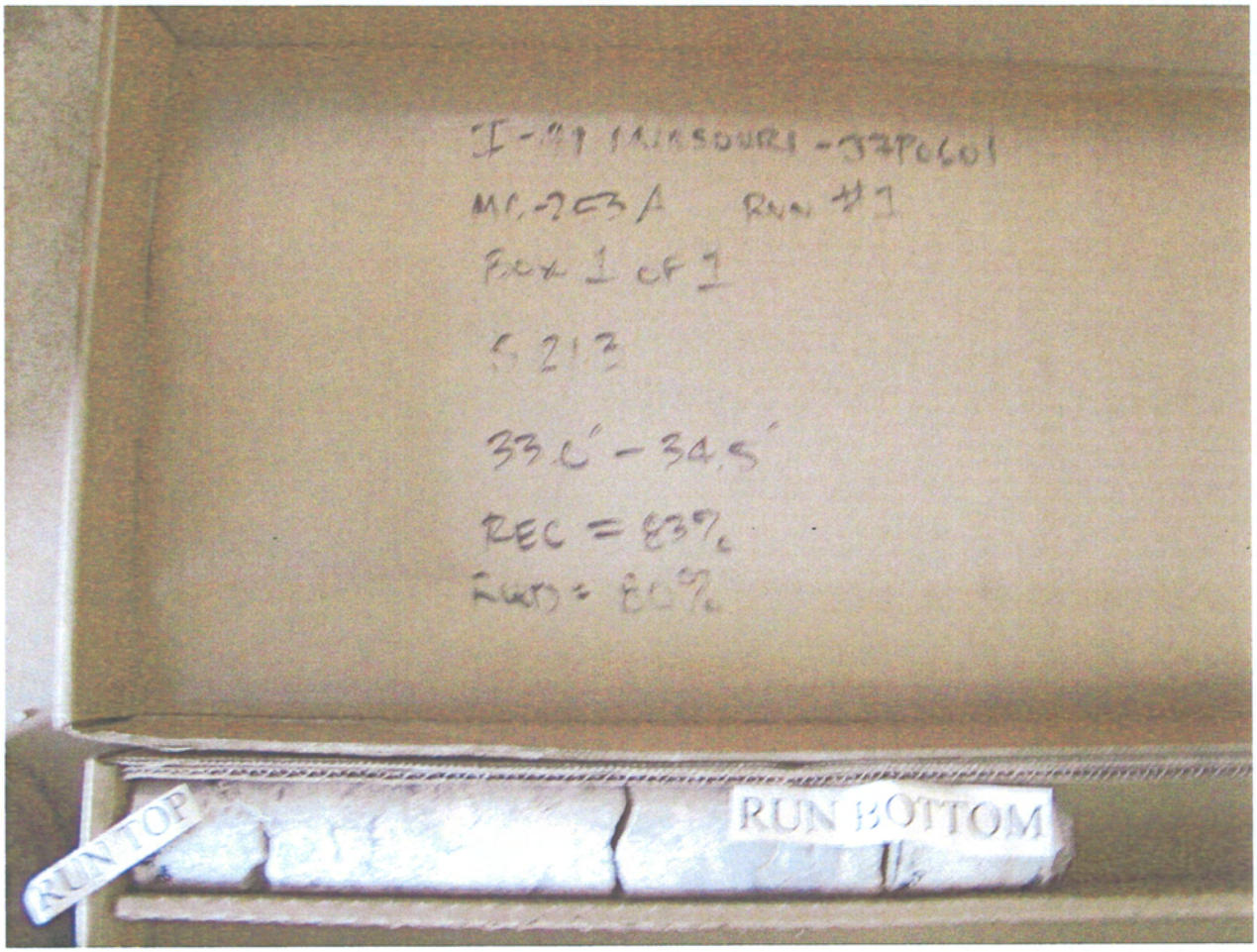
I 49 Missouri
Missouri J7P0601
Boring MC-253
Run No. 1
7.0 Feet to 10.0 Feet
Run No. 2
10.0 Feet to 15.0 Feet

I 49 Missouri
Missouri J7P0601
Boring MC-253
Run No. 3
15.0 Feet to 20.0 Feet (no recovery)
Run No. 4
20.0 Feet to 25.0 Feet

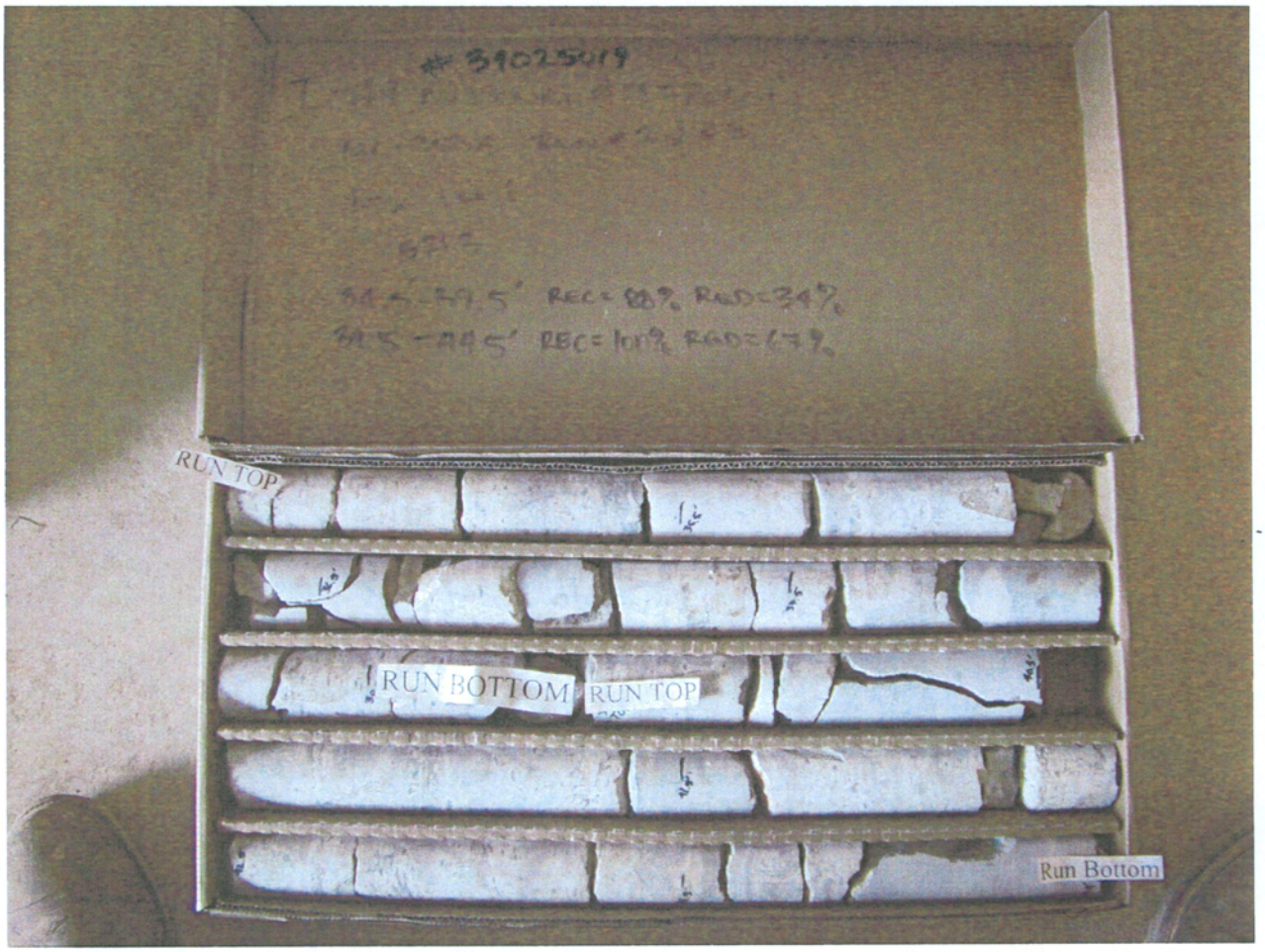


I 49 Missouri
Missouri J7P0601
Boring MC-253
Run No. 5
25.0 Feet to 30.0 Feet
Run No. 6
30.0 Feet to 35.0 Feet

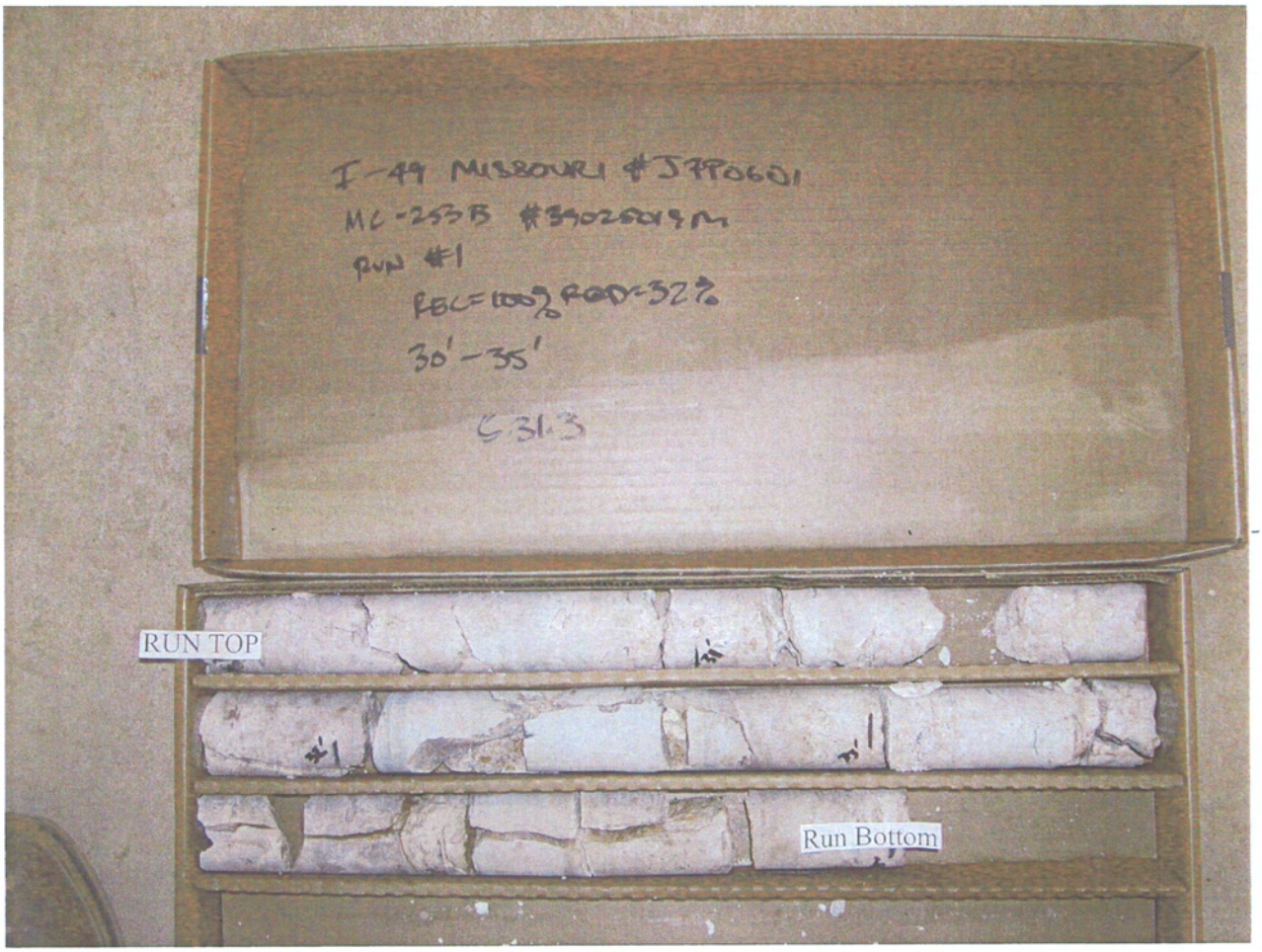
I 49 Missouri
Missouri J7P0601
Boring MC-253
Run No. 7
35.0 Feet to 40.0 Feet
Run No. 8
40.0 Feet to 45.0 Feet



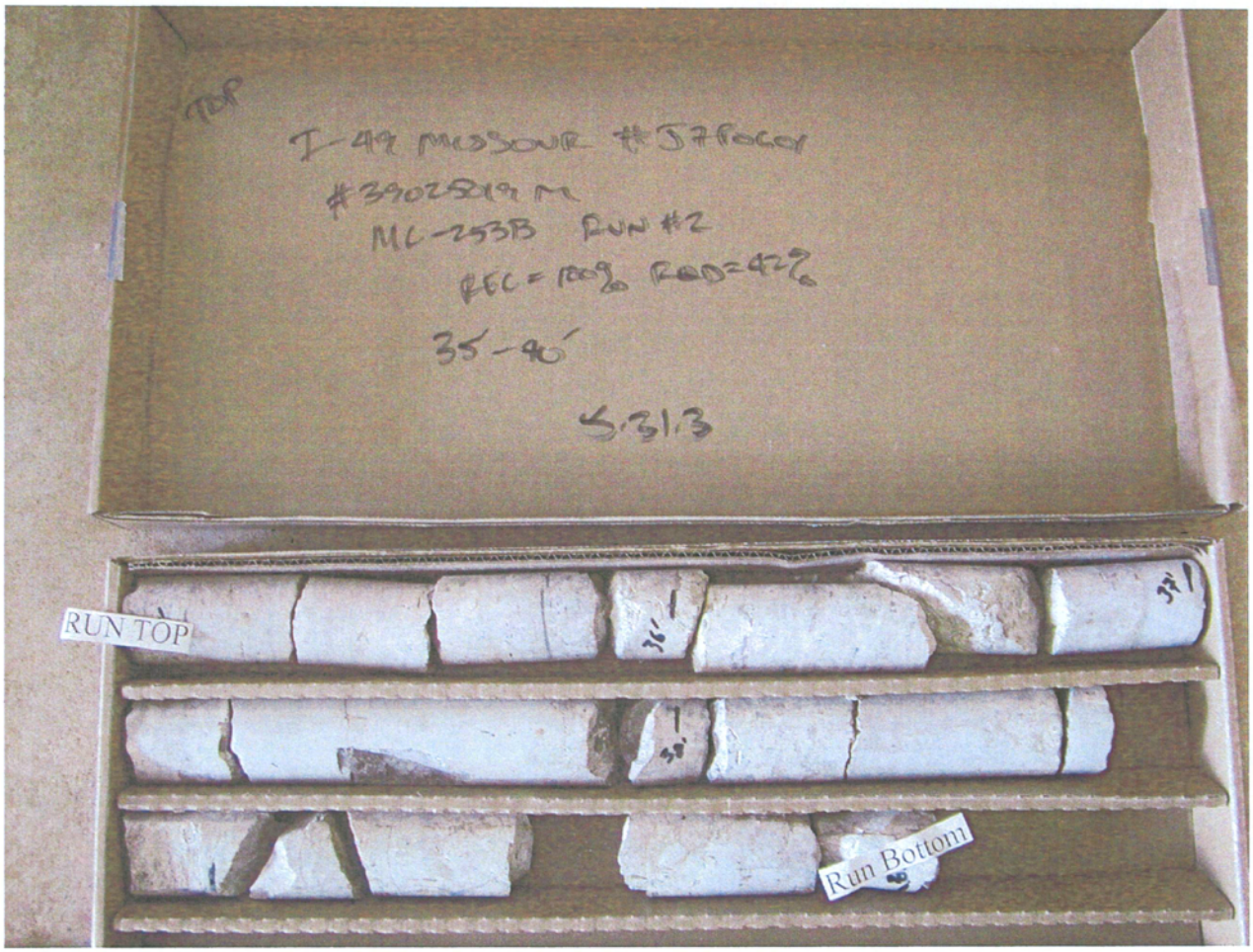
I 49 Missouri
Missouri J7P0601
Boring No. MC 253A
Run No. 1
33.0 Feet to 34.5 Feet



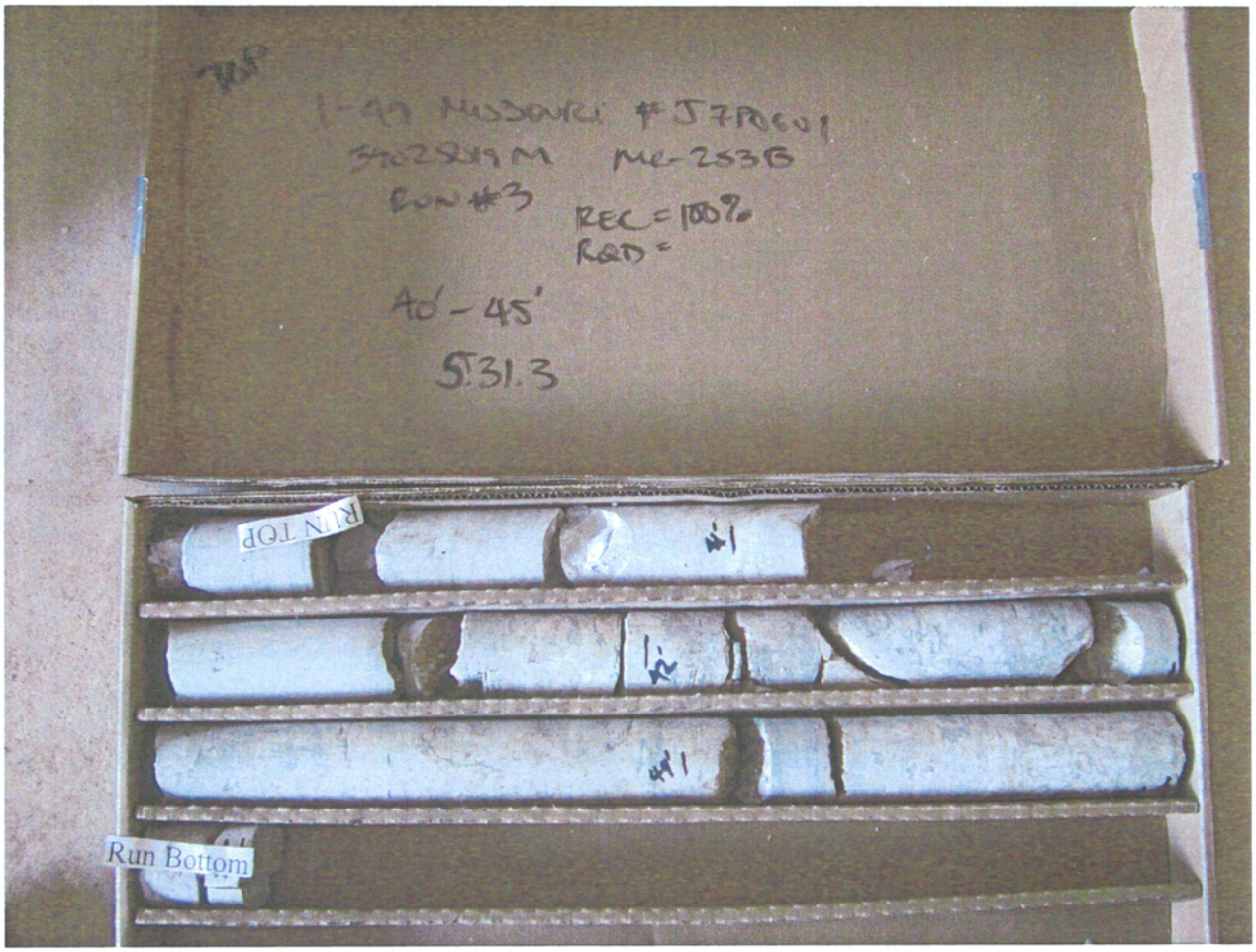
I 49 Missouri
Missouri J7P0601
Boring No. MC 253A
Run No. 2
34.5 Feet to 39.5 Feet
Run No. 3
39.5 Feet to 44.5 Feet



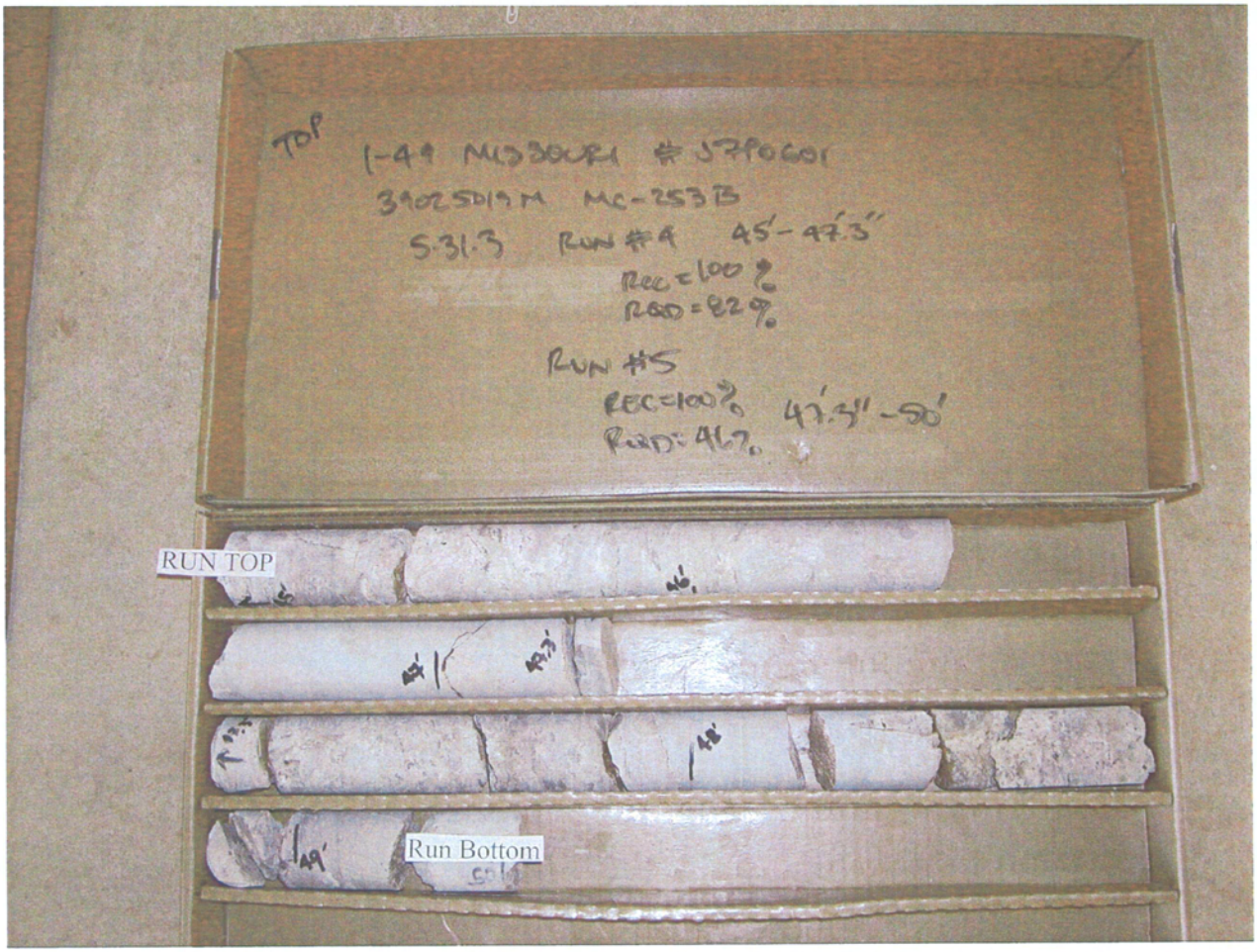
I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 1
30.0 Feet to 35.0 Feet



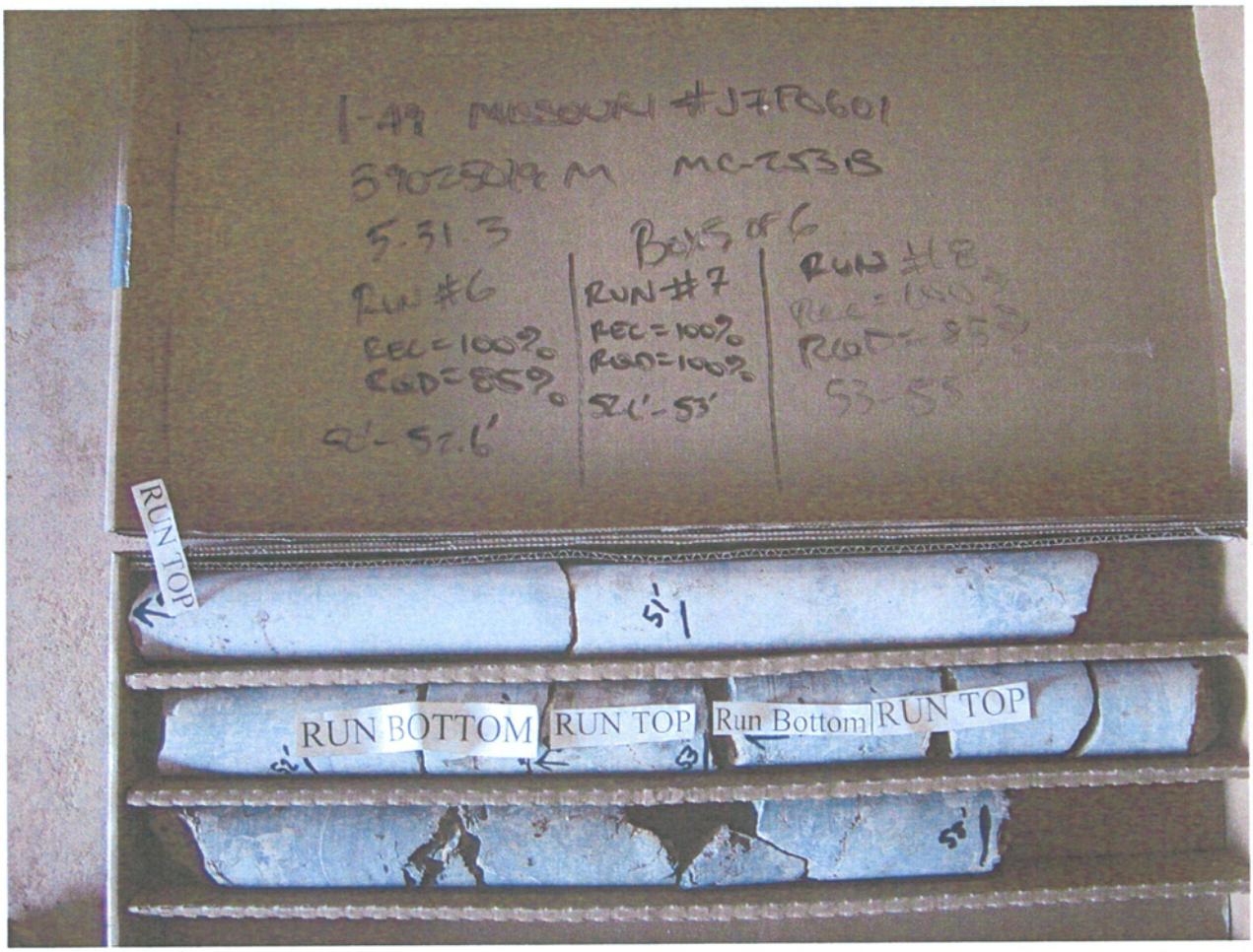
I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 2
35.0 Feet to 40.0 Feet



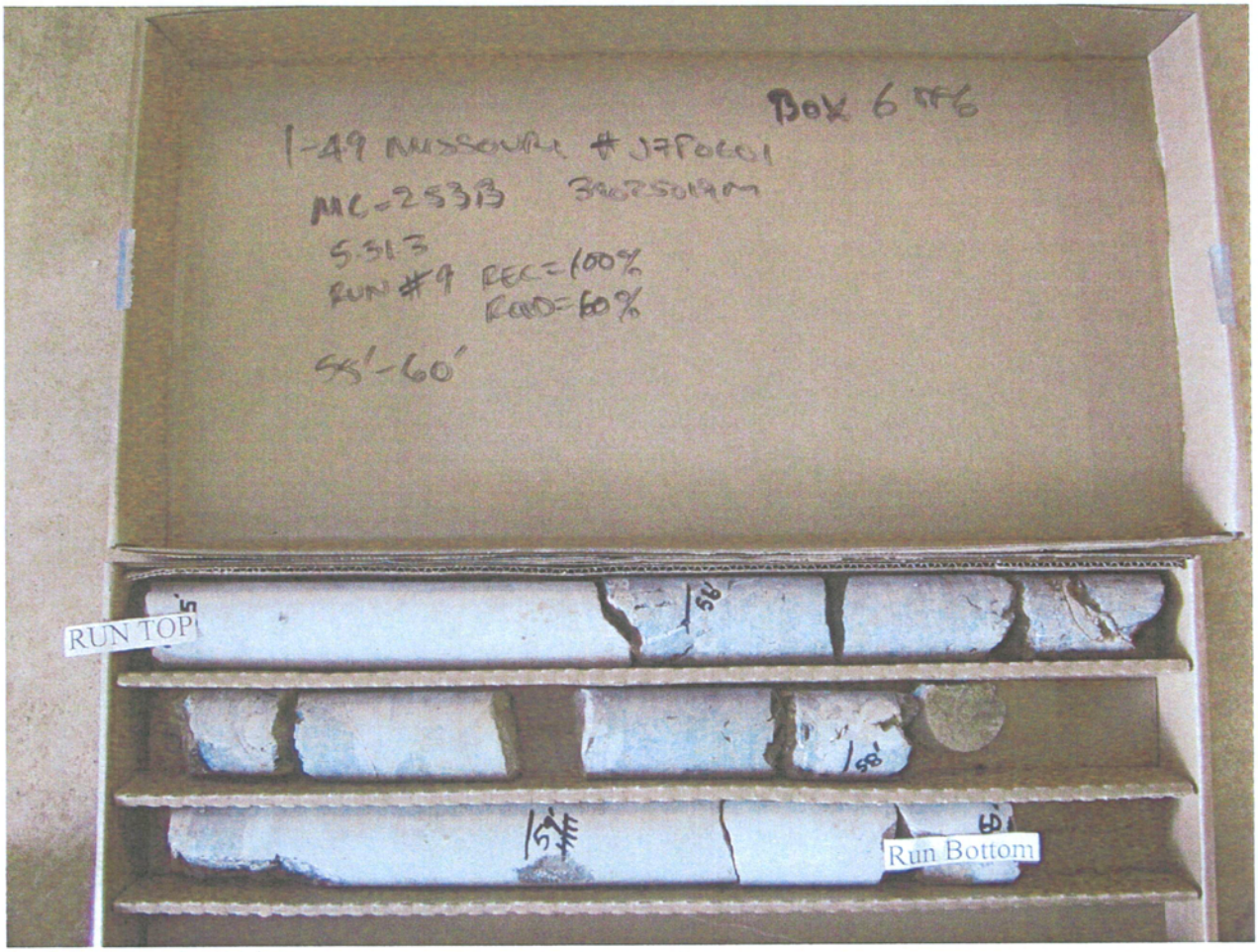
I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 3
40.0 Feet to 45.0 Feet



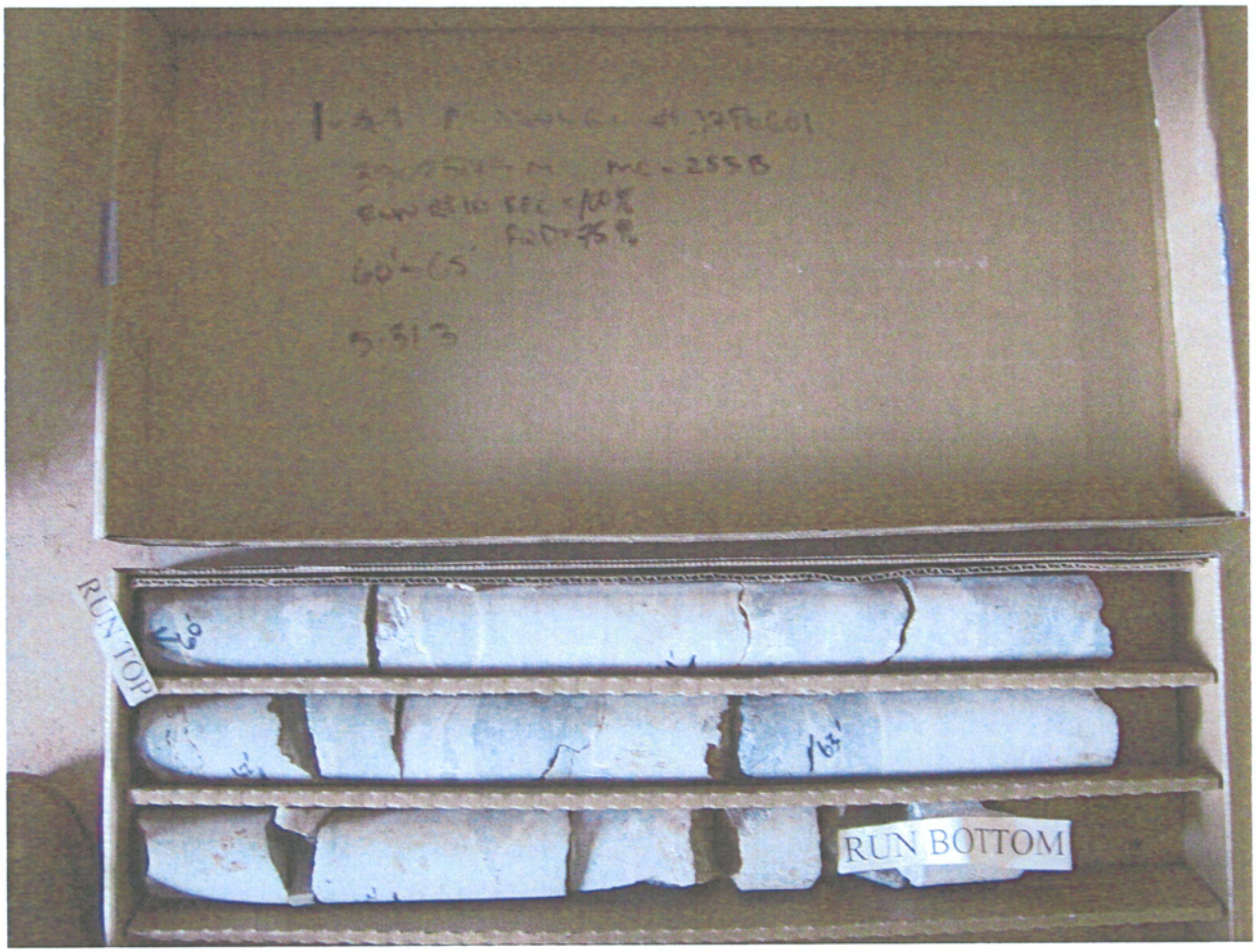
I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 4
45.0 Feet to 47.3 Feet
Run No. 5
47.5 Feet to 50.0 Feet



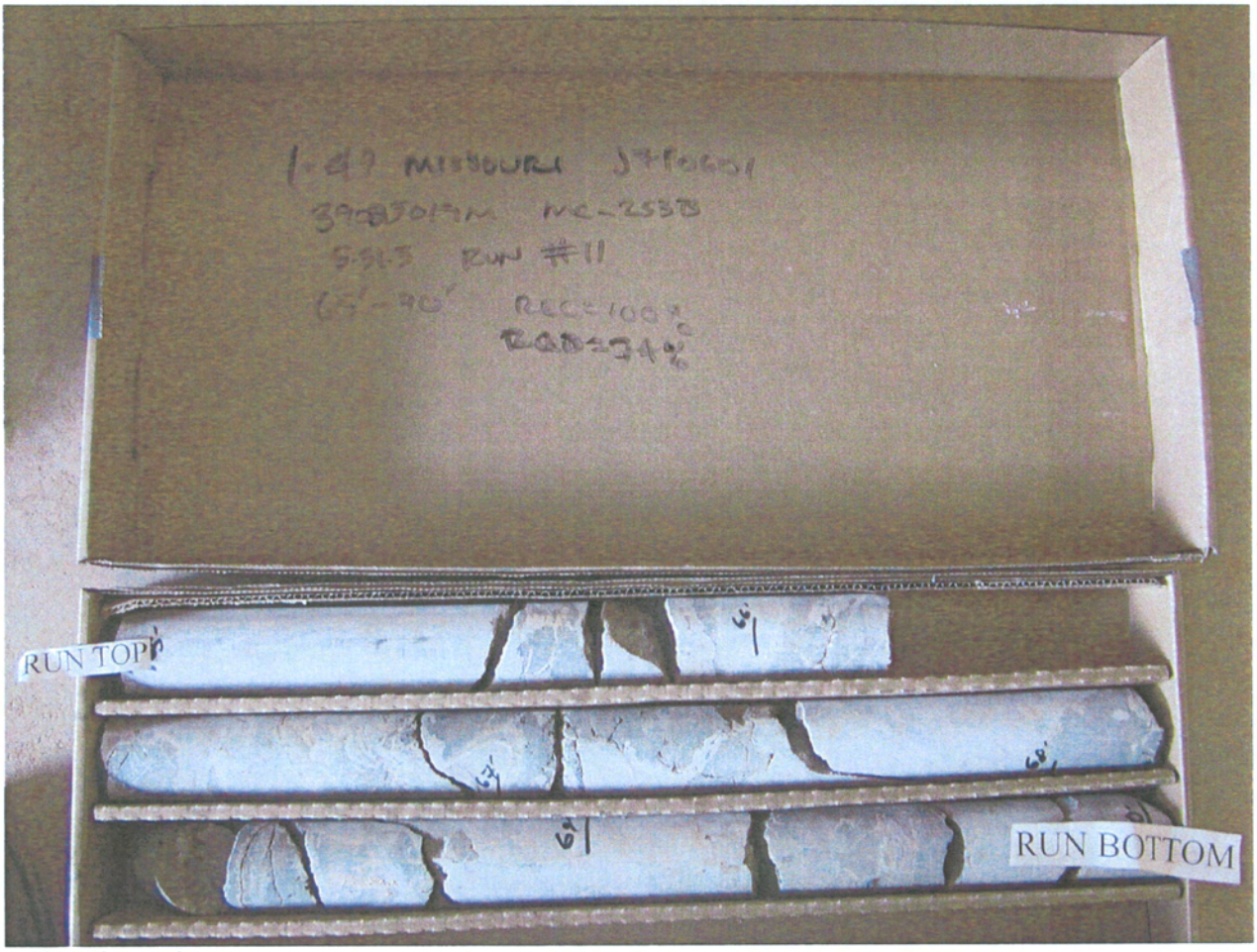
I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 6
50.0 Feet to 52.6 Feet
Run No. 7
52.6 Feet to 53.0 Feet
Run No. 8
53.0 Feet to 55.0 Feet



I 49 Missouri 5/31/03
Missouri J7P0601
Boring No. MC 253B
Run No. 9
55.0 Feet to 60.0 Feet

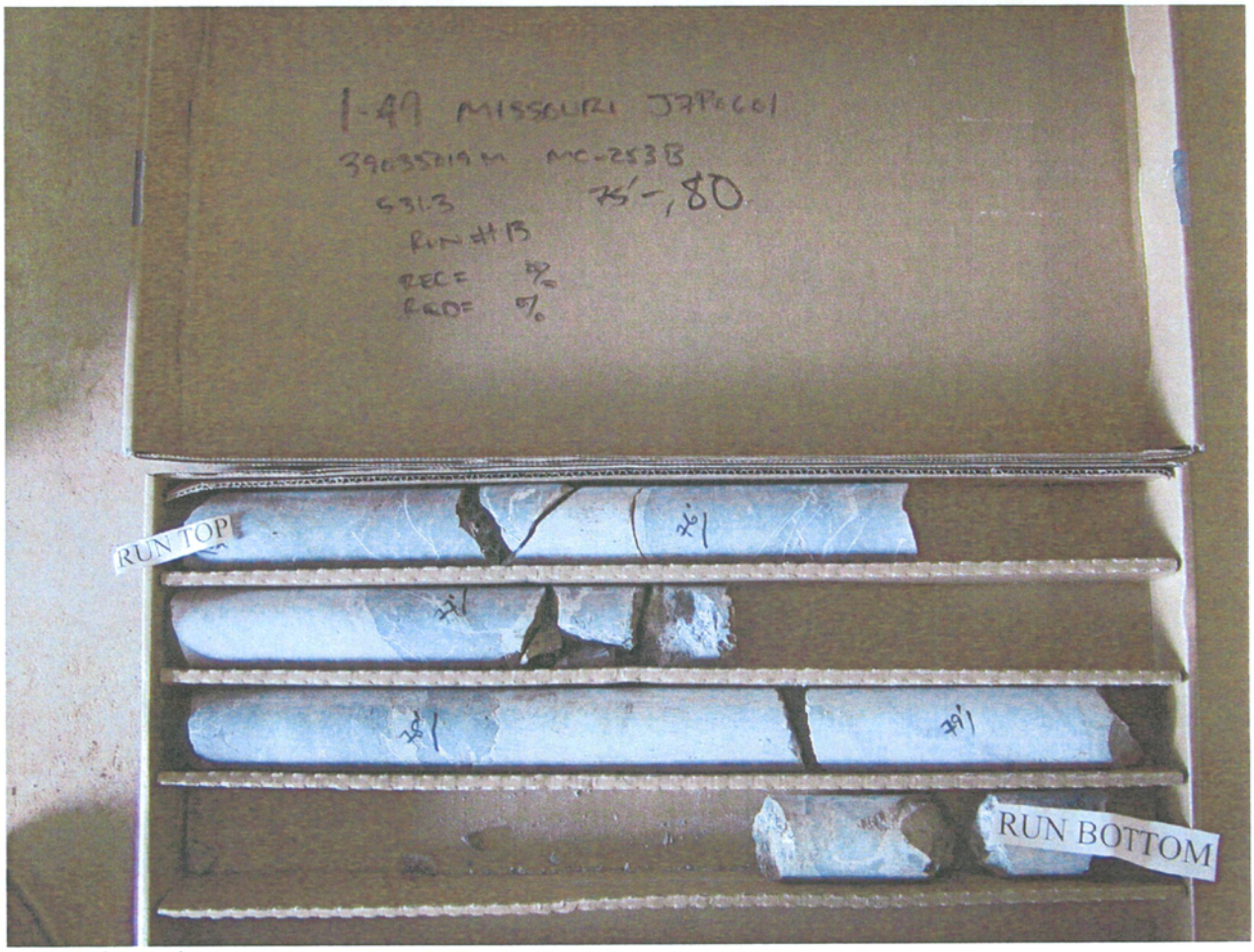


I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 10
60.0 Feet to 65.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 11
65.0 Feet to 70.0 Feet

I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 12
70.0 Feet to 75.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 253B
Run No. 13
75.0 Feet to 80.0 Feet

LOG OF BORING NO. MC-271

CLIENT: **HNTB**

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 973+08, 120 feet left of centerline

Approx. Surface Elev.: 1205.0 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
SANDY GRAVEL, with clay red, white and gray, dense, moist	0	GP	1	AS					
20 1185.0	20								
GRAVEL, with silt and clay light brown and white, dense, moist	20	GP	2	AS					
25 1180.0	25								
26 **CHERT++** 1179.0 stratified, abundant clay seams, white and pink, very thin bedded, very fine grained, highly weathered, hard, with cavities 1178.0 27 **CHERT++** stratified, trace limestone seams, white and light gray, medium bedded, very fine grained, weathered, hard, solid, trace vugs	25		RUN 1	DB	17%	RQD 0%			
	30		RUN 2	DB	100%	RQD 57%			
			RUN 3	DB	100%	RQD 83%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 11/17/03

300

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
		35								
	CHERT++ stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 4	DB	100%	RQD 90%			
		40		RUN 5	DB	90%	RQD 78%			
		45		RUN 6	DB	100%	RQD 94%			
		50		RUN 7	DB	100%	RQD 100%			
				RUN 8	DB	100%	RQD 95%			
		55		RUN 9	DB	100%	RQD 95%			
		60		RUN 10	DB	95%	RQD 90%			
		65								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▼ DRY 24 hr	AB	▼
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	CHERT++ stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid	70		RUN 11	DB	100%	RQD 88%			
		75		RUN 12	DB	100%	RQD 97%			
	76 1129.0									
	CHERT++ stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid	80		RUN 13	DB	100%	RQD 97%			
		85		RUN 14	DB	97%	RQD 69%			
	BOTTOM OF BORING AT 96 FEET BORING BACKFILLED WITH CUTTINGS 08/22/03 ++ Classification estimated from core samples. Petrographic analysis may reveal other rock types. Note: Catcher broke - lost last foot of core from barrel.	90		RUN 15	DB	95%	RQD 87%			
	96 1109.0	95		RUN 16	DB	75%	RQD 69%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY	AB
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED			8-20-03
BORING COMPLETED			8-22-03
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
	25 1180.0	25								
CT CLAY	**CHERT++** stratified, abundant clay seams, white and pink, very thin bedded, very fine grained, highly weathered, hard, with cavities			RUN 1	DB	17%	RQD 0%			
	26 1179.0									
CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 2	DB	100%	RQD 57%			
	REED SPRINGS FORMATION - highly fractured									
CT										
LS										
CT		30								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT	31 1174.0									
CT LS CT LS	**CHERT++** stratified, trace limestone seams, white and light gray, medium bedded, very fine grained, weathered, hard, solid, trace vugs			RUN 3	DB	100%	RQD 83%			
CT										
CT		35								
CT LS CT	36 1169.0									
CT LS CT LS CT LS CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 4	DB	100%	RQD 90%			
	Continued Next Page	40								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▽ DRY	AB
WL	▽ DRY 24 hr	AB ▽	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-271

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT	41 1164.0									
CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 5	DB	90%	RQD 78%			
CT	46 1159.0	45								
	CHERT++ stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 6	DB	100%	RQD 94%			
CT	48.8 1156.2									
CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid	50		RUN 7	DB	100%	RQD 100%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

305

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT / LS	51 1154.0									
CT / LS / CT / CT / CLAY / CT / CT / 56 LS	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid	55		RUN 8	DB	100%	RQD 95%			
1149.0										
CT / CT / CT / LS / CT / CT+LS / CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid	60		RUN 9	DB	100%	RQD 95%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

LOG OF BORING NO. MC-271

CLIENT: HNTB

GEOLOGIC LOG

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT	CT									
	61 1144.0									
CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 10	DB	95%	RQD 90%			
LS	LS									
CT	CT									
LS	LS									
LS	LS									
CT	CT	65								
	66 1139.0									
CT	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid → highly fractured w/clay seams			RUN 11	DB	100%	RQD 88%			
CT	CT									
CT	CT	70								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY 24 hr	AB	▼	
WL				

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

307

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT / LS	71 1134.0									
LS / CT / CLAY	**CHERT++** stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 12	DB	100%	RQD 97%			
CT / LS / CT / CT / CLAY / LS	76 1129.0	75								
CT	**CHERT++** stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid			RUN 13	DB	100%	RQD 97%			
CT / LS / CT / CT / CT	**Continued Next Page**	80								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT LS	**CHERT++** stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid									
81	1124.0									
CT CT LS CT LS CT LS SH CT SH CT	**CHERT++** stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid	85		RUN 14	DB	97%	RQD 69%			
87	1118.0									
SH LS CT LS CT LS	**CHERT++** stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid	90		RUN 15	DB	95%	RQD 87%			

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▼ DRY WD	▼ DRY AB	
WL	▼ DRY 24 hr AB	▼	
WL			

Terracon

BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

309

LOG OF BORING NO. MC-271

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
LS CT	**CHERT++** stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid									
92 CT	1113.0									
LS CT SH CT+LS CT+LS LS CT	**CHERT++** stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid	95		RUN 16	DB	75%	RQD 69%			
96	1109.0									

