

**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**

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## 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.

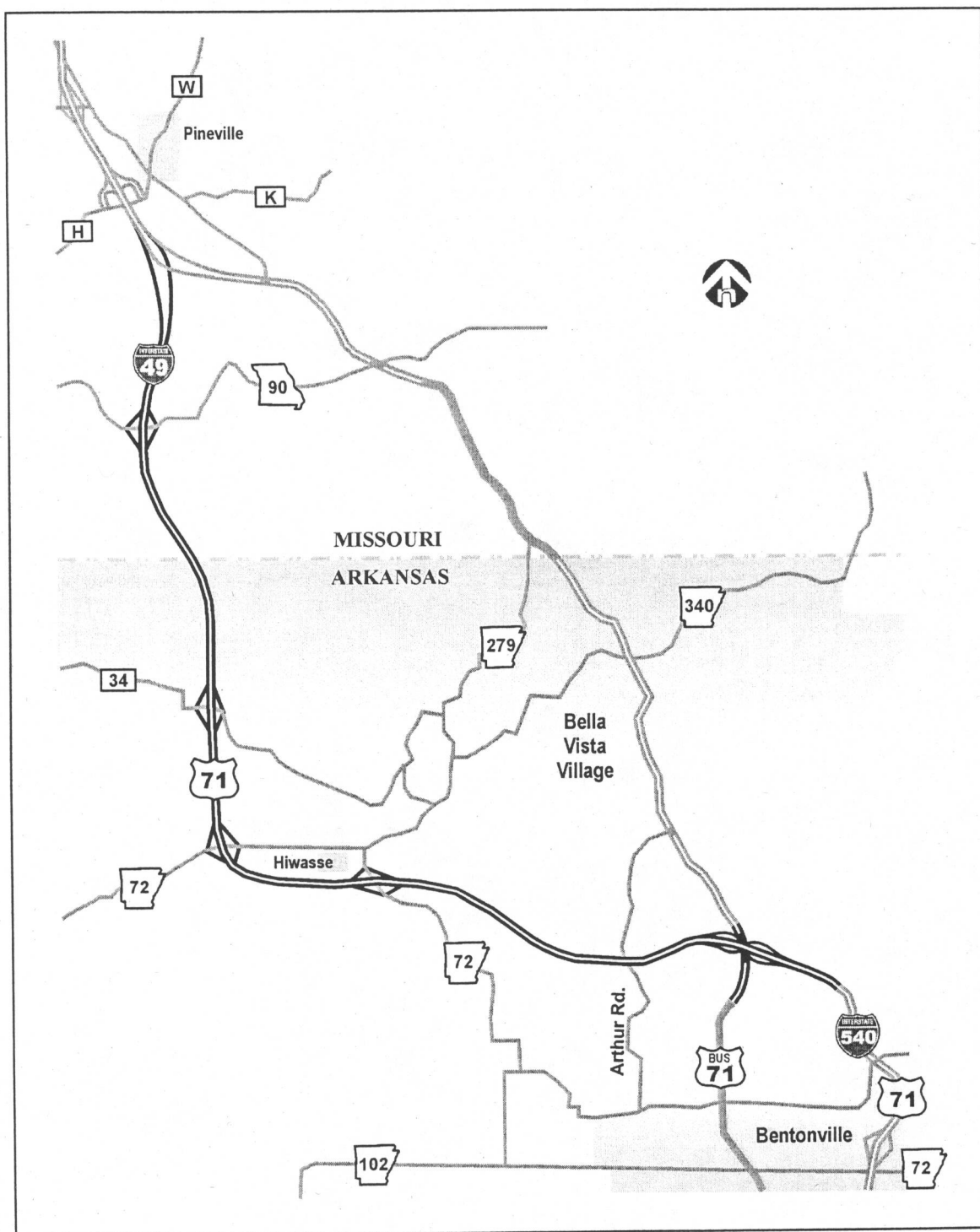


Figure 1: Vicinity Map



## 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

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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 1½:1 (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



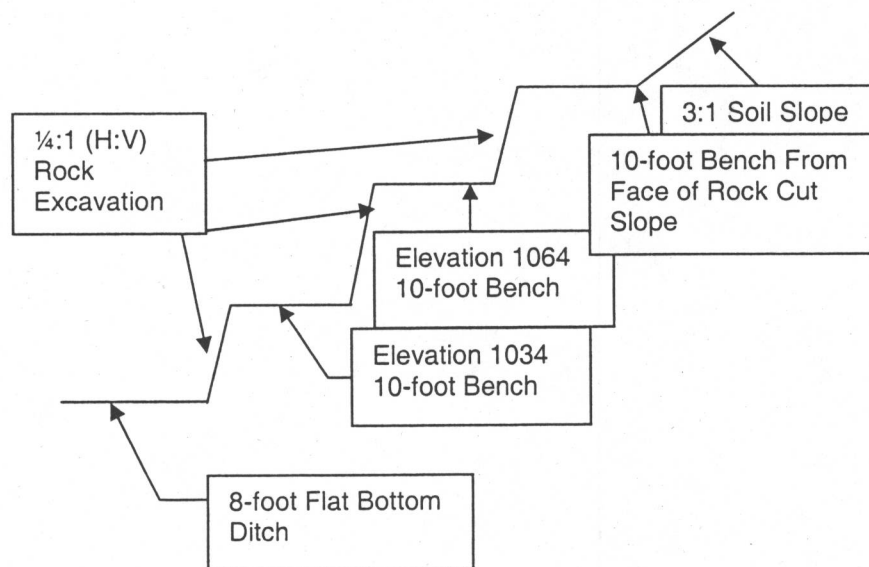
blasting is recommended at all final rock faces to promote long term stability, safety, and reduced maintenance.

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  $\frac{1}{4}$ :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

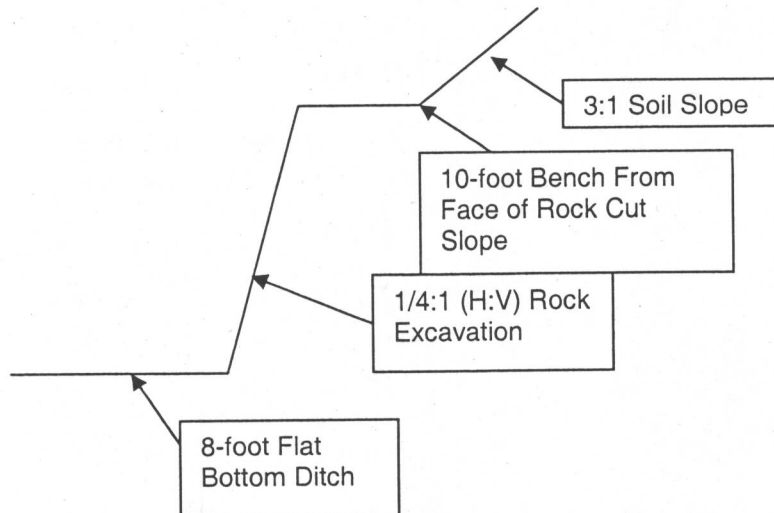
#### Cut – Northbound Lanes – Station 730 to 740

Rock to be cut at  $\frac{1}{4}$ :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.



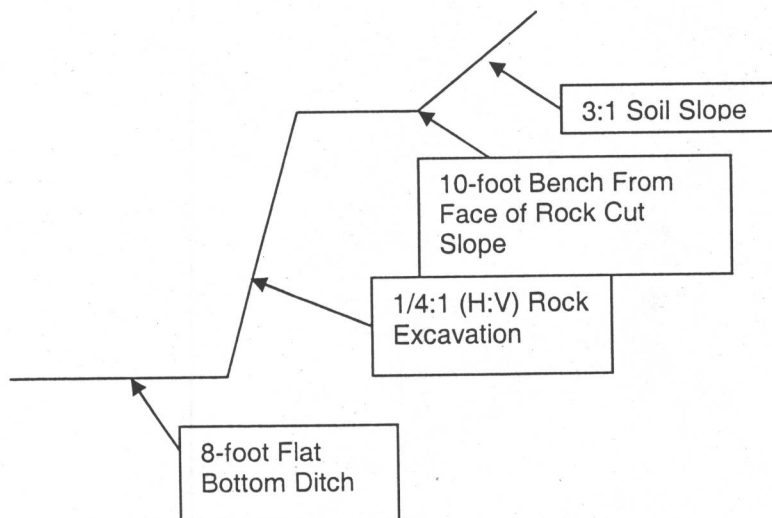
#### Cut – Northbound Lanes – Station 751 to 756

Rock to be cut at  $\frac{1}{4}$ :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**

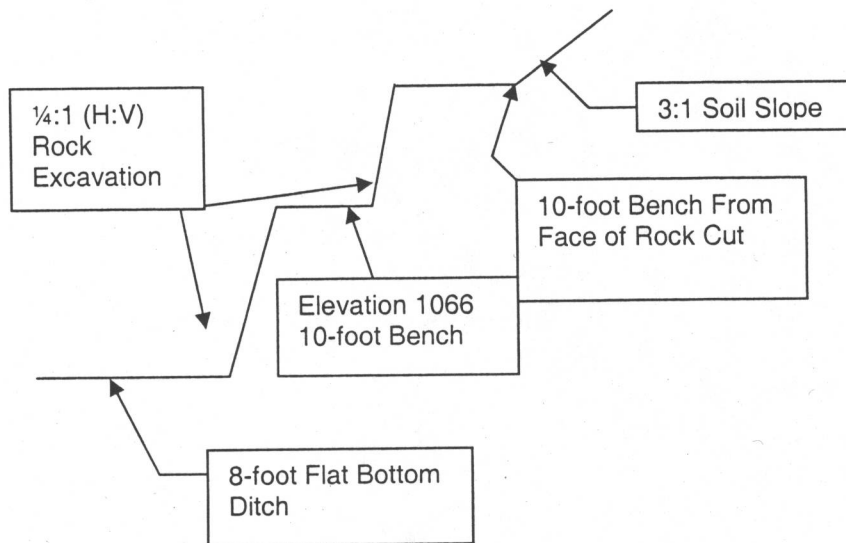
Rock to be cut at 1/4:1 (H:V) from ditch, and 3:1 (H:V) soil backslope. No bench within the rock face is necessary. At the rock cut interface with the soil slope, the soil excavation should be cut 10 feet back from the face of the rock cut slope.



**Cut – I-49 Mainline – Station 773 to 793**

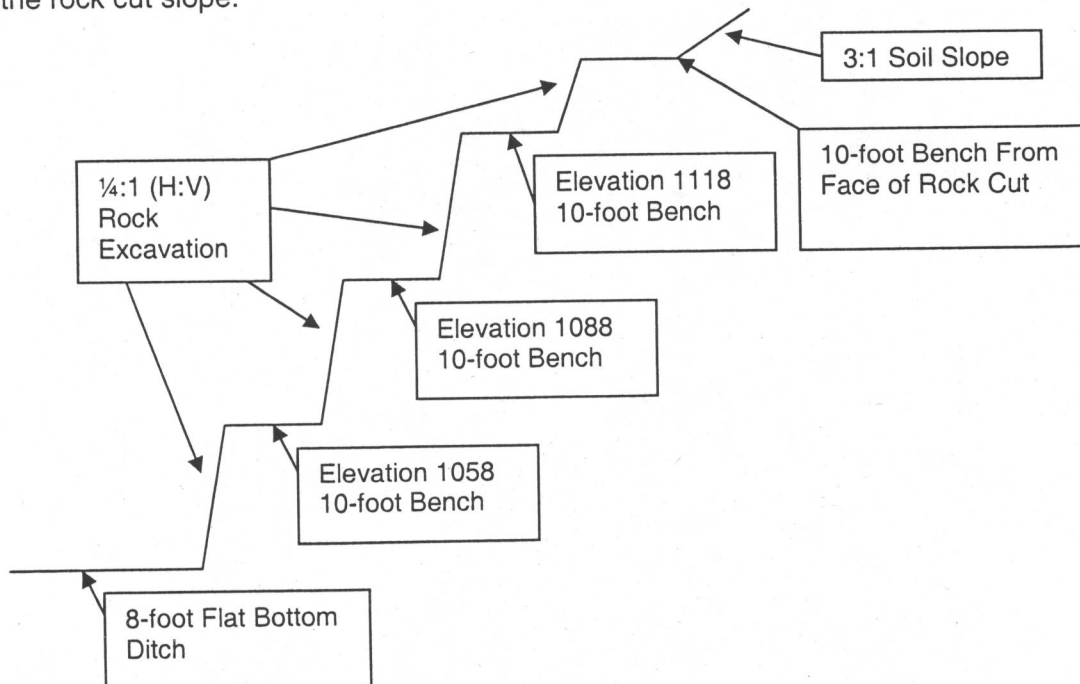
Rock to be cut at 1/4:1 (H:V) from ditch, a 10-foot wide bench at Elevation 1066, and 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At

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

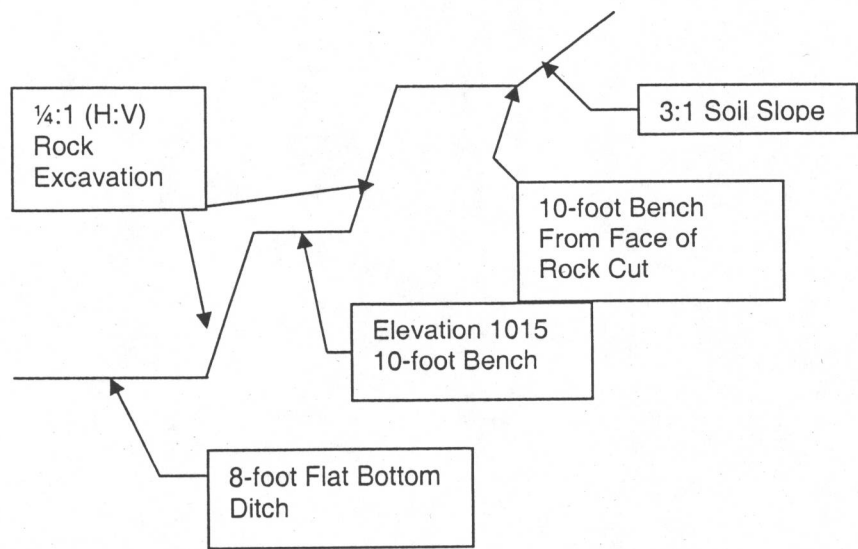
Rock to be cut at  $\frac{1}{4}:1$  (H:V), 10-foot wide benches at Elevations 1058, 1088 and 1118, and 3:1 (H:V) soil backslope. The benches shall be down sloped at 2% from the rock face. At the interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.



#### Cut – I-49 Mainline – Station 819 to 830

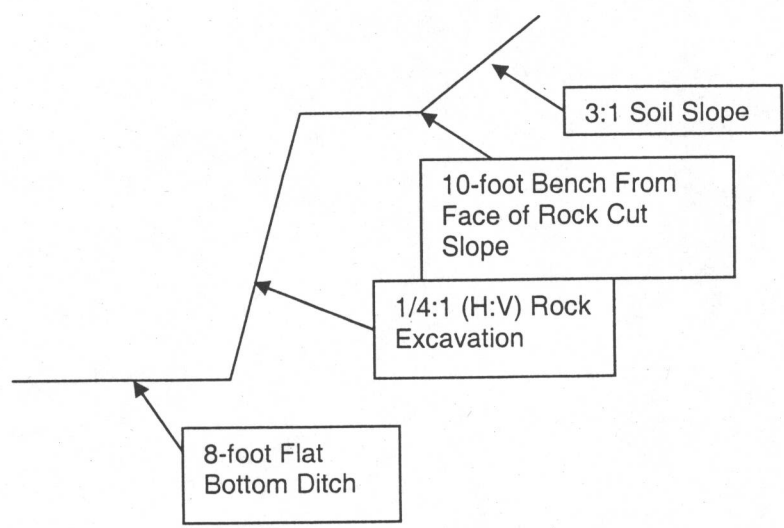
Rock to be cut at  $\frac{1}{4}:1$  (H:V), a 10-foot wide bench at Elevation 1015, and 3:1 (H:V) soil backslope. The bench shall be down sloped at 2% from the rock face. At the rock cut

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**

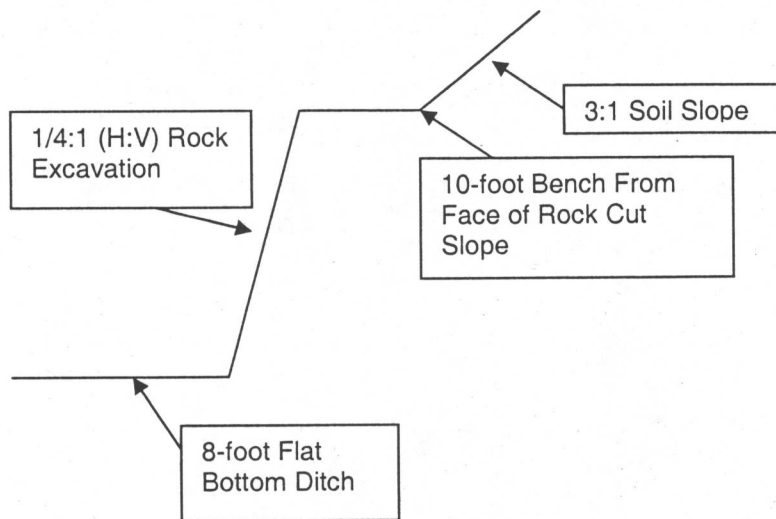
Rock to be cut at 1/4:1 (H:V) from ditch, and 3:1 (H:V) soil backslope. No bench within the rock face is necessary. At the rock cut interface with the soil slope, the soil should be 10 feet back from the face of the rock cut slope.





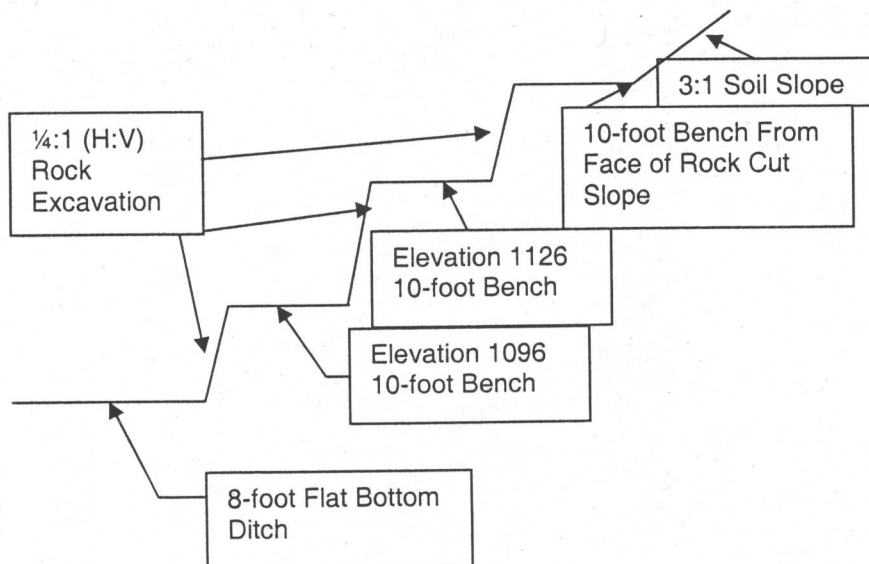
### Cut – I-49 Mainline – Station 903 to 907

Rock to be cut at  $\frac{1}{4}:1$  (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.



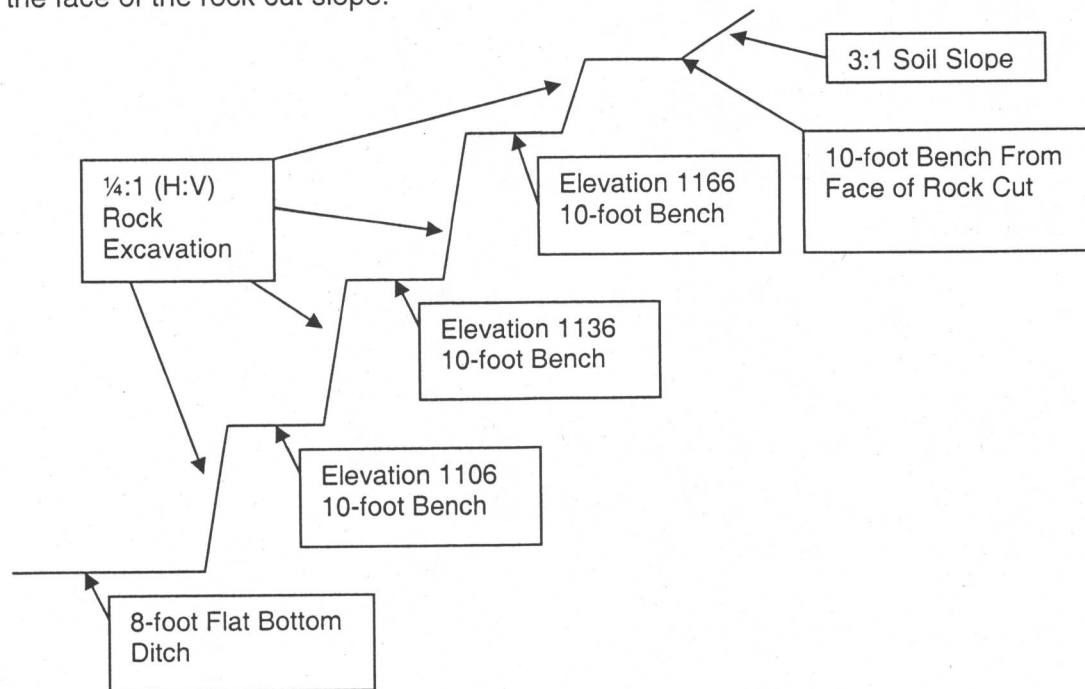
### Cut – I-49 Mainline – Station 912 to 935

Rock to be cut at  $\frac{1}{4}:1$  (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  $\frac{1}{4}$ :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

- 18
- 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

\* NRPPCP—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

\* NRPPCP—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

EXIST. R/W

PC  
STA. 727+42.03

PT  
STA. 722+77.90

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

GOODIN HOLLOW CREEK

RELOCATED GOODIN HOLLOW CREEK

736+64.03  
574.41

- 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

PROJECT NO. J7P0601  
SCALE 202.866667:1.000000  
PEN TABLE m:\jobs\34905\missouri\library\pentable\geotech\fig1.dgn  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig1.dgn

HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 4
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

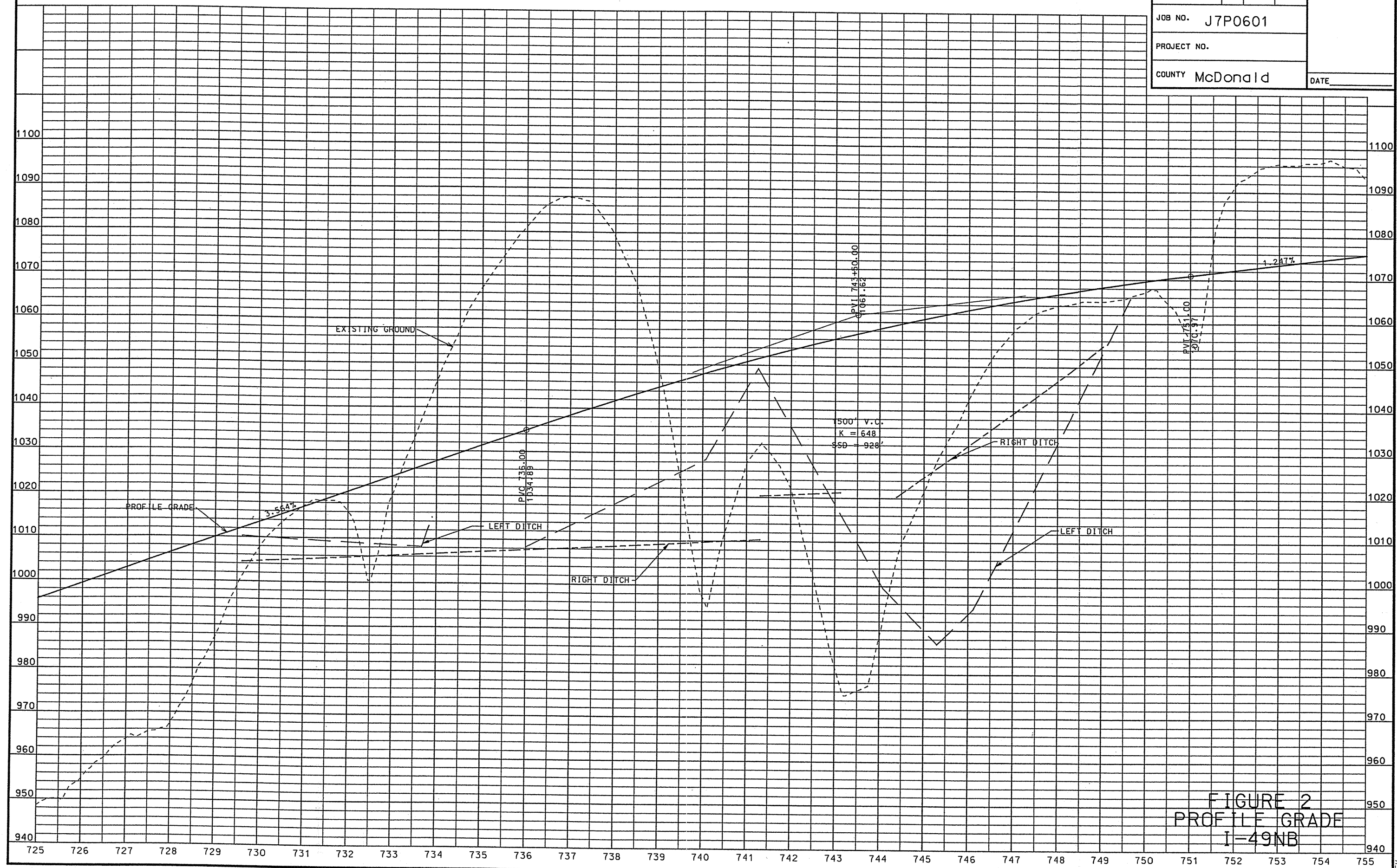


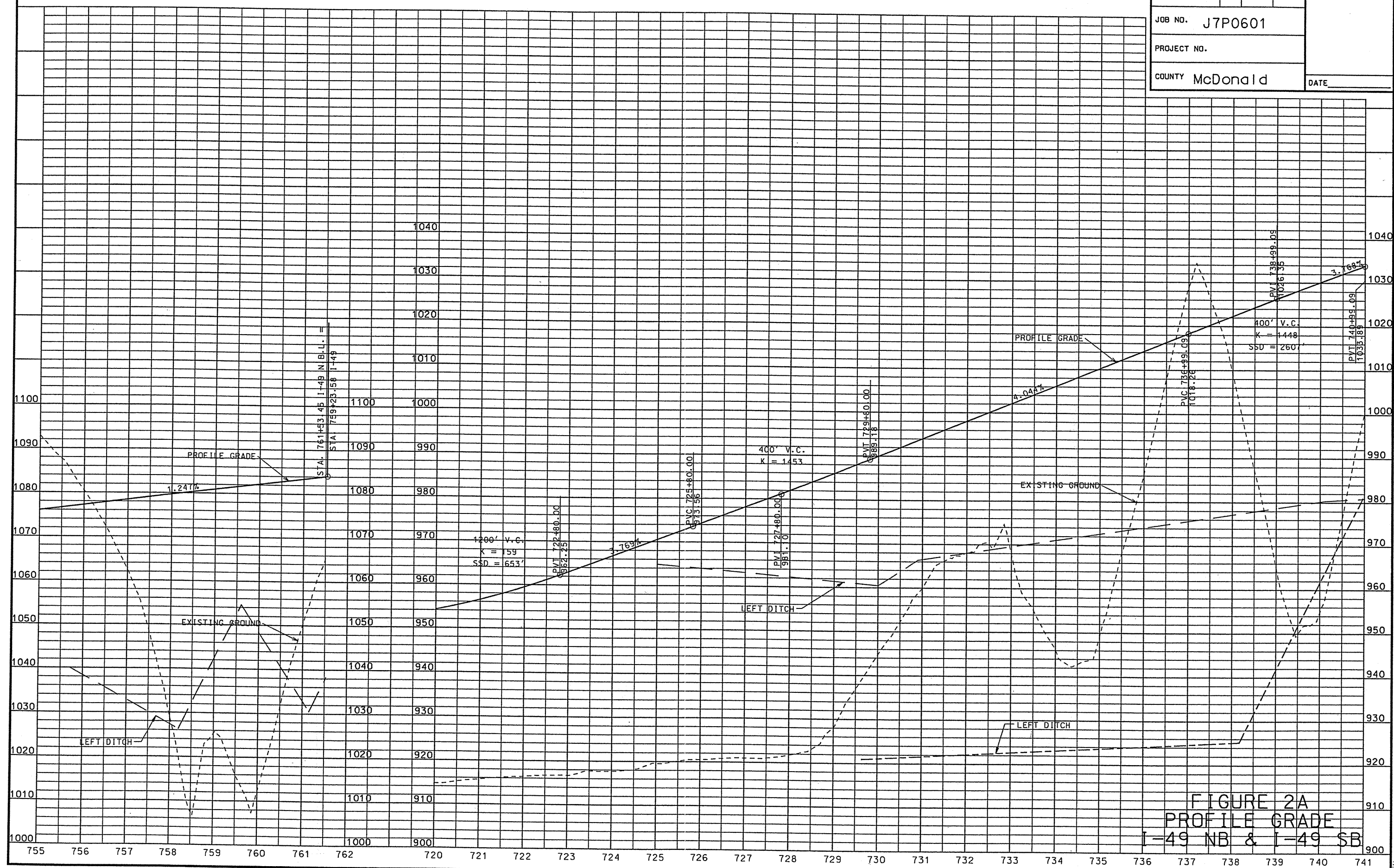
FIGURE 2  
PROFILE GRADE  
I-49NB

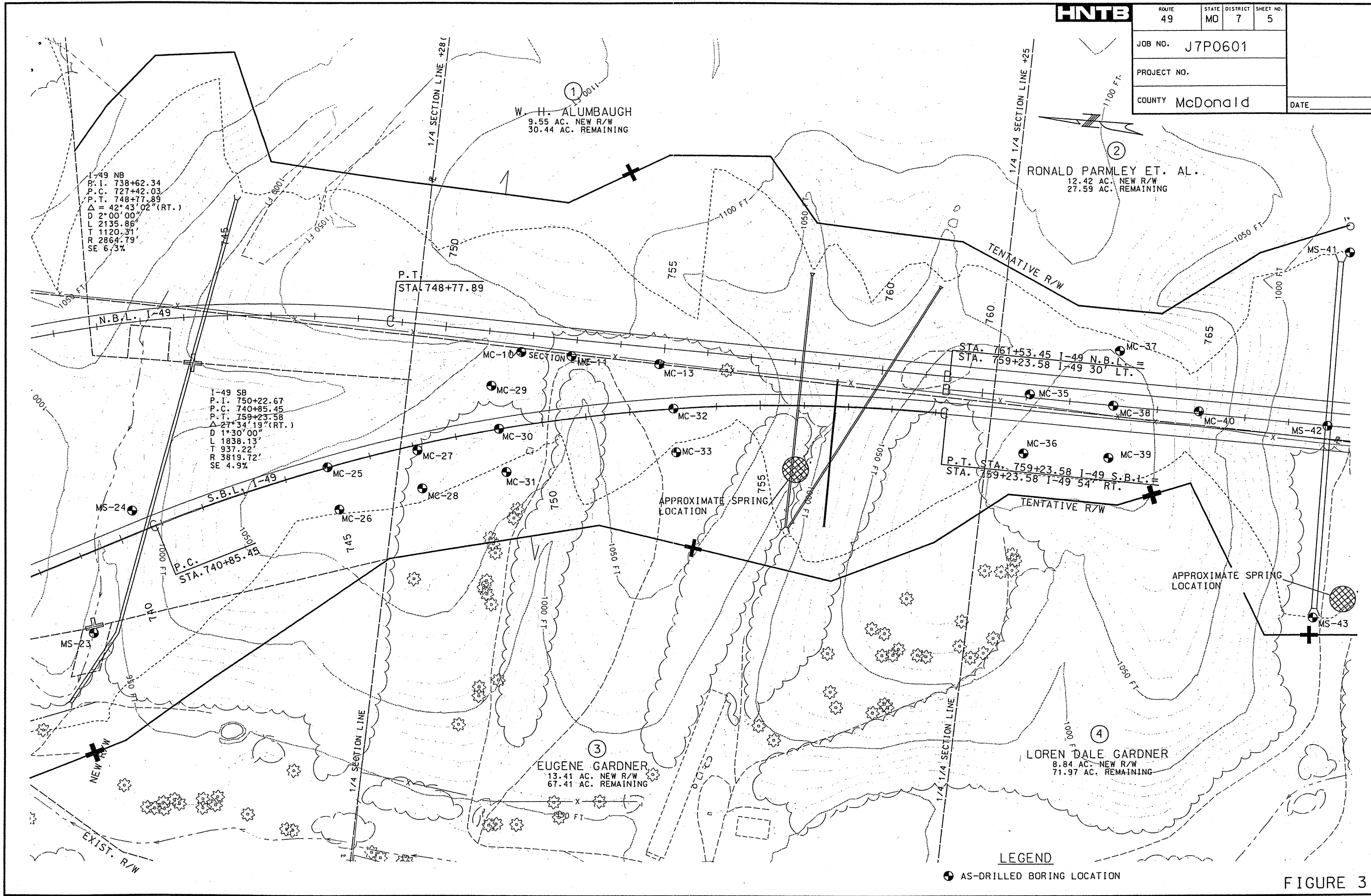
USER NAME: JUV  
DATE: 05-DEC-2003 14:01  
PEN TABLE: m:\jobs\34905\missouri\library\pentable\highalf.pen  
DESIGN FILE: m:\jobs\34905\geotech\missouri\exhibits\fig2.dgn



HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 6
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			





USER NAME CLGW  
PEN TABLE m:\jobs\34905\missouri\library\pentable\geotech\pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig3.dgn

DATE 12-FEB-2004 09:04

IP PROJ. NO. NONE

SCALE 202.866669:1.000000



HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 7
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

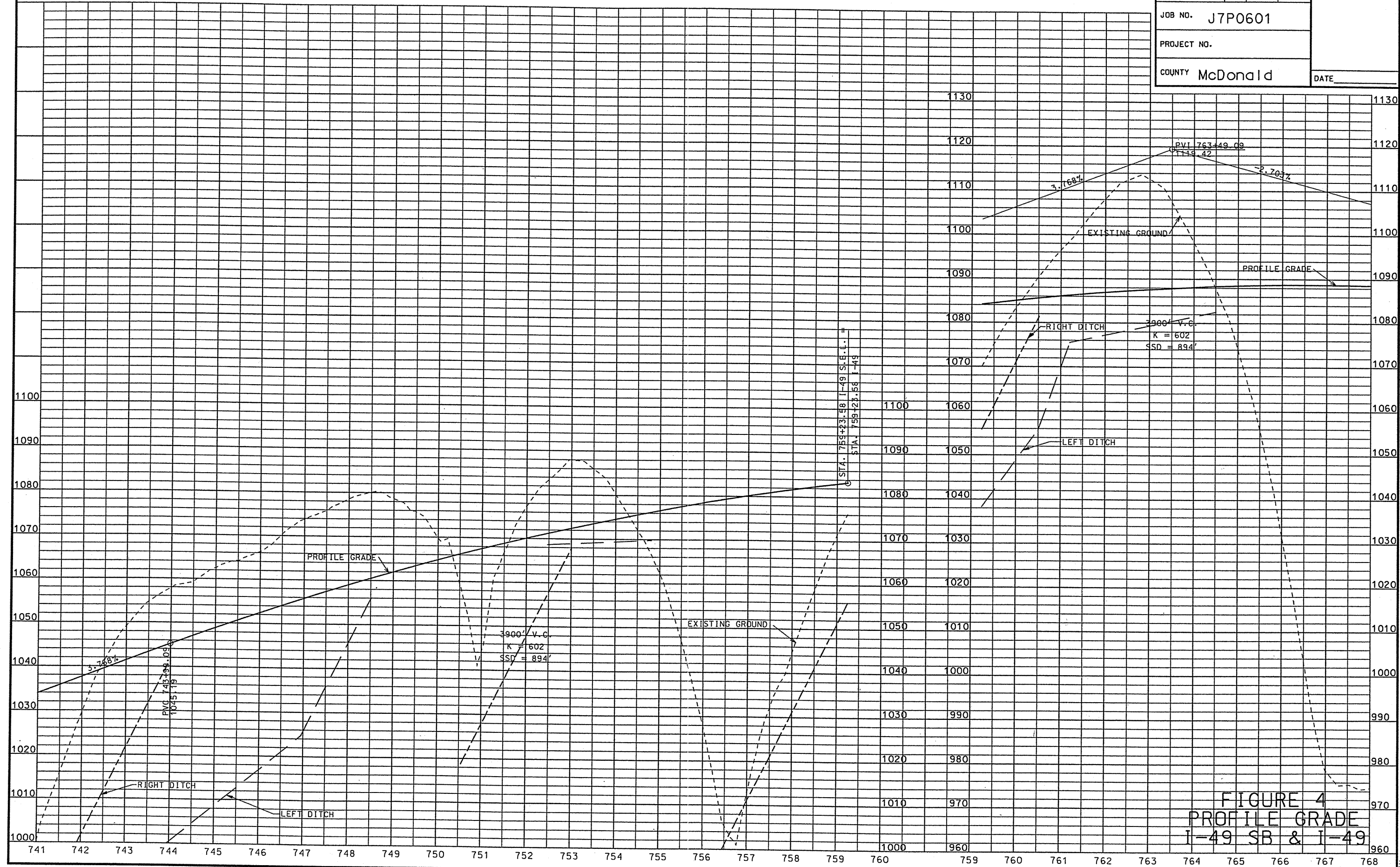


FIGURE 4  
PROFILE GRADE  
I-49 SB & I-49 NB

FILE NAME: DATE 05-DEC-2003 14:11  
PEN TABLE: M:\jobs\34905\Missouri\Library\pentable\highway.pen  
DESIGN FILE: M:\jobs\34905\geotech\missouri\exhibits\fig4.dgn

USER NAME CLOW DATE 12-FEB-2004 09:10  
PEN TABLE m:\jobs\34905\missouri\library\pentable\geotech\pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig5.dgn  
IP PROJ. NO. NONE  
SCALE 202.866641:000000

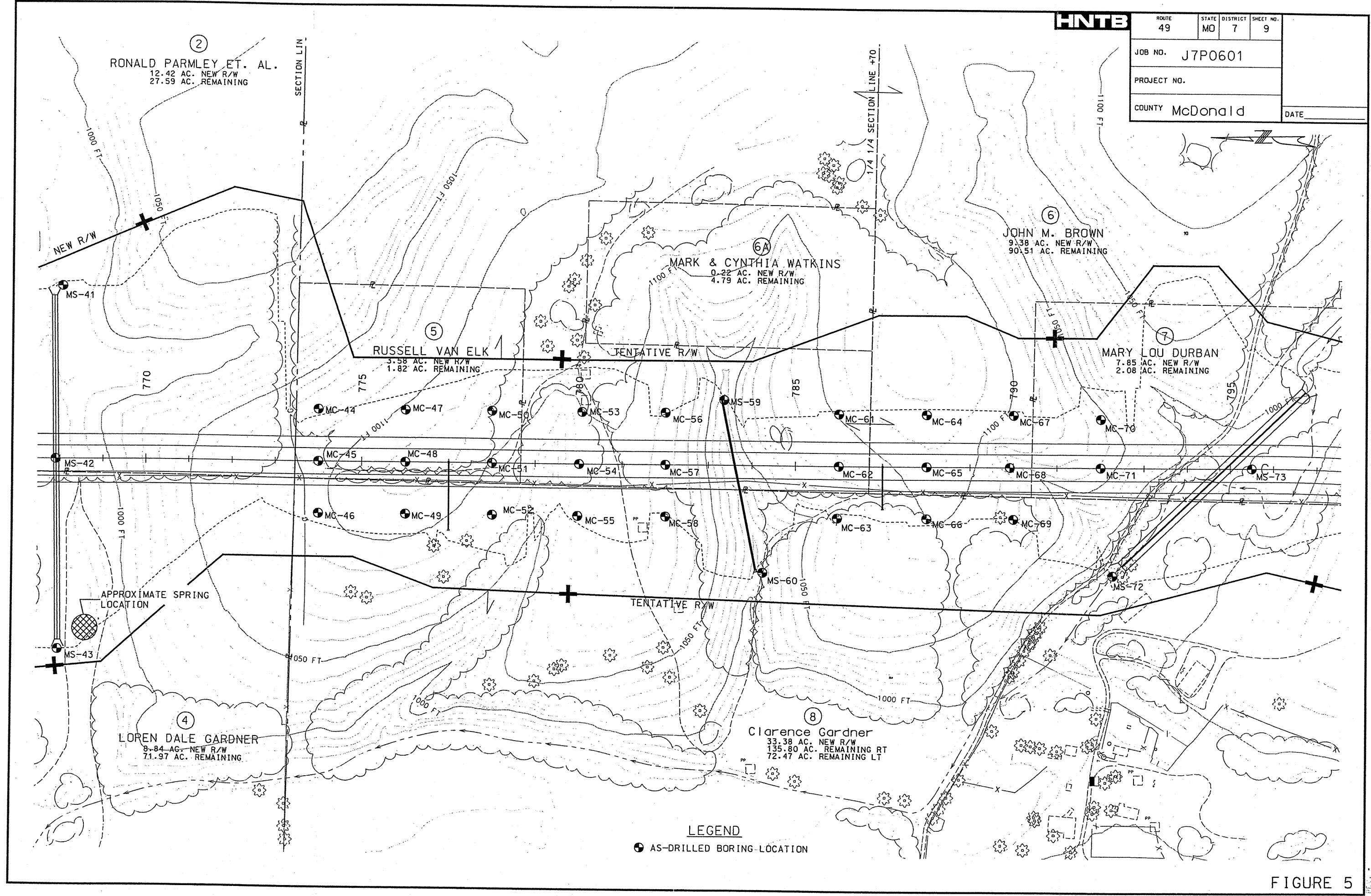


FIGURE 5

HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 10
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			DATE

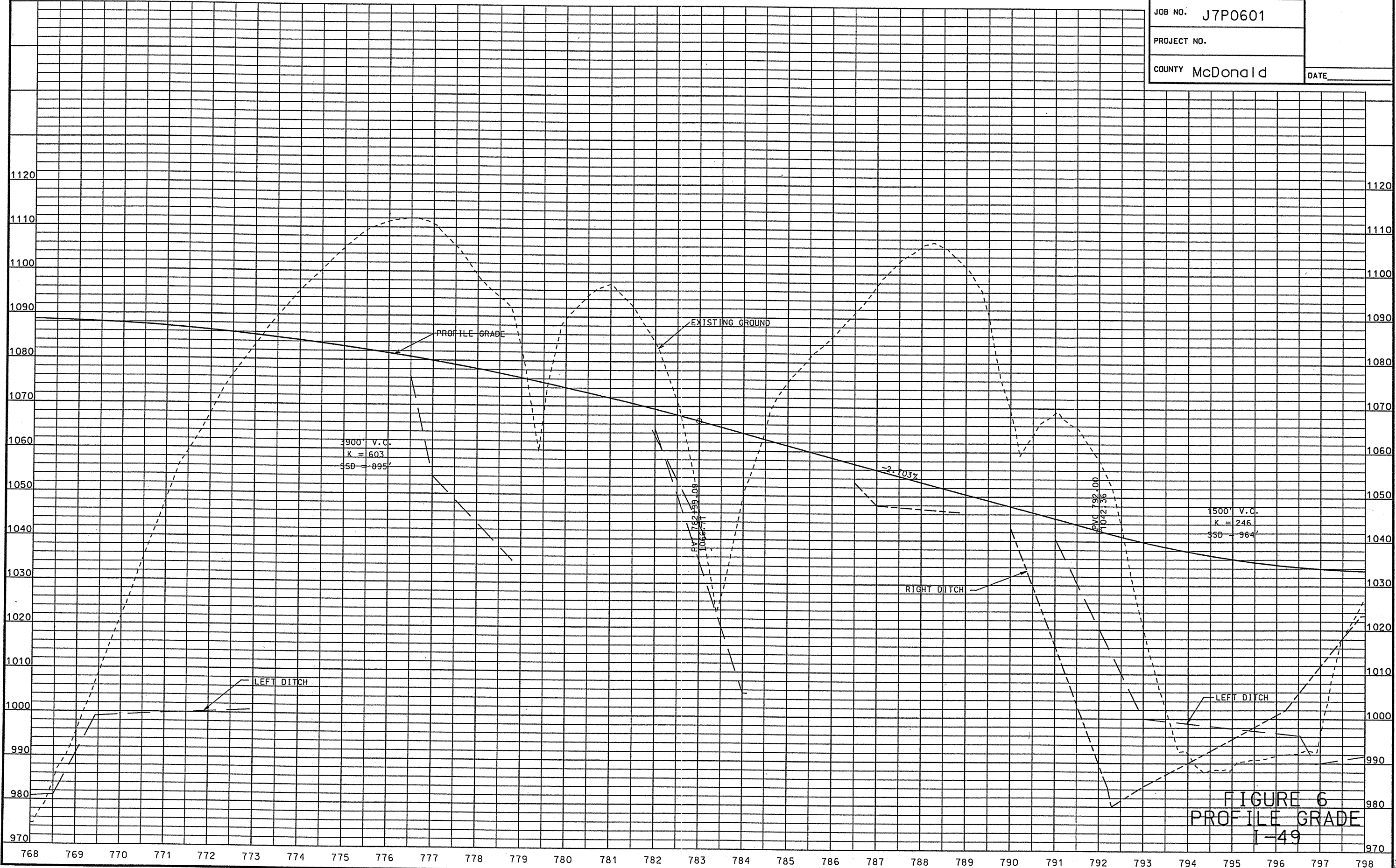


FIGURE 6  
PROFILE GRADE  
I-49

USER NAME caw  
PEN TABLE m:\jobs\34905\missouri\library\pentable\highait.pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig6.dgn  
DATE 05-DEC-2003 14l  
IP PROJ. NO. NONE  
SCALE 202.866664:1.000000





HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 12
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

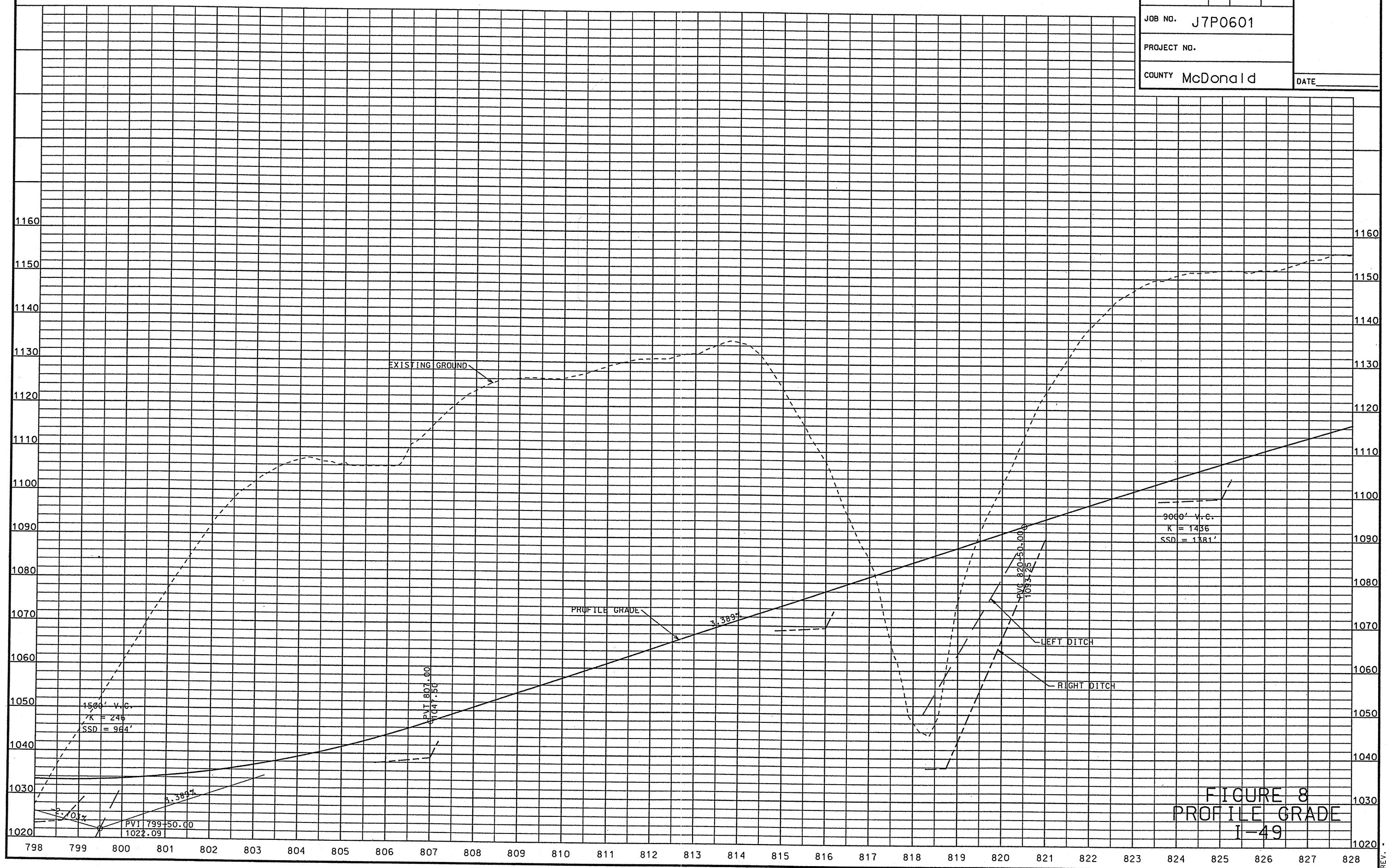


FIGURE 8  
PROFILE GRADE  
I-49

USER NAME: ckw  
DATE: 05-DEC-2003 14:12  
PEN TABLE: m:\jobs\34905\missouri\library\pentable\highalf.pen  
DESIGN FILE: m:\jobs\34905\geotech\missouri\exhibits\fig8.dgn

**HNTB**

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 13
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			DATE

CAUTION:  
16" H.P. GAS  
LINE

(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.  
9.25 AC. REMAINING LT.