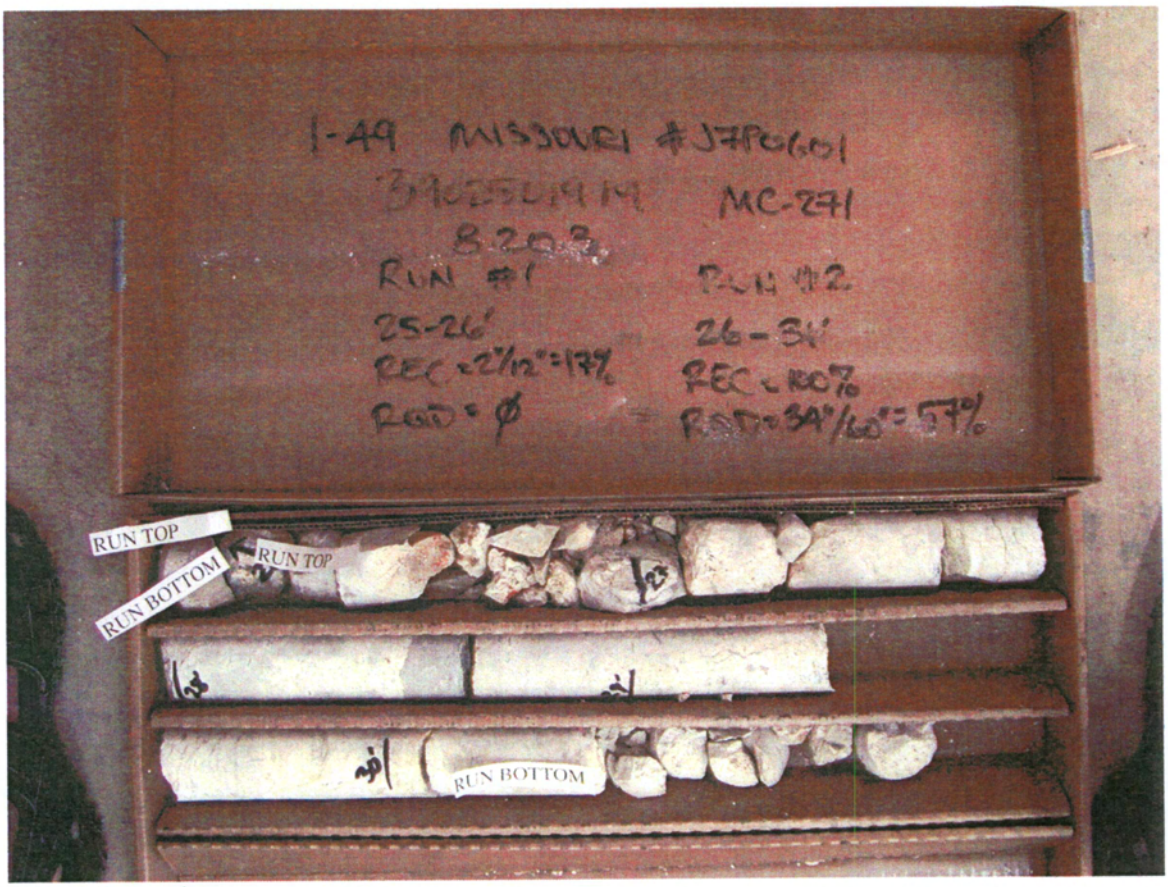
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY AB	
WL	▽ DRY 24 hr AB	▽	
WL			

Terracon

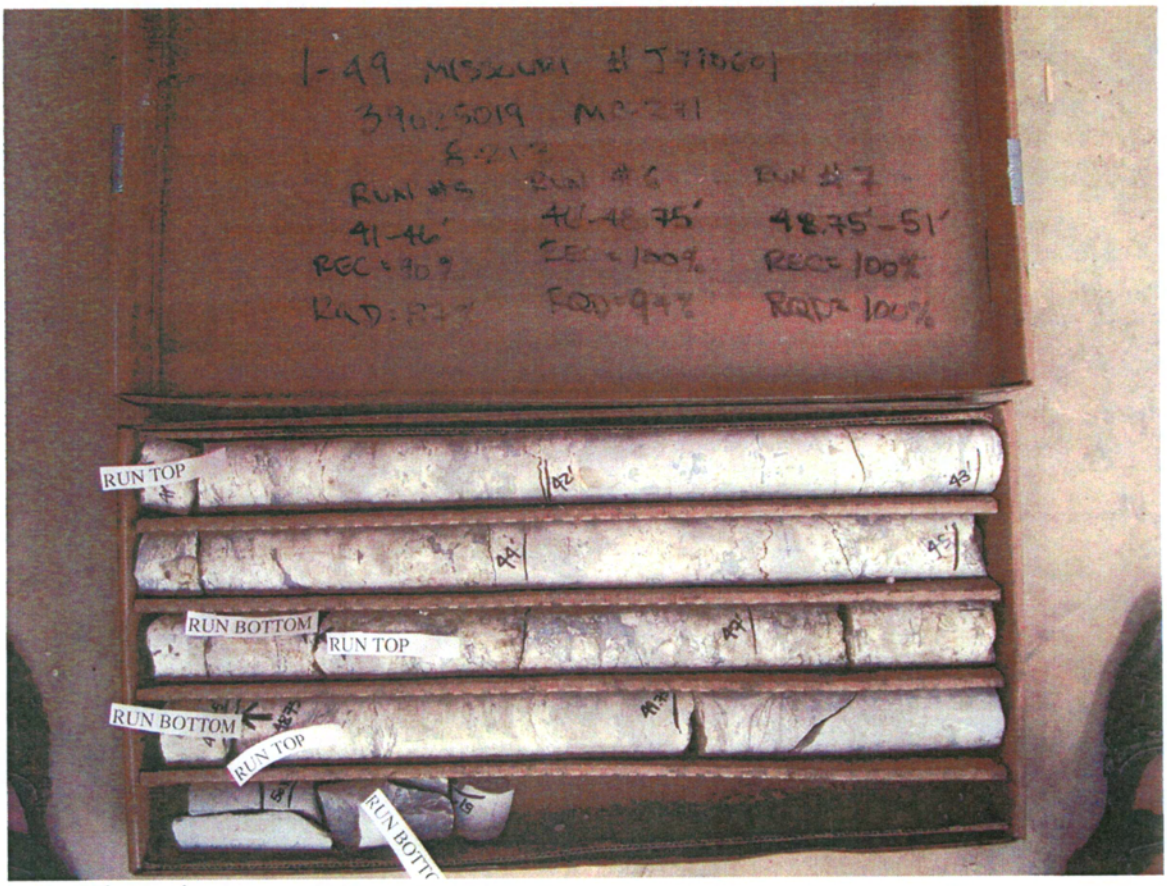
BORING STARTED	8-20-03		
BORING COMPLETED	8-22-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-271.GPJ TERRACON.GDT 12/5/03

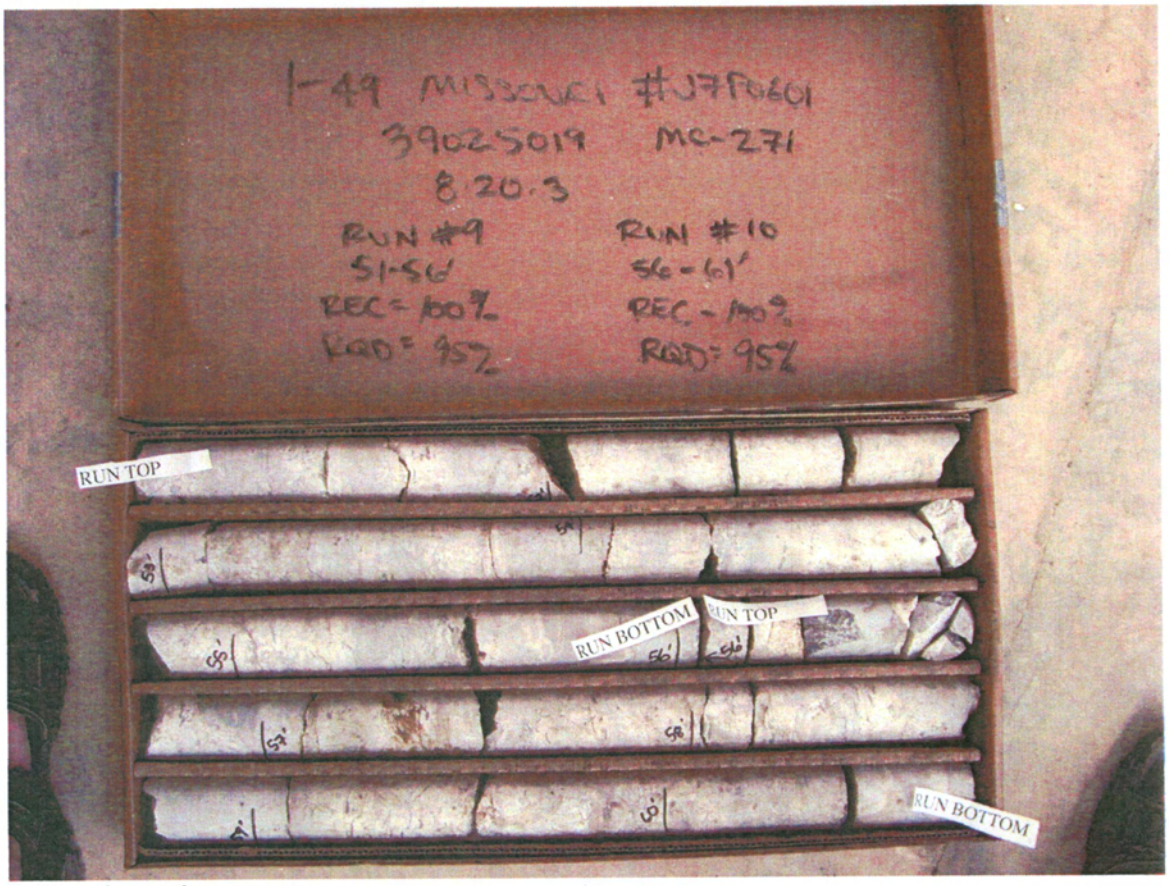


I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 1
25.0 Feet to 26.0 Feet
Run No. 2
26.0 Feet to 31.0 Feet

I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 3
31.0 Feet to 36.0 Feet
Run No. 4
36.0 Feet to 41.0 Feet

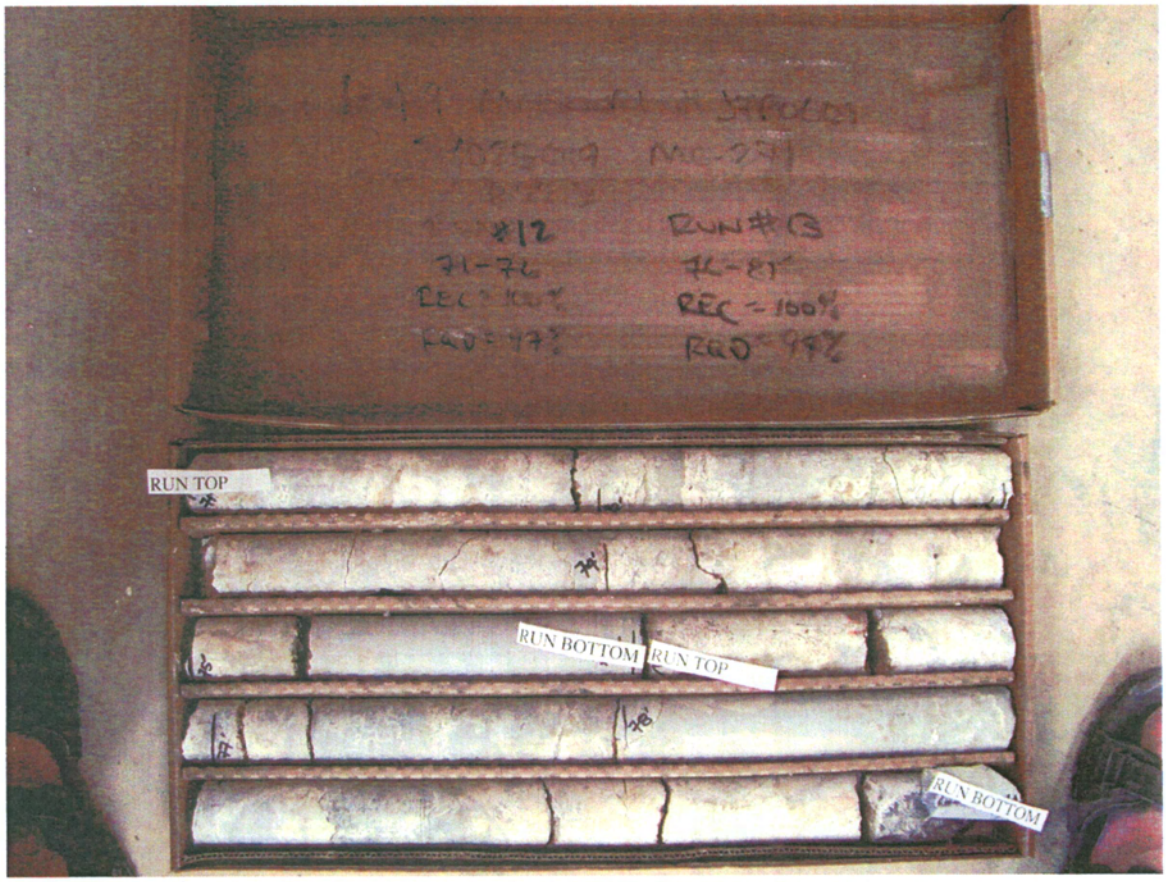


I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 5
41.0 Feet to 46.0 Feet
Run No. 6
46.0 Feet to 48.75 Feet
Run No. 7
48.75 Feet to 51.0 Feet

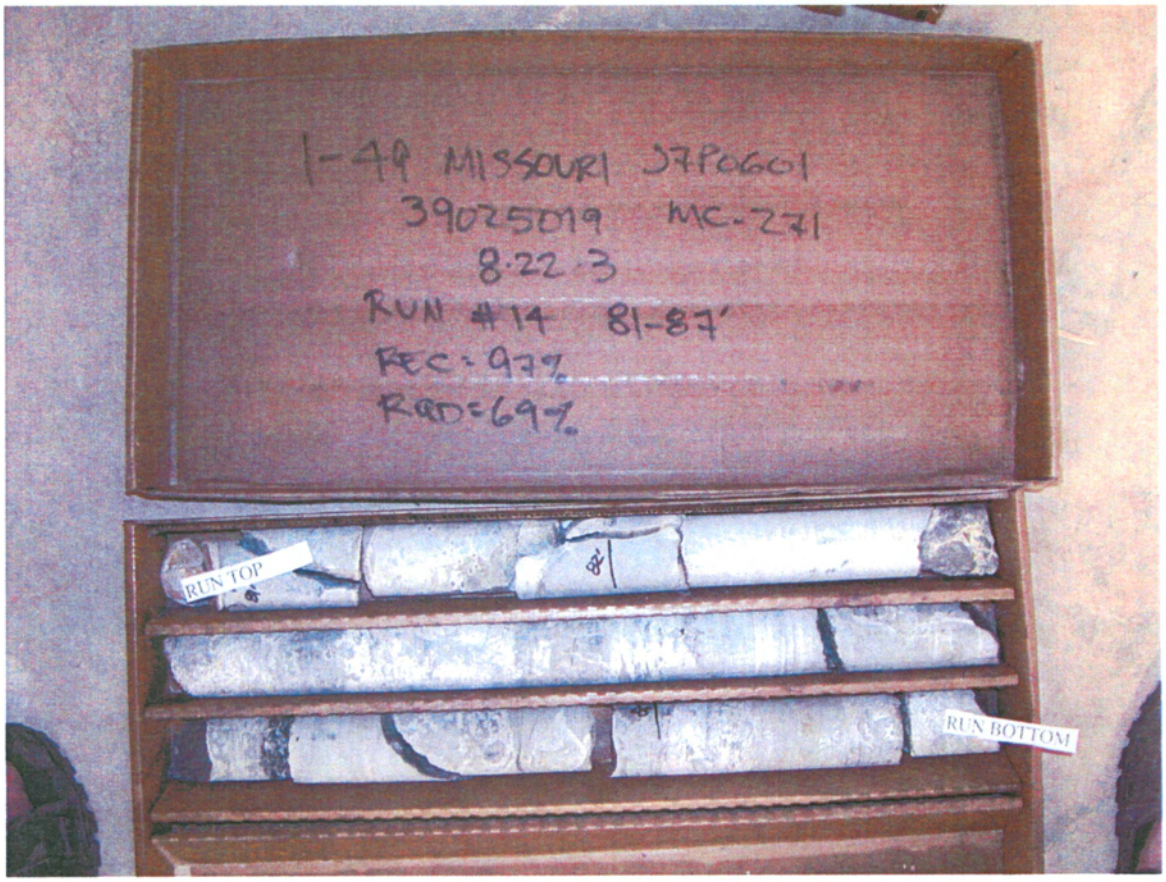


I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 8
51.0 Feet to 56.0 Feet
Run No. 9
56.0 Feet to 61.0 Feet

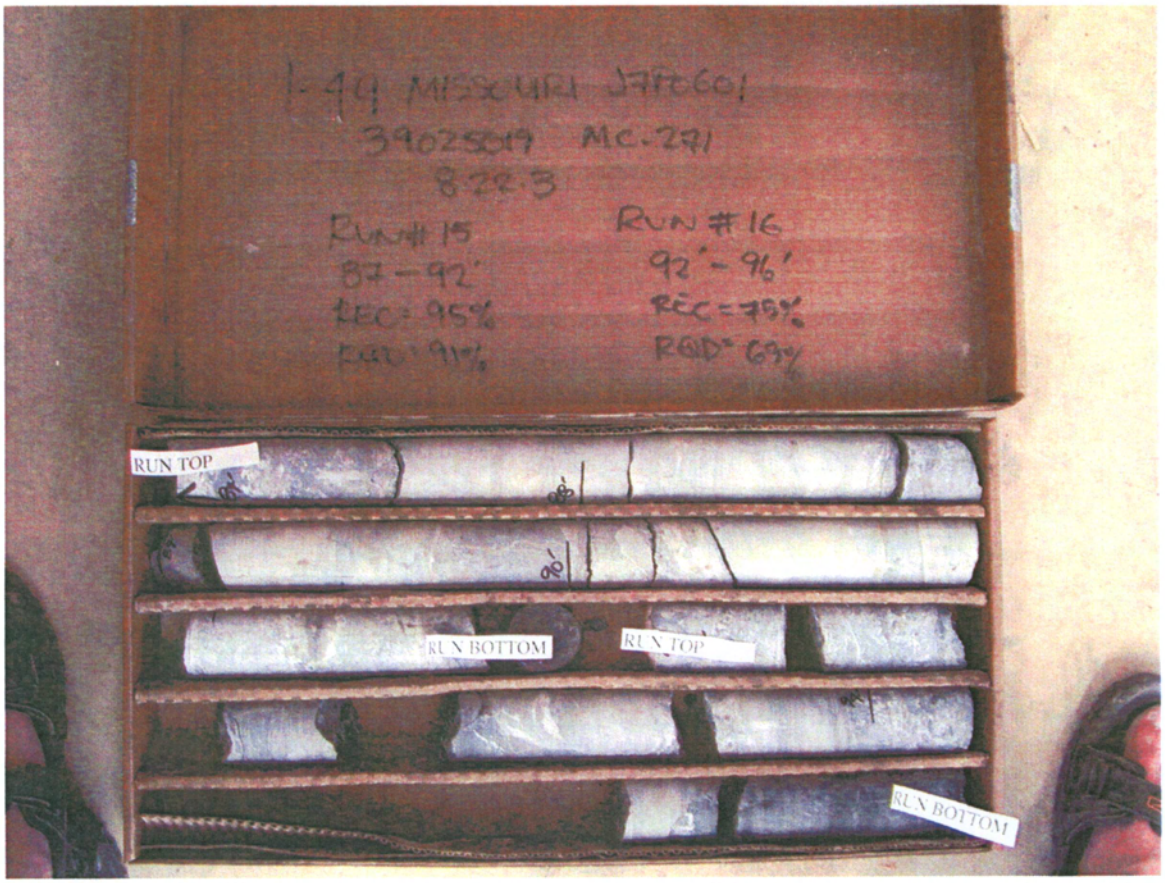
I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 10
61.0 Feet to 66.0 Feet
Run No. 11
66.0 Feet to 71.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 12
71.0 Feet to 76.0 Feet
Run No. 13
76.0 Feet to 81.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 14
81.0 Feet to 87.0 Feet



I 49 Missouri
Missouri J7P0601
Boring No. MC 271
Run No. 15
87.0 Feet to 92.0 Feet
Run No. 16
92.0 Feet to 96.0 Feet

LOG OF BORING NO. MC-283

CLIENT
HNTB

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 981+08, 120 feet left of centerline

DESCRIPTION

Approx. Surface Elev.: 1183.0 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	DESCRIPTION
	0	GC	1	AS						**GRAVEL**, with silt and clay light brown and white, medium dense to dense, dry
	5									
	10									
	15									
	20		2	AS						**GRAVEL**, with clay reddish brown, dense, dry to moist
	25									
	30			RB						

20 1163.0

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	8-12-03		
BORING COMPLETED	8-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BO	JOB #	J7P0601

BOREHOLE 99 MC-283.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-283

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	GRAVEL, with clay reddish brown, dense, dry to moist	35								
		40								
		45								
		50								
		55								
		60								
	65 1118.0	65								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

BORING STARTED	8-12-03		
BORING COMPLETED	8-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BO	JOB #	J7P0601

BOREHOLE 99 MC-283.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-283

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
	CHERT++ stratified, abundant limestone seams and beds, gray to dark gray, medium bedded, very fine grained, fresh, hard, solid			RUN 1	DB	100%	RQD 44%			
		70		RUN 2	DB	90%	RQD 58%			
73	1110.0									
	CHERT++ stratified, with limestone seams, trace shale laminations, white, light gray and dark gray, medium bedded, very fine grained, fresh, very hard, solid	75		RUN 3	DB	90%	RQD 85%			
78	1105.0									

BOTTOM OF BORING AT 78 FEET
BACKFILLED WITH CUTTINGS 08/20/03

++ Classification estimated from core samples. Petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	8-12-03		
BORING COMPLETED	8-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BO	JOB #	J7P0601

BOREHOLE 99 MC-283.GPJ TERRACON.GDT 11/17/03

LOG OF BORING NO. MC-283

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	OVERBURDEN									
65	1118.0	65								
CT / LS	**CHERT++** stratified, abundant limestone seams and beds, gray to dark gray, medium bedded, very fine grained, fresh, hard, solid			RUN 1	DB	100%	RQD 44%			
CT	REED SPRINGS FORMATION									
LS										
CT										
68	1115.0									
LS / CT	**CHERT++** stratified, abundant limestone seams and beds, gray to dark gray, medium bedded, very fine grained, fresh, hard, solid			RUN 2	DB	90%	RQD 58%			
LS										
CT										
	Continued Next Page	70								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▽ DRY	AB
WL	▽	▽	
WL			

Terracon

BORING STARTED	8-12-03		
BORING COMPLETED	8-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-283.GPJ TERRACON.GDT 12/5/03

322

LOG OF BORING NO. MC-283

CLIENT: HNTB

SITE: McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
CT, CT, LS, CT	**CHERT++** stratified, abundant limestone seams and beds, gray to dark gray, medium bedded, very fine grained, fresh, hard, solid									
73 CT	1110.0									
CT, SH, CT, CT+LS, LS, CT, SH, LS, CT, CT, LS, CT, SH, CT, SH, CT+LS	**CHERT++** stratified, with limestone seams, trace shale laminations, white, light gray and dark gray, medium bedded, very fine grained, fresh, very hard, solid	75		RUN 3	DB	90%	RQD 85%			
78	1105.0									

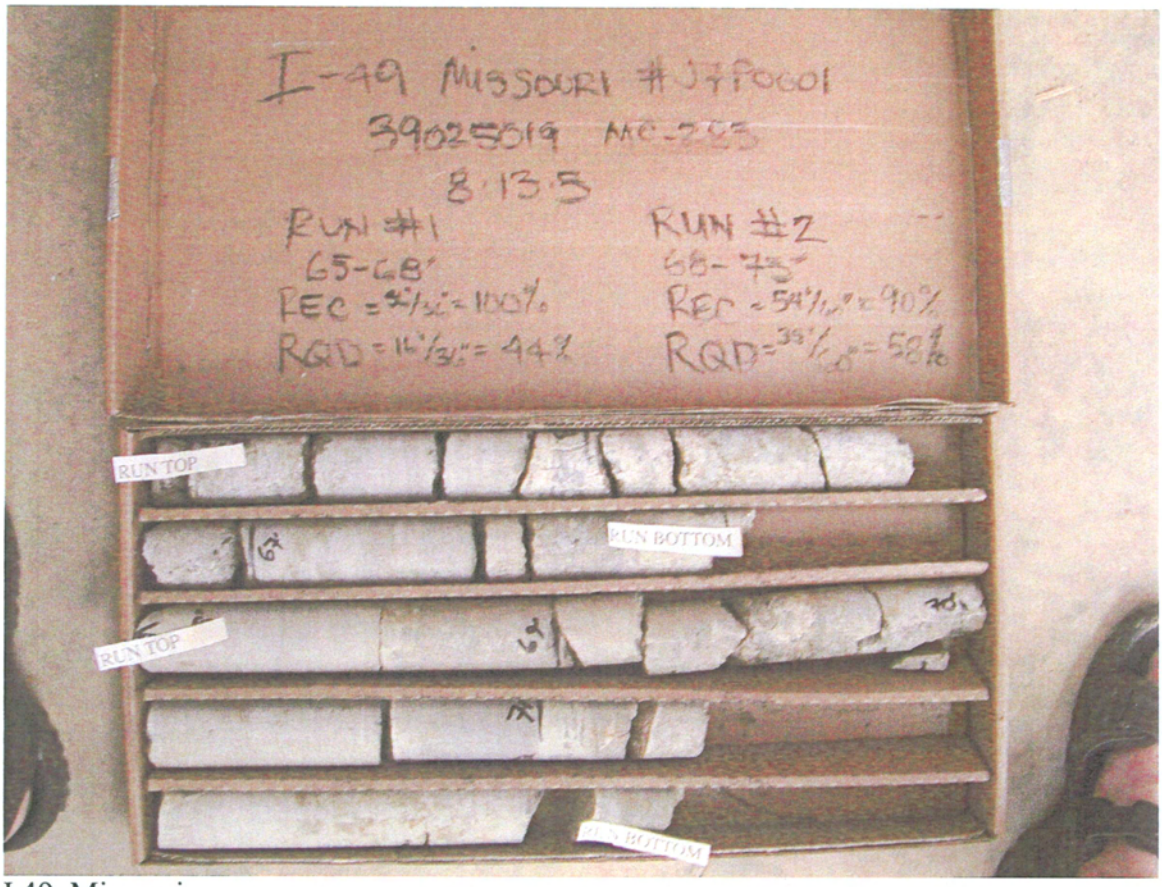
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▽		▼
WL			

Terracon

BORING STARTED	8-12-03		
BORING COMPLETED	8-20-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 MC-283.GPJ TERRACON.GDT 12/5/03



I 49 Missouri
Missouri J7P0601
Boring No. MC 283
Run No. 1
65.0 Feet to 68.0 Feet
Run No. 2
68.0 Feet to 73.0 Feet

I 49 Missouri
Missouri J7P0601
Boring No. MC 283
Run No. 3
73.0 Feet to 78.0 Feet

9.4 Roadway Structure Boring Logs

LOG OF BORING NO. MS-23

CLIENT
HNTB

Automatic Hammer Efficiency = 80.7%

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 738+62, 175 Feet right from baseline southbound ramp

DESCRIPTION

Approx. Surface Elev.: 943.6 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
		GP		HS						
		GP	1	SS	14	10				5, 5, 5
	5	GP		HS						
		GP	2	SS	10	10				4, 4, 6
	10	GP		HS						
		GP	3	SS	11	30				13, 13, 17
	15	GP								

GRAVEL, trace clay
light brown and white, loose to dense, moist

14 — 929.6

LIMESTONE GRAVEL, with sand
gray, dense, dry

17 — 926.6

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 17 FEET
BACKFILLED WITH CUTTINGS 10/15/02

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▼ DRY	AB
WL	▼ DRY 24 hr AB	▼	
WL			

Terracon

BORING STARTED	10-15-02		
BORING COMPLETED	10-15-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS23-24.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-24

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 740+47, 51 Feet left from baseline southbound ramp

DESCRIPTION

Approx. Surface Elev.: 963.2 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
GRAVEL, with silt light brown and gray, dense, dry		GM		HS						
3.5 / 959.7										
3.8 / 959.4 **CHERT++** gray, hard, dry		GM	1	SS	0	50/1"				20/1", 30/0"

AUGER REFUSAL ON CHERT

BOTTOM OF BORING AT 3.8 FEET
BACKFILLED WITH CUTTINGS 10/18/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▼ DRY	AB
WL	▼ DRY 24 hr AB	▼	
WL			

Terracon

BORING STARTED	10-17-02		
BORING COMPLETED	10-17-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED CSK		JOB #	J7P0601

BOREHOLE 99 5019MS23-24.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-41

CLIENT: HNTB

Automatic Hammer Efficiency = 83%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 768+04, 400 Feet left of centerline

Approx. Surface Elev.: 995.1 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CLAYEY GRAVEL dark brown and white, loose, dry to moist		GC		PA						
			GC	1	SS	12	9				3, 4, 5
		5	GC		PA						
			GC	2	SS	10	10				5, 5, 5
		10	GC		PA						
	13.5 / 981.6										
	GRAVELLY LEAN CLAY, scattered sand brown and white, medium stiff, moist		CL	3	SS	14	11				5, 5, 6
		15	CL		PA						
	18.3 / 976.8										
	AUGER REFUSAL ON APPARENT CHERT BOTTOM OF BORING AT 18.3 FEET BACKFILLED WITH CUTTINGS 11/14/03										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▼ DRY	AB
WL	▼ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG	ATV, #98	FOREMAN	DB
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS41-43.GPJ TERRACON.GDT 1/5/04

LOG OF BORING NO. MS-42

CLIENT: **HNTB**

Automatic Hammer Efficiency = 83%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 767+90, Centerline

Approx. Surface Elev.: 977.6 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVEL WITH COBBLES brown, dry		GP		PA						
	3.5 974.1										
	GRAVELLY SAND, trace clay brown and white, loose to medium dense, dry		SP	1	SS	6	14				2, 5, 9
		5	SP		PA						
			SP	2	SS	4	4				2, 1, 3
	11 966.6	10	SP		PA						
	11.4 966.2 **LIMESTONE++** gray, hard										

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 11.4 FEET
BACKFILLED WITH CUTTINGS 11/13/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY 24 hr	AB	▼	
WL				

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG	ATV, #98	FOREMAN	DB
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS41-43.GPJ TERRACON.GDT 1/5/04

LOG OF BORING NO. MS-43

CLIENT: **HNTB**

Automatic Hammer Efficiency = 83%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 767+97, 440 Feet right of centerline

Approx. Surface Elev.: 966.0 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVEL, with clay brown and white, medium dense, dry to moist		GC		PA						
			GC	1	SS	10	12				5, 6, 6
		5	GC		PA						
			GC	2	SS	6	12				5, 7, 5
		10	GC		PA						
	14.5 951.5		GC	3	SS	10	9				5, 4, 5
	SANDY LEAN CLAY brown, very soft, moist	15	CL		PA						
	19 947.0										
	19.5 946.5 **LIMESTONE++** light brown, hard, highly weathered		CL	4	ST	6					50/0"
				5	SS	0	50/0"				
	AUGER REFUSAL ON LIMESTONE										
	BOTTOM OF BORING AT 19.5 FEET BACKFILLED WITH CUTTINGS 11/13/03										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	11-13-02		
BORING COMPLETED	11-13-02		
RIG	ATV, #98	FOREMAN	DB
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS41-43.GPJ TERRACON.GDT 1/5/04

LOG OF BORING NO. MS-59

CLIENT
HNTB

Automatic Hammer Efficiency = 80.7%

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 783+36, 150 Feet left of centerline

Approx. Surface Elev.: 1034.3 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVEL		GP		HS						
	1.5 gray, loose, dry 1032.8										
	AUGER REFUSAL ON APPARENT CHERT										
	BOTTOM OF BORING AT 1.5 FEET BACKFILLED WITH CUTTINGS 10/22/02										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▼ DRY	AB
WL	▼ DRY 24 hr	AB ▼	
WL			

Terracon

BORING STARTED	10-22-02		
BORING COMPLETED	10-22-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS59-60.72-74.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-60

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 784+25, 248 Feet right of centerline

DESCRIPTION

Approx. Surface Elev.: 1010.4 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
		GM		HS						
			1	SS	10	18/6"				25, 18,
	4.5 1005.9					50/2"				50/2"
	5 1005.4			HS						

GRAVEL, with silt
light brown and gray, very dense, dry

CHERT++
gray, hard

AUGER REFUSAL ON CHERT

BOTTOM OF BORING AT 5 FEET
BACKFILLED WITH CUTTINGS 10/18/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY 24 hr	AB	▽	
WL				

Terracon

BORING STARTED	10-18-02		
BORING COMPLETED	10-18-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS59-60.72-74.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-72

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 792+28, 250 Feet right of centerline

Approx. Surface Elev.: 979.8 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CLAYEY GRAVEL, with silt brown, light brown and reddish brown, medium dense, moist		GC		HS						
			GC	1	SS	10	14				6, 6, 8
		5	GC		HS						
	8 971.8										
△ △ △ △ △ △	**CHERT++** gray, hard			2	SS HS	0	55/2"				5/2", 50/0"
	11.2 968.6	10									
	AUGER REFUSAL ON CHERT BOTTOM OF BORING AT 11.2 FEET BACKFILLED WITH CUTTINGS 10/17/02 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY AB	
WL	▼ DRY 24 hr AB	▽	
WL			

Terracon

BORING STARTED	10-17-02		
BORING COMPLETED	10-17-02		
RIG ATV, #103E	FOREMAN JW		
APPROVED CSK	JOB # J7P0601		

BOREHOLE 99 5019MS59-60,72-74.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-73

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 795+49, Centerline

Approx. Surface Elev.: 990.4 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY GRAVEL brown, medium dense, dry		GM		HS						
	3.5 / 986.9										
	SILTY SANDY GRAVEL brown, light reddish brown and gray, medium dense, dry to moist		GM	1	SS	14	13				10, 7, 6
		5	GM		HS						
			GM	2	SS	4	11				5, 5, 6
		10	GM		HS						
			GM	3	SS	8	16				8, 10, 6
		15	GM		HS						
	17 / 973.4										
	CLAYEY GRAVEL, with sand brown, medium dense, moist		GC	4	SS	8	13/6" 50/1"				6, 13, 50/1"
	19.5 / 970.9	20			HS						
	BROKEN CHERT++, with sand gray, hard, moist										
	21.8 / 968.6										

AUGER REFUSAL ON CHERT

BOTTOM OF BORING AT 21.8 FEET
BACKFILLED WITH CUTTINGS 10/21/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY 24 hr	AB	▼	
WL				

Terracon

BORING STARTED	10-21-02		
BORING COMPLETED	10-21-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS59-60.72-74.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-74

CLIENT
HNTB

Automatic Hammer Efficiency = 80.7%

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 797+99, 200 Feet left of centerline

DESCRIPTION

Approx. Surface Elev.: 994.0 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
		GM		HS						
SILTY GRAVEL brown, medium dense, moist 3.5 990.5										
		GM	1	SS	12	14				8, 7, 7
SILTY SANDY GRAVEL brown, light reddish brown and gray, medium dense, moist	5	GM		HS						
		GM	2	SS	12	12				4, 6, 6
	10	GM		HS						
		GM	3	SS	14	24				7, 13, 11
17.3 976.7	15			HS						

AUGER REFUSAL ON APPARENT CHERT

BOTTOM OF BORING AT 17.3 FEET
BACKFILLED WITH CUTTINGS 10/22/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY 24 hr	AB	▼	
WL				

Terracon

BORING STARTED	10-21-02		
BORING COMPLETED	10-21-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED CSK		JOB #	J7P0601

LOG OF BORING NO. MS-103

CLIENT: **HNTB**

Automatic Hammer Efficiency = 83%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 818+71, 239 Feet right of centerline

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1039.7 ft										
	LEAN CLAY, trace gravel light brown and gray, medium stiff, dry		CL		HS						
			CL	1	SS	12	13/6" ~~50/2"~~				7, 13, 50/2"
	- scattered cobbles below 4.7 feet	5	CL		HS						
	6 1033.7										
	7 **LIMESTONE++** 1032.7 brown to gray, hard, weathered to fresh										
	AUGER REFUSAL ON LIMESTONE BOTTOM OF BORING AT 7 FEET BACKFILLED WITH CUTTINGS 05/05/03 ++ Classification estimated from disturbed samples. Core samples or petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD ▼ DRY	AB
WL	▽	▼	
WL			

Terracon

BORING STARTED	5-5-03		
BORING COMPLETED	5-5-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BKM	JOB #	J7P0601

BOREHOLE 99 5019MS103.GPJ TERRACON.GDT 1/5/04

LOG OF BORING NO. MS-119

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 830+76, 188 Feet left of centerline

Approx. Surface Elev.: 1086.3 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVEL AND COBBLES, with sand and clay dark brown and white, medium dense, dry		GP		PA						
	3.5 1082.8										
	GRAVEL, scattered clay reddish brown and brown, medium dense, moist		GP	1	SS	12	8/6" 50/2"				7, 8, 50/2"
	5 1081.3	5	GP		HS						

AUGER REFUSAL ON APPARENT CHERT

BOTTOM OF BORING AT 5 FEET
BACKFILLED WITH CUTTINGS 10/24/02

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED SPB		JOB #	J7P0601

BOREHOLE 99 5019MS119-120.129-131.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-120

CLIENT
HNTB

Automatic Hammer Efficiency = 80.7%

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 831+28, 4 Feet right of centerline

DESCRIPTION

Approx. Surface Elev.: 1077.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	GRAVEL, scattered clay and cobbles brown and white, dense, dry		GP		PA						
	3.5 1074.2										
	GRAVEL, with clay brown, reddish brown and white, dense, dry		GC	1	SS	18	47				22, 26, 21
		5	GC		HS						
	7.5 1070.2										
	8 **CHERT++** 1069.7 white, hard, weathered										
	AUGER REFUSAL ON CHERT										
	BOTTOM OF BORING AT 8 FEET BACKFILLED WITH CUTTINGS 10/24/02										
	++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS119-120.129-131.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-121

CLIENT
HNTB

Automatic Hammer Efficiency = 80.7%

SITE
McDONALD COUNTY, MISSOURI

PROJECT
I-49, MISSOURI

Boring Location: 832+24, 276 Feet right of centerline

DESCRIPTION

Approx. Surface Elev.: 1062.7 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
		GC		HS						
	4									
	1058.7	GC	1	SS	8	17/6"				17/6",
	4.8			HS		50/6"				50/6"
	1057.9									

GRAVEL, abundant clay, scattered cobbles and sand
gray, grayish brown and white, dense to very dense, dry

CHERT++
light gray, hard

AUGER REFUSAL ON CHERT

BOTTOM OF BORING AT 4.8 FEET
BACKFILLED WITH CUTTINGS 10/24/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS119-120 129-131.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-129

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 841+03, 375 Feet right of centerline

Approx. Surface Elev.: 1052.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVEL AND COBBLES, with clay dark brown, medium dense, moist		GP GC		HS						
	3.5 1049.2										
	GRAVEL AND COBBLES, with clay brown, light reddish brown and white, medium dense, moist		GP GC	1	SS	4	13				7, 7, 6
		5	GP GC		HS						
	9 1043.7										
	10 **LEAN CLAY**, with sand, trace gravel brown, very stiff, moist 1042.7		CL	2	SS	12	13				7, 6, 7
	CHERT++, with clay seams	10			HS						
	12 white, moderately hard, highly weathered 1040.7										

AUGER REFUSAL ON CHERT

BOTTOM OF BORING AT 12 FEET
BACKFILLED WITH CUTTINGS 10/25/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-25-02		
BORING COMPLETED	10-25-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED SPB		JOB #	J7P0601

BOREHOLE 99 5019MS119-120.129-131.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-130

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 843+99, Centerline

Approx. Surface Elev.: 1064.3 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
GRAVEL AND COBBLES, trace clay dark brown, loose, wet		GP		HS						
3.5 1060.8										
SILTY SANDY GRAVEL brown, light reddish brown and gray, medium dense, moist		GP	1	SS	4	8				9, 6, 2
	5	GP		HS						
		GP	2	SS	3	11				10, 5, 6
	10	GP		HS						
13.5 1050.8										
14 **FAT CLAY**, with gravel 1050.3		CH	3	SS	12	12				12, 50/6"
15 dark brown and white, stiff, moist 1049.3	15			HS		50/6"				
CHERT++, trace clay seams white, hard, highly weathered										
AUGER REFUSAL ON CHERT										
BOTTOM OF BORING AT 15 FEET BACKFILLED WITH CUTTINGS 10/24/02										
++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▽		▼
WL			

Terracon

BORING STARTED	10-24-02		
BORING COMPLETED	10-24-02		
RIG ATV, #103E		FOREMAN	JW
APPROVED SPB		JOB #	J7P0601

BOREHOLE 99 5019MS119-120,129-131.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-131

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 847+53, 328 Feet left of centerline

Approx. Surface Elev.: 1074.4 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	GRAVEL AND COBBLES, scattered clay dark brown, medium dense		GP		HS						
	3.5 1070.9										
	GRAVEL, with clay brown, reddish brown and white, medium dense, moist		GC	1	SS	8	22				7, 10, 12
		5	GC		HS						
	8 1066.4										
	CHERT++, with clay seams white, hard, highly weathered to fresh			2	SS	4	13/6"				13/6", 50/3"
	10.5 1063.9	10			HS		50/3"				

AUGER REFUSAL ON CHERT

BOTTOM OF BORING AT 10.5 FEET
BACKFILLED WITH CUTTINGS 10/25/02

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	10-25-02		
BORING COMPLETED	10-25-02		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS119-120.129-131.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-168

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 884+52, 476 Feet left of centerline

DESCRIPTION

Approx. Surface Elev.: 1074.6 ft

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
		GP		PA						
		GP	1	SS	18	13				8, 7, 6
	5	GP		PA						
	9.2 1065.4	CL	2	SS	13	3			5000*	5, 3, 50/2"
	9.7 1064.9			PA		50/2"				
	10									
			3	SS PA	0	50/0.5"				50/0.5"
	15									
	18.2 1056.4		4	SS PA	0	50/0.25"				50/0.25"
	19.7 1054.9									

SANDY GRAVEL, few clay
brown, medium dense, dry

LEAN CLAY
reddish brown, very stiff, moist

CHERT AND LIMESTONE++, trace clay seams
light gray, moderately hard to hard, highly weathered

CHERT++, with limestone seams, trace clay seams
light gray and white, hard

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 19.7 FEET
BACKFILLED WITH CUTTINGS 10/08/03

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-8-03		
BORING COMPLETED	10-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS168-169.GPJ TERRACON.GDT 12/8/03

LOG OF BORING NO. MS-169

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 887+97, 53 Feet right of centerline

Approx. Surface Elev.: 1056.7 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SANDY GRAVEL AND COBBLES, with clay dark brown, very dense, dry	2	SP		PA						
	1054.7										
	GRAVELLY SAND light brown, very dense, dry		SP	1	SS	18	31				10, 16, 15
		5	SP		PA						
	7.5 1049.2										
	SANDY GRAVEL, with clay gray and reddish brown, very dense, dry		GP	2	SS	10	50/5.5"				41, 50/5.5"
		10	GC GP GC		PA						
	12.5 1044.2										
	CLAYEY GRAVEL gray and reddish brown, medium dense, moist		GC	3	SS	18	17				10, 9, 8
		15	GC		PA						
	17.5 1039.2										
	SANDY GRAVEL, with clay brown, loose to very loose, dry		GP	4	SS	4	1/8" 50/1"				6, 1/8", 50/1"
	20 1036.7	20	GC GP GC		PA						
	FAT CLAY, trace chert seams reddish brown, stiff, moist		CH	5	SS	18	20			3000*	6, 6, 14
	24 1032.7										
	24.5 **LIMESTONE++** 1032.2 gray, hard				PA						

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 24.5 FEET
BACKFILLED WITH CUTTINGS 10/08/03

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	10-8-03		
BORING COMPLETED	10-8-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS168-169.GPJ TERRACON.GDT 12/8/03

LOG OF BORING NO. MS-170

CLIENT: HNTB

Automatic Hammer Efficiency = 84.1%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 890+67, 496 Feet right of centerline

Approx. Surface Elev.: 1145.8 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	FAT CLAY, with to abundant gravel brown, very stiff, moist		CH		HS						
			CH	1	SS	18	21				7, 11, 10
		5	CH		HS						
	9.1 1136.7		CH	2	SS	10	10/6"				10, 50/5"
	9.7 **LIMESTONE++** 1136.1 gray to light gray, hard, fresh				HS		50/5"				

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 9.7 FEET
BACKFILLED WITH CUTTINGS 12/22/02

++ Classification estimated from disturbed samples. Core samples or petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▽		▼
WL			

Terracon

BORING STARTED	12-22-02		
BORING COMPLETED	12-22-02		
RIG CME-75,#386	FOREMAN	JW	
APPROVED BKM	JOB #	J7P0601	

BOREHOLE 99 5019MS170.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-173

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 899+51, 49 Feet left of centerline

Approx. Surface Elev.: 1089.1 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY GRAVEL brown, loose, moist		GM		PA						
	3.5 — 1085.6										
	FAT CLAY, scattered gravel olive brown, stiff, moist		CH	1	SS	14	10				3, 4, 6
		5	CH		PA						
	7 — 1082.1										
	LIMESTONE++ gray, hard										
	8.5 — 1080.6										

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 8.5 FEET
BACKFILLED WITH CUTTINGS 01/13/03

++ Classification estimated from disturbed samples. Core samples or petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▼ DRY	24 hr	▼	
WL				

Terracon

BORING STARTED	1-13-03		
BORING COMPLETED	1-13-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS173-175.182-184.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-174

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 900+30, 200 Feet right of centerline

Approx. Surface Elev.: 1068.1 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CLAYEY GRAVEL dark brown and gray, medium dense, moist		GC		PA						
			GC	1	SS	18	11				7, 5, 6
		5	GC		PA						
8	1060.1										
	SHALE++ gray to brownish gray, hard, weathered			2	SS PA	3	50/3"				50/3"
		10									
				3	SS PA	2	50/2"				50/2"
		15									
				4	SS PA	1	50/2"				50/2"
		20									
				5	SS PA	0	50/2"				50/2"
		25									
				6	SS PA	1	50/2"				50/2"
		30									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽ DRY	24 hr	▼	
WL				

Terracon

BORING STARTED	1-13-03		
BORING COMPLETED	1-13-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS173-175,182-184.GPJ TERRACON.GDT 12/4/03

338

LOG OF BORING NO. MS-174

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SHALE++ gray to brownish gray, hard, weathered	35		7	SS PA	0	50/2"				50/2"
		40		8	SS PA	1	50/2"				50/2"
		45		9	SS PA	0	50/3"				50/3"
	50 1018.1	50		10	SS PA	0	50/2"				50/2"
	AUGER REFUSAL ON SHALE BOTTOM OF BORING AT 50 FEET BACKFILLED WITH CUTTINGS 01/13/03 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽ DRY	24 hr	▽
WL			

Terracon

BORING STARTED	1-13-03		
BORING COMPLETED	1-13-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS173-175,182-184.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MS-175

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 901+16, 597 Feet right of centerline

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1030.0 ft										
	GRAVELLY LEAN CLAY, with sand dark brown, very stiff, moist to wet ▽ ▽		CL		PA						
			CL	1	SS	18	14				4, 5, 9
		5	CL		PA						
	7 1023.0										
	SHALE++ dark gray to brownish gray, moderately hard to hard, weathered			2	SS PA	2	50/5"				50/5"
		10									
				3	SS PA	1	50/2"				50/2"
		15									
				4	SS PA	2	50/2"				50/2"
		20									
	22 ▼ 1008.0										
	AUGER REFUSAL ON SHALE BOTTOM OF BORING AT 22.0 FEET BACKFILLED WITH CUTTINGS 01/13/03 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 3.5	WD	▼ 22	AB
WL	▼ 2	24 hr	▼	
WL				

Terracon

BORING STARTED			1-13-03
BORING COMPLETED			1-13-03
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS173-175 182-184.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-181A

CLIENT: HNTB

Automatic Hammer Efficiency = 83%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 909+15, 248 Feet left of centerline

Approx. Surface Elev.: 1057.0 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	SHALE++ grayish brown, soft to moderately hard, highly weathered				PA						
				1	SS	16	45/6" 50/2"				30, 45, 50/2"
		5			PA						
	- sample wet at 9 feet ▽			2	SS PA	6	50/6"				50/6"
		10									
	13.6 - becoming gray, hard, fresh below 13.5 feet 1043.4			3	SS	1	50/1"				50/1"

AUGER REFUSAL ON SHALE

BOTTOM OF BORING AT 13.6 FEET
BACKFILLED WITH CUTTINGS 06/05/03

++ Classification estimated from disturbed samples. Core samples or petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 9.0 WD	▼ DRY AB	
WL	▼ DRY 24 hr AB	▼	
WL			

Terracon

BORING STARTED	6-5-03		
BORING COMPLETED	6-5-03		
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

BOREHOLE 99 5019MS181A.GPJ TERRACON.GDT 1/5/04

LOG OF BORING NO. MS-182

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 908+87, 46 Feet left of centerline

Approx. Surface Elev.: 1048.1 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVEL, with silt dark brown, loose, dry — 1047.1	1	GM		PA						
	SHALE++ brownish gray, moderately hard to hard, weathered										
		5		1	SS PA	0	50/2"				50/2"
		10		2	SS PA	2	50/2"				50/2"
		15		3	SS PA	1	50/3"				50/3"
	AUGER REFUSAL ON SHALE	20		4	SS PA	3	50/5"				50/5"
	BOTTOM OF BORING AT 26.0 FEET BACKFILLED WITH CUTTINGS 01/14/03 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types. — 1022.1	25		5	SS PA	2	50/2"				50/2"
		26									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 8.5	WD	▼ 20	AB
WL	▼		▼	
WL				

Terracon

BORING STARTED	1-14-03		
BORING COMPLETED	1-14-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS173-175.182-184.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-183

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 909+24, 241 Feet right of centerline

Approx. Surface Elev.: 1044.8 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVELLY LEAN CLAY dark brown and reddish brown, very stiff, moist		CL		PA						
		5	CL	1	SS	3	16				8, 8, 8
	5 1039.8				PA						
	SHALE++ brownish gray to gray, moderately hard to hard, weathered			2	SS PA	9	30 50/3"				30, 50/3"
		10		3	SS PA	2	50/3"				50/3"
		15		4	SS PA	0	50/3"				50/3"
	22.5 1022.3	20									

AUGER REFUSAL ON SHALE

BOTTOM OF BORING AT 22.5 FEET
BACKFILLED WITH CUTTINGS 01/14/03

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	1-14-03		
BORING COMPLETED	1-14-03		
RIG ATV, #103E	FOREMAN	KS	
APPROVED CSK	JOB #	J7P0601	

BOREHOLE 99 5019MS173-175.182-184.GPJ TERRACON.GDT 12/4/03

LOG OF BORING NO. MS-184

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 909+71, 575 Feet right of centerline

Approx. Surface Elev.: 1033.5 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	GRAVELLY SILT, with clay dark brown, dense, moist to wet ▽		ML		PA						
	4 1029.5										
	SHALEY LEAN CLAY / HIGHLY WEATHERED SHALE dark gray and brown, hard, moist to wet	5	CL	1	SS	12	35				10, 15, 20
	8.5 1025.0		CL		PA						
	AUGER REFUSAL ON APPARENT SHALE BOTTOM OF BORING AT 8.5 FEET BACKFILLED WITH CUTTINGS 01/14/03										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL ▽ 2	WD	▼ DRY	AB
WL ▽		▼	
WL			

Terracon

BORING STARTED	1-14-03		
BORING COMPLETED	1-14-03		
RIG ATV, #103E		FOREMAN	KS
APPROVED CSK		JOB #	J7P0601

BOREHOLE 99 5019MS173-175 182-184 GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-218

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 935+80, 216 Feet left of centerline

Approx. Surface Elev.: 1020.8 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CLAYEY GRAVEL, with sand dark brown, loose, moist		GC		PA						
			GC	1	SS	6	13				4, 6, 7
		5	GC		PA						
			GC	2	SS	14	11				8, 6, 5
		10	GC		PA						
			GC	3	SS	6	20				9, 9, 11
		15	GC		PA						
	17 1003.8										
	SHALE++ dark gray and gray, moderately hard to hard, weathered			4	SS PA	2	50/2"				50/2"
	AUGER REFUSAL ON SHALE	20									
	BOTTOM OF BORING AT 28.0 FEET BACKFILLED WITH CUTTINGS 01/14/03			5	SS PA	2	50/2"				50/2"
	++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types. ▼	25									
	28 992.8										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ 27	AB
WL	▼		▼	
WL				

Terracon

BORING STARTED	1-14-03		
BORING COMPLETED	1-14-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS218-220.259-261.288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-219

CLIENT: **HNTB**

Automatic Hammer Efficiency = 80.7%

SITE: **McDONALD COUNTY, MISSOURI**

PROJECT: **I-49, MISSOURI**

Boring Location: 936+09, 17 Feet right of centerline

Approx. Surface Elev.: 1024.0 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CLAYEY GRAVEL, with sand dark brown, loose, moist		GC		PA						
			GC	1	SS	5	4				3, 2, 2
		5	GC		PA						
	- with clay seams below 8.5 feet		GC	2	SS	5	9				4, 4, 5
		10	GC		PA						
			GC	3	SS	18	16				8, 8, 8
		15	GC		PA						
	- changing to brown and reddish brown, moist to wet below 18.5 feet		GC	4	SS	18	10				4, 4, 6
		20	GC		PA						
	23.5 1000.5										
	SHALE++ dark gray and gray, moderately hard to hard, weathered			5	SS PA	0	50/3"				50/3"
		25									
				6	SS PA	6	50/6"				50/6"
		30									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY WD	▼ DRY AB	
WL	▽	▼	
WL			

Terracon

BORING STARTED	1-14-03		
BORING COMPLETED	1-14-03		
RIG ATV, #103E		FOREMAN	KS
APPROVED CSK		JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

346

LOG OF BORING NO. MS-219

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf	TESTS: Blow Counts for 18"
	33 991.0										
	AUGER REFUSAL ON SHALE BOTTOM OF BORING AT 33.0 FEET BACKFILLED WITH CUTTINGS 01/14/03 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	1-14-03		
BORING COMPLETED	1-14-03		
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-220

CLIENT: HNTB

Automatic Hammer Efficiency = 84.1%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 936+62, 244 Feet right of centerline

Approx. Surface Elev.: 1020.3 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	CLAYEY GRAVEL brown, stiff to very stiff, moist to wet		GC		PA						
			GC	1	SS	12	7				4, 4, 3
		5	GC		PA						
			GC	2	SS	12	18				5, 8, 10
		10	CH		PA						
			CH	3	SS	3	13				5, 6, 7
		15	CH		PA						
			CH	4	SS	8	29				4, 16, 13
		20	CH		PA						
	11 1009.3										
	FAT CLAY, abundant gravel brown to dark brown, moist to wet			5	SS	0	50/6"				50/6"
		25		6	PA						
	23.8 996.5										
	SHALE++ dark gray, hard, weathered			7	SS	8	45/6"				45/6",
	BOTTOM OF BORING AT 27.8 FEET BACKFILLED WITH CUTTINGS 12/22/02						50/2"				50/2"
	27.8 992.5										

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	12-22-02		
BORING COMPLETED	12-22-02		
RIG CME-75, #386	FOREMAN	JW	
APPROVED BKM	JOB #	J7P0601	

BOREHOLE 99 5019MS220.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-259

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 963+89, 193 Feet left of centerline

Approx. Surface Elev.: 1075.1 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY GRAVEL gray and dark brown, dense, dry to moist	0	GM		PA						
		2									
		1073.1									
	LIMESTONE++, with chert seams gray, hard	2.5		1	SS	0	50/0"				50/0"
		1072.6									

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 2.5 FEET
BACKFILLED WITH CUTTINGS 01/19/03

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▼ DRY AB
WL	▽		▼
WL			

Terracon

BORING STARTED	1-19-03		
BORING COMPLETED	1-19-03		
RIG ATV, #103E	FOREMAN	JW	
APPROVED CSK	JOB #	J7P0601	

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-260

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 964+72, 3 Feet right of centerline

Approx. Surface Elev.: 1070.1 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY GRAVEL gray and dark brown, dense, dry to moist		GM		PA						
		4									
	▼ 1066.1										
	LIMESTONE++, with chert seams gray, hard	4.5	GM	1	SS	6	12/6" 50/0"				4, 12, 50/0"
	▼ 1065.6										

AUGER REFUSAL ON LIMESTONE

BOTTOM OF BORING AT 4.5 FEET
BACKFILLED WITH CUTTINGS 01/19/03

++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 4	WD	▼ 4	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	1-19-03		
BORING COMPLETED	1-19-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-261

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 965+57, 258 Feet right of centerline

Approx. Surface Elev.: 1058.5 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	SILTY GRAVEL gray and dark brown, dense, dry to moist		GM		PA						
	2 1056.5		GM	1	SS	0	50/0"				50/0"
	AUGER REFUSAL ON APPARENT LIMESTONE										
	BOTTOM OF BORING AT 2.0 FEET BACKFILLED WITH CUTTINGS 01/19/03										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ DRY	WD	▼ DRY	AB
WL	▽		▼	
WL				

Terracon

BORING STARTED	1-19-03		
BORING COMPLETED	1-19-03		
RIG ATV, #103E		FOREMAN	JW
APPROVED CSK		JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-288

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 987+29, 300 Feet left of centerline

Approx. Surface Elev.: 1040.3 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	TESTS Blow Counts for 18"
	CLAYEY GRAVEL, with cobbles reddish brown, brown and white, loose to medium dense, moist		GC		PA						
			GC	1	SS	8	6				2, 3, 3
			GC		PA						
			GC	2	SS	6	15				7, 8, 7
		5	GC		PA						
	8.5 1031.8										
	GRAVEL, with sand and clay brown and white, medium dense, wet		GP GC	3	SS	4	12				4, 6, 6
		10	GP GC		PA						
			GP GC	4	SS	1	6/6" 54/5"				4, 6, 54/5"
	14.9 1025.4										
			GP GC		PA						
	AUGER REFUSAL ON APPARENT LIMESTONE										
	BOTTOM OF BORING AT 14.9 FEET BACKFILLED WITH CUTTINGS 01/30/03										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 9.5	WD	▼ 10	AB
WL	▼ 4.3	24 hr	▼	
WL				

Terracon

BORING STARTED	1-30-03		
BORING COMPLETED	1-30-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-289

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 986+60, Centerline

Approx. Surface Elev.: 1041.9 ft

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SILTY LEAN CLAY, with gravel dark brown, stiff, moist		CL ML		PA						
			CL ML	1	SS	12	12			2000*	3, 5, 7
		5	CL ML		PA						
	8 ▽ 1033.9										
	CLAYEY SAND, with gravel reddish brown, medium dense to loose, moist to wet		SC	2	SS	16	13				4, 6, 7
	▽	10	SC		PA						
	▽		SC	3	SS	5	12				5, 5, 7
		15	SC		PA						
			SC	4	SS	6	6				9, 3, 3
	22 1019.9	20	SC		PA						
	SHALE++ dark gray and gray, moderately hard to hard, weathered			5	SS PA	4	50/4"				50/4"
		25									
				6	SS PA	2	50/2"				50/2"
		30									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 11	WD	▽ 13	AB
WL	▽ 7.5	24 hr	▽	
WL				

Terracon

BORING STARTED	1-20-03		
BORING COMPLETED	1-29-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-289

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SHALE++ dark gray and gray, moderately hard to hard, weathered	35		7	SS HS	2	50/2"				50/2"
		40		8	SS HS	1	50/1"				50/1"
		45		9	SS HS	1	50/1"				50/1"
	50.5 991.4	50		10	SS HS	1	50/1"				50/1"
	AUGER REFUSAL ON SHALE BOTTOM OF BORING AT 50.5 FEET BACKFILLED WITH CUTTINGS 01/30/03 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 11	WD	▼ 13	AB
WL	▼ 7.5	24 hr	▼	
WL				

Terracon

BORING STARTED	1-20-03		
BORING COMPLETED	1-29-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-290

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

Boring Location: 986+00, 300 Feet right of centerline

Approx. Surface Elev.: 1038.0 ft

DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
GRAVEL, with sand and clay reddish brown, brown and white, loose to medium dense, moist		GP		PA						
		GP	1	SS	12	17				9, 8, 9
	5	GP		PA						
		GP	2	SS	10	9				6, 4, 5
	10	GP		PA						
		GP	3	SS	2	30				11, 13, 17
	15	GP		PA						
		GP	4	SS	6	6				3, 3, 3
	20	GP		PA						
		GP	5	SS	10	16				9, 8, 8
	25	GP		PA						
			6	SS	1	50/1"				50/1"
	30			PA						

18.5 1019.5

SANDY GRAVEL with clay reddish brown and white, loose to medium dense, moist to wet

25.5 1012.5

SHALE++ dark gray and gray, moderately hard to hard, weathered

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 14	WD	▽ 9.5	AB
WL	▽ 6	24 hr	▽	
WL				

Terracon

BORING STARTED	1-30-03		
BORING COMPLETED	1-30-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS218-220,259-261,286-290.GPJ TERRACON.GDT 7/24/03

LOG OF BORING NO. MS-290

CLIENT: HNTB

Automatic Hammer Efficiency = 80.7%

SITE: McDONALD COUNTY, MISSOURI

PROJECT: I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf	Blow Counts for 18"
	SHALE++ dark gray and gray, moderately hard to hard, weathered	35		7	SS HS	1	50/1"				50/1"
		40		8	SS HS	1	50/1"				50/1"
		45		9	SS HS	2	50/3"				50/3"
		50		10	SS HS	1	50/1"				50/1"
	51.8 986.2										
	AUGER REFUSAL ON SHALE BOTTOM OF BORING AT 51.8 FEET BACKFILLED WITH CUTTINGS 01/30/03 ++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ 14	WD	▼ 9.5	AB
WL	▼ 6	24 hr	▼	
WL				

Terracon

BORING STARTED	1-30-03		
BORING COMPLETED	1-30-03		
RIG	ATV, #103E	FOREMAN	JW
APPROVED	SPB	JOB #	J7P0601

BOREHOLE 99 5019MS218-220 259-261 288-290.GPJ TERRACON.GDT 7/24/03

10.0 TEST DATA

10.1 Summary of Laboratory Test Data

I-49 MISSOURI LAB TEST DATA
PINEVILLE, MISSOURI TO ARKANSAS STATE LINE
McDONALD COUNTY, MISSOURI
MODOT PROJECT NO. J7P0601

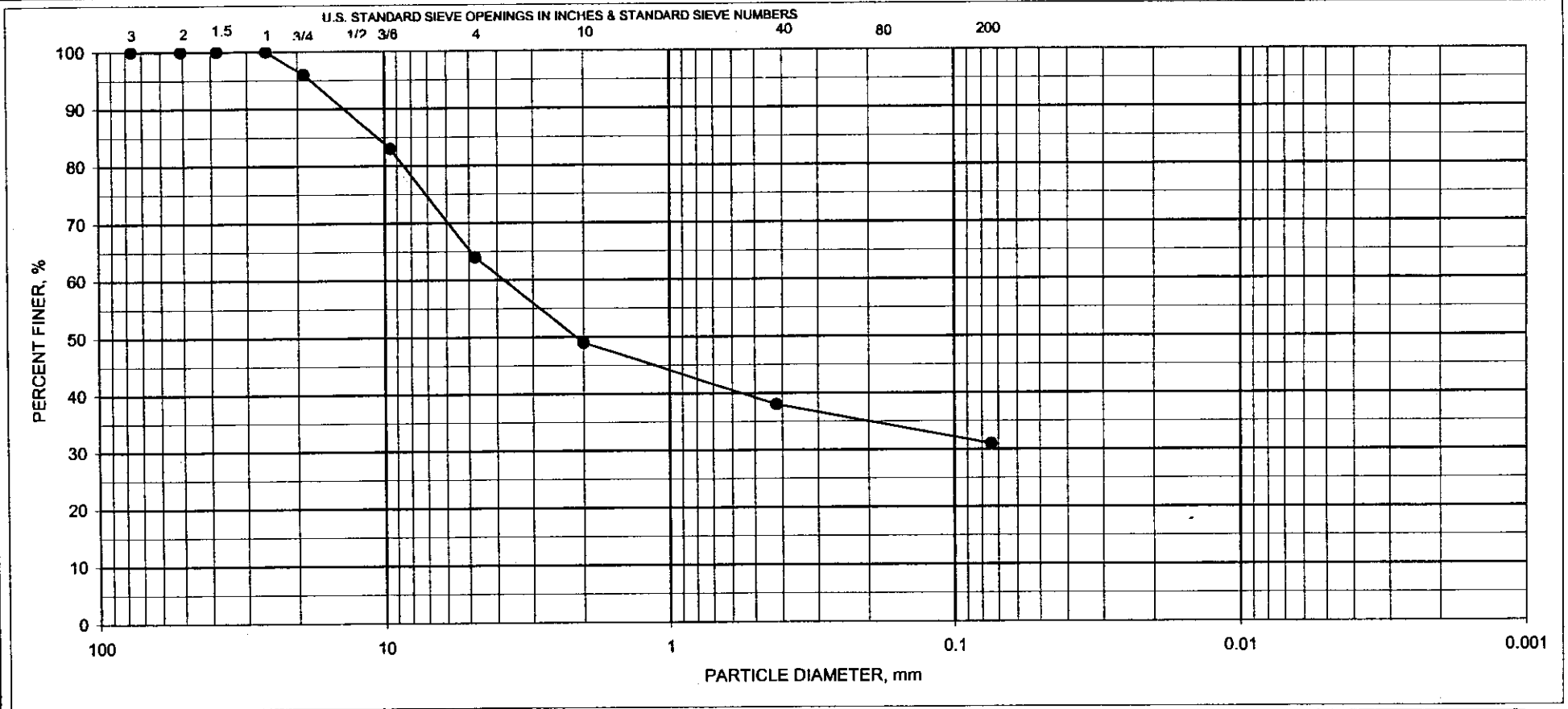
Boring	Sample	Depth	Moisture	Atterberg Limits			Sieve Analysis (percent passing)										Resistivity	Unit Weight, pcf		Std Compaction	Unconfined	Lab CBR	AASHTO	Group
Number	Number	(feet)	Content (%)	LL	PL	PI	1.5"	1"	3/4"	3/8"	No. 4	No. 10	No. 40	No. 100	No. 200	pH	(ohm/cm)	In-situ	Dry	(pcf) @ %	(psf)	(@0.1 in.)		Index
MC-3	Bulk	5-16.3'	11.6	29	20	9			96	83	64	49	38		31					108.0 @ 17.3		1.7	A-2-4	0
MC-19	Bulk	5-15.5'	8.6	29	17	12			100	93	82	64	42		33	8.3	4470						A-2-6	0
MC-28	S-1	0-2'	20.1	38	34	4																		
MC-28	S-2	2-5'	17.9	40	20	20																		
MC-28	S-3	5-10'	28.9																					
MC-28	S-4	10-13'	22.2																					
MC-28	S-5	13-20'	22.6	27	25	2																		
MC-28	S-6	20-25'	19.8	26	23	3																		
MC-28	S-7	25-27.5'	20.6	24	22	2																		
MC-33	Bulk	0-5.5'	13.7	38	21	17			96	75	34	32	27		24					102.3 @ 19.0			A-2-6	1
MC-39	Bulk	2-35'	0.8	30	20	10			98	90	75	56	44		38					100.8 @ 17.8			A-4	1
MS-43	Tube	18.5'-19'	16.5															Note 1	Note 1		Note 1			
MC-44	Bulk	0-10.5'	13.7	30	19	11			100	97	89	73	53		41								A-6	2
MC-49	AS-1	0-4'	13.4																					
MC-49	AS-2	4-10'	24.5																					
MC-49	AS-3	10-15'	22.9	27	24	3																		
MC-49	AS-4	15-20'	27.4																					
MC-57	Bulk	0-6.8'	17.8	28	20	8			98	91	77	63	49		41	4.9	2881						A-4	1
MC-57	Tube	5.5-6.6'	17.6	31	21	10												113.2	96.1		1200			
MC-65	Bulk	0-25.0'	9.8	31	24	7			100	95	80	59	37		29								A-2-4	0
MC-79	Bulk	3-23.5'	0.7	32	23	9			99	84	65	50	38		31								A-2-4	0
MC-85	AS-1	0-3'	15.3																					
MC-85	AS-2	3-10'	25.1																					
MC-85	AS-3	10-15'	22.3																					
MC-85	AS-4	15-20'	33.7																					
MC-85	AS-5	20-25'	25.3																					
MC-85	AS-6	25-30'	22.2																					
MC-88	Bulk	3-20.0'	0.5	27	22	5			99	90	73	59	48		41					97.2 @ 22.6			A-4	1
MC-94	Bulk	0-9.5'	3.9	47	19	28			100	92	83	75	67		54								A-7-6	11
MC-125	Bulk	1-25'	32.8	48	25	23			100	97	92	83	70		53	4.9	9470			101.7 @ 18.9		5.1	A-7-6	9
MC-125	Tube	6-6.8'	25.1	43	21	22												117.6	94.0		1550			
MC-133	Tube	8-9'	18.3	38	21	17												Note 1	Note 1		Note 1			
MC-137	Tube	3-4'	14.0	37	19	18												125.6	110.2		Note 1			
MC-142	Tube	8'-9.5'	25.0															118.0	94.4		760			
MC-148	Tube	8-9.5'	18.8	48	24	24												121.5	102.3		1550			
MC-153	Bulk	4-30'	22.9	49	22	27			96	94	88	82	74		69	4.4	9120			103.5 @ 15.9		6.0	A-7-6	15
MC-153	Tube	8.5-9.4'	21.9	53	26	27												123.6	101.3		1850			
MC-158	Tube	3-5'	7.6	46	23	23												Note 1	Note 1		Note 1			
MC-159	AS-1	0-2'	17.8																					
MC-159	AS-2	2-10'	26.3	54	21	33																		
MC-159	AS-3	10-17'	28.3																					
MC-159	AS-4	17-20'	34.8	53	23	30																		
MC-159	AS-5	20-25'	32.7																					
MC-164	Bulk	1'-32'	25.5	56	19	37	100	100	100	98	96	92	83	77	74	5.6	5602			106.3 @ 18.2		3.1	A-7-6	19
MC-177	Bulk	0 - 13.0'	6.6	20	17	3	100	95	92	79	56	35	22	17	16					124.2 @ 9.5			A-2-4	0
MC-178A	1	0 - 8	2.6	30	23	7	100	86	70	25	12	10	8	7	7								A-2-4	0
MC-178A	2	8 - 13	2.2	27	20	7	83	74	53	25	10	7	6	5	5								A-2-4	0
MC-178A	3	13 - 18	11.4	22	16	6	100	100	98	85	65	44	28	22	20								A-2-4	0
MC-186	Bulk	0-4'	3.8	24	21	3	100	93	84	40	11	7	6	5	5								A-2-4	0
MC-186	Bulk	4'-9.8'	10.7	28	19	9	100	100	97	81	63	50	40	36	34								A-2-4	0
MC-189	Bulk	2' - 22.8'	3.6	20	17	3	98	96	96	88	68	47	29	23	21								A-2-4	0
MC-189	S-1	0'-2'	4.0																					
MC-189	S-3	7'-22.8'	3.2																					

I-49 MISSOURI LAB TEST DATA
PINEVILLE, MISSOURI TO ARKANSAS STATE LINE
McDONALD COUNTY, MISSOURI
MODOT PROJECT NO. J7P0601

Boring	Sample	Depth	Moisture	Atterberg Limits			Sieve Analysis (percent passing)										Resistivity	Unit Weight, pcf		Std Compaction	Unconfined	Lab CBR	AASHTO	Group
Number	Number	(feet)	Content (%)	LL	PL	PI	1.5"	1"	3/4"	3/8"	No. 4	No. 10	No. 40	No. 100	No. 200	pH	(ohm/cm)	In-situ	Dry	(pcf) @ %	(psf)	(@0.1 in.)		Index
MC-190A	1	0 - 4	6.1	25	19	6	100	100	89	74	50	36	27	25	24								A-2-4	0
MC-190A	2	4 - 9	6.3	25	20	5	100	100	94	77	52	36	27	25	23								A-2-4	0
MC-190A	3	9 - 14	4.3	26	20	6	100	96	91	76	52	36	27	25	24								A-2-4	0
MC-190A	4	14 - 19	2.0	26	19	7	100	87	71	39	20	13	8	7	6								A-2-4	0
MC-190A	5	19 - 24	1.9	29	19	10	83	83	67	38	14	6	5	5	4								A-2-4	0
MC-202	AS-1	0'-10'	6.0																					
MC-202	AS-2	10'-15.5'	5.4																					
MC-204	Bulk	0.5'-21.5'	5.9	24	19	5	100	100	100	95	80	62	42	35	32	5.0	28			109.6 @ 16.6			A-2-4	0
MC-205A	Bulk	0 - 11	4.9	26	19	7	100	100	100	86	63	47	35	31	30								A-2-4	0
MC-213	Bulk	0.8'-18.2'	11.0	24	18	6	100	100	100	95	83	66	49	43	40								A-4	1
MS-218	SS	8.5'-10'	18.1	40	18	22																		
MS-219	SS	3'-5'	16.5																					
MS-219	SS	8.5'-10'	21.3																					
MS-219	SS	13.5'-15'	15.0																					
MS-220	SS	3.5'-5.0'	6.5	36	22	14																		
MC-224	Bulk	0'-10'	7.1	29	16	13	100	100	98	94	81	61	40	33	30					124.1 @ 9.4			A-2-6	0
MC-226	AS-1	0'-10'	12.0																					
MC-226	AS-2	10'-14.5'	18.6																					
MC-227	Bulk	0'-20'	9.3	28	20	8	100	100	100	94	82	66	49	43	41	4.5	2			112.7 @ 16.2		7.8	A-4	1
MC-242	AS-1	0'-5'	17.3																					
MC-242	AS-2	5'-15'	21.0																					
MC-242	AS-3	15'-20'	18.9																					
MC-245	Bulk	0'-20'	12.6	33	22	11	100	100	98	94	82	69	54	48	46								A-6	3
MC-257	Bulk	0'-7'	1.3																					
MC-263	Bulk	0'-19'	11.5	29	20	9	100	100	100	91	77	63	49	47	45								A-4	2
MC-264	AS-1	3.5'-10'	10.8																					
MC-264	AS-2	10'-20'	9.4																					
MC-264	AS-3	20'-30'	12.2																					
MC-266	Bulk	0'-24'	8.8	31	21	10	100	100	100	95	78	60	42	36	33								A-2-4	0
MC-272	Bulk	6'-13.5'	10.6	34	26	8	100	100	99	96	85	69	51	45	42	4.4	2			94.2 @ 23.7			A-4	1
MC-277	Bulk	0'-12.5'	10.6	22	18	4	100	91	87	75	60	46	35	31	30								A-2-4	0
MC-281	AS-1	0'-5'	15.1																					
MC-281	AS-2	5'-10'	7.4																					
MC-281	AS-3	10'-15'	7.0																					
MC-281	AS-4	15'-20'	9.1																					
MC-281	AS-5	20'-25'	13.2																					
MC-281	AS-6	25'-30'	10.3																					
MC-284	Bulk	20'-51'	14.3	37	20	17	100	100	100	97	90	77	57	49	46	5.7	2			106.0 @ 13.0		7.5	A-6	4
MC-284	ST-6	25'-27'	17.7															Note 1	Note 1		Note 1			
MS-289	SS	8.5'-10'	25.2	42	21	21																		
MS-290	SS	8.5'-10'	23.8	48	20	28																		

Note 1: Sample could not be recovered intact for unit weight and unconfined compressive strength testing.

10.2 Grain Size Curves



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

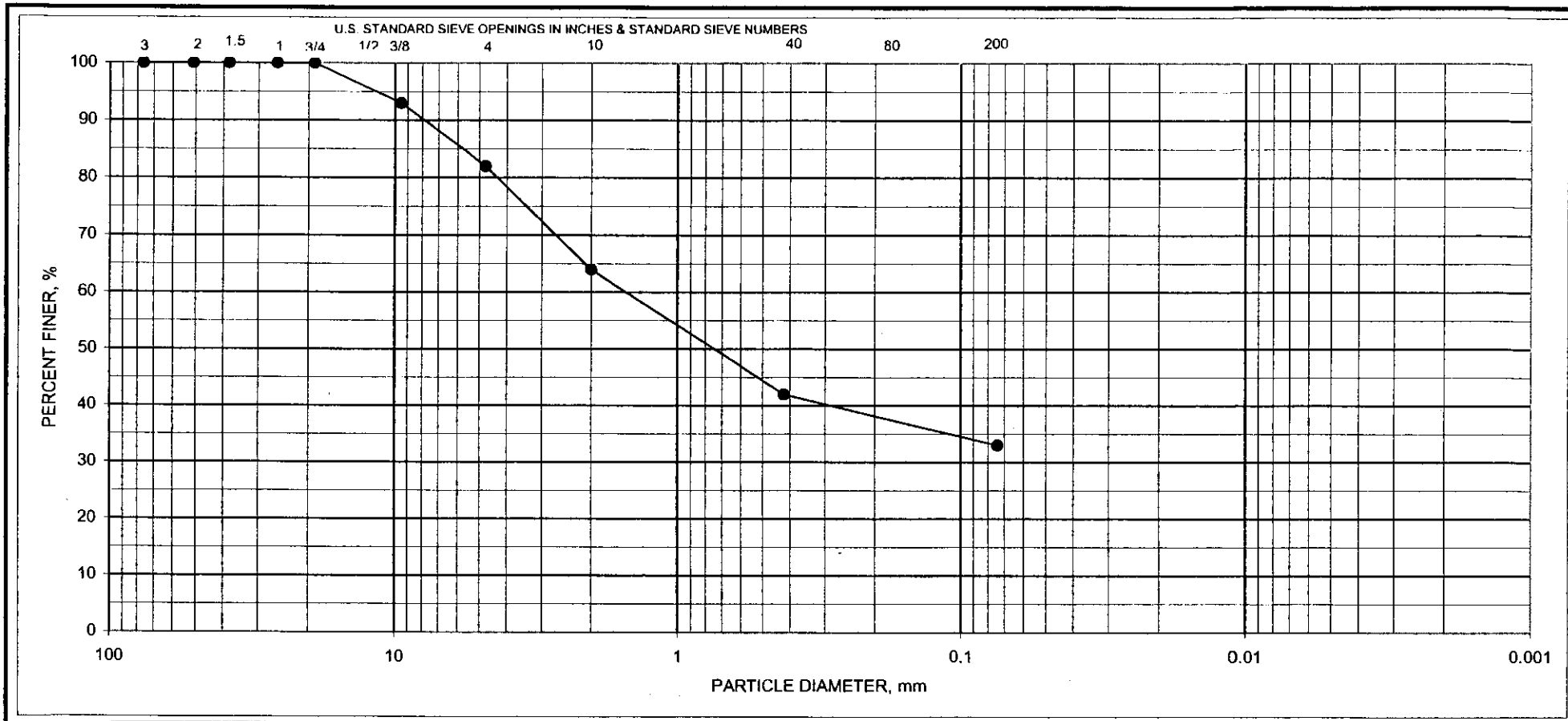
BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-3	Bulk	5 to 18.3 feet	Clayey Gravel with Sand	GC	11.6	29	20	9

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon

361



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

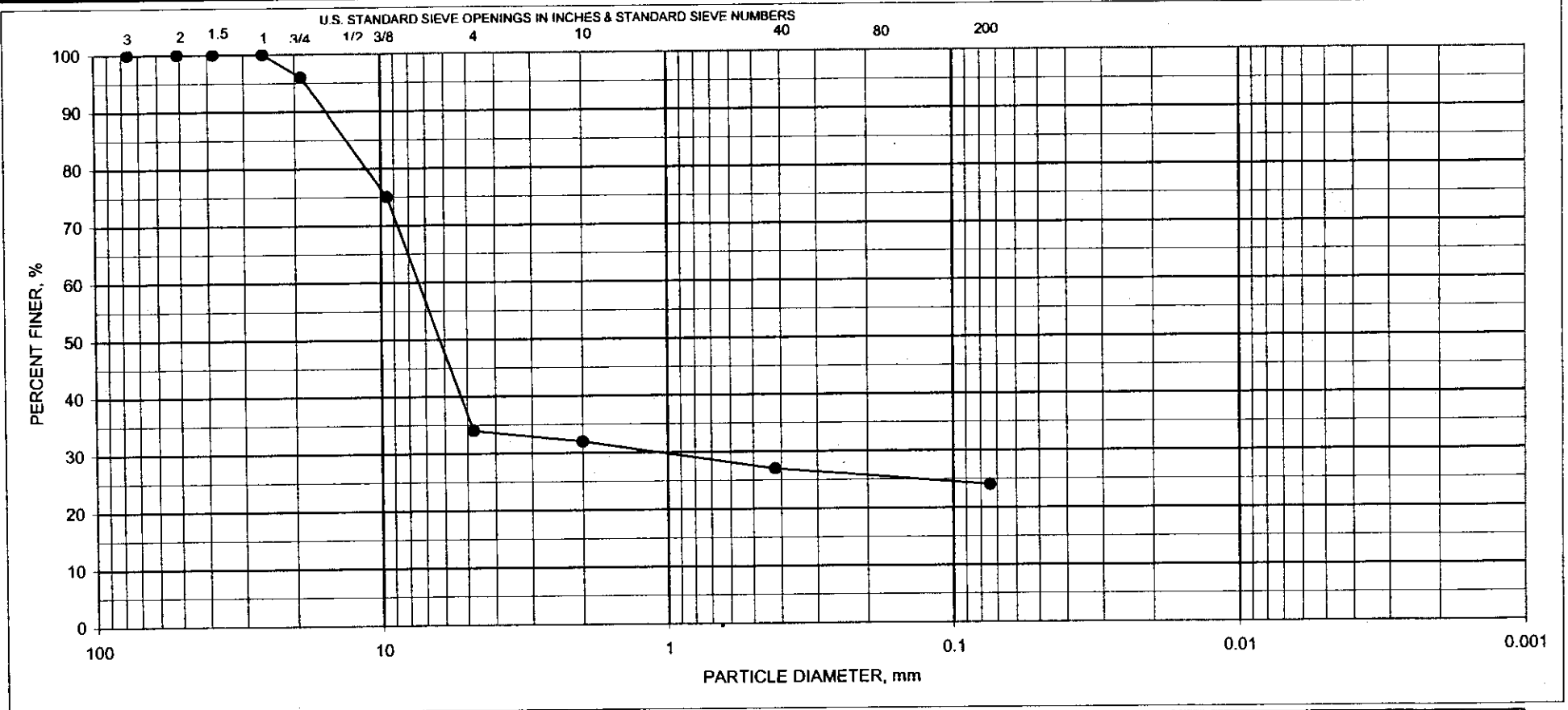
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-19	Bulk	5 to 15.5 feet	Clayey Sand with Gravel	SC	8.6	29	17	12

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

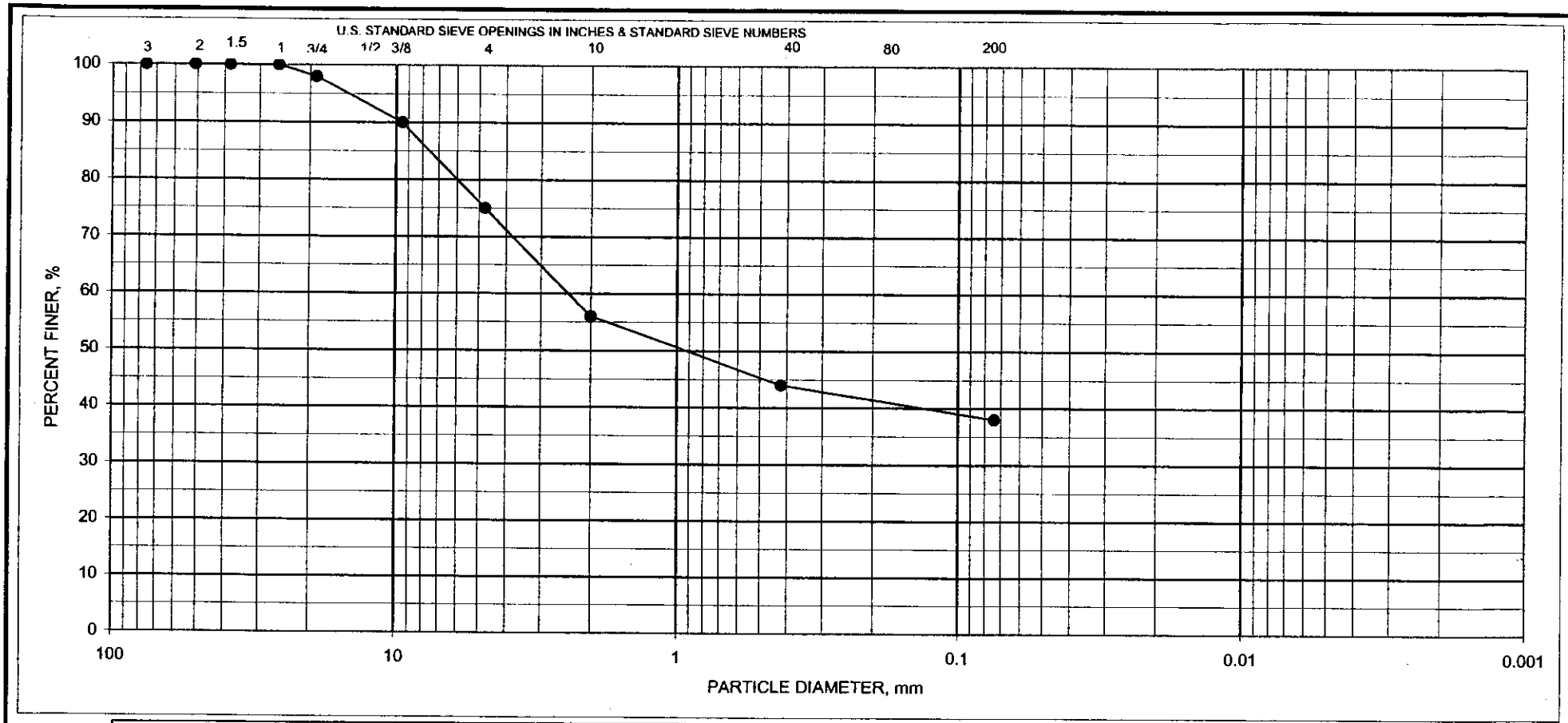
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-33	Bulk	0 to 5.5 feet	Clayey Gravel with Sand	GC	13.7	38	21	17

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

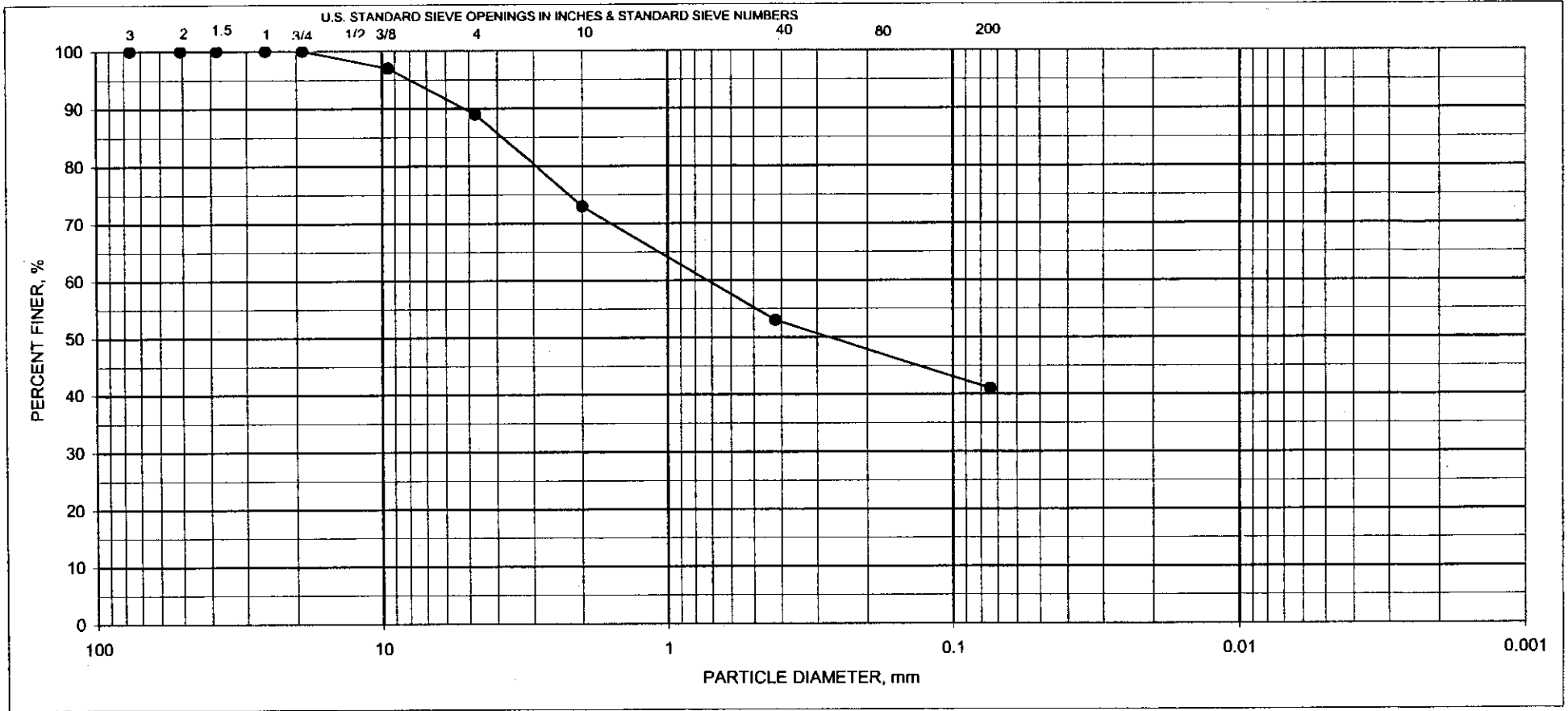
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-39	Bulk	2 to 35 feet	Clayey Sand with Gravel	SC	0.8	30	20	10

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

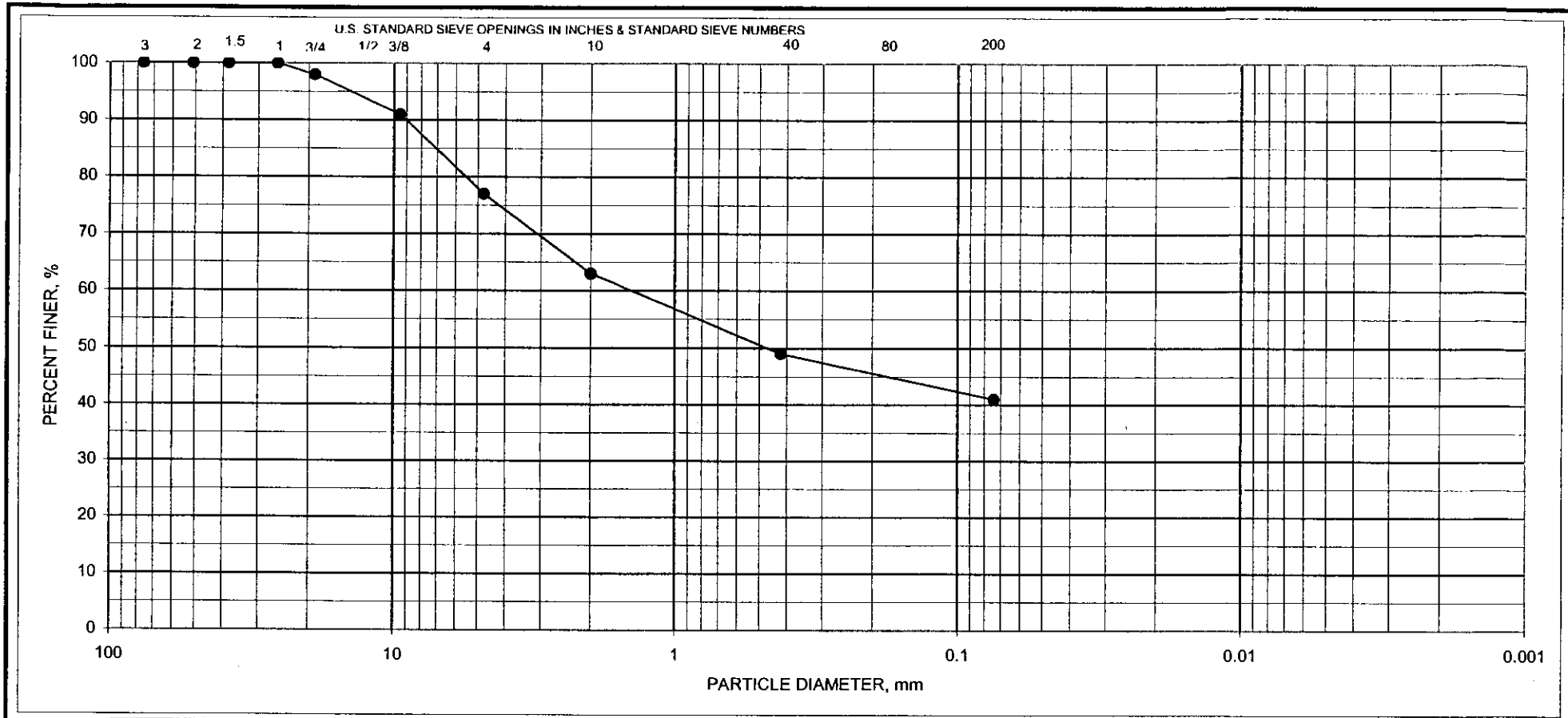
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-44	Bulk	0 to 10.5 feet	Clayey Sand	SC	13.7	30	19	11