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\pentabla\geotech\pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig9.dgn  
IP PROJ. NO. NONE  
SCALE 202.866662:1.000000



HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 14
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			DATE

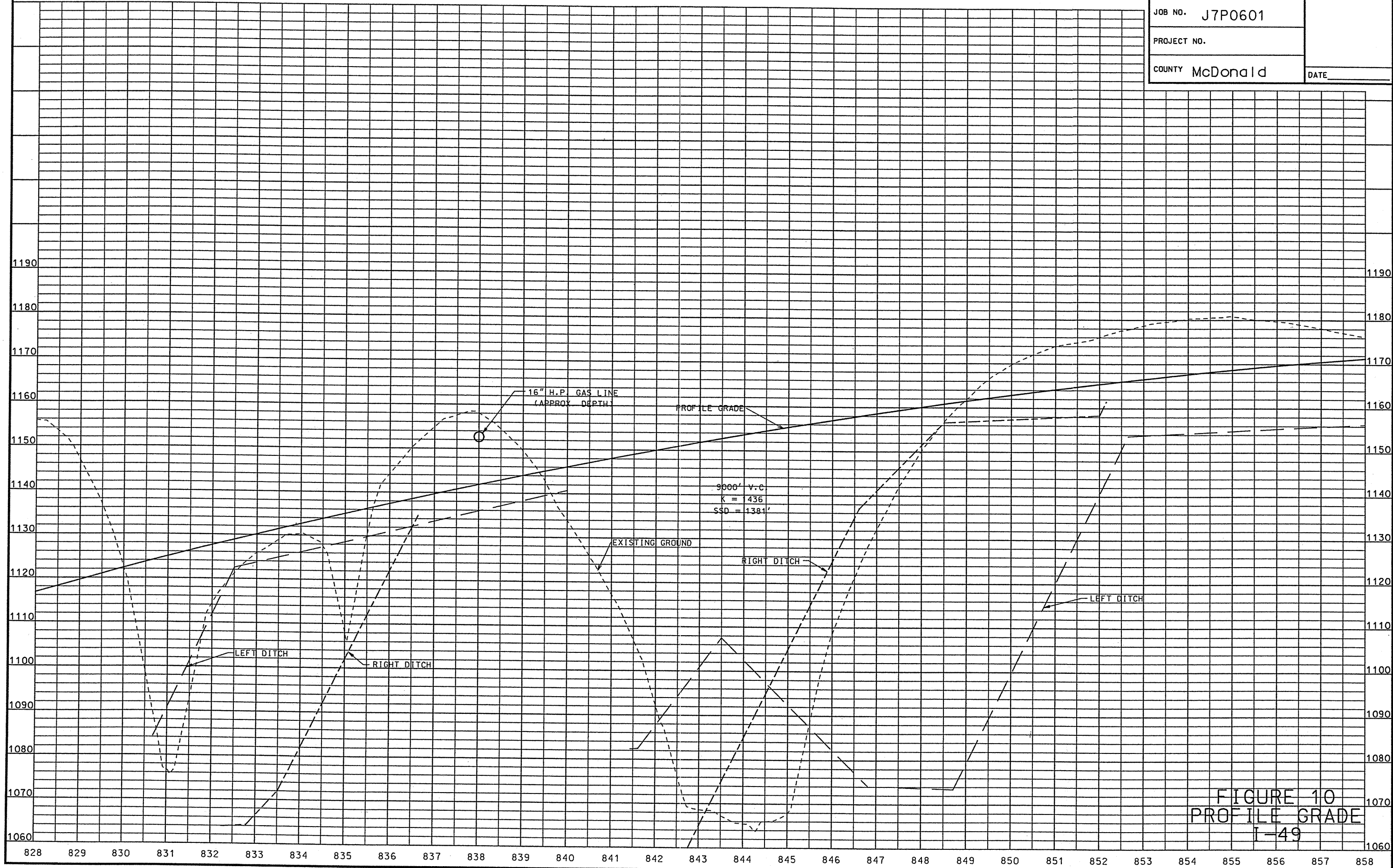
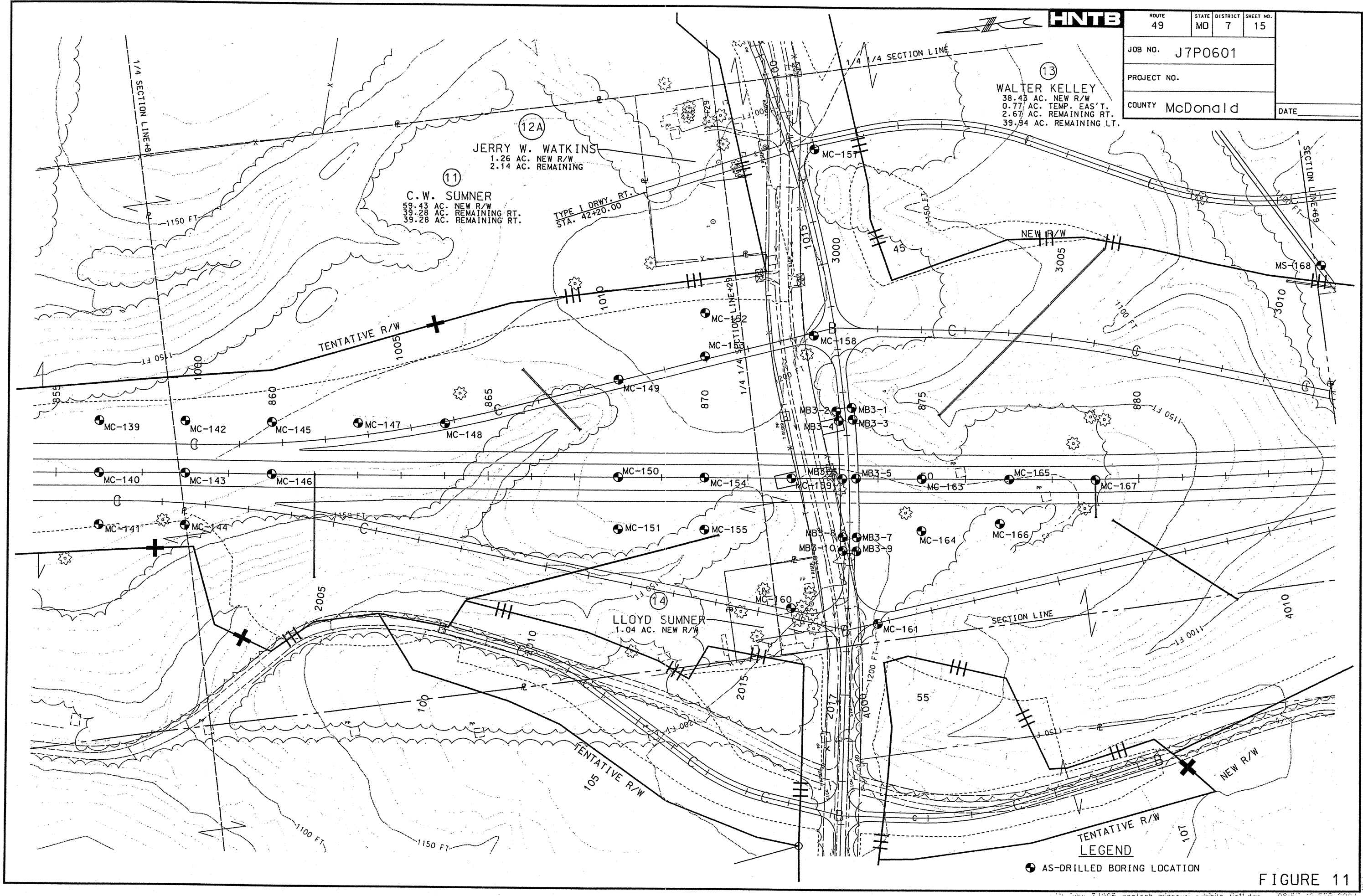


FIGURE 10  
PROFILE GRADE  
I-49

USER NAME: cldw  
PEN TABLE: m:\jobs\34905\missouri\library\pentable\highalf.pen  
DESIGN FILE: m:\jobs\34905\geotech\missouri\exhibits\fig10.dgn  
IP PROJ. NO.: NONE  
SCALE: 202.866714.000000  
DATE: 05-DEC-2003 14:13

USER NAME CLOW  
PEN TABLE m:\jobs\34905\missouri\library\pentable\geotech\fig11.dgn  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig11.dgn  
IP PROJ NO. NONE  
SCALE 202.866667:1.000000  
DATE 12-FEB-2004 08:57



**HNTB**

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 16
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

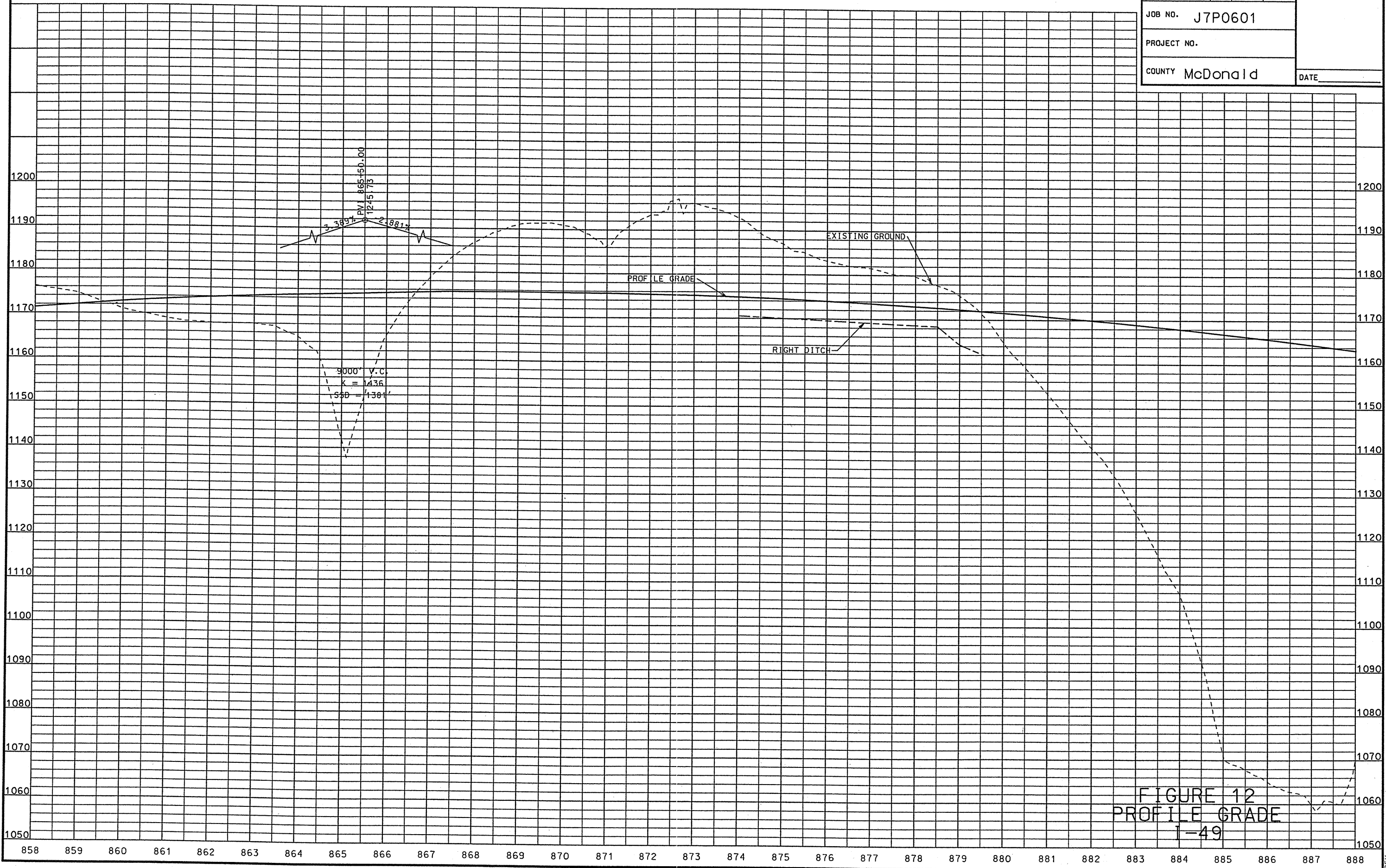


FIGURE 12  
PROFILE GRADE  
I-49

USER NAME: jdw DATE: 05-DEC-2003 14:14  
PEN TABLE: M:\Jobs\34905\Missouri\Library\pentable\highd.pen  
DESIGN FILE: M:\Jobs\34905\geotech\missouri\exhibits\fig12.dgn



HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 17
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

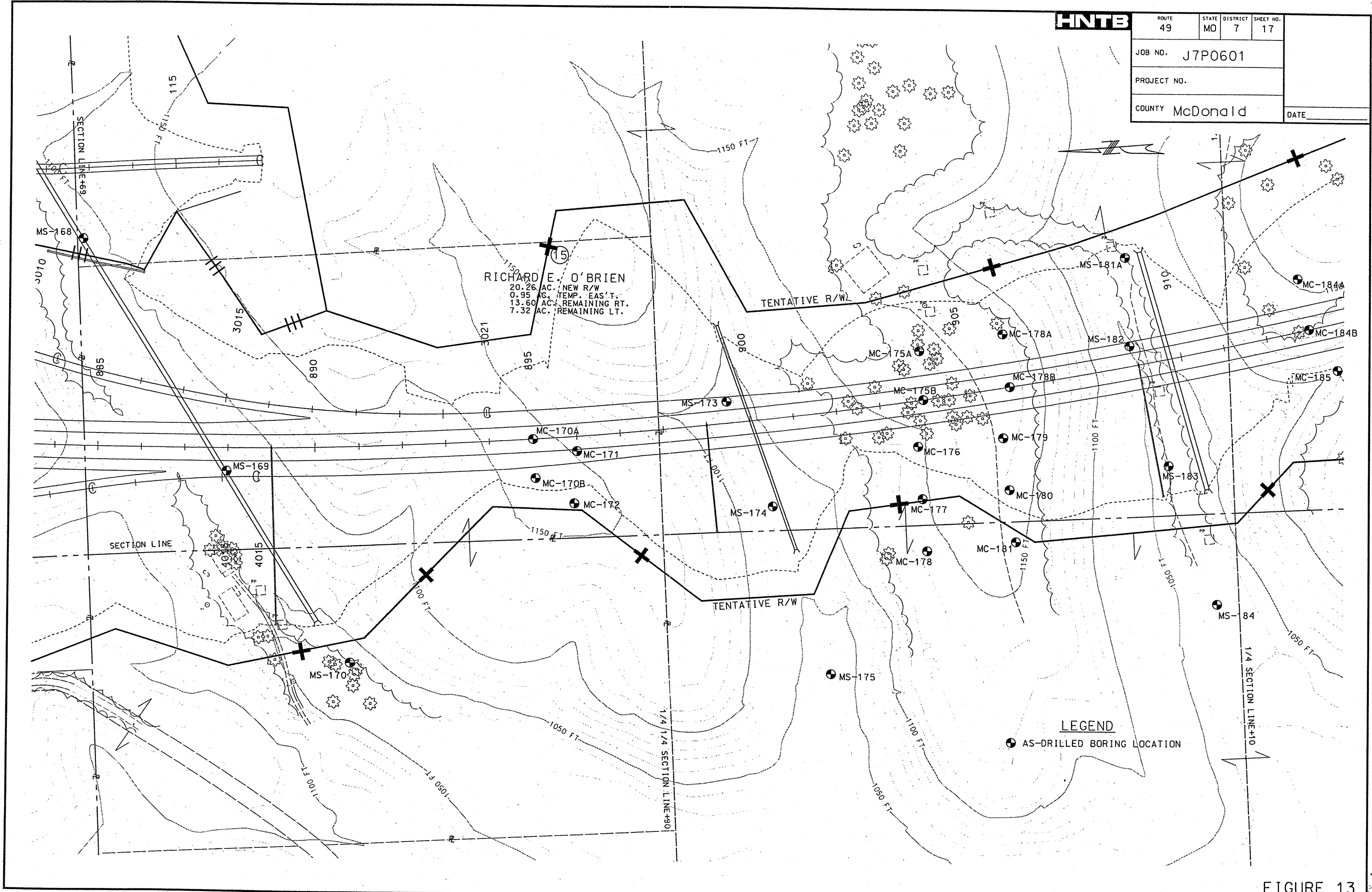
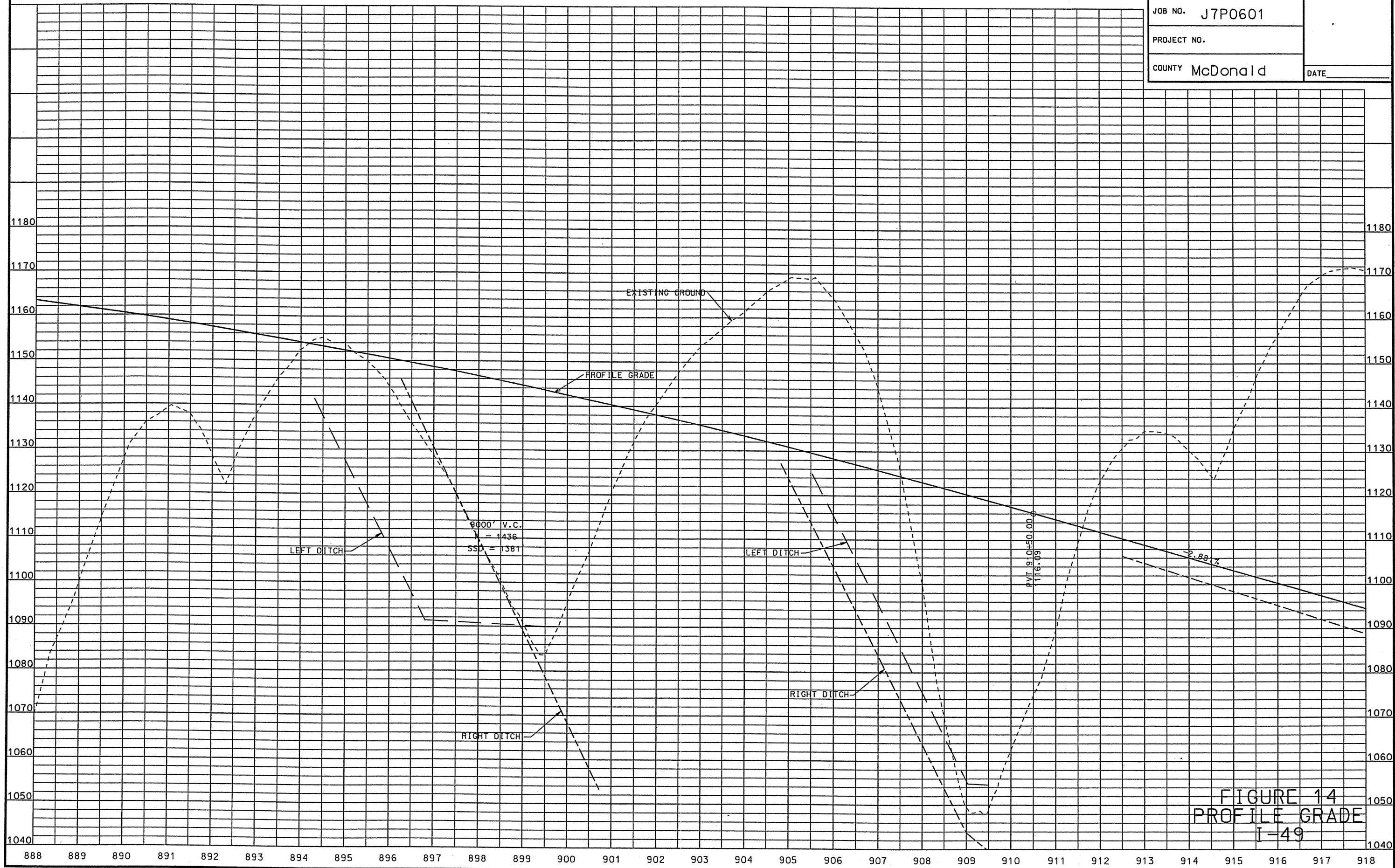


FIGURE 13

USER NAME CLW  
PEN TABLE  
DESIGN FILE  
DATE 12-FEB-2004 09:16  
SCALE 202.86666661:000000  
IP PROJ NO. NONE  
SCALE 202.86666661:000000

HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 18
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			



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

**HNTB**

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 20
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

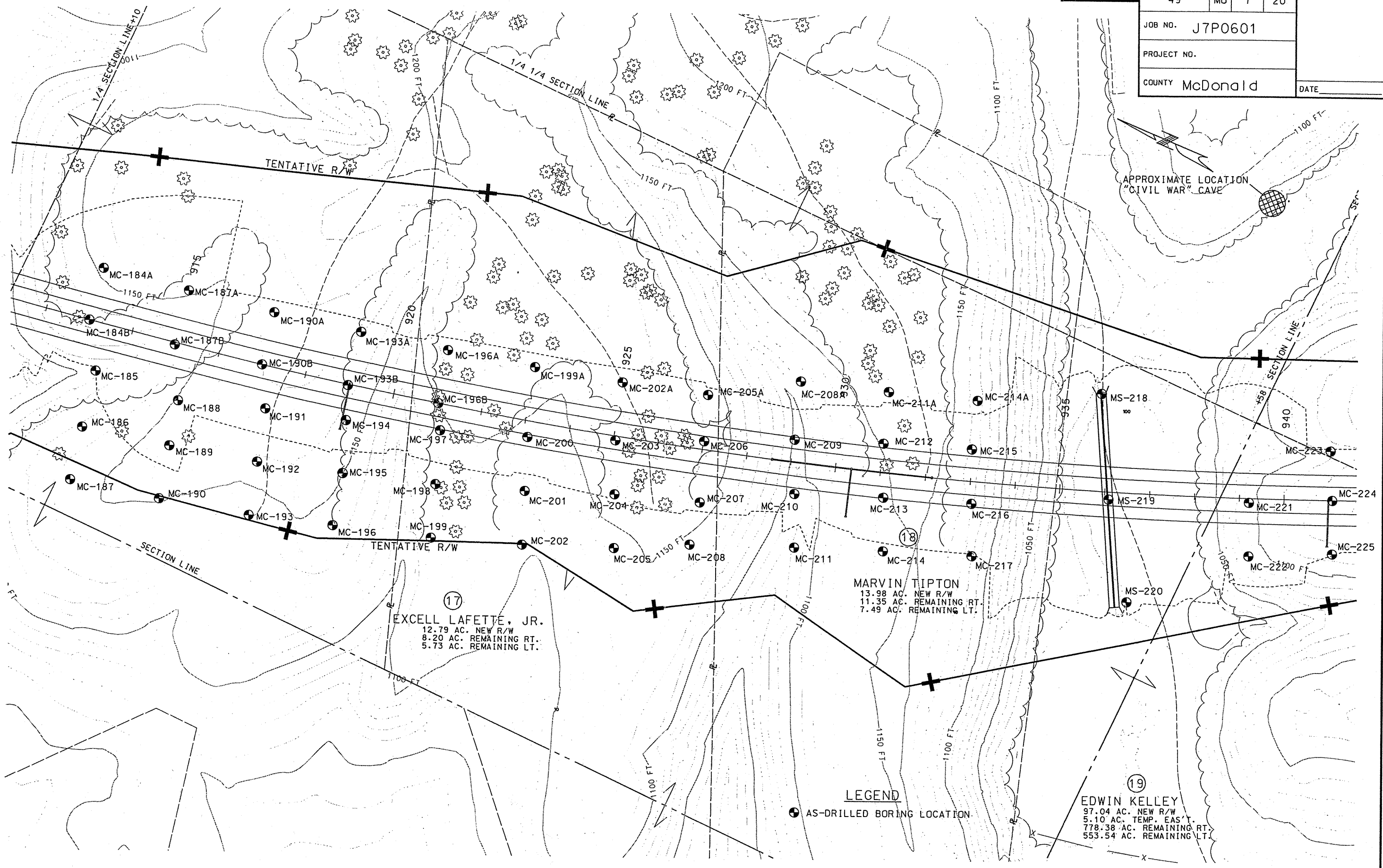


FIGURE 15

USER NAME CLOW  
 PEN TABLE m:\Jobs\34905\Missouri\Library\pentable\GEOTECH\pen  
 DESIGN FILE M:\Jobs\34905\geotech\missouri\exhibits\fig15.dgn  
 DATE 12-FEB-2004 09:18  
 IP PROJ. NO. NONE  
 SCALE 202.8666724:000000



HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 21
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			DATE

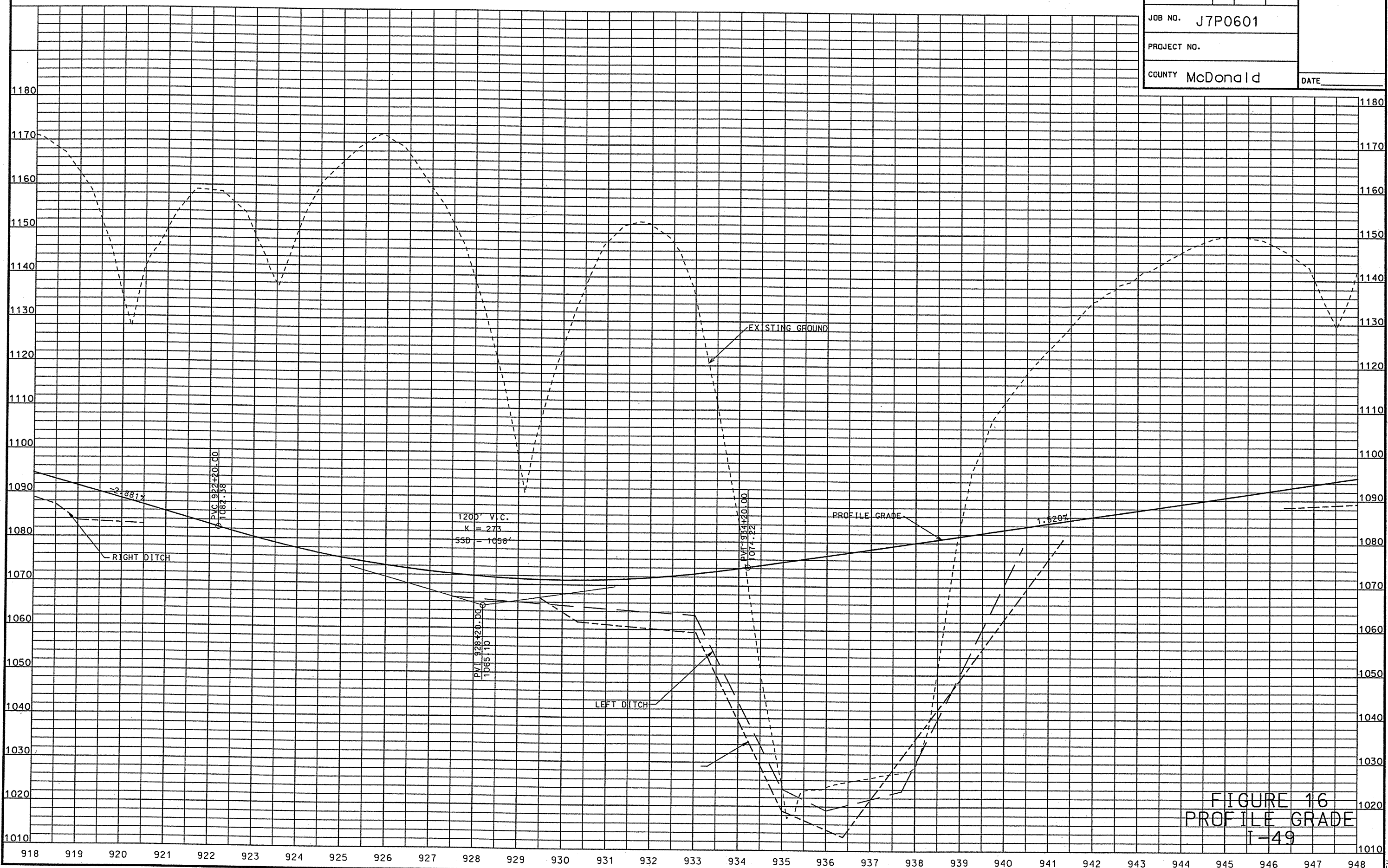
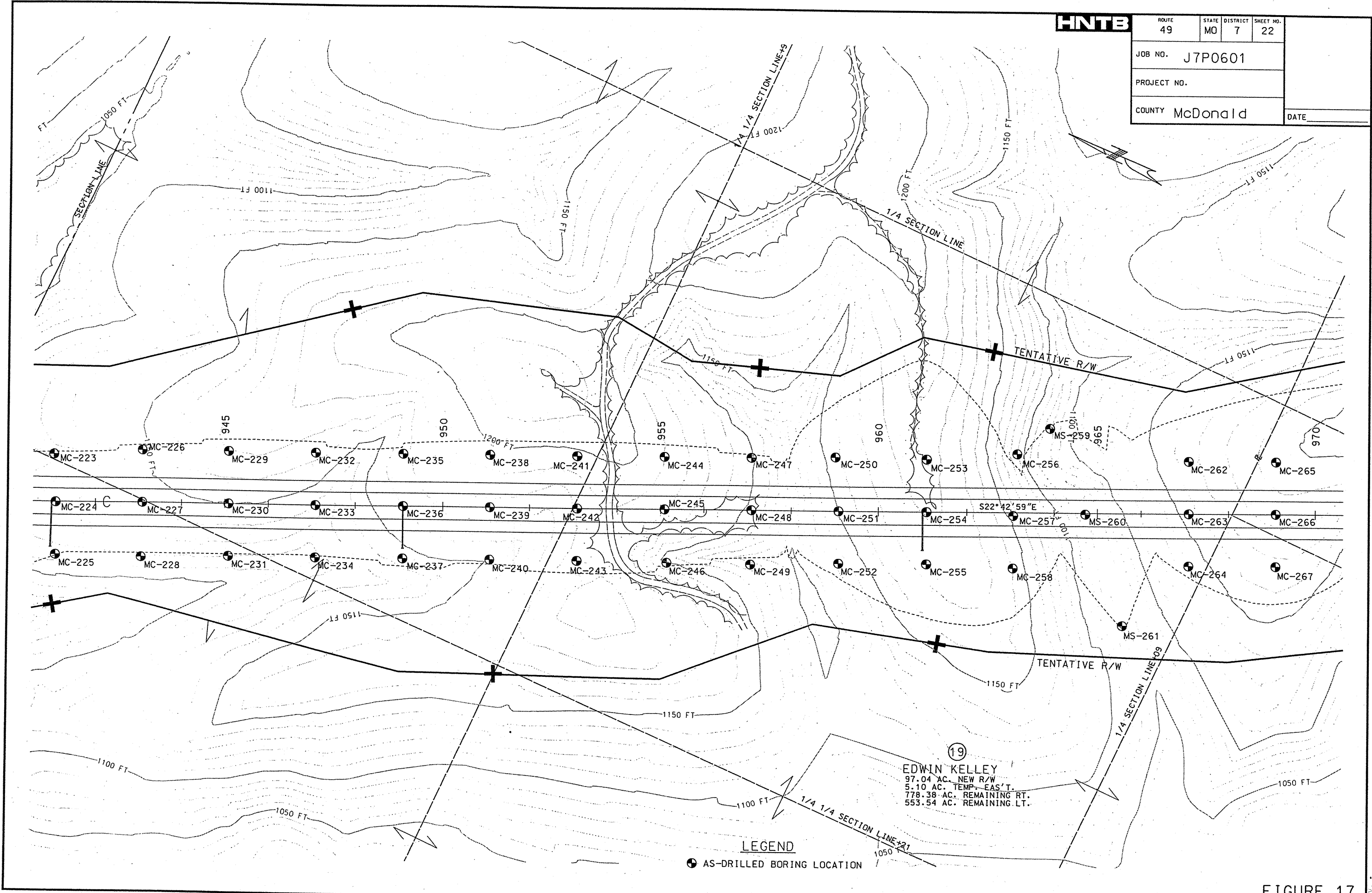


FIGURE 16  
PROFILE GRADE  
I-49

USER NAME caw  
DATE 05-DEC-2003 1416  
PEN TABLE m:\jobs\34905\missouri\library\pentable\highait.pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig16.dgn

HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 22
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

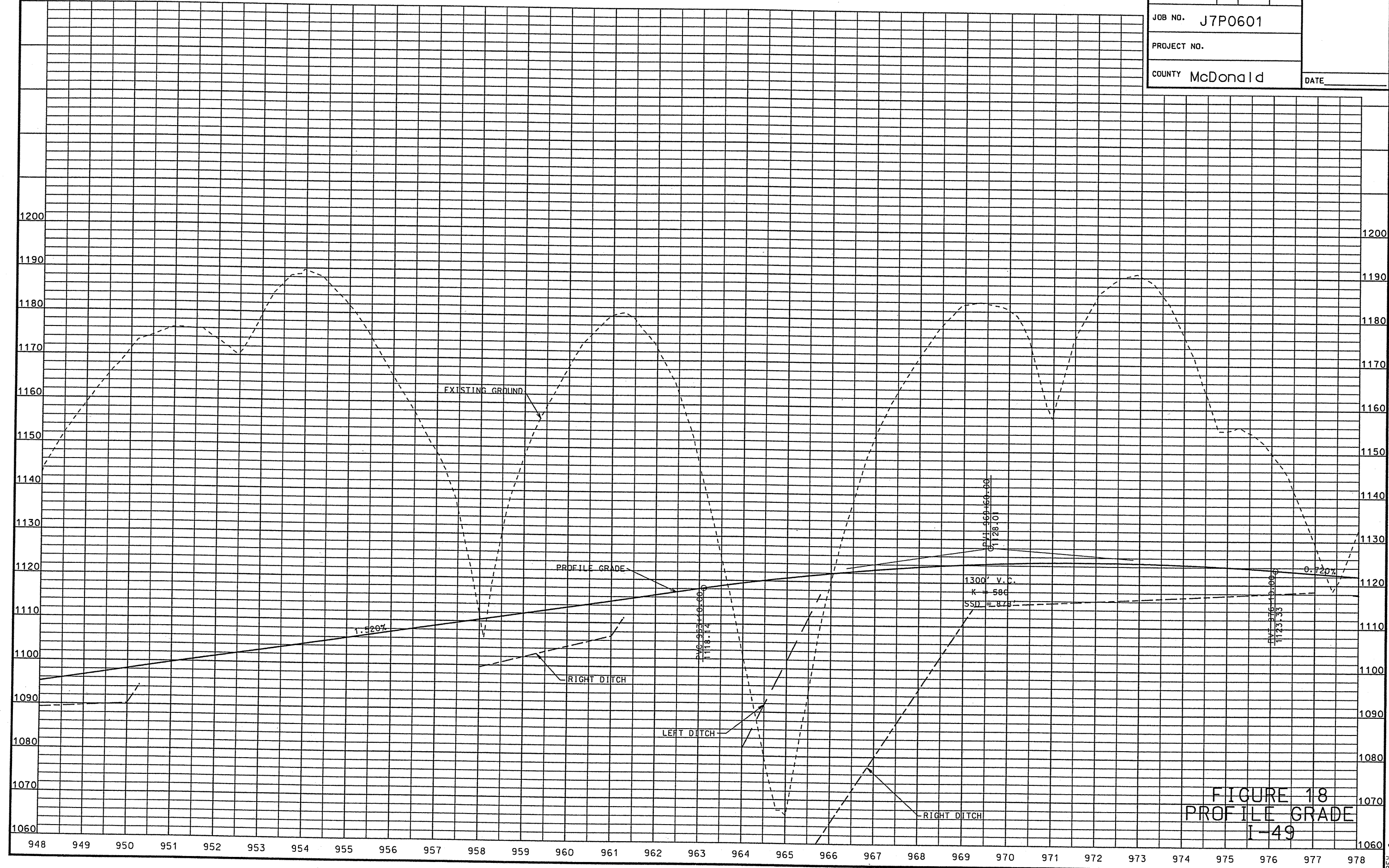


USER NAME CLW  
PEN TABLE m:\jobs\34905\missouri\library\geotech\pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig17.dgn  
DATE 12-FEB-2004 09:19  
IP PROJ. NO. NONE  
SCALE 202.8666341.000000

FIGURE 17

HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 23
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			



USER NAME caw  
DATE 05-DEC-2003 14:17  
PEN TABLE m:\jobs\34905\missouri\library\pentable\highait.pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig18.dgn

HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 24
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			
DATE			

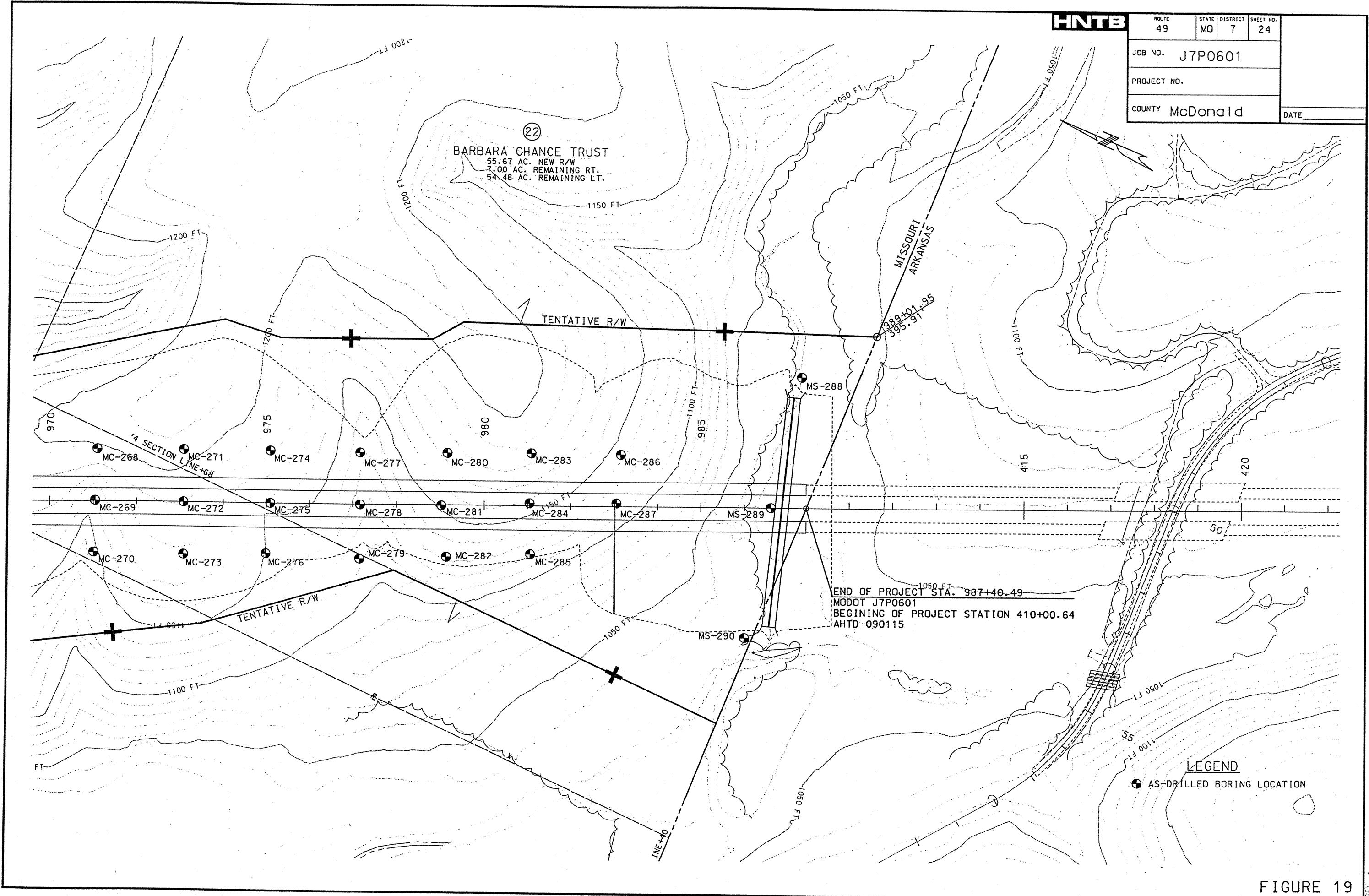


FIGURE 19

USER NAME CLOW  
PEN TABLE m:\jobs\34905\Missouri\Library\pentable\geotech\pen  
DESIGN FILE m:\jobs\34905\geotech\missouri\exhibits\fig19.dgn  
IP PROJ NO. NONE  
SCALE 202.866631:000000  
DATE 12-FEB-2004 09:29



HNTB

ROUTE 49	STATE MO	DISTRICT 7	SHEET NO. 25
JOB NO. J7P0601			
PROJECT NO.			
COUNTY McDonald			DATE

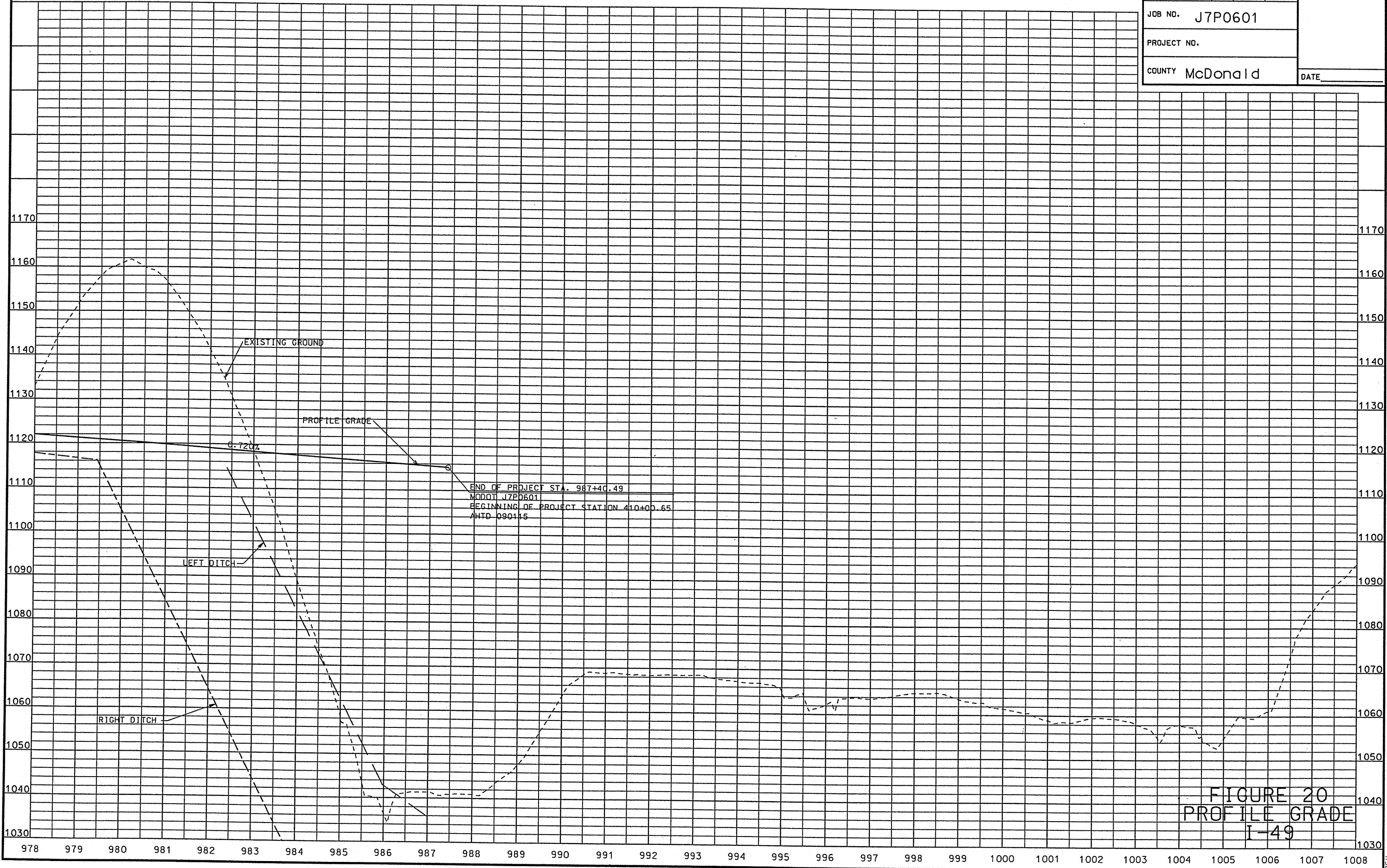


FIGURE 20  
PROFILE GRADE  
I-49

USER NAME cldw DATE 05-DEC-2003 1418  
PEN TABLE m:\jobs\34905\missouri\library\pentable\highait.pen  
DESIGN FILE M:\jobs\34905\geotech\missouri\exhibits\fig20.dgn  
IP PROJ. NO. NONE  
SCALE 202.86563:1.000000