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

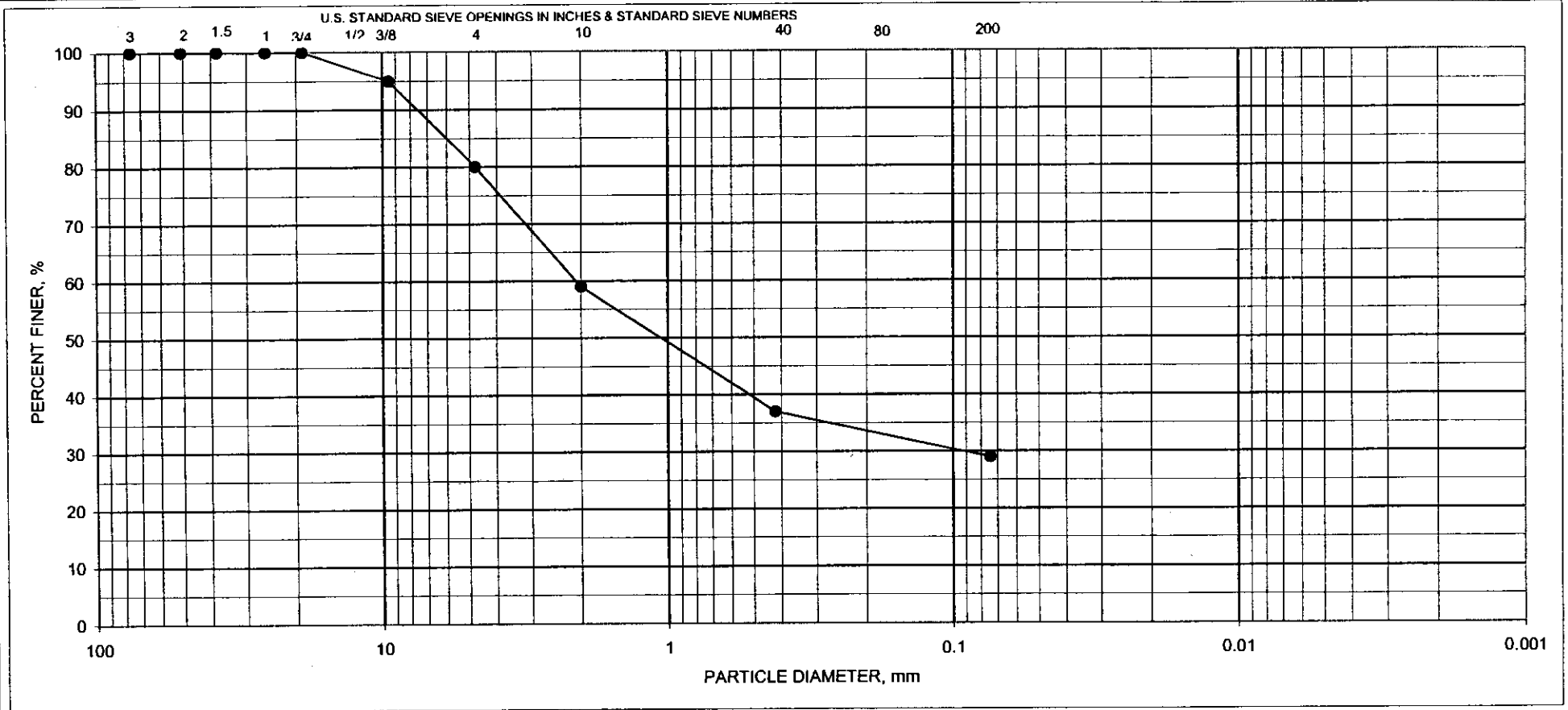
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-57	Bulk	0 to 6.8 feet	Clayey Sand with Gravel	SC	17.8	28	20	8

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

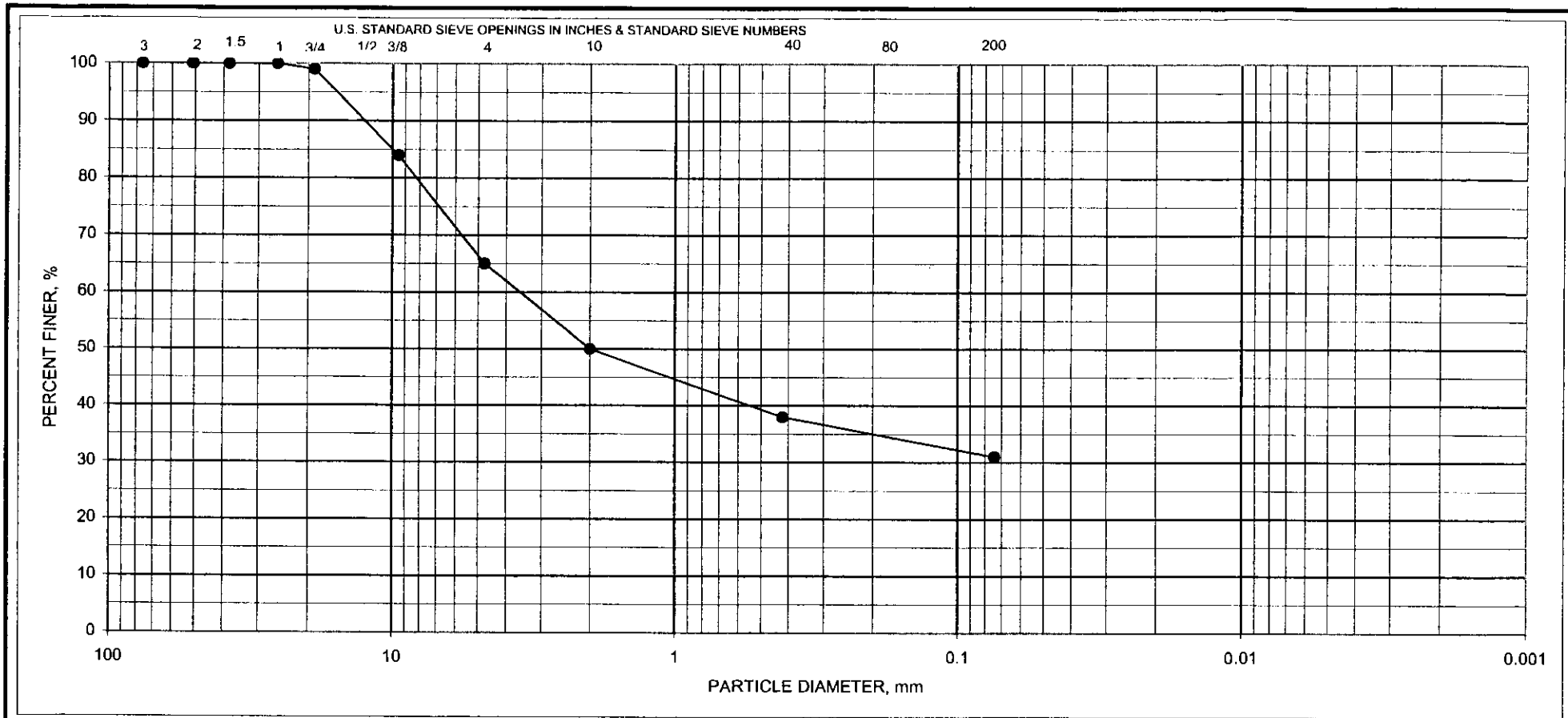
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-65	Bulk	0 to 25 feet	Silty Sand with Gravel	SM	9.8	31	24	7

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

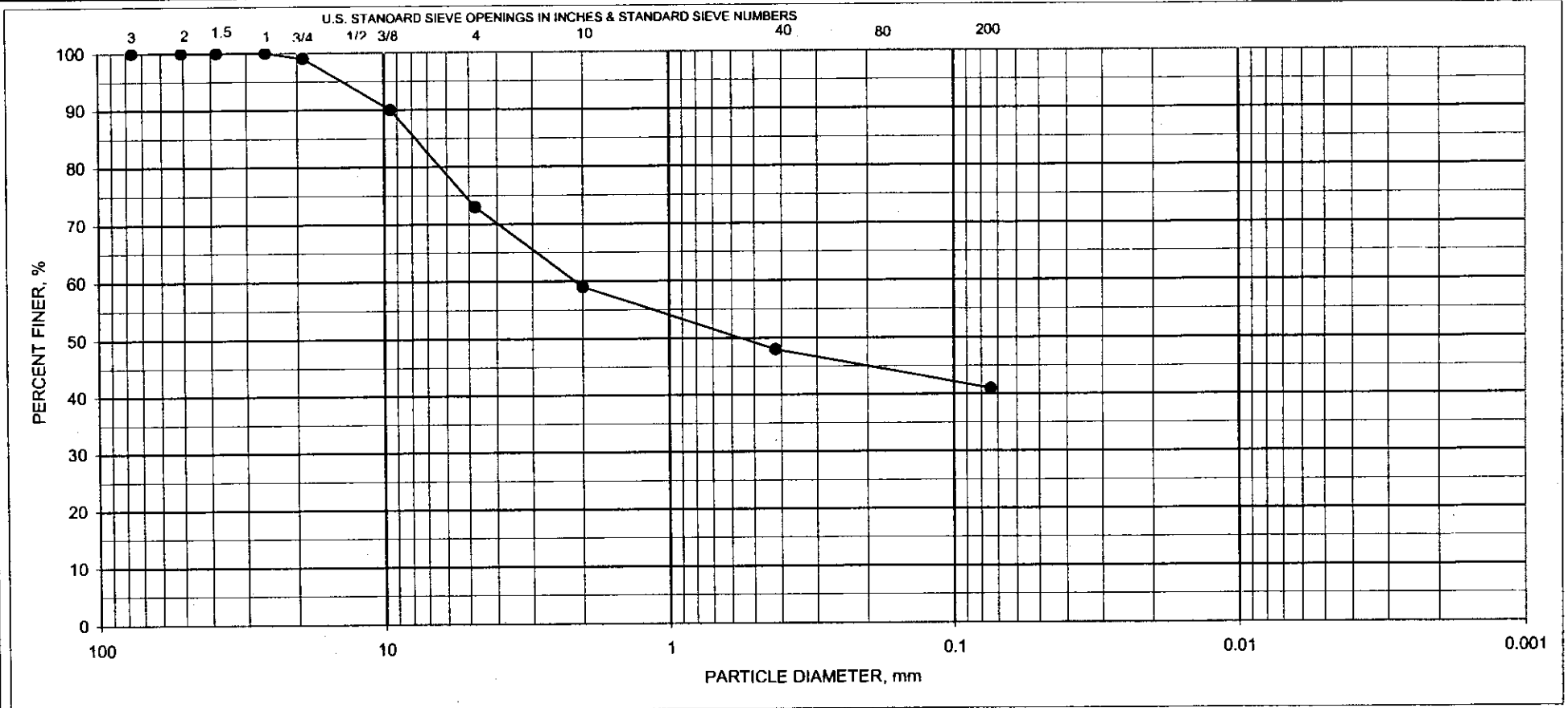
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-79	Bulk	3 to 23.5 feet	Clayey Gravel with Sand	GC	0.7	32	23	9

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

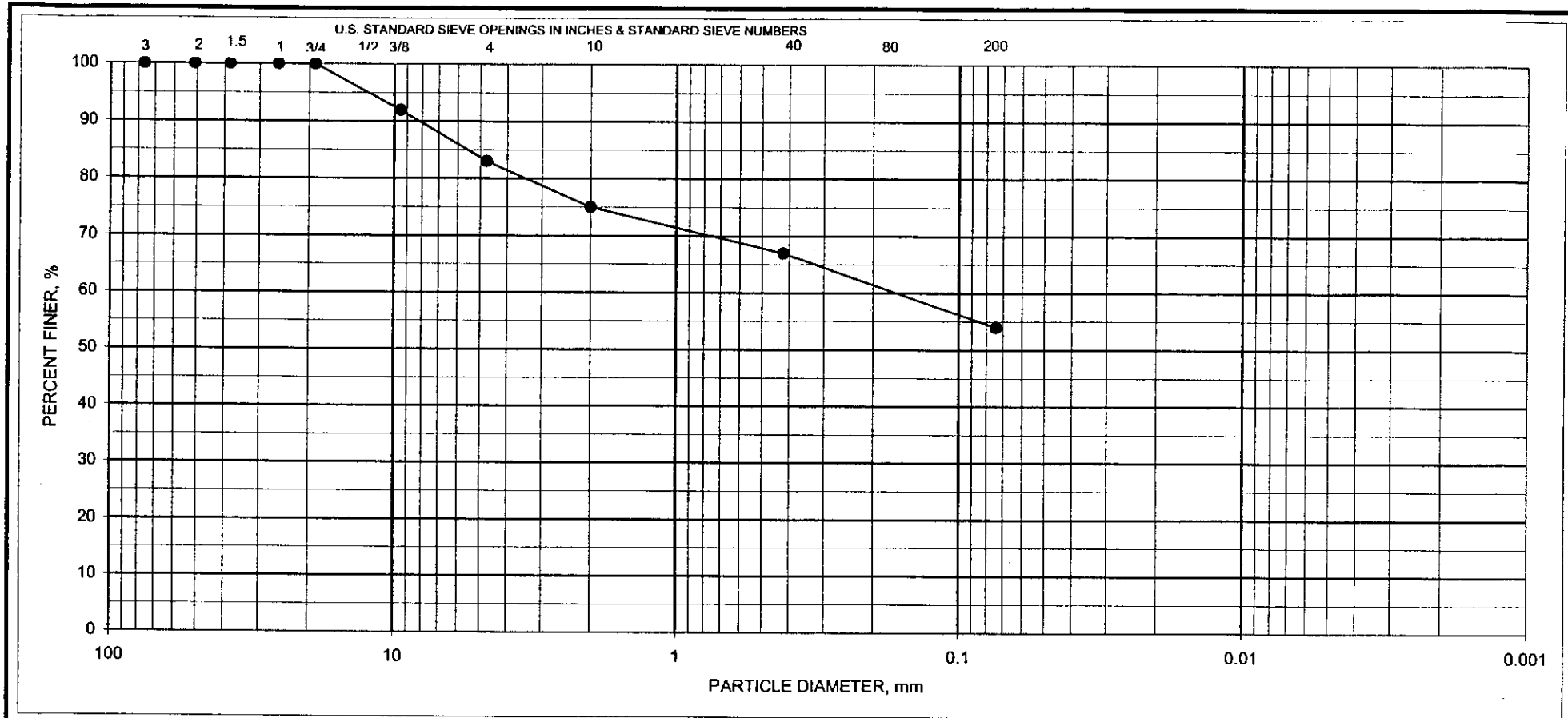
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-88	Bulk	3 to 20 feet	Silty Sand with Gravel	SM	0.5	27	22	5

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

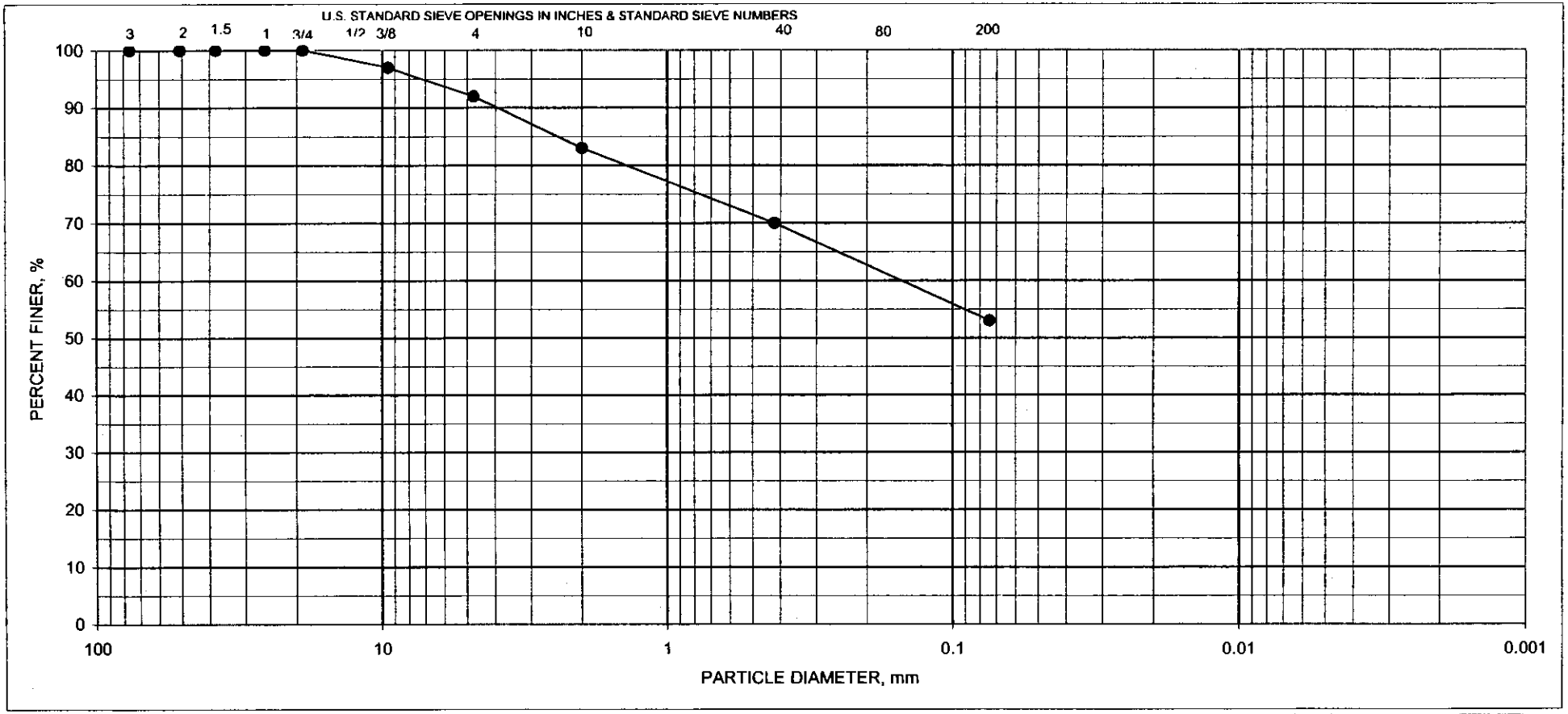
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-94	Bulk	0 to 9.5 feet	Sandy Lean Clay with Gravel	CL	3.9	47	19	28

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

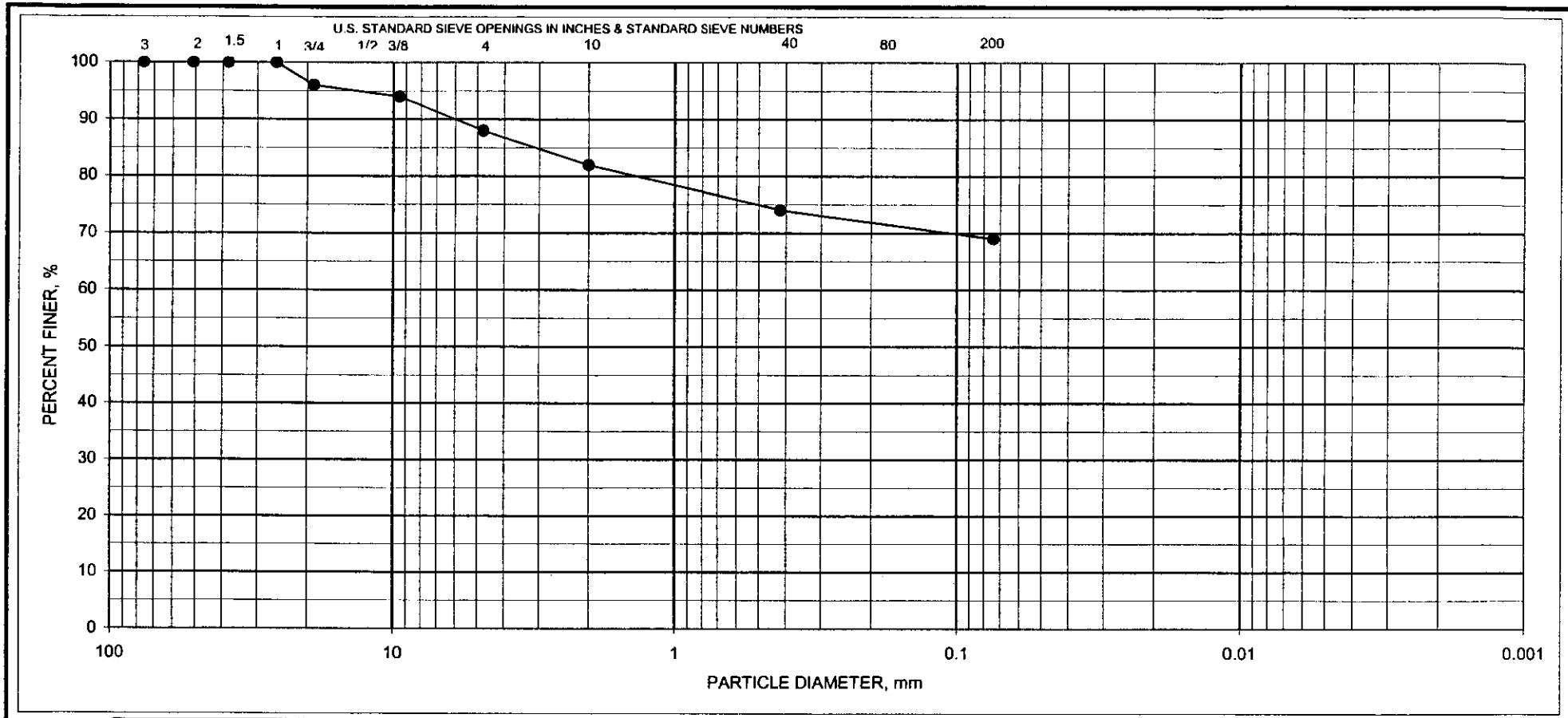
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-125	Bulk	1 to 25 feet	Sandy Lean Clay	CL	32.8	48	25	23

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

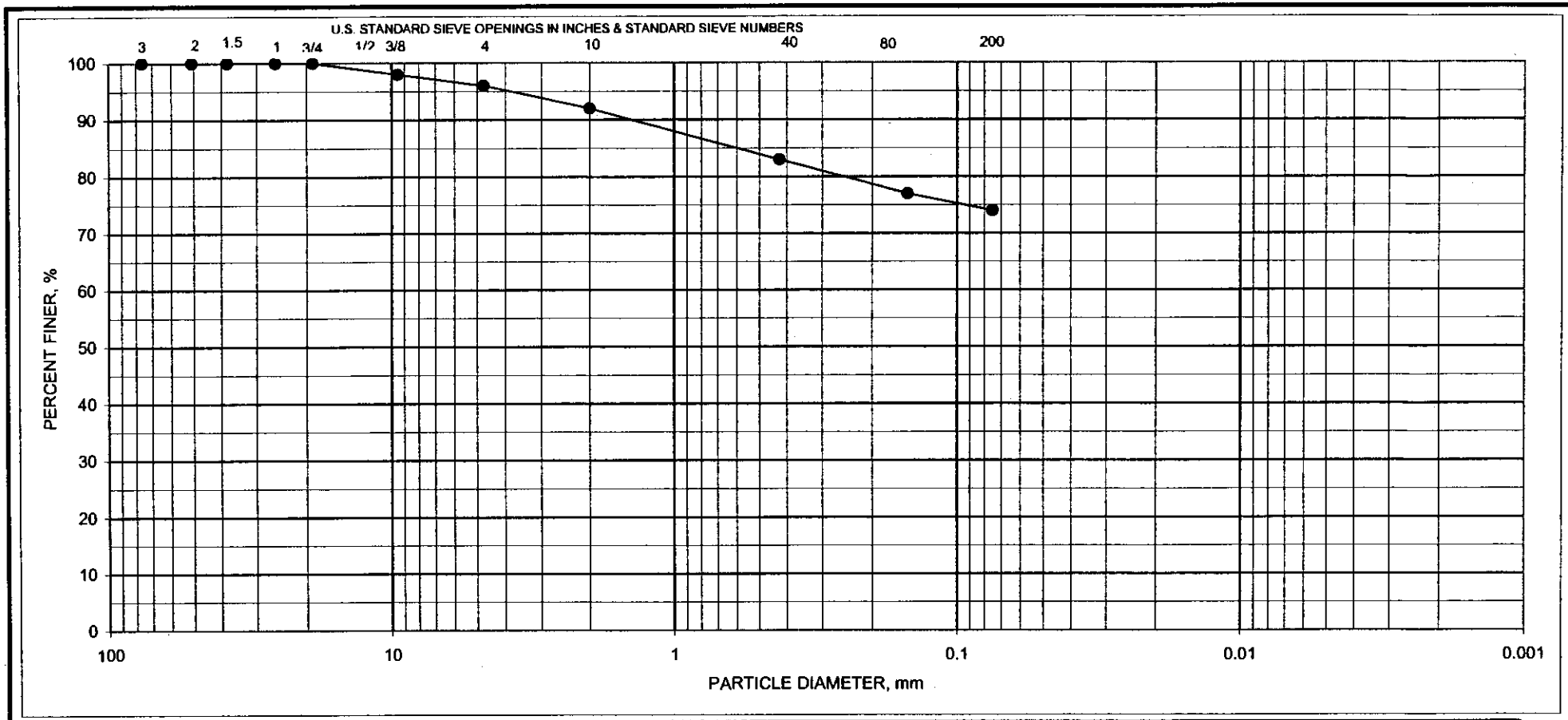
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-153	Bulk	4 to 30 feet	Sandy Lean Clay	CL	22.9	49	22	27

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

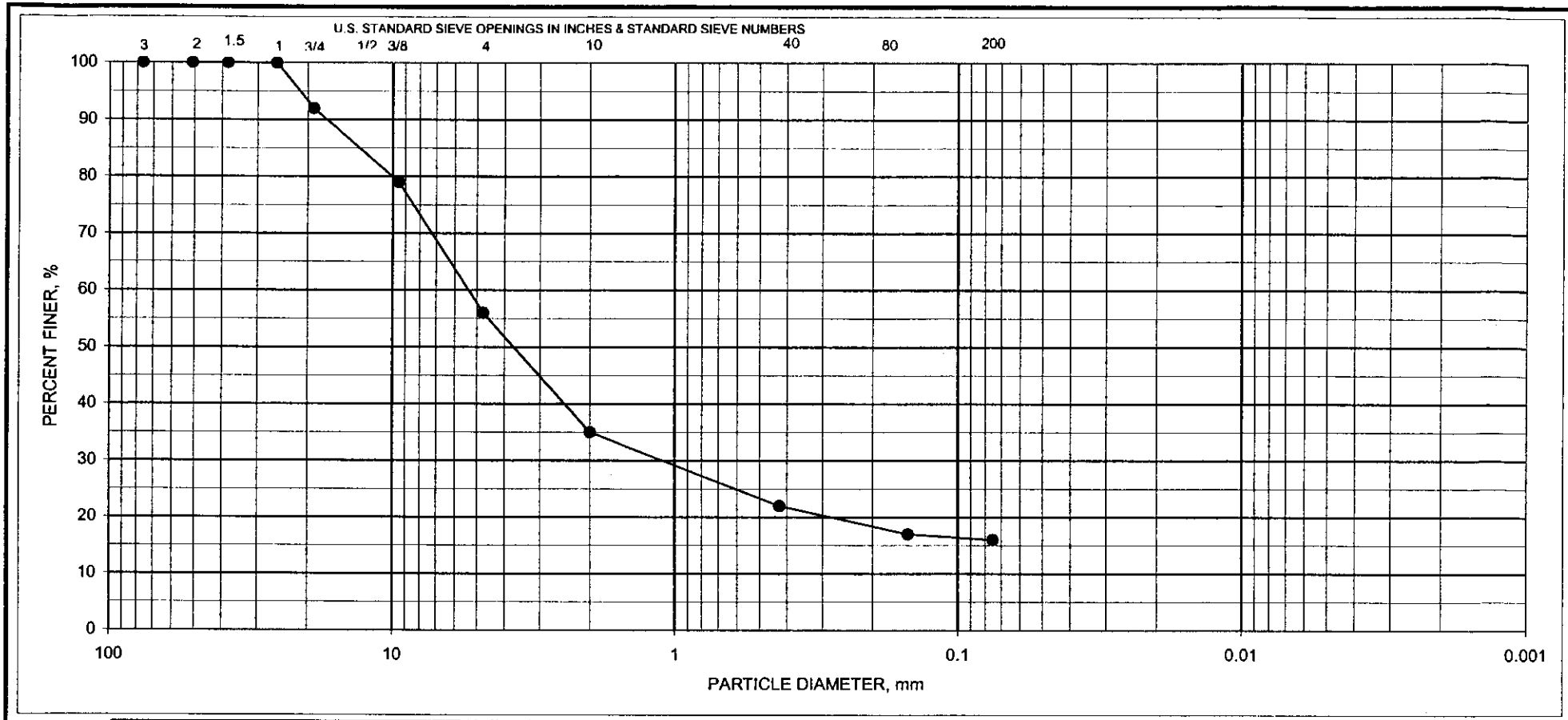
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-164	Bulk	1 to 32 feet	Fat Clay with Sand	CL	25.5	56	19	37

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

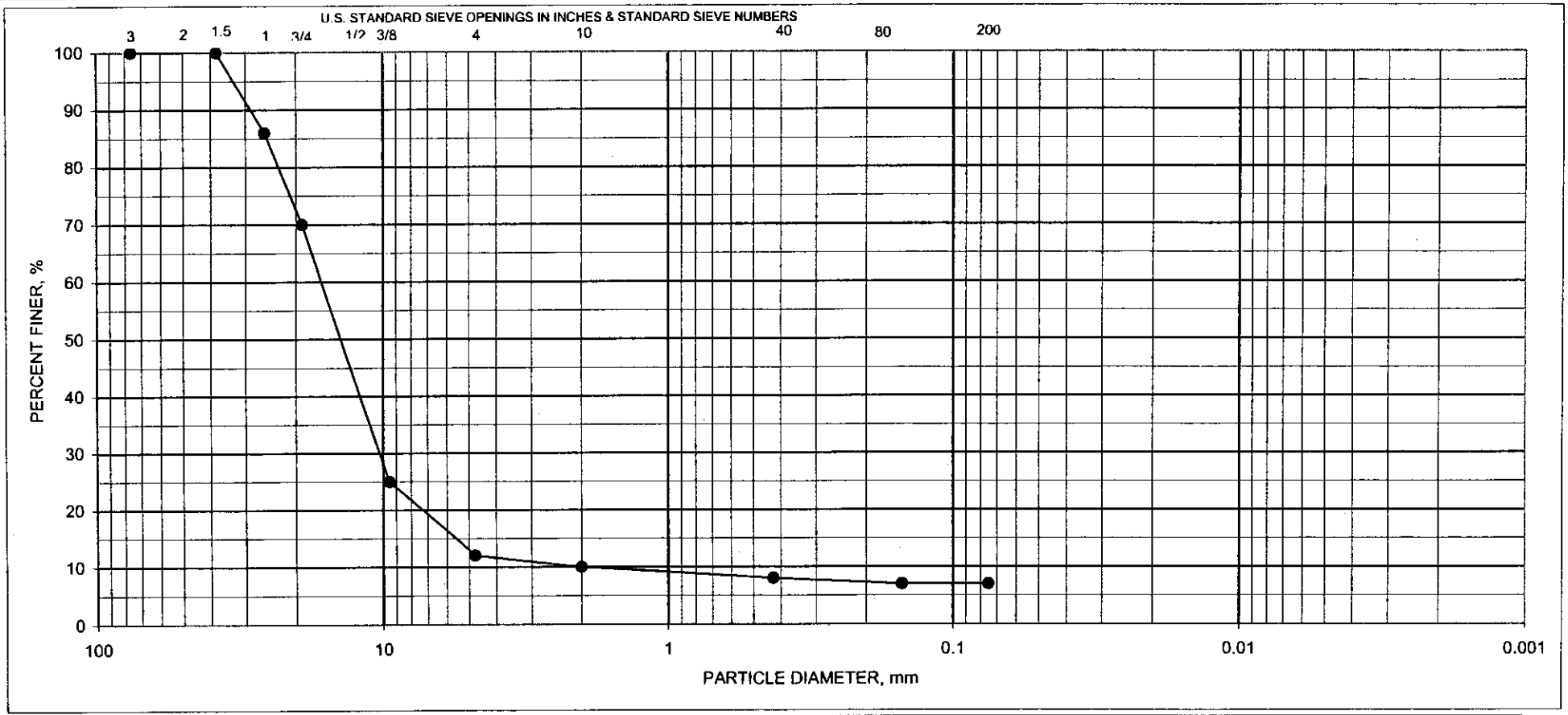
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-177	Bulk	0 to 13 feet	Silty Gravel with Sand	SM	6.6	20	17	3

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE Aprit 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

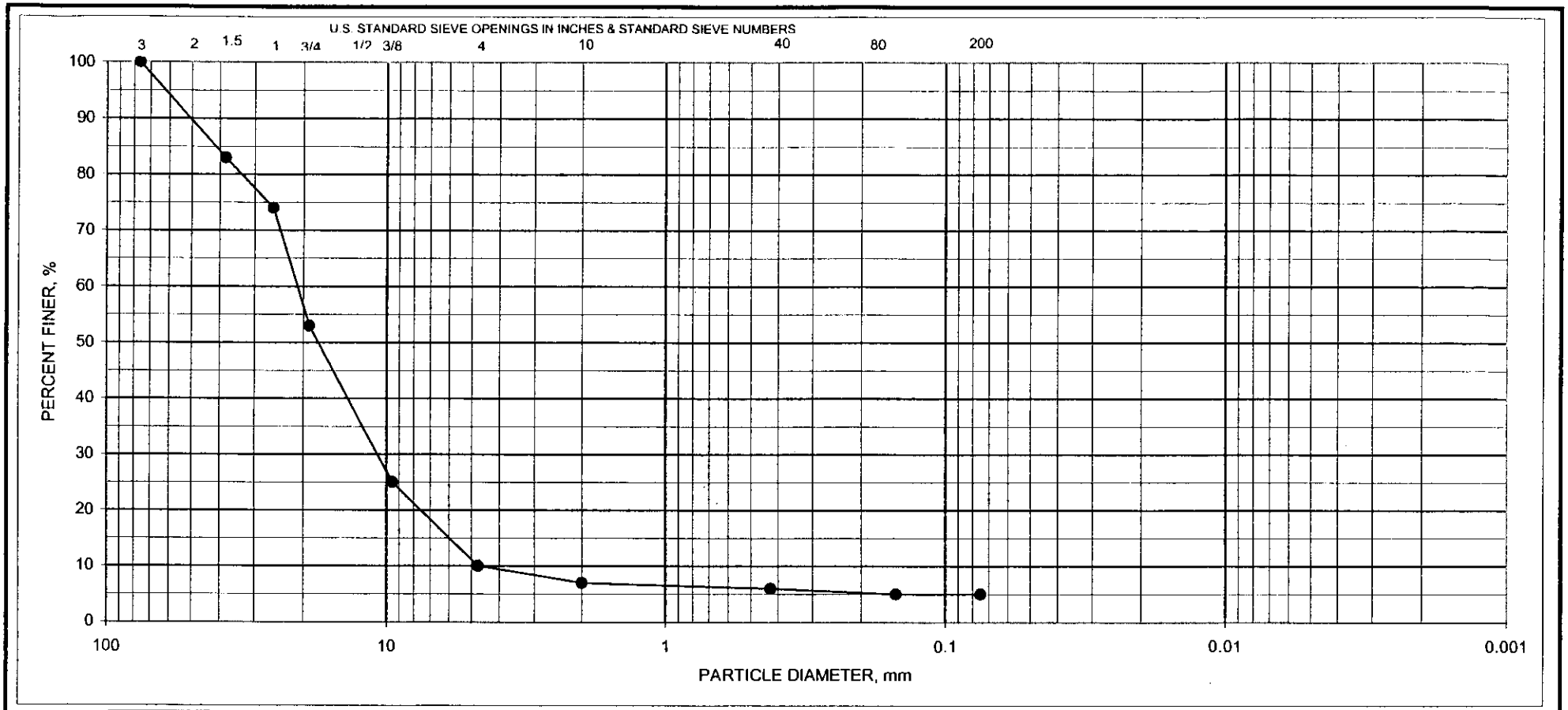
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-178A	1	0 - 8	Poorly Graded Gravel with Silt	GP-GM	2.6	30	23	7

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

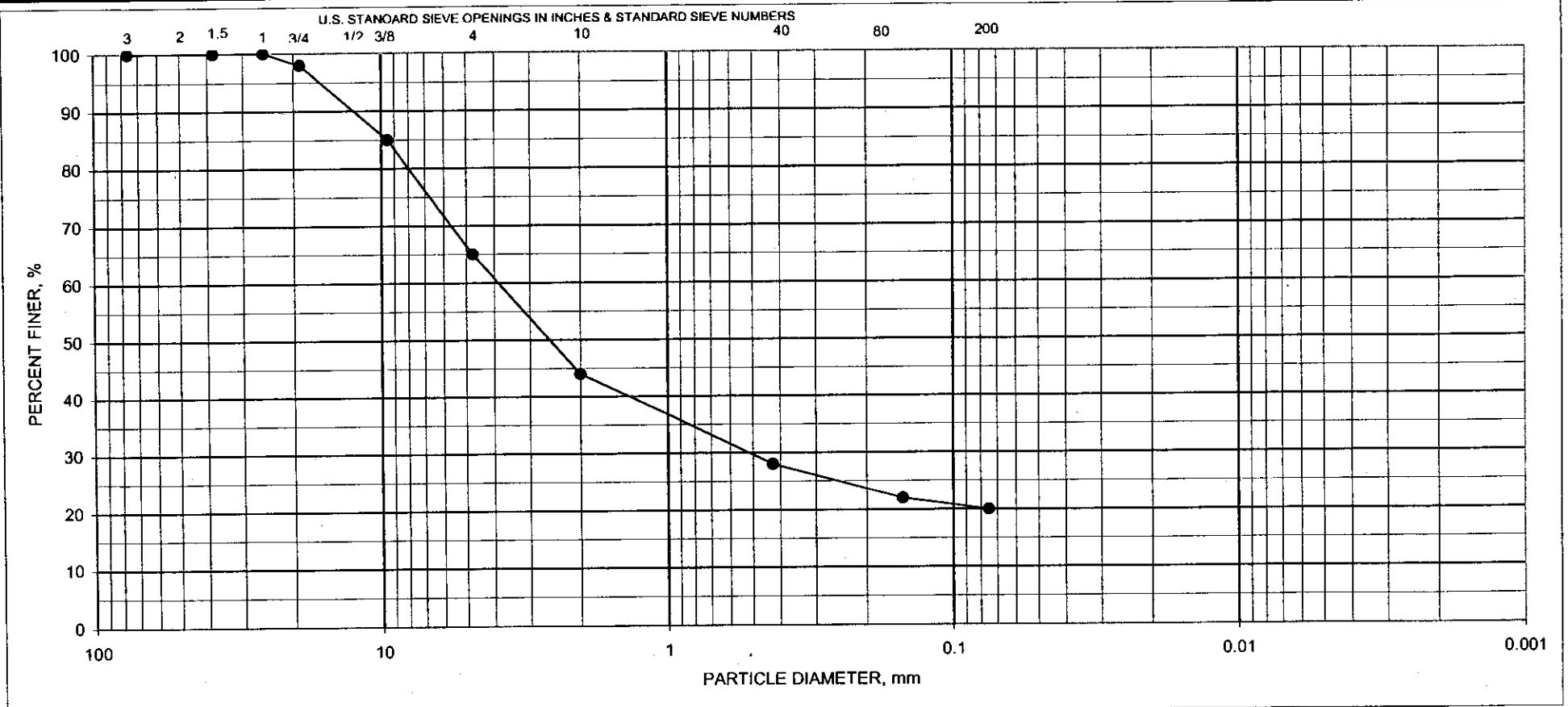
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-178A	2	8 - 13	Well Graded Gravel with Silty Clay	GW-GC	2.2	27	20	7

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

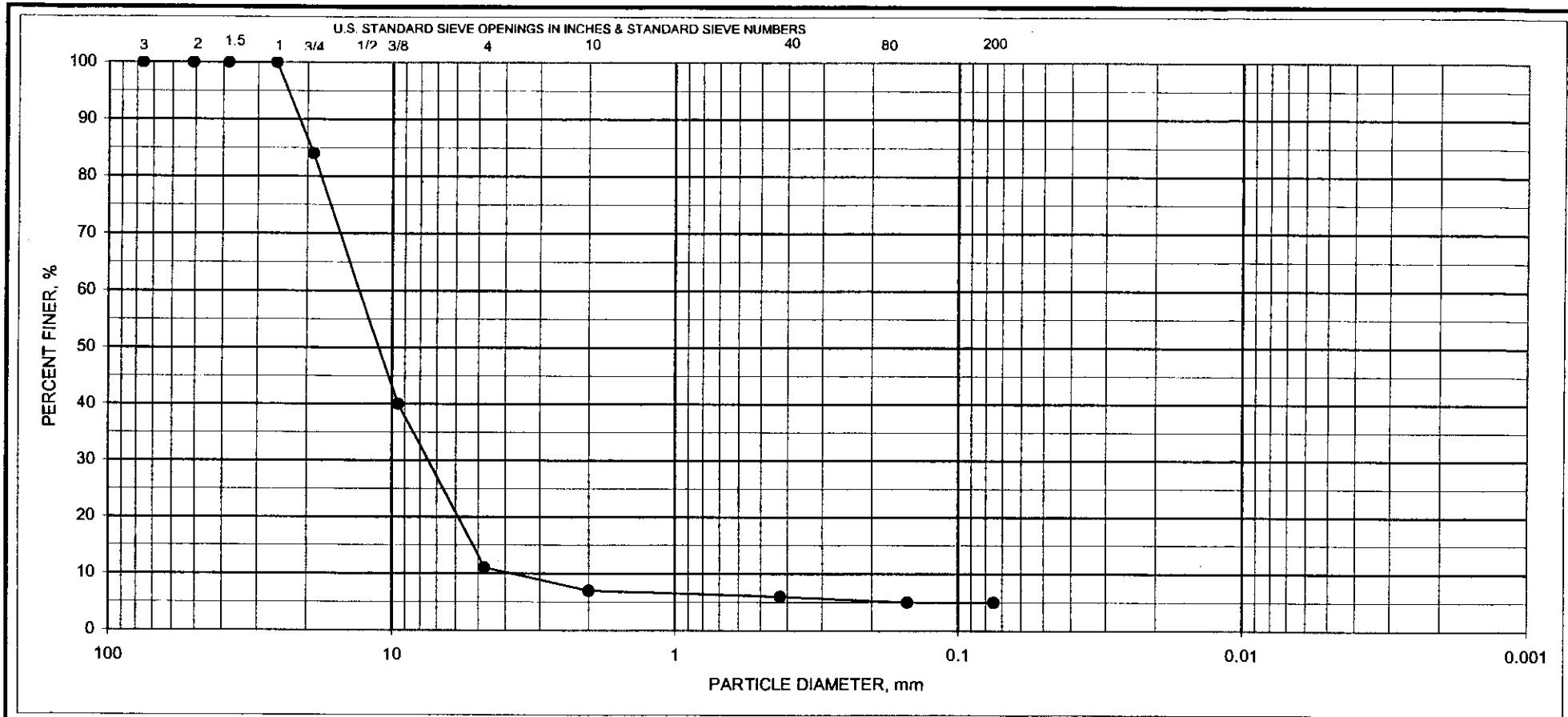
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-178A	3	13 - 18	Silty, Clayey Sand with Gravel	SC-SM	11.4	22	16	6

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

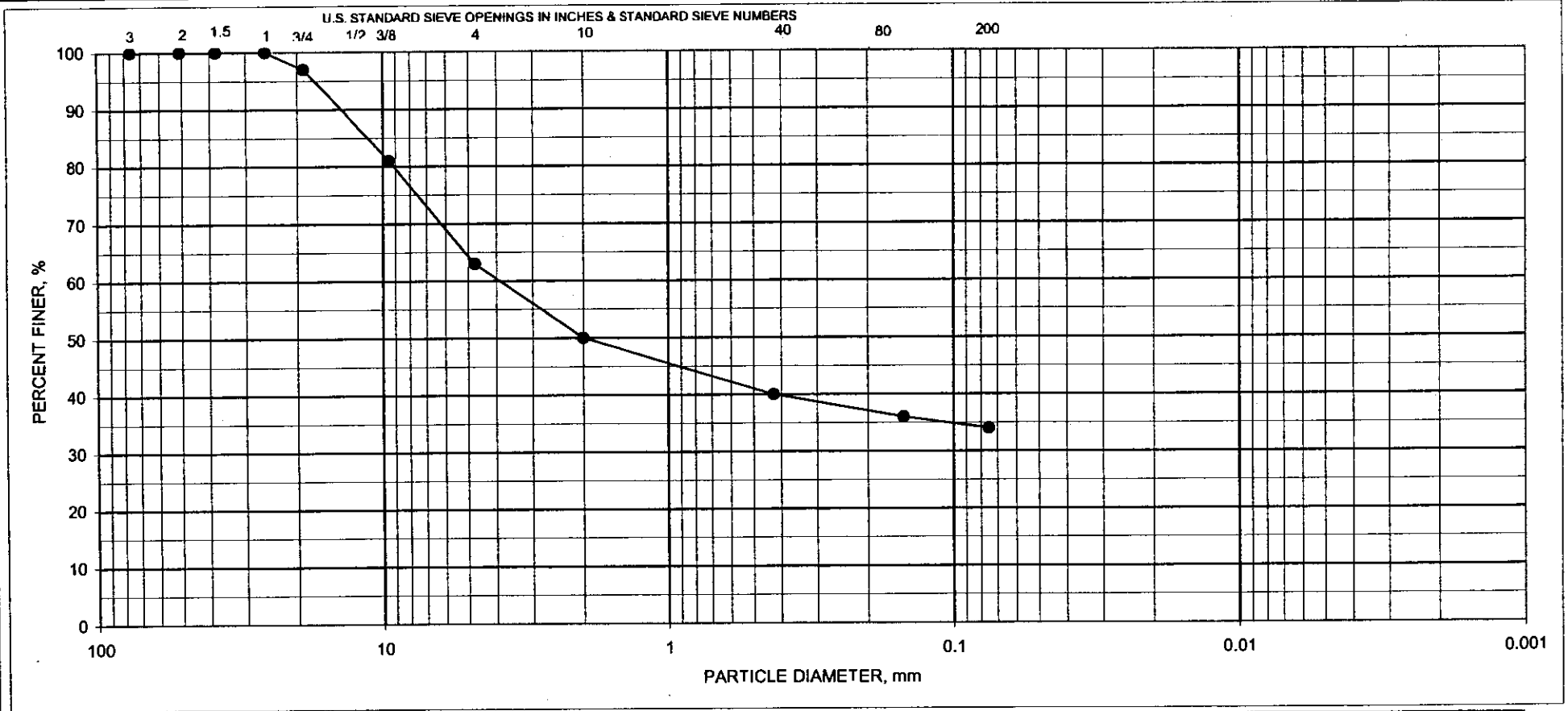
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-186	Bulk	0 to 4 feet	Well Graded Gravel	GW	3.8	24	21	3

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

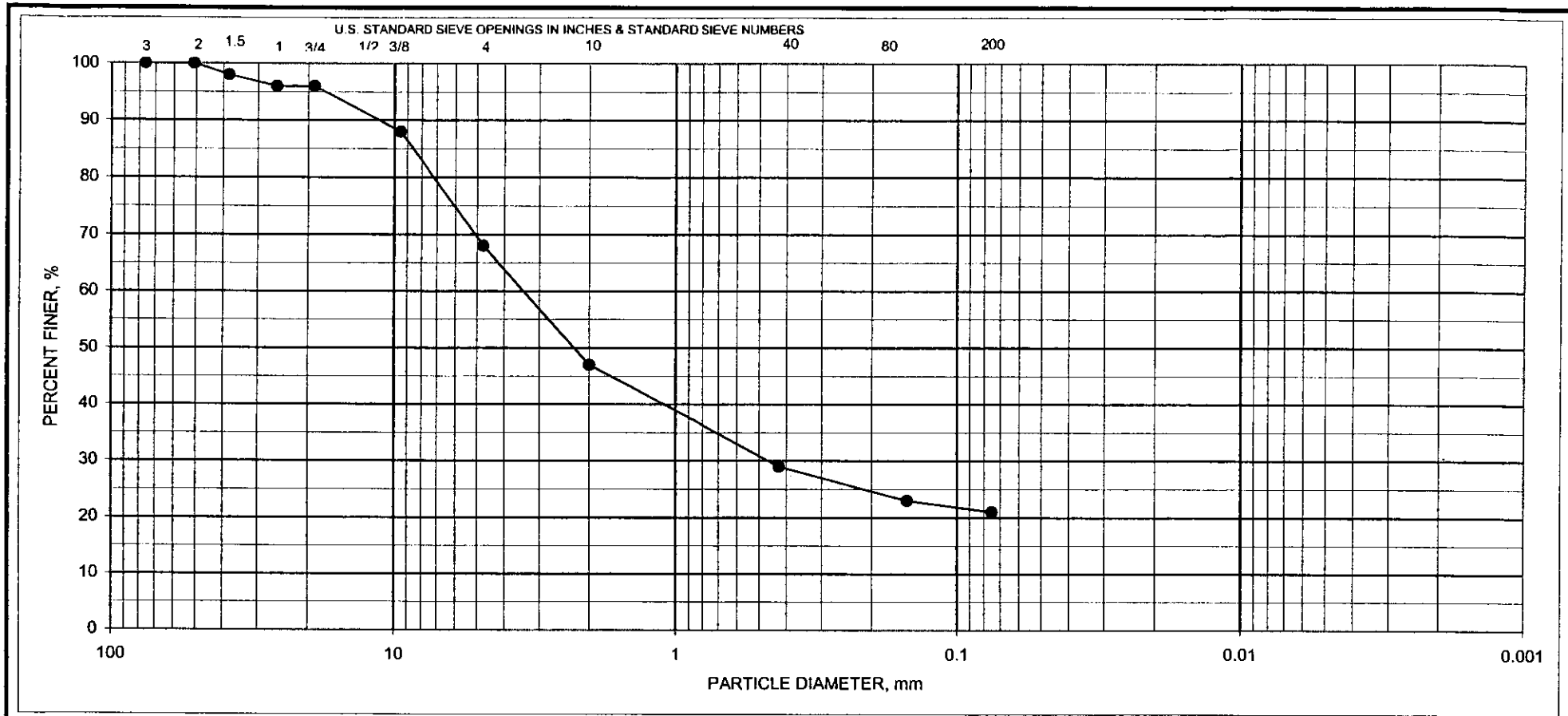
BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-186	Bulk	4 to 9.8 feet	Clayey Gravel with Sand	GC	10.7	28	19	9