## 9.0 BORING LOGS



## 9.1 As-Drilled Boring Coordinates

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

Boring No.	Northing	Easting	Boring No.	Northing	Easting	Boring No.	Northing	Easting
<b>I-49 NBL OVER US-71 SBL</b>			<b>ROADWAY BORINGS CONTINUED</b>			<b>ROADWAY BORINGS CONTINUED</b>		
MBS-1	145647.8928	2823511.4875	MC-30	143962.0480	2823602.1748	MS-72	139648.3218	2823455.8195
MBS-2	145467.1907	2823581.4382	MC-31	143937.5127	2823505.2315	MS-73	139322.3647	2823699.3208
MBS-3	145284.0427	2823635.6887	MC-32	143569.8489	2823679.8517	MS-74	139057.3878	2823887.6677
MB1-1	145572.9041	2823516.2888	MC-33	143555.5813	2823580.8747	MC-75	138857.2942	2823786.6502
MB1-2	145483.4773	2823596.0160	MC-35	142763.5295	2823775.4619	MC-76	138872.7323	2823667.6475
MB1-3	145385.7638	2823602.7771	MC-36	142768.2610	2823639.5295	MC-77	138882.2775	2823548.8840
MB1-4	145294.0607	2823674.6218	MC-37	142565.1786	2823890.5007	MC-78	138653.5133	2823754.7696
<b>MISSOURI RTE. 90 OVER I-49</b>			MC-38	142570.7090	2823764.5863	MC-79	138675.1583	2823636.7378
MB3-1	132121.2337	2821227.4738	MC-39	142573.1196	2823644.6106	MC-80	138696.8033	2823518.7061
MB3-2	132157.3745	2821225.7835	MC-40	142376.6478	2823765.6883	MC-81	138451.2280	2823727.5779
MB3-3	132123.5270	2821200.4192	MS-41	142058.7756	2824154.3813	MC-82	138479.4728	2823595.5304
MB3-4	132155.3995	2821203.2722	MS-42	142080.8079	2823754.7432	MC-83	138507.2655	2823478.7932
MB3-5	132138.8169	2821065.4988	MS-43	142082.6480	2823314.6914	MC-84	138244.4346	2823656.9238
MB3-6	132170.5197	2821069.8505	MC-44	141468.5204	2823862.4655	MC-85	138273.5132	2823587.3090
MB3-7	132160.4487	2820931.4426	MC-45	141470.9310	2823742.4897	MC-86	138320.0762	2823429.0154
MB3-8	132191.9111	2820937.2834	MC-46	141473.3416	2823622.5139	MC-87	138057.7234	2823591.1778
MB3-9	132166.5062	2820899.7996	MC-47	141268.5608	2823858.4479	MC-88	138095.9060	2823482.7016
MB3-10	132197.9014	2820905.9918	MC-48	141270.9713	2823738.4721	MC-89	138135.7488	2823369.5091
<b>ROADWAY BORINGS</b>			MC-49	141273.3819	2823618.4963	MC-90	137861.4592	2823526.9647
MC-1	145965.8950	2823426.1438	MC-50	141068.6012	2823854.4303	MC-91	137909.0760	2823411.3895
MC-2	145898.0872	2823327.1382	MC-51	141071.0117	2823734.4545	MC-92	137954.7882	2823300.4373
MC-3	145798.3235	2823537.5422	MC-52	141072.4225	2823614.4587	MC-93	137674.7779	2823438.8050
MC-4	145729.2687	2823434.3019	MC-53	140861.6429	2823850.2721	MC-94	137717.6582	2823348.4652
MC-5	145678.3784	2823334.2956	MC-54	140871.0521	2823730.4369	MC-98	137604.9413	2823134.3806
MC-10	143924.5029	2823781.7847	MC-55	140873.4626	2823610.4612	MS-103	137287.0148	2822796.3632
MC-11	143809.4859	2823781.4742	MC-56	140668.6819	2823846.3952	MC-104	136892.4407	2822936.8163
MC-13	143609.5062	2823778.4563	MC-57	140671.0924	2823726.4193	MC-105	136963.9105	2822855.3481
MC-16	145660.8487	2822994.3017	MC-58	140673.5030	2823606.4436	MC-106	137035.2823	2822758.8801
MC-17	145481.3052	2823077.9264	MS-59	140532.1067	2823873.6572	MC-107	136737.3534	2822832.0264
MC-18	145427.9097	2822970.4605	MS-60	140451.1196	2823473.9497	MC-108	136803.1306	2822736.3950
MC-19	145302.1953	2823166.9188	MC-61	140268.7626	2823838.3600	MC-109	136874.5024	2822639.9271
MC-20	145248.7998	2823059.4529	MC-62	140271.1732	2823718.3842	MC-110	136583.5995	2822717.0277
MC-21	145123.0854	2823255.9113	MC-63	140277.5829	2823598.4887	MC-111	136642.3507	2822617.4420
MC-22	145069.6899	2823148.4454	MC-64	140068.8029	2823834.3424	MC-112	136713.7225	2822520.9741
MS-23	144846.7426	2823063.8082	MC-65	140071.2135	2823714.3667	MC-113	136410.1990	2822594.9569
MS-24	144781.6274	2823348.5203	MC-66	140073.6240	2823594.3908	MC-114	136481.5707	2822498.4890
MC-25	144343.9793	2823483.9276	MC-67	139868.8433	2823830.3248	MC-115	136552.9426	2822402.0211
MC-26	144309.4449	2823390.0799	MC-68	139879.2522	2823710.5097	MC-116	136249.4191	2822476.0039
MC-27	144143.0985	2823537.9834	MC-69	139873.6644	2823590.3732	MC-117	136320.7908	2822379.5360
MC-28	144124.9865	2823452.5254	MC-70	139669.0443	2823818.3089	MC-118	136392.1627	2822283.0680
MC-29	143986.5833	2823699.1182	MC-71	139671.2942	2823706.3315	MS-119	136067.4887	2822425.9904

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

Boring No.	Northing	Easting	Boring No.	Northing	Easting	Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED			ROADWAY BORINGS CONTINUED			ROADWAY BORINGS CONTINUED		
MS-120	136139.8808	2822240.7139	MC-164	132010.6143	2820920.5358	MC-192	127737.9055	2820805.3753
MS-121	136224.4826	2821964.9558	MC-165	131792.8703	2821004.1288	MC-193	127708.3697	2820689.0282
MC-122	135849.4415	2822182.4128	MC-166	131831.1992	2820907.2985	MC-193A	127639.5693	2821162.9742
MC-123	135917.7062	2822083.7218	MC-167	131595.8899	2820969.3627	MC-193B	127619.1027	2821042.6662
MC-124	135604.2227	2822026.6619	MS-168	130997.2290	2821372.0335	MC-194	127592.4889	2820969.4151
MC-125	135664.5339	2821922.9192	MS-169	130709.4553	2820813.8343	MC-195	127552.9825	2820857.9511
MC-126	135733.6522	2821842.8600	MS-170	130462.3502	2820353.7482	MC-196	127527.0524	2820742.7945
MC-127	135446.6051	2821960.3711	MC-170A	130002.8087	2820833.7677	MC-196A	127445.6831	2821202.6447
MS-129	135459.3857	2821396.8704	MC-170B	130004.2797	2820743.7797	MC-196B	127417.4607	2821084.9442
MS-130	135031.5443	2821628.7029	MC-171	129904.7125	2820798.7309	MC-197	127391.5653	2821031.1812
MS-131	134611.7497	2821842.7816	MC-172	129920.8074	2820679.8152	MC-198	127353.6175	2820917.6317
MC-132	134452.1104	2821471.5000	MS-173	129552.9678	2820884.2582	MC-199	127316.4114	2820803.9359
MC-133	134474.3322	2821353.5755	MS-174	129466.4499	2820637.4774	MC-199A	127252.5187	2821245.6928
MC-134	134255.1777	2821436.6127	MS-175	129364.5877	2820243.6730	MC-200	127206.5101	2821096.2294
MC-135	134275.9370	2821318.4220	MC-175A	129103.3198	2820966.6095	MC-201	127165.6840	2820983.5639
MC-136	134037.4338	2821520.2047	MC-175B	129103.2764	2820854.3931	MC-202	127123.5822	2820871.2165
MC-137	134058.1932	2821402.0140	MC-176	129123.9468	2820747.9346	MC-202A	127060.1350	2821292.1057
MC-138	134078.9524	2821283.8232	MC-177	129122.8775	2820627.7851	MC-203	127024.6620	2821166.9757
MC-139	133840.4492	2821485.6059	MC-178	129123.0207	2820508.5692	MC-204	126979.0335	2821055.7482
MC-140	133861.2086	2821367.4152	MC-178A	128910.6097	2820991.4119	MC-205	126933.3152	2820945.6011
MC-141	133881.9678	2821249.2244	MC-178B	128903.7817	2820868.5653	MC-205A	126873.6280	2821341.5499
MC-142	133643.4647	2821451.0071	MC-179	128927.9378	2820752.3228	MC-206	126841.1177	2821243.6333
MC-143	133664.2240	2821332.8163	MC-180	128922.8044	2820632.3639	MC-207	126796.0069	2821114.9404
MC-144	133684.9832	2821214.6256	MC-181	128918.7825	2820512.3217	MC-208	126779.8202	2821019.8754
MC-145	133446.4801	2821416.4083	MS-181A	128616.6836	2821144.5184	MC-208A	126694.5460	2821452.6249
MC-146	133467.2394	2821298.2176	MS-182	128622.8146	2820940.7284	MC-209	126656.6612	2821328.2518
MC-147	133249.4956	2821381.8095	MS-183	128555.2166	2820659.2452	MC-210	126609.9042	2821216.8511
MC-148	133052.5110	2821347.2107	MS-184	128470.2212	2820332.6687	MC-211	126563.1497	2821106.5087
MC-149	132640.3774	2821381.4300	MC-184A	128224.9678	2821064.3449	MC-211A	126505.8587	2821508.7442
MC-150	132679.3011	2821159.8223	MC-184B	128208.1353	2820945.5313	MC-212	126472.1142	2821398.8065
MC-151	132700.0604	2821041.6316	MC-185	128150.3095	2820846.7474	MC-213	126425.3774	2821287.6330
MC-152	132416.5788	2821499.4942	MC-186	128128.8502	2820720.5223	MC-214	126378.6997	2821177.5009
MC-153	132433.8782	2821401.0019	MC-187	128107.4605	2820602.3728	MC-214A	126318.1797	2821568.1480
MC-154	132482.3165	2821125.2236	MC-187A	128029.2711	2821093.8138	MC-215	126287.2166	2821463.5961
MC-155	132503.0758	2821007.0328	MC-187B	128010.5679	2820970.2170	MC-216	126241.4452	2821352.3045
MC-157	132104.6103	2821830.5164	MC-188	127953.9102	2820858.8116	MC-217	126194.5028	2821244.5608
MC-158	132178.9977	2821406.9996	MC-189	127932.4849	2820758.9581	MS-218	126069.2269	2821690.7392
MC-159	132285.3319	2821090.6247	MC-190	127907.2087	2820642.5109	MS-219	125964.2187	2821480.7662
MC-160	132337.2302	2820795.1479	MC-190A	127834.1184	2821126.6936	MS-220	125837.0922	2821285.2135
MC-161	132146.3003	2820726.0767	MC-190B	127813.1497	2821008.5398	MC-221	125672.9346	2821596.5091
MC-163	131989.8551	2821038.7266	MC-191	127766.9503	2820921.3102	MC-222	125628.0667	2821486.2733

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

Boring No.	Northing	Easting	Boring No.	Northing	Easting	Boring No.	Northing	Easting
ROADWAY BORINGS CONTINUED			ROADWAY BORINGS CONTINUED					
MC-223	125549.2596	2821773.5472	MC-264	123058.7514	2822567.1619			
MC-224	125503.2797	2821673.4941	MC-265	122966.9462	2822865.7784			
MC-225	125456.2536	2821563.0741	MC-266	122920.6060	2822755.0870			
MC-226	125365.2597	2821861.7402	MC-267	122874.2658	2822644.3957			
MC-227	125318.9195	2821751.0488	MC-268	122782.4606	2822943.0121			
MC-228	125271.5708	2821635.3592	MC-269	122740.5824	2822832.6209			
MC-229	125180.7740	2821938.9740	MC-270	122697.3957	2822721.6934			
MC-230	125134.4338	2821828.2826	MC-271	122597.9749	2823020.2458			
MC-231	125088.0936	2821717.5912	MC-272	122551.6347	2822909.5544			
MC-232	124996.2884	2822016.2077	MC-273	122505.2945	2822798.8631			
MC-233	124949.9482	2821905.5162	MC-274	122413.4893	2823097.4795			
MC-234	124903.6079	2821794.8249	MC-275	122367.1491	2822986.7882			
MC-235	124811.8027	2822093.4413	MC-276	122330.6554	2822876.3109			
MC-236	124765.4625	2821982.7500	MC-277	122220.8519	2823175.9577			
MC-237	124719.1223	2821872.0586	MC-278	122174.8978	2823066.1887			
MC-238	124627.3171	2822170.6751	MC-279	122127.5492	2822950.4991			
MC-239	124580.9768	2822059.9837	MC-280	122037.6748	2823253.7277			
MC-240	124534.6367	2821949.2923	MC-281	122003.3262	2823138.0161			
MC-241	124442.8314	2822247.9087	MC-282	121947.2254	2823032.4950			
MC-242	124396.4912	2822137.2174	MC-283	121860.0323	2823329.1807			
MC-243	124350.1510	2822026.5260	MC-284	121819.0226	2823222.6732			
MC-244	124258.3458	2822325.1425	MC-285	121771.7498	2823115.7136			
MC-245	124212.0056	2822214.4511	MC-286	121669.6260	2823407.8089			
MC-246	124159.3584	2822104.2318	MC-287	121635.5993	2823300.6352			
MC-247	124073.8602	2822402.3762	MS-288	121356.7147	2823735.0284			
MC-248	124027.5199	2822291.6848	MS-289	121304.5117	2823431.6542			
MC-249	123980.1712	2822175.9951	MS-290	121244.0068	2823131.7557			
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						

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## 9.2 Roadway Boring Logs



ROADWAY BORING LOGS  
I 49 - MISSOURI  
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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ROADWAY BORING LOGS  
I 49 - MISSOURI  
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
MC-25	745+00	Centerline	1061.7						CSK	10/17/2002		
				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		
				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		
				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						

ROADWAY BORING LOGS  
I 49 - MISSOURI  
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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ROADWAY BORING LOGS  
I 49 - MISSOURI  
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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ROADWAY BORING LOGS  
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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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					

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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					

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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					

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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					

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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	1147.8						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					

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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+08	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						

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Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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  
149 - MISSOURI  
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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 to 27 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)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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						



McDONALD COUNTY, MISSOURI

[illegible]

ROADWAY BORING LOGS  
I 49 - MISSOURI  
McDONALD COUNTY, MISSOURI

Boring No.	Station	Offset	Elevation	Depth (Ft)		Log of Materials	Samples	USCS	Logged By:	Date	GW Depth	Comments
				From	To							
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

Page 1 of 2

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

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

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 1045.6 ft

**SILTY GRAVEL**  
light grayish brown, dry 1043.6

**GRAVEL**, trace clay seams  
light gray and reddish brown, dry  
  
- with clay seams below 10 feet  
  
14.5 1031.1

**CHERT++**  
stratified, trace limestone seams, light gray,  
and gray, thin bedded, very fine grained,  
fresh, hard, solid

DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
		NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	GM	1	AS					
	GP							
5	GP	2	AS					
10	GP	3	AS					
15	RUN 1	DB	93%	RQD 63%				
25	RUN 2	DB	100%	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	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

Page 2 of 4

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	OVERBURDEN										
	14.5										
	CHERT++ stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	1031.1		RUN 1	DB	93%	RQD 63%				
	CT										
	REED SPRINGS FORMATION										
	LS										
	CT CLAY SEAM										
	CT, TR LS										
	Continued Next Page	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	▽ 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

# LOG OF BORING NO. MC-1

Page 3 of 4

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

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

↑  
CT  
↓

25

30

RUN  
2

DB

100%

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 10-15-02

BORING COMPLETED 10-16-02

RIG ATV, #103E FOREMAN JW

APPROVED CSK JOB # J7P0601



# LOG OF BORING NO. MC-1

Page 4 of 4

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	34.5									
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	38.5		RUN 3	DB	100%	RQD 90%				
		1011.1									
		1007.1									

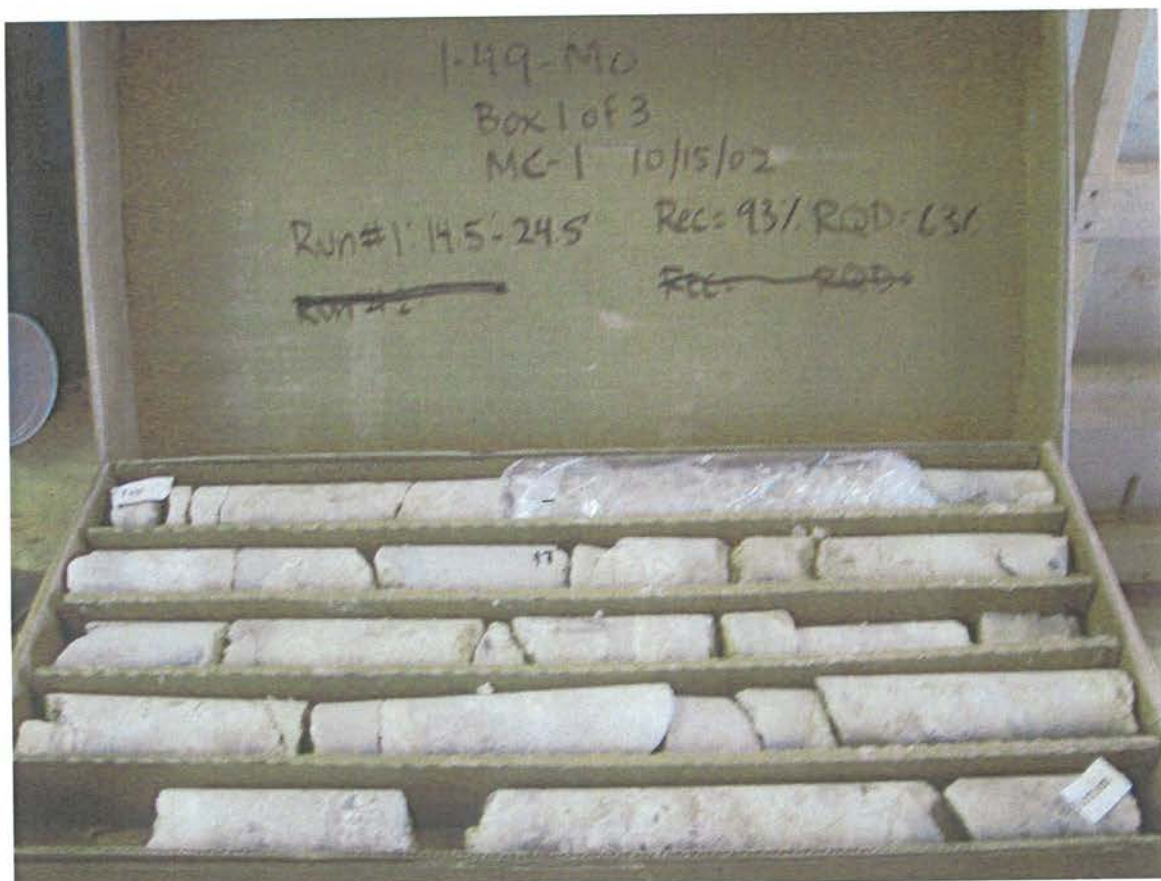
The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft

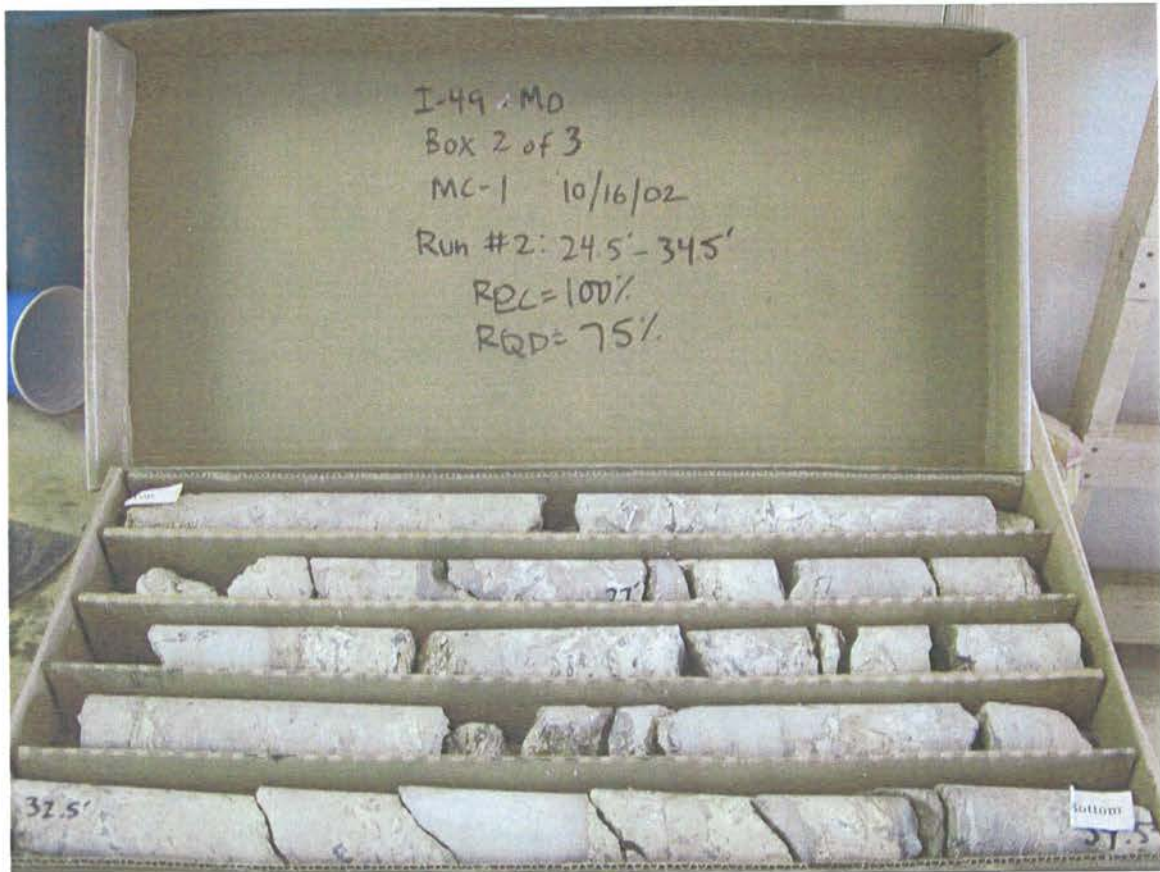
WL	▽	DRY	WD	▽	DRY	AB
WL	▽		▽			
WL						

# Terracon

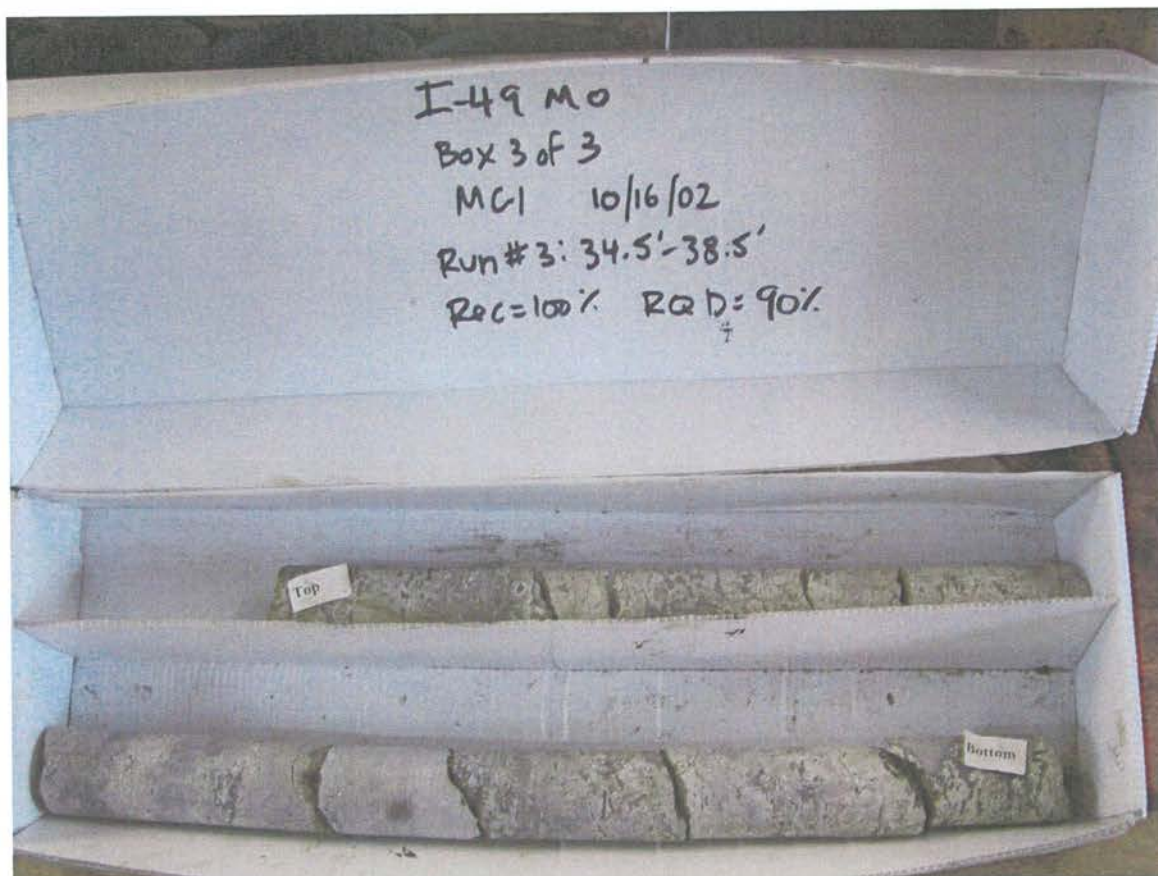
BORING STARTED		10-15-02	
BORING COMPLETED		10-16-02	
RIG	ATV, #103E	FOREMAN	JW
APPROVED	CSK	JOB #	J7P0601



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

Page 1 of 1

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

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

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 1089.7 ft

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

Blow Counts for 18"

**GRAVELLY LEAN CLAY**  
light brown, dry to moist

3.5

1086.2

**LEAN CLAY**, trace sand and gravel  
reddish brown, moist

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

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)

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

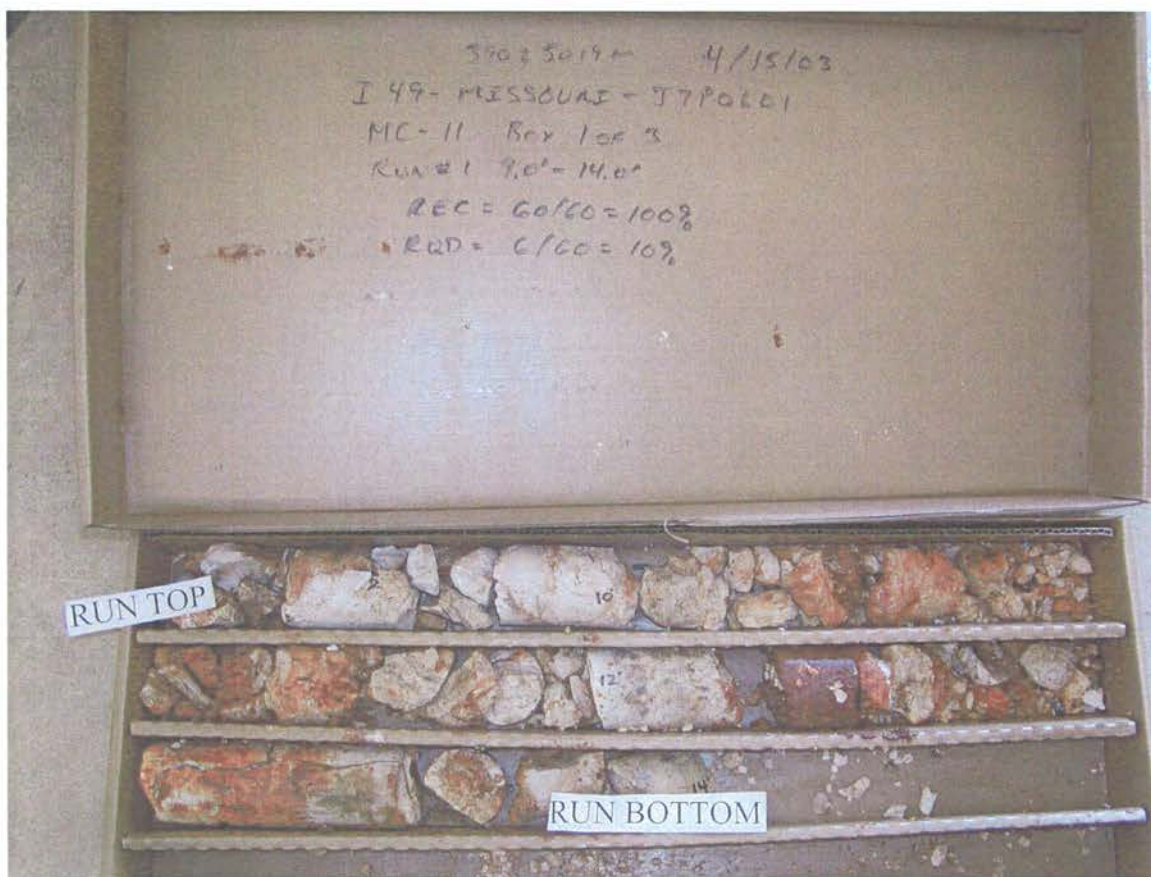
BOREHOLE 99 MC-11.GPJ TERRACON.GDT 11/12/03

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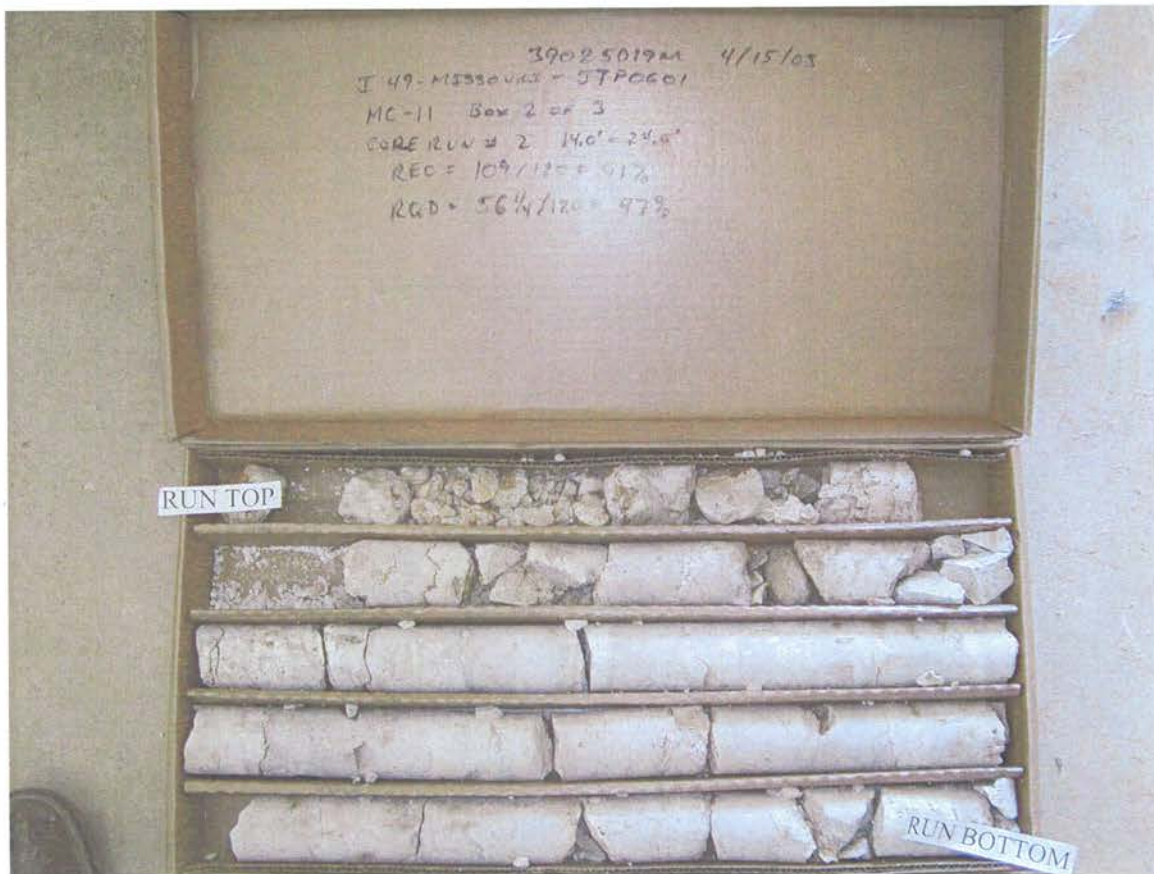
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft				BORING STARTED		4-15-03			
WL	▽ DRY	WD		▽ DRY	AB	BORING COMPLETED		4-15-03	
WL	▽			▽		RIG	ATV, #103E	FOREMAN	JW
WL				APPROVED	SPB	JOB #	J7P0601		



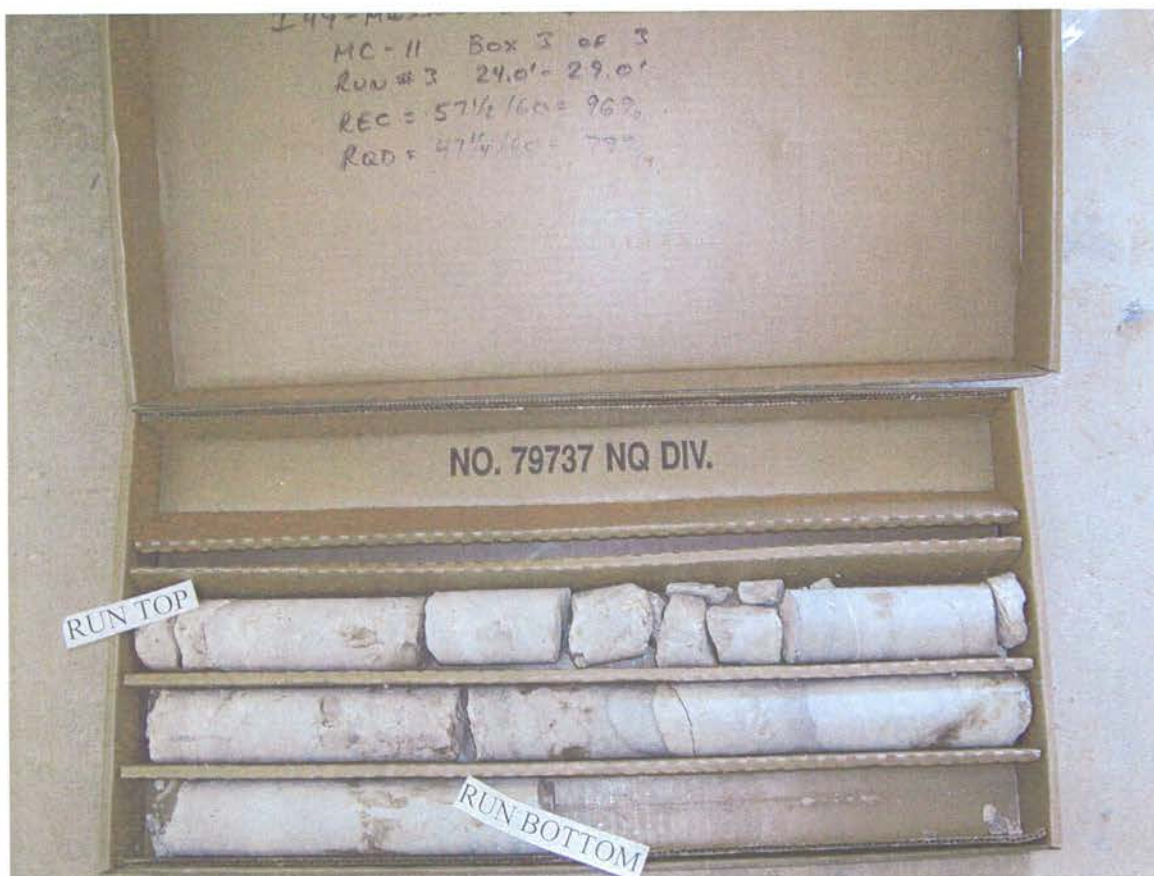
I 49 Missouri  
Missouri J7P0601  
Boring MC-11  
Run No. 1  
9.0 Feet to 14.0 Feet





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								Measured Section							
SITE		McDONALD COUNTY, MISSOURI								PROJECT							
GRAPHIC LOG	Boring Location: 733+00, Centerline		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS								
	DESCRIPTION				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf						
Approx. Surface Elev.: 1001.7 ft																	
18		CHERT OUTCROPS thin beds exposed in vegetated gravel cover		983.7													
28		EXPOSED BEDROCK interbedded limestone and chert with talus light gray and gray, medium bedded  Photo 10		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		



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

Page 2 of 3

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

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

# LOG OF BORING NO. MC-18

Page 3 of 3

CLIENT		HNTB									
SITE		McDONALD COUNTY, MISSOURI									
PROJECT		Measured Section									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT OUTCROPS</b> 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



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.

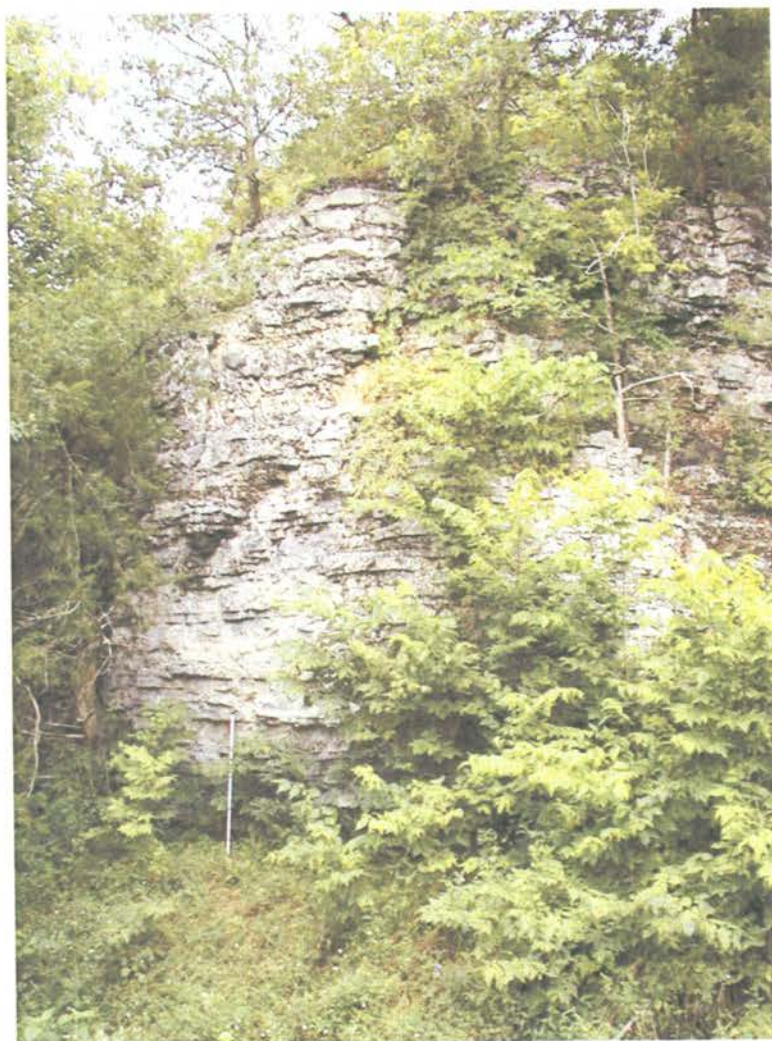


Photo 3: Basal rock outcrop

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.



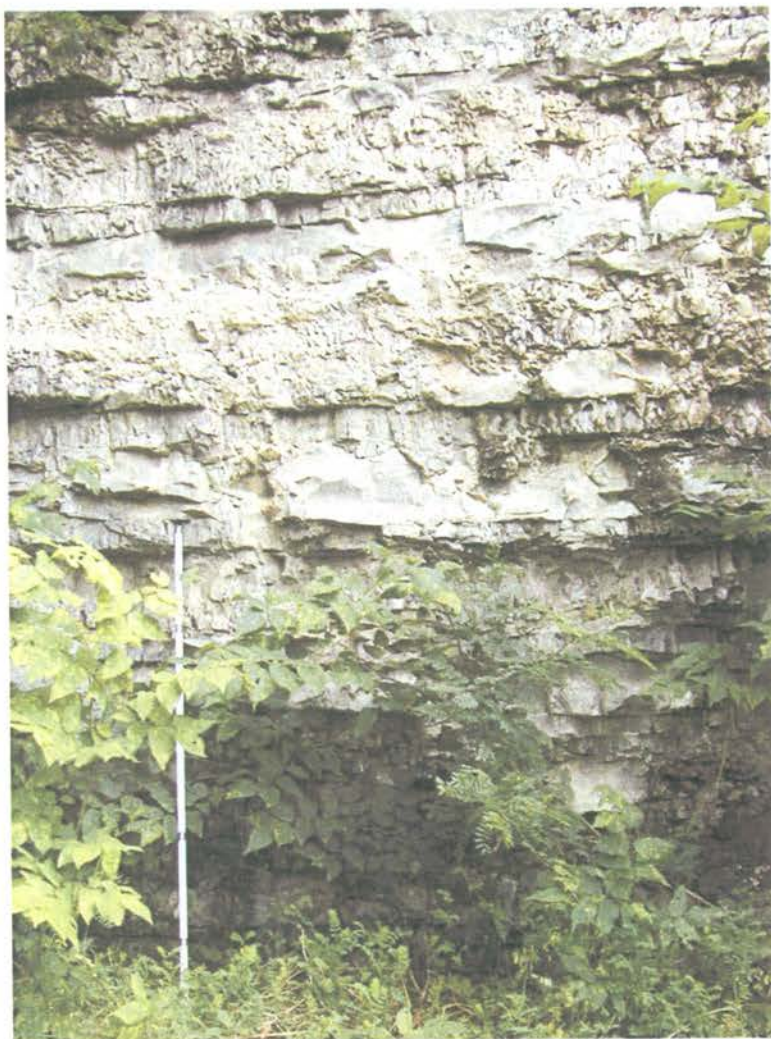


Photo 4: Lower half of basal outcrop.

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.

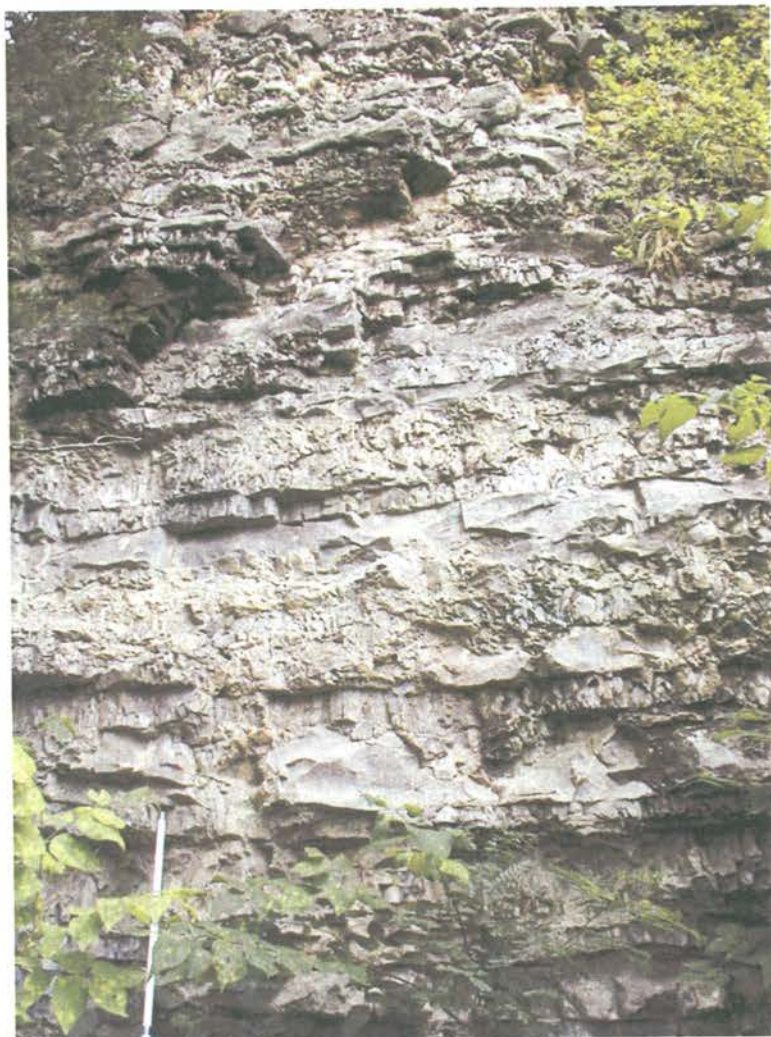


Photo 5: Upper section of basal outcrop.  
Detail of upper section of basal outcropping of interbedded chert and limestone. Top of exposure not shown. Blocky fracture layers are limestone beds. Angular fracture layers are chert beds. Jacob staff is 5 feet long with 1-foot divisions (gray) for scale.





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.



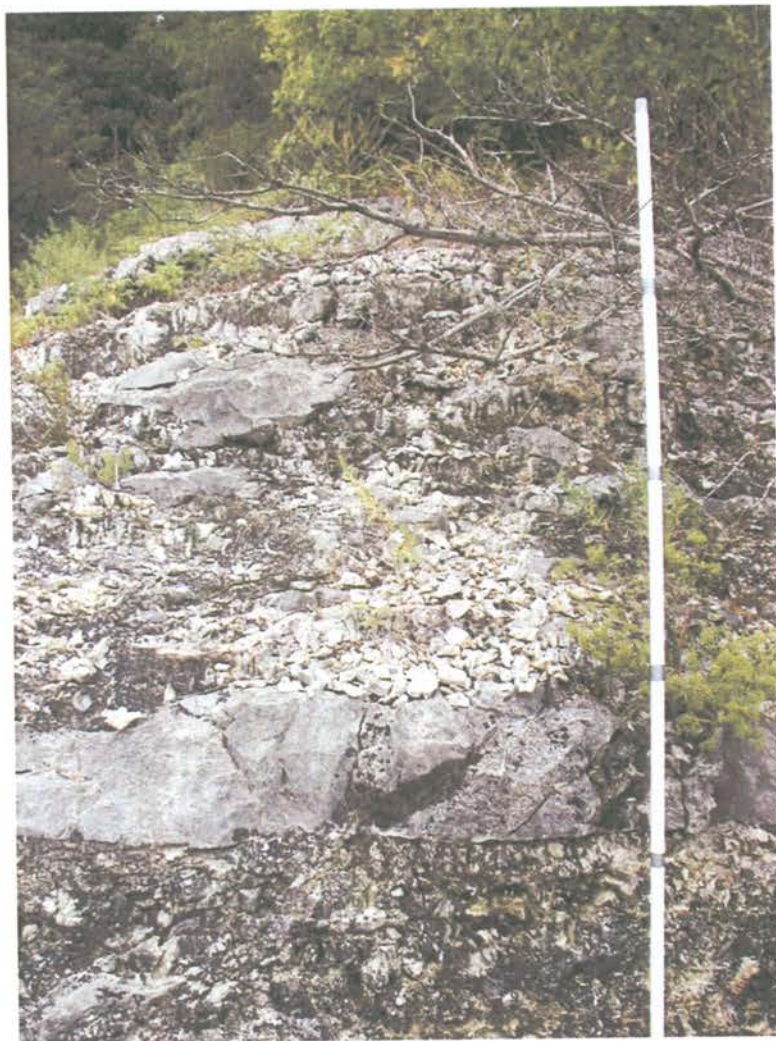


Photo 8: Detail of outcrop above MC-18.  
Interbedded chert and limestone outcrop. Blocky fracture layers (gray) are limestone beds. Angular fracture layers (white and also black exposure in bottom of photo) are chert beds. Jacob staff is 5 feet long with 1-foot divisions (gray) for scale.



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.



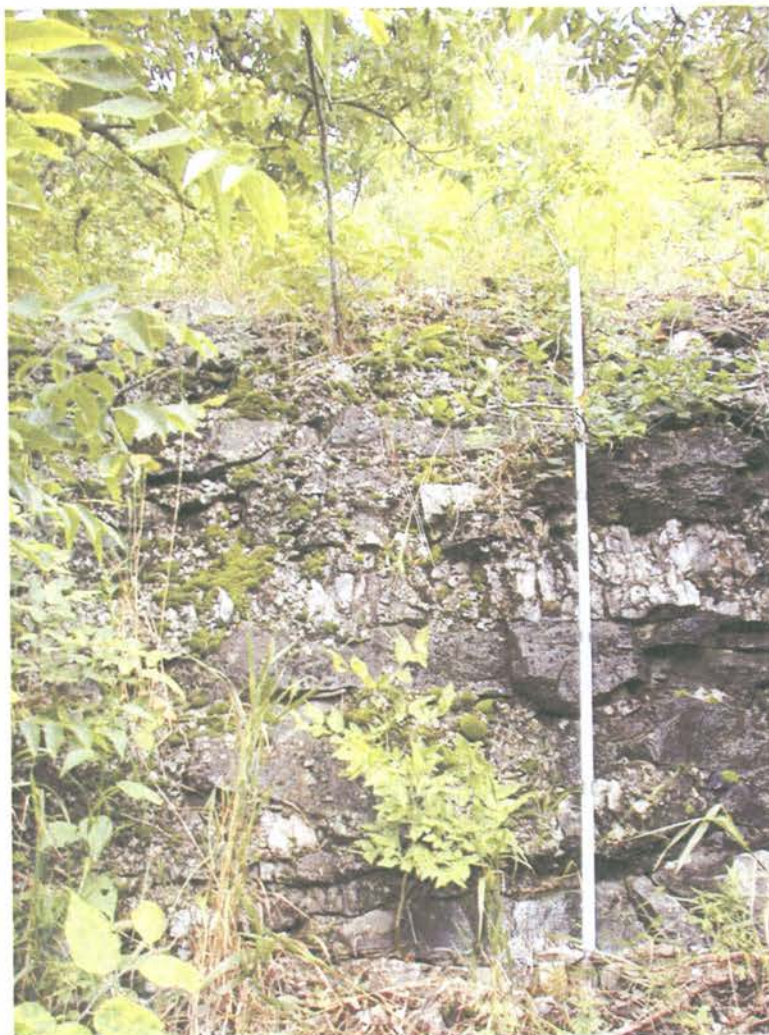


Photo 10: Rock outcrop near middle of exposure, below MC-18. Shown are interbedded chert and limestone beds. This exposure is located approximately 30 feet south of the basal outcrop shown in Photos 1 through 3. The top of this outcrop is at a similar elevation as the top of the basal outcrop. Jacob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



## Page 1 of 2

**HNTB**

**McDONALD COUNTY, MISSOURI**

## I-49, MISSOURI

### DESCRIPTION

**Approx. Surface Elev.: 1052.5 ft**

light grayish brown, dry

1050.5

**GRAVEL**, with sand, with clay seams  
light reddish brown and light gray, dry

1047.5

**GRAVEL**, with sand, with clay seams  
reddish brown and light gray, dry to moist

**21.5**

▽ 1031.0

stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

## RECOVERY in

**SPT - N**

\_\_\_\_\_

CONTENT, %

DRY UNIT WT

\_\_\_\_\_

**STRENGTH, ps**

### Blow Counts for 18"

**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

Page 2 of 2

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

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

40

45

50

55

RUN  
3

DB

100%

RQD  
95%

RUN  
4

DB

100%

RQD  
92%

55.5

997.0

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		WD		
WL		WD		

**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

**Continued Next Page**

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

# LOG OF BORING NO. MC-21

Page 4 of 6

CLIENT		GEOLOGIC LOG									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	31.5									
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	1021.0		RUN 2	DB	100%	RQD 46%				
		35									
		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

LOG OF BORING NO. MC-21

Page 5 of 6

CLIENT		GEOLOGIC LOG									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
CT LS	<b>CHERT++</b> 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	<b>CHERT++</b> 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

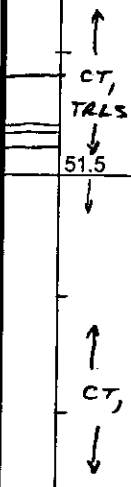
WL	21.5	WD	DRY	AB
WL				
WL				

Terracon

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

# LOG OF BORING NO. MC-21

Page 6 of 6

CLIENT		GEOLOGIC LOG									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	51.5									
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	1001.0		RUN 4	DB	100%	RQD 92%				
		55									
		55.5									
		997.0									

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

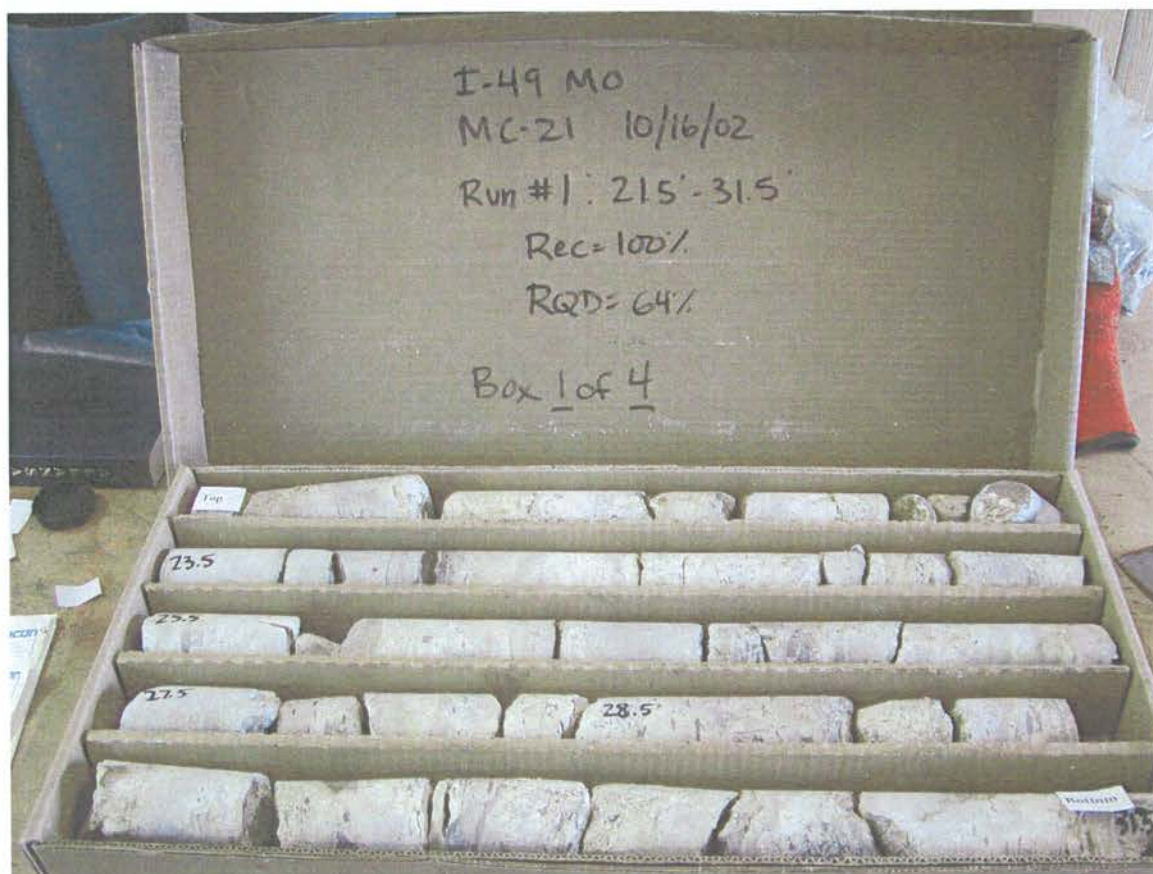
## WATER LEVEL OBSERVATIONS, ft

WL	▽ 21.5	WD	▽ DRY	AB
WL	▽		▽	
WL				

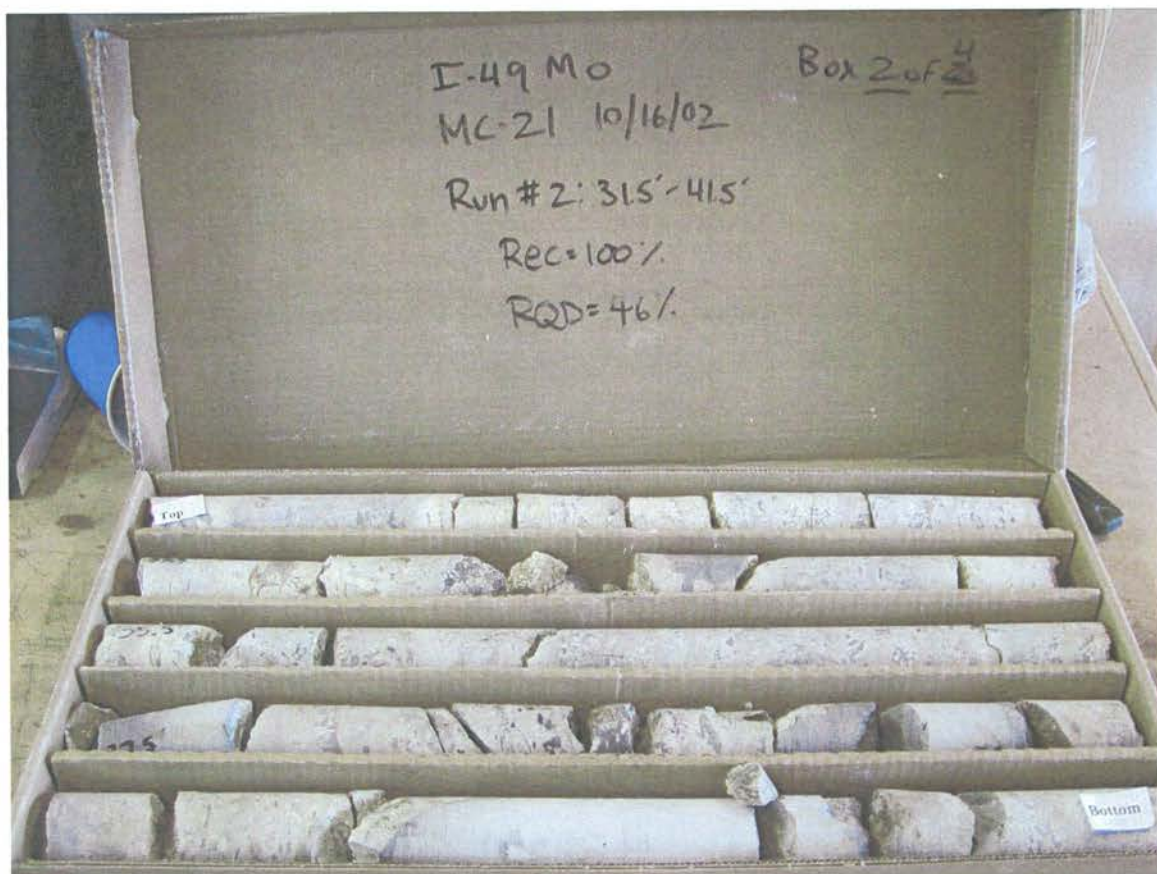
# Terracon

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

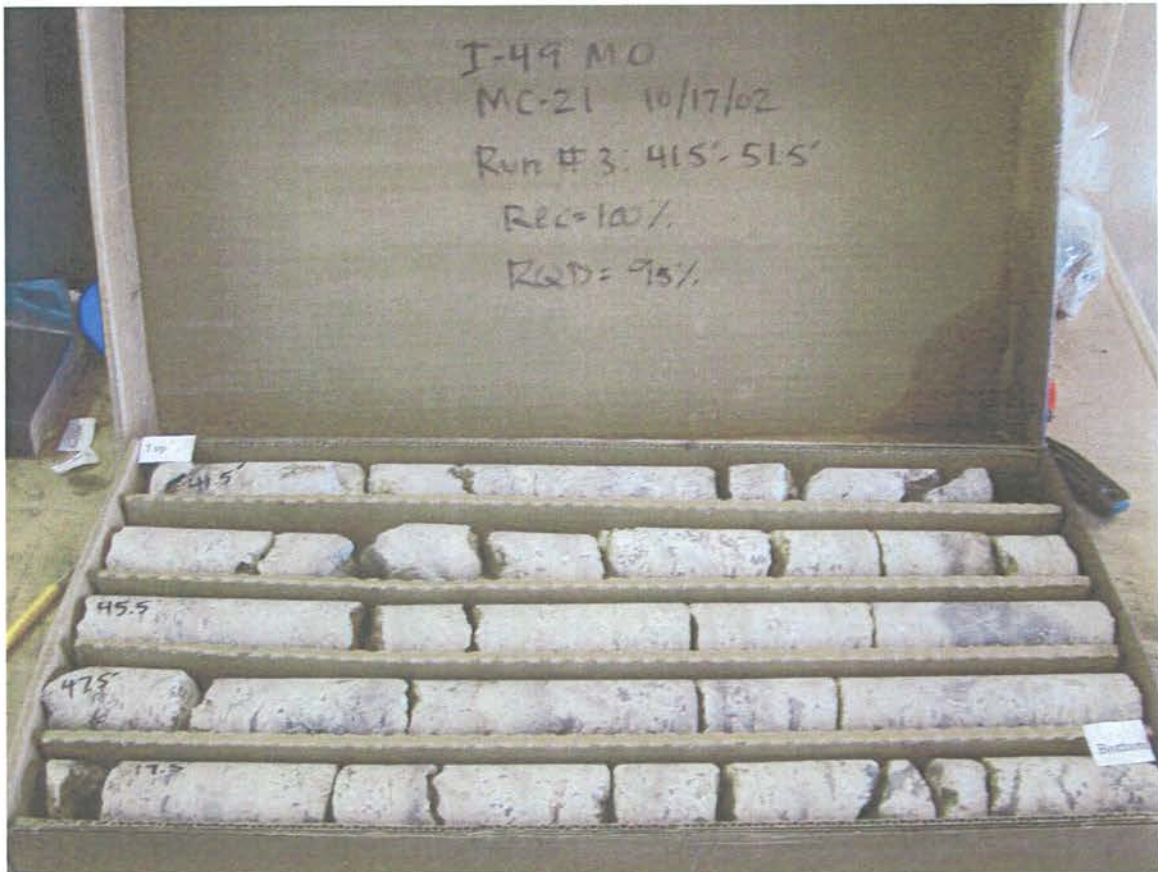




I 49 Missouri  
Missouri J7P0601  
Boring MC-21  
Run No. 1  
21.5 Feet to 31.5 Feet

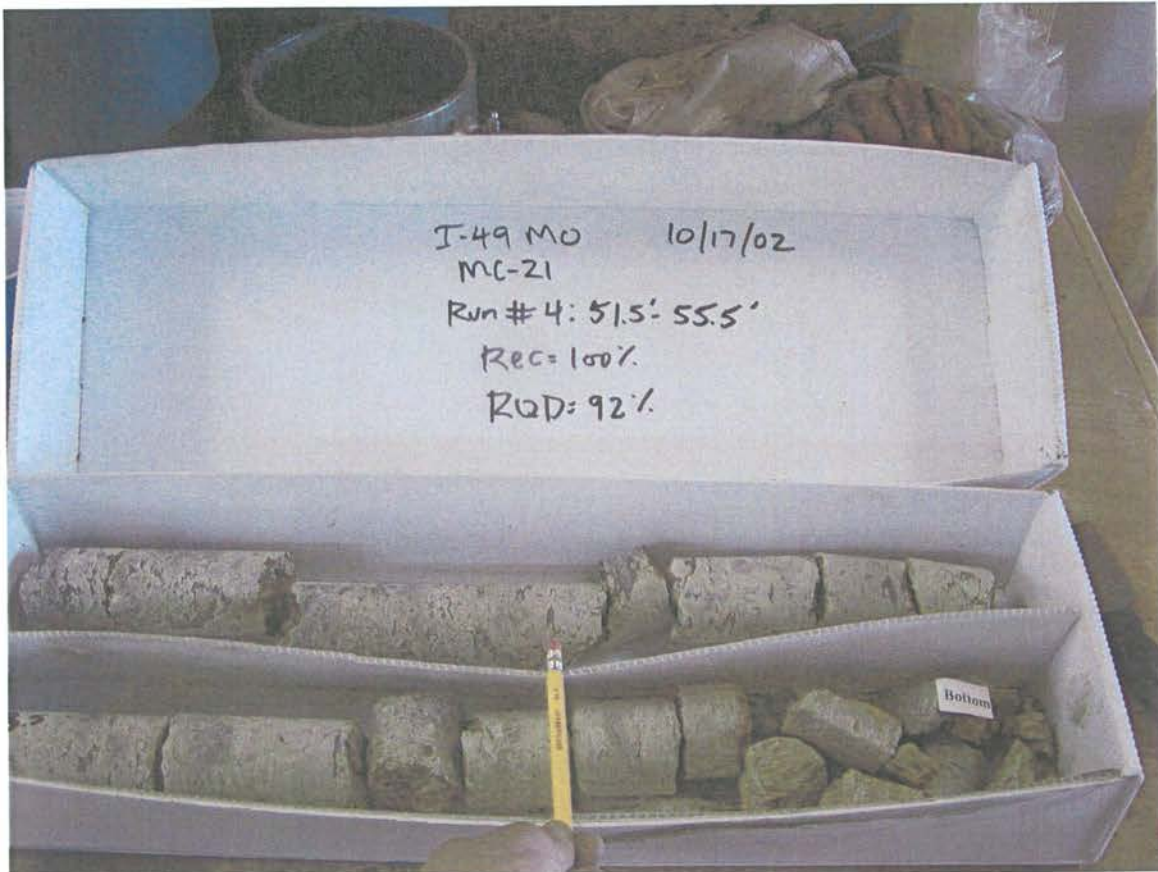


I 49 Missouri  
Missouri J7P0601  
Boring MC-21  
Run No. 2  
31.5 Feet to 41.5 Feet



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

## Page 1 of 2

Page 1 of 2

CLIENT		HNTB									
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	Boring Location: 747+00, 100 Feet right of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1080.5 ft										
	<b>GRAVEL AND COBBLES</b> , with sand and clay dark brown and white, dry 1078.5		GP	1	AS						
	<b>GRAVEL</b> , with clay, with chert seams white and light reddish brown, dry 1075.5		GP	2	AS						
	<b>CLAYEY GRAVEL</b> , scattered chert seams white and reddish brown, moist 1067.5	5	GC	3	AS						
		10	GC	4	AS						
	<b>SANDY GRAVEL</b> , with clay, with chert seams light brown, moist to wet 1060.5	15	GP	5	AS						
	<b>BROKEN CHERT</b> , with clay seams, abundant chert seams and beds light brown and white, moist 1052.5	20	GP	6	AS						
		25	GP	7	AS						
	<b>CHERT++</b> stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid	30		RUN 1	DB	77%	RQD 58%				
				RUN 2	DB	100%	RQD 59%				

Continued Next Page

**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

# LOG OF BORING NO. MC-28

Page 2 of 2

CLIENT					HNTB									
SITE					PROJECT									
McDONALD COUNTY, MISSOURI					I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
Δ Δ Δ Δ Δ Δ Δ Δ Δ	34.5 - weathered and vuggy below 33.5 feet 1046.0				11 11 11		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					BORING STARTED 11-13-02				
WL	▽ 27.5	WD	▽ DRY	AB	BORING COMPLETED 11-13-02				
WL	▽		▽		RIG	ATV, #103E	FOREMAN	JW	
WL					APPROVED	SPB	JOB #	J7P0601	

**Terracon**



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

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

# LOG OF BORING NO. MC-28

Page 4 of 4

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

GEOLOGIC LOG

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

SAMPLES

TESTS

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

**CHERT++**

stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid

CT

32

1048.5

**CHERT++**

stratified, trace limestone seams, light gray and gray, thin bedded, very fine grained, slightly weathered to fresh, hard, solid

CT

- weathered and vuggy below 33.5 feet

*dissolution - smooth, rounded*

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	▽	WD	▽	
WL		WD		

**Terracon**

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



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

Page 1 of 3

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

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

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 1117.4 ft

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

Blow Counts for 18"

**SILT**, trace gravel and sand, with clay seams  
light reddish brown, dry

5

1112.4

**SANDY LEAN CLAY**, with gravel  
reddish brown, moist

10

1107.4

**SILTY GRAVEL AND SAND**  
light reddish brown, dry

10

GP  
GM

3

AS

15

GP  
GM

4

AS

20

GP  
GM

5

AS

25

1092.4

**CLAYEY GRAVEL**, with chert seams and beds  
white and reddish brown, moist

25

GC

6

AS

30

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

Page 2 of 3

CLIENT		HNTB									
SITE		McDONALD COUNTY, MISSOURI									
PROJECT		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	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									
	CHERT++ stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid	1074.4									
		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

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

WATER LEVEL OBSERVATIONS, ft						BORING STARTED		10-23-02			
WL	▽	DRY	WD	▽		DRY	AB	BORING COMPLETED		10-25-02	
WL	▽	Dry 24 hr	AB	▽				RIG	ATV, #103E	FOREMAN	JW
WL								APPROVED	SPB	JOB #	J7P0601



# LOG OF BORING NO. MC-64

Page 5 of 8

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft	USCS SYMBOL	SAMPLES			TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	OVERBURDEN								
43	1074.4								
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid			RUN 1	DB	100%	RQD 43%		
LS									
CT									
	REED SPRINGS FORMATION	45							
CT									
CT									
LS									
CT									
CT									
LS									
CT									
48	1069.4								
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, slightly weathered to fresh, hard, solid			RUN 2	DB	85%	RQD 21%		
CT									
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	✓ 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

Page 6 of 8

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

LS

CT

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

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LS

CT

LS

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, slightly weathered to fresh, hard, solid

*Damaged*

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

1063.9

55

60

RUN  
3

DB

100%

RQD  
25%

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 98 MC-64.GPJ TERRACON.GDT 12/5/03

## LOG OF BORING NO. MC-64

Page 7 of 8

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

SAMPLES

TESTS

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.WATER  
CONTENT, %DRY UNIT WT  
pcfUNCONFINED  
STRENGTH, psf

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

CHERT  
LS

CT

CT w/LS - broken and recemented  
w/ calcite, some crystals

62.5

1054.9

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

CT

LS

CT

LS

CT

CT

LS

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

CT

LS

CT

65

70

RUN  
4

DB

99%

RQD  
15%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

# LOG OF BORING NO. MC-64

Page 8 of 8

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

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

LS

LS

LS

LS

LS

LS

LS

LS

LS

LS

LS

LS

LS

LS

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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

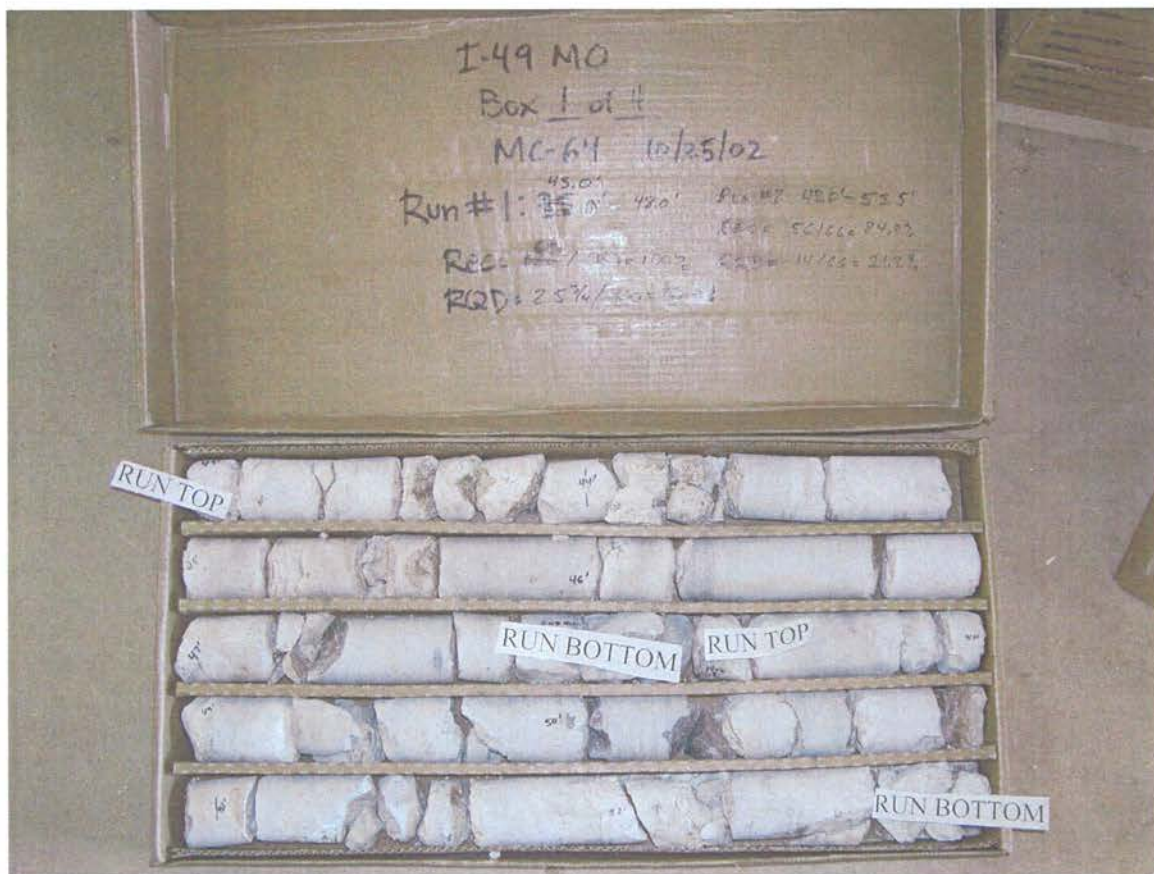
**Terracon**

BORING STARTED 10-23-02

BORING COMPLETED 10-25-02

RIG ATV, #103E FOREMAN JW

APPROVED SPB JOB # J7P0601



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

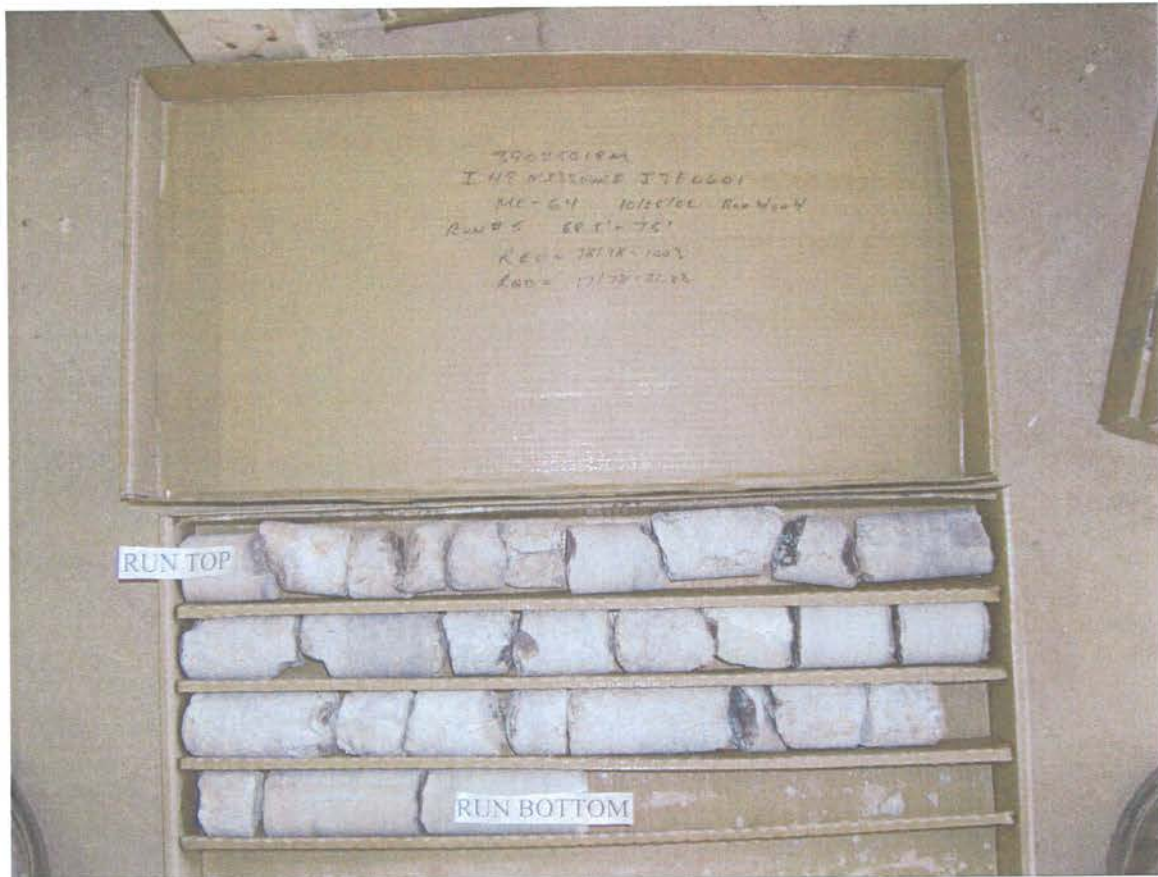


I 49 Missouri  
Missouri J7P0601  
Boring MC-64  
Run No. 3  
53.5 Feet to 62.5 Feet





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

Page 2 of 3

CLIENT		HNTB									
SITE		McDONALD COUNTY, MISSOURI									
PROJECT		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	33 <b>GRAVELLY FAT CLAY</b> , with sand light brown, moist	1074.6									
	37.4 <b>LIMESTONE++</b> stratified, with chert seams and inclusions, gray, thin to medium bedded, fine grained, slightly weathered, hard, solid	1070.2	CH	8	AS						
				RUN 1	DB	95%	RQD 13%				
				RUN 2	DB	97%	RQD 80%				
				RUN 3	DB	100%	RQD 77%				
				RUN 4	DB	92%	RQD 63%				
				RUN 5	DB	100%	RQD 82%				
	62	1045.6		RUN 6	DB	100%	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	10-17-02
BORING COMPLETED	10-17-02
RIG CME-75, #219	FOREMAN DB
APPROVED DP	JOB # J7P0601

# LOG OF BORING NO. MC-82

Page 3 of 3

CLIENT

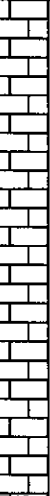
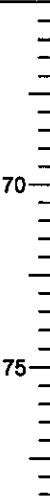
HNTB

SITE

MCDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>LIMESTONE++</b> 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%				
				RUN 8	DB	95%	RQD 73%				
				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

CLIENT		HNTB	GEOLOGIC LOG							
SITE		MCDONALD COUNTY, MISSOURI	PROJECT							
			I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	NO LOG <i>No original sketch</i>									
37.4	LIMESTONE++ stratified, with chert seams and inclusions, gray, thin to medium bedded, fine grained, slightly weathered, hard, solid	1070.2		RUN 1	DB	95%	RQD 13%			
40		1067.6								

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						BORING STARTED		10-17-02		
WL	▽	DRY	WD	▽		DRY	AB	BORING COMPLETED		10-17-02
WL	▽		▽					RIG CME-75, #219	FOREMAN	DB
WL								APPROVED	DP	JOB # J7P0601





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

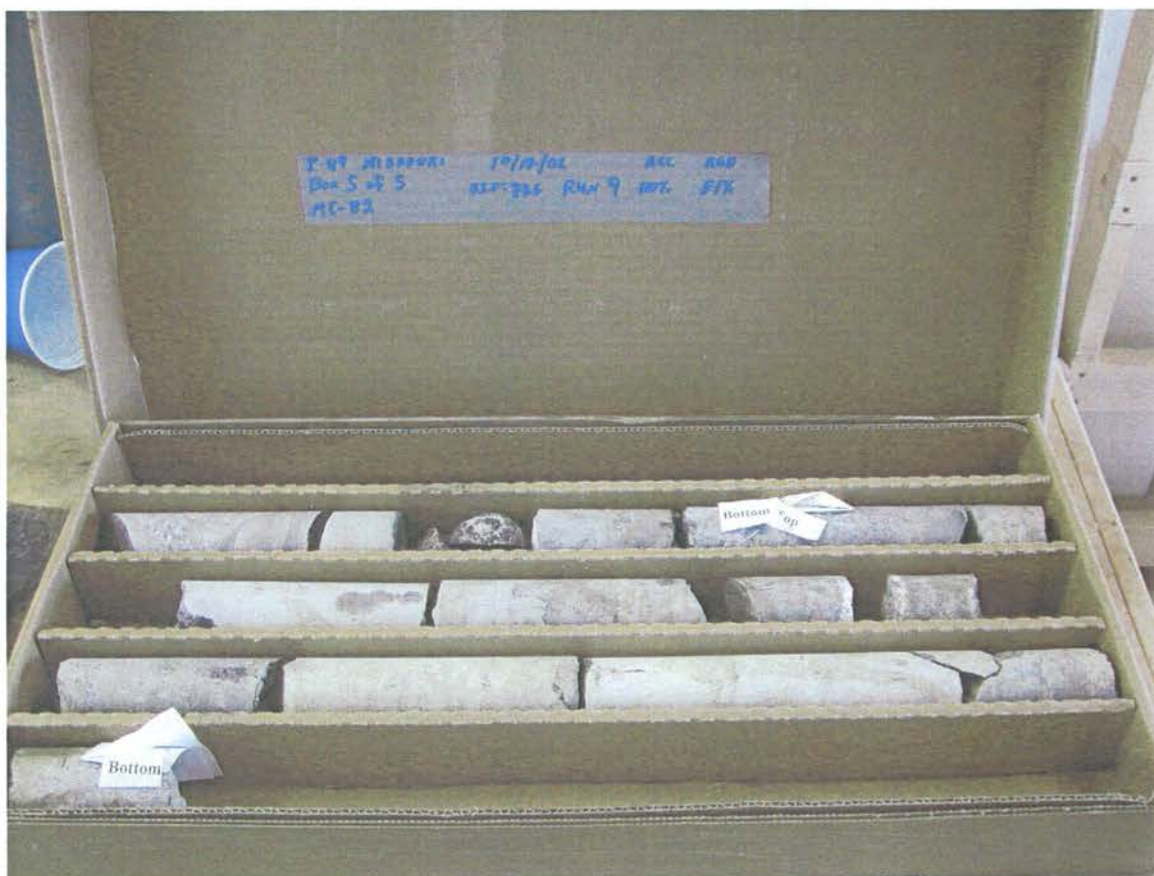


I 49 Missouri  
 Missouri J7P0601  
 Boring MC-82  
 Run No. 5 (partial)  
 55.0 Feet to 60.0 Feet  
 Run No. 6  
 60.0 Feet to 65.0 Feet





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

Page 1 of 2

CLIENT		HNTB														
SITE		McDONALD COUNTY, MISSOURI					PROJECT					I-49, MISSOURI				
GRAPHIC LOG	Boring Location: 824+88, 115 Feet left of centerline					DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
	DESCRIPTION							NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"	
	Approx. Surface Elev.: 1163.7 ft															
	1	<b>LEAN CLAY</b> light brown and brown, dry					1162.7	CL	1	AS						
		<b>LEAN CLAY</b> , trace gravel reddish brown, dry						CL	2	AS						
	4						1159.7									
		<b>LEAN CLAY</b> , scattered to with gravel light reddish brown, dry						CL	3	AS						
							5									
							10									
							15									
	19						1144.7									
		<b>CHERT++</b> stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid								HS						
							20									
								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				



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





# LOG OF BORING NO. MC-110

CLIENT		GEOLOGIC LOG									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	OVERBURDEN										
	22.3 1141.4										
	CT <b>CHERT++</b> stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 1	DB	100%	RQD 92%				
	LS <b>REED SPRINGS FORMATION</b>										
	24.3 1139.4										
	CT <b>CHERT++</b> 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%				
	LS										
	CT										
	LS Inclusions LS CT LS - minor dissolution LS + CT - Interbedded										
	29.3 1134.4										
	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

# LOG OF BORING NO. MC-110

Page 4 of 7

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
<div><div>↑</div><div>CT</div><div>↓</div><div>LS</div><div>CT</div><div>LS - highly fractured</div><div>CT</div><div>LS - highly fractured</div><div>34.3</div></div>	<div>CHERT++</div> <div>stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid</div>	1129.4									
	<div>CT</div> <div>LS</div>										
<div>39.3</div>	<div>CT</div> <div>LS</div> <div>CT</div>	1124.4		RUN 4	DB	100%	RQD 56%				
<div>40</div>	<div>LS</div> <div>CT</div> <div>CT</div>			RUN 5	DB	100%	RQD 88%				

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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

**Continued Next Page**

APPROVED	BKM	JOB #	J7P0601
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BOREHOLE 99 MC-110.GPJ TERRACON GDT 12/6/03

## LOG OF BORING NO. MC-110

Page 6 of 7

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> 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									
	<b>CHERT++</b> 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										
	LS										
	CT										
	LS										
	59.3	1104.4									
	CT										
	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

LOG OF BORING NO. MC-110

Page 7 of 7

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	LS <b>CHERT++</b> stratified, with limestone seams, light gray and gray, medium bedded, very fine grained, slightly weathered to fresh, hard, solid										
	CT										
	LS										
	CT										
	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			

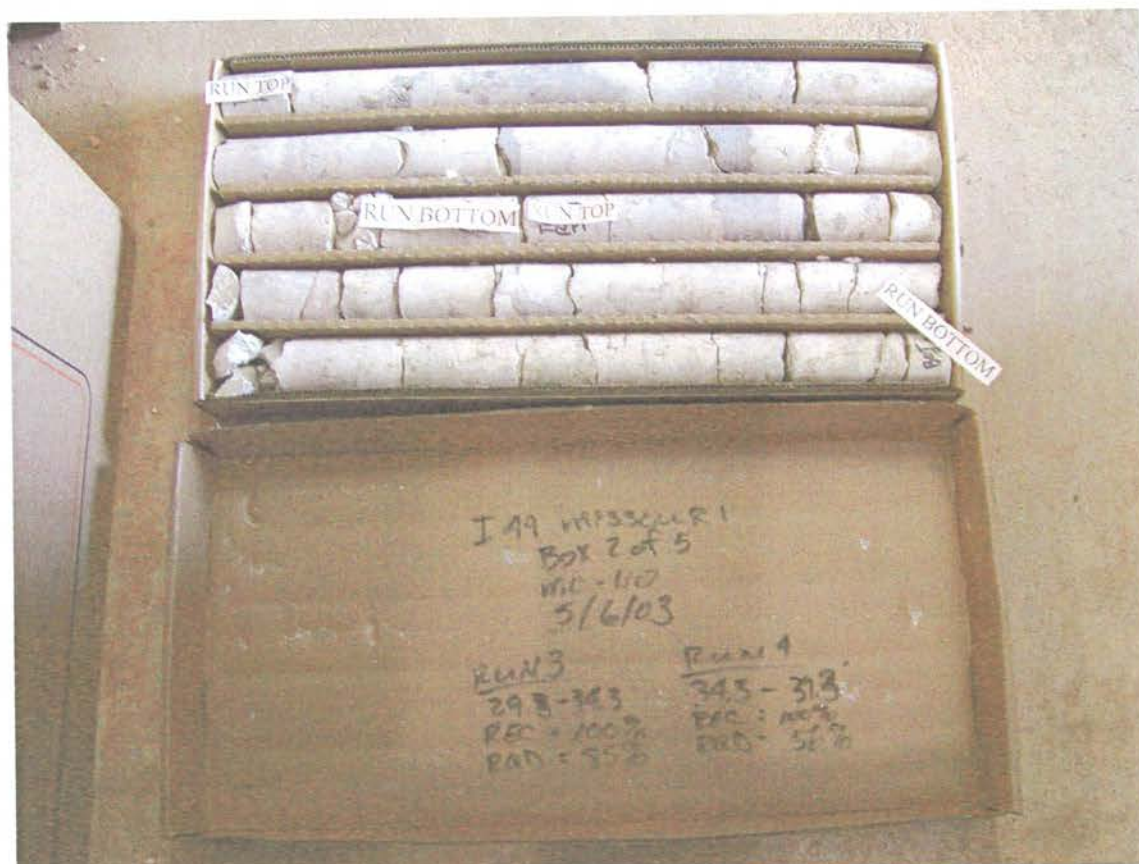
Terracon

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





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

Page 1 of 2

CLIENT


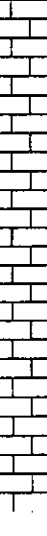
HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG	Boring Location: 837+00, 120 Feet left of centerline	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
					NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	Approx. Surface Elev.: 1169.5 ft									
	<u>GRAVEL</u> , abundant clay brown and reddish brown, dense			1	AS					
	5 1164.5		5		2	AS				
	<u>FAT CLAY</u> , abundant gravel, trace chert seams reddish brown, very stiff, moist		10		3	AS				
	15 1154.5		15		4	AS				
	18.5 1151.0		20		RUN 1	DB	99%	RQD 88%		
	<u>LIMESTONE++</u> stratified, scattered chert seams and inclusions, light gray and white, medium bedded, very fine grained, fresh, hard, solid		25							
			30		RUN 2	DB	98%	RQD 71%		

Continued Next Page

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	▽	WD	▽	
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

Page 2 of 2

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

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

RUN  
3

DB

100%

RQD  
80%

40.5

1129.0

40

BOTTOM OF BORING AT 40.5 FEET  
BACKFILLED WITH CUTTINGS 10/24/02

++ 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	▽	WD	▽	
WL		WD		

**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

Page 2 of 5

CLIENT		HNTB		GEOLOGIC LOG						
SITE		McDONALD COUNTY, MISSOURI		PROJECT						
				I-49, MISSOURI						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf

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	▽	WD	▽	
WL		WD		

**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

Page 3 of 5

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

LS

**LIMESTONE++**

stratified, scattered chert seams and  
inclusions, light gray and white, medium  
bedded, very fine grained, fresh, hard, solid

LS

CT

LS

LS

LS

CT

LS

CT

CT

CT

LS

LS

LS

LS

28.2

1141.3

**LIMESTONE++**

stratified, scattered chert seams and  
inclusions, light gray and white, medium  
bedded, very fine grained, fresh, hard, solid

LS

CT

CT

CT

LS

CT

LS

Continued Next Page

30

RUN  
2

DB

98%

RQD  
71%

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

**Continued Next Page**

APPROVED	SPB	JOB #	J7P0601
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# Terracon

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

## Page 5 of 5

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

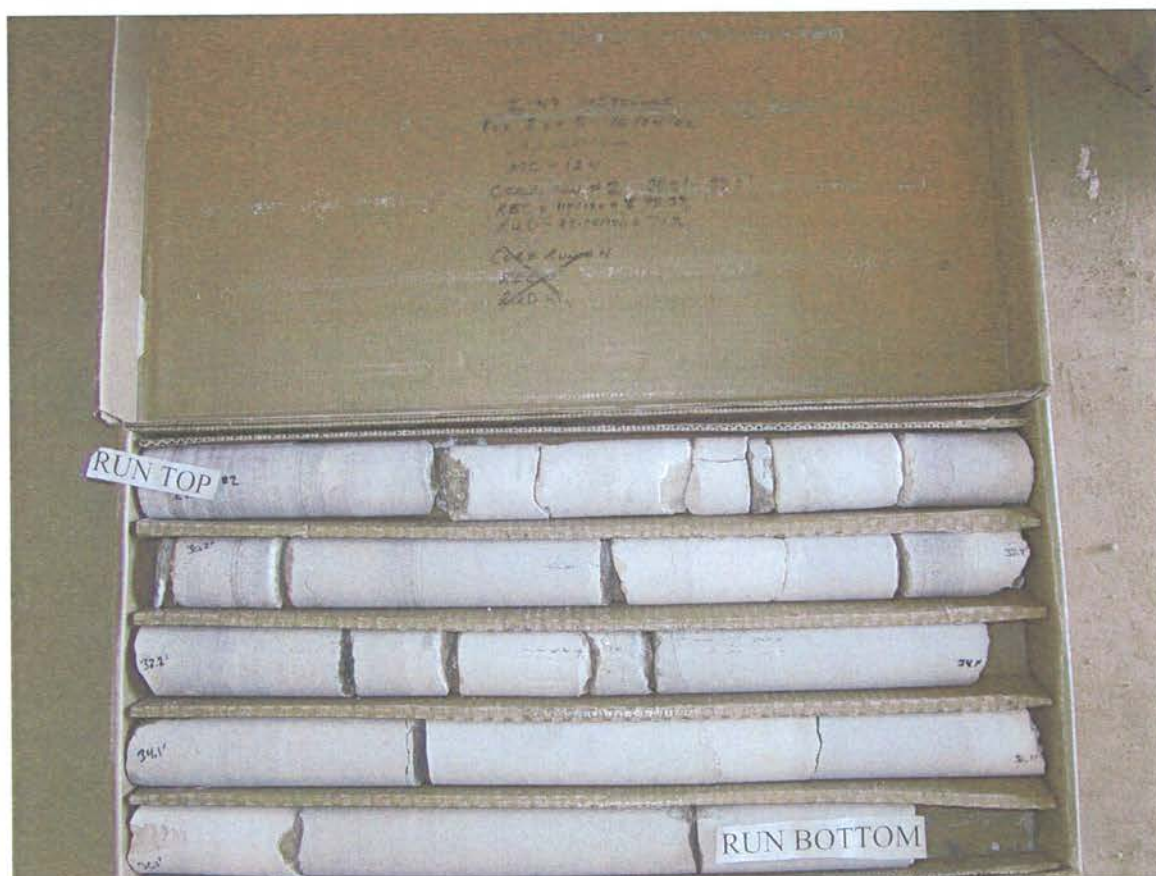
WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽		▽
WL			