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon

379



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

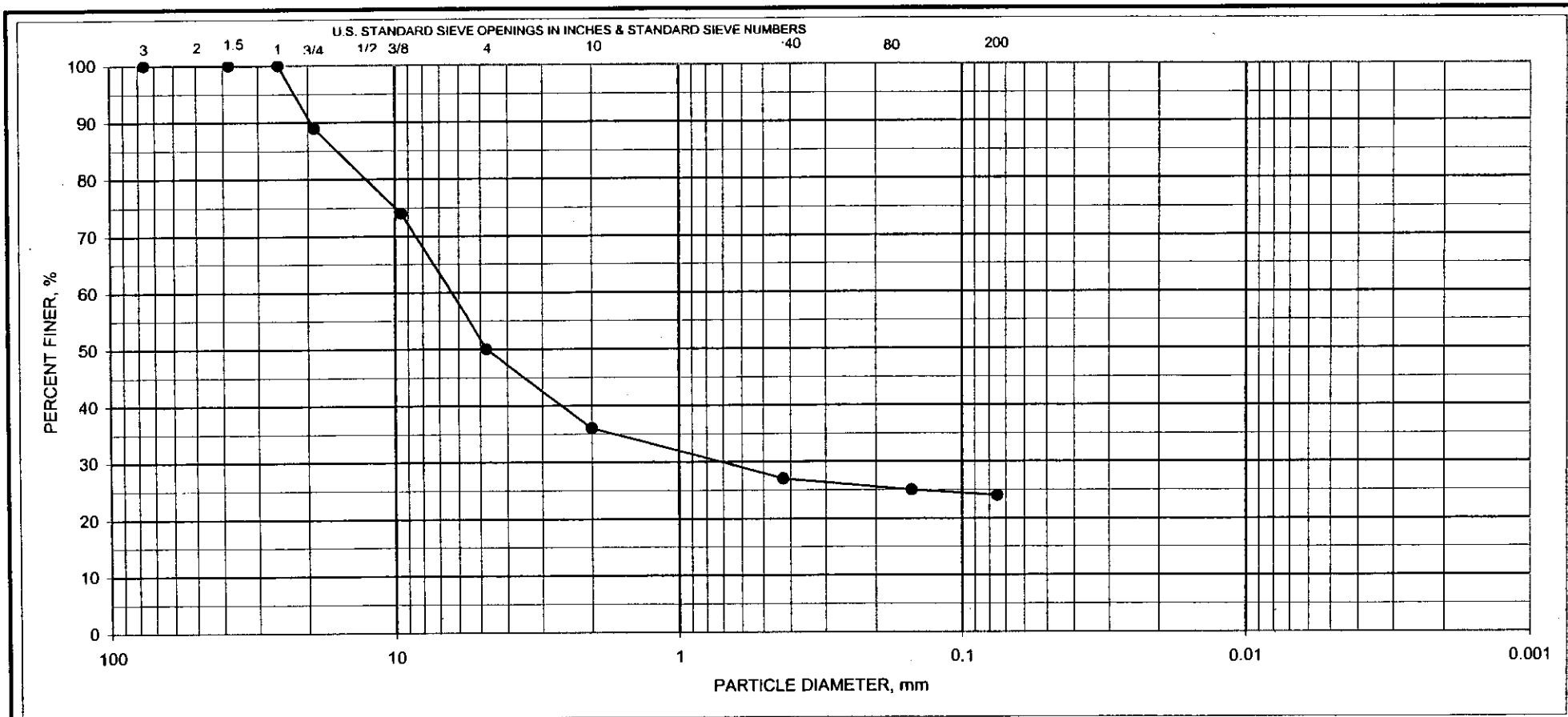
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-189	Bulk	2 to 22.8 feet	Silty Sand with Gravel	SM	3.6	20	17	3

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

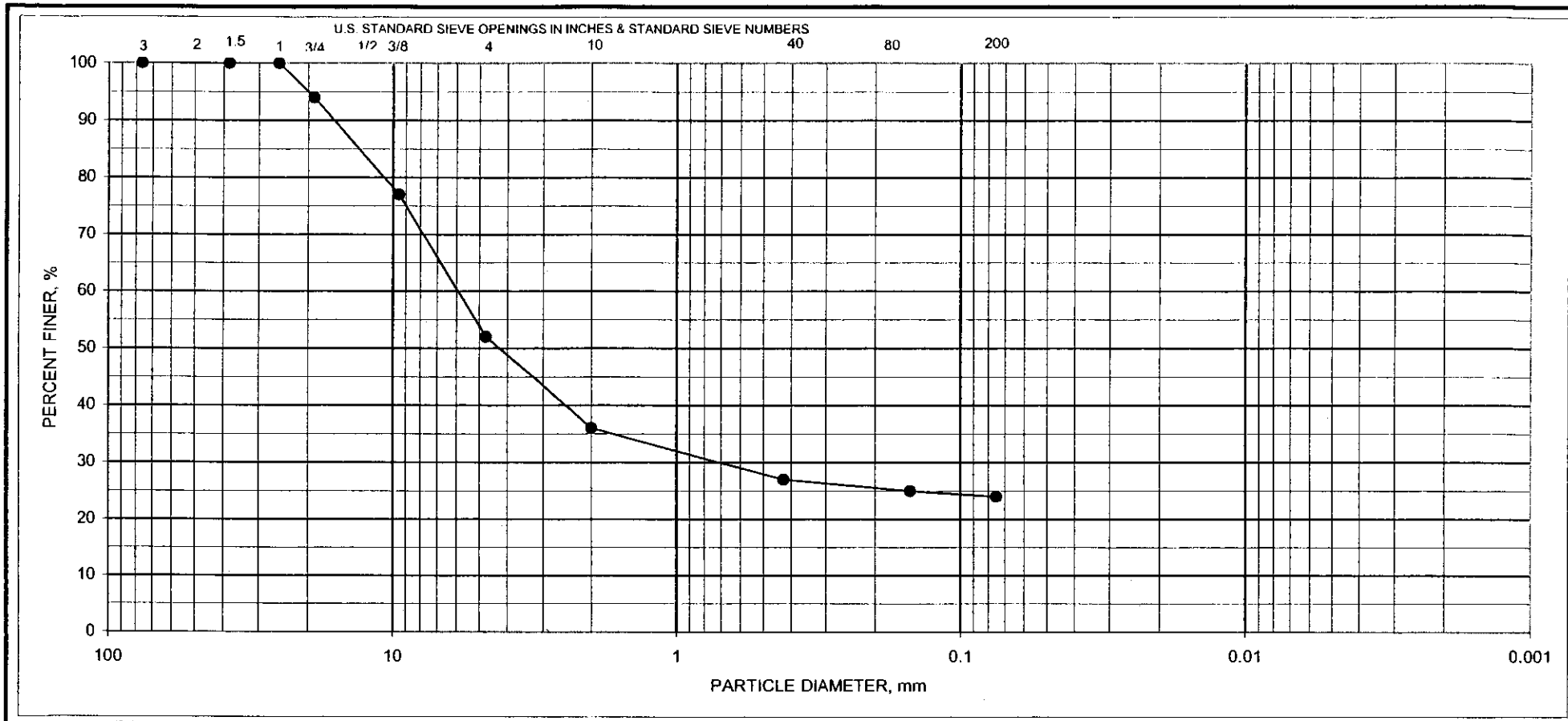
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-190A	1	0 - 4	Silty, Clayey Gravel with Sand	GC-GM	6.1	25	19	6

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

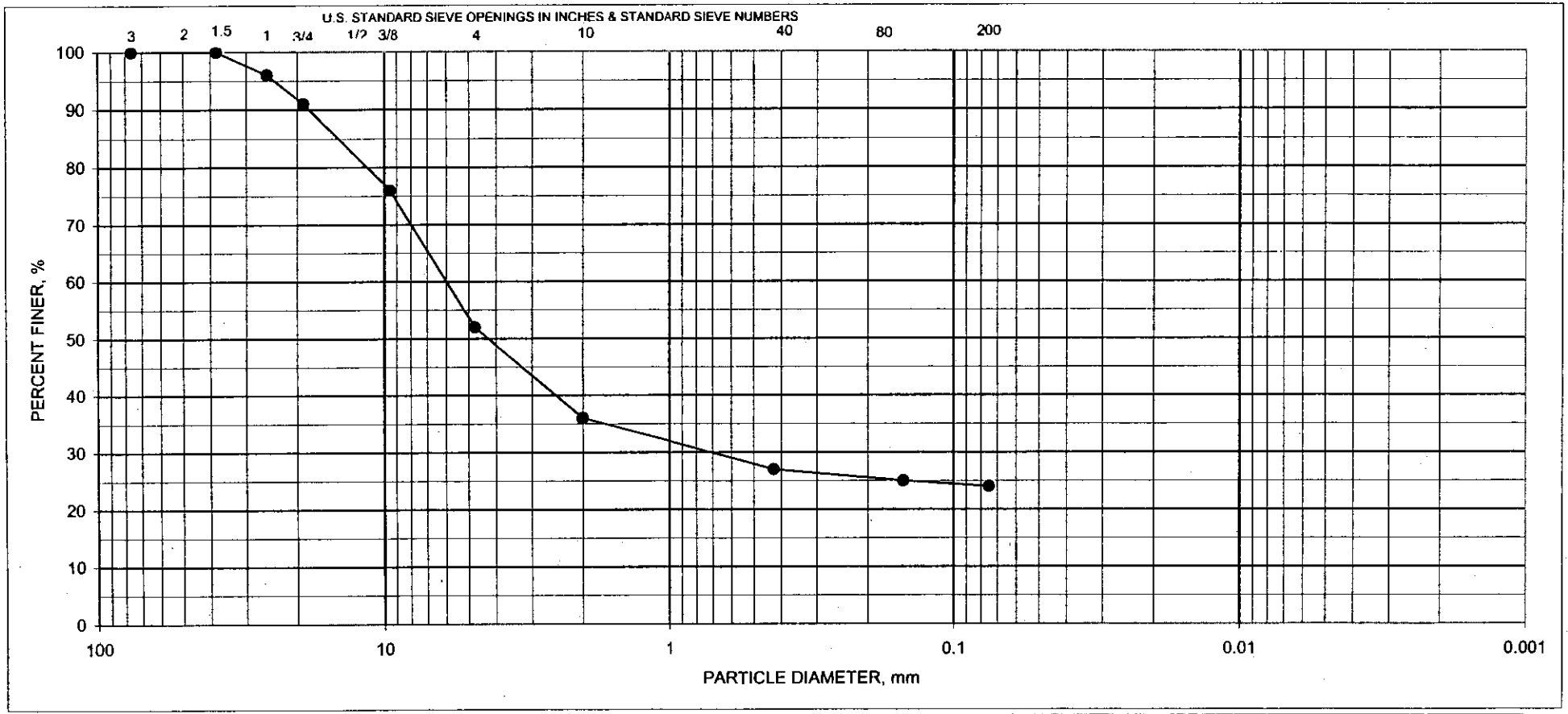
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-190A	2	4 - 9	Silty, Clayey Gravel with Sand	GC-GM	6.3	25	20	5

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

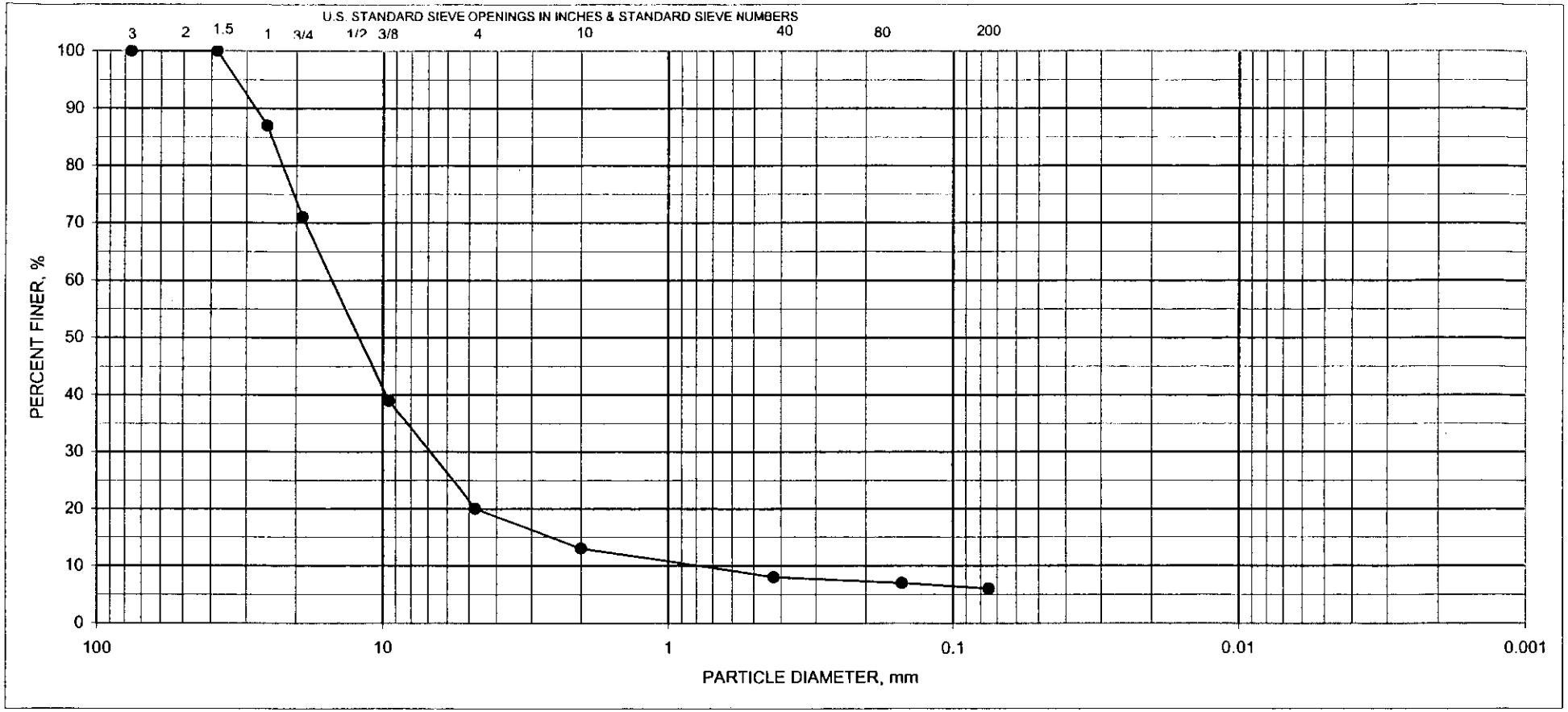
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-190A	3	9 - 14	Silty, Clayey Gravel with Sand	GC-GM	4.3	26	20	6

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

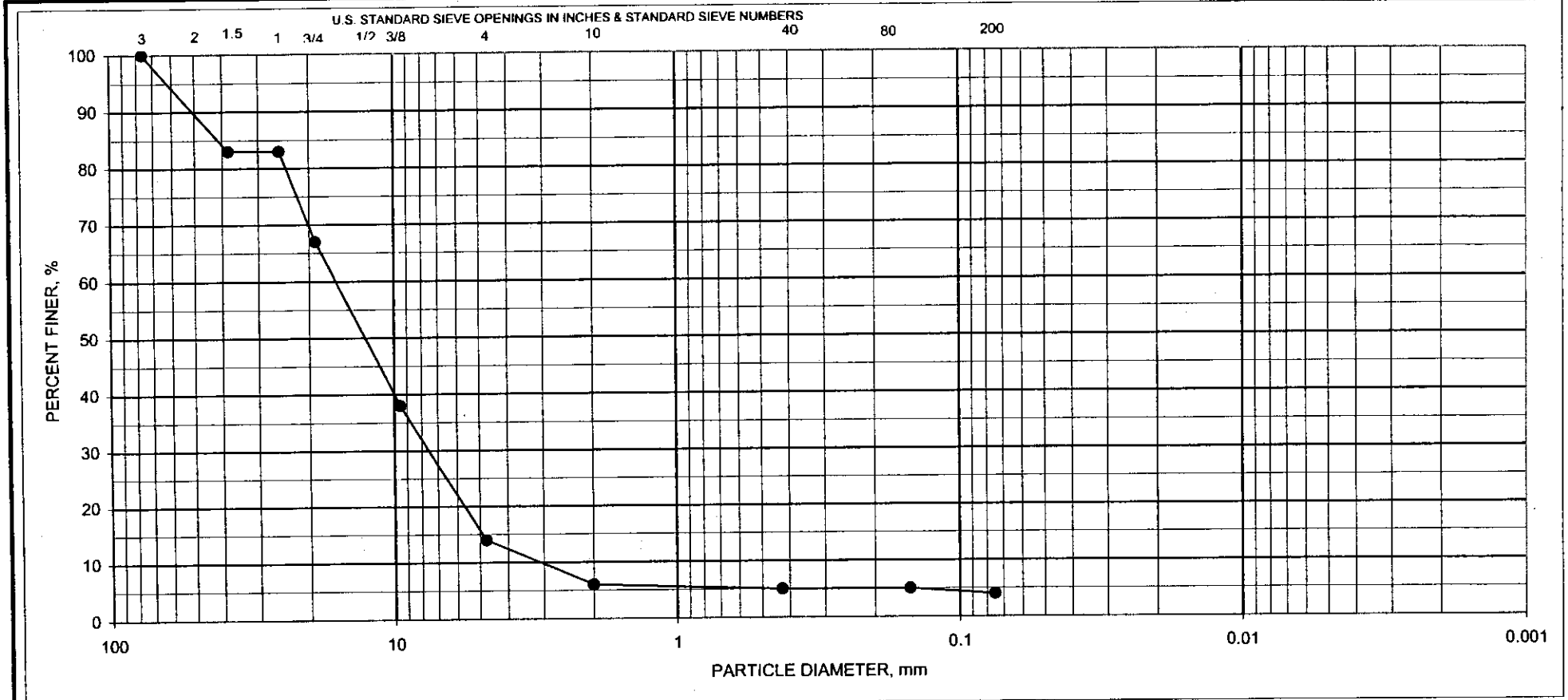
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-190A	4	14 - 19	Poorly Graded Gravel with Silty Clay	GP-GC	2	26	19	7

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

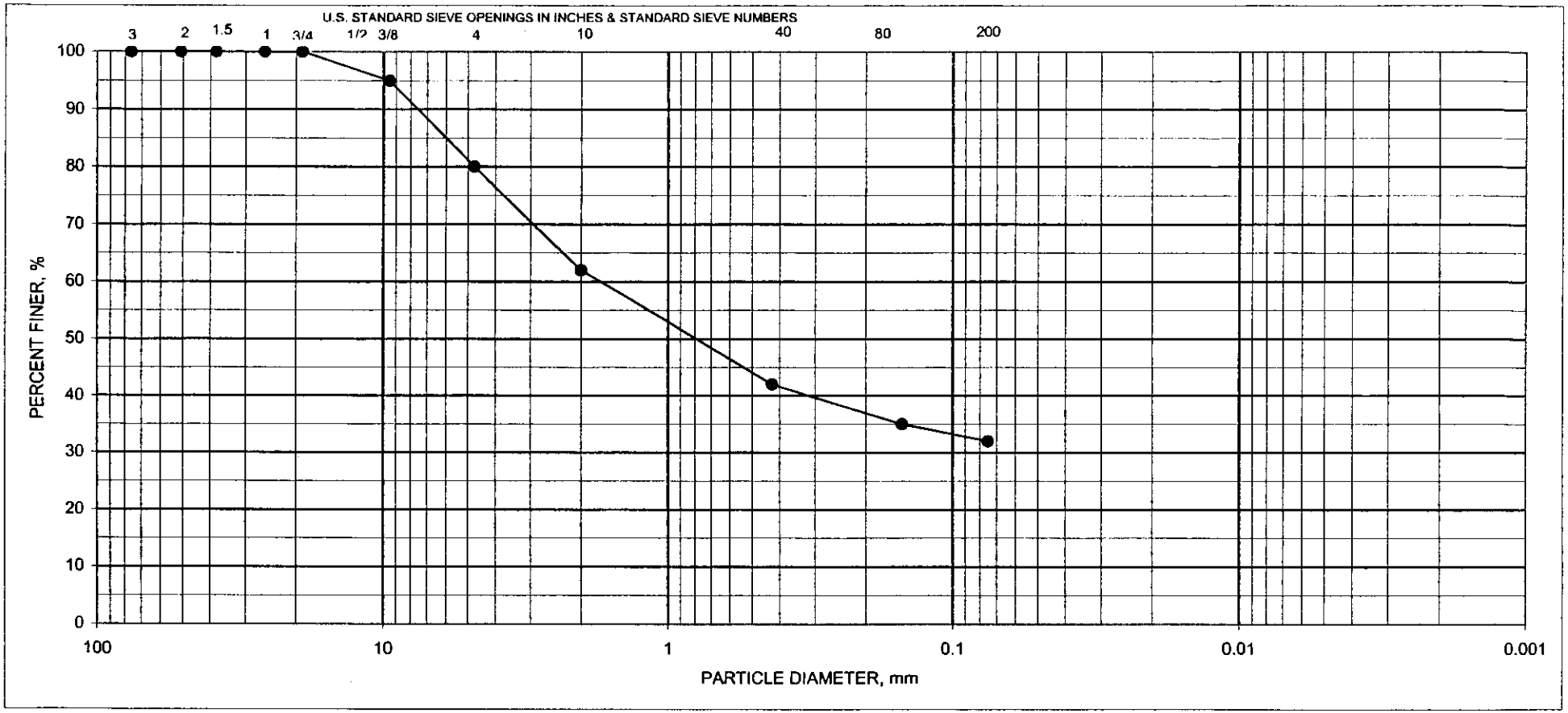
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-190A	5	19 - 24	Well Graded Gravel	GW	1.9	29	19	10

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

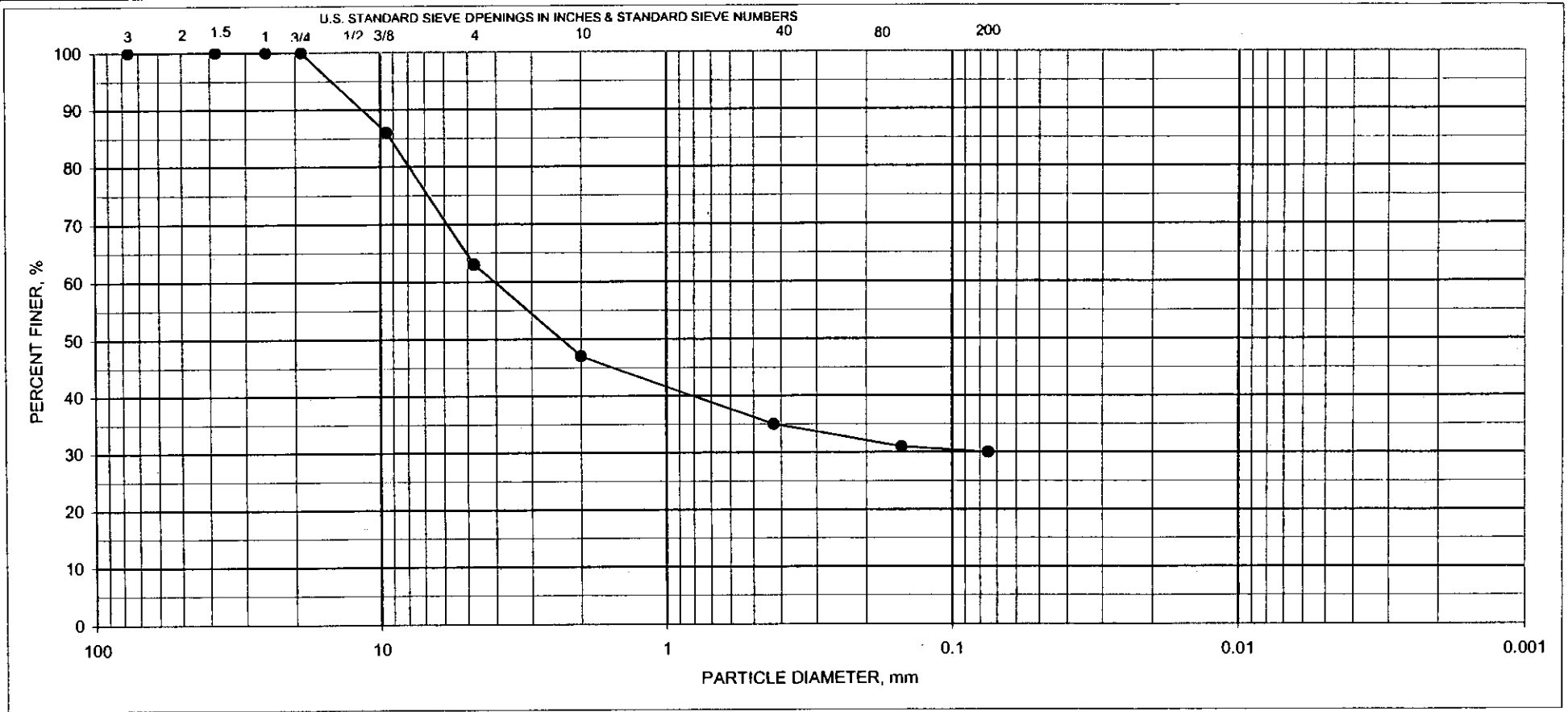
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-204	Bulk	0.5 to 21.5 feet	Silty Clayey Sand with Gravel	SC-SM	5.9	24	19	5

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

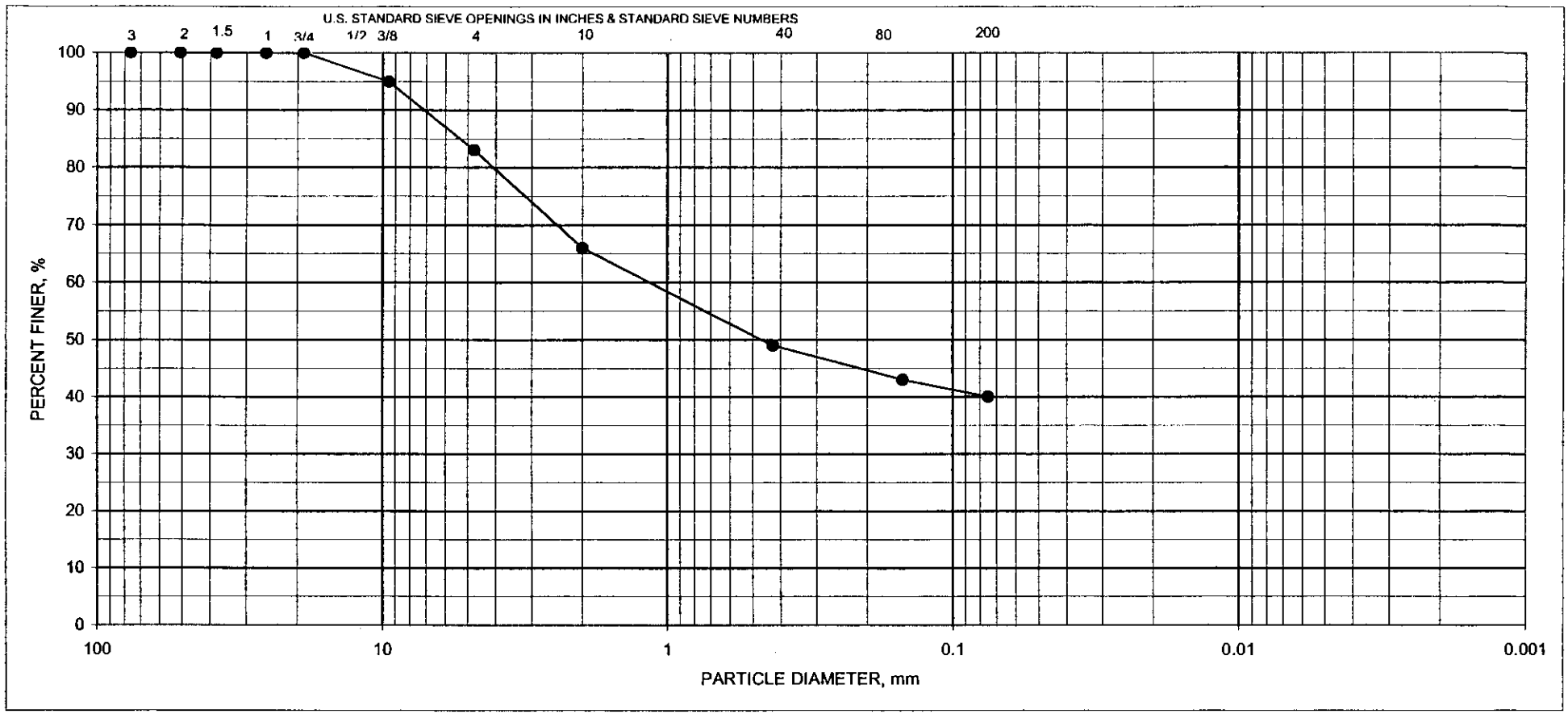
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-205A	1, 2, 3	0 - 11	Silty, Clayey Gravel with Sand	GC-GM	4.9	26	19	7

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE November 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

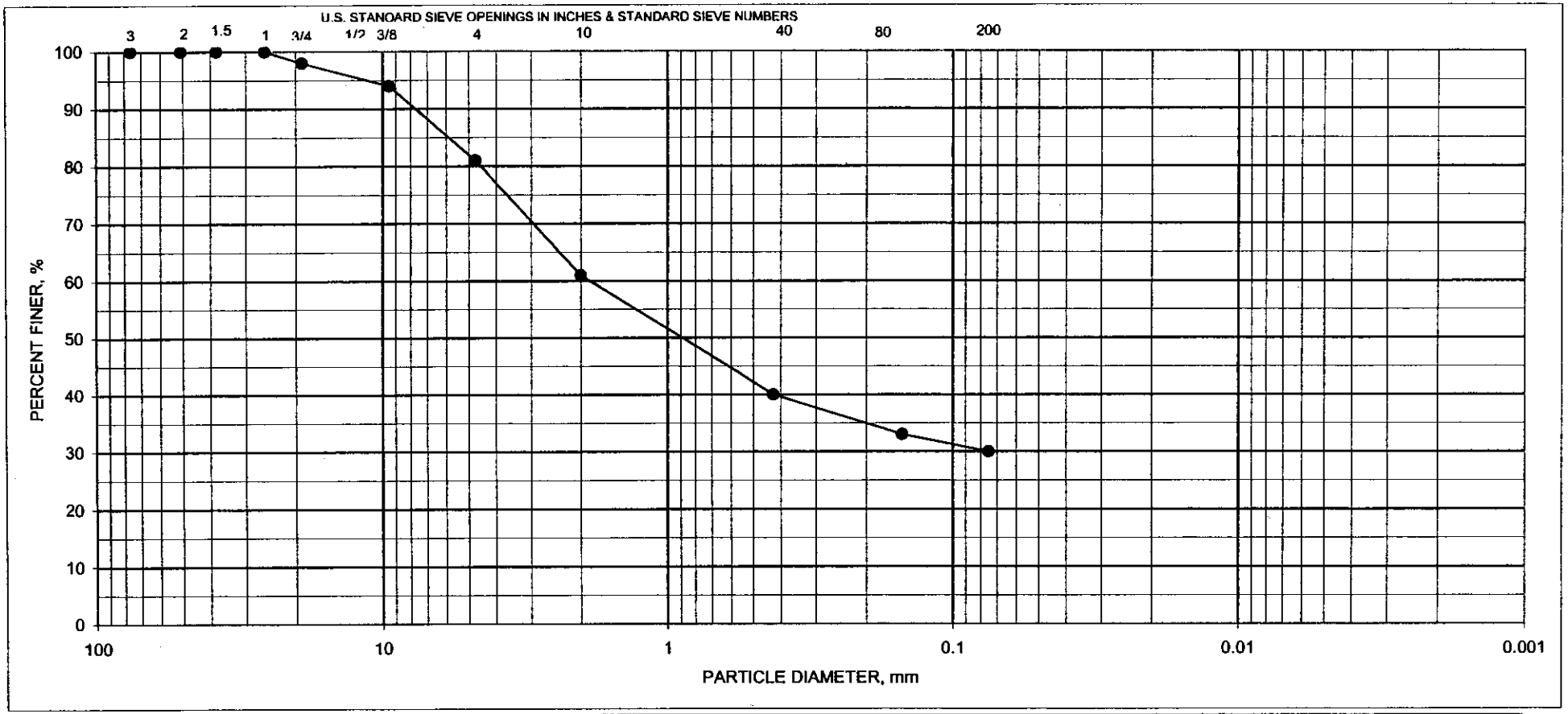
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-213	Bulk	0.8 to 18.2 feet	Silty Clayey Sand with Gravel	SC-SM	11	24	18	6

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

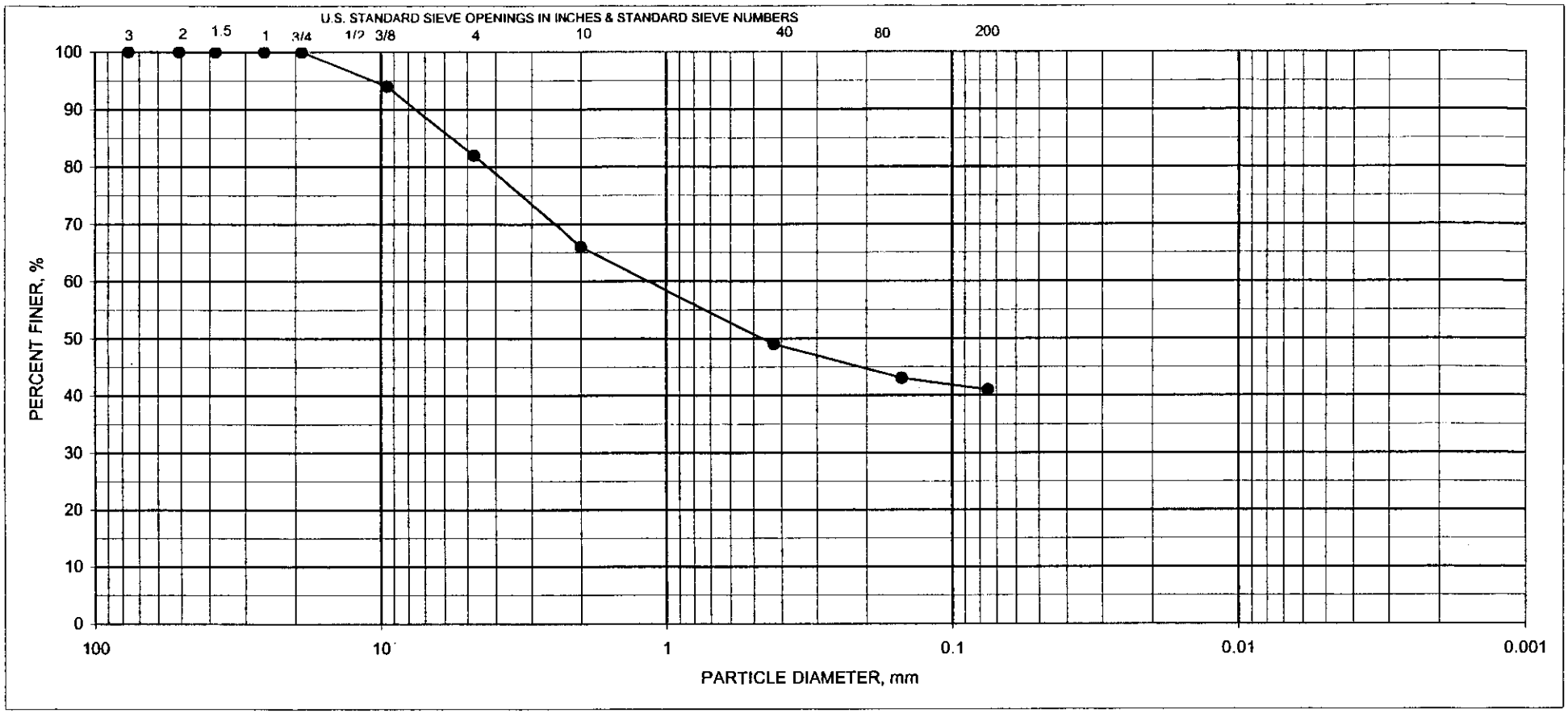
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-224	Bulk	0 to 10 feet	Clayey Sand with Gravel	SC	7.1	29	16	13

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

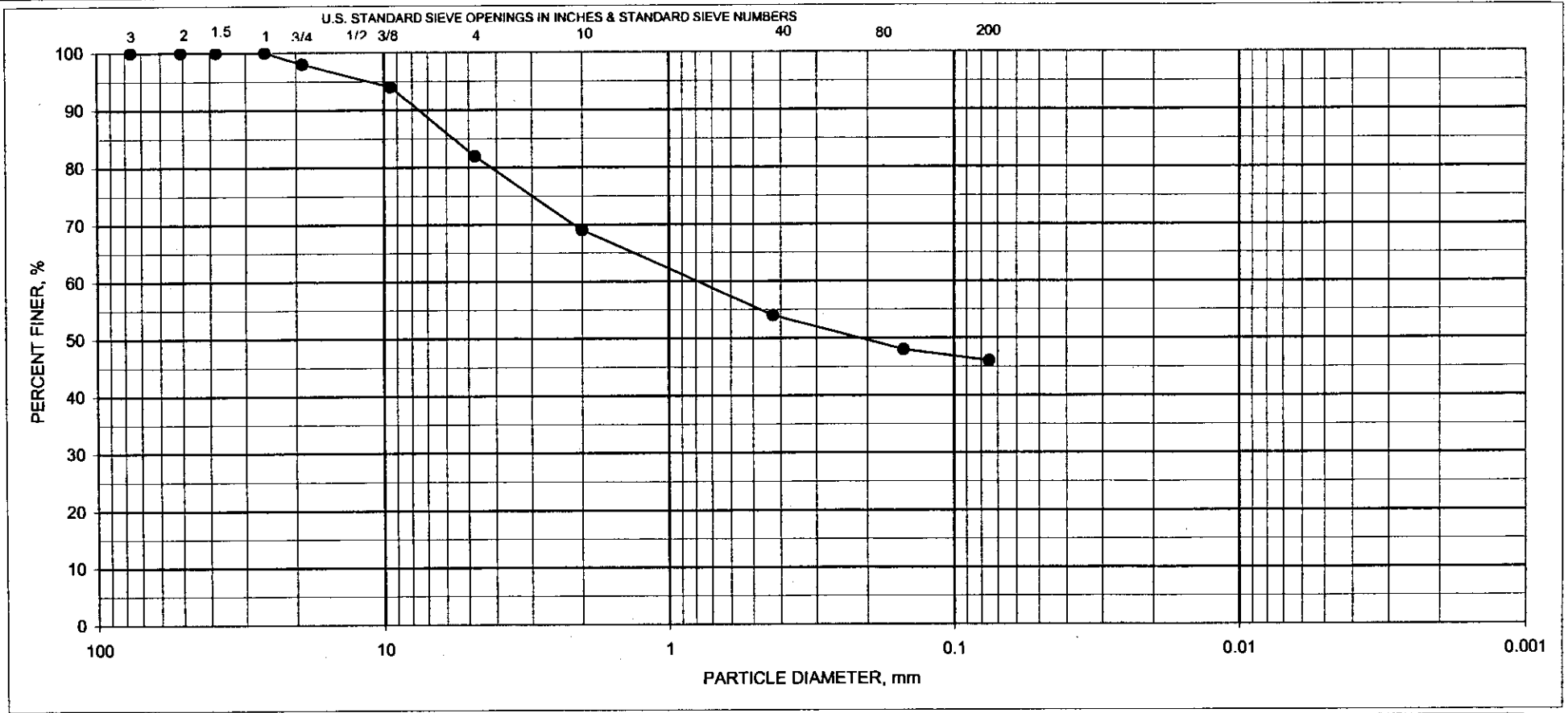
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-227	Bulk	0 to 20 feet	Clayey Sand with Gravel	SC	9.3	28	20	8

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

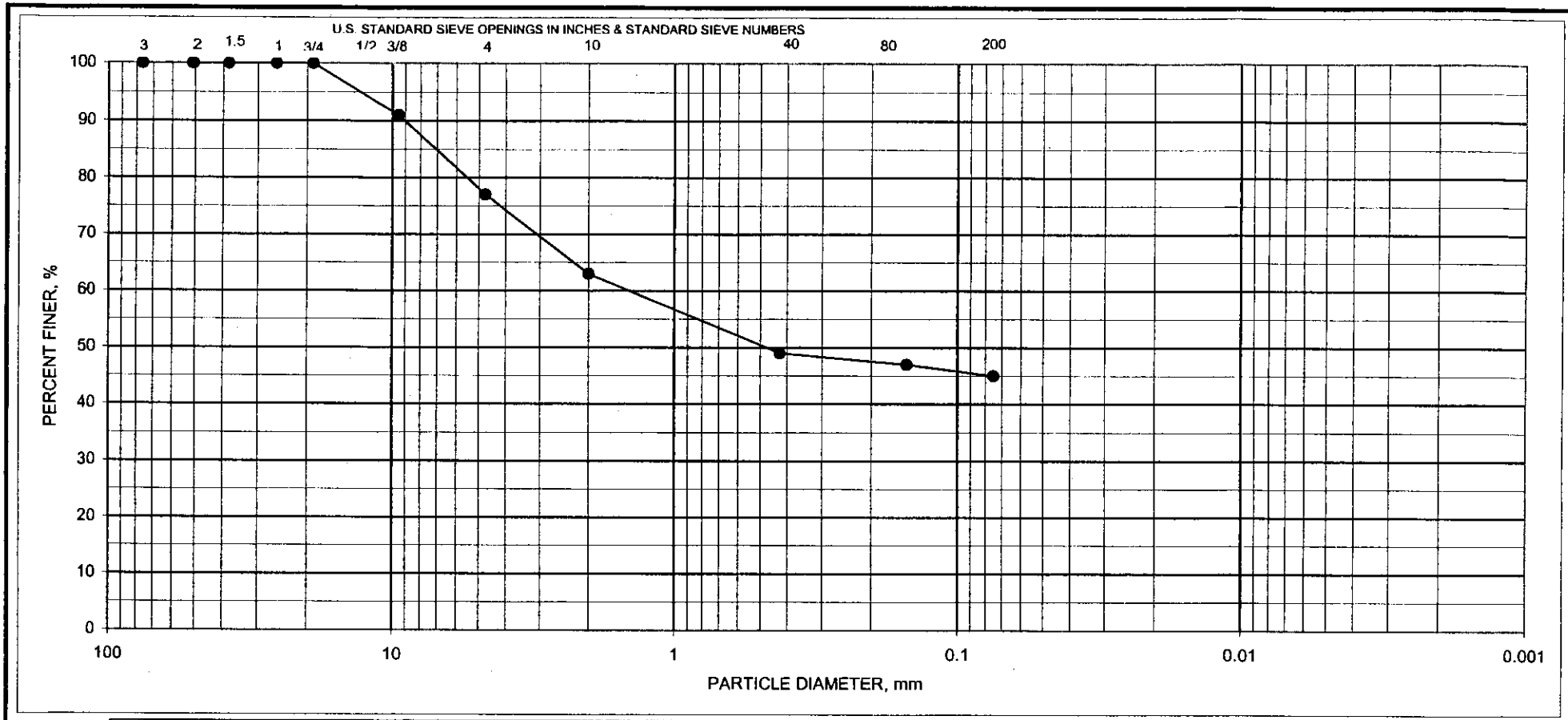
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-245	Bulk	0 to 20 feet	Clayey Sand with Gravel	SC	12.6	33	22	11

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

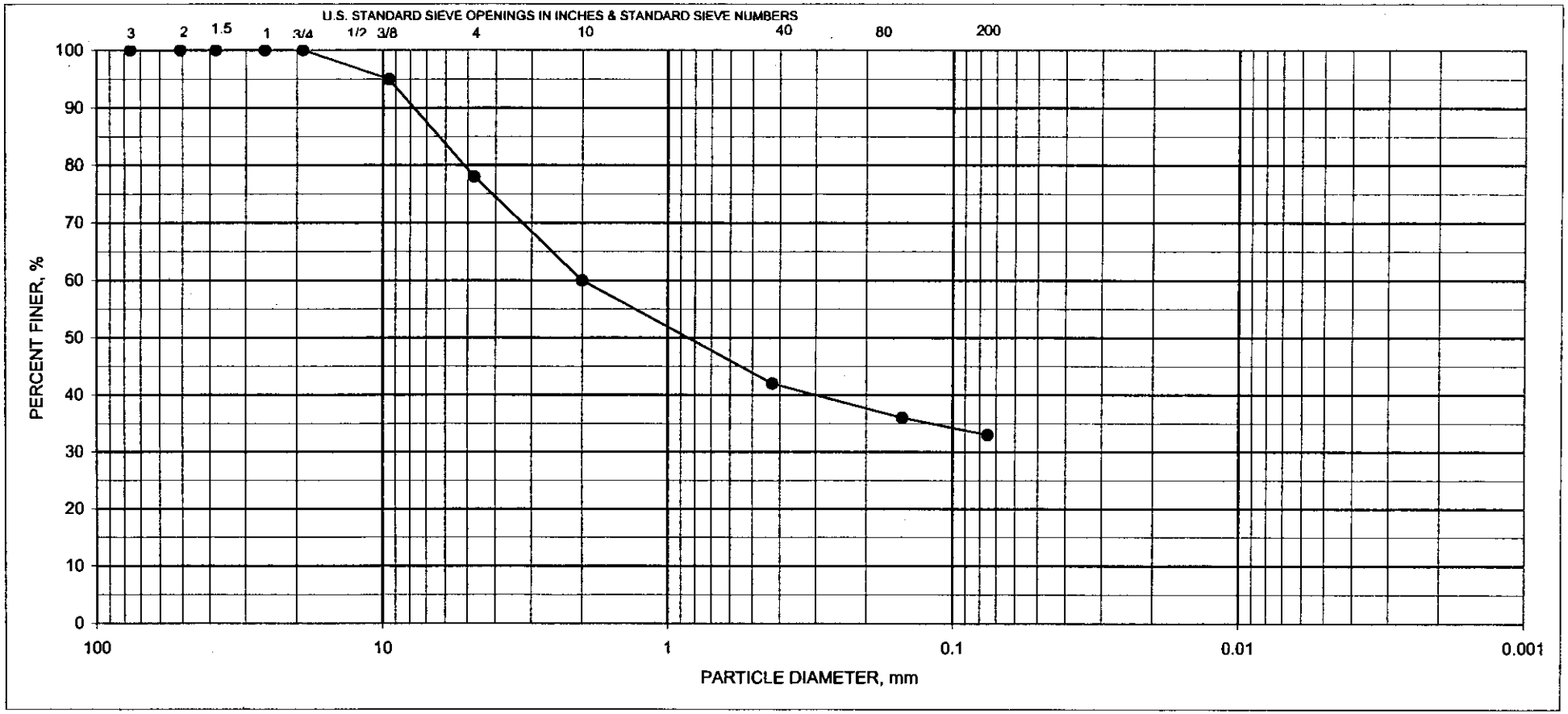
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-263	Bulk	0 to 19 feet	Clayey Sand with Gravel	SC	11.5	29	20	9