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

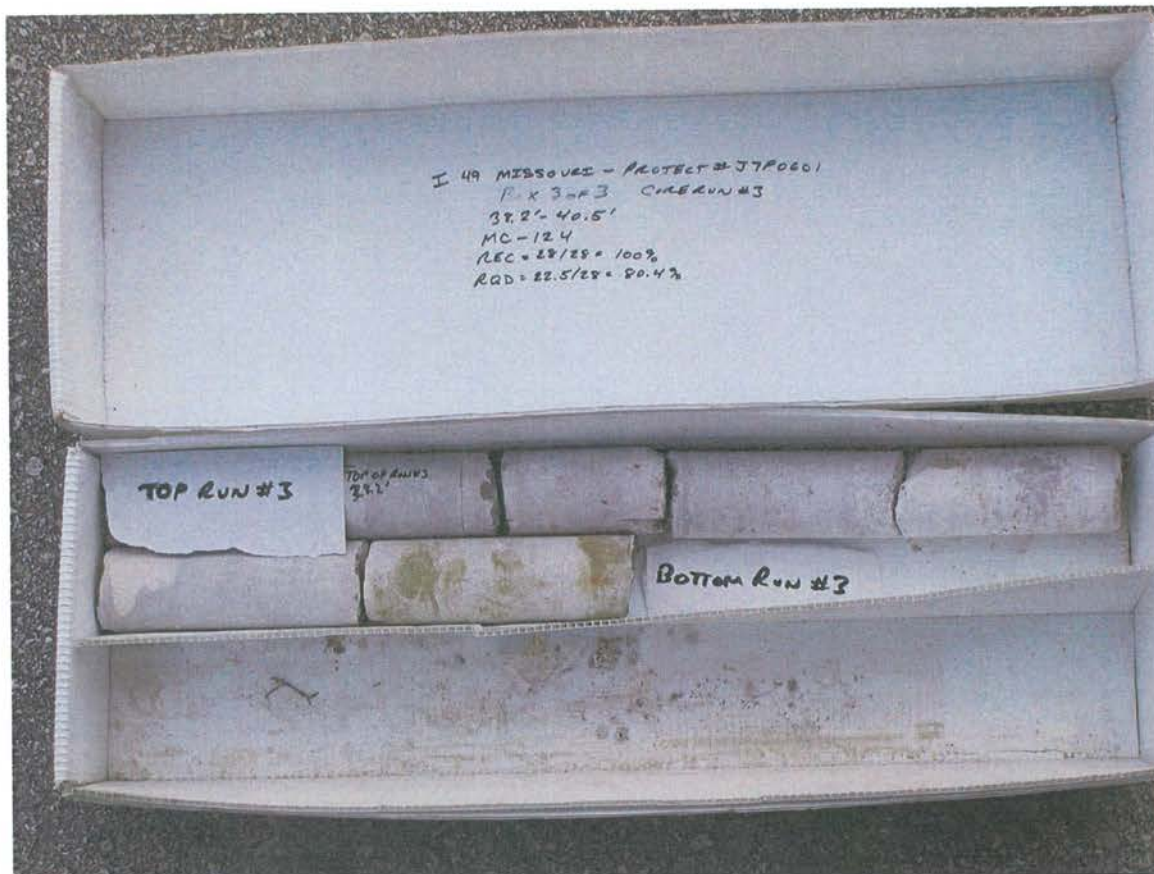


I 49 Missouri  
Missouri J7P0601  
Boring MC-124  
Run No. 1  
18.5 Feet to 28.2 Feet







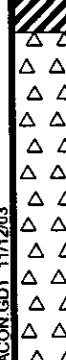
I 49 Missouri  
Missouri J7P0601  
Boring MC-124  
Run No. 2  
28.2 Feet to 38.2 Feet



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

Page 1 of 2

CLIENT		HNTB							
SITE		McDONALD COUNTY, MISSOURI							
PROJECT		I-49, MISSOURI							
GRAPHIC LOG	Boring Location: 905+67, 114 Feet right of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	Approx. Surface Elev.: 1163.7 ft								
	1 <b>CLAYEY GRAVEL</b> light brown, dry	1162.7	GC	1	AS				
	<b>SANDY FAT CLAY</b> , scattered gravel light brown to light reddish brown, dry		CH	2	AS				
	9.5 <b>SANDY FAT CLAY</b> , with chert seams light brown to light reddish brown, moist	1154.2	CH	3	AS				
	23.5 <b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	1140.2		RUN 1	DB	90%	RQD 37%		
				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	▽	WD	▽
WL			

## Terracon

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

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

# Terracon

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

LOG OF BORING NO. MC-179

CLIENT		HNTB								
SITE		PROJECT								
McDONALD COUNTY, MISSOURI		I-49, MISSOURI								
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	OVERBURDEN	24.5	1139.2							
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid	25		RUN 1	DB	90%	RQD 37%			
	REED SPRINGS FORMATION									
	LS									
	CT+LS - Interbedded									
	LS									
	CT									
	LS									
	CT									
	LS									
	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	▽	WD	▽
WL			

Terracon

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

# LOG OF BORING NO. MC-179

Page 4 of 5

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

LS  
30.4

1133.3

**CHERT++**

stratified, abundant limestone seams, light gray and gray, thin bedded, very fine grained, fresh, hard, solid

LS

CT

LS

CT

LS

CT

LS

LS w/ CT Inclusions

LS - healed vertical joint

CT

LS

CLAY SEAM / JOINT

LS

CT

LS w/ CT INCLUSIONS

40.2

1123.5

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  $\nabla$  DRY WD  $\nabla$  DRY AB

WL  $\nabla$   $\nabla$

WL

**Terracon**

BORING STARTED 12-20-02

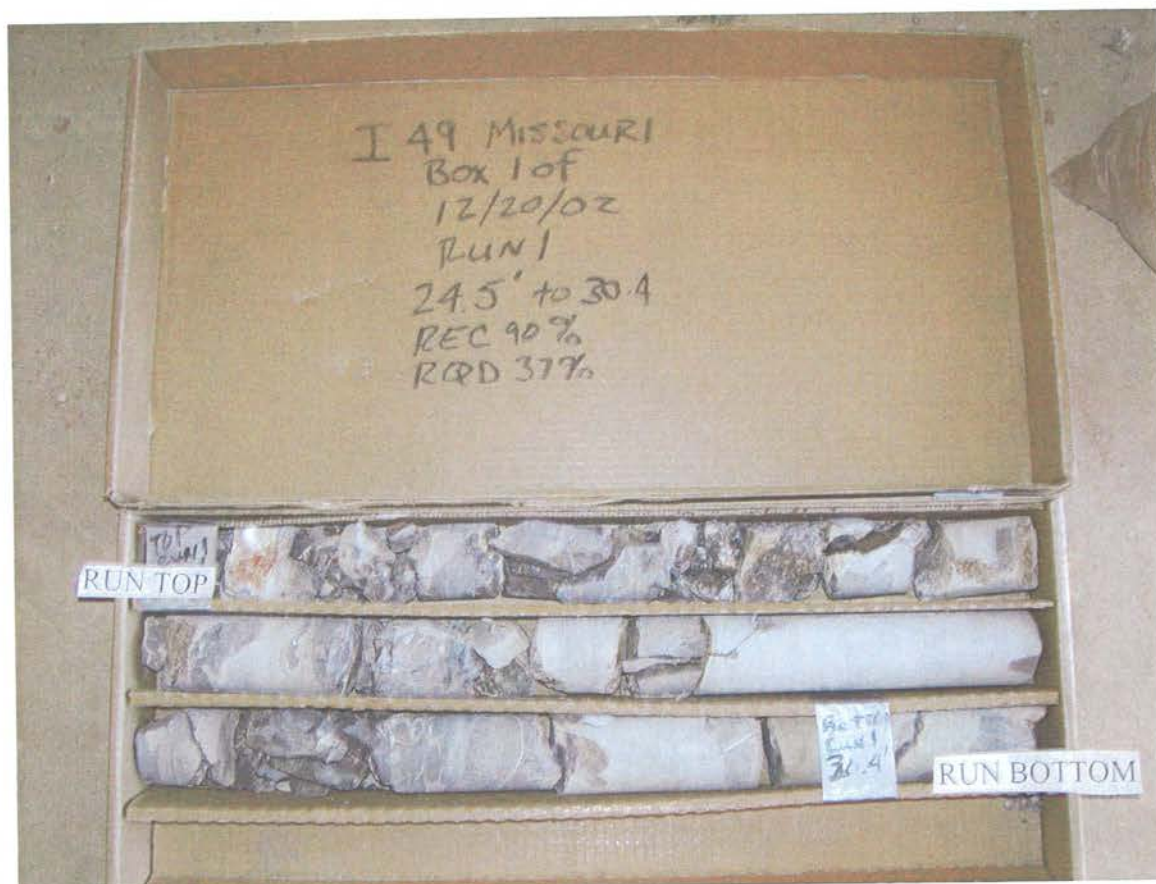
BORING COMPLETED 12-20-02

RIG ATV, #103E FOREMAN JW

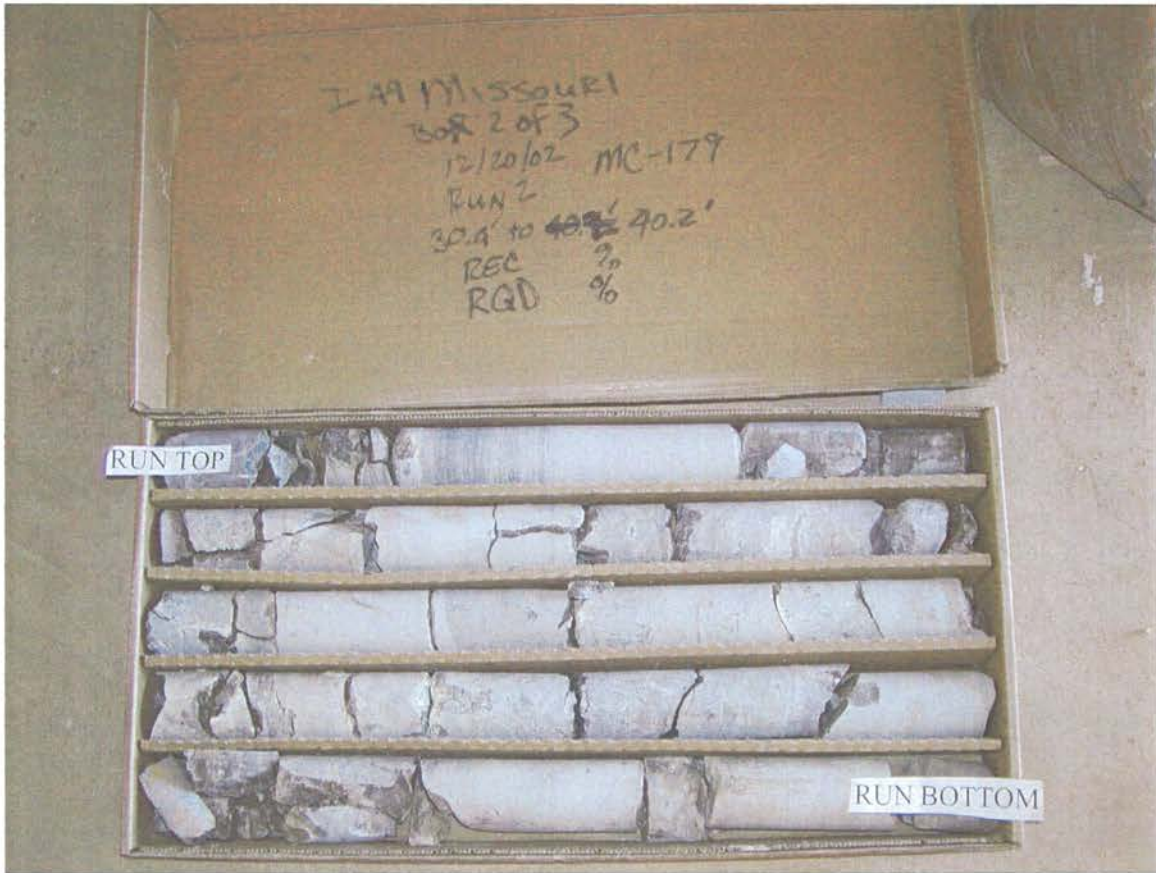
APPROVED BKM JOB # J7P0601

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

**Continued Next Page**

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

Page 2 of 3

Page 2 of 3

CLIENT		HNTB		Automatic Hammer Efficiency = 80.7%							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
△△ △△<											

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

CLIENT		HNTB		Automatic Hammer Efficiency = 80.7%			
SITE		McDONALD COUNTY, MISSOURI		PROJECT			
				I-49, MISSOURI			
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES		TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	73					
	<b>LIMESTONE++</b> stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid	1095.7					
	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.	1084.2					
	<b>NOTE:</b> 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				Terracon	BORING STARTED		1-31-03		
WL	▽ DRY	WD	▽ DRY		AB	BORING COMPLETED		2-8-03	
WL	▽ DRY	24 hr	▽			RIG	ATV, #103E	FOREMAN	JW
WL						APPROVED	SPB	JOB #	J7P0601

# LOG OF BORING NO. MC-191

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	OVERBURDEN	22.8							
	1145.9								
	CT <b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			RUN 1	DB	100%	RQD 56%		
	LS								
	CT								
	LS								
	CT <b>REED SPRINGS FORMATION</b>								
	LS								
	LS								
	25.3	1143.4							
	CT <b>CHERT++</b> 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%		
	LS								
	26.5	1142.2							
	CT <b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			RUN 3	DB	100%	RQD 75%		
	LS w/ CT SEAMS								
	CT								
	LS								
	CT								
	29.5	1139.2							
	LS								
	CT			RUN 4	DB	100%	RQD 76%		
	CT								

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 12/5/03



# LOG OF BORING NO. MC-191

Page 4 of 9

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
CT	<b>CHERT++</b>								
CT	stratified, abundant limestone seams, light								
CT	gray and gray, thin to medium bedded,								
	very fine to fine grained, fresh, hard to very								
	hard, solid								
LS									
LS									
CT	Quartzite Drug								
CT									
LS									
CT									
LS	open fracture								
CT									
LS									
CT									
LS									
CT									
34.5		1134.2							
CT	<b>CHERT++</b>			RUN	DB	94%	RQD		
CT	stratified, abundant limestone seams, light			5			59%		
CT	gray and gray, thin to medium bedded,	35							
	very fine to fine grained, fresh, hard to very								
	hard, solid								
LS									
36.2		1132.5							
CT	<b>CHERT++</b>			RUN	DB	100%	RQD		
CT	stratified, abundant limestone seams, light			6			53%		
LS	gray and gray, thin to medium bedded,								
CT	very fine to fine grained, fresh, hard to very								
	hard, solid								
CT									
CT									
LS									
CT									
CT									
CT									
LS									
39.5		1129.2							
CT				RUN	DB	100%	RQD		
CT				7			75%		
LS									
CT									

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

## LOG OF BORING NO. MC-191

Page 5 of 9

CLIENT		HNTB		GEOLOGIC LOG						
SITE		McDONALD COUNTY, MISSOURI		PROJECT						
				I-49, MISSOURI						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid	1127.7								
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid			8	RUN DB	98%	RQD 81%			

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

## WATER LEVEL OBSERVATIONS, ft

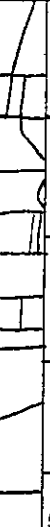
WL	▽ DRY	WD	▽ DRY	AB
WL	▽ DRY	24 hr	▽	
WL				

Terracon

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

# LOG OF BORING NO. MC-191

Page 6 of 9

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid										
CT											
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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

# 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			TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid									
	CT									
	CT									
	LS									
	SH									
	CT									
	LS									
	CT									
	SH									
	LS									
	CT									
64.5	1104.2									
	<b>CHERT++</b> 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%			
	LS									
	CT									
	LS									
	CT									
	SH									
	CT									
	SH									
	LS									
	CT									
	LS									
LS Inclusion										
CT										
69.5	1099.2									
	LS			RUN 14	DB	100%	RQD 74%			
	CT Inclusions									

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			



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

Page 8 of 9

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>CHERT++</b> stratified, abundant limestone seams, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard to very hard, solid								
	CT								
	CT								
	LS								
	CT								
	LS								
	CT								
	CT, LS Inclusion								
	LS								
	CT LS								
73 CT	1095.7								
SH	<b>LIMESTONE++</b> stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid								
LS									
7 SH	<b>ST. JOE LIMESTONE MEMBER</b>								
74.5	1094.2								
LS	<b>LIMESTONE++</b> stratified, trace shale seams, light gray, medium bedded, fine grained, fresh, hard, solid	75		RUN 15	DB	100%	RQD 100%		
SH									
SH									
SH									
SH									
SH									
SH									
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SH									
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SH									
SH									
SH									
SH									
SH									
79.5	1089.2			RUN 16	DB	100%	RQD 96%		
SH LS		80							
SH									

Continued Next Page

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

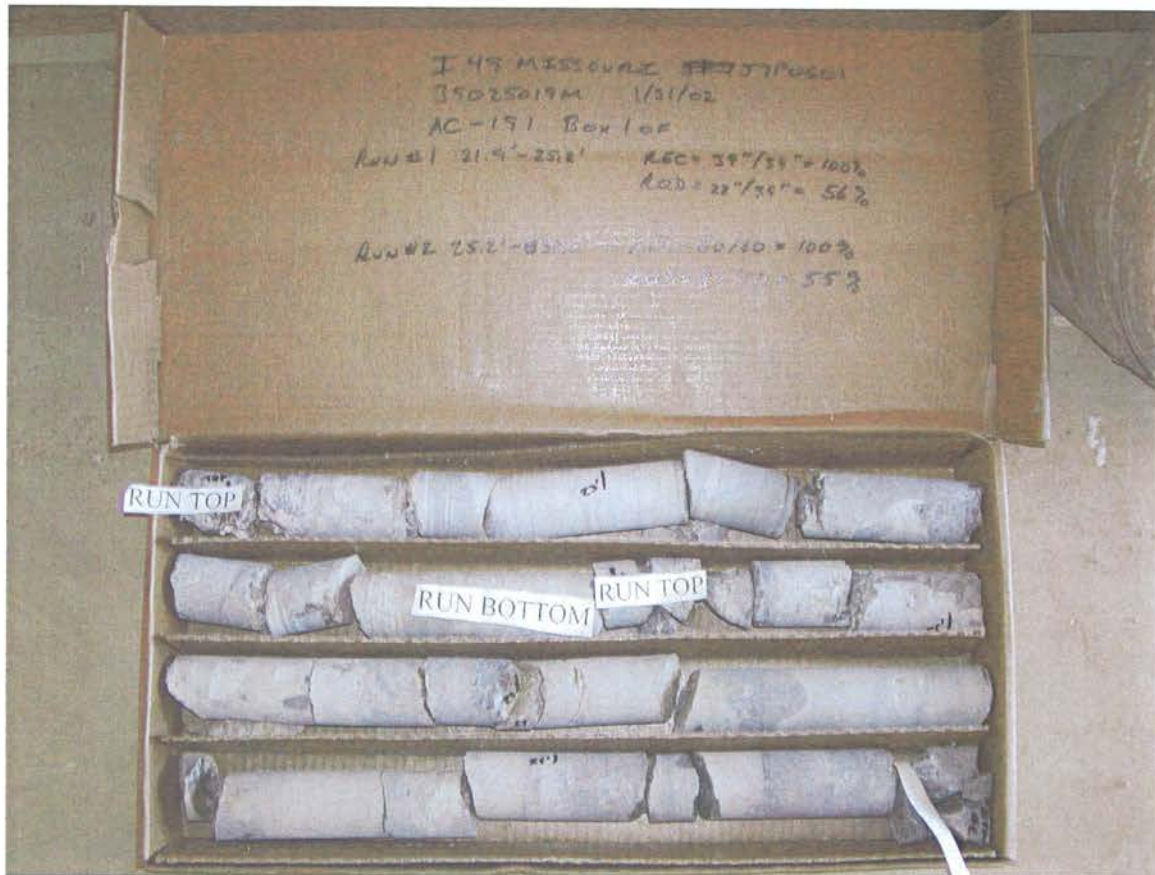
BOREHOLE 98 MC-191.GPJ TERRACON.GDT 12/5/03

**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.

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





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

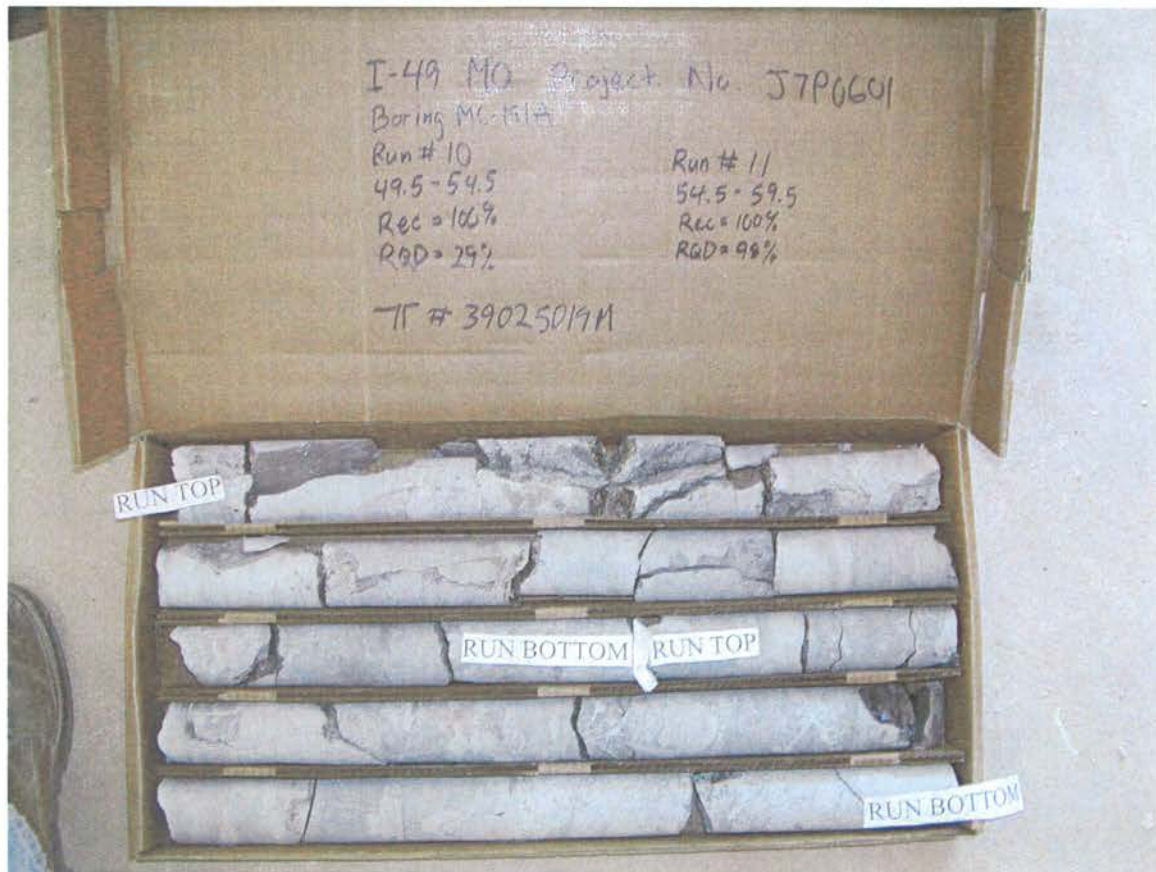


I 49 Missouri  
 Missouri J7P0601  
 Boring MC-191A  
 Run No. 4  
 29.5 Feet to 34.5 Feet  
 Run No. 5  
 34.5 Feet to 36.2 Feet  
 Run No. 6  
 36.2 Feet to 39.5 Feet

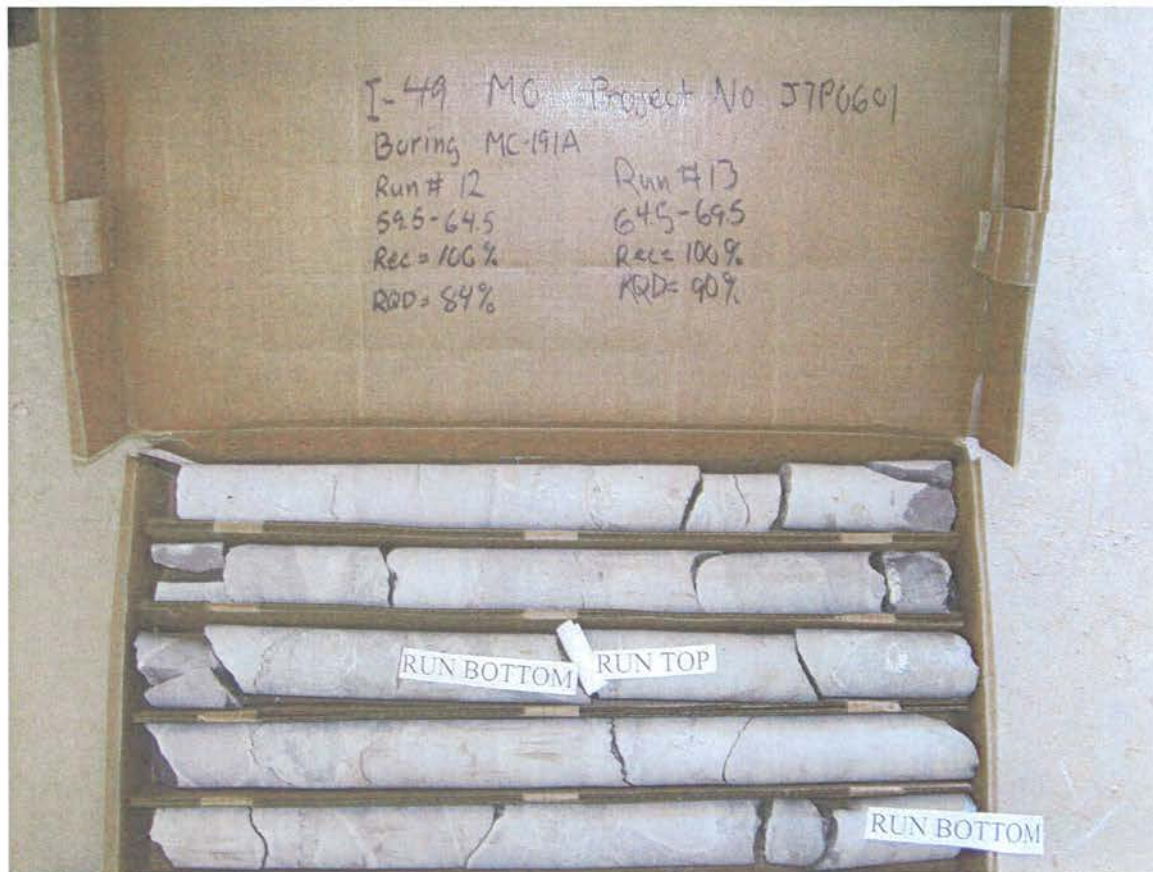




I 49 Missouri  
Missouri J7P0601  
Boring MC-191A  
Run No. 7  
39.5 Feet to 41.0 Feet  
Run No. 8  
41.0 Feet to 44.5 Feet  
Run No. 9  
44.5 Feet to 49.5 Feet

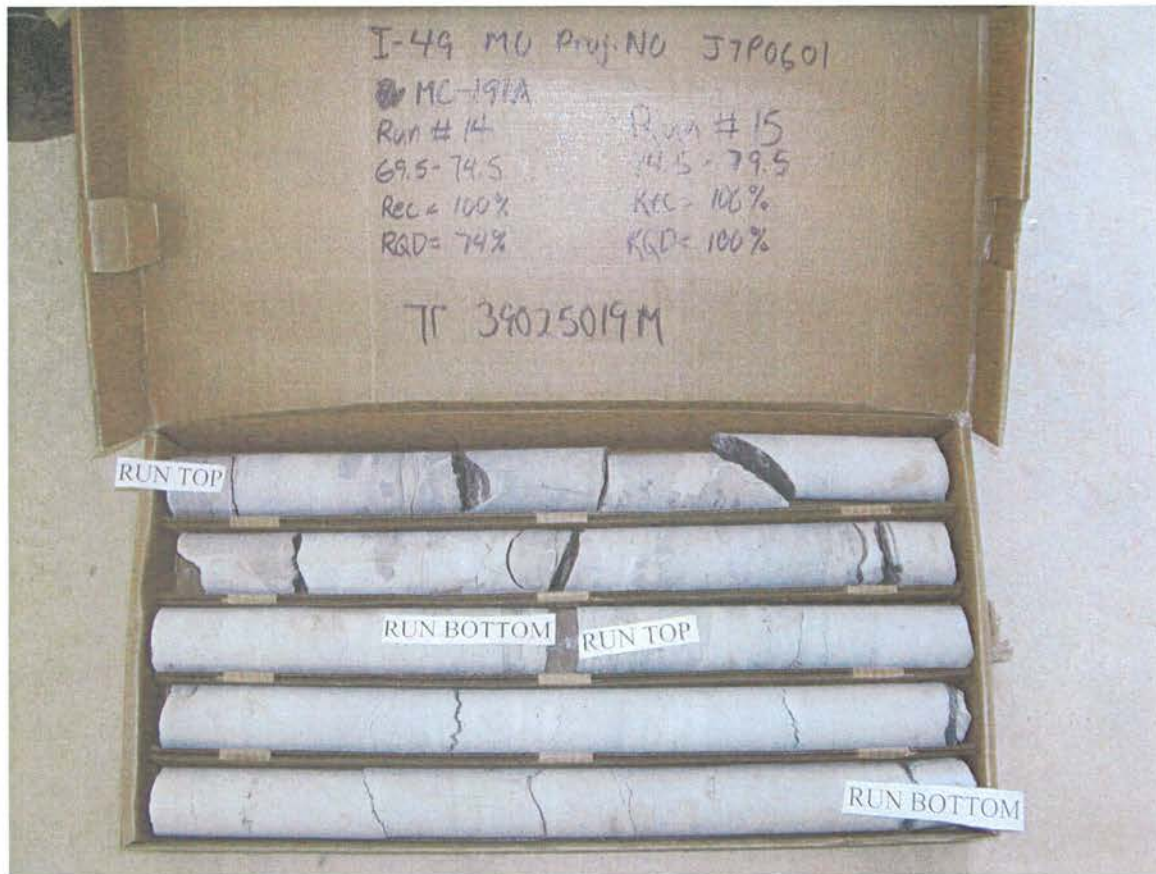


I 49 Missouri  
Missouri J7P0601  
Boring MC-191A  
Run No. 10  
49.5 Feet to 54.5 Feet  
Run No. 11  
54.5 Feet to 59.5 Feet

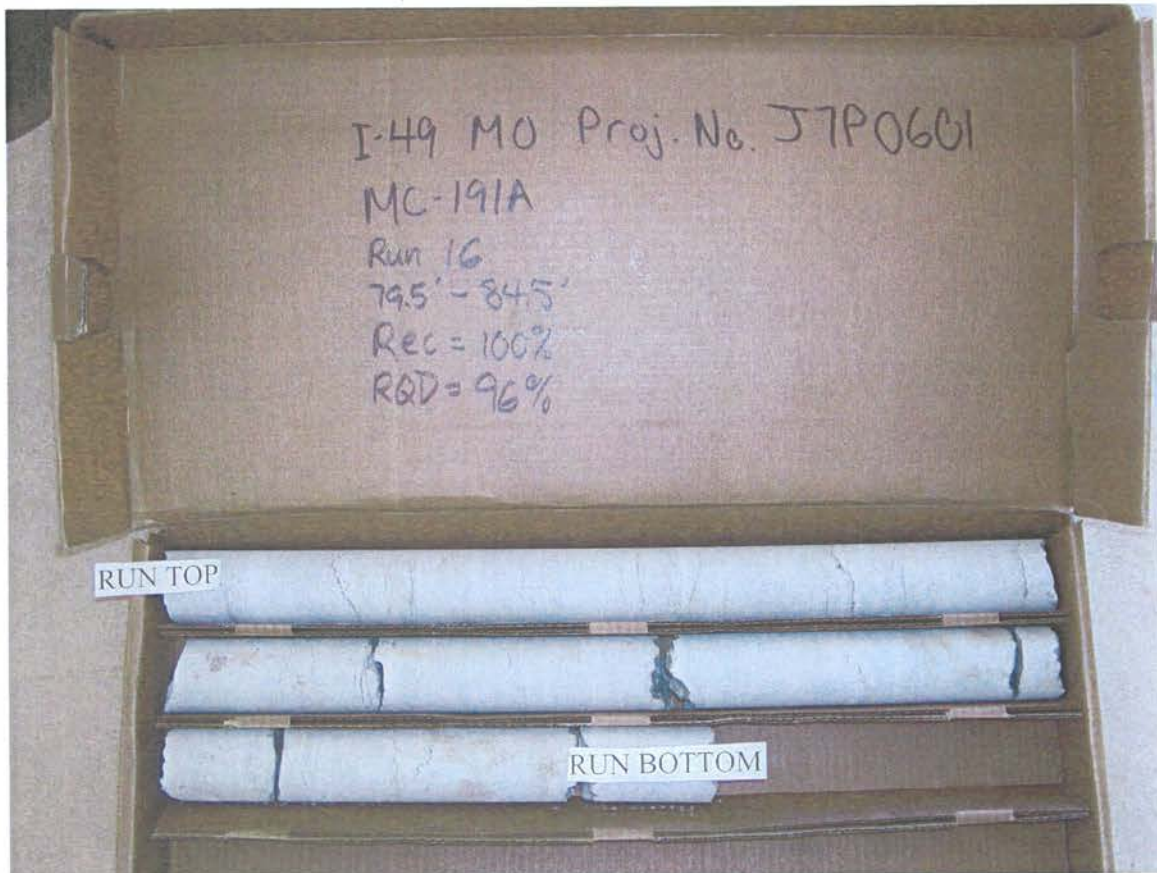


I 49 Missouri  
Missouri J7P0601  
Boring MC-191A  
Run No. 12  
59.5 Feet to 64.5 Feet  
Run No. 13  
64.5 Feet to 69.5 Feet






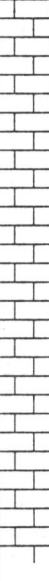
I 49 Missouri  
 Missouri J7P0601  
 Boring MC-191A  
 Run No. 14  
 69.5 Feet to 74.5 Feet  
 Run No. 15  
 74.5 Feet to 79.5 Feet



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

## LOG OF BORING NO. MC-212

Page 1 of 3

CLIENT		HNTB							
SITE		McDONALD COUNTY, MISSOURI							
PROJECT		I-49, MISSOURI							
GRAPHIC LOG	Boring Location: 931+00, 65 Feet left of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	Approx. Surface Elev.: 1151.7 ft								
	<u>LEAN CLAY</u> , with gravel brown, stiff to very stiff, moist	5	CL	1	AS				
	<u>SANDY LEAN CLAY</u> , with gravel, scattered chert seams brown to light reddish brown, very stiff, moist	10	CL	2	AS				
	<u>SANDY LEAN CLAY</u> , with gravel, with chert seams light brown to brown, very stiff, moist	17	CL	3	AS				
	- soft clay layer from 16 to 17 feet	17	CL	4	AS				
	<u>LIMESTONE++</u> 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%		
		20		RUN 2	DB	100%	RQD 93%		
		25		RUN 3	DB	100%	RQD 98%		
		30		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.

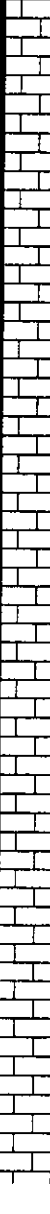
WATER LEVEL OBSERVATIONS, ft			
WL	▽ DRY	WD	▽ DRY AB
WL	▽	WD	▽
WL			

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

Page 2 of 3

CLIENT		HNTB								
SITE		PROJECT								
McDONALD COUNTY, MISSOURI		I-49, MISSOURI								
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>LIMESTONE++</b> 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								

# LOG OF BORING NO. MC-212

CLIENT <b>HNTB</b>									
SITE <b>McDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>LIMESTONE++</b> 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%		
	<b>LIMESTONE++</b> stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid	81							
		1070.7							
	<b>LIMESTONE++</b> 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
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

Page 2 of 10

CLIENT <b>HNTB</b>		GEOLOGIC LOG							
SITE <b>MCDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>OVERBURDEN</b>								
	18 1133.7								
	CT <b>LIMESTONE++</b> 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%		
	CT								
	CT								
	LS <b>REED SPRINGS FORMATION</b>								
	20 1131.7								
	LS								

OVERBURDEN

18

1133.7

CT

**LIMESTONE++**

CT

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

CT

LS

**REED SPRINGS FORMATION**

20 1131.7

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	▽	WD	▽	
WL		WD		

**Terracon**

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

BOREHOLE 98 MC-212.GPJ TERRACON.GDT 12/5/03



# LOG OF BORING NO. MC-212

Page 3 of 10

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

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

CT

CT

LS

CT

CT

LS

CT

LS

CT

SH

25 LS

1126.7

## 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

CT

CT

CT

CT

LS

LS

CT

CT

CT

LS

CT

30 CT

1121.7

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 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

Page 4 of 10

CLIENT		GEOLOGIC LOG						
HNTB								
SITE		PROJECT						
McDONALD COUNTY, MISSOURI		I-49, MISSOURI						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %
	<b>LIMESTONE++</b> 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%	
	<b>LIMESTONE++</b> 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%	
	LS, CT Inclusion LS + CT w/ SH Laminations	39		RUN 6	DB	100%	RQD 63%	
		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		2-9-03	
BORING COMPLETED		2-20-03	
RIG	ATV, #103E	FOREMAN	KS
APPROVED	SPB	JOB #	J7P0601

# LOG OF BORING NO. MC-212

Page 5 of 10

CLIENT

HNTB

GEOLOGIC LOG

SITE

MCDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

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 **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

LS

CT

CT

LS

LS

SH

LS & CT

CT

LS

LS

49 SH

1102.7

CT

LS & CT

LS - healed joint

CT

50

RUN DB 100% RQD  
7 72%

RUN DB 100% RQD  
8 61%

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				


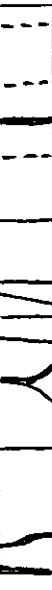
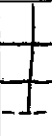
**Terracon**

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

BOREHOLE 98 MC-212.GPJ TERRACON.GDT 12/5/03

## LOG OF BORING NO. MC-212

Page 6 of 10

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>LIMESTONE++</b> 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								
	<b>LIMESTONE++</b> 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%		
	<b>LIMESTONE++</b> 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	60		RUN 10	DB	100%	RQD 94%		
Continued Next Page									

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 ABWL ☒ ☒

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

Page 7 of 10

CLIENT		GEOLOGIC LOG							
HNTB		PROJECT							
SITE		I-49, MISSOURI							
McDONALD COUNTY, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>LIMESTONE++</b> 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							
	<b>LIMESTONE++</b> 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 11	DB	100%	RQD 88%		
		65							
69		1082.7							
				RUN 12	DB	100%	RQD 95%		
		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	2-9-03
BORING COMPLETED	2-20-03
RIG ATV, #103E	FOREMAN KS
APPROVED SPB	JOB # J7P0601

# LOG OF BORING NO. MC-212

Page 8 of 10

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	CT								
	CT								
	LS								
	LS+CT								
	SH								
	CT								
	SH								
	LS								
74	1077.7								
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	SH								
	CT								
	CT								
	LS								
	CT								
	CT								
	CT								
75									
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	SH								
	CT								
	CT								
	LS								
	CT								
	CT								
	CT								
76									
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	SH								
	CT								
	CT								
	LS								
	CT								
	CT								
	CT								
77									
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	SH								
	CT								
	CT								
	LS								
	CT								
	CT								
	CT								
78									
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	SH								
	CT								
	CT								
	LS								
	CT								
	CT								
	CT								
79									
	<b>LIMESTONE++</b> 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								
	CT								
	LS								
	SH								
	CT								
	CT								
	LS								
	CT								
	CT								
	CT								
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	▽	WD	▽
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

Page 9 of 10

CLIENT					GEOLOGIC LOG									
HNTB					PROJECT									
SITE					I-49, MISSOURI									
McDONALD COUNTY, MISSOURI														
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>REED SPRINGS FORMATION</b>													
	<b>LIMESTONE++</b> 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				1070.7									
81	<b>LIMESTONE++</b> stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid													
	<b>ST. JOE LIMESTONE MEMBER</b>													
	<b>LIMESTONE++</b> stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid				1067.7									
84														
	<b>LIMESTONE++</b> stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid				85		RUN 15	DB	100%	RQD 93%				
	↑ <b>LS</b> ↓													
	<b>SH</b>													
	<b>SH</b>													
	<b>SH</b>													
89	<b>LIMESTONE++</b> stratified, trace shale laminations, gray, medium to thick bedded, medium to coarse grained, fresh, hard, solid				1062.7		RUN 16	DB	100%	RQD 100%				
	<b>LS</b>													

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

Page 10 of 10

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>LIMESTONE++</b> LS stratified, trace shale laminations, gray, SH medium to thick bedded, medium to coarse 91 LS grained, fresh, hard, solid	1060.7									

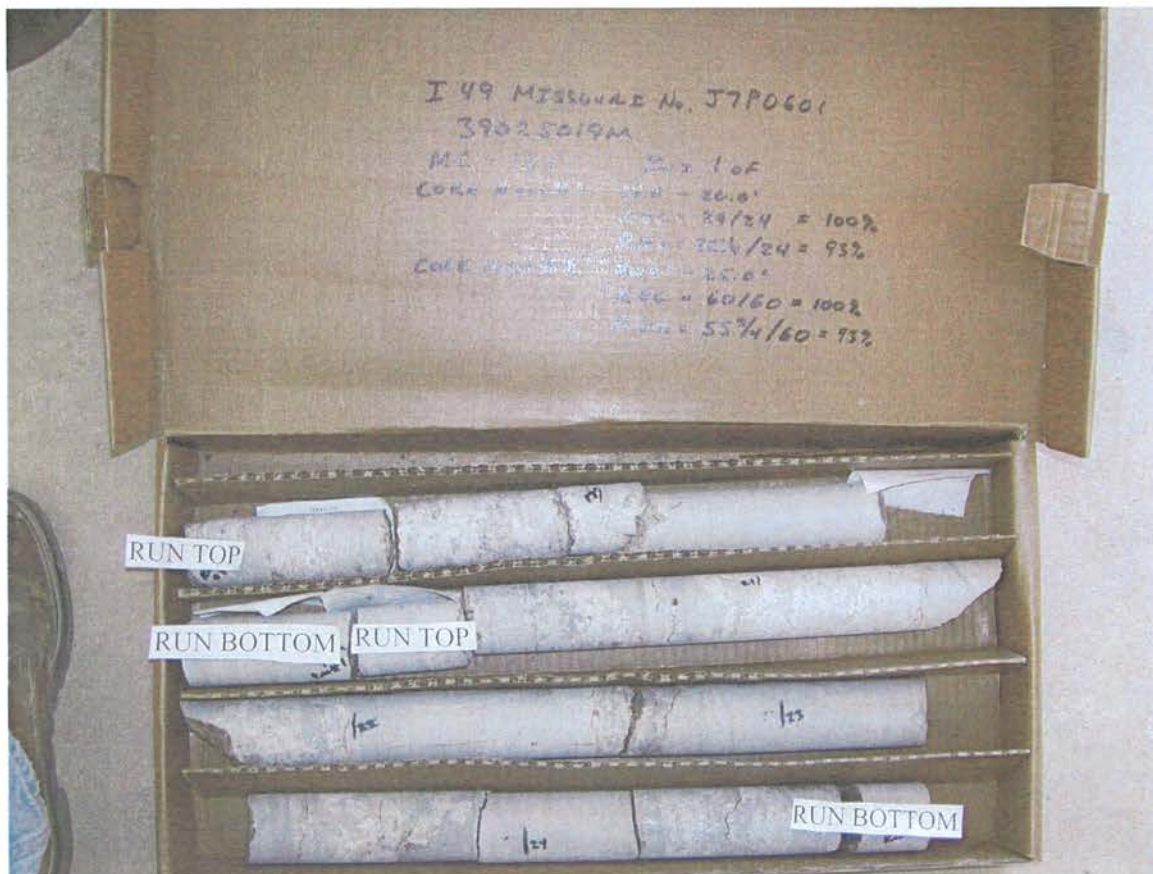
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft

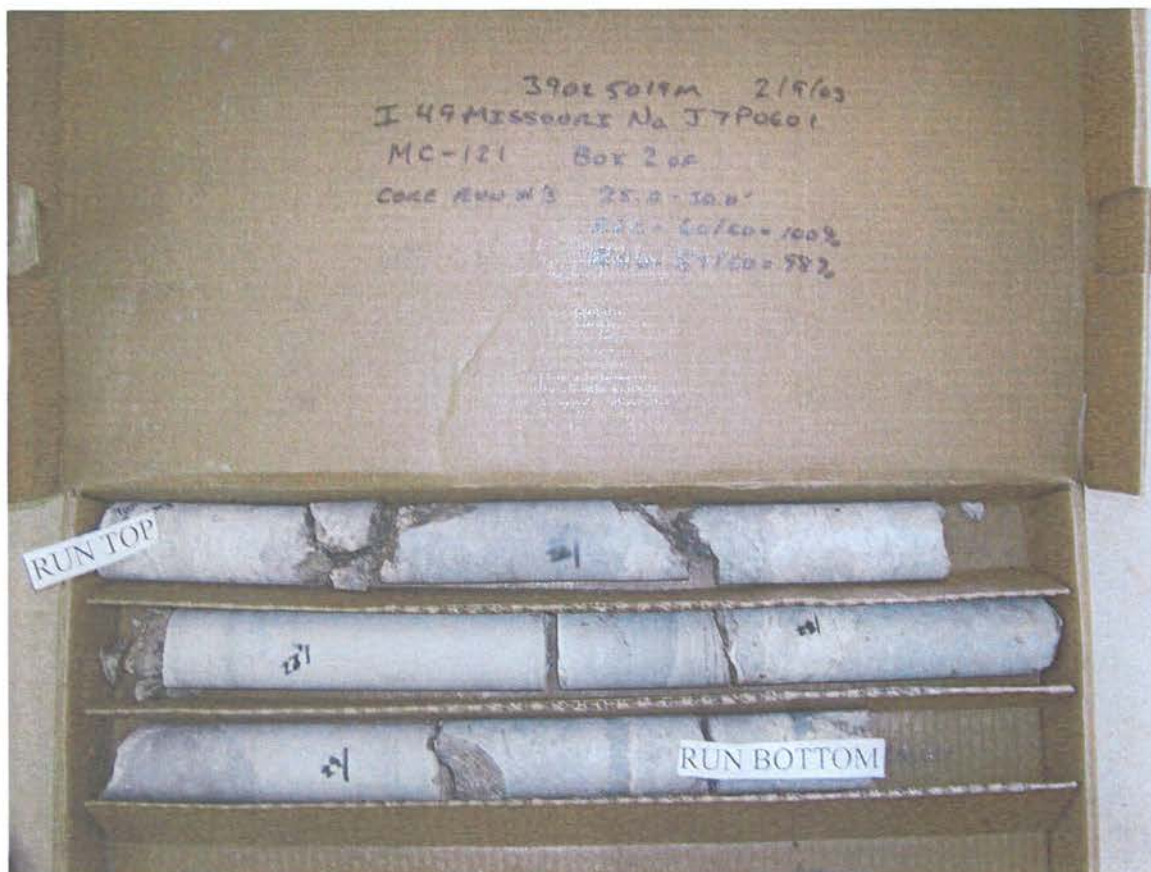
WL	▽ DRY	WD	▽ DRY	AB
WL	▽		▽	
WL				

Terracon

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



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

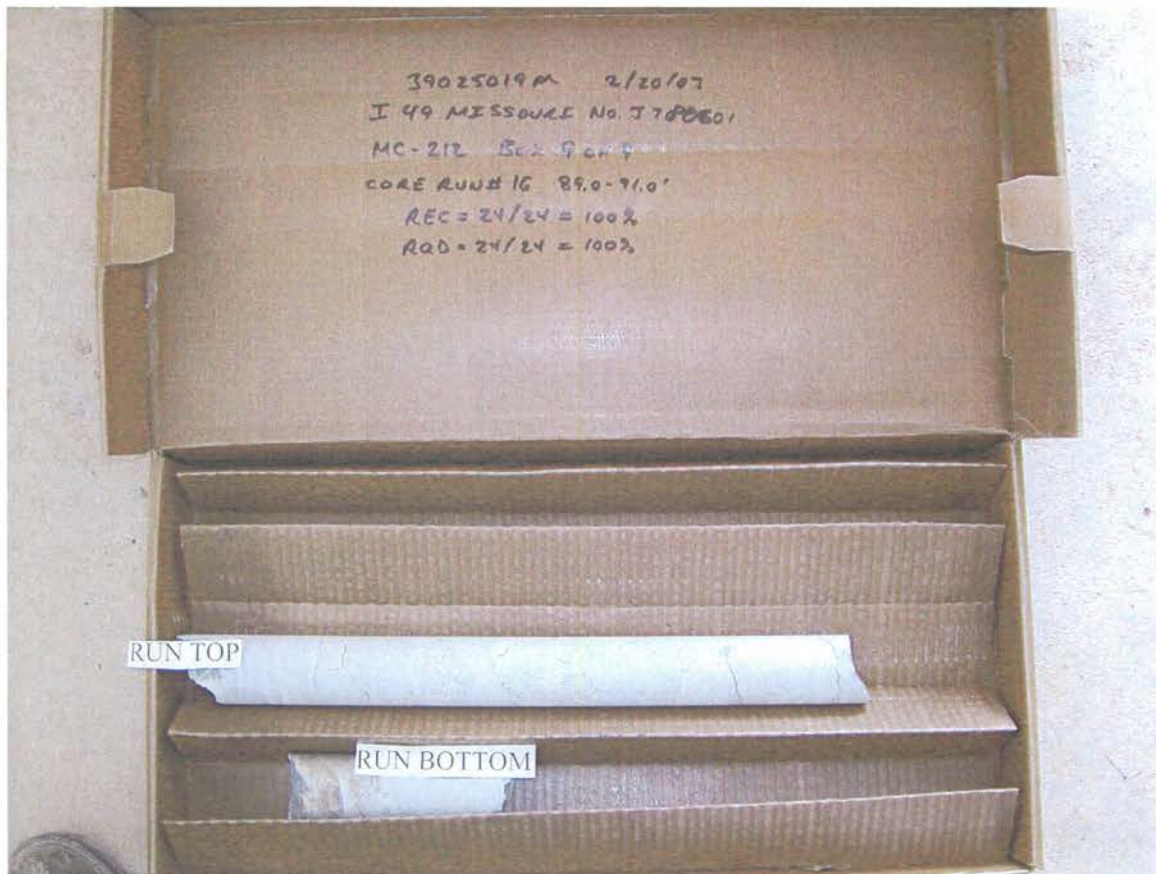


I 49 Missouri  
 Missouri J7P0601  
 Boring MC-212  
 Run No. 12  
 69.0 Feet to 74.0 Feet  
 Run No. 13  
 74.0 Feet to 79.0 Feet





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

Page 1 of 3

CLIENT		HNTB								
SITE		PROJECT								
McDONALD COUNTY, MISSOURI		I-49, MISSOURI								
GRAPHIC LOG	Boring Location: 945+08, 120 feet left of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS			
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 1169.5 ft									
	<u>LEAN CLAY</u> , with gravel brown, stiff, moist	5	CL	1	AS					
	<u>LEAN CLAY</u> , scattered gravel reddish brown, stiff to very stiff, moist	5	CL	2	AS					
		10								
		15								
		20								
	<u>LEAN CLAY</u> , with gravel brown, stiff, moist	20	CL	3	AS					
		25								
		30								
	- abundant chert seams below 31 feet									

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	▽	WD	▽	
WL		WD		

Terracon


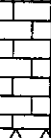
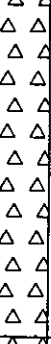
BORING STARTED	5-8-03
BORING COMPLETED	5-20-03
RIG	ATV, #98
FOREMAN	SS
APPROVED	BRO
JOB #	J7PO601

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



# LOG OF BORING NO. MC-229

Page 2 of 3

CLIENT		HNTB									
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>LEAN CLAY</b> , with gravel brown, stiff, moist	36								1133.5	
	<b>LIMESTONE++</b> stratified, abundant chert seams and inclusions, with clay seams, light gray and gray, thin bedded, fine grained, weathered, hard, possible cavities	39.5		RUN 1	DB	73%	RQD 59%				1130.0
	<b>CHERT++</b> 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 2	DB	100%	RQD 95%				
				RUN 3	DB	100%	RQD 81%				
				RUN 4	DB	100%	RQD 100%				
		49		RUN 5	DB	98%	RQD 88%				1120.5
	<b>CHERT++</b> 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 6	DB	97%	RQD 79%				
					RB						
				RUN 7	DB	98%	RQD 83%				
				RUN 8	DB	100%	RQD 55%				
				RUN	DB	100%	RQD				

Continued Next Page

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	▽	WD	▽
WL		WD	

# 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

[illegible]

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

WATER LEVEL OBSERVATIONS, ft					BORING STARTED		5-8-03				
WL	▽	DRY	WD		▽	DRY	AB	BORING COMPLETED		5-20-03	
WL	▽		▽				RIG	ATV, #98	FOREMAN	SS	
WL							APPROVED	BRO	JOB #	J7PO601	

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

## LOG OF BORING NO. MC-229

Page 5 of 10

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	<b>CHERT++</b> 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								
	CT <i>fractures</i>								
	CT								
	LS								
	CT								
	CT								
	CT								
	LS								
	CT								
	LS								
	CT								
	LS								
	CT								
	LS								
	CT								
	CT								
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	LS								
	CT								
	LS								
	CT								

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		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
CT	<b>CHERT++</b> 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										
LS											
CT											
LS											
CT											
LS											
CT											
LS											
54 CT		1115.5									
LS	<b>CHERT++</b> 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 6	DB	97%	RQD 79%				
CT		55									
56 LS		1113.5									
No core	<b>CHERT++</b> 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						
57		1112.5									
LS	<b>CHERT++</b> 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%				
CT											
CT											
59		1110.5									
LS				RUN 8	DB	100%	RQD 55%				
CT		60									
CT											

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			



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

BOREHOLE 98 MC-229.GPJ TERRACON.GDT 12/6/03

# LOG OF BORING NO. MC-229

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CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

**CHERT++**

CT 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

LS

CT

LS

CT

LS

CT

LS

CT

LS

64

1105.5

**CHERT++**

CT 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

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

CT

LS

65

RUN  
9

DB

100%

RQD  
60%

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 ☒ ☒  
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

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Page 8 of 10

CLIENT		HNTB		GEOLOGIC LOG						
SITE		McDONALD COUNTY, MISSOURI		PROJECT						
				I-49, MISSOURI						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>CHERT++</b> 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	74 1095.5								
	<b>CHERT++</b> 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	75 1090.5		RUN 11	DB	95%	RQD 94%			
	<b>CHERT++</b> 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	79 80		RUN 12	DB	97%	RQD 97%			

Continued Next Page

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

Page 9 of 10

CLIENT					GEOLOGIC LOG									
HNTB														
SITE					PROJECT									
McDONALD COUNTY, MISSOURI					I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
CT	<b>CHERT++</b>													
LS	stratified, abundant limestone seams, light													
CT	gray and gray, medium to thick bedded,													
LS	very fine to fine grained, slightly weathered													
LS	to fresh, hard, solid, trace pits and vugs													
81.5					1088.0									
CT	<b>CHERT++</b>													
LS	stratified, abundant limestone seams, light													
CT	gray and gray, medium to thick bedded,													
LS	very fine to fine grained, slightly weathered													
CT	to fresh, hard, solid, trace pits and vugs													
CT														
LS														
CT														
84					1085.5									
LS	<b>CHERT++</b>													
CT	stratified, abundant limestone seams, light													
LS	gray and gray, medium to thick bedded,													
LS	very fine to fine grained, slightly weathered													
LS	to fresh, hard, solid, trace pits and vugs													
LS														
CT														
LS														
LS														
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

Page 10 of 10

CLIENT		HNTB							
SITE		McDONALD COUNTY, MISSOURI				PROJECT			
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
									UNCONFINED STRENGTH, psf
	<p><b>NOTE:</b> 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.</p> <p>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.</p>								

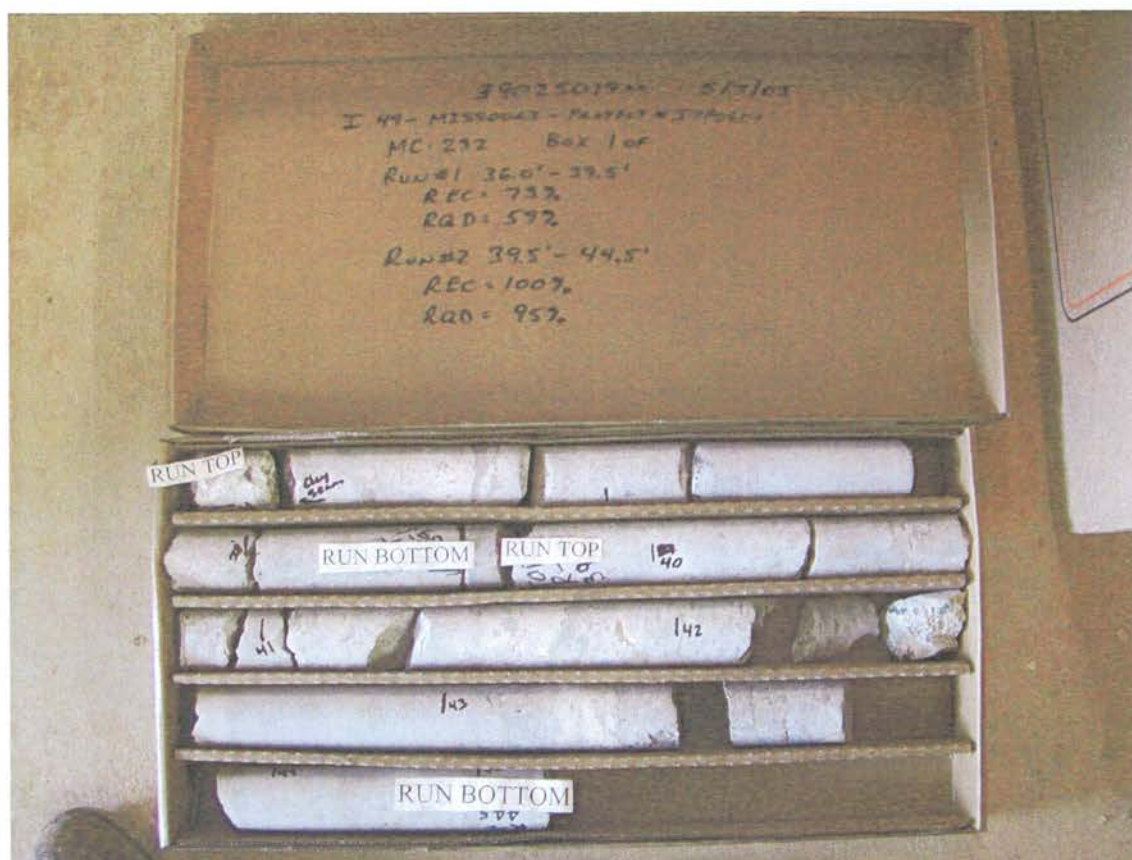
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## 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



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

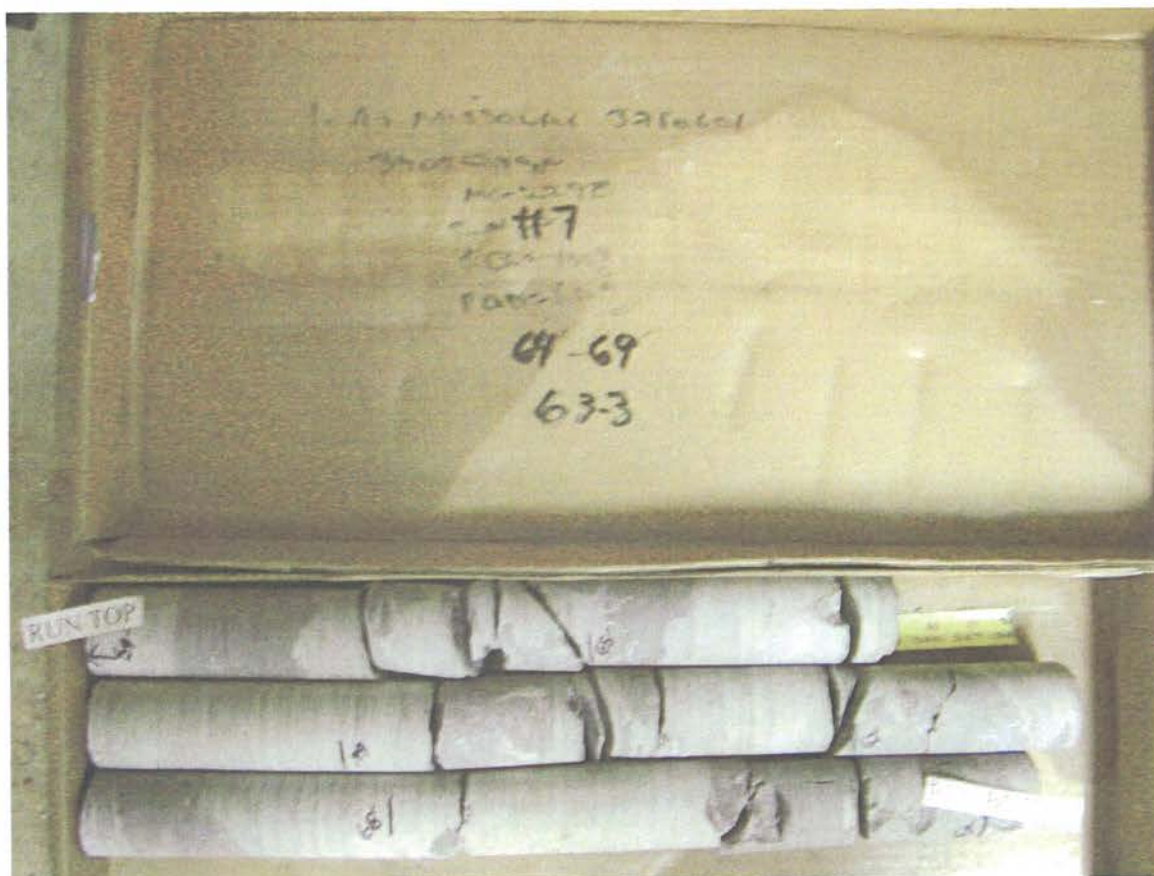




I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 229B  
 Run No. 3  
 47.5 Feet to 49.0 Feet  
 Run No. 4  
 49.0 Feet to 54.0 Feet  
 Run No. 5  
 54.0 Feet to 56.0 Feet

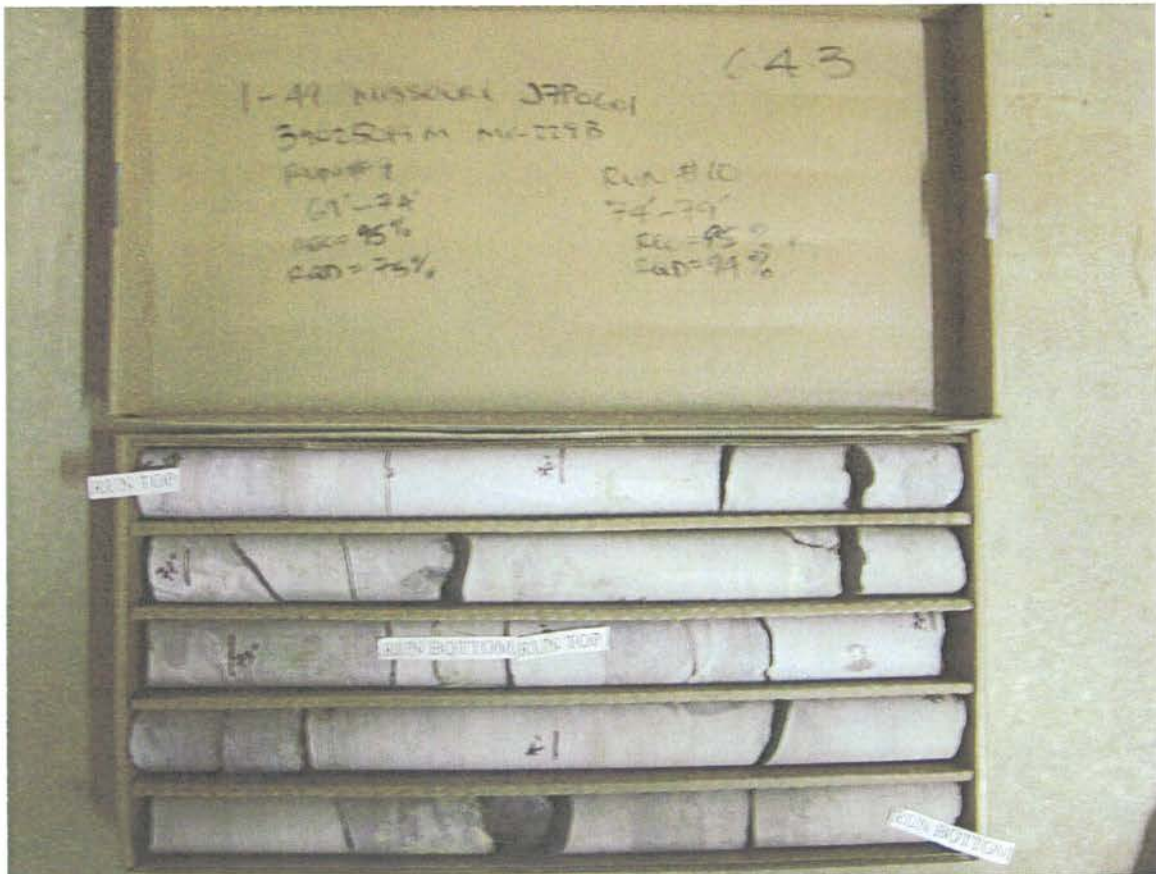


I 49 Missouri  
Missouri J7P0601  
Boring No. MC 229B  
Run No. 6  
57.0 Feet to 59.0 Feet  
Run No. 7  
59.0 Feet to 64.0 Feet



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

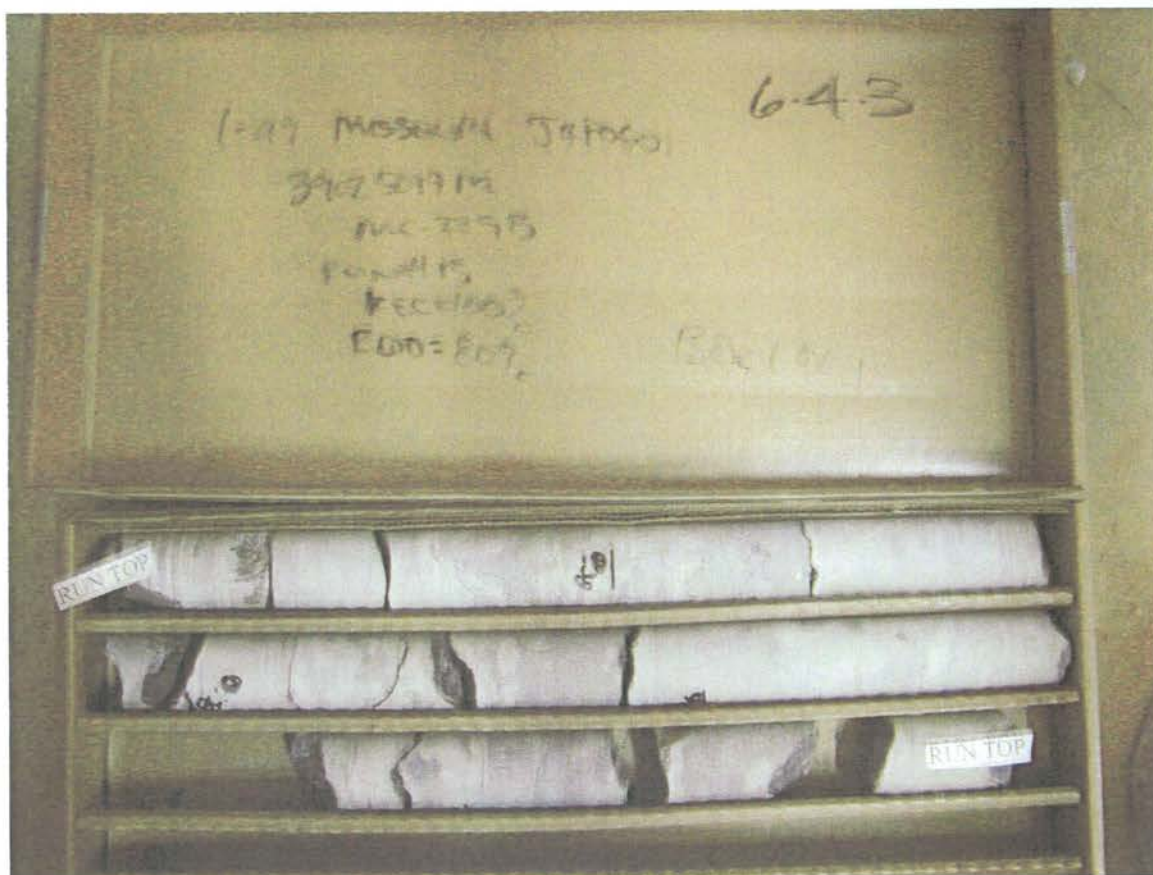




I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 229B  
 Run No. 9  
 69.0 Feet to 74.0 Feet  
 Run No. 10  
 74.0 Feet to 79.0 Feet



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





CLIENT		HNTB									
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
△ △<											

**Continued Next Page**

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

<b>WATER LEVEL OBSERVATIONS, ft</b>						<b>BORING STARTED</b> 2-20-03			
<b>WL</b>	<b>▽ DRY</b>	<b>WD</b>	<b>▽ DRY</b>	<b>AB</b>		<b>BORING COMPLETED</b> 5-31-03			
<b>WL</b>	<b>▽</b>		<b>▽</b>			<b>RIG</b>	<b>ATV, #98</b>	<b>FOREMAN</b>	<b>SS</b>
<b>WL</b>						<b>APPROVED BRO</b>	<b>JOB #</b>	<b>J7P0601</b>	

[illegible]

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

Page 4 of 9

CLIENT					GEOLOGIC LOG									
HNTB														
SITE					PROJECT									
McDONALD COUNTY, MISSOURI					I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
LS	<b>CHERT++</b>						RUN	DB	100%	RQD				
CT	stratified, abundant limestone seams and						1			32%				
LS	beds, light gray and gray, thin bedded, very													
	fine grained, weathered, hard, abundant													
	fractures, with vugs													
CT	<i>REED SPRINGS FORMATION</i>													
LS														
CT														
LS														
CT														
CT														
LS														
CT														
35					1148.4									
LS	<b>CHERT++</b>				35		RUN	DB	100%	RQD				
CT	stratified, abundant limestone seams and						2			42%				
LS	beds, light gray and gray, thin bedded, very													
	fine grained, weathered, hard, abundant													
	fractures, with vugs													
CT														
LS														
CT														
LS														
CT														
LS														
CT														
LS														
CT														
40					1143.4									
LS	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	▽	▽		
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

Page 5 of 9

CLIENT		GEOLOGIC LOG									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
LS	<b>CHERT++</b> stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs			RUN 3	DB	100%	RQD 57%				
CT											
CT											
LS											
CT											
CT											
LS											
CT											
LS											
CT											
45		1138.4									
CT	<b>CHERT++</b> stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs	45		RUN 4	DB	100%	RQD 82%				
CT											
LS											
47.3		1136.1									
CT	<b>CHERT++</b> stratified, abundant limestone seams and beds, light gray and gray, thin bedded, very fine grained, weathered, hard, abundant fractures, with vugs			RUN 5	DB	100%	RQD 46%				
LS											
CT											
LS											
50		1133.4									
Continued Next Page		50									

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

Page 6 of 9

Page 6 of 9

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> 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%				
	CT										
	LS										
53	CT	1130.4		RUN 7	DB	100%	RQD 100%				
	<b>CHERT++</b> 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%				
	CT										
	LS										
55	CT	1128.4									
	<b>CHERT++</b> stratified, abundant limestone seams and beds, light gray and gray, thin to medium bedded, very fine to fine grained, fresh, hard, solid		55	RUN 9	DB	100%	RQD 60%				
	CT										
	CT										
	CT										
	LS										
	LS										
	CT										
	CT										
	LS										
60	LS	1123.4									
Continued Next Page		60									

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

Page 7 of 9

CLIENT

HNTB

GEOLOGIC LOG

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

DESCRIPTION

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

CT **CHERT++**  
LS stratified, abundant limestone seams and  
beds, light gray and gray, thin to medium  
bedded, very fine to fine grained, fresh,  
hard, solid

LS  
CT  
LS  
CT  
LS  
CT  
LS  
CT  
LS

LS  
LS  
LS  
65 LS

1118.4

CT **CHERT++**  
LS stratified, abundant limestone seams and  
beds, light gray and gray, thin to medium  
bedded, very fine to fine grained, fresh,  
hard, solid

CT  
LS  
CT  
LS  
LS  
CT

LS  
CT  
70 LS

1113.4

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	▽	WD	▽	
WL		WD		

**Terracon**

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

BOREHOLE 98 MC-253.GPJ TERRACON.GDT 12/5/03

2815

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

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	▽	WD	▽
WL			



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

BOREHOLE - 98 MC-253 (SPT) TERRACON.GDT 12/5/03

## LOG OF BORING NO. MC-253

Page 9 of 9

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<p><b>NOTE:</b> 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.</p> <p>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.</p> <p>Boring MC-253B was moved 9 feet northeast of boring MC-253. MC-253B was drilled to 30 feet and cored to 80 feet.</p>										

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	▽	WD	▽	
WL		WD		



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

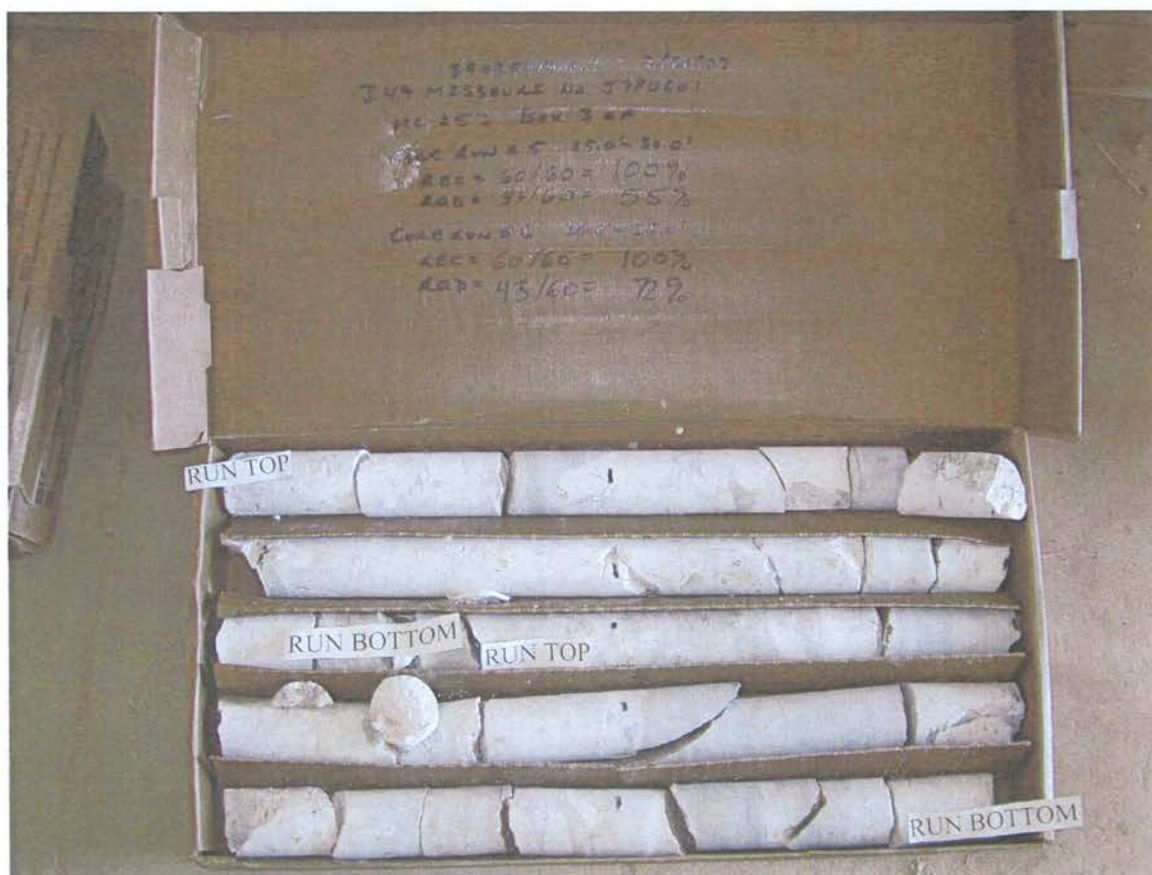


I 49 Missouri  
Missouri J7P0601  
Boring MC-253  
Run No. 1  
7.0 Feet to 10.0 Feet  
Run No. 2  
10.0 Feet to 15.0 Feet



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



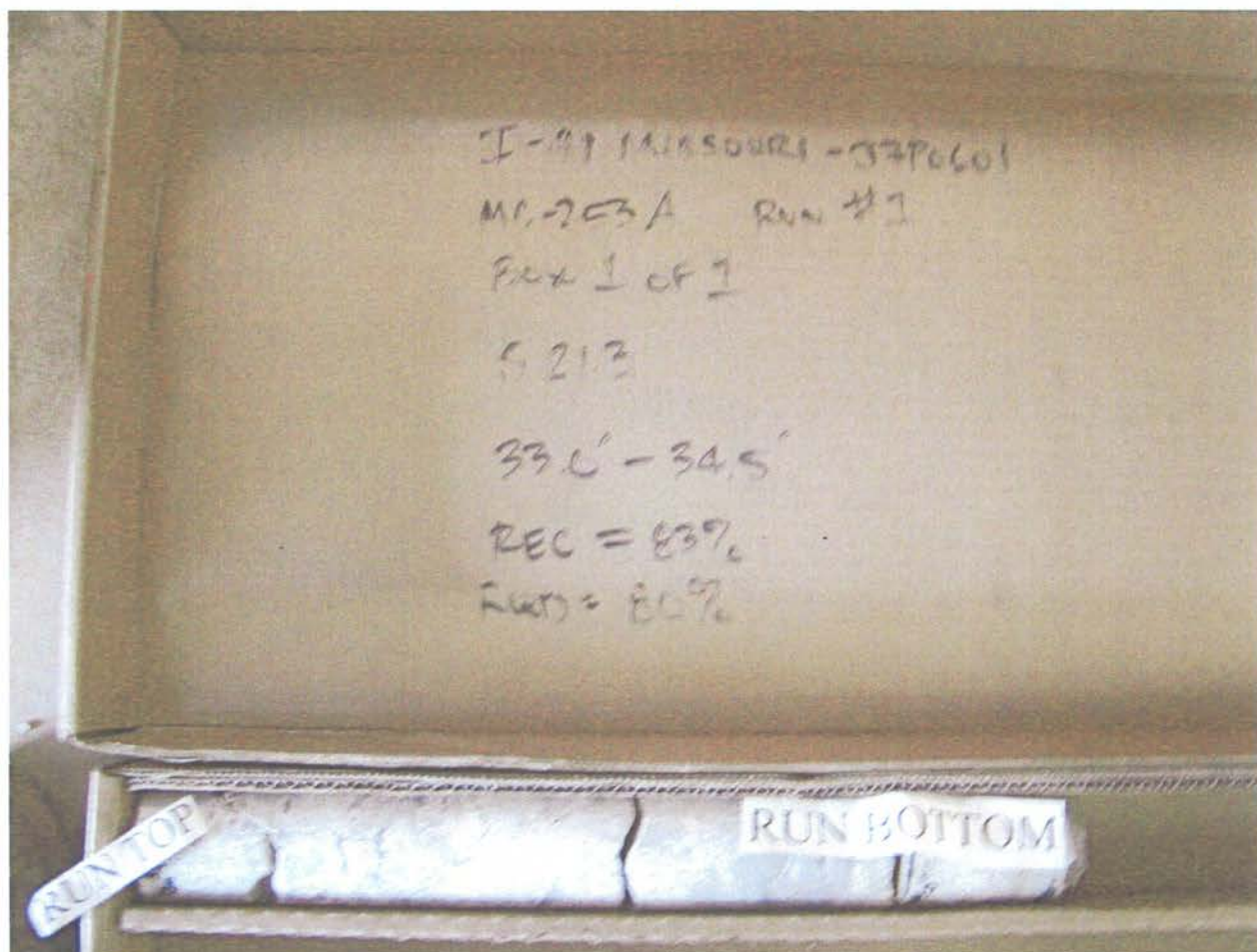


I 49 Missouri  
 Missouri J7P0601  
 Boring MC-253  
 Run No. 5  
 25.0 Feet to 30.0 Feet  
 Run No. 6  
 30.0 Feet to 35.0 Feet



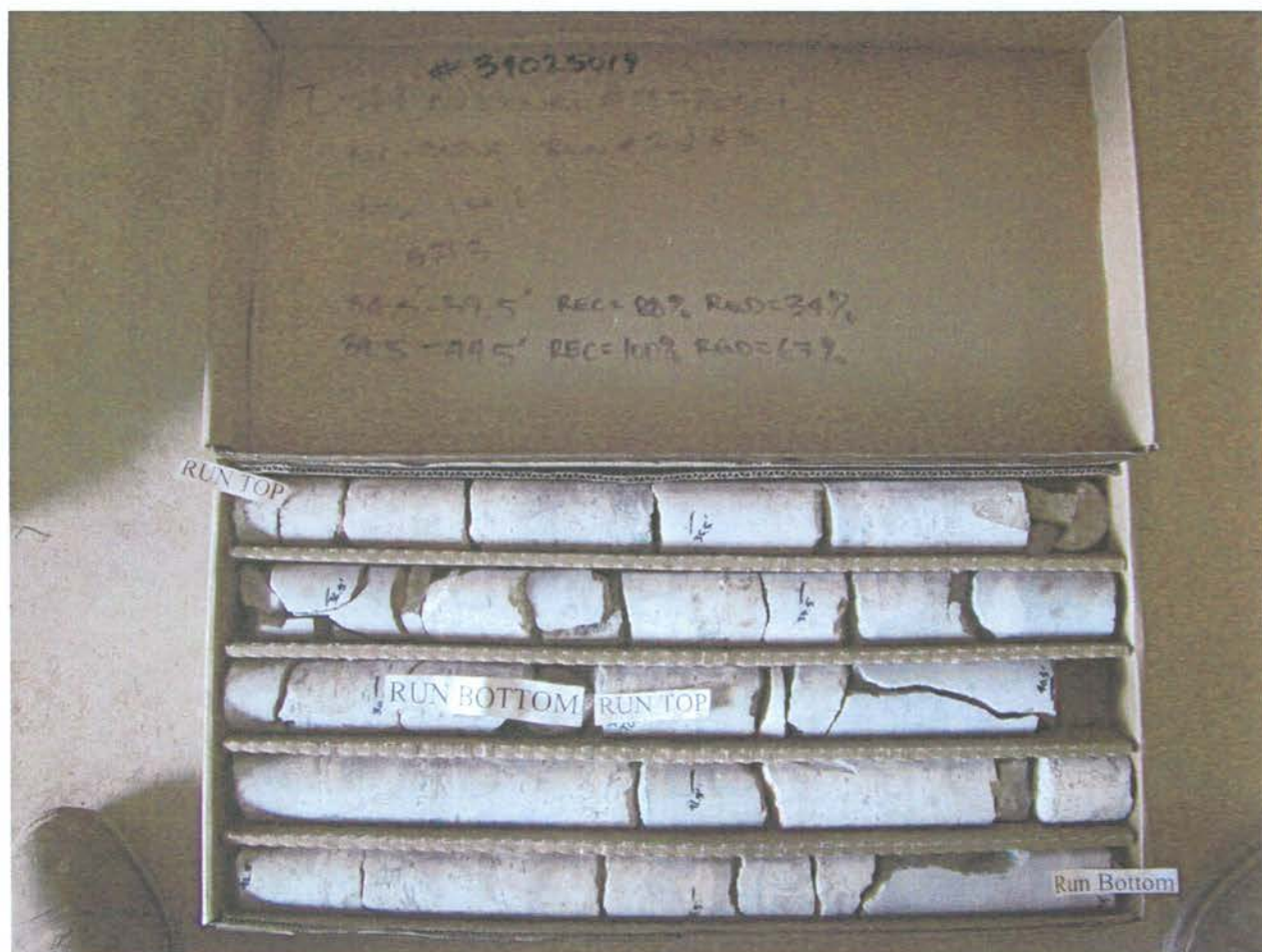


I 49 Missouri  
 Missouri J7P0601  
 Boring MC-253  
 Run No. 7  
 35.0 Feet to 40.0 Feet  
 Run No. 8  
 40.0 Feet to 45.0 Feet

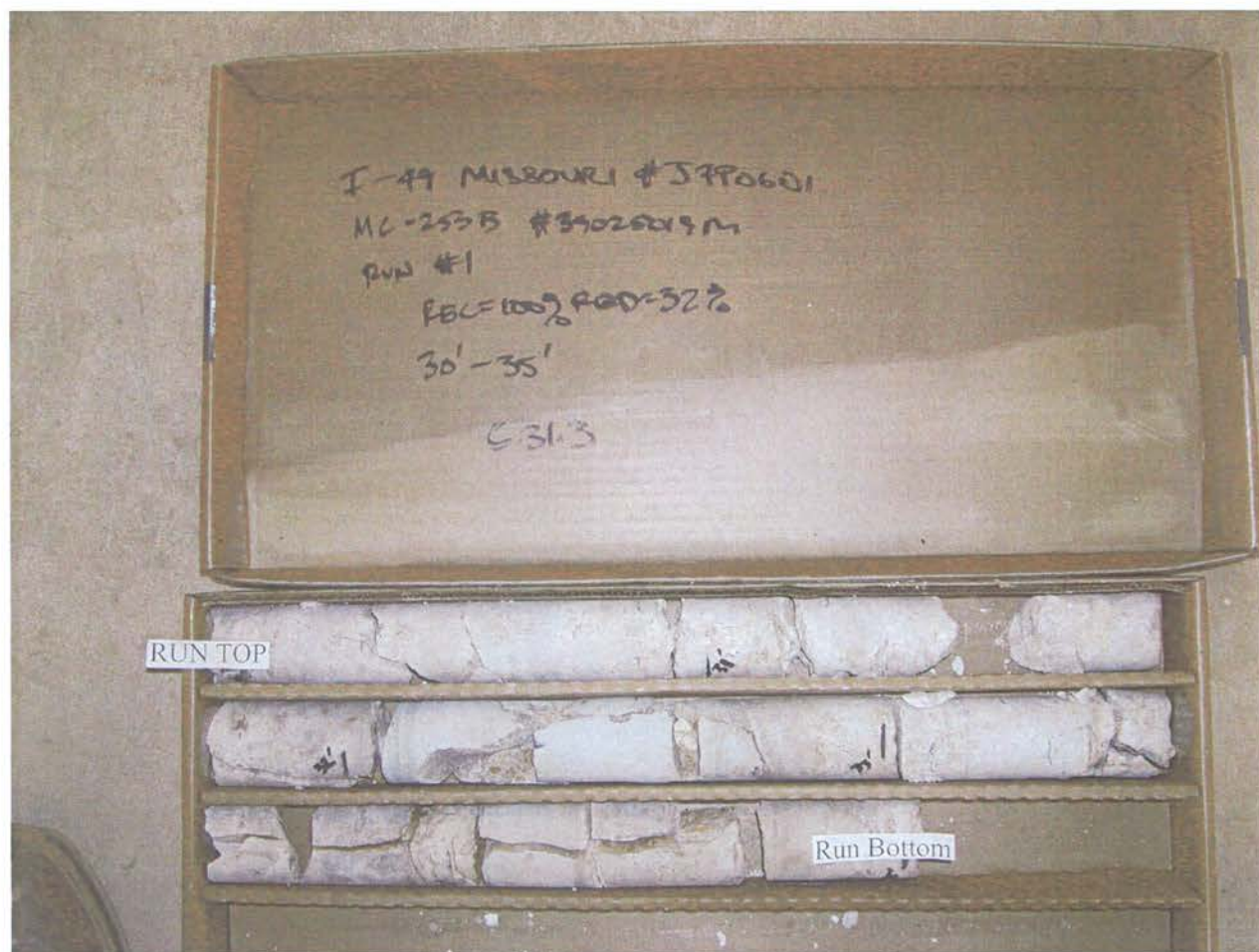


I 49 Missouri  
Missouri J7P0601  
Boring No. MC 253A  
Run No. 1  
33.0 Feet to 34.5 Feet



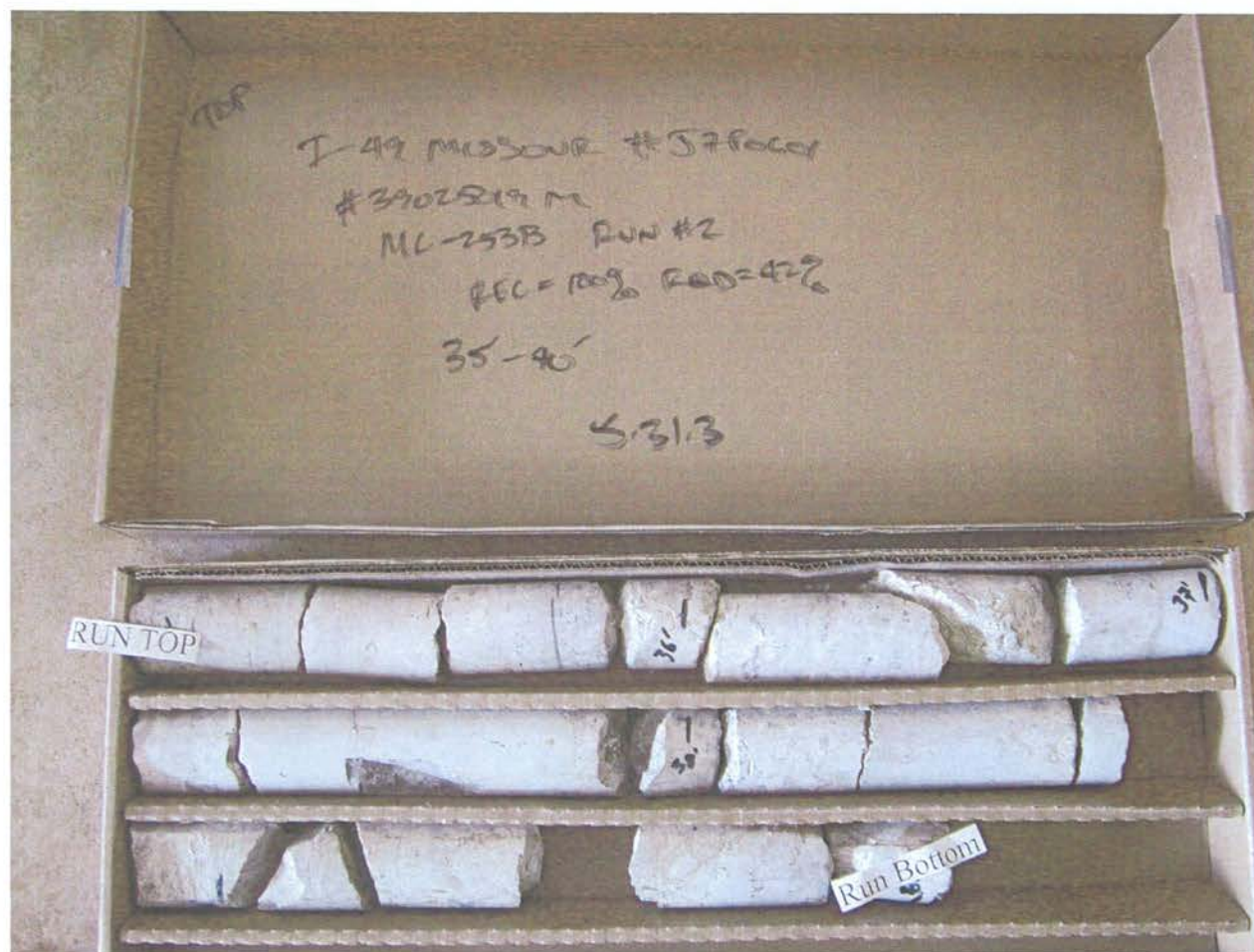


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 253A  
 Run No. 2  
 34.5 Feet to 39.5 Feet  
 Run No. 3  
 39.5 Feet to 44.5 Feet

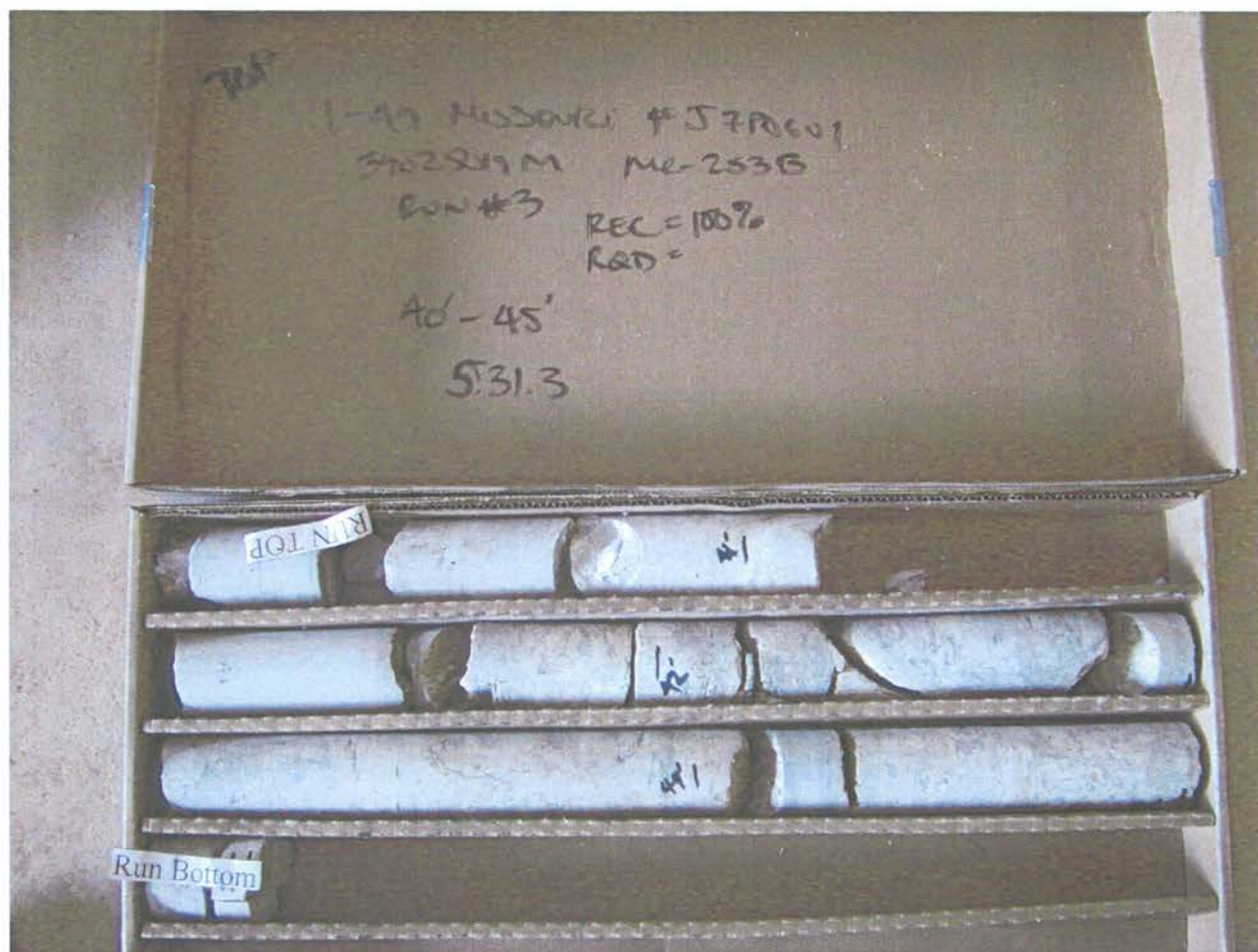


I 49 Missouri  
Missouri J7P0601  
Boring No. MC 253B  
Run No. 1  
30.0 Feet to 35.0 Feet