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

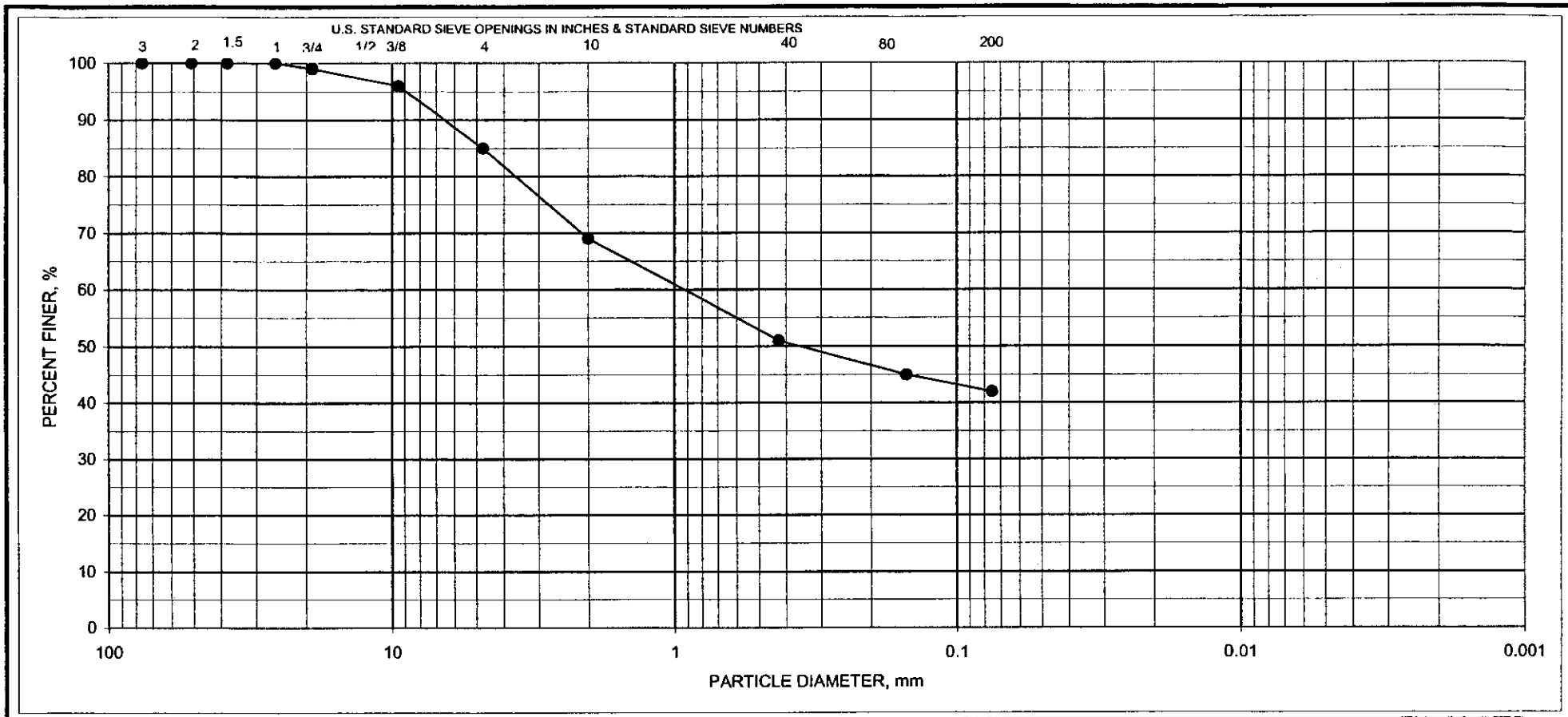
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-266	Bulk	0 to 24 feet	Clayey Sand with Gravel	SC	8.8	31	21	10

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas Stete Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

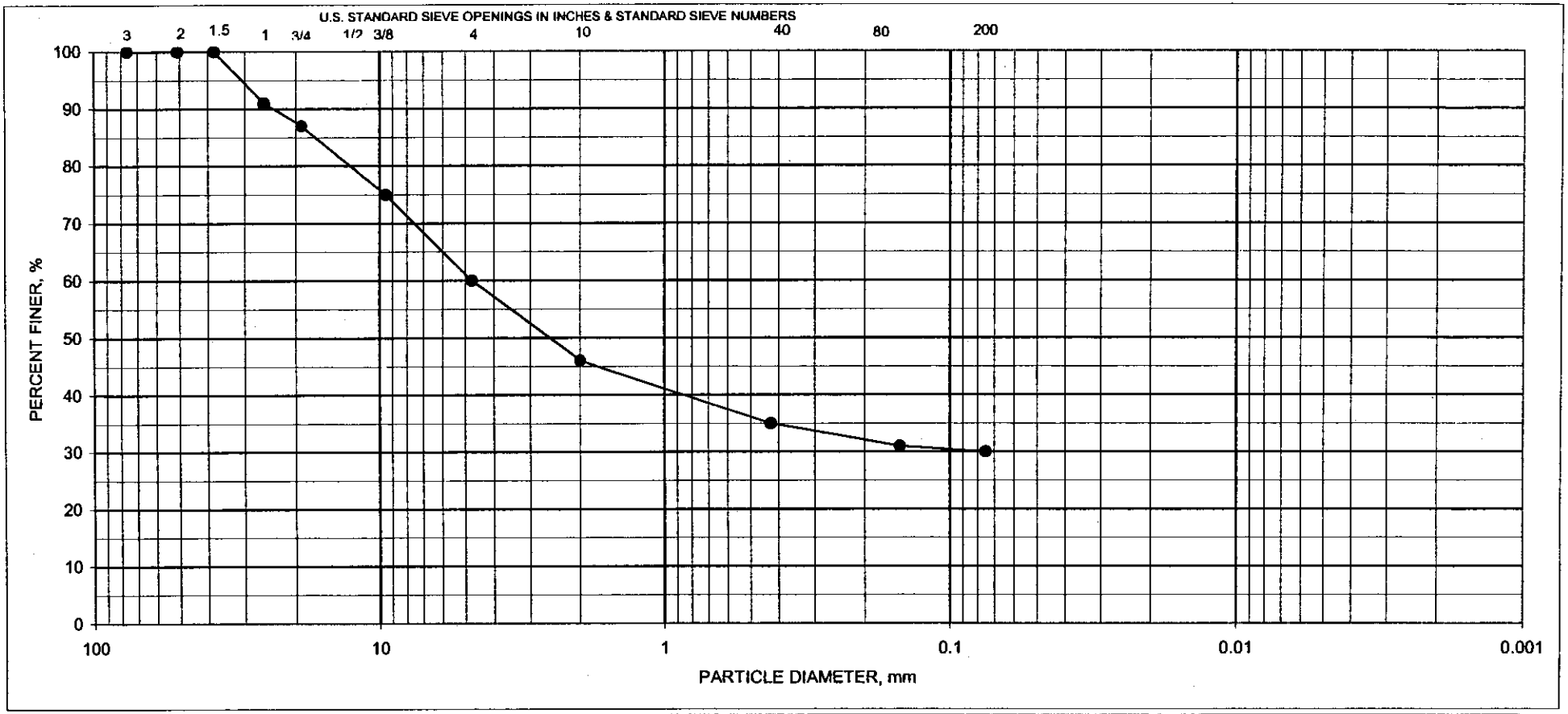
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-272	Bulk	6 to 13.5 feet	Silty Sand with Gravel	SM	10.6	34	26	8

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

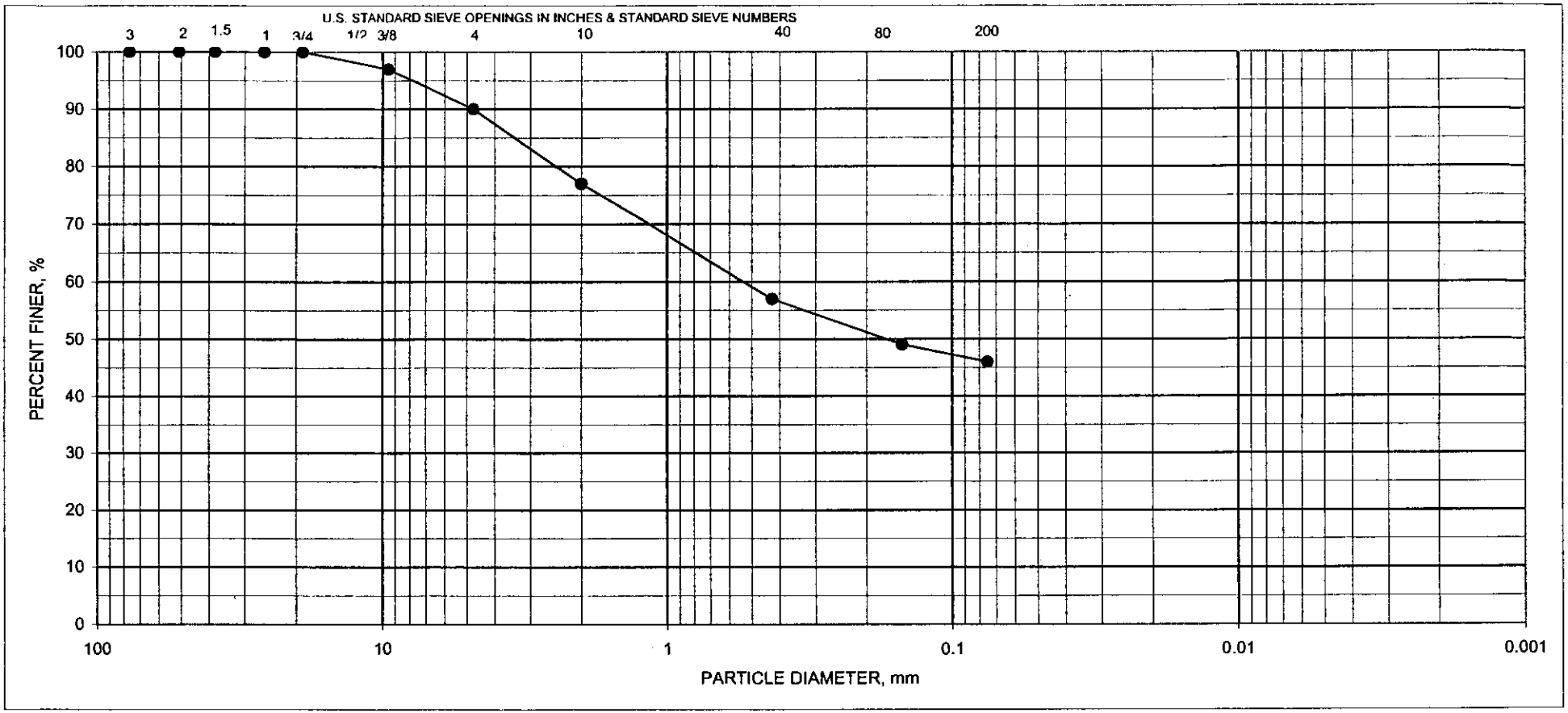
GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-277	Bulk	0 to 12.5 feet	Silty Clayey Gravel with Sand	GC-GM	10.6	22	18	4

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

GRAIN SIZE DISTRIBUTION CURVE

BORING NO.	SAMPLE NO.	DEPTH, feet	ASTM DESCRIPTION	UNIFIED SYMBOL	NAT. WC, %	ATTERBERG LIMITS LL	PL	PI
MC-284	Bulk	20 to 51 feet	Clayey Sand	SC	14.3	37	20	17

PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri JOB NO. 39025019M DATE April 2003

Terracon

10.3 Standard Compaction Results

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-3 5 to 16.3 feet
Sample Description:

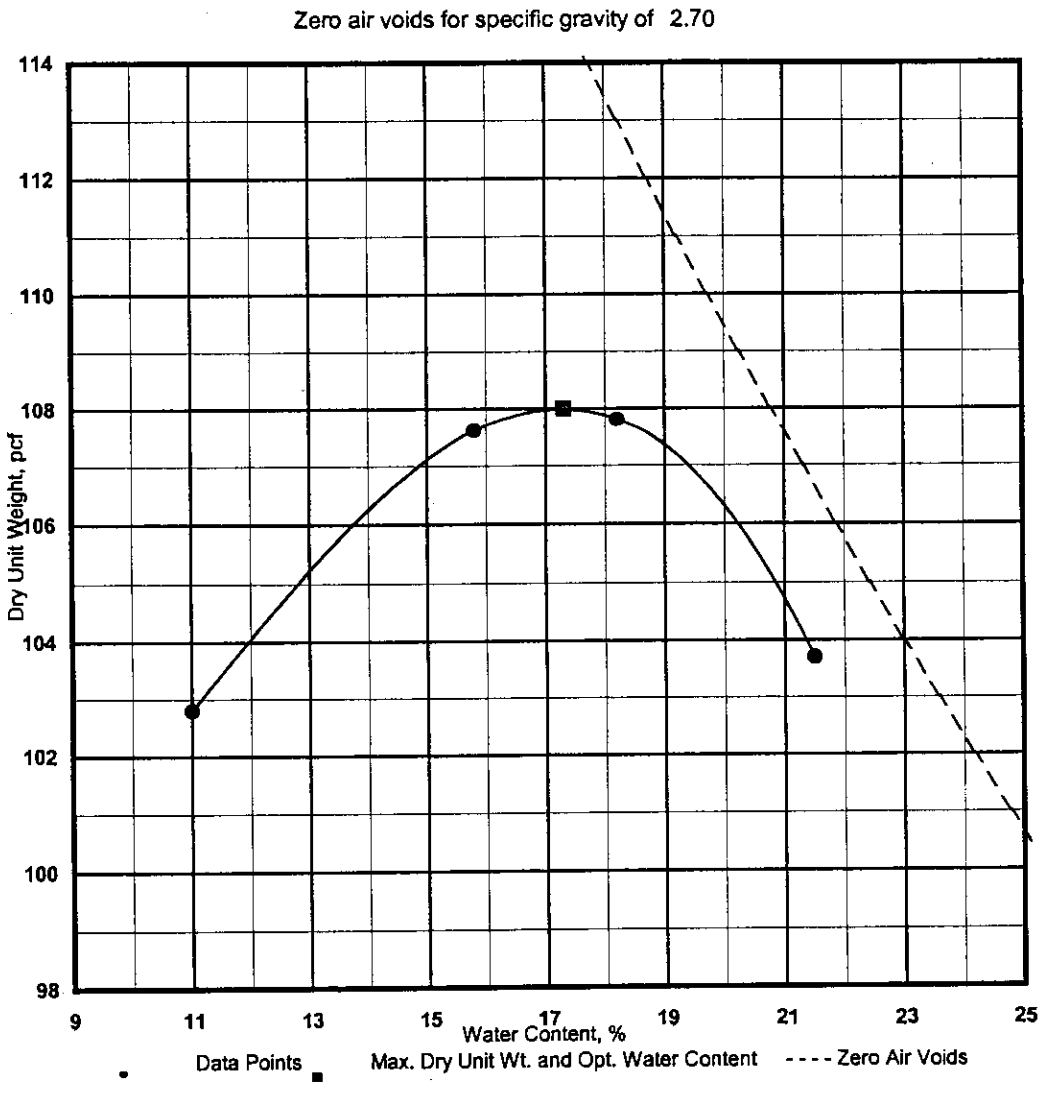
Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 108.0 pcf
Optimum Water Content: 17.3 %

Liquid Limit: 29 Plastic Limit: 20
Plasticity Index: 9
% passing # 200 sieve: 31

Reviewed by: SPB



399

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-33 0 to 5.5 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

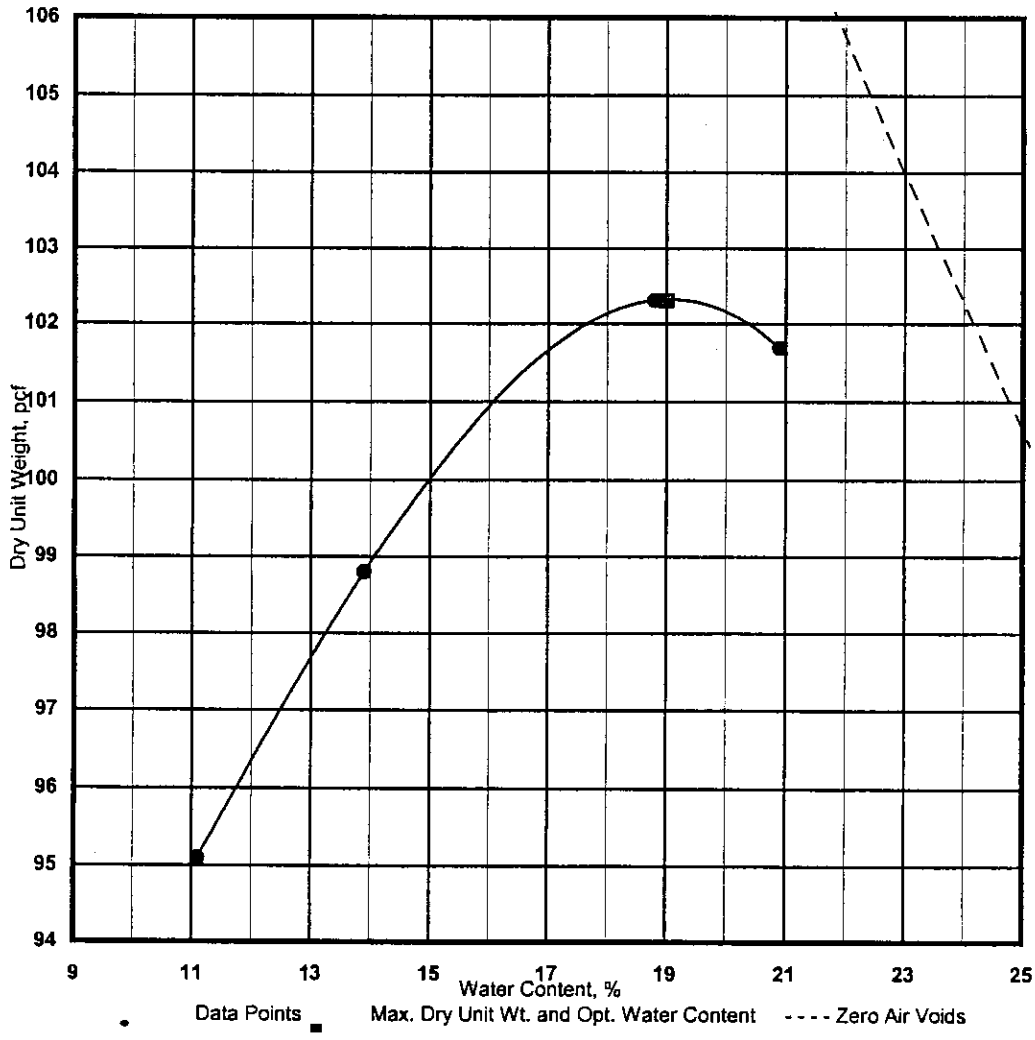
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 102.3 pcf
Optimum Water Content: 19.0 %

Liquid Limit: 38 Plastic Limit: 21
Plasticity Index: 17
% passing # 200 sieve: 24

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-39 2 to 35 feet
Sample Description:

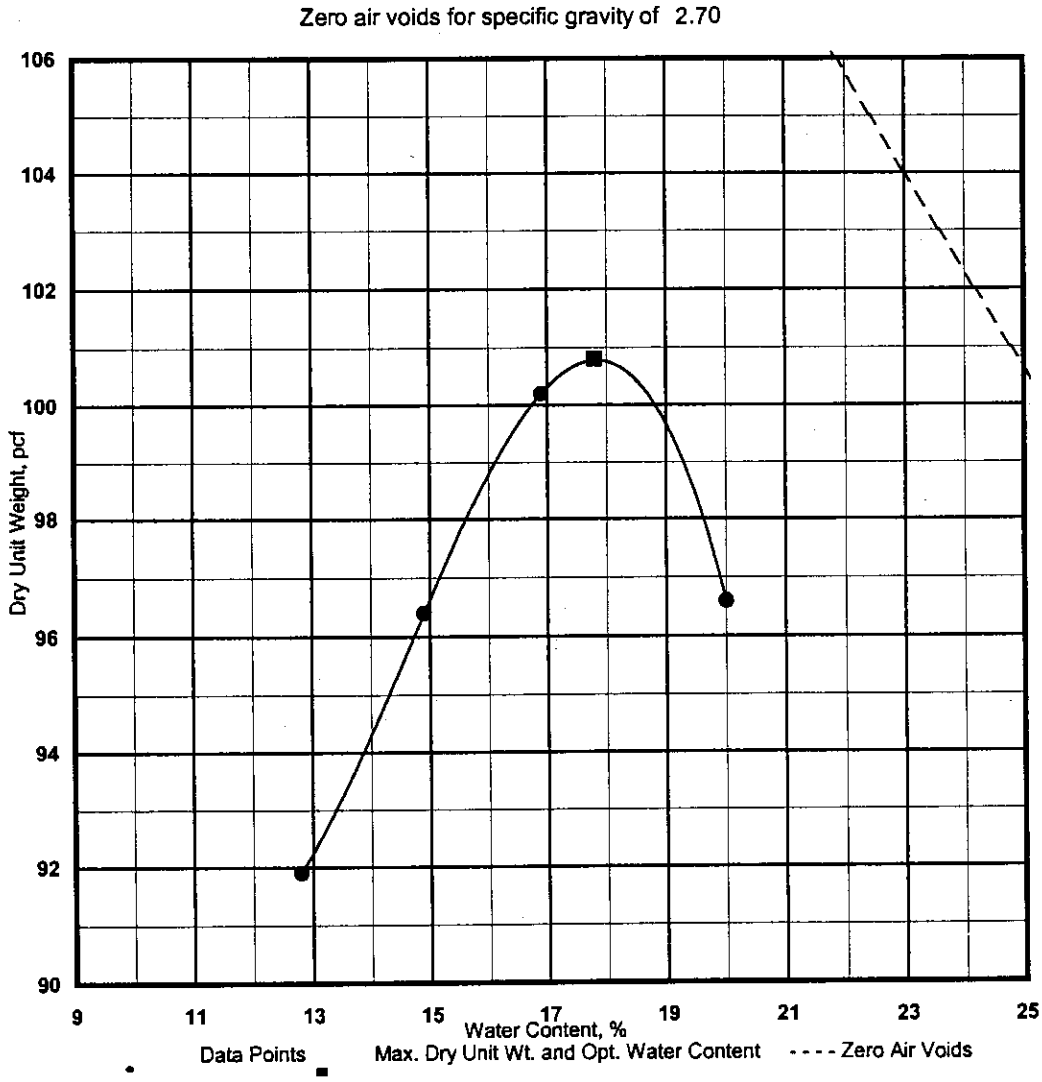
Material Designation: Sample date:
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 100.8 pcf
Optimum Water Content: 17.8 %

Liquid Limit: 30 Plastic Limit: 20
Plasticity Index: 10
% passing # 200 sieve: 38

Reviewed by: SPB



401

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-88 3.0 to 20.0 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

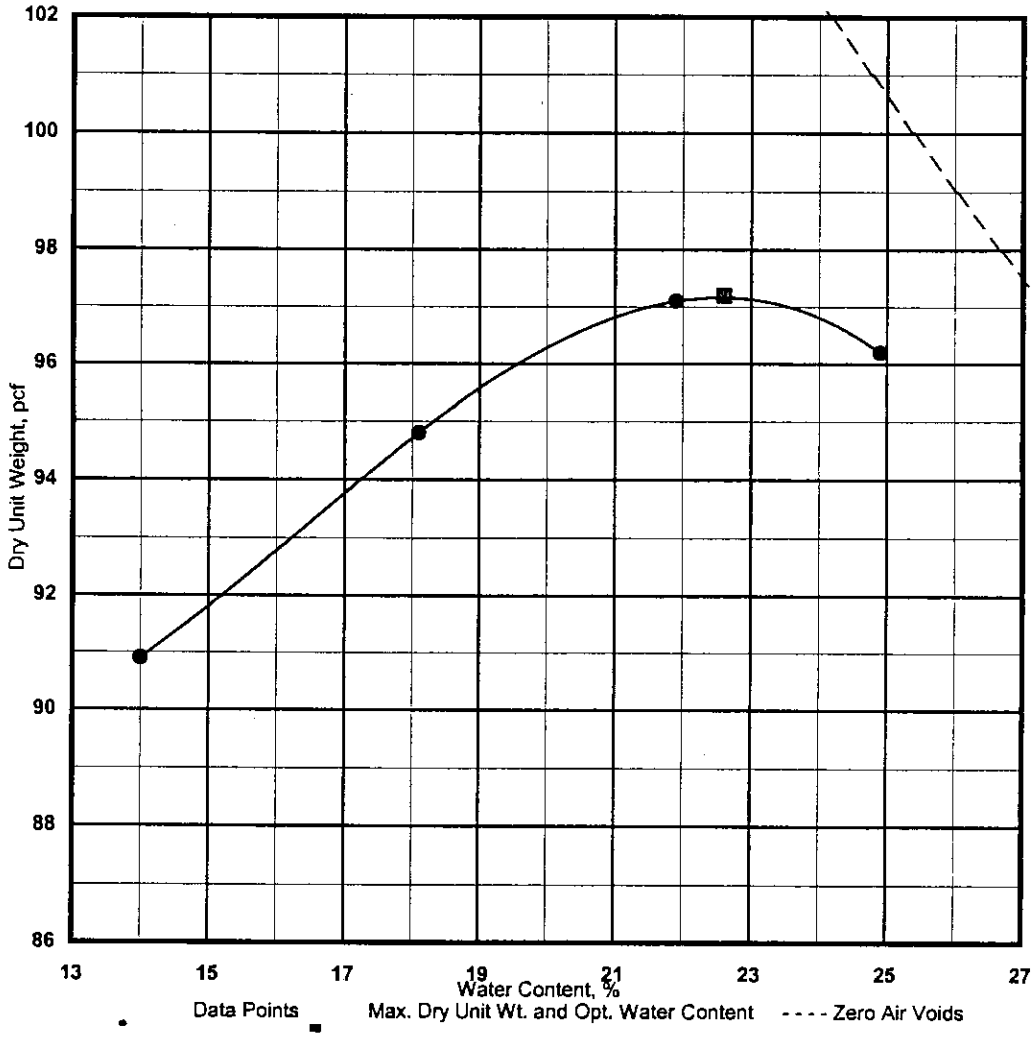
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 97.2 pcf
Optimum Water Content: 22.6 %

Liquid Limit: 27 Plastic Limit: 22
Plasticity Index: 5
% passing # 200 sieve: 41

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-125 1 to 25 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

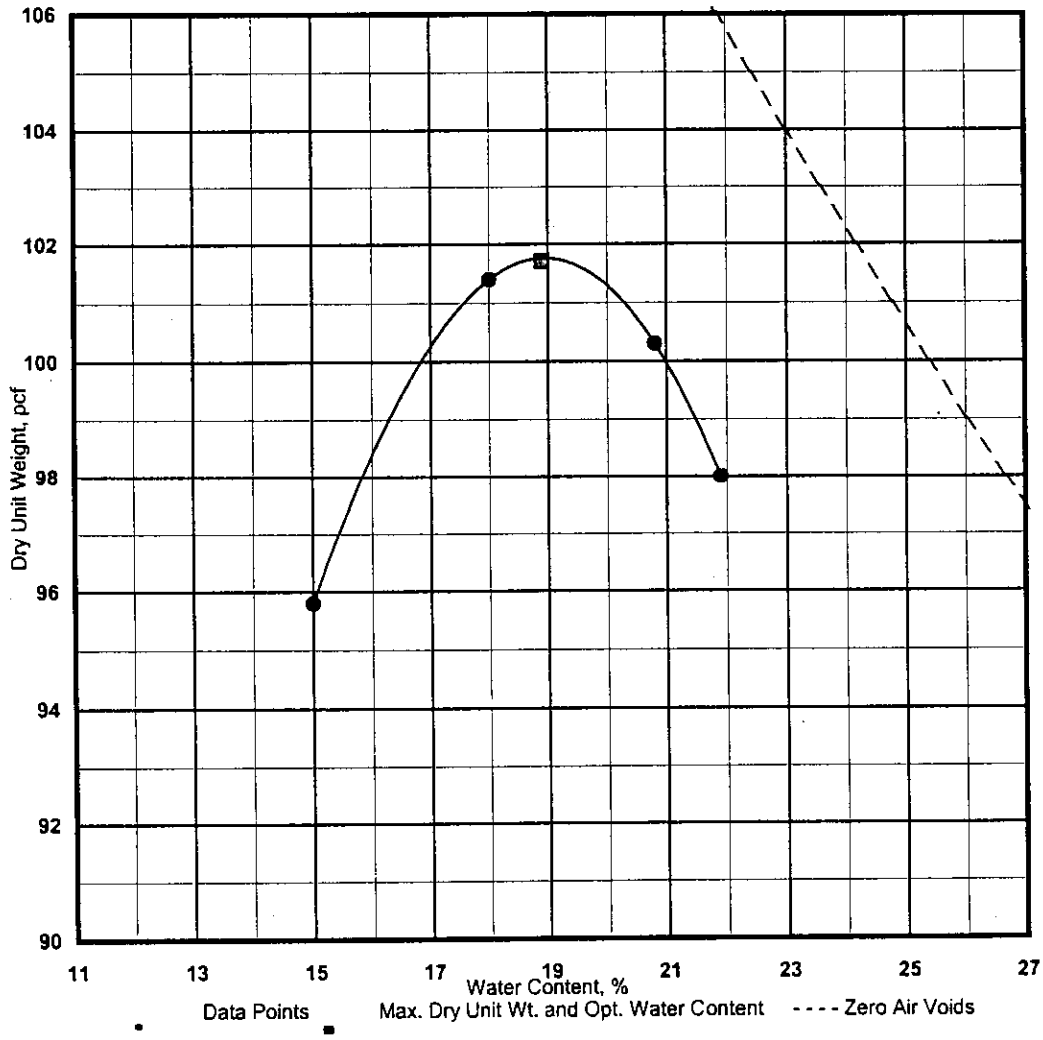
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 101.7 pcf
Optimum Water Content: 18.9 %

Liquid Limit: 48 Plastic Limit: 25
Plasticity Index: 23
% passing # 200 sieve: 53

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



403

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-153 4 to 30 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

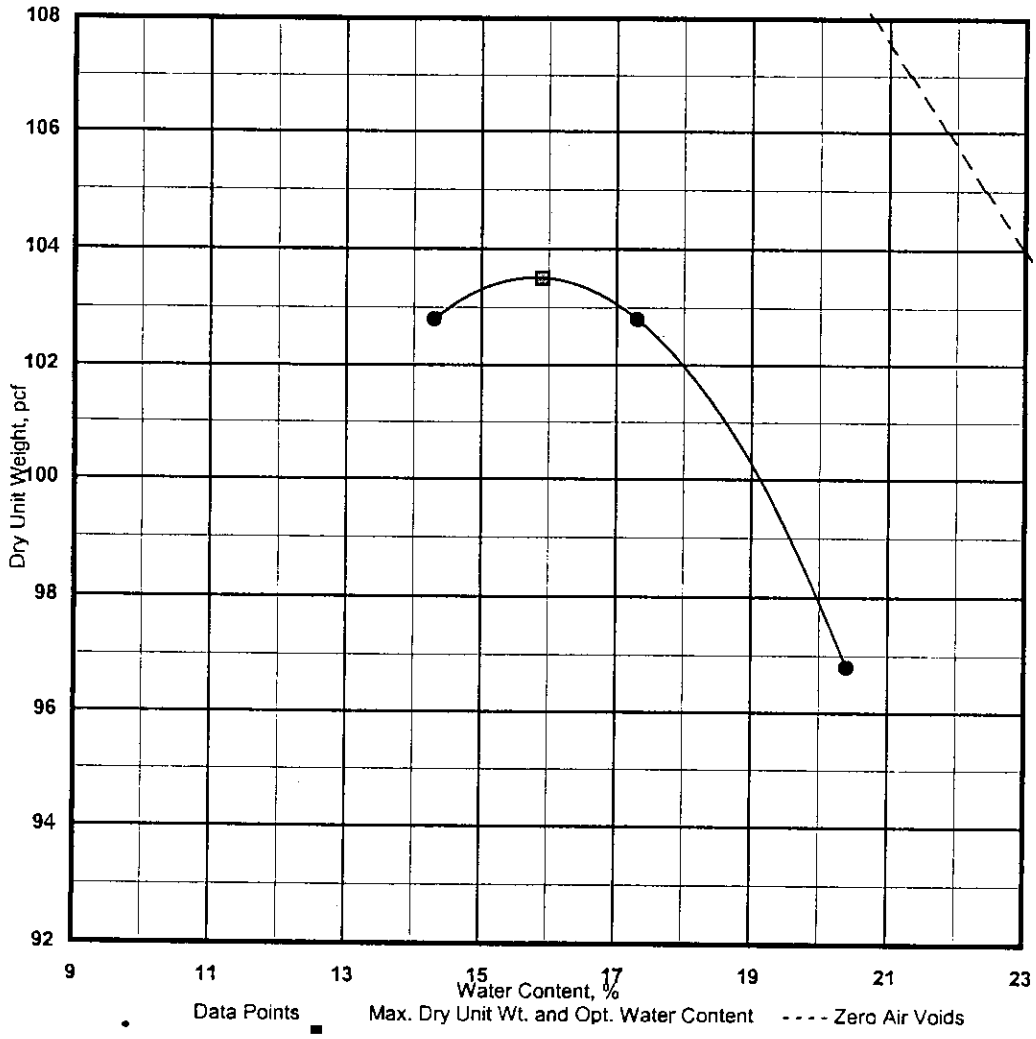
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 103.5 pcf
Optimum Water Content: 15.9 %

Liquid Limit: 49 Plastic Limit: 22
Plasticity Index: 27
% passing # 200 sieve: 69

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-164 1.0 to 32.0 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

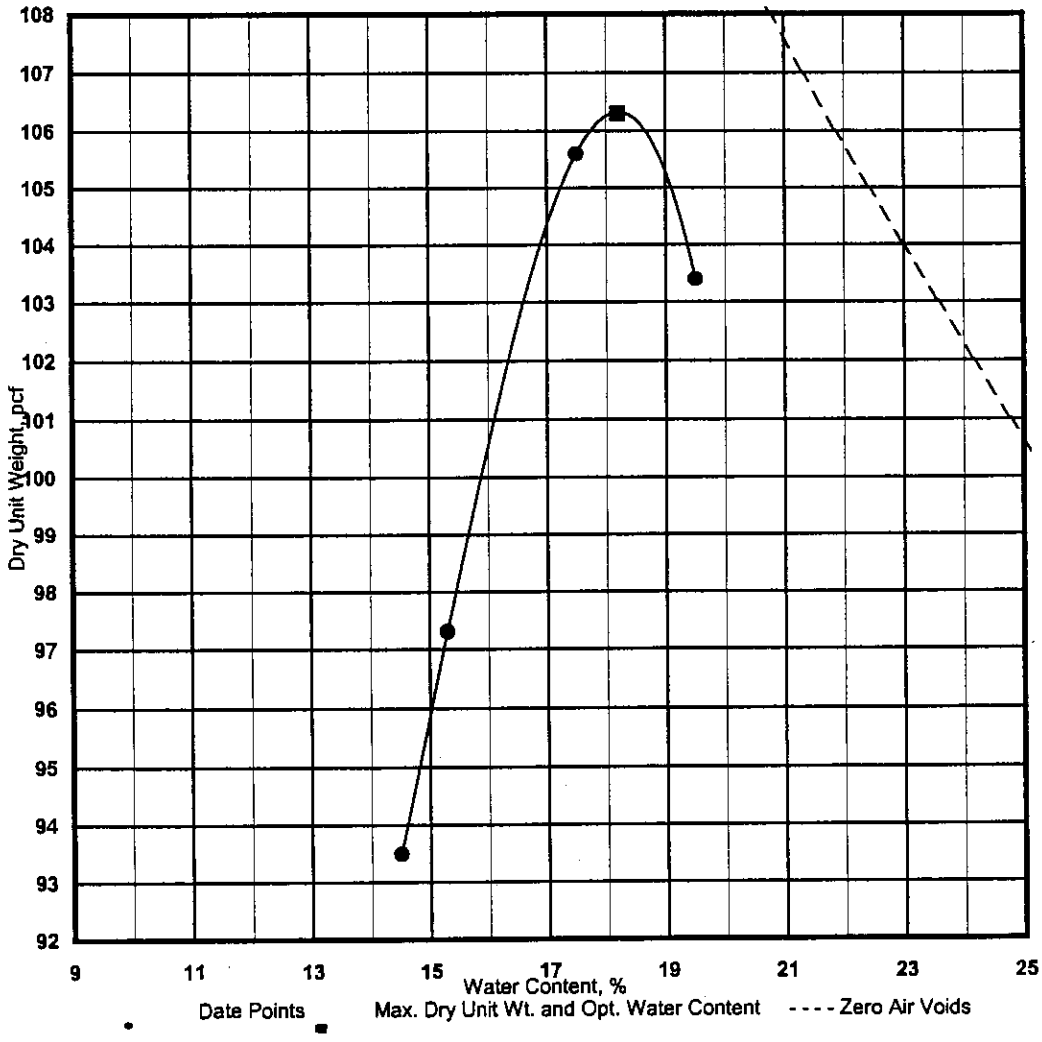
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 106.3 pcf
Optimum Water Content: 18.2 %

Liquid Limit: 56 Plastic Limit: 19
Plasticity Index: 37
% passing # 200 sieve: 74

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



405

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-177 0 to 13.0 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: AASHTO T99
Rammer: ___ Mechanical X Manual

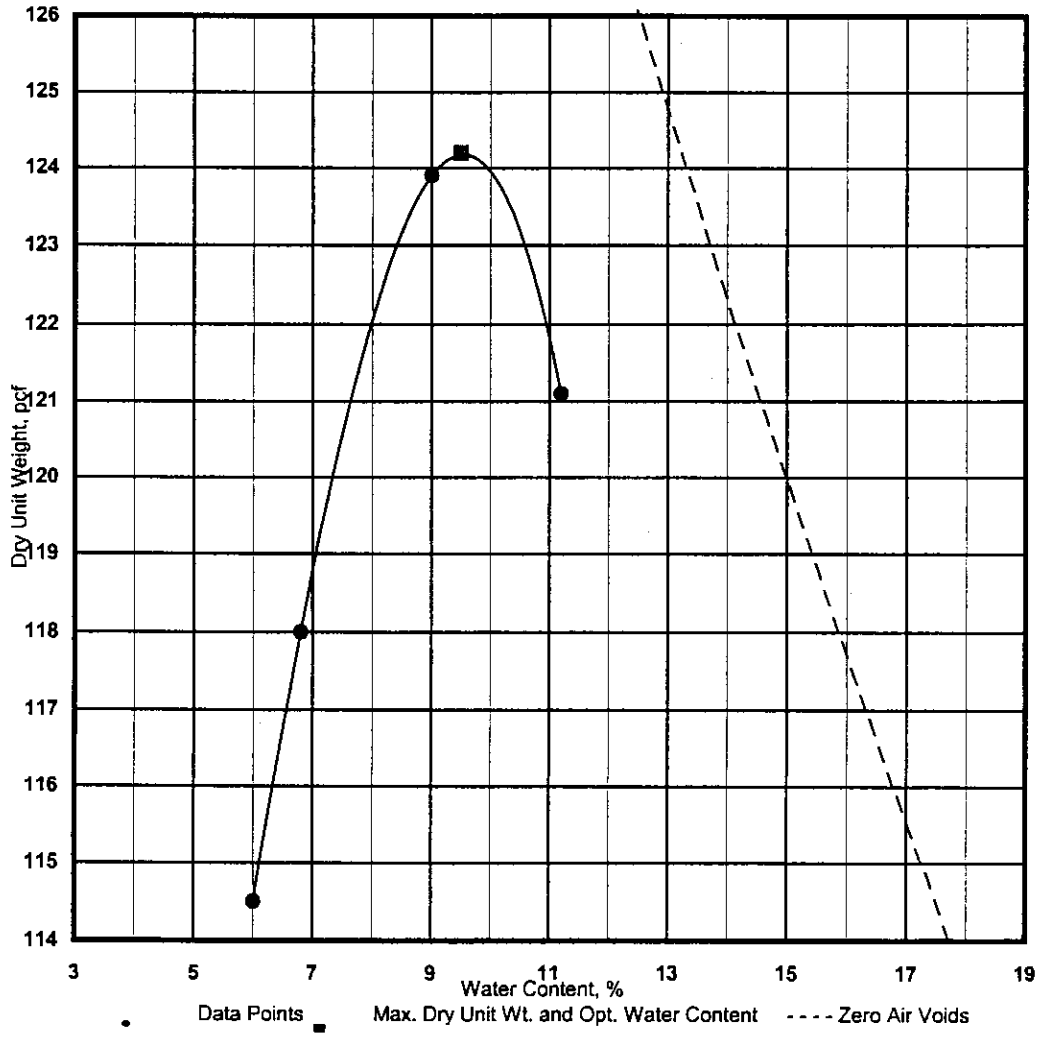
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 124.2 pcf
Optimum Water Content: 9.5 %

Liquid Limit: 20 Plastic Limit: 17
Plasticity Index: 3
% passing # 200 sieve: 16

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



406

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-204 0.5 to 21.5 feet
Sample Description:

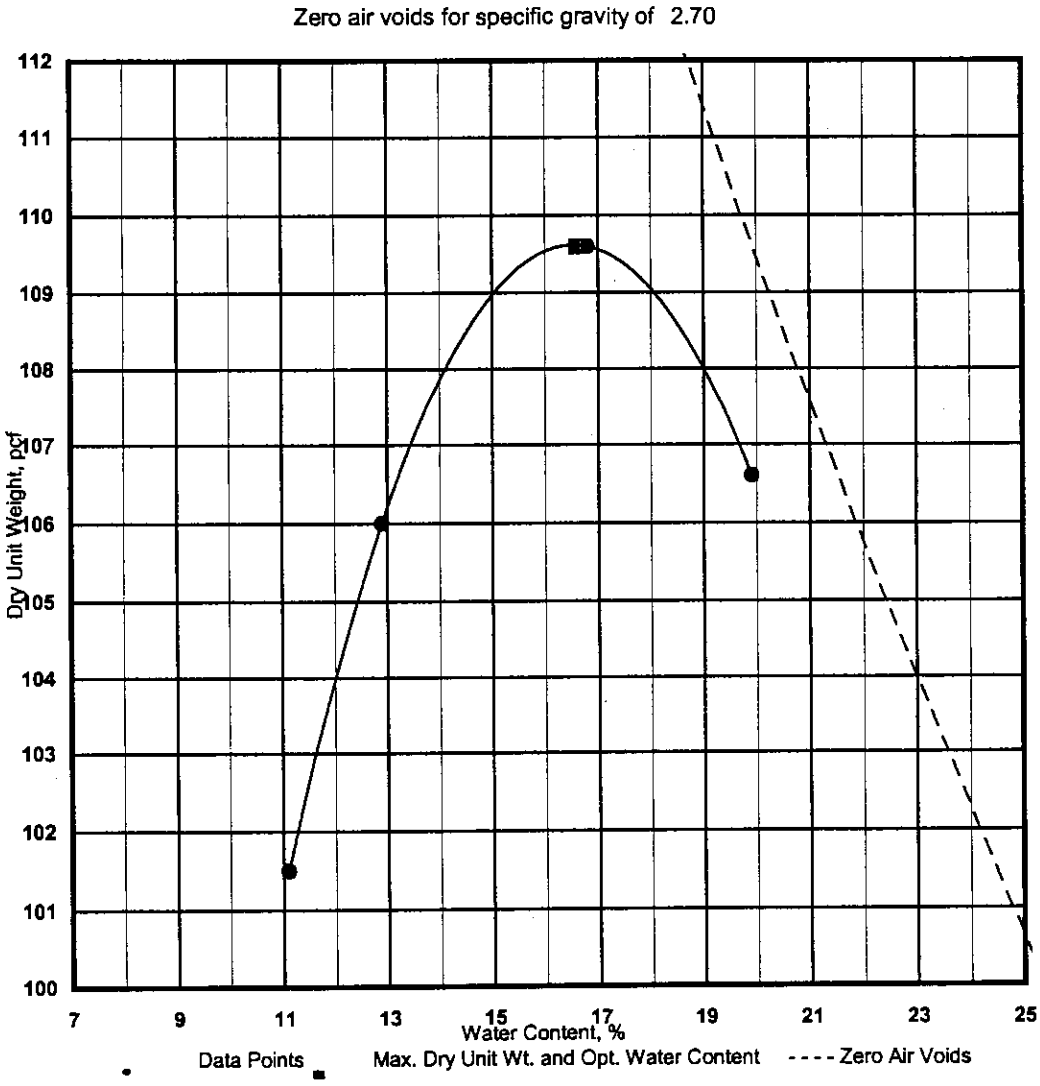
Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method A
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 109.6 pcf
Optimum Water Content: 16.6 %

Liquid Limit: 24 Plastic Limit: 19
Plasticity Index: 5
% passing # 200 sieve: 32

Reviewed by: SPB



407

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-224 0 to 10.0 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

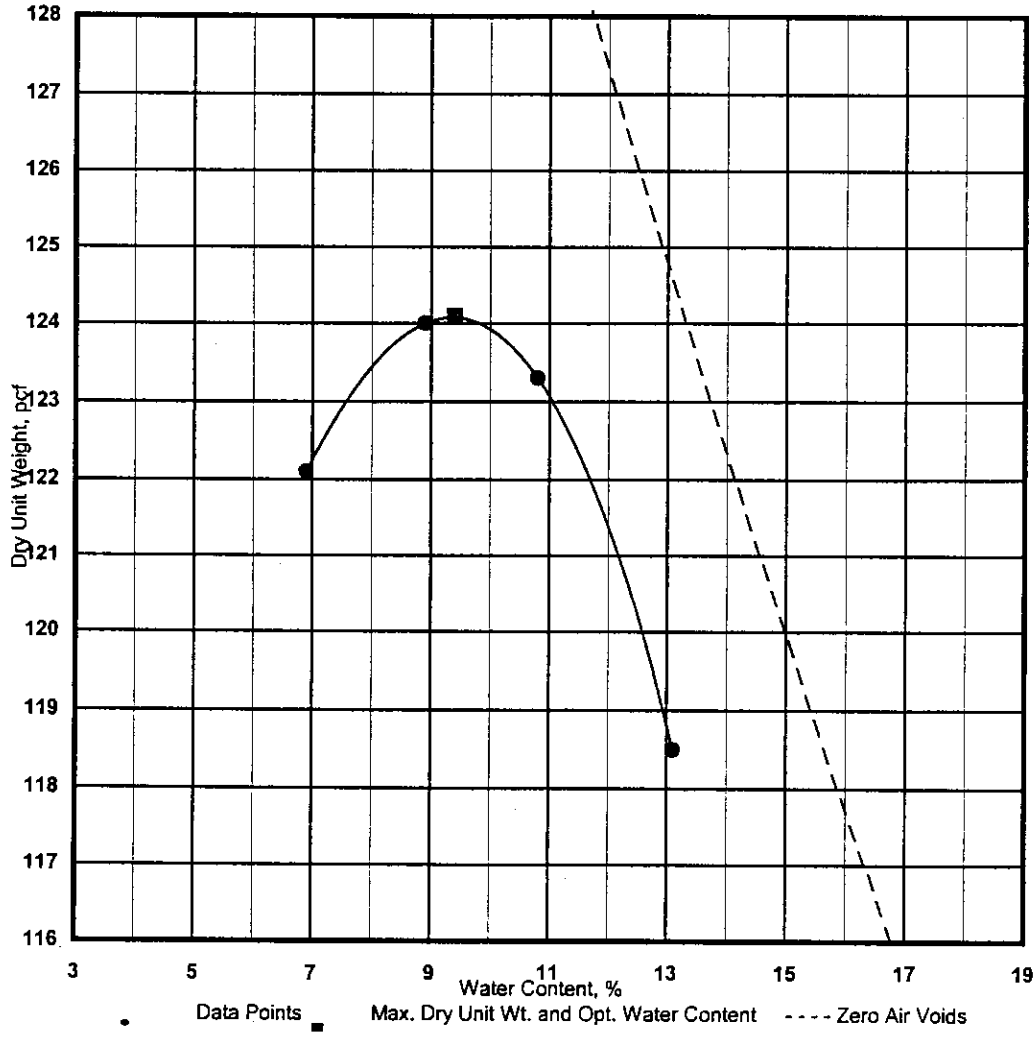
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 124.1 pcf
Optimum Water Content: 9.4 %

Liquid Limit: 29 Plastic Limit: 16
Plasticity Index: 13
% passing # 200 sieve: 30

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-227 0 to 20.0 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method A
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

Project No.: 39025019M Date: April 2003

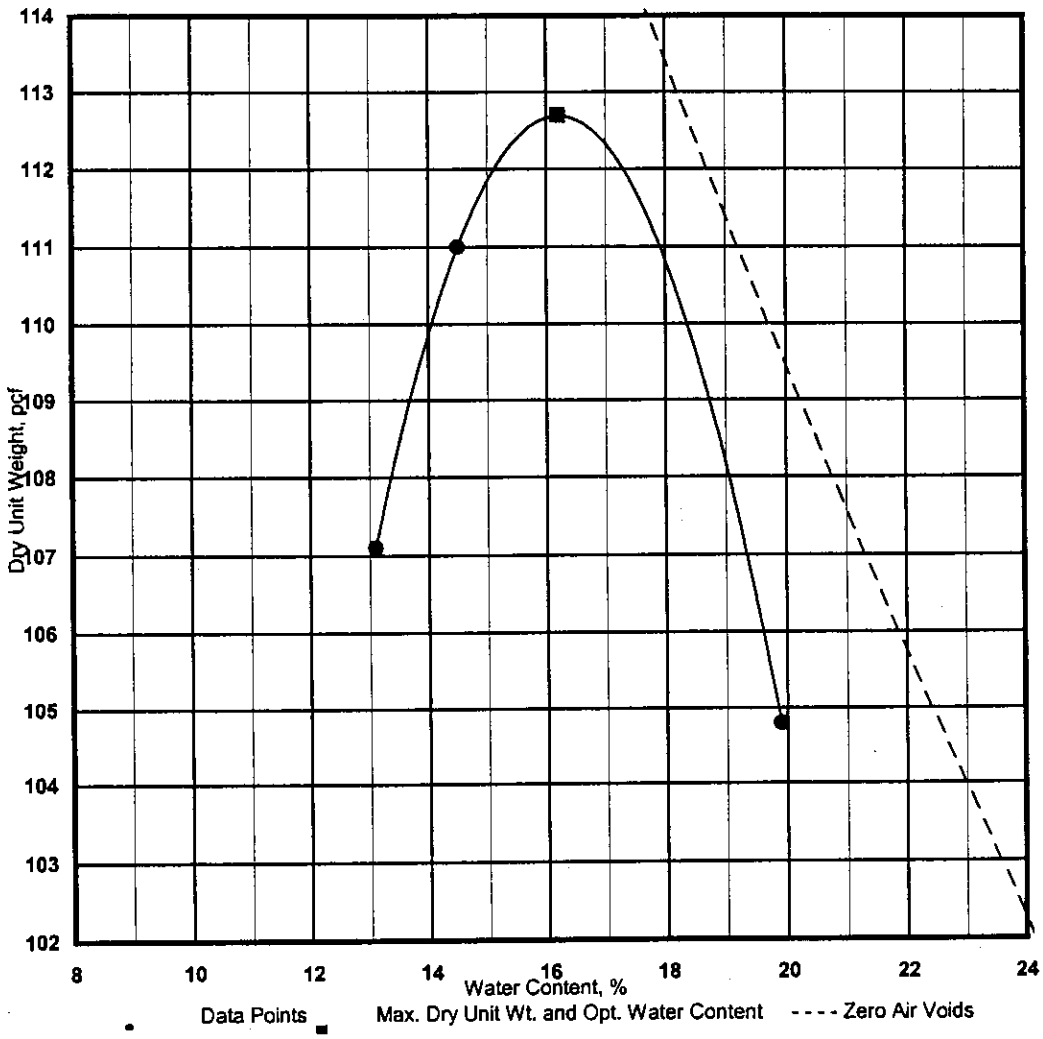
TEST RESULTS

Maximum Dry Unit Wt.: 112.7 pcf
Optimum Water Content: 16.2 %

Liquid Limit: 28 Plastic Limit: 20
Plasticity Index: 8
% passing # 200 sieve: 41

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



409

Terracon

Laboratory Compaction Characteristics of Soil

2201-C S Thompson, #3
Springdale, AR 72764
(479)750-9775

Client Name: HNTB Corporation
Project Name: I 49 - Missouri Project Number J7P0601
Location: Pineville, Missouri to Arkansas State Line
City & State: McDonald County, Missouri

Source Material: MC-272 6.0 to 13.5 feet
Sample Description:

Material Designation: _____ Sample date: _____
Test Method: AASHTO T99
Test Procedure: Method C
Sample Preparation: Wet Preparation
Rammer: ___ Mechanical X Manual

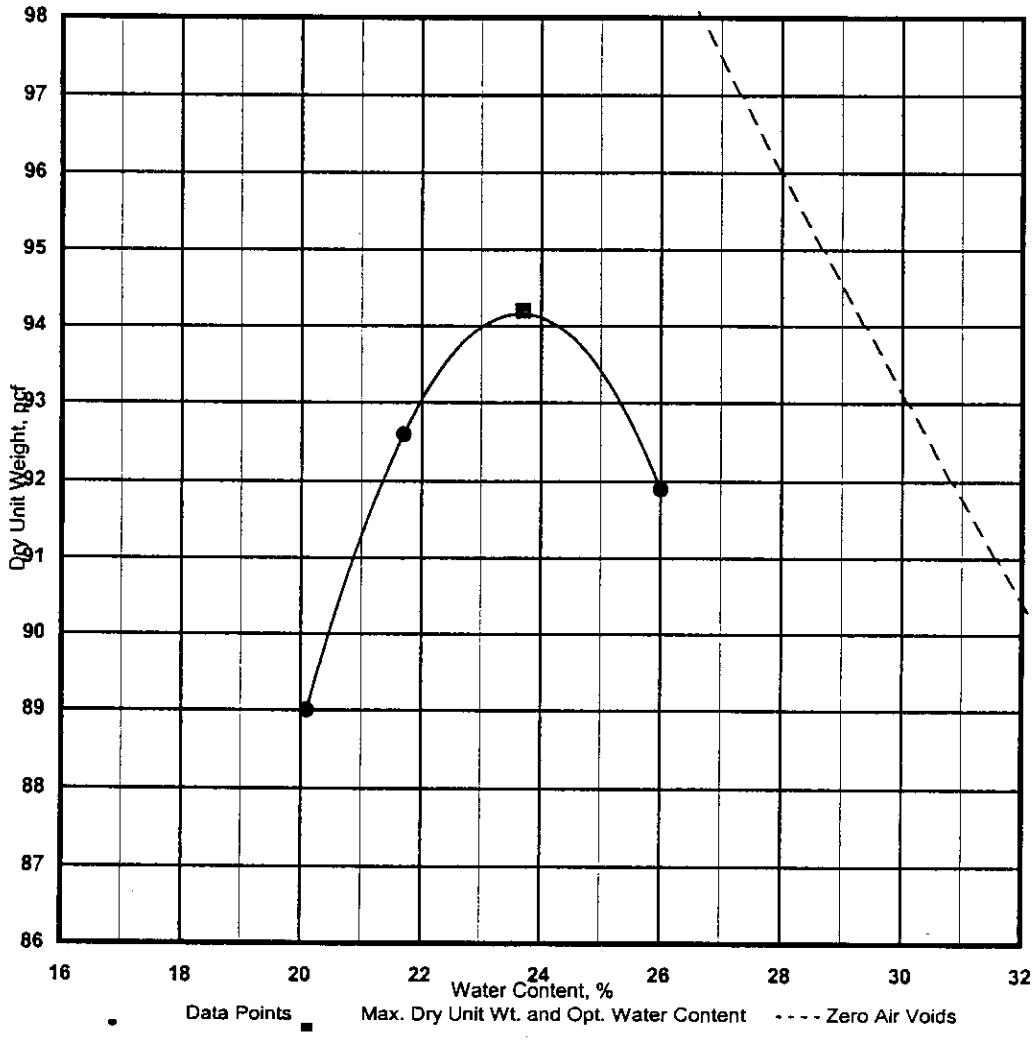
Project No.: 39025019M Date: April 2003

TEST RESULTS
Maximum Dry Unit Wt.: 94.2 pcf
Optimum Water Content: 23.7 %

Liquid Limit: 34 Plastic Limit: 26
Plasticity Index: 8
% passing # 200 sieve: 42

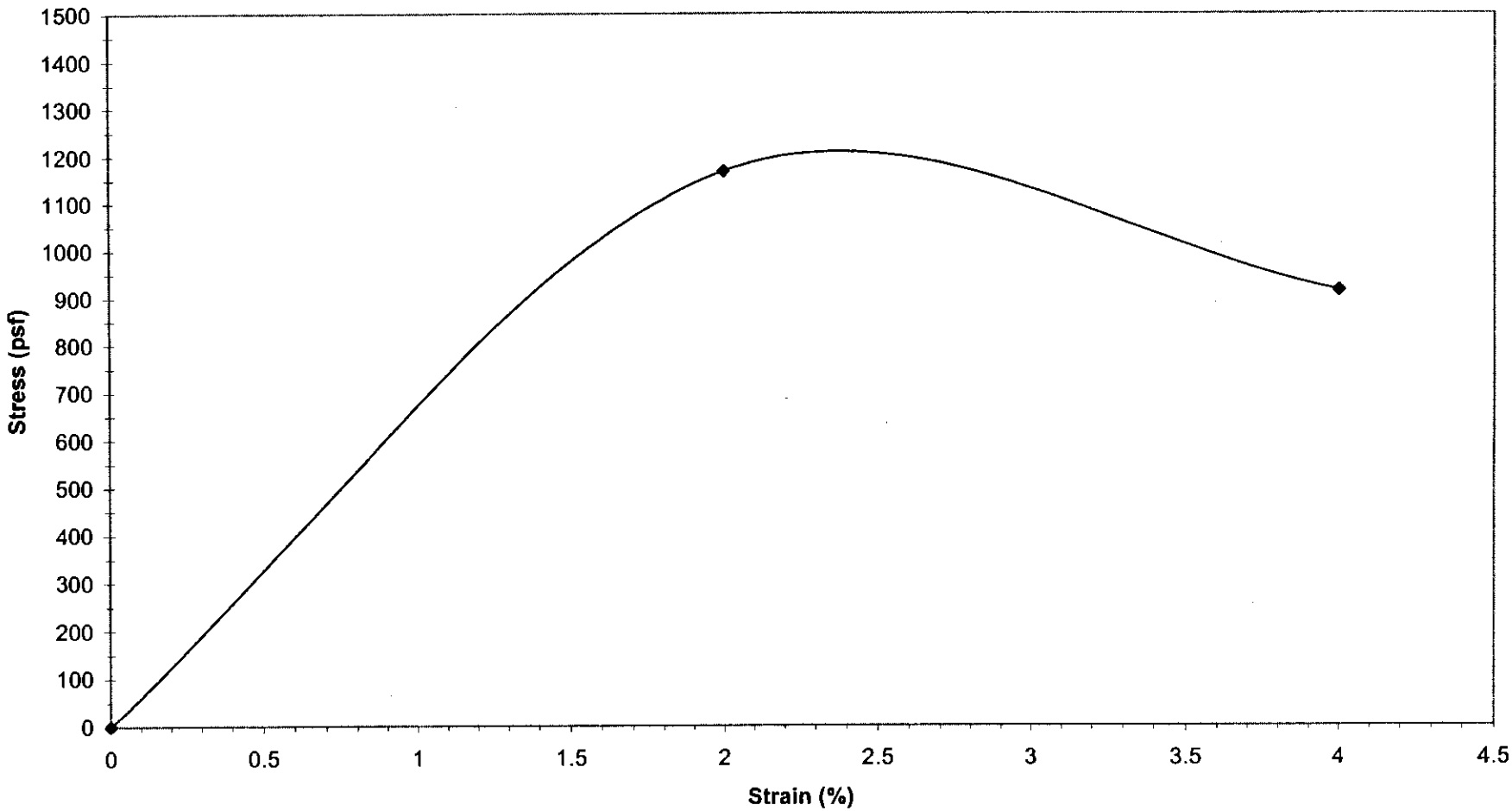
Reviewed by: SPB

Zero air voids for specific gravity of 2.70



10.4 Unconfined Compression Strength Results

Unconfined Compressive Strength of Cohesive Soil
Boring MC-57, Sample ST-2, 5.5 to 6.6 feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



412

Terracon

Dry Unit Weight of Soil

Field Sampled by Shelby Tube

ASTM D-1587
ASTM D-2166

10930 East 56th Street
Tulsa, Oklahoma 74146
(918)250-0461

Job Name: I 49 Missouri Project J7P0601 Project No.: 39025019M Date: January 2003
Pineville, Missouri to Arkansas State Line

Boring MC-57 Sample ST-2 Depth 5.5 to 6.6 feet

Recovery 13" Qp 1.5 tsf Sample Description Sandy Lean Clay, Red Brown

Unit Weight Data

Mold Wt.	1072.4	
Mold + Soil	2104.1	
Mass	1031.7 gms	2.275 = lbs.

Tube Sample Geometry

Do=	2.813	in.	Initial Diameter
Ao=	6.215	sq. in.	Initial Area
Ao=	0.0432	sq. ft.	
Lo=	5.594	in.	Initial Length
Vo=	34.74	cu. In.	Initial Volume
Vo=	0.0201	cu. Ft.	
Lo/Do=	2.0		

Moisture Content

Tare No#	t-6		Tare No#		
Wet Wt + Tare	120.6	g	Wet Wt + Tare		g
Dry Wt + Tare	105.9	g	Dry Wt + Tare		g
Tare Wt.	23.3	g	Tare Wt.		g
Wt of Water	14.7	g	Wt of Water		g
Wt of Dry Soil	82.6	g	Wt of Dry Soil		g
Moisture Content	17.8	%	Moisture Content		%

3" Shelby Tube Sample Proving Ring

Load Dial Reading	Axial Load (lbs.)	Strain	Unit Strain (%)	Corrected Area (sq. ft.)	Stress (PSF)
0	0	0	0	0	0
	51.5	0.112	2	22.7	1169
	41.2	0.224	4	22.2	916
		0.336	6	21.8	0
		0.448	8	21.3	0
		0.559	10	20.9	0
		0.671	12	20.4	0
		0.783	14	19.9	0
		0.895	16	19.5	0
		1.007	18	19.0	0
		1.119	20	18.5	0

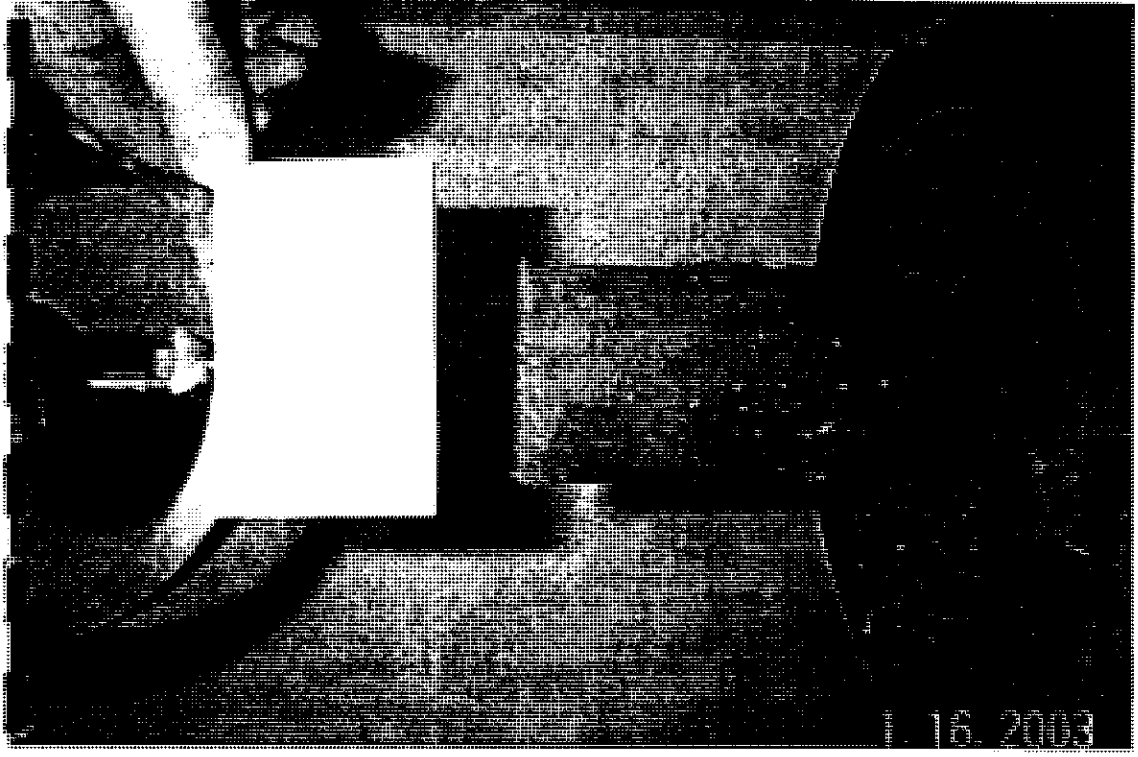
Failure Sketch

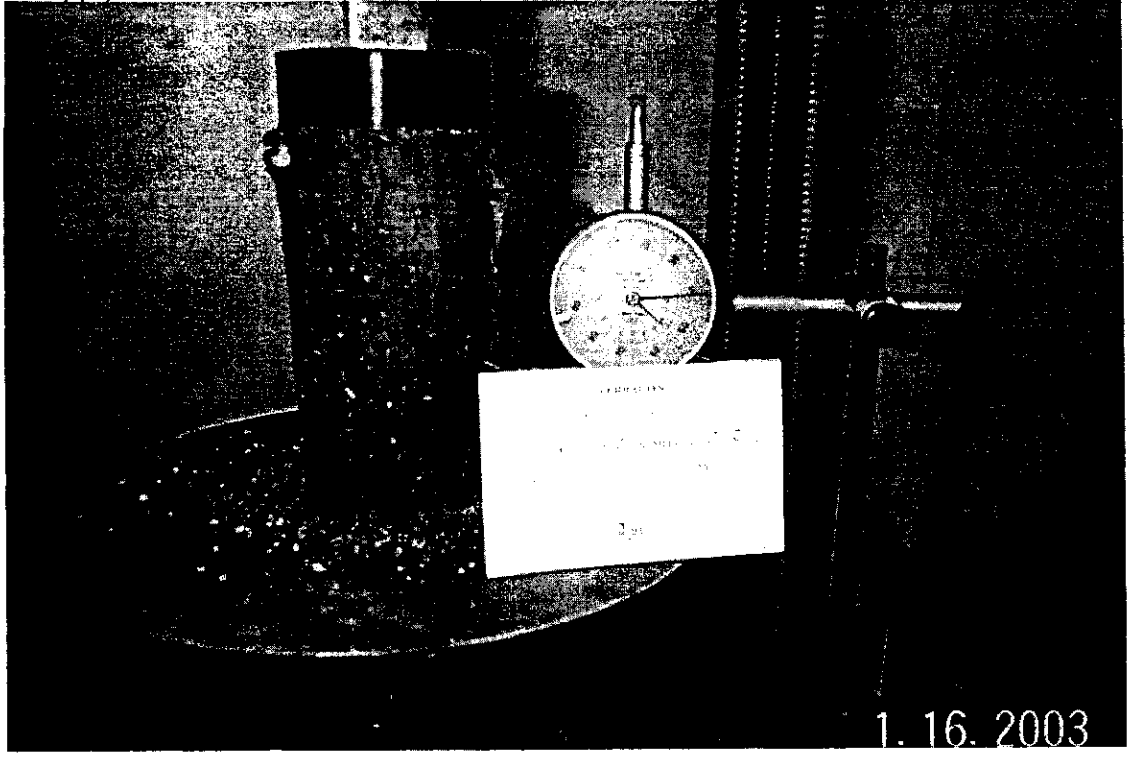
Wet Density 113.2 (pcf)

Dry Density 96.1 (pcf)

qu= 1200 psf

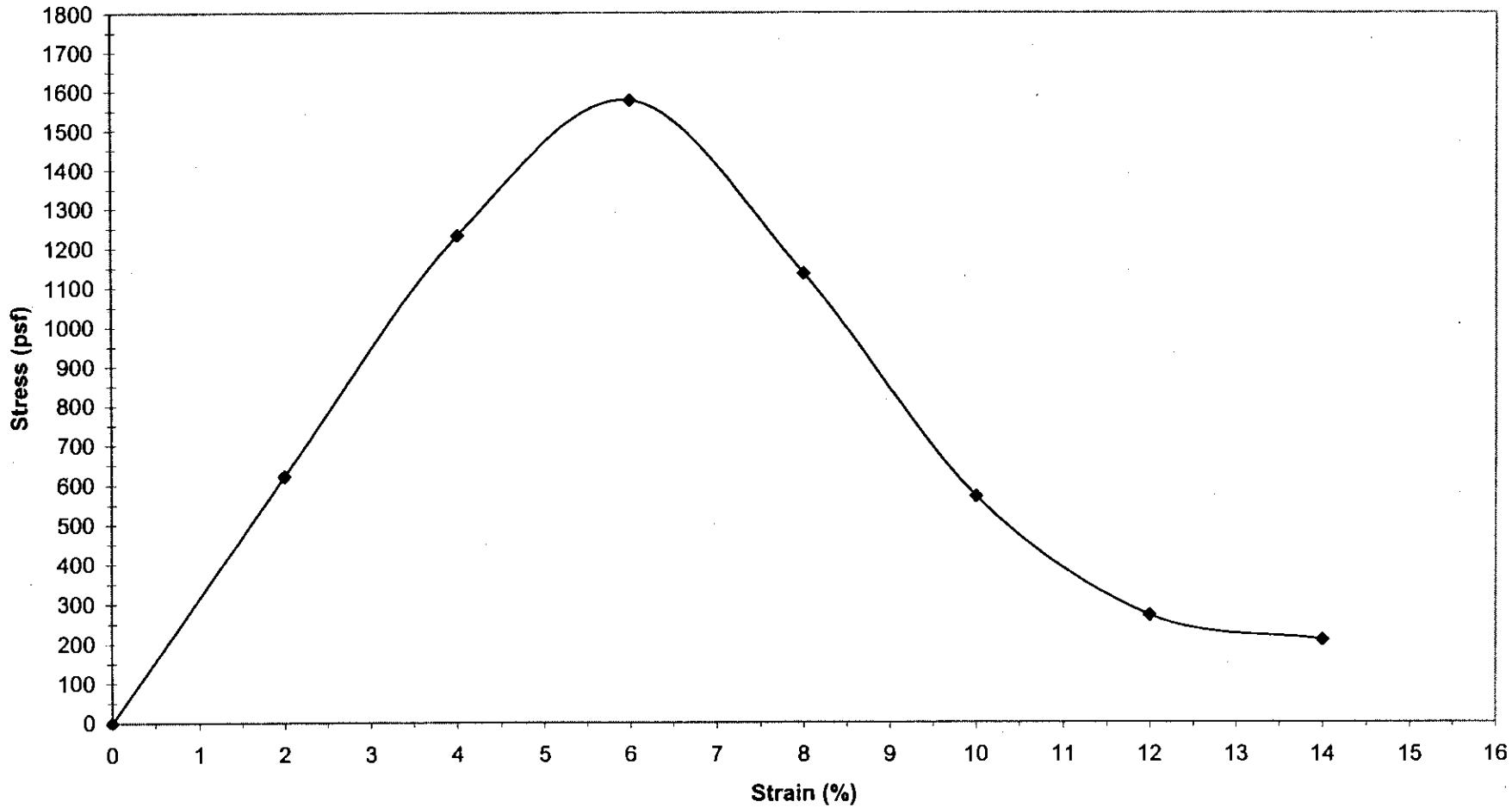
su= 600 psf


16. 2003



414

Unconfined Compressive Strength of Cohesive Soil
Boring MC-125, Sample ST-2a, 6.0 to 6.8 feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



4/16

Terracon

Dry Unit Weight of Soil

Field Sampled by Shelby Tube

ASTM D-1587
ASTM D-2166

10930 East 56th Street
Tulsa, Oklahoma 74146
(918)250-0461

Job Name: I 49 Missouri Project J7P0601 Project No.: 39025019M Date: January 2003
Pineville, Missouri to Arkansas State Line

Boring MC-125 Sample ST-2a Depth 6 to 6.8 feet

Recovery 8" Qp 1.75 tsf Sample Description Lean Clay, trace gravel - Red Brown

Unit Weight Data

Mold Wt.	1072.5	
Mold + Soil	2145.1	
Mass	1072.6	2.365
	gms	= lbs.

Tube Sample Geometry

Do=	2.813	in.	Initial Diameter
Ao=	6.215	sq. in.	Initial Area
Ao=	0.0432	sq. ft.	
Lo=	5.594	in.	Initial Length
Vo=	34.74	cu. In.	Initial Volume
Vo=	0.0201	cu. Ft.	
Lo/Do=	2.0		

Moisture Content

Tare No#	t-72		Tare No#		
Wet Wt + Tare	133.9	g	Wet Wt + Tare		g
Dry Wt + Tare	111.2	g	Dry Wt + Tare		g
Tare Wt.	20.7	g	Tare Wt.		g
Wt of Water	22.7	g	Wt of Water		g
Wt of Dry Soil	90.5	g	Wt of Dry Soil		g
Moisture Content	25.1	%	Moisture Content		%

3" Shelby Tube Sample Proving Ring

Load Dial Reading	Axial Load (lbs.)	Strain	Unit Strain (%)	Corrected Area (sq. ft.)	Stress (PSF)
0	0	0	0	0	0
	27.4	0.112	2	22.7	622
	55.4	0.224	4	22.2	1232
	72.4	0.336	6	21.8	1577
	53.3	0.448	8	21.3	1136
	27.4	0.559	10	20.9	571
	13.3	0.671	12	20.4	271
	10.5	0.783	14	19.9	209
		0.895	16	19.5	0
		1.007	18	19.0	0
		1.119	20	18.5	0

Failure Sketch

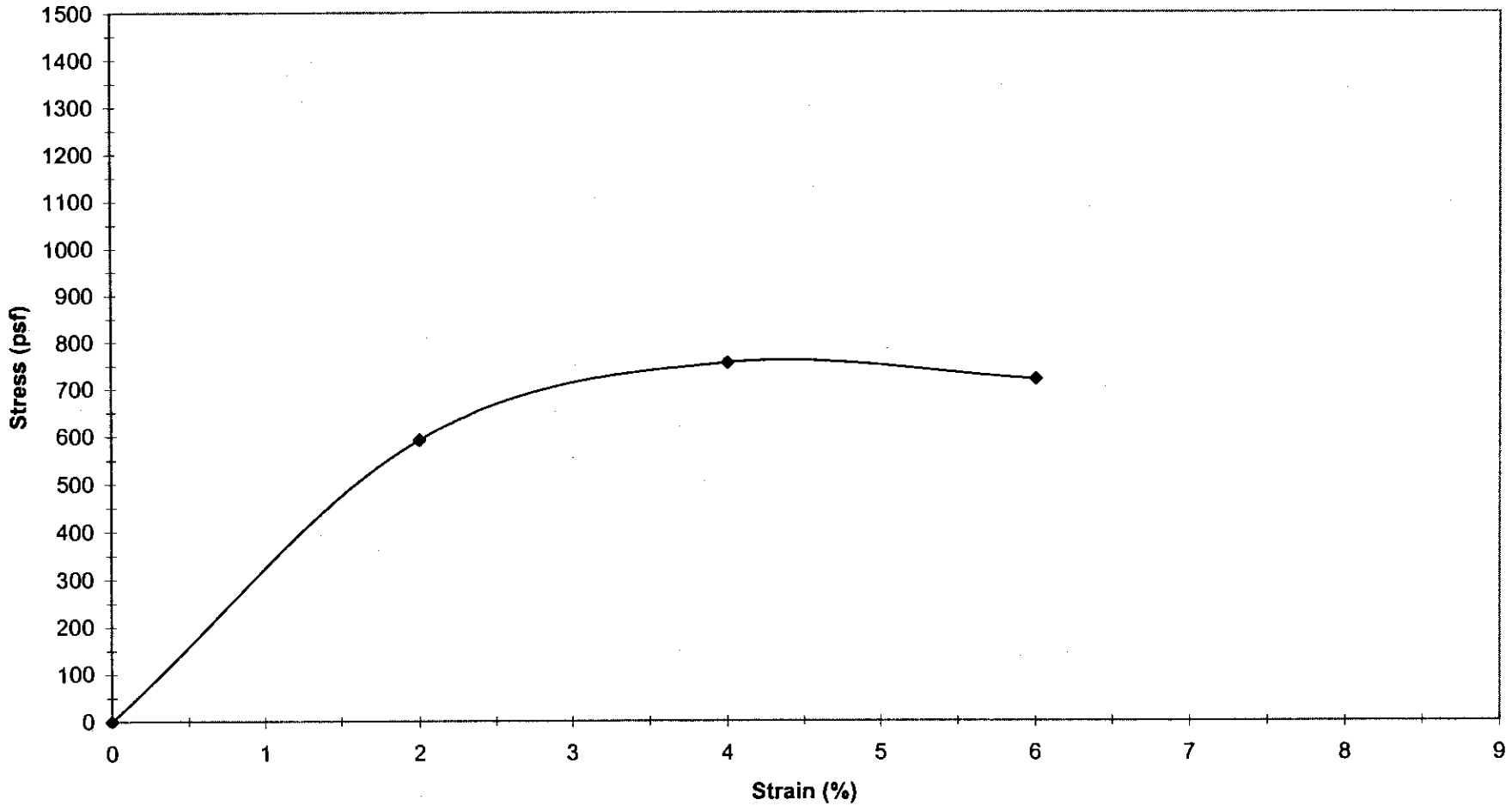
Wet Density 117.6 (pcf)

Dry Density 94.1 (pcf)

qu= 1550 psf

su= 775 psf

Unconfined Compressive Strength of Cohesive Soil
Boring MC-142, Sample ST-3, 8.0 to 9.5 feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



418

Terracon

Dry Unit Weight of Soil

Field Sampled by Shelby Tube

ASTM D-1587
ASTM D-2166

10930 East 56th Street
Tulsa, Oklahoma 74146
(918)250-0461

Job Name: I 49 Missouri Project J7P0601 Project No.: 39025019M Date: April 2003
Pineville, Missouri to Arkansas State Line

Boring MC-142 Sample ST-3 Depth 8 to 9.5 feet

Recovery 10" Qp 4.0 tsf Sample Description Lean Clay, with gravel - Red Brown

Unit Weight Data

Mold Wt.	1073.5	
Mold + Soil	2149.2	
Mass	1075.7 gms	2.372 = lbs.

Tube Sample Geometry

Do=	2.813	in.	Initial Diameter
Ao=	6.215	sq. in.	Initial Area
Ao=	0.0432	sq. ft.	
Lo=	5.594	in.	Initial Length
Vo=	34.74	cu. In.	Initial Volume
Vo=	0.0201	cu. Ft.	
Lo/Do=	2.0		

Moisture Content

Tare No#	31	Tare No#	
Wet Wt + Tare	487.5 g	Wet Wt + Tare	g
Dry Wt + Tare	413.7 g	Dry Wt + Tare	g
Tare Wt.	118.5 g	Tare Wt.	g
Wt of Water	73.8 g	Wt of Water	g
Wt of Dry Soil	295.2 g	Wt of Dry Soil	g
Moisture Content	25.0 %	Moisture Content	%

3" Shelby Tube Sample Proving Ring

Load Dial Reading	Axial Load (lbs.)	Strain	Unit Strain (%)	Corrected Area (sq. ft.)	Stress (PSF)
	0	0	0	0	0
	26.1	0.112	2	22.7	593
	34	0.224	4	22.2	756
	33.1	0.336	6	21.8	721

Failure Sketch

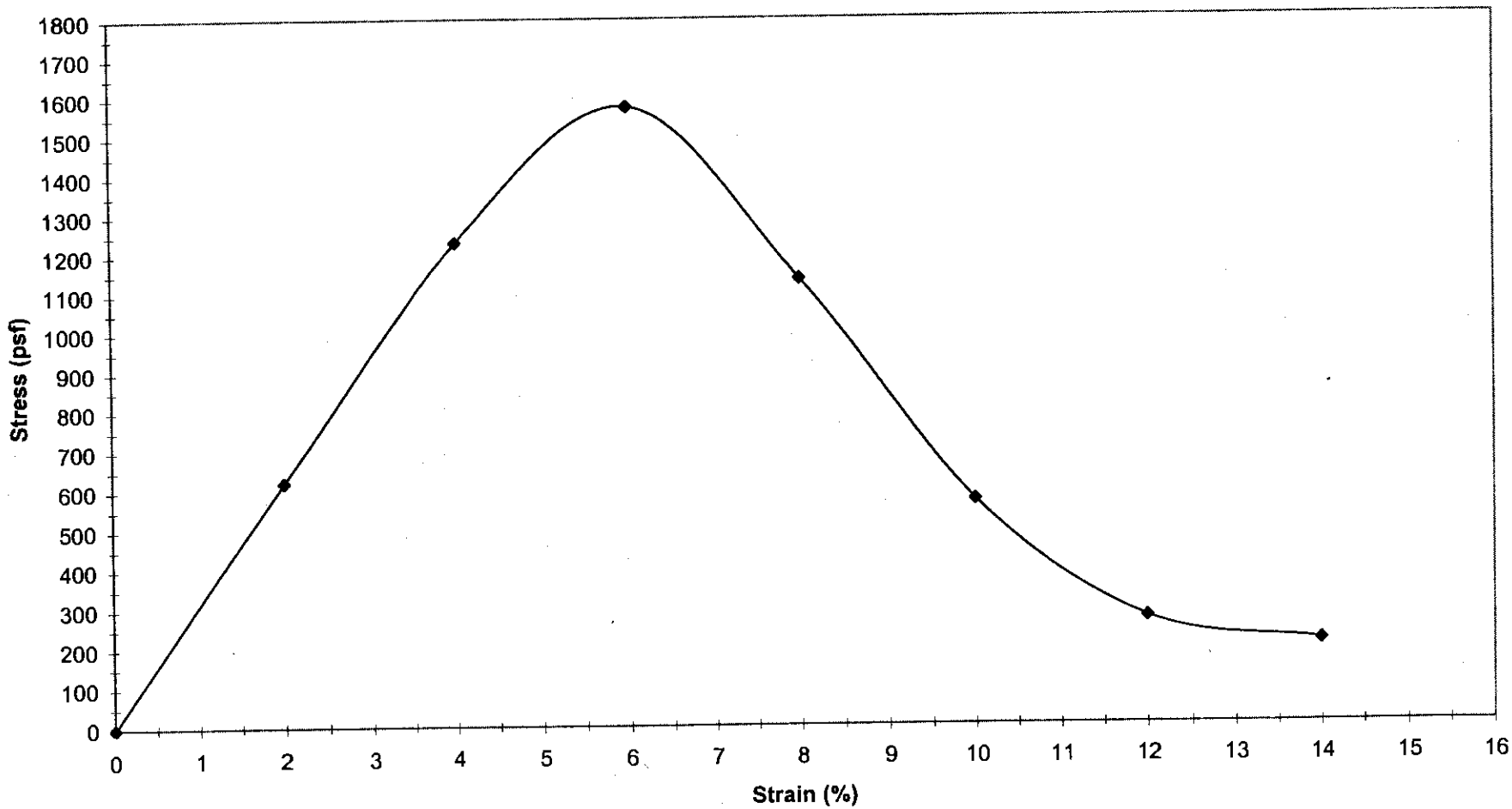
Wet Density 118.0 (pcf)

Dry Density 94.4 (pcf)

qu= 760 psf

su= 380 psf

Unconfined Compressive Strength of Cohesive Soil
Boring MC-148, Sample ST-3, 8.0 to 9.5 feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



420

Terracon

Dry Unit Weight of Soil

Field Sampled by Shelby Tube

ASTM D-1587
ASTM D-2166

10930 East 56th Street
Tulsa, Oklahoma 74146
(918)250-0461

Job Name: I 49 Missouri Project J7P0601 Project No.: 39025019M Date: January 2003
Pineville, Missouri to Arkansas State Line

Boring MC-148 Sample ST-3 Depth 8.0 to 9.5 feet

Recovery 12.5" Qp 3.25 tsf Sample Description Lean Clay, with gravel, trace sand, Red Brown

Unit Weight Data

Mold Wt.	1072.5	
Mold + Soil	2180.5	
Mass	1108 gms	2.443 = lbs.

Tube Sample Geometry

Do=	2.813	in.	Initial Diameter
Ao=	6.215	sq. in.	Initial Area
Ao=	0.0432	sq. ft.	
Lo=	5.594	in.	Initial Length
Vo=	34.74	cu. In.	Initial Volume
Vo=	0.0201	cu. Ft.	
Lo/Do=	2.0		

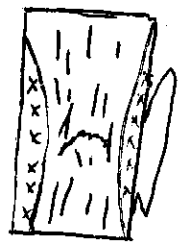
Moisture Content

Tare No#	t46	Tare No#	
Wet Wt + Tare	123.5 g	Wet Wt + Tare	g
Dry Wt + Tare	107.3 g	Dry Wt + Tare	g
Tare Wt.	21.2 g	Tare Wt.	g
Wt of Water	16.2 g	Wt of Water	g
Wt of Dry Soil	86.1 g	Wt of Dry Soil	g
Moisture Content	18.8 %	Moisture Content	%

3" Shelby Tube Sample Proving Ring

Load Dial Reading	Axial Load (lbs.)	Strain	Unit Strain (%)	Corrected Area (sq. ft.)	Stress (PSF)
0	0	0	0	0	0
	27.4	0.112	2	22.7	622
	55.4	0.224	4	22.2	1232
	72.4	0.336	6	21.8	1577
	53.3	0.448	8	21.3	1136
	27.4	0.559	10	20.9	571
	13.3	0.671	12	20.4	271
	10.5	0.783	14	19.9	209
		0.895	16	19.5	0
		1.007	18	19.0	0
		1.119	20	18.5	0

Failure Sketch



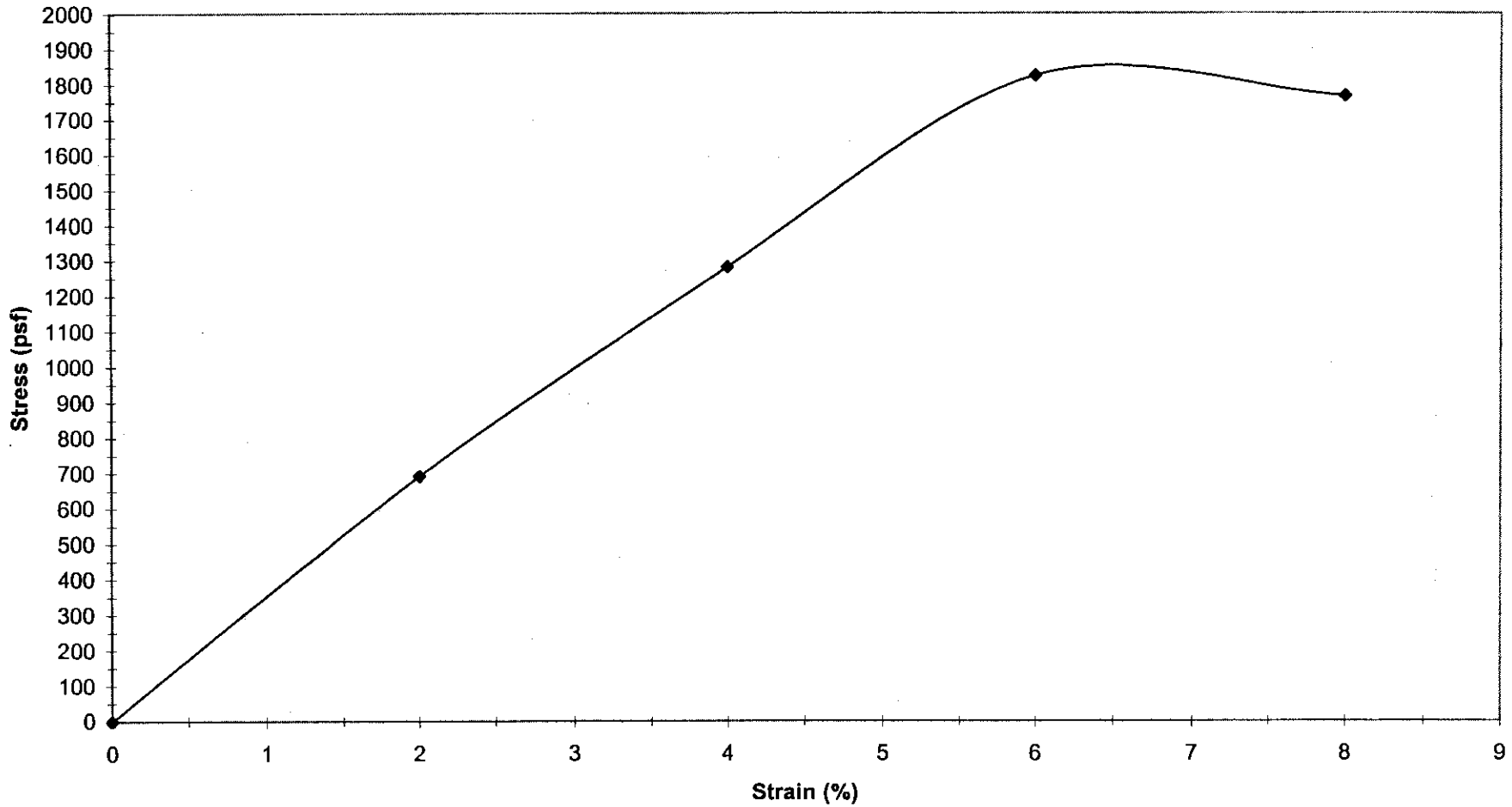
Wet Density 121.5 (pcf)

Dry Density 102.3 (pcf)

qu= 1550 psf

su= 775 psf

Unconfined Compressive Strength of Cohesive Soil
Boring MC-153, Sample ST-3, 8.5 to 9.4 feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



422

Terracon

Dry Unit Weight of Soil

Field Sampled by Shelby Tube

ASTM D-1587
ASTM D-2166

10930 East 56th Street
Tulsa, Oklahoma 74146
(918)250-0461

Job Name: I 49 Missouri Project J7P0601 Project No.: 39025019M Date: January 2003
Pineville, Missouri to Arkansas State Line

Boring MC-153 Sample ST-3 Depth 8.5 to 9.4 feet

Recovery 14" Qp 2.0 tsf Sample Description Fat Clay, with sand, trace gravel - Red Brown

Unit Weight Data

Mold Wt.	1072.5	
Mold + Soil	2199.1	
Mass	1126.6	2.484
	gms	= lbs.