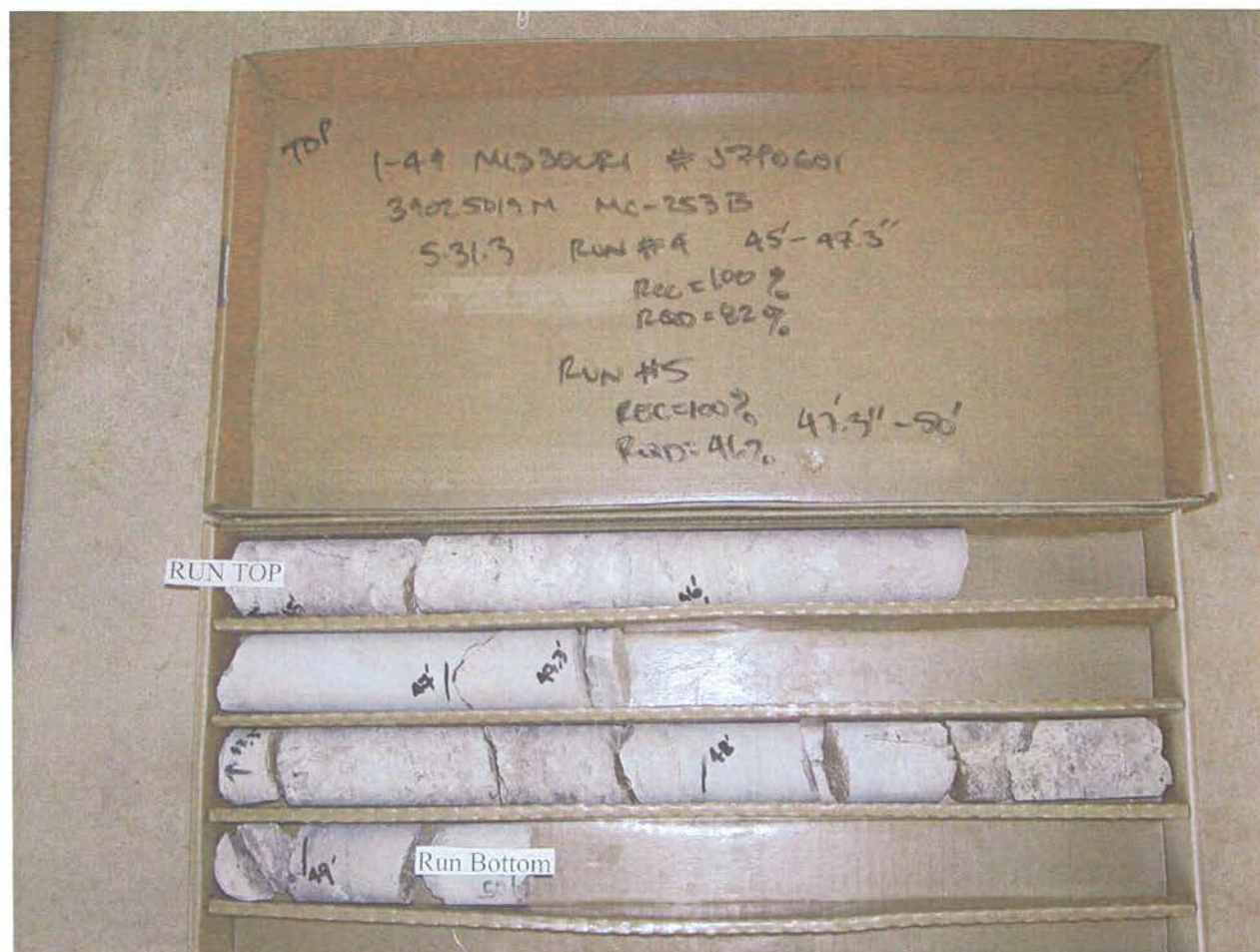


I 49 Missouri  
Missouri J7P0601  
Boring No. MC 253B  
Run No. 2  
35.0 Feet to 40.0 Feet

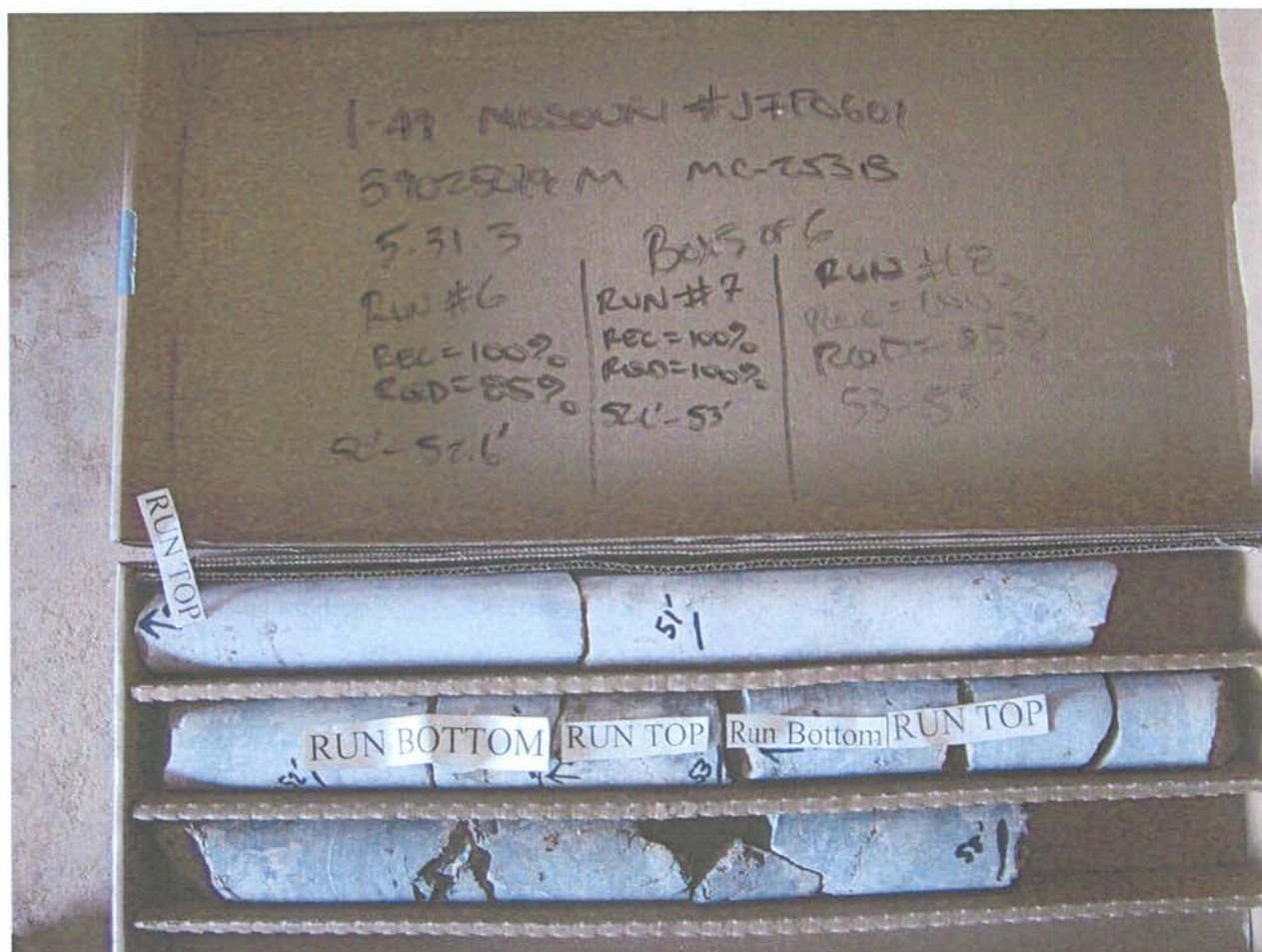


I 49 Missouri  
Missouri J7P0601  
Boring No. MC 253B  
Run No. 3  
40.0 Feet to 45.0 Feet



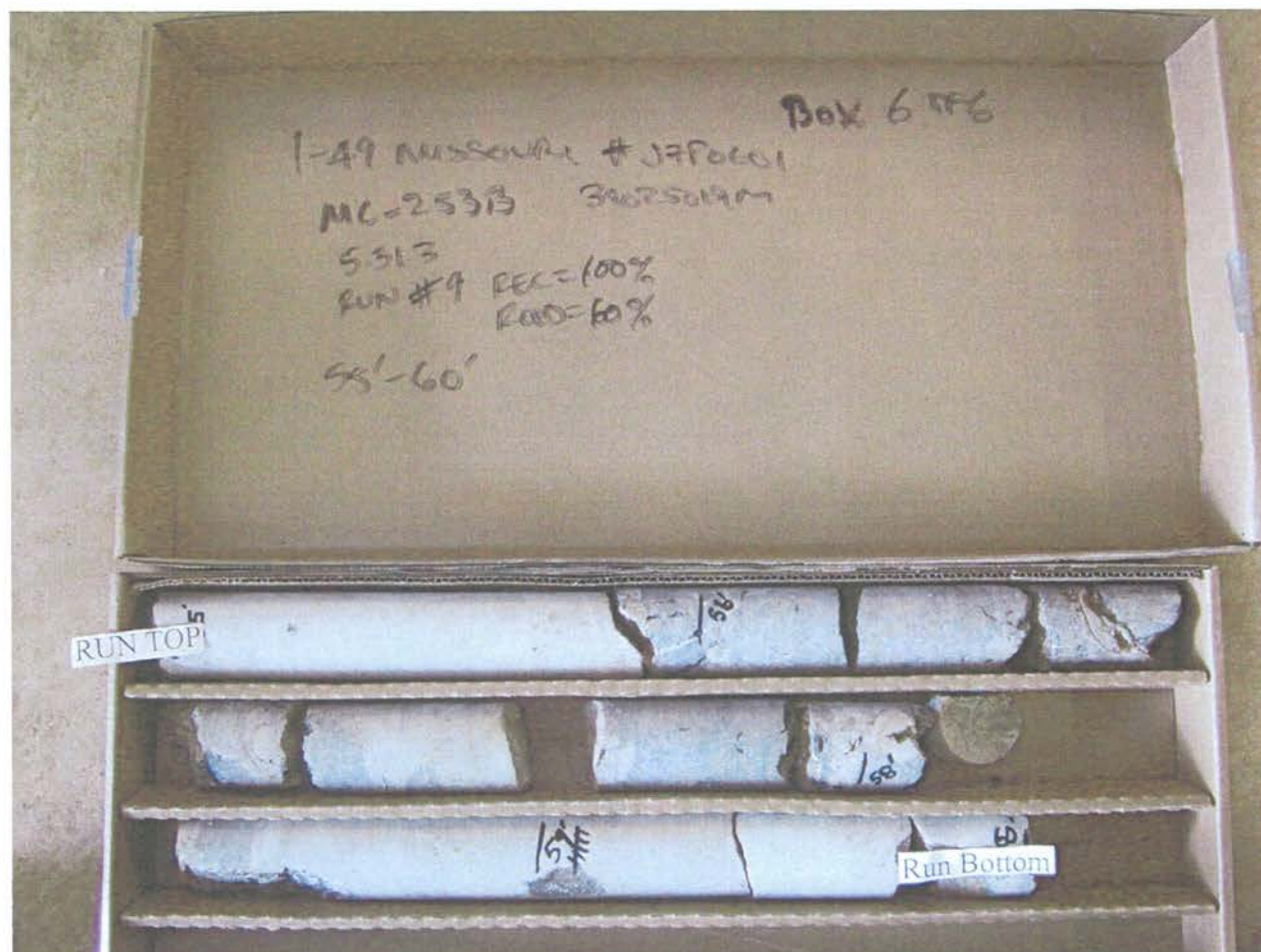


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 253B  
 Run No. 4  
 45.0 Feet to 47.3 Feet  
 Run No. 5  
 47.5 Feet to 50.0 Feet

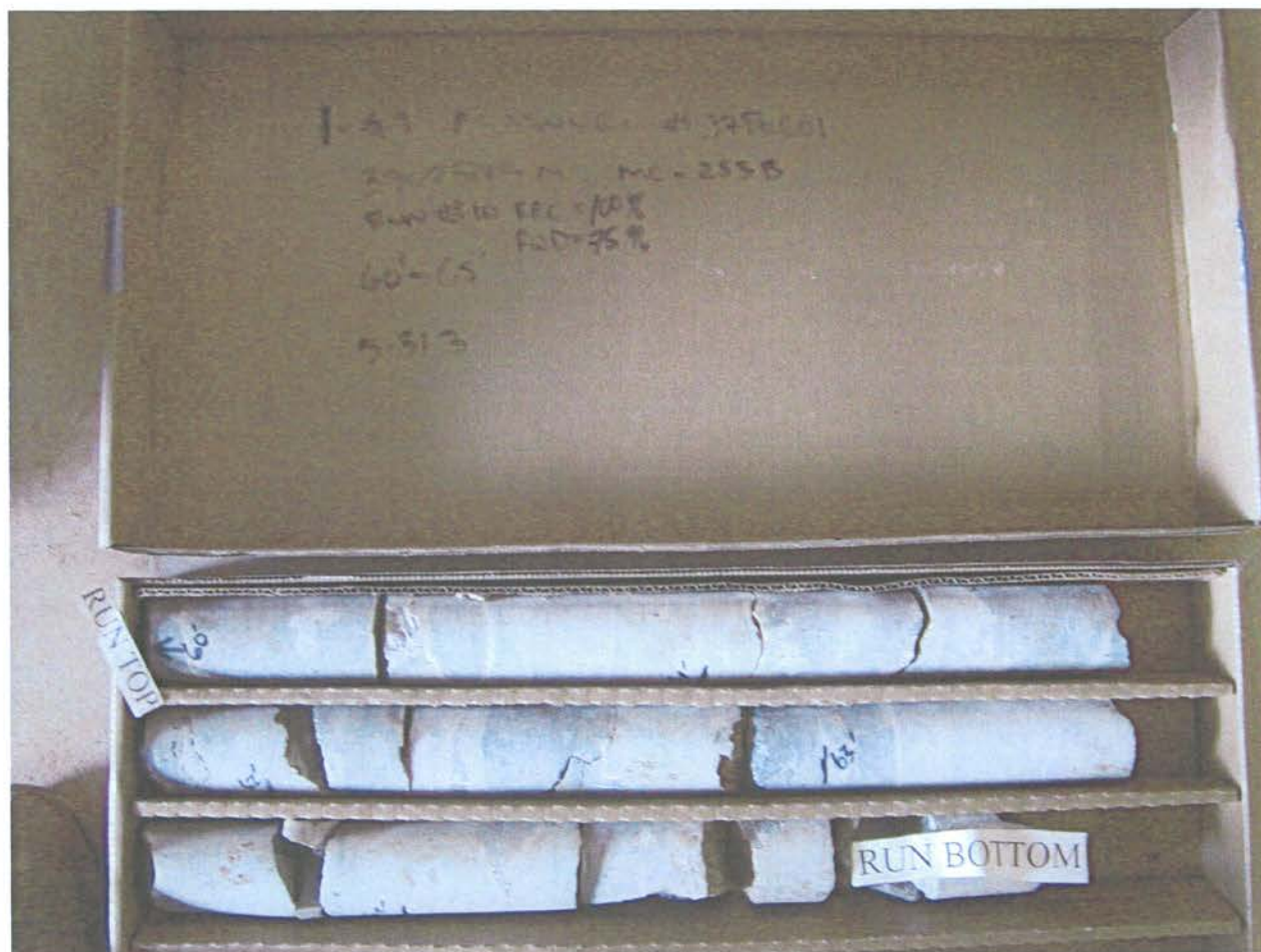


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 253B  
 Run No. 6  
 50.0 Feet to 52.6 Feet  
 Run No. 7  
 52.6 Feet to 53.0 Feet  
 Run No. 8  
 53.0 Feet to 55.0 Feet



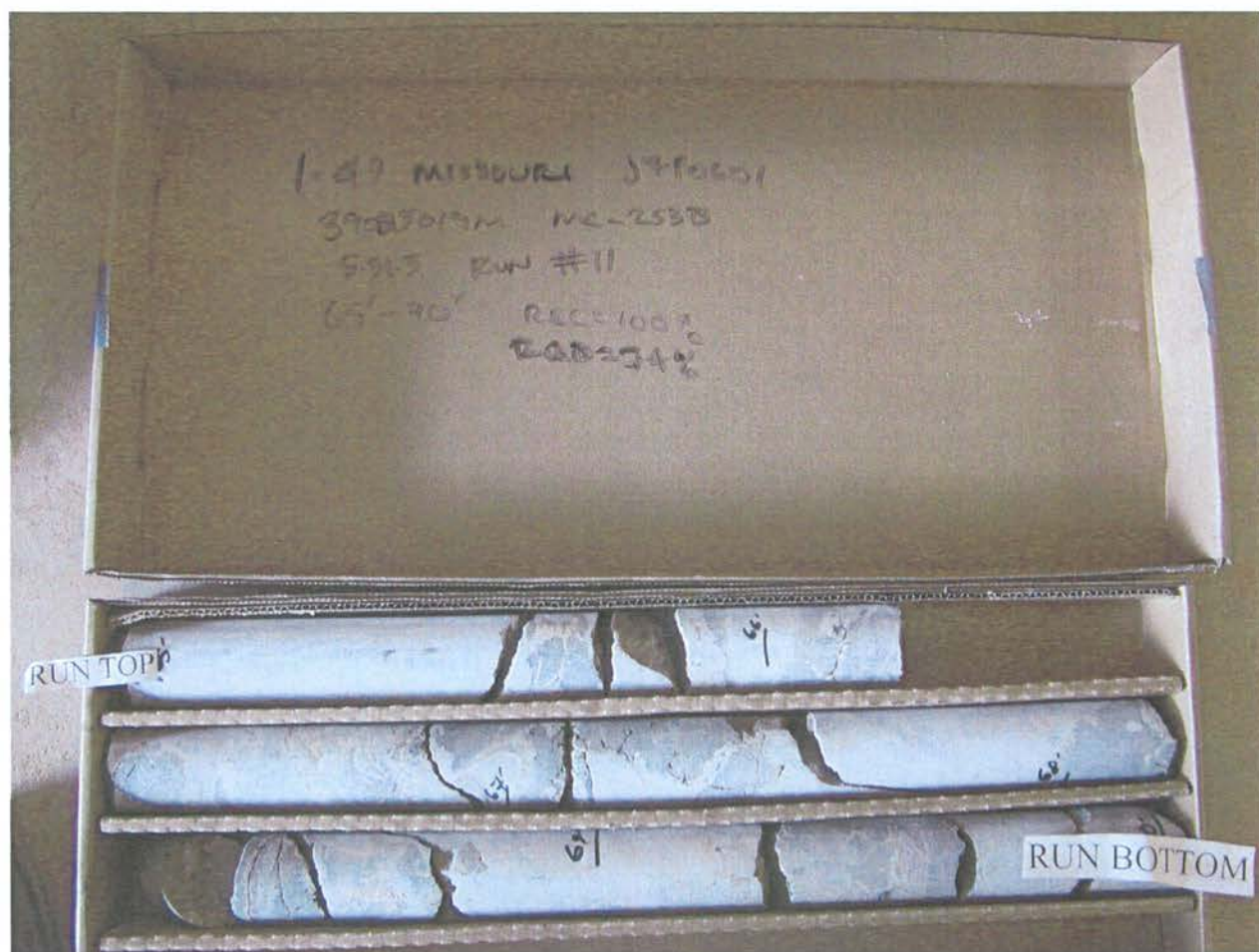


I 49 Missouri 5/31/03  
 Missouri J7P0601  
 Boring No. MC 253B  
 Run No. 9  
 55.0 Feet to 60.0 Feet

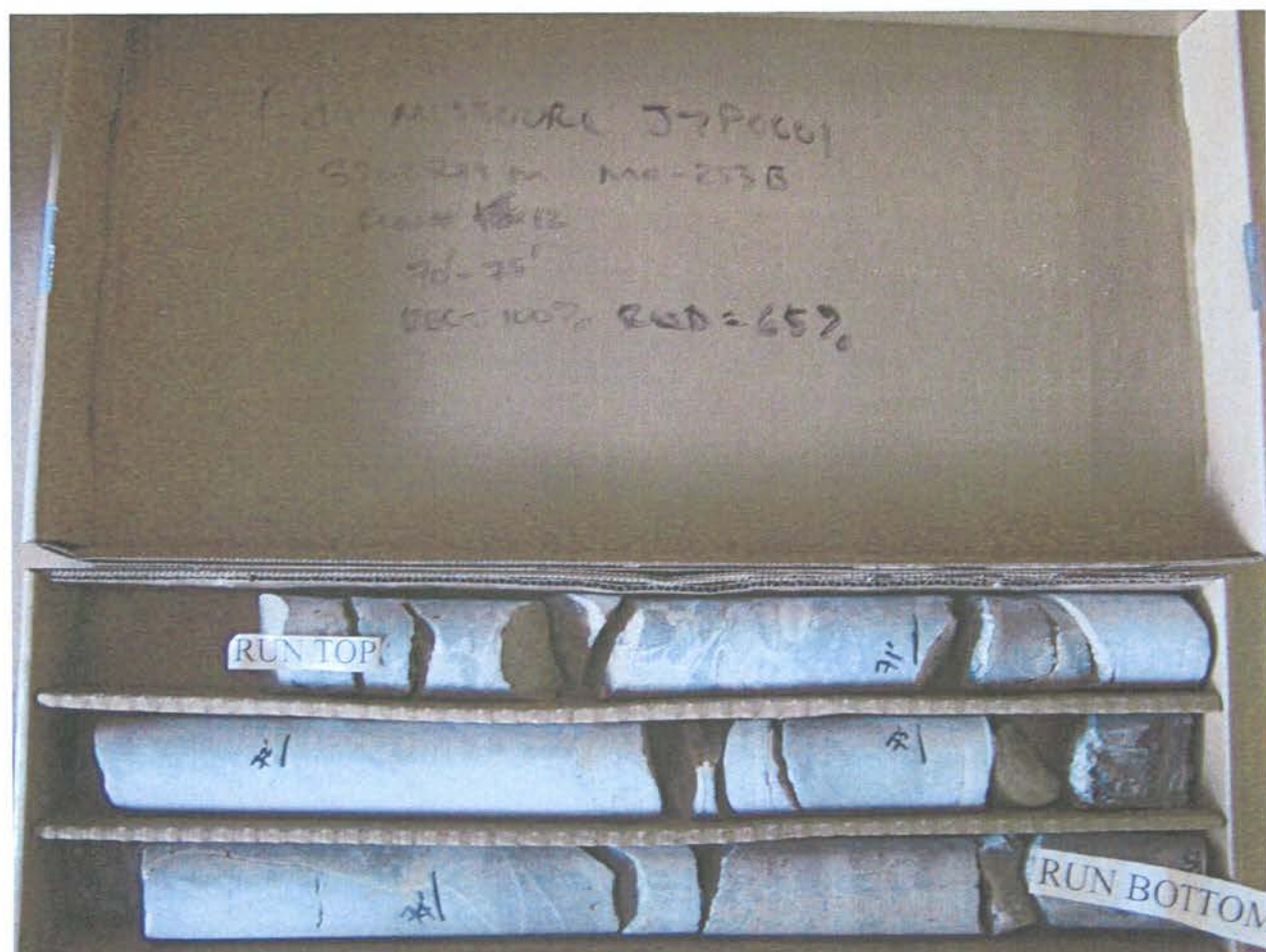


I 49 Missouri  
Missouri J7P0601  
Boring No. MC 253B  
Run No. 10  
60.0 Feet to 65.0 Feet



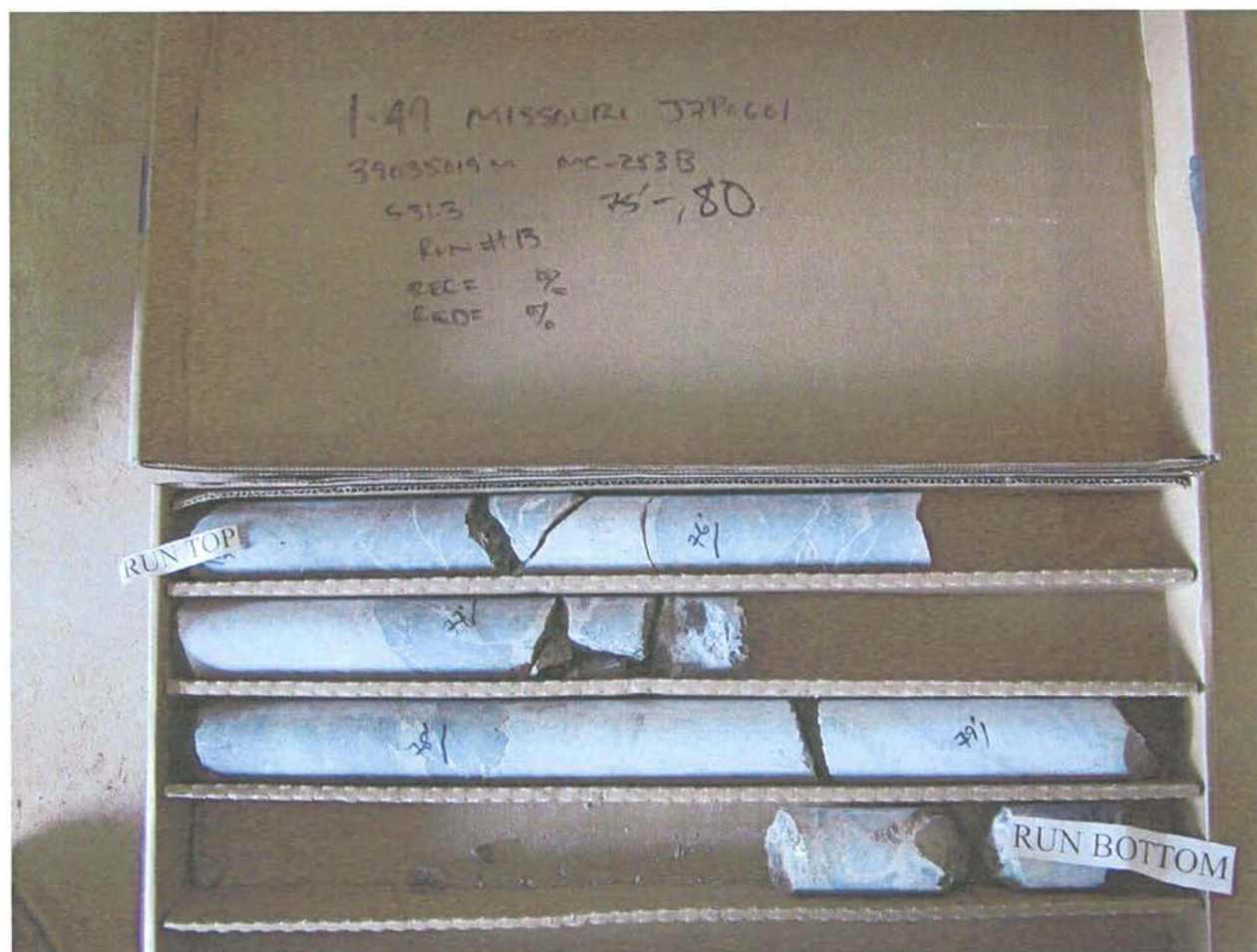


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 253B  
 Run No. 11  
 65.0 Feet to 70.0 Feet



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

Page 1 of 3

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

GRAPHIC LOG

Boring Location: 973+08, 120 feet left of centerline

DESCRIPTION

Approx. Surface Elev.: 1205.0 ft

DEPTH, ft.

USCS SYMBOL

NUMBER

TYPE

RECOVERY, in.

SPT - N  
BLOWS / ft.

WATER  
CONTENT, %

DRY UNIT WT  
pcf

UNCONFINED  
STRENGTH, psf

**SANDY GRAVEL**, with clay  
red, white and gray, dense, moist

GP

1

AS

5

10

15

20

1185.0

**GRAVEL**, with silt and clay  
light brown and white, dense, moist

GP

2

AS

25

1180.0

**CHERT++**  
stratified, abundant clay seams, white and  
pink, very thin bedded, very fine grained,  
highly weathered, hard, with cavities

25

RUN

DB

17%

RQD

26

1179.0

**CHERT++**  
stratified, trace limestone seams, white and  
light gray, medium bedded, very fine  
grained, weathered, hard, solid, trace vugs

26

1

DB

100%

RQD

27

1178.0

RUN

2

57%

RQD

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 ☒ 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

**HNTB**

**McDONALD COUNTY, MISSOURI**

## I-49, MISSOURI

**Continued Next Page**

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

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

Page 3 of 10

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	OVERBURDEN										
	25 1180.0	25									
	CT <b>CHERT++</b> 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 <b>CHERT++</b> 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

## LOG OF BORING NO. MC-271

Page 4 of 10

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	CT										
	31	1174.0									
	CT <b>CHERT++</b>										
	LS stratified, trace limestone seams, white and										
	CT light gray, medium bedded, very fine										
	LS grained, weathered, hard, solid, trace vugs										
	CT										
	CT										
	CT										
	LS										
	CT										
	36	1169.0									
	CT <b>CHERT++</b>										
	LS stratified, with limestone seams, white and										
	CT light gray, medium to thick bedded, very										
	LS fine grained, slightly weathered to fresh,										
	CT hard, solid										
	LS										
	CT										
	LS										
	CT										
	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	☐ 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

Page 5 of 10

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	CT	41									
	CT										
	CHERT++ stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid										
	CT										
		45									
	CT	46									
	CHERT++ stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid										
	CT										
		48.8									
	CHERT++ stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid										
	CT										
		50									

Continued Next Page

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

Page 6 of 10

CLIENT		HNTB		GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	CT LS 51	1154.0									
	<b>CHERT++</b> stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 8	DB	100%	RQD 95%				
	CT										
	LS										
	CT										
	CT										
	CLAY										
	CT	55									
	CT										
	56 LS	1149.0									
	<b>CHERT++</b> stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			RUN 9	DB	100%	RQD 95%				
	CT										
	LS										
	CT										
	CT+LS										
	CT	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		8-20-03	
BORING COMPLETED		8-22-03	
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601

## LOG OF BORING NO. MC-271

Page 7 of 10

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
61	CT 1144.0										
	<b>CHERT++</b> 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										
	CT										
	LS										
	LS										
	CT	65									
66	1139.0										
	<b>CHERT++</b> stratified, with limestone seams, white and light gray, medium to thick bedded, very fine grained, slightly weathered to fresh, hard, solid			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

## LOG OF BORING NO. MC-271

Page 8 of 10

CLIENT		GEOLOGIC LOG							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	CT								
	LS								
71	1134.0								
	LS <b>CHERT++</b> stratified, with limestone seams, white and			RUN	DB	100%	RQD		
	CT light gray, medium to thick bedded, very			12			97%		
	CLAY fine grained, slightly weathered to fresh,								
	hard, solid								
	CT								
	LS								
	CT								
	CT								
	CLAY	75							
	LS								
76	1129.0								
	CT <b>CHERT++</b> stratified, with limestone seams, light gray			RUN	DB	100%	RQD		
	and gray, thick bedded, very fine to fine			13			97%		
	grained, fresh, hard, solid								
	CT								
	LS								
	CT								
	CT								
	CT	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	▽ 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

CLIENT		HNTB	GEOLOGIC LOG							
SITE		McDONALD COUNTY, MISSOURI		PROJECT						
				I-49, MISSOURI						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>CHERT++</b> CT stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid LS 81 1124.0									
	<b>CHERT++</b> CT stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid LS  CT  LS  CT  LS CT LS SH CT SH  CT 87 1118.0			RUN 14	DB	97%	RQD 69%			
	<b>CHERT++</b> SH stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid LS  CT  LS  CT  LS 89			RUN 15	DB	95%	RQD 87%			

Continued Next Page

**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					BORING STARTED		8-20-03					
WL	▽	DRY	WD		▽	DRY	AB	BORING COMPLETED		8-22-03		
WL	▽	DRY 24 hr AB			▽							
WL								RIG	ATV, #98	FOREMAN	SS	
							APPROVED	BRO	JOB #	J7P0601		

## LOG OF BORING NO. MC-271

Page 10 of 10

CLIENT					GEOLOGIC LOG									
HNTB					PROJECT									
SITE					I-49, MISSOURI									
McDONALD COUNTY, MISSOURI														
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> LS stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid													
	CT													
	92 CT 1113.0													
	<b>CHERT++</b> LS stratified, with limestone seams, light gray and gray, thick bedded, very fine to fine grained, fresh, hard, solid						RUN 16	DB	75%	RQD 69%				
	CT													
	SH													
	CT+LS													
	CT+LS													
	LS													
	CT				95									
	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				

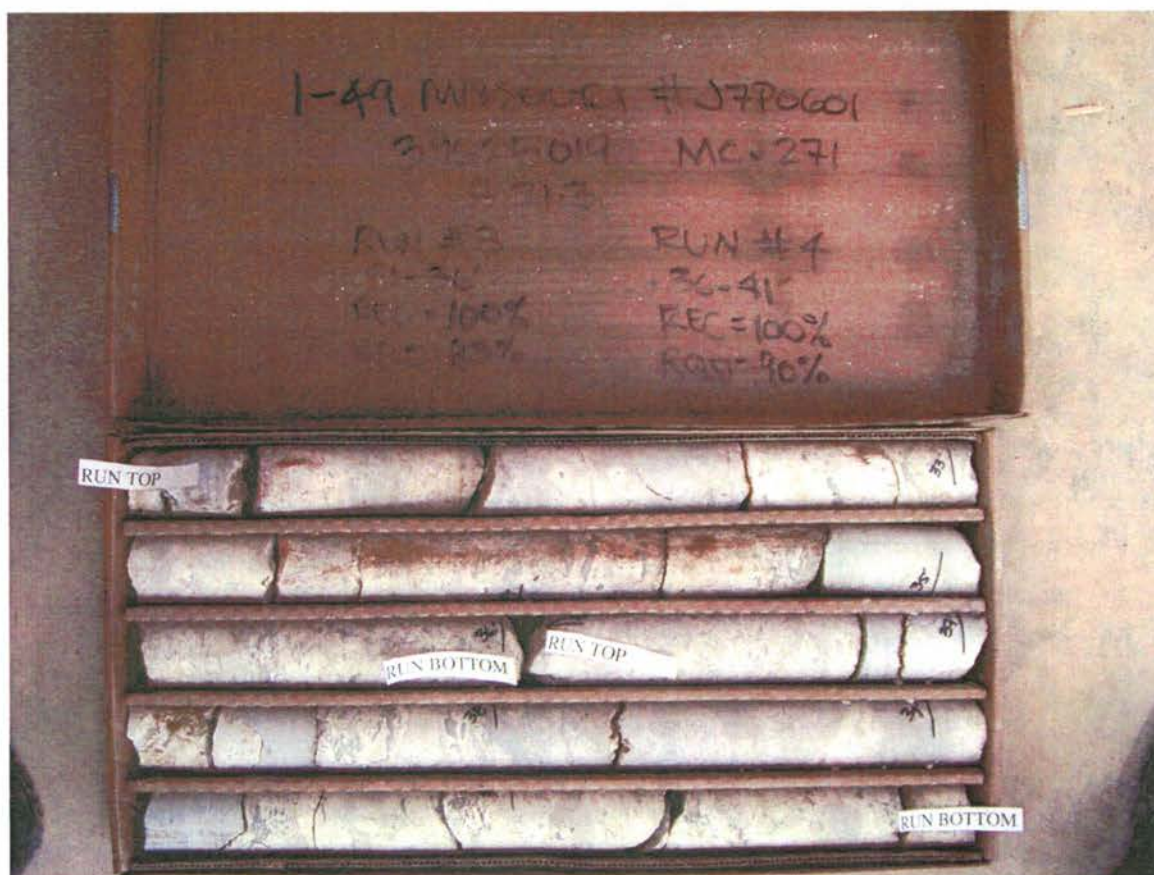
# Terracon

BORING STARTED		8-20-03	
BORING COMPLETED		8-22-03	
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601



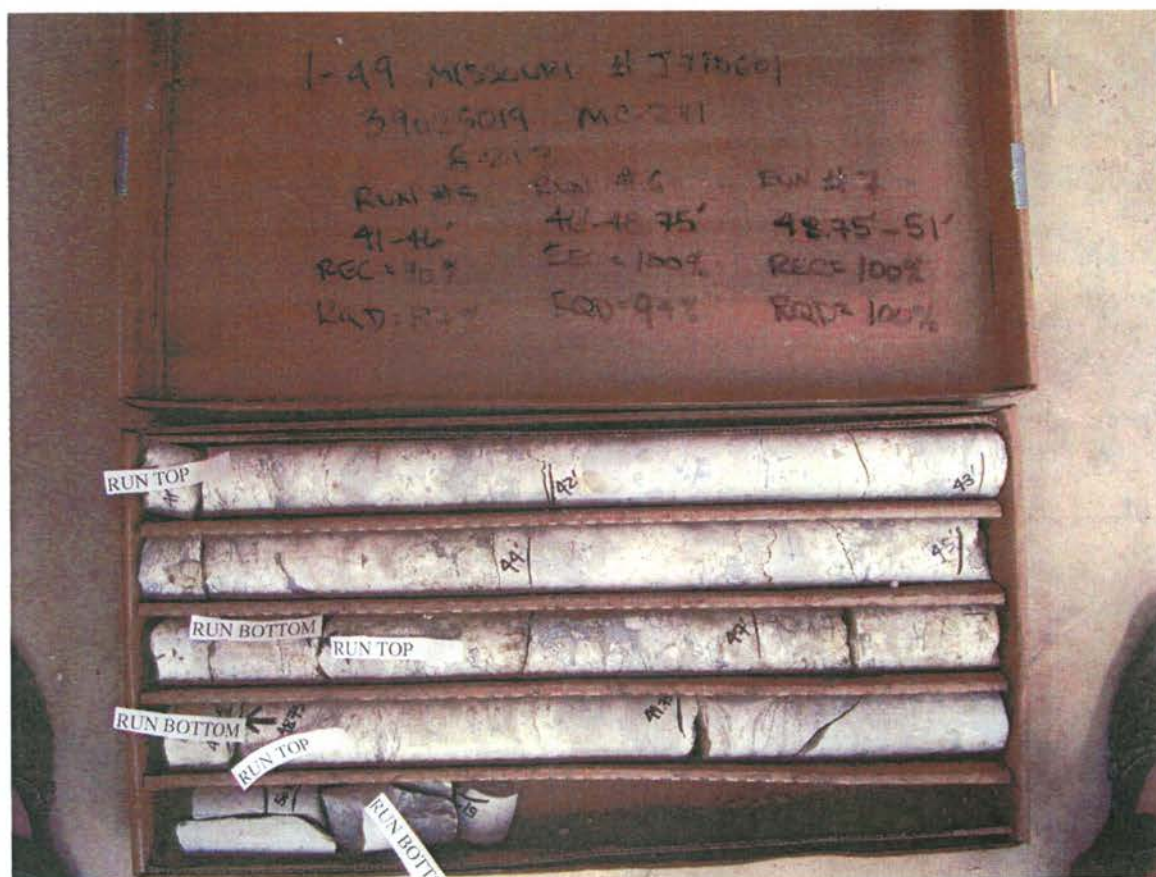


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 271  
 Run No. 1  
 25.0 Feet to 26.0 Feet  
 Run No. 2  
 26.0 Feet to 31.0 Feet

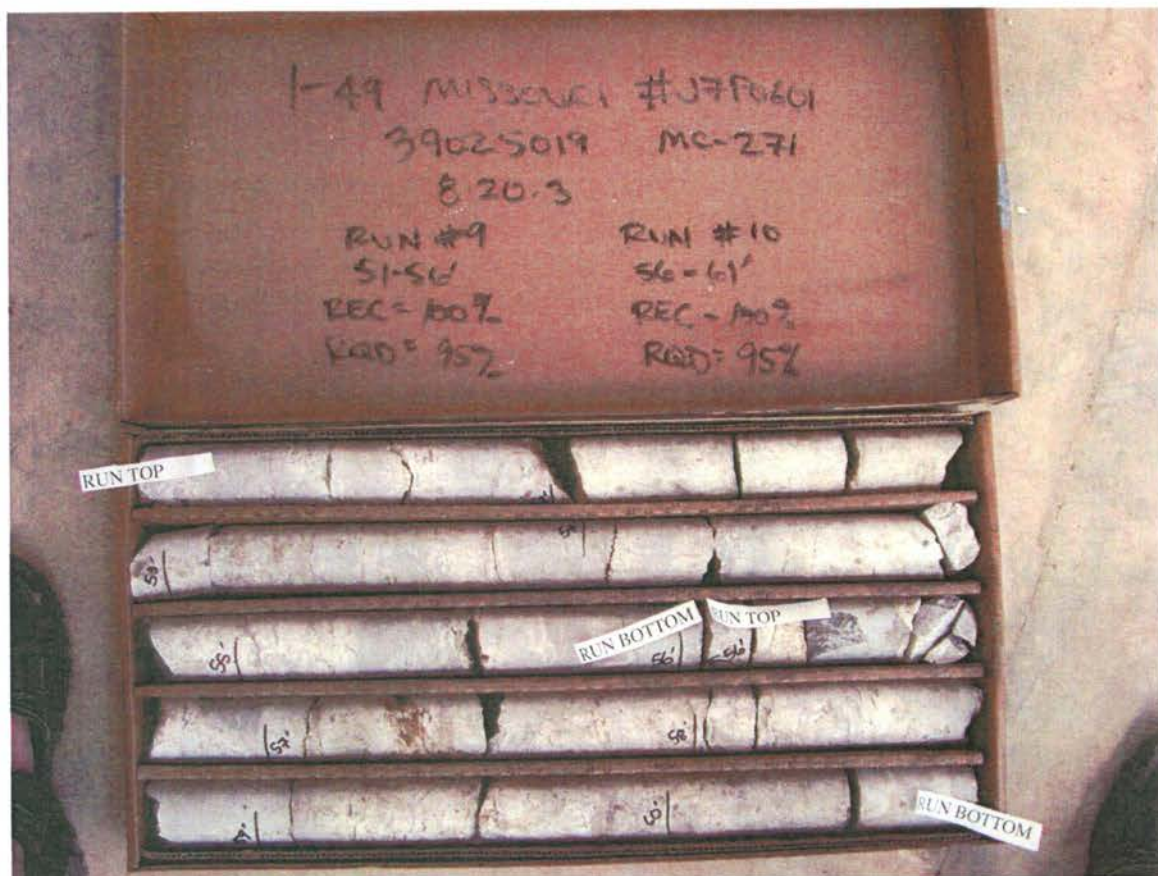


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 271  
 Run No. 3  
 31.0 Feet to 36.0 Feet  
 Run No. 4  
 36.0 Feet to 41.0 Feet



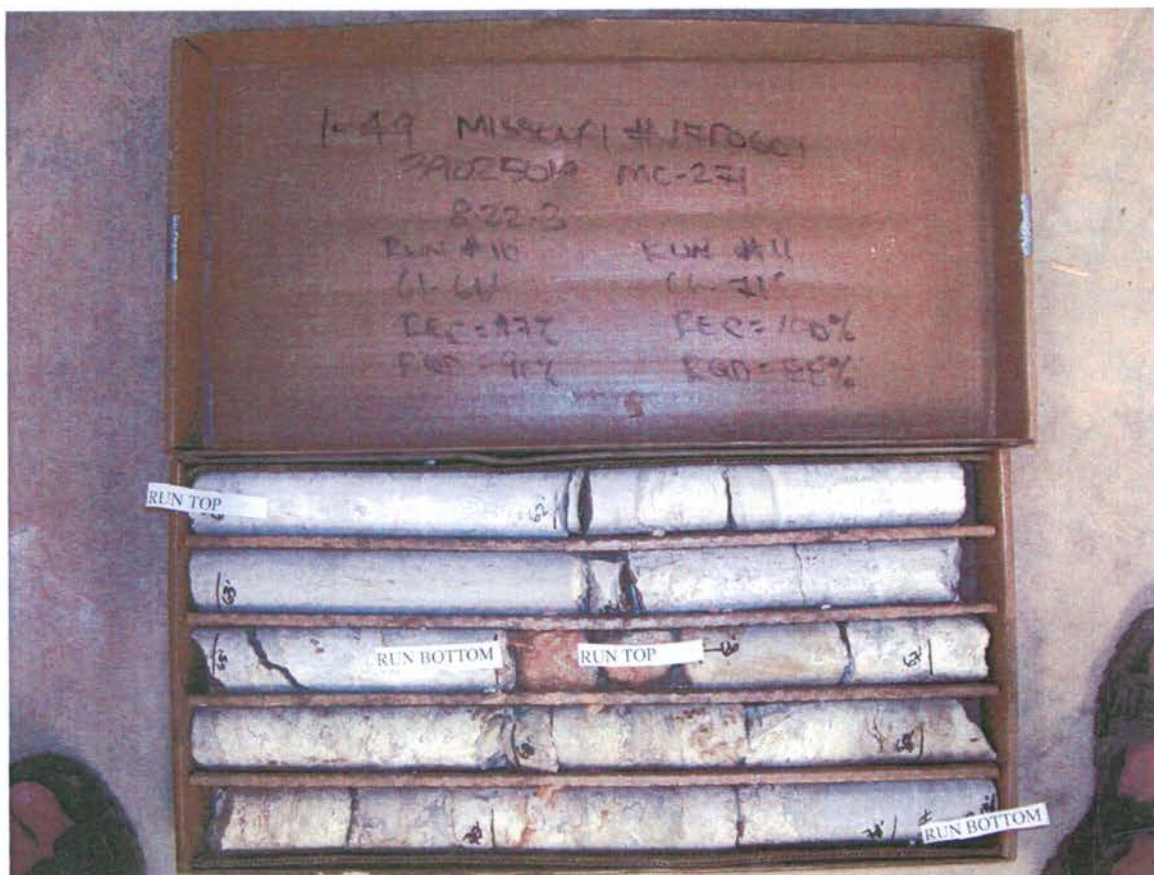


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 271  
 Run No. 5  
 41.0 Feet to 46.0 Feet  
 Run No. 6  
 46.0 Feet to 48.75 Feet  
 Run No. 7  
 48.75 Feet to 51.0 Feet



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

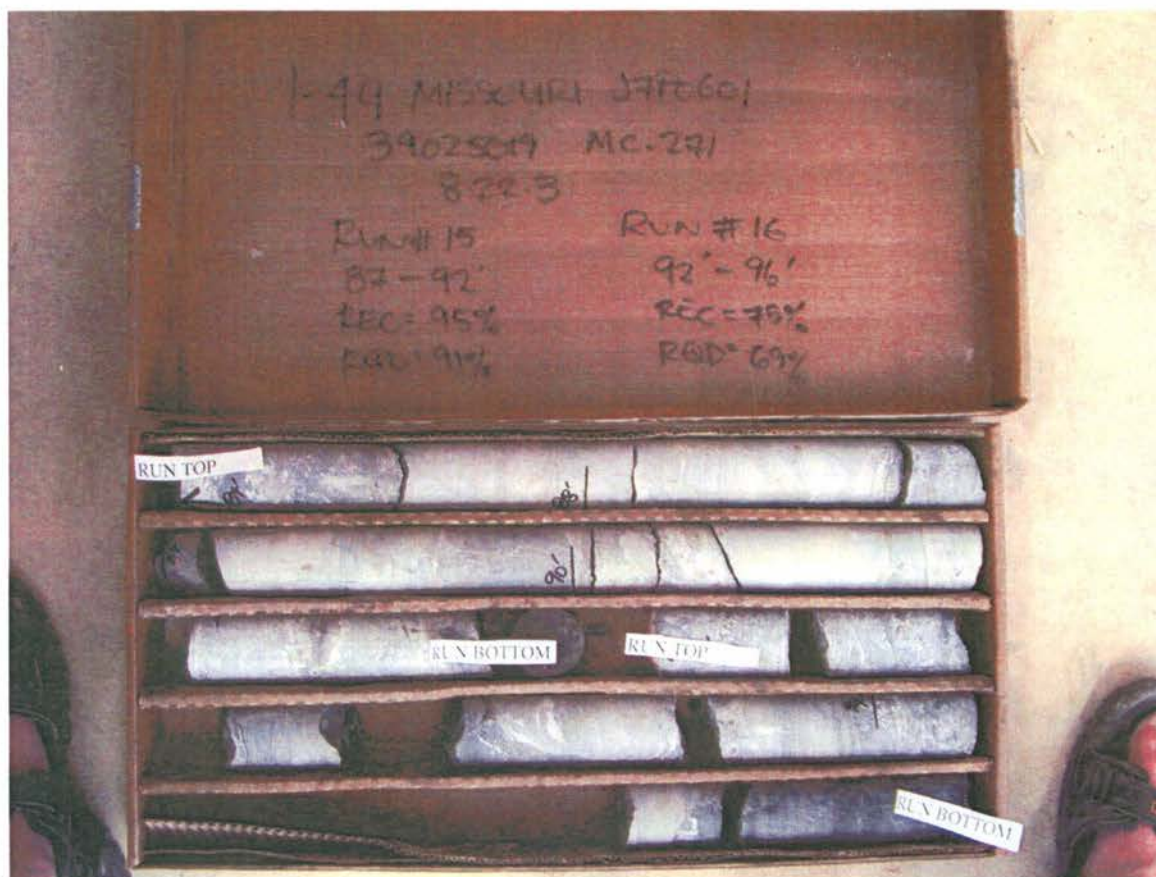


I 49 Missouri  
 Missouri J7P0601  
 Boring No. MC 271  
 Run No. 12  
 71.0 Feet to 76.0 Feet  
 Run No. 13  
 76.0 Feet to 81.0 Feet