Tube Sample Geometry

Do=	2.813	in.	Initial Diameter
Ao=	6.215	sq. in.	Initial Area
Ao=	0.0432	sq. ft.	
Lo=	5.594	in.	Initial Length
Vo=	34.74	cu. In.	Initial Volume
Vo=	0.0201	cu. Ft.	
Lo/Do=	2.0		

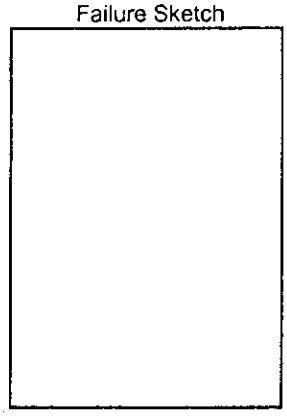
Moisture Content

Tare No#	t14		Tare No#		
Wet Wt + Tare	130.8	g	Wet Wt + Tare		g
Dry Wt + Tare	111.5	g	Dry Wt + Tare		g
Tare Wt.	23.5	g	Tare Wt.		g
Wt of Water	19.3	g	Wt of Water		g
Wt of Dry Soil	88	g	Wt of Dry Soil		g
Moisture Content	21.9	%	Moisture Content		%

3" Shelby Tube Sample Proving Ring

Load Dial Reading	Axial Load (lbs.)	Strain	Unit Strain (%)	Corrected Area (sq. ft.)	Stress (PSF)
0	0	0	0	0	0
	30.5	0.112	2	22.7	693
	57.6	0.224	4	22.2	1281
	83.8	0.336	6	21.8	1825
	82.9	0.448	8	21.3	1767
		0.559	10	20.9	0
		0.671	12	20.4	0
		0.783	14	19.9	0
		0.895	16	19.5	0
		1.007	18	19.0	0
		1.119	20	18.5	0

Failure Sketch

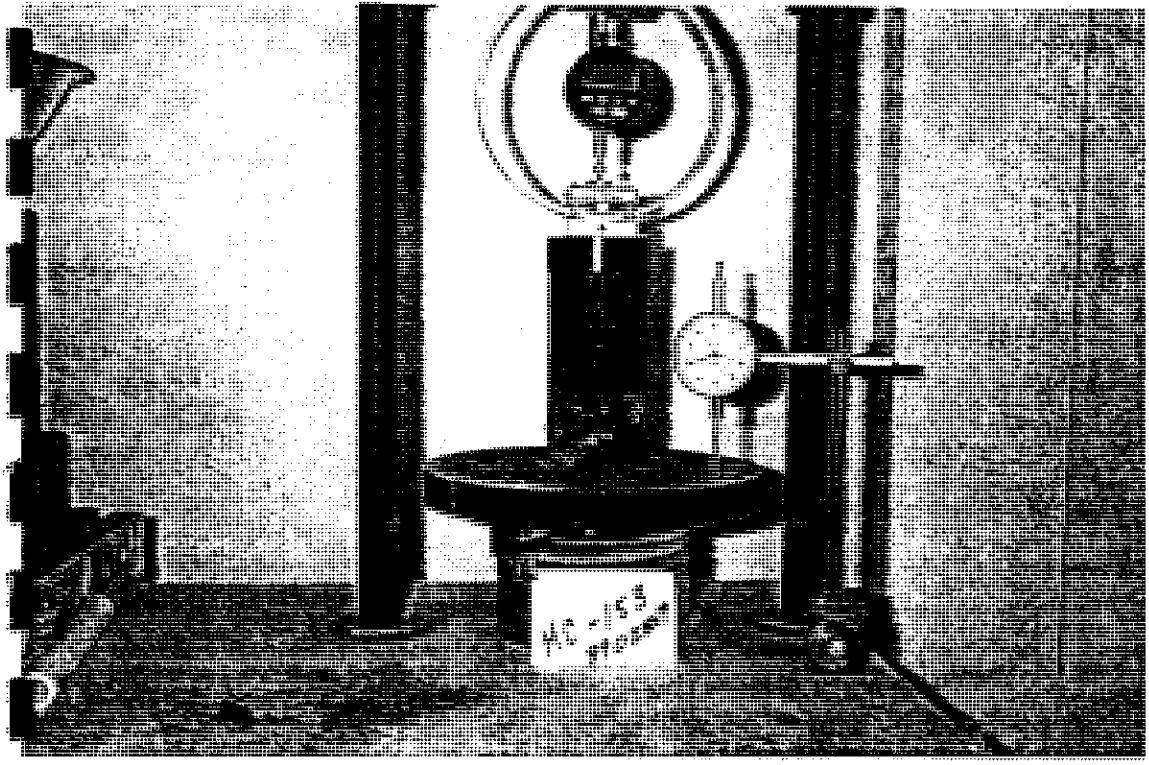


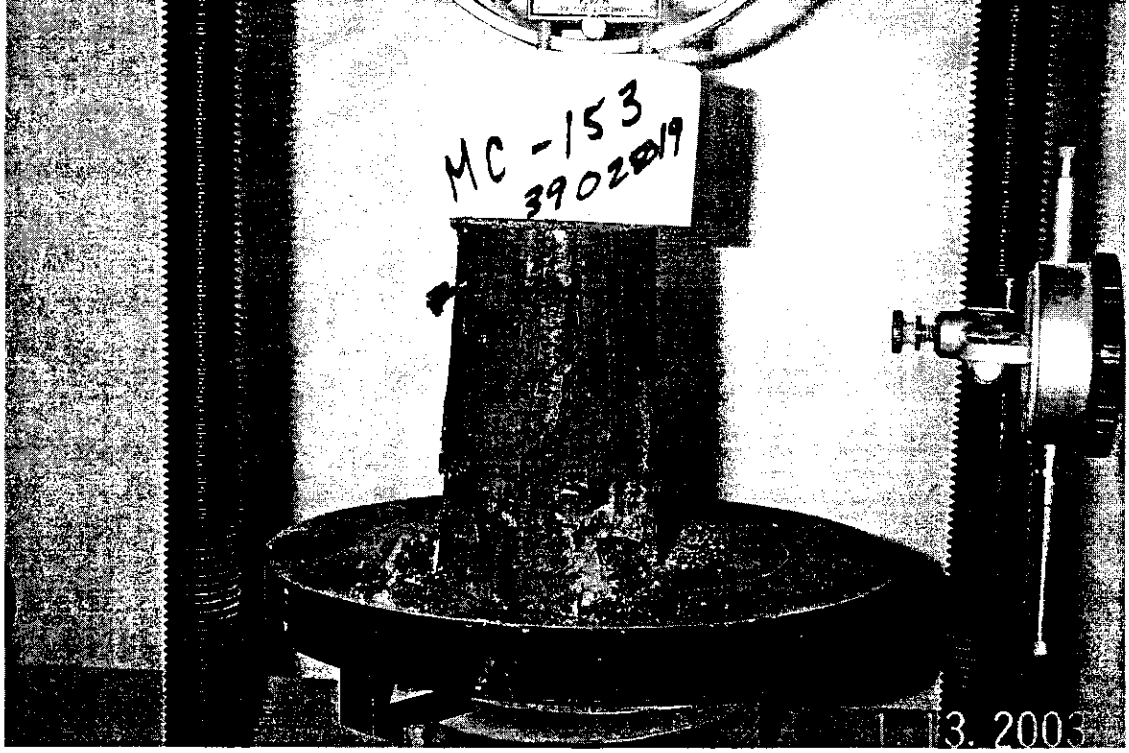
Wet Density 123.6 (pcf)

Dry Density 101.3 (pcf)

qu= 1850 psf

su= 925 psf

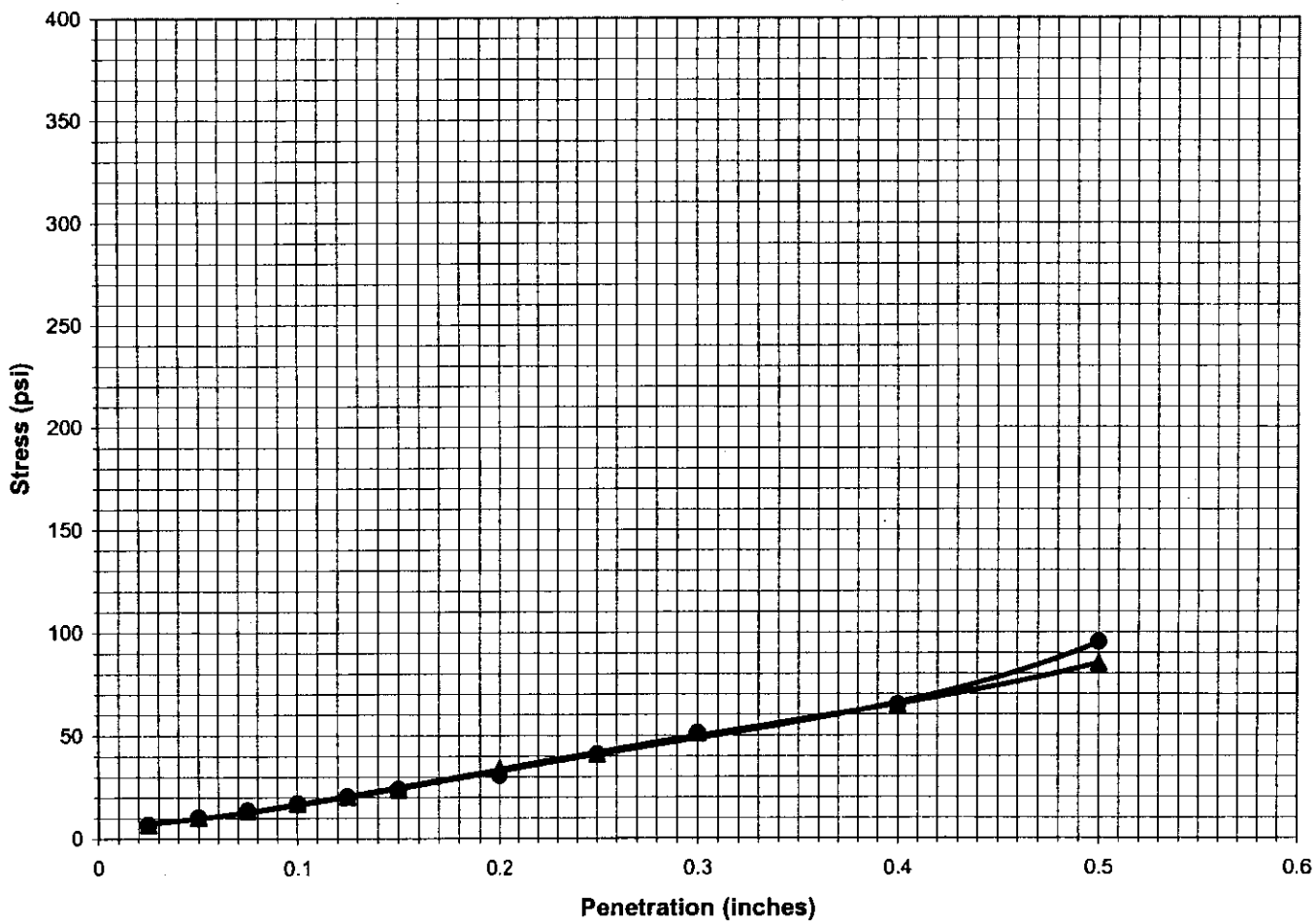




424

10.5 California Bearing Ratio Results

California Bearing Ratio
MC-3: Bulk Sample from 5 to 16.3 Feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



○ Top As Soaked
△ Bottom As soaked
● Corrected Top, As Soaked
▲ Corrected Bottom, As Soaked

Corrected CBR Top
As Soaked = 1.7

Corrected CBR Bottom
As Soaked = 1.7

427

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

CALIFORNIA BEARING RATIO TEST INFORMATION

39025019M

MC-3: 5 to 16.3 Feet

Input:	Diameter of Penetration Piston (in.):	2	
Calcs:	Area of Penetration Piston (in.^{2}):	3.14	

MOISTURE CONTENT DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Wet Soil & Tare (g):	2046.5	774.9	2582.6
	Wt. Dry Soil & Tare (g):	1886.6	684.8	2223.5
	Wt. Tare (g):	373	250.1	371.7
Results:	Wt. of Water (g):	159.90	90.10	359.10
	Wt. of Dry Soil (g):	1513.60	434.70	1851.80
	Moisture Content (%):	10.56421776	20.726938	19.39194297

DENSITY DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Moist Soil & Mold (g):	8532.7	8567.1	8567.1
	Wt. Empty Mold (g):	4319.5	4319.5	4319.5
Results:	Wt. Moist Soil (g):	4213.2	4247.6	4247.6
	Wet Density (lb./ft.^{3}):	123.9	124.9	124.9
	Dry Density (lb./ft.^{3}):	112.0327015	103.43958	104.5962038

Top As Soaked

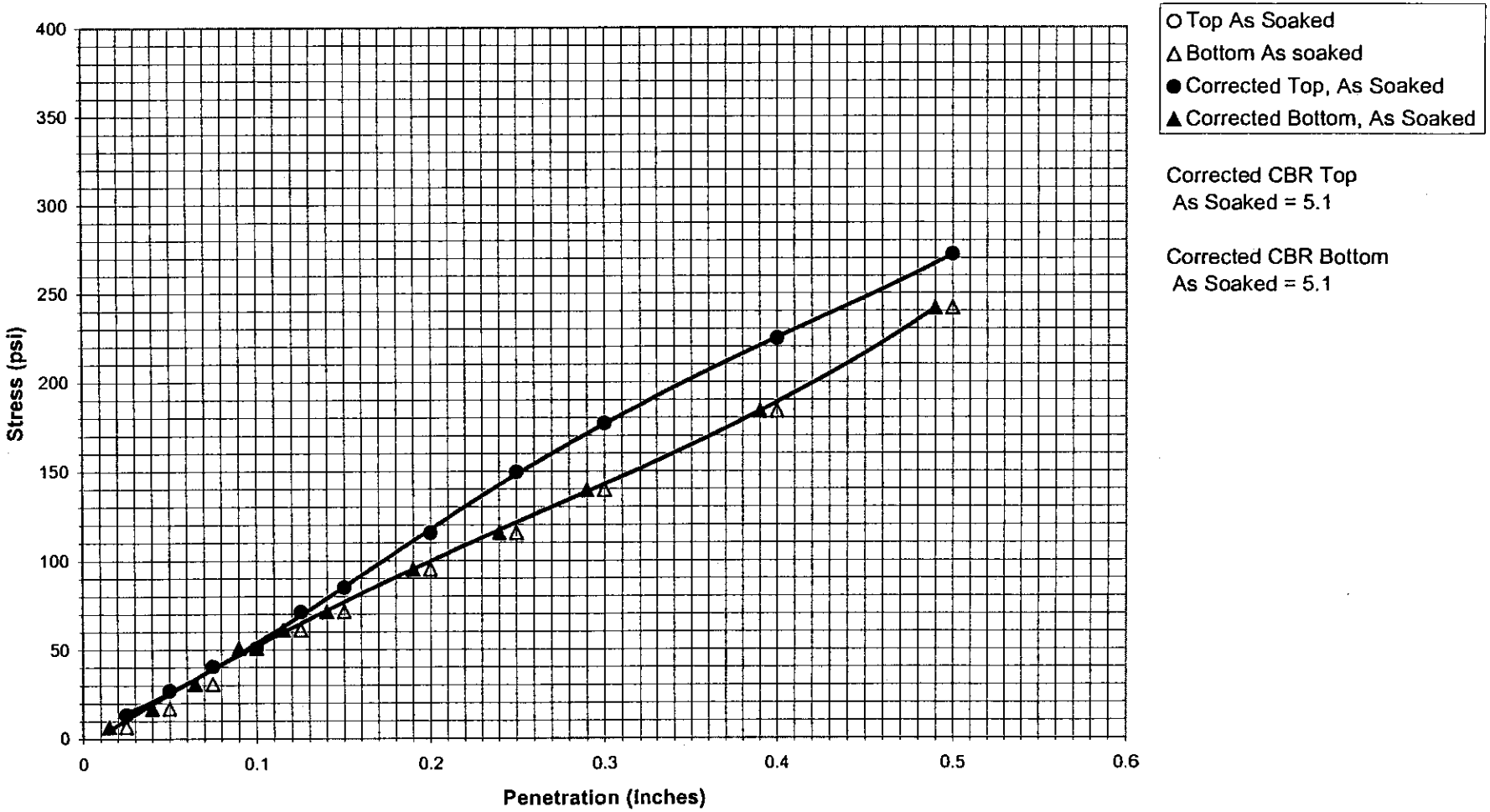
Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value		
0.025	2		6.8		0.025	
0.050	3		10.2		0.050	
0.075	4		13.6		0.075	
0.100	5		17.0	1.70	0.100	1.7
0.125	6		20.4		0.125	
0.150	7		23.8		0.150	
0.200	9		30.6	2.04	0.200	
0.250	12		40.9		0.250	
0.300	15		51.1		0.300	
0.400	19		64.7		0.400	
0.500	28		95.3		0.500	

Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value		
0.025	2		6.8		0.025	
0.050	3		10.2		0.050	
0.075	4		13.6		0.075	
0.100	5		17.0	1.70	0.100	1.7
0.125	6		20.4		0.125	
0.150	7		23.8		0.150	
0.200	10		34.0	2.27	0.200	
0.250	12		40.9		0.250	
0.300	15		51.1		0.300	
0.400	19		64.7		0.400	
0.500	25		85.1		0.500	

Density Correction	
Final Moisture Content	19.39194
Final Moist Wt of Soil	4247.6
Dry Weight of Soil	3557.694
Initial Moisture Content	
Initial Moisture Wt of Soil	4213.2
Weight of Water initial	655.5
Initial Moisture Content	18.4
Initial Density of Soil	
Initial Wet Density	123.9
Initial Dry Density	104.6

California Bearing Ratio
MC-125: Bulk Sample from 1 to 25 Feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



429

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

CALIFORNIA BEARING RATIO TEST INFORMATION

Input:	Diameter of Penetration Piston (in.):	2	**39025019M**
Calcs:	Area of Penetration Piston (in.^{2}):	3.14	MC-125: 1 to 25 feet

MOISTURE CONTENT DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Wet Soil & Tare (g):	1832.6	1085.8	2251.1
	Wt. Dry Soil & Tare (g):	1597.4	959.2	1951
	Wt. Tare (g):	237.6	241	249.7
Results:	Wt. of Water (g):	235.20	126.60	300.10
	Wt. of Dry Soil (g):	1359.80	718.20	1701.30
	Moisture Content (%):	17.29666127	17.627402	17.63945218

DENSITY DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Moist Soil & Mold (g):	8072.4	8027.5	8027.5
	Wt. Empty Mold (g):	4129.6	4129.6	4129.6
Results:	Wt. Moist Soil (g):	3942.8	3897.9	3897.9
	Wet Density (lb./ft.^{3}):	115.9	114.6	114.6
	Dry Density (lb./ft.^{3}):	98.82491005	97.424799	97.4148195

Top As Soaked

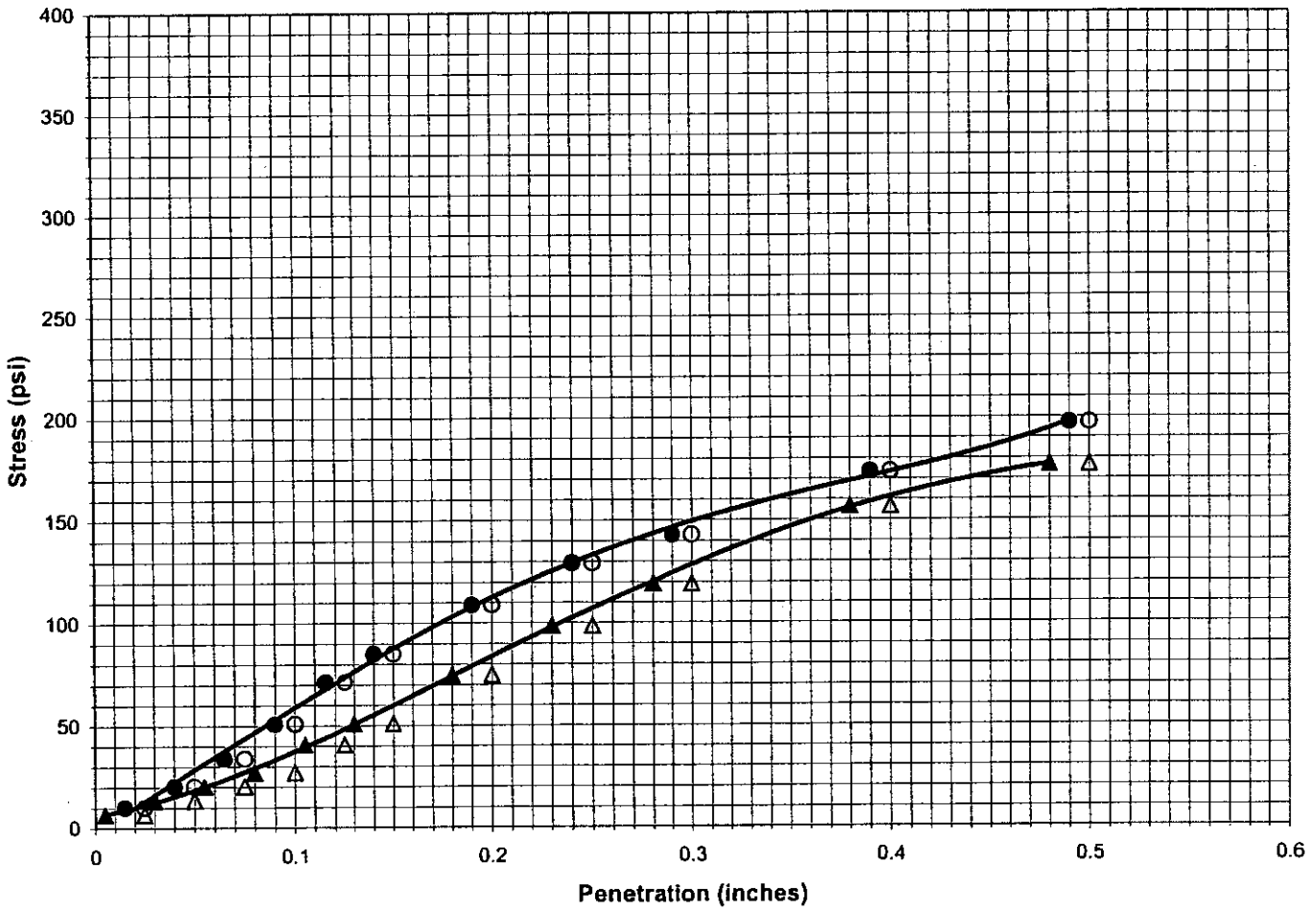
Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value	
0.025	4		13.6		0.025
0.050	8		27.2		0.050
0.075	12		40.9		0.075
0.100	15		51.1	5.11	0.100
0.125	21		71.5		0.125
0.150	25		85.1		0.150
0.200	34		115.8	7.72	0.200
0.250	44		149.8		0.250
0.300	52		177.0		0.300
0.400	66		224.7		0.400
0.500	80		272.4		0.500

Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value	
0.025	2		6.8		0.015
0.050	5		17.0		0.040
0.075	9		30.6		0.065
0.100	15		51.1	5.11	0.090
0.125	18		61.3		0.115
0.150	21		71.5		0.140
0.200	28		95.3	6.36	0.190
0.250	34		115.8		0.240
0.300	41		139.6		0.290
0.400	54		183.9		0.390
0.500	71		241.7		0.490

Density Correction	
Final Moisture Content	17.63945
Final Moist Wt of Soil	3897.9
Dry Weight of Soil	3313.429
Initial Moisture Content	
Initial Moisture Wt of Soil	3942.8
Weight of Water initial	629.4
Initial Moisture Content	19.0
Initial Density of Soil	
Initial Wet Density	115.9
Initial Dry Density	97.4

California Bearing Ratio
MC-153: Bulk Sample from 4 to 30 Feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



○ Top As Soaked
△ Bottom As soaked
● Corrected Top, As Soaked
▲ Corrected Bottom, As Soaked

Corrected CBR Top
As Soaked = 6.0

Corrected CBR Bottom
As Soaked = 3.8

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

CALIFORNIA BEARING RATIO TEST INFORMATION

39025019M

Input:	Diameter of Penetration Piston (in.):	2	
Calcs:	Area of Penetration Piston (in.^{2}):	3.14	MC-153: 4 to 30 feet

MOISTURE CONTENT DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Wet Soil & Tare (g):	2728.6	1043.2	2369.8
	Wt. Dry Soil & Tare (g):	2431.9	929.6	2085.2
	Wt. Tare (g):	249.4	237.3	245.9
Results:	Wt. of Water (g):	296.70	113.60	284.60
	Wt. of Dry Soil (g):	2182.50	692.30	1839.30
	Moisture Content (%):	13.59450172	16.409071	15.47327788

DENSITY DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Moist Soil & Mold (g):	8179.2	8178.3	8178.3
	Wt. Empty Mold (g):	4287.9	4287.9	4287.9
Results:	Wt. Moist Soil (g):	3891.3	3890.4	3890.4
	Wet Density (lb./ft.^{3}):	114.4	114.4	114.4
	Dry Density (lb./ft.^{3}):	100.7128147	98.255023	99.05128018

Top As Soaked

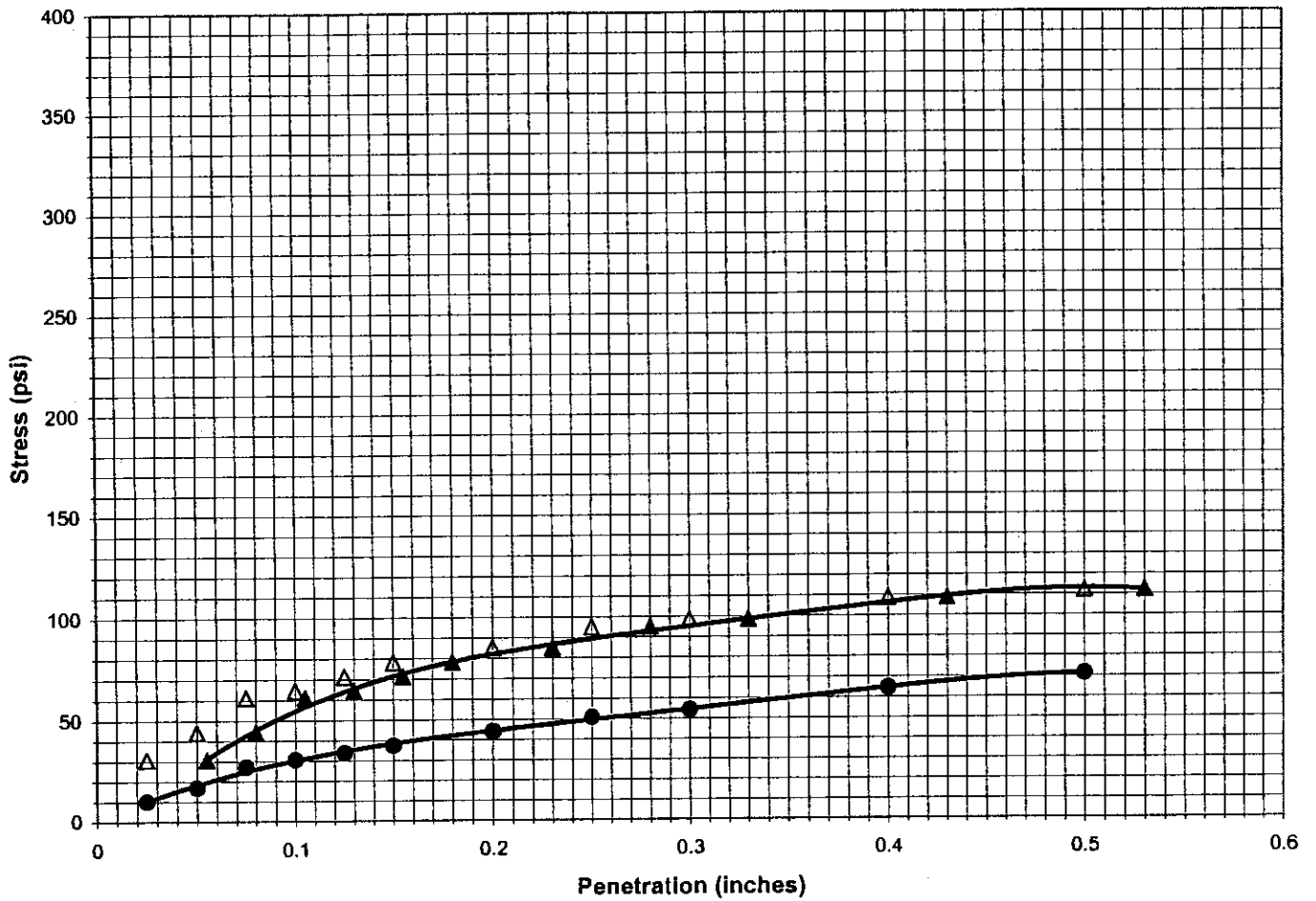
Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value	
0.025	3		10.2		0.015
0.050	6		20.4		0.040
0.075	10		34.0		0.065
0.100	15		51.1	5.11	0.090
0.125	21		71.5		0.115
0.150	25		85.1		0.140
0.200	32		109.0	7.26	0.190
0.250	38		129.4		0.240
0.300	42		143.0		0.290
0.400	51		173.6		0.390
0.500	58		197.5		0.490

Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value	
0.025	2		6.8		0.005
0.050	4		13.6		0.030
0.075	6		20.4		0.055
0.100	8		27.2	2.72	0.080
0.125	12		40.9		0.105
0.150	15		51.1		0.130
0.200	22		74.9	4.99	0.180
0.250	29		98.7		0.230
0.300	35		119.2		0.280
0.400	46		156.6		0.380
0.500	52		177.0		0.480

Density Correction	
Final Moisture Content	15.47328
Final Moist Wt of Soil	3890.4
Dry Weight of Soil	3369.091
Initial Moisture Content	
Initial Moisture Wt of Soil	3891.3
Weight of Water initial	522.2
Initial Moisture Content	15.5
Initial Density of Soil	
Initial Wet Density	114.4
Initial Dry Density	99.1

California Bearing Ratio
MC-164: Bulk Sample from 1 to 32 Feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



○ Top As Soaked
△ Bottom As soaked
● Corrected Top, As Soaked
▲ Corrected Bottom, As Soaked

Corrected CBR Top
As Soaked = 3.1

Corrected CBR Bottom
As Soaked = 5.5

433

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

CALIFORNIA BEARING RATIO TEST INFORMATION

Input:	Diameter of Penetration Piston (in.):	2	**39025019M**
Calcs:	Area of Penetration Piston (in.^{2}):	3.14	MC-164: 1 to 32 feet

MOISTURE CONTENT DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Wet Soil & Tare (g):	710.1	1035.4	2416.7
	Wt. Dry Soil & Tare (g):	646.4	864.9	1996.6
	Wt. Tare (g):	240.8	244.9	247.2
Results:	Wt. of Water (g):	63.70	170.50	420.10
	Wt. of Dry Soil (g):	405.60	620.00	1749.40
	Moisture Content (%):	15.70512821	27.5	24.01394764

DENSITY DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Moist Soil & Mold (g):	8021.4	8216.8	8216.8
	Wt. Empty Mold (g):	4116.8	4116.8	4116.8
Results:	Wt. Moist Soil (g):	3904.6	4100.0	4100.0
	Wet Density (lb./ft.^{3}):	114.8	120.5	120.5
	Dry Density (lb./ft.^{3}):	99.21361463	94.541176	97.19874441

Top As Soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2}) tsi	Uncorrected CBR Value		
0.025	3		10.2		0.025	
0.050	5		17.0		0.050	
0.075	8		27.2		0.075	
0.100	9		30.6	3.06	0.100	3.1
0.125	10		34.0		0.125	
0.150	11		37.5		0.150	
0.200	13		44.3	2.95	0.200	
0.250	15		51.1		0.250	
0.300	16		54.5		0.300	
0.400	19		64.7		0.400	
0.500	21		71.5		0.500	

Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2}) tsi	Uncorrected CBR Value		
0.025	9		30.6		0.055	
0.050	13		44.3		0.080	
0.075	18		61.3		0.105	
0.100	19		64.7	6.47	0.130	5.5
0.125	21		71.5		0.155	
0.150	23		78.3		0.180	
0.200	25		85.1	5.67	0.230	
0.250	28		95.3		0.280	
0.300	29		98.7		0.330	
0.400	32		109.0		0.430	
0.500	33		112.4		0.530	

Density Correction

Final Moisture Content	24.01395
Final Moist Wt of Soil	4100.0
Dry Weight of Soil	3306.08

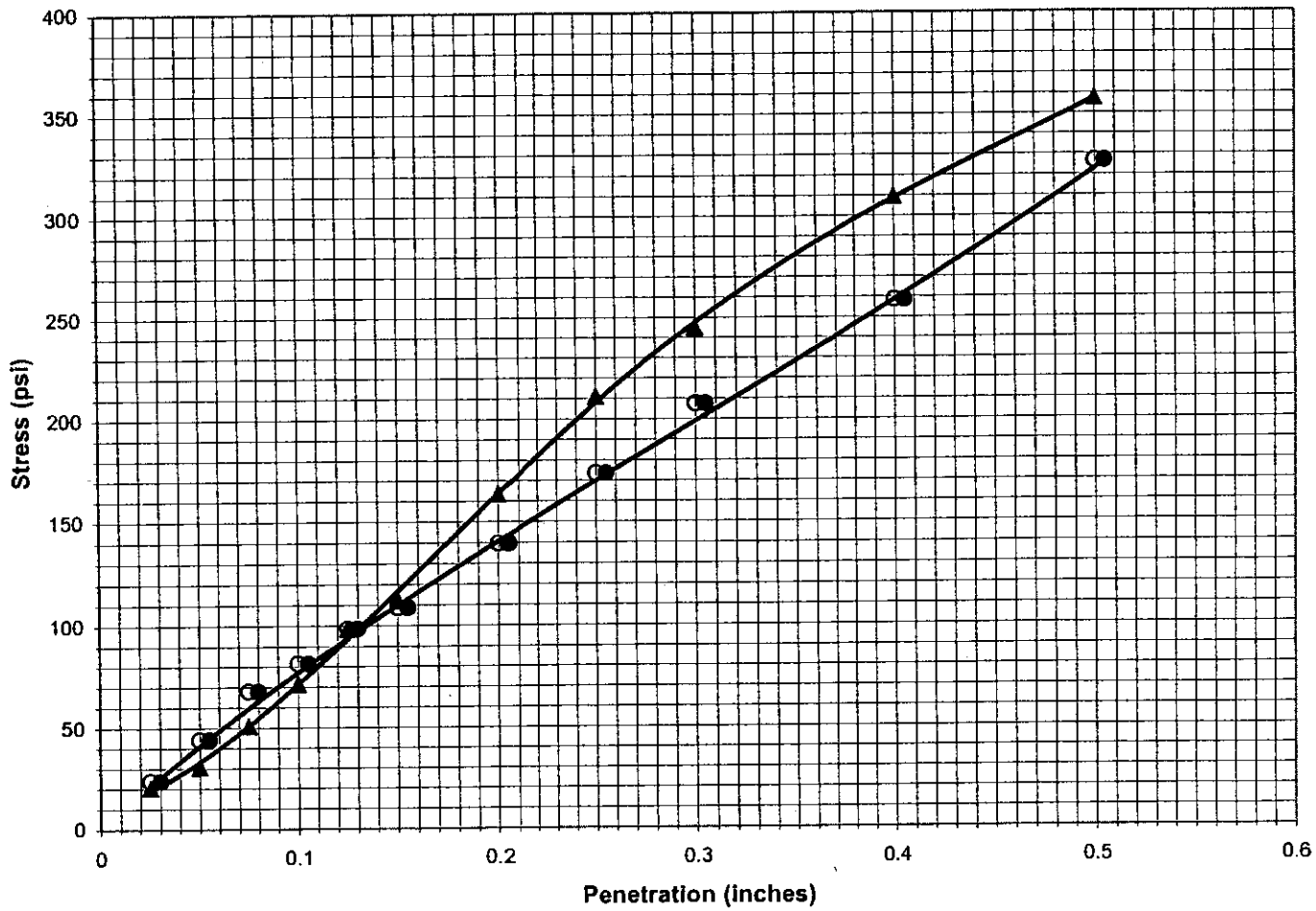
Initial Moisture Content

Initial Moisture Wt of Soil	3904.6
Weight of Water initial	598.5
Initial Moisture Content	18.1

Initial Density of Soil

Initial Wet Density	114.8
Initial Dry Density	97.2

California Bearing Ratio
MC-227: Bulk Sample from 0 to 20 Feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



○ Top As Soaked
△ Bottom As soaked
● Corrected Top, As Soaked
▲ Corrected Bottom, As Soaked

Corrected CBR Top
As Soaked = 7.8

Corrected CBR Bottom
As Soaked = 7.2

435

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

CALIFORNIA BEARING RATIO TEST INFORMATION

Input:	Diameter of Penetration Piston (in.):	2	**39025019M**
Calcs:	Area of Penetration Piston (in.^{2}):	3.14	MC-227: 0 to 20 feet

MOISTURE CONTENT DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Wet Soil & Tare (g):	1091.2	777.8	2843.4
	Wt. Dry Soil & Tare (g):	966	692.7	2437.2
	Wt. Tare (g):	247.6	236.8	248.4
Results:	Wt. of Water (g):	125.20	85.10	406.20
	Wt. of Dry Soil (g):	718.40	455.90	2188.80
	Moisture Content (%):	17.42761693	18.666374	18.55811404

DENSITY DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Moist Soil & Mold (g):	8338.1	8379.6	8379.6
	Wt. Empty Mold (g):	4127.1	4127.1	4127.1
Results:	Wt. Moist Soil (g):	4211.0	4252.5	4252.5
	Wet Density (lb./ft.^{3}):	123.8	125.0	125.0
	Dry Density (lb./ft.^{3}):	105.4295431	105.35714	105.4533475

Top As Soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value		
0.025	7		23.8		0.030	
0.050	13		44.3		0.055	
0.075	20		68.1		0.080	
0.100	24		81.7	8.17	0.105	7.8
0.125	29		98.7		0.130	
0.150	32		109.0		0.155	
0.200	41		139.6	9.31	0.205	
0.250	51		173.6		0.255	
0.300	61		207.7		0.305	
0.400	76		258.8		0.405	
0.500	96		326.9		0.505	

Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value		
0.025	6		20.4		0.025	
0.050	9		30.6		0.050	
0.075	15		51.1		0.075	
0.100	21		71.5	7.15	0.100	7.2
0.125	29		98.7		0.125	
0.150	33		112.4		0.150	
0.200	48		163.4	10.90	0.200	
0.250	62		211.1		0.250	
0.300	72		245.1		0.300	
0.400	91		309.8		0.400	
0.500	105		357.5		0.500	

Density Correction

Final Moisture Content	18.55811
Final Moist Wt of Soil	4252.5
Dry Weight of Soil	3586.849

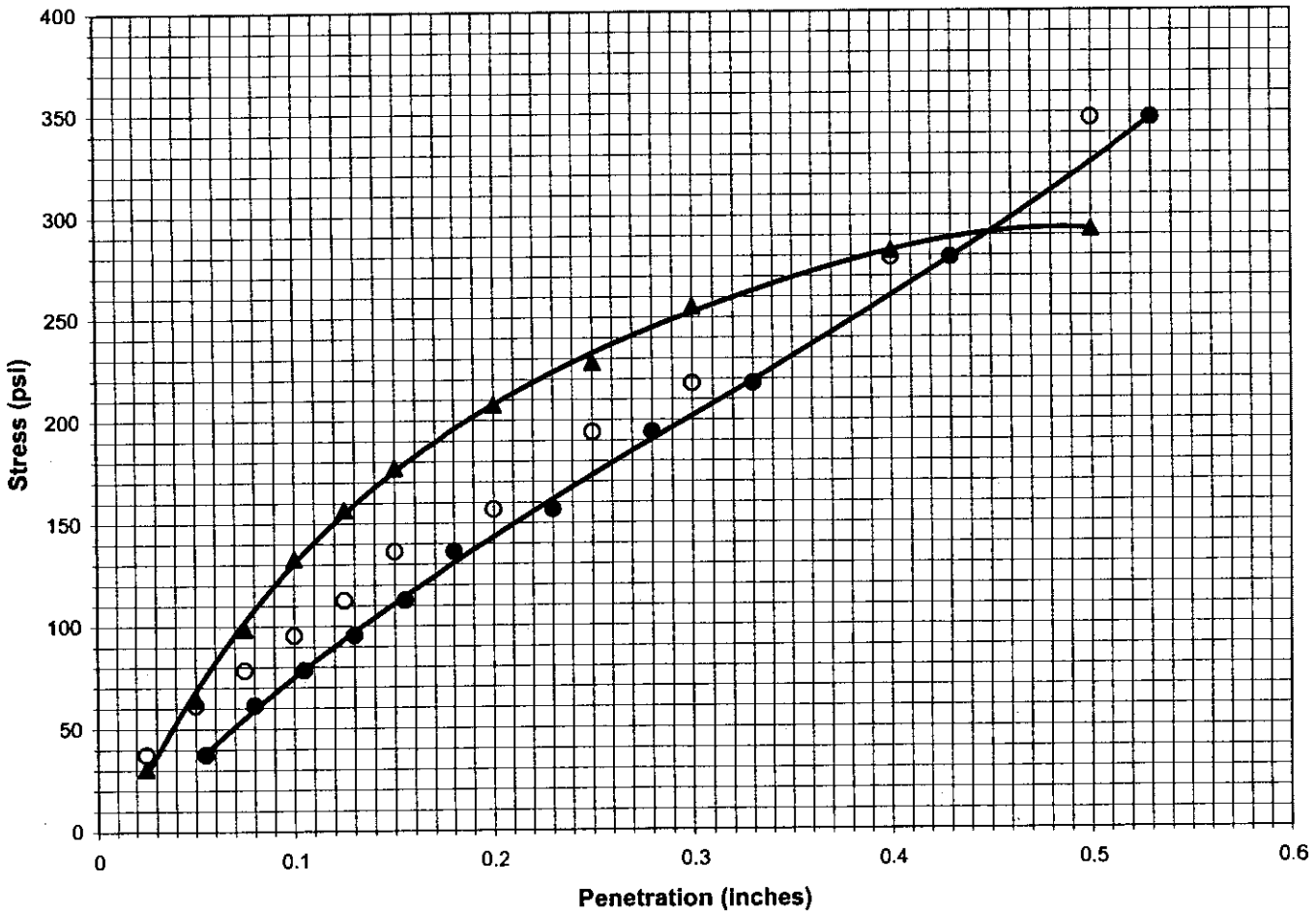
Initial Moisture Content

Initial Moisture Wt of Soil	4211.0
Weight of Water initial	624.2
Initial Moisture Content	17.4

Initial Density of Soil

Initial Wet Density	123.8
Initial Dry Density	105.5

California Bearing Ratio
MC-284: Bulk Sample from 20 to 51 Feet
I 49 Missouri - Project J7P0601
McDonald County, Missouri



○ Top As Soaked
△ Bottom As soaked
● Corrected Top, As Soaked
▲ Corrected Bottom, As Soaked

Corrected CBR Top
As Soaked = 7.5

Corrected CBR Bottom
As Soaked = 13.3

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS

CALIFORNIA BEARING RATIO TEST INFORMATION

Input: Diameter of Penetration Piston (in.): 2

Calcs: Area of Penetration Piston (in.^{2}): 3.14

39025019M

MC-284: 20 to 51 feet

MOISTURE CONTENT DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Wet Soil & Tare (g):	1115.4	995.8	3564.7
	Wt. Dry Soil & Tare (g):	1002.7	861.8	3039.6
	Wt. Tare (g):	244	240.8	245.8
Results:	Wt. of Water (g):	112.70	134.00	525.10
	Wt. of Dry Soil (g):	758.70	621.00	2793.80
	Moisture Content (%):	14.85435614	21.5781	18.79518935

DENSITY DETERMINATION

		Before Soaking	After Soaking	
			Top 1"	Average
Input:	Wt. Moist Soil & Mold (g):	8088.5	8244	8244
	Wt. Empty Mold (g):	4117.5	4117.5	4117.5
Results:	Wt. Moist Soil (g):	3971.0	4126.5	4126.5
	Wet Density (lb./ft.^{3}):	116.7	121.3	121.3
	Dry Density (lb./ft.^{3}):	101.6482125	99.786968	102.1245899

Top As Soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value		
0.025	11		37.5		0.055	
0.050	18		61.3		0.080	
0.075	23		78.3		0.105	
0.100	28		95.3	9.53	0.130	**7.5**
0.125	33		112.4		0.155	
0.150	40		136.2		0.180	
0.200	46		156.6	10.44	0.230	
0.250	57		194.1		0.280	
0.300	64		217.9		0.330	
0.400	82		279.2		0.430	
0.500	102		347.3		0.530	

Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in.^{2})	Uncorrected CBR Value		
0.025	9		30.6		0.025	
0.050	19		64.7		0.050	
0.075	29		98.7		0.075	
0.100	39		132.8	13.28	0.100	**13.3**
0.125	46		156.6		0.125	
0.150	52		177.0		0.150	
0.200	61		207.7	13.85	0.200	
0.250	67		228.1		0.250	
0.300	75		255.4		0.300	
0.400	83		282.6		0.400	
0.500	86		292.8		0.500	

Density Correction	
Final Moisture Content	18.79519
Final Moist Wt of Soil	4126.5
Dry Weight of Soil	3473.626
Initial Moisture Content	
Initial Moisture Wt of Soil	3971.0
Weight of Water initial	497.4
Initial Moisture Content	14.3
Initial Density of Soil	
Initial Wet Density	116.7
Initial Dry Density	102.1

11.0 MoDOT TRAFFIC INFORMATION

439

MEMORANDUM

Missouri Department of Transportation
Transportation Planning
2217 St. Marys Blvd.

Post-it® Fax Note 7671	Date 2/1/2002	# of pages ▶ 3
To JOHN MARTEL	From SEAN MATLOCK	
Co./Dept. HNTB	Co. MoDOT	
Phone # (816) 527-2231	Phone # (417) 629-3378	
Fax # (816) 472-4086	Fax # (417) 629-3314	

TO: Sean L. Matlock-7de

CC: Diane Heckemeyer-de
Ken Fryer-po
Shyam Gupta-br

FROM: Barb Dudenhoeffer BD
Transportation Planner

DATE: January 31, 2002

SUBJECT: Design Traffic
Route 71, McDonald County
Rte. H to Arkansas State Line
Job No. J7P0601

We are providing updated estimates of average daily traffic and 18-kip ESAL units for the above project as requested.

US 71	ADT	Daily ESAL Units (Two Way) Flexible	Rigid
Construction Year (2007)	17,200	3,630	6,060
Design Year (2027)	28,700	6,060	10,120
Peak Hour – 8%			
Directional Distribution – 60%			
ADT Trucks – 22%			
Accumulated 20-year ESAL units (thousands)		34,820	58,110
Accumulated 35-year ESAL units (thousands)		75,040	125,240

Route 90	ADT	Daily ESAL Units (Two Way) Flexible	Rigid
Construction Year (2007)	1,220	80	120
Design Year (2027)	2,040	130	200
ADT Trucks – 11%			
Accumulated 20-year ESAL units (thousands)		760	1,130
Accumulated 35-year ESAL units (thousands)		1,630	2,430

Attached are estimated construction and design year turning movements for the intersection of US 71 and Route 90. The traffic estimates are based on manual and machine counts.

cw

Attachment

J:\analysis\j7p0601.doc

Missouri Highway and Transportation Department

Transportation Management Systems

Turning Movement Diagram and Summary

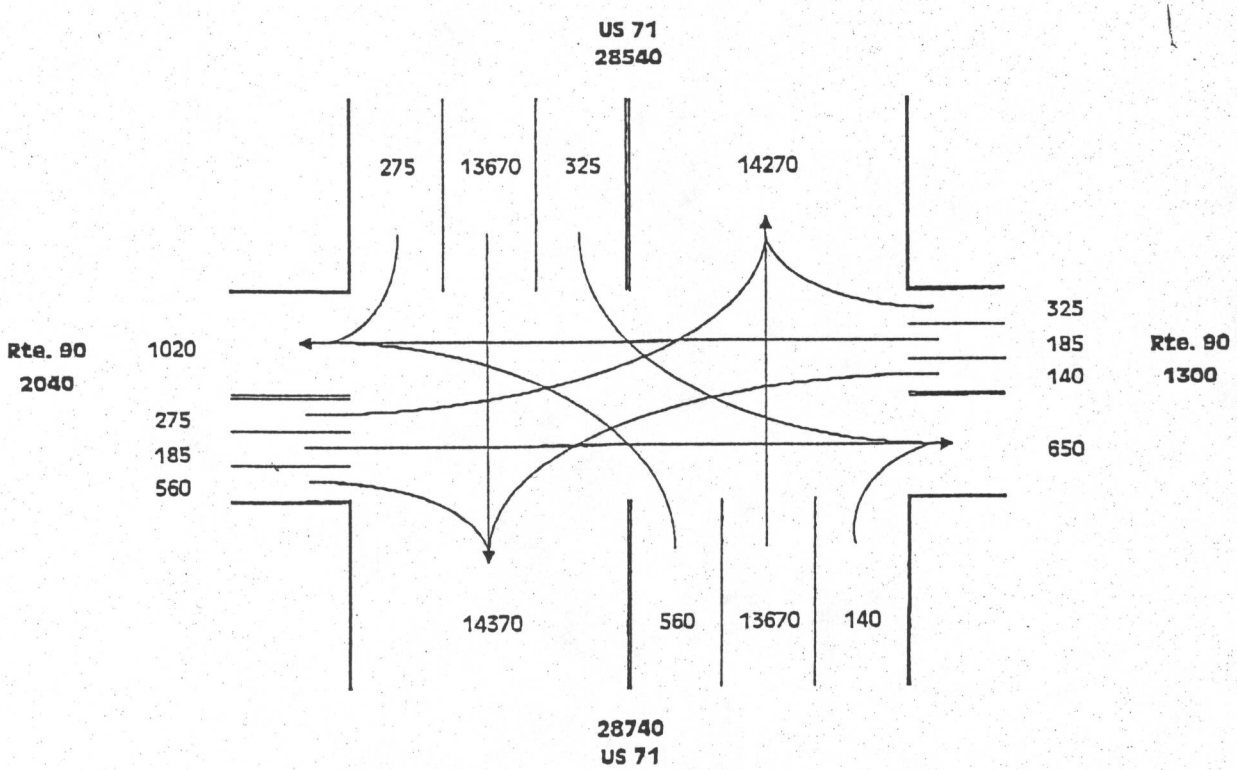
McDonald County

Station Location: Intersection of US 71 & Rte. 90 Date: January, 2002

Base Year: _____ Const. Year: 2007 Design Year: 2027

20 Year Design Factor 1.68

	Base	Const. 2007	Design 2027
North to West		165	275
North to South		8180	13670
North to East		195	325
East to North		195	325
East to West		110	185
East to South		85	140
South to East		85	140
South to North		8180	13670
South to West		335	560
West to South		335	560
West to East		110	185
West to North		165	275



Comments: _____

J:\dudenb\tm71_90