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

Page 1 of 3

CLIENT

HNTB

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

Boring Location: 981+08, 120 feet left of centerline

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 1183.0 ft

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

**GRAVEL**, with silt and clay light brown and white, medium dense to dense, dry

GC

1

AS

5

10

15

20

1163.0

20

**GRAVEL**, with clay reddish brown, dense, dry to moist

2

AS

25

RB

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	8-12-03
BORING COMPLETED	8-20-03
RIG	ATV, #98
FOREMAN	SS
APPROVED	BO
JOB #	J7P0601

# LOG OF BORING NO. MC-283

Page 2 of 3

CLIENT		HNTB							
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL						
				SAMPLES		TESTS			
			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>GRAVEL</b> , with clay reddish brown, dense, dry to moist	35							
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

[illegible]

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

WATER LEVEL OBSERVATIONS, ft					BORING STARTED		8-12-03		
WL	▽ DRY	WD	▽ DRY		AB	BORING COMPLETED		8-20-03	
WL	▽		▽			RIG	ATV, #98	FOREMAN	SS
WL					APPROVED	BO	JOB #	J7P0601	

LOG OF BORING NO. MC-283

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	OVERBURDEN	65									
		1118.0									
	CHERT++ stratified, abundant limestone seams and beds, gray to dark gray, medium bedded, very fine grained, fresh, hard, solid	65		RUN 1	DB	100%	RQD 44%				
	CT REED SPRINGS FORMATION										
	LS										
	CT										
		68									
		1115.0									
	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%				
	CT										
	LS										
	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	▽	▽	
WL			



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



## LOG OF BORING NO. MC-283

Page 8 of 8

CLIENT		GEOLOGIC LOG									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<b>CHERT++</b> stratified, abundant limestone seams and beds, gray to dark gray, medium bedded, very fine grained, fresh, hard, solid										
	73 CT 1110.0										
	<b>CHERT++</b> stratified, with limestone seams, trace shale laminations, white, light gray and dark gray, medium bedded, very fine grained, fresh, very hard, solid										
	78 1105.0										

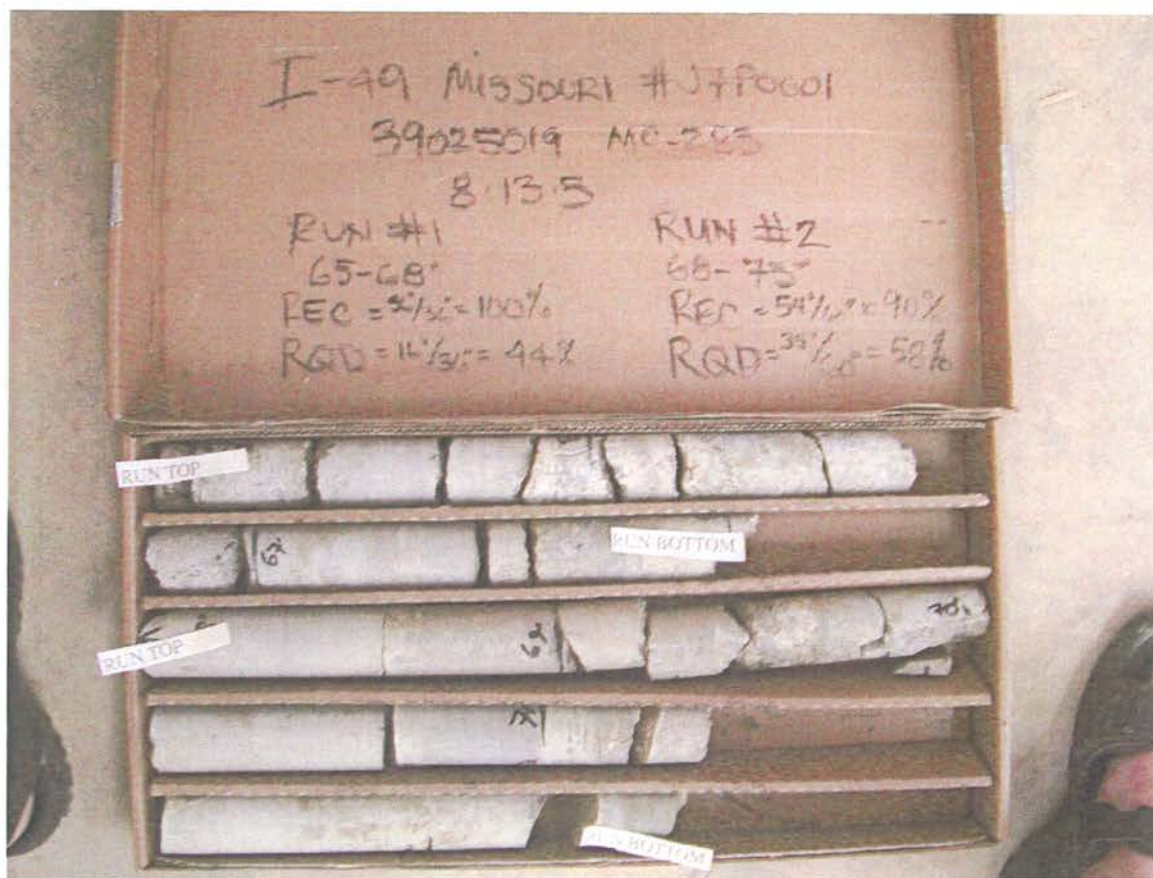
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

## WATER LEVEL OBSERVATIONS, ft

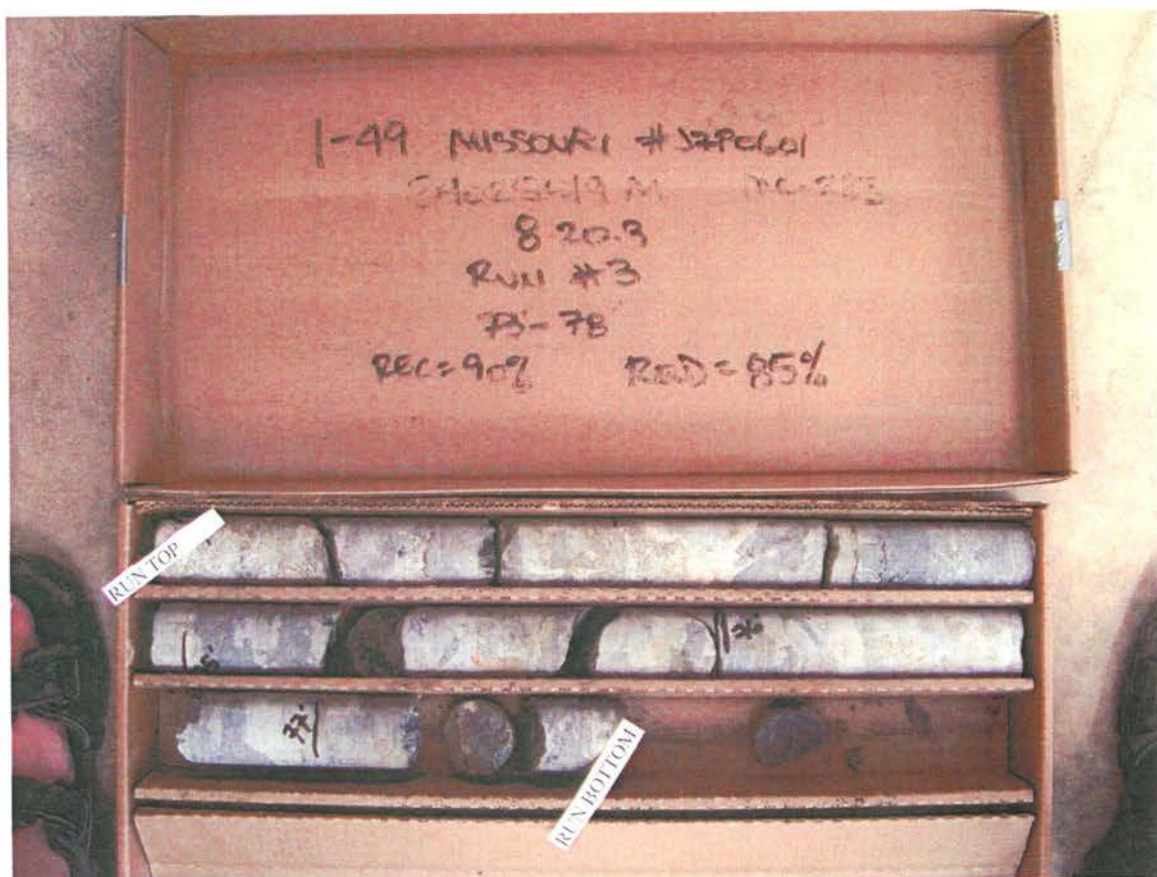
WL	▽ DRY	WD	▽ DRY	AB
WL	▽	▽		
WL				

# Terracon

BORING STARTED		8-12-03	
BORING COMPLETED		8-20-03	
RIG	ATV, #98	FOREMAN	SS
APPROVED	BRO	JOB #	J7P0601



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

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%				
SITE		McDONALD COUNTY, MISSOURI										PROJECT				
Boring Location: 738+62, 175 Feet right from baseline southbound ramp		I-49, MISSOURI														
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS								
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"					
	Approx. Surface Elev.: 943.6 ft  <b>GRAVEL</b> , trace clay light brown and white, loose to dense, moist  14 929.6 <b>LIMESTONE GRAVEL</b> , with sand gray, dense, dry 17 926.6  AUGER REFUSAL ON LIMESTONE  BOTTOM OF BORING AT 17 FEET BACKFILLED WITH CUTTINGS 10/15/02	5	GP		HS							5, 5, 5				
			GP	1	SS	14	10									
			GP		HS											
		10	GP	2	SS	10	10						4, 4, 6			
			GP		HS											
		15	GP	3	SS	11	30							13, 13, 17		
	GP															

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



## LOG OF BORING NO. MS-24

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%								
SITE		McDONALD COUNTY, MISSOURI										PROJECT								
		I-49, MISSOURI																		
GRAPHIC LOG	Boring Location: 740+47, 51 Feet left from baseline southbound ramp																			
	DESCRIPTION																			
	Approx. Surface Elev.: 963.2 ft										DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	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



## LOG OF BORING NO. MS-41

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 83%				
SITE		McDONALD COUNTY, MISSOURI					PROJECT									
		Boring Location: 768+04, 400 Feet left of centerline					I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				Blow Counts for 18"				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf						
	Approx. Surface Elev.: 995.1 ft															
	<b>CLAYEY GRAVEL</b> dark brown and white, loose, dry to moist		GC		PA											
		5	GC	1	SS	12	9					3, 4, 5				
			GC		PA											
		10	GC	2	SS	10	10					5, 5, 5				
			GC		PA											
	13.5	981.6														
	<b>GRAVELLY LEAN CLAY</b> , 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

[illegible]

## LOG OF BORING NO. MS-43

Page 1 of 1

CLIENT <b>HNTB</b>		Automatic Hammer Efficiency = 83%									
SITE <b>McDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>									
GRAPHIC LOG	Boring Location: 767+97, 440 Feet right of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 966.0 ft										
	<b>GRAVEL</b> , with clay brown and white, medium dense, dry to moist	5	GC		PA						5, 6, 6
			GC	1	SS	10	12				
			GC		PA						
			GC	2	SS	6	12				5, 7, 5
			GC		PA						
			GC	3	SS	10	9				5, 4, 5
			CL		PA						
			CL	4	ST	6					
				5	SS	0	50/0"				50/0"
	14.5 951.5 <b>SANDY LEAN CLAY</b> brown, very soft, moist	15									
	19 947.0 19.5 946.5 <b>LIMESTONE++</b> light brown, hard, highly weathered		CL	4	ST	6					
				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

## LOG OF BORING NO. MS-59

Page 1 of 1

CLIENT <b>HNTB</b>		Automatic Hammer Efficiency = 80.7%									
SITE <b>McDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>									
GRAPHIC LOG	Boring Location: 783+36, 150 Feet left of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES					TESTS		
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1034.3 ft										
	1.5 <b>GRAVEL</b> gray, loose, dry 1032.8		GP		HS						
	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

# LOG OF BORING NO. MS-60

Page 1 of 1

CLIENT		Automatic Hammer Efficiency = 80.7%									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	Boring Location: 784+25, 248 Feet right of centerline		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
	DESCRIPTION				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 1010.4 ft										
	<u>GRAVEL</u> , with silt light brown and gray, very dense, dry			GM		HS					
	4.5	1005.9			1	SS	10	18/6"			25, 18, 50/2"
	5	1005.4				HS		50/2"			
	<u>CHERT++</u> 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



CLIENT		Automatic Hammer Efficiency = 80.7%										
SITE		PROJECT										
McDONALD COUNTY, MISSOURI		I-49, MISSOURI										
GRAPHIC LOG	Boring Location: 792+28, 250 Feet right of centerline	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"
					NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	Approx. Surface Elev.: 979.8 ft  8 971.8	<b>CLAYEY GRAVEL</b> with silt brown, light brown and reddish brown, medium dense, moist		GC		HS						6, 6, 8
			GC	1	SS	10	14					
			GC		HS							
	11.2 968.6	<b>CHERT++</b> gray, hard			2	SS HS	0	55/2"				5/2", 50/0"
		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.										

\*Calibrated Hand Penetrometer

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	$\nabla$ DRY	WD	$\nabla$ DRY	AB
WL	$\nabla$ DRY	24 hr AB	$\nabla$	
WL				

# Terracon

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



## LOG OF BORING NO. MS-73

Page 1 of 1

CLIENT		Automatic Hammer Efficiency = 80.7%										
HNTB		PROJECT										
SITE		I-49, MISSOURI										
McDONALD COUNTY, MISSOURI		Boring Location: 795+49, Centerline										
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf		
	Approx. Surface Elev.: 990.4 ft											
	<b>SILTY GRAVEL</b> brown, medium dense, dry	3.5	GM		HS							
	<b>SILTY SANDY GRAVEL</b> brown, light reddish brown and gray, medium dense, dry to moist	986.9	GM	1	SS	14	13					10, 7, 6
			GM		HS							
			GM	2	SS	4	11					5, 5, 6
			GM		HS							
			GM	3	SS	8	16					8, 10, 6
			GM		HS							
	<b>CLAYEY GRAVEL</b> with sand brown, medium dense, moist	17										
		973.4										
	<b>BROKEN CHERT++</b> , with sand gray, hard, moist	19.5	GC	4	SS	8	13/6" 50/1"					6, 13, 50/1"
		970.9			HS							
		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

CLIENT		HNTB		Automatic Hammer Efficiency = 80.7%							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	Boring Location: 797+99, 200 Feet left of centerline		DEPTH, ft.	USCS SYMBOL	SAMPLES			TESTS			Blow Counts for 18"
	DESCRIPTION				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	
	Approx. Surface Elev.: 994.0 ft										
	<b><u>SILTY GRAVEL</u></b> brown, medium dense, moist			GM		HS					
	3.5	990.5		GM	1	SS	12	14			8, 7, 7
	<b><u>SILTY SANDY GRAVEL</u></b> brown, light reddish brown and gray, medium dense, moist			GM		HS					
				GM	2	SS	12	12			4, 6, 6
				GM		HS					
				GM	3	SS	14	24			7, 13, 11
						HS					
	17.3	976.7									
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

Page 1 of 1

CLIENT		HNTB		Automatic Hammer Efficiency = 83%								
SITE		McDONALD COUNTY, MISSOURI		PROJECT								
Boring Location: 818+71, 239 Feet right of centerline				I-49, MISSOURI								
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"	
	Approx. Surface Elev.: 1039.7 ft											
	<u>LEAN CLAY</u> , trace gravel light brown and gray, medium stiff, dry		CL		HS							
	- scattered cobbles below 4.7 feet	5	CL	1	SS	12	13/6"					7, 13, 50/2"
			CL		HS		50/2"					
6												
7	<u>LIMESTONE++</u> brown to gray, hard, weathered to fresh	1033.7										
		1032.7										
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	▽	WD	▽	
WL		WD		

Terracon

BORING STARTED	5-5-03
BORING COMPLETED	5-5-03
RIG	ATV, #98
FOREMAN	SS
APPROVED	BKM
JOB #	J7P0601

## LOG OF BORING NO. MS-119

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%				
SITE		McDONALD COUNTY, MISSOURI										PROJECT				
		Boring Location: 830+76, 188 Feet left of centerline										I-49, MISSOURI				
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS								
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"					
	Approx. Surface Elev.: 1086.3 ft															
	<b>GRAVEL AND COBBLES</b> , with sand and clay dark brown and white, medium dense, dry		GP		PA											
3.5		1082.8														
	<b>GRAVEL</b> , scattered clay reddish brown and brown, medium dense, moist		GP	1	SS	12	8/6"						7, 8, 50/2"			
5		1081.3					50/2"									
			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

## LOG OF BORING NO. MS-120

Page 1 of 1

CLIENT <b>HNTB</b>		Automatic Hammer Efficiency = 80.7%									
SITE <b>McDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>									
GRAPHIC LOG	Boring Location: 831+28, 4 Feet right of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1077.7 ft										
	<b>GRAVEL</b> , scattered clay and cobbles brown and white, dense, dry		GP	PA							
	3.5 1074.2										
	<b>GRAVEL</b> , with clay brown, reddish brown and white, dense, dry	5	GC	1 SS	18	47					22, 26, 21
			GC	HS							
	7.5 1070.2										
	8 1069.7										
	<b>CHERT++</b> 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



## LOG OF BORING NO. MS-121

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%				
SITE		McDONALD COUNTY, MISSOURI										PROJECT				
		Boring Location: 832+24, 276 Feet right of centerline										I-49, MISSOURI				
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				Blow Counts for 18"				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf						
	Approx. Surface Elev.: 1062.7 ft															
	<b>GRAVEL</b> , abundant clay, scattered cobbles and sand gray, grayish brown and white, dense to very dense, dry		GC	HS												
	4 1058.7		GC	1 SS	8	17/6"						17/6"				
4.8 1057.9	<b>CHERT++</b> light gray, hard			HS		50/6"						50/6"				
<p>AUGER REFUSAL ON CHERT</p> <p>BOTTOM OF BORING AT 4.8 FEET BACKFILLED WITH CUTTINGS 10/24/02</p> <p>++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.</p>																

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



## LOG OF BORING NO. MS-129

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%				
SITE		McDONALD COUNTY, MISSOURI										PROJECT				
Boring Location: 841+03, 375 Feet right of centerline		I-49, MISSOURI														
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS								
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"					
	Approx. Surface Elev.: 1052.7 ft															
	<b>GRAVEL AND COBBLES</b> , with clay dark brown, medium dense, moist		GP GC		HS											
	3.5 1049.2															
	<b>GRAVEL AND COBBLES</b> , with clay brown, light reddish brown and white, medium dense, moist		GP GC	1	SS	4	13				7, 7, 6					
			GP GC		HS											
9 1043.7																
10 1042.7	<b>LEAN CLAY</b> , with sand, trace gravel brown, very stiff, moist		CL	2	SS	12	13				7, 6, 7					
	<b>CHERT++</b> , with clay seams				HS											
12 1040.7	white, moderately hard, highly weathered															
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	▽	WD	▽	
WL		WD		

Terracon

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

LOG OF BORING NO. MS-130

CLIENT		Automatic Hammer Efficiency = 80.7%										
HNTB		PROJECT										
SITE		I-49, MISSOURI										
McDONALD COUNTY, MISSOURI		Boring Location: 843+99, Centerline										
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"	
	Approx. Surface Elev.: 1064.3 ft											
	<b>GRAVEL AND COBBLES</b> , trace clay dark brown, loose, wet	3.5	1060.8	GP		HS						
	<b>SILTY SANDY GRAVEL</b> brown, light reddish brown and gray, medium dense, moist			GP	1	SS	4	8				9, 6, 2
				GP		HS						
				GP	2	SS	3	11				10, 5, 6
				GP		HS						
	<b>FAT CLAY</b> , with gravel dark brown and white, stiff, moist	13.5	1050.8	CH	3	SS	12	12				12, 50/6"
	<b>CHERT++</b> , trace clay seams white, hard, highly weathered	14	1050.3			HS		50/6"				
	<b>AUGER REFUSAL ON CHERT</b>	15	1049.3									
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						BORING STARTED		10-24-02
WL ▽ DRY WD ▽ DRY AB						BORING COMPLETED		10-24-02
WL ▽						RIG ATV, #103E		FOREMAN JW
WL						APPROVED SPB		JOB # J7P0601

BOREHOLE 99 5019MS119-120.129-131.GPJ TERRACON GDT 7/24/03

## LOG OF BORING NO. MS-131

Page 1 of 1

CLIENT <b>HNTB</b>		Automatic Hammer Efficiency = 80.7%									
SITE <b>McDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>									
GRAPHIC LOG	Boring Location: 847+53, 328 Feet left of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	Approx. Surface Elev.: 1074.4 ft										
	<b>GRAVEL AND COBBLES</b> , scattered clay dark brown, medium dense		GP		HS						
3.5	1070.9										
	<b>GRAVEL</b> , with clay brown, reddish brown and white, medium dense, moist	5	GC	1	SS	8	22				7, 10, 12
			GC		HS						
8	1066.4										
	<b>CHERT++</b> , with clay seams white, hard, highly weathered to fresh			2	SS	4	13/6"				13/6",
10.5	1063.9	10			HS		50/3"				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

[illegible]

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



## LOG OF BORING NO. MS-169

Page 1 of 1

CLIENT		Automatic Hammer Efficiency = 80.7%									
SITE		PROJECT									
HNTB		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	Boring Location: 887+97, 53 Feet right of centerline		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
	DESCRIPTION				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 1056.7 ft										
	<b>SANDY GRAVEL AND COBBLES</b> , with clay dark brown, very dense, dry		2	SP		PA					
	<b>GRAVELLY SAND</b> light brown, very dense, dry			SP	1	SS	18	31			10, 16, 15
				SP		PA					
	7.5		5								
	<b>SANDY GRAVEL</b> , with clay gray and reddish brown, very dense, dry			GP	2	SS	10	50/5.5"			41, 50/5.5"
				GC		PA					
				GP							
				GC							
	12.5		10								
	<b>CLAYEY GRAVEL</b> gray and reddish brown, medium dense, moist			GC	3	SS	18	17			10, 9, 8
				GC		PA					
	17.5		15								
	<b>SANDY GRAVEL</b> , with clay brown, loose to very loose, dry			GP	4	SS	4	1/8"			6, 1/8", 50/1"
				GC		PA		50/1"			
				GP							
				GC							
	20		20								
	<b>FAT CLAY</b> , trace chert seams reddish brown, stiff, moist										
	24			CH	5	SS	18	20		3000*	6, 6, 14
	24.5					PA					
	<b>LIMESTONE++</b> gray, hard										
	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

## LOG OF BORING NO. MS-170

Page 1 of 1

CLIENT		HNTB										Automatic Hammer Efficiency = 84.1%				
SITE		McDONALD COUNTY, MISSOURI										PROJECT				
		Boring Location: 890+67, 496 Feet right of centerline										I-49, MISSOURI				
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS								
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"					
	Approx. Surface Elev.: 1145.8 ft															
	<b>FAT CLAY</b> , with to abundant gravel brown, very stiff, moist		CH	HS												
			CH	1	SS	18	21					7, 11, 10				
			CH		HS											
	9.1 1136.7		CH	2	SS	10	10/6"					10, 50/5"				
	9.7 1136.1			HS		50/5"										
	<b>LIMESTONE++</b> gray to light gray, hard, fresh															
	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



## LOG OF BORING NO. MS-173

Page 1 of 1

CLIENT		HNTB									
SITE		McDONALD COUNTY, MISSOURI									
Boring Location: 899+51, 49 Feet left of centerline		PROJECT									
		I-49, MISSOURI									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1089.1 ft										
	<b>SILTY GRAVEL</b> brown, loose, moist		GM		PA						
	<b>FAT CLAY</b> , scattered gravel olive brown, stiff, moist	3.5									
		1085.6									
	<b>LIMESTONE++</b> gray, hard	7			PA						
		1082.1									
		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

## LOG OF BORING NO. MS-174

Page 1 of 2

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%				
SITE		McDONALD COUNTY, MISSOURI										PROJECT				
Boring Location: 900+30, 200 Feet right of centerline		I-49, MISSOURI														
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				Blow Counts for 18"				
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf						
	Approx. Surface Elev.: 1068.1 ft															
	<b>CLAYEY GRAVEL</b> dark brown and gray, medium dense, moist	5	GC		PA								7, 5, 6			
			GC	1	SS	18	11									
			GC		PA											
				2	SS PA	3	50/3"						50/3"			
				3	SS PA	2	50/2"						50/2"			
				4	SS PA	1	50/2"						50/2"			
				5	SS PA	0	50/2"						50/2"			
			6	SS PA	1	50/2"						50/2"				
	<b>SHALE++</b> gray to brownish gray, hard, weathered	1060.1														

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

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## LOG OF BORING NO. MS-174

Page 2 of 2

CLIENT HNTB		Automatic Hammer Efficiency = 80.7%								
SITE McDONALD COUNTY, MISSOURI		PROJECT I-49, MISSOURI								
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	<b>SHALE++</b> 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		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.		50								

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

# LOG OF BORING NO. MS-175

CLIENT		Automatic Hammer Efficiency = 80.7%							
HNTB									
SITE		PROJECT							
McDONALD COUNTY, MISSOURI		I-49, MISSOURI							
GRAPHIC LOG	Boring Location: 901+16, 597 Feet right of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf
	DESCRIPTION								
	Approx. Surface Elev.: 1030.0 ft								
	<b>GRAVELLY LEAN CLAY</b> with sand dark brown, very stiff, moist to wet	CL	PA						
		CL	1	SS	18	14			4, 5, 9
		CL		PA					
7	1023.0								
	<b>SHALE++</b> dark gray to brownish gray, moderately hard to hard, weathered								
			2	SS PA	2	50/5"			50/5"
			3	SS PA	1	50/2"			50/2"
			4	SS PA	2	50/2"			50/2"
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

BOREHOLE 99 5019MS173-175-182-184 G.P.J TERRACON GDT 7/24/03

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

# LOG OF BORING NO. MS-181A

Page 1 of 1

CLIENT <b>HNTB</b>		Automatic Hammer Efficiency = 83%									
SITE <b>McDONALD COUNTY, MISSOURI</b>		PROJECT <b>I-49, MISSOURI</b>									
GRAPHIC LOG	Boring Location: 909+15, 248 Feet left of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES					TESTS		Blow Counts for 18"
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	Approx. Surface Elev.: 1057.0 ft										
	<b>SHALE++</b> grayish brown, soft to moderately hard, highly weathered			PA							
		5		1	SS	16	45/6" 50/2"				30, 45, 50/2"
				PA							
	- sample wet at 9 feet	10		2	SS PA	6	50/6"				50/6"
	13.6 - becoming gray, hard, fresh below 13.5 feet			3	SS	1	50/1"				50/1"
	1043.4										
	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 5019MS173-175.182-184.GPJ TERRACON.GDT 7/24/03



LOG OF BORING NO. MS-183

CLIENT		Automatic Hammer Efficiency = 80.7%									
SITE		PROJECT									
HNTB		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	Boring Location: 909+24, 241 Feet right of centerline		DEPTH, ft.	USCS SYMBOL	SAMPLES					TESTS	
	DESCRIPTION				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
Approx. Surface Elev.: 1044.8 ft											
	<b>GRAVELLY LEAN CLAY</b> dark brown and reddish brown, very stiff, moist		CL		PA						
	5	1039.8	CL	1	SS	3	16				8, 8, 8
	<b>SHALE++</b> brownish gray to gray, moderately hard to hard, weathered				PA						
				2	SS PA	9	30 50/3"				30, 50/3"
				3	SS PA	2	50/3"				50/3"
				4	SS PA	0	50/3"				50/3"
22.5	1022.3										
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

## LOG OF BORING NO. MS-184

Page 1 of 1

CLIENT		Automatic Hammer Efficiency = 80.7%										
HNTB												
SITE		PROJECT										
McDONALD COUNTY, MISSOURI		I-49, MISSOURI										
GRAPHIC LOG	Boring Location: 909+71, 575 Feet right of centerline		DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
	DESCRIPTION				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
Approx. Surface Elev.: 1033.5 ft												
 4 1029.5 <u>GRAVELLY SILT</u> with clay dark brown, dense, moist to wet		ML		PA							10, 15, 20	
 5 1025.0 <u>SHALEY LEAN CLAY / HIGHLY WEATHERED SHALE</u> dark gray and brown, hard, moist to wet		CL	1	SS	12	35						
 8.5 AUGER REFUSAL ON APPARENT SHALE  BOTTOM OF BORING AT 8.5 FEET BACKFILLED WITH CUTTINGS 01/14/03		CL		PA								

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	▽	WD	▽	
WL		WD		

# 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

\*Calibrated Hand Penetrometer

BORING STARTED		1-14-03	
BORING COMPLETED		1-14-03	
RIG	ATV, #103E	FOREMAN	KS
APPROVED	CSK	JOB #	J7P0601

# LOG OF BORING NO. MS-219

CLIENT		HNTB		Automatic Hammer Efficiency = 80.7%							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
Boring Location: 936+09, 17 Feet right of centerline				SAMPLES				TESTS			
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1024.0 ft										
	<b>CLAYEY GRAVEL</b> with sand dark brown, loose, moist		GC		PA						
		5	GC	1	SS	5	4				3, 2, 2
			GC		PA						
	- with clay seams below 8.5 feet	10	GC	2	SS	5	9				4, 4, 5
			GC		PA						
		15	GC	3	SS	18	16				8, 8, 8
			GC		PA						
	- changing to brown and reddish brown, moist to wet below 18.5 feet	20	GC	4	SS	18	10				4, 4, 6
			GC		PA						
23.5	1000.5	25		5	SS PA	0	50/3"				50/3"
		30		6	SS PA	6	50/6"				50/6"

Continued Next Page

\*Calibrated Hand Penetrometer

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
WL	▽	WD
WL		



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 G.P.J. TERRACON GDT 7/24/03

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## LOG OF BORING NO. MS-219

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CLIENT		Automatic Hammer Efficiency = 80.7%									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
33	991.0										
<p>AUGER REFUSAL ON SHALE</p> <p>BOTTOM OF BORING AT 33.0 FEET BACKFILLED WITH CUTTINGS 01/14/03</p> <p>++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.</p>											

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	▽	WD	▽	
WL		WD		

Terracon

BORING STARTED	1-14-03
BORING COMPLETED	1-14-03
RIG ATV, #103E	FOREMAN KS
APPROVED CSK	JOB # J7P0601

BOREHOLE 98 5019MS218-220 259.261 288-290.GPJ TERRACON.GDT 7/24/03

CLIENT		HNTB		Automatic Hammer Efficiency = 84.1%								
SITE		McDONALD COUNTY, MISSOURI		PROJECT								
				I-49, MISSOURI								
GRAPHIC LOG	Boring Location: 936+62, 244 Feet right of centerline	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
					NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
		Approx. Surface Elev.: 1020.3 ft										
		<u>CLAYEY GRAVEL</u> brown, stiff to very stiff, moist to wet		GC		PA						
			5	GC	1	SS	12	7				4, 4, 3
				GC		PA						
			10	GC	2	SS	12	18				5, 8, 10
				CH		PA						
		<u>FAT CLAY</u> , abundant gravel brown to dark brown, moist to wet		CH	3	SS	3	13				5, 6, 7
			15	CH		PA						
			20	CH	4	SS	8	29				4, 16, 13
				CH		PA						
			23.8		5	SS	0	50/6"				50/6"
		<u>SHALE++</u> dark gray, hard, weathered			6	PA						
		BOTTOM OF BORING AT 27.8 FEET BACKFILLED WITH CUTTINGS 12/22/02										
			27.8		7	SS	8	45/6"				45/6", 50/2"
		++ Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.						50/2"				

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						BORING STARTED		12-22-02		
WL	▽	DRY	WD	▽		DRY	AB	BORING COMPLETED		12-22-02
WL	▽			▽				RIG CME-75, #386	FOREMAN	JW
WL								APPROVED	BKM	J7P0601

BOREHOLE 99 5019MS220.GPJ TERRACON.GDT 7/24/03



# LOG OF BORING NO. MS-259

CLIENT		Automatic Hammer Efficiency = 80.7%									
HNTB		PROJECT									
SITE		I-49, MISSOURI									
McDONALD COUNTY, MISSOURI		Boring Location: 963+89, 193 Feet left of centerline									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	Approx. Surface Elev.: 1075.1 ft										
	<u>SILTY GRAVEL</u> gray and dark brown, dense, dry to moist	1073.1	GM	PA							
	2										
	2.5 <u>LIMESTONE++</u> , with chert seams gray, hard	1072.6									
					1	SS	0	50/0"			50/0"
	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	▽	WD	▽
WL		WD	

# Terracon

BORING STARTED	1-19-03
BORING COMPLETED	1-19-03
RIG ATV, #103E	FOREMAN JW
APPROVED CSK	JOB # J7P0601

LOG OF BORING NO. MS-260

CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%									
SITE		McDONALD COUNTY, MISSOURI										PROJECT									
Boring Location: 964+72, 3 Feet right of centerline		I-49, MISSOURI										SAMPLES					TESTS				
												DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
GRAPHIC LOG	DESCRIPTION																				
	Approx. Surface Elev.: 1070.1 ft																				
	<u>SILTY GRAVEL</u> gray and dark brown, dense, dry to moist		GM		PA																
	4 4.5																				
	<u>LIMESTONE++</u> , with chert seams gray, hard		GM	1	SS	6	12/6" 50/0"									4, 12, 50/0"					
	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						BORING STARTED		1-19-03	
WL ▽ 4		WD ▽ 4				BORING COMPLETED		1-19-03	
WL ▽		▽				RIG ATV, #103E		FOREMAN JW	
WL						APPROVED CSK		JOB # J7P0601	

BOREHOLE 99 5019MS218-220.259-261.288-290.GPJ TERRACON.GDT 7/24/03

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# LOG OF BORING NO. MS-261

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CLIENT		HNTB										Automatic Hammer Efficiency = 80.7%									
SITE		McDONALD COUNTY, MISSOURI										PROJECT									
		I-49, MISSOURI																			
GRAPHIC LOG	Boring Location: 965+57, 258 Feet right of centerline										DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
	DESCRIPTION												NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"	
Approx. Surface Elev.: 1058.5 ft																					
2		<u>SILTY GRAVEL</u> gray and dark brown, dense, dry to moist										1056.5	GM	PA							
													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				<b>Terracon</b>	BORING STARTED		1-19-03				
WL	▽	DRY	WD		▽	DRY	AB	BORING COMPLETED	1-19-03		
WL	▽		▽					RIG	ATV, #103E	FOREMAN	JW
WL								APPROVED	CSK	JOB #	J7P0601


BOREHOLE 98 5019MS218-220 259-261 288-290 GPJ TERRACON GDI 7/24/03

# LOG OF BORING NO. MS-288

CLIENT		Automatic Hammer Efficiency = 80.7%									
HNTB											
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	Boring Location: 987+29, 300 Feet left of centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
	DESCRIPTION			NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	Approx. Surface Elev.: 1040.3 ft										
	<b>CLAYEY GRAVEL</b> with cobbles reddish brown, brown and white, loose to medium dense, moist 	5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835									

## LOG OF BORING NO. MS-289

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CLIENT		Automatic Hammer Efficiency = 80.7%									
SITE		PROJECT									
McDONALD COUNTY, MISSOURI		I-49, MISSOURI									
GRAPHIC LOG	Boring Location: 986+60, Centerline	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	Approx. Surface Elev.: 1041.9 ft										
	<b>SILTY LEAN CLAY</b> with gravel dark brown, stiff, moist		CL ML		PA						
		5	CL ML	1	SS	12	12			2000*	3, 5, 7
			CL ML		PA						
	8										
	<b>CLAYEY SAND</b> 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
		20	SC		PA						
	22										
	<b>SHALE++</b> dark gray and gray, moderately hard to hard, weathered										
		25		5	SS PA	4	50/4"				50/4"
		30		6	SS PA	2	50/2"				50/2"

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

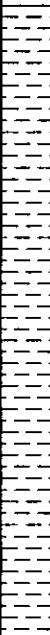
WL	▽ 11	WD	▽ 13	AB
WL	▽ 7.5	24 hr	▽	
WL				

Terracon

BORING STARTED	1-20-03
BORING COMPLETED	1-29-03
RIG ATV, #103E	FOREMAN JW
APPROVED CSK	JOB # J7P0601

## LOG OF BORING NO. MS-289

Page 2 of 2

CLIENT		HNTB		Automatic Hammer Efficiency = 80.7%							
SITE		McDONALD COUNTY, MISSOURI		PROJECT							
				I-49, MISSOURI							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		Blow Counts for 18"	
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf		UNCONFINED STRENGTH, psf
	<b>SHALE++</b> 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		10	SS HS	1	50/1"			50/1"	
		50.5	991.4								
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



# LOG OF BORING NO. MS-290

Page 1 of 2

CLIENT

HNTB

Automatic Hammer Efficiency = 80.7%

SITE

McDONALD COUNTY, MISSOURI

PROJECT

I-49, MISSOURI

Boring Location: 986+00, 300 Feet right of centerline

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 1038.0 ft

**GRAVEL** with sand and clay  
reddish brown, brown and white, loose to  
medium dense, moist

▽

▽

▽

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

DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			Blow Counts for 18"
		NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	GP		PA						
5	GP	1	SS	12	17				9, 8, 9
	GP		PA						
10	GP	2	SS	10	9				6, 4, 5
	GP		PA						
15	GP	3	SS	2	30				11, 13, 17
	GP		PA						
20	GP	4	SS	6	6				3, 3, 3
	GP		PA						
25	GP	5	SS	10	16				9, 8, 8
	GP		PA						
30		6	SS PA	1	50/1"				50/1"

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 98 5019MS218-220 259-261 288-290 GP J TERRACON GDT 7/24/03

# LOG OF BORING NO. MS-290

Page 2 of 2

CLIENT

HNTB


SITE

McDONALD COUNTY, MISSOURI

Automatic Hammer Efficiency = 80.7%

PROJECT

I-49, MISSOURI

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	Blow Counts for 18"
	<b>SHALE++</b> 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.										

Page 2 of 2

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 Number	Sample Number	Depth (feet)	Moisture Content (%)	Atterberg Limits			Sieve Analysis (percent passing)										pH	Resistivity (ohm/cm)	Unit Weight, pcf		Std Compaction (pcf) @ %	Unconfined (psf)	Lab CBR (@ 0.1 in.)	AASHTO	Group Index
				LL	PL	PI	1.5"	1"	3/4"	3/8"	No. 4	No. 10	No. 40	No. 100	No. 200	In-situ			Dry						
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			A-6	2	
MC-44	Bulk	0-10.5'	13.7	30	19	11			100	97	89	73	53		41										
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																						

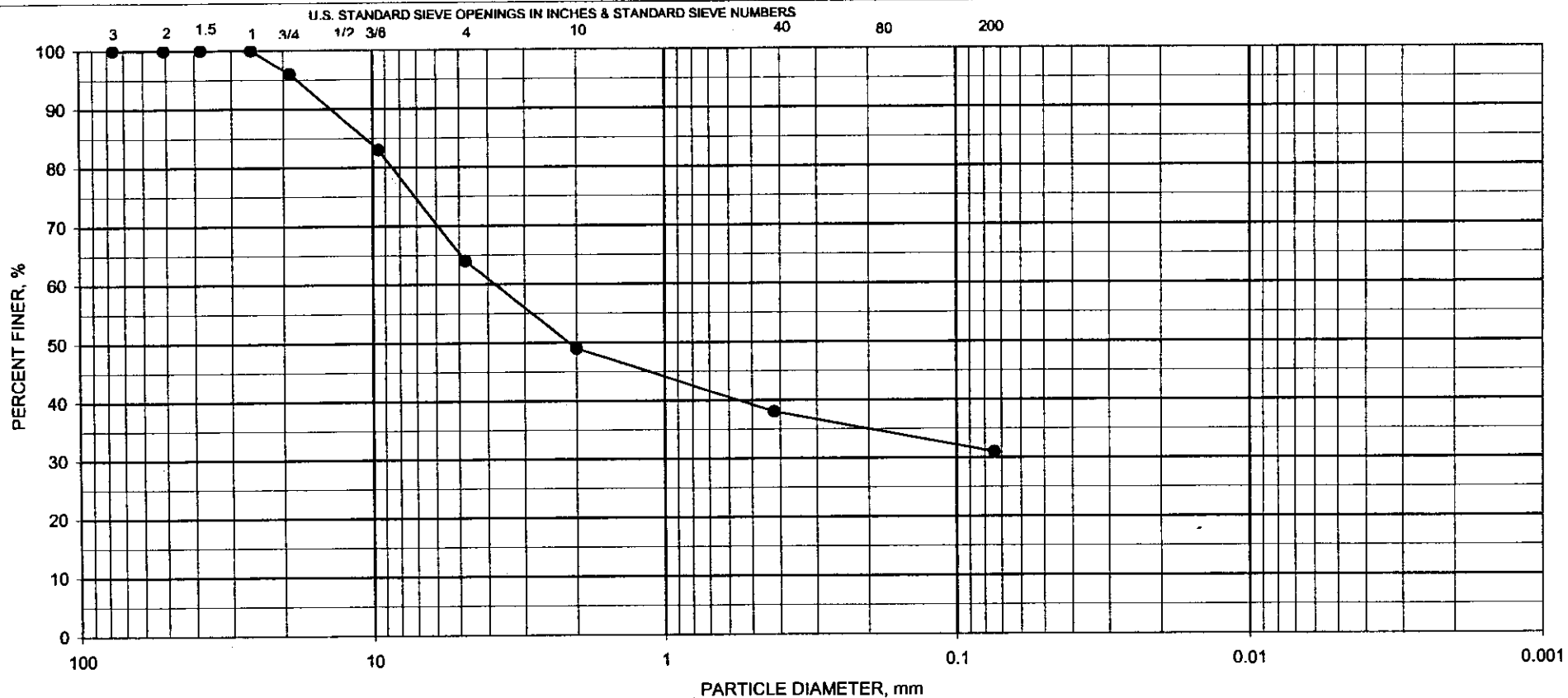
**I-49 MISSOURI LAB TEST DATA**  
**PINEVILLE, MISSOURI TO ARKANSAS STATE LINE**  
**MCDONALD COUNTY, MISSOURI**  
**MODOT PROJECT NO. J7P0601**

Boring Number	Sample Number	Depth (feet)	Moisture Content (%)	Atterberg Limits			Sieve Analysis (percent passing)										pH	Resistivity (ohm/cm)	Unit Weight, pcf		Std Compaction (pcf) @ %	Unconfined (psf)	Lab CBR (@ 0.1 in.)	AASHTO	Group Index
				LL	PL	PI	1.5"	1"	3/4"	3/8"	No. 4	No. 10	No. 40	No. 100	No. 200	In-situ			Dry						
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

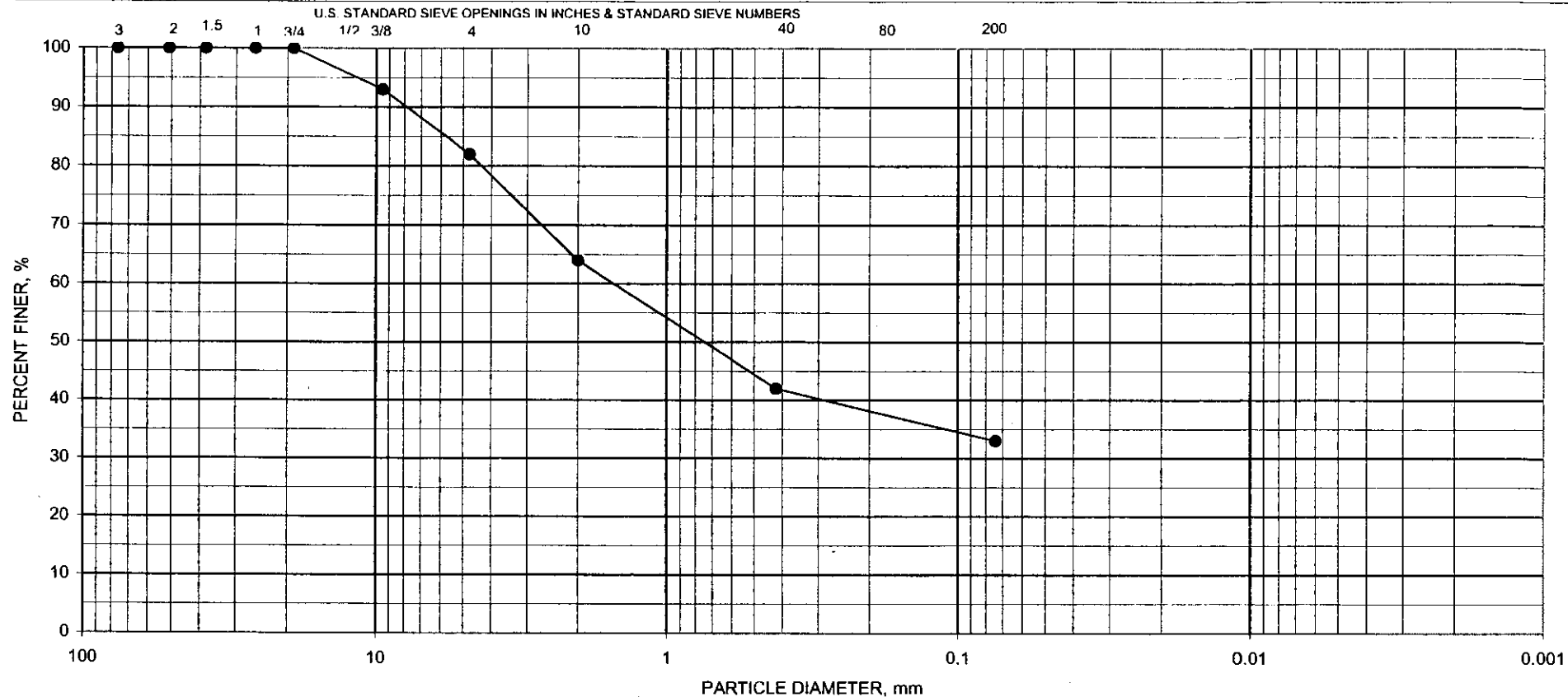
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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-19	Bulk	5 to 15.5 feet	Clayey Sand with Gravel	SC	8.6	29	17	12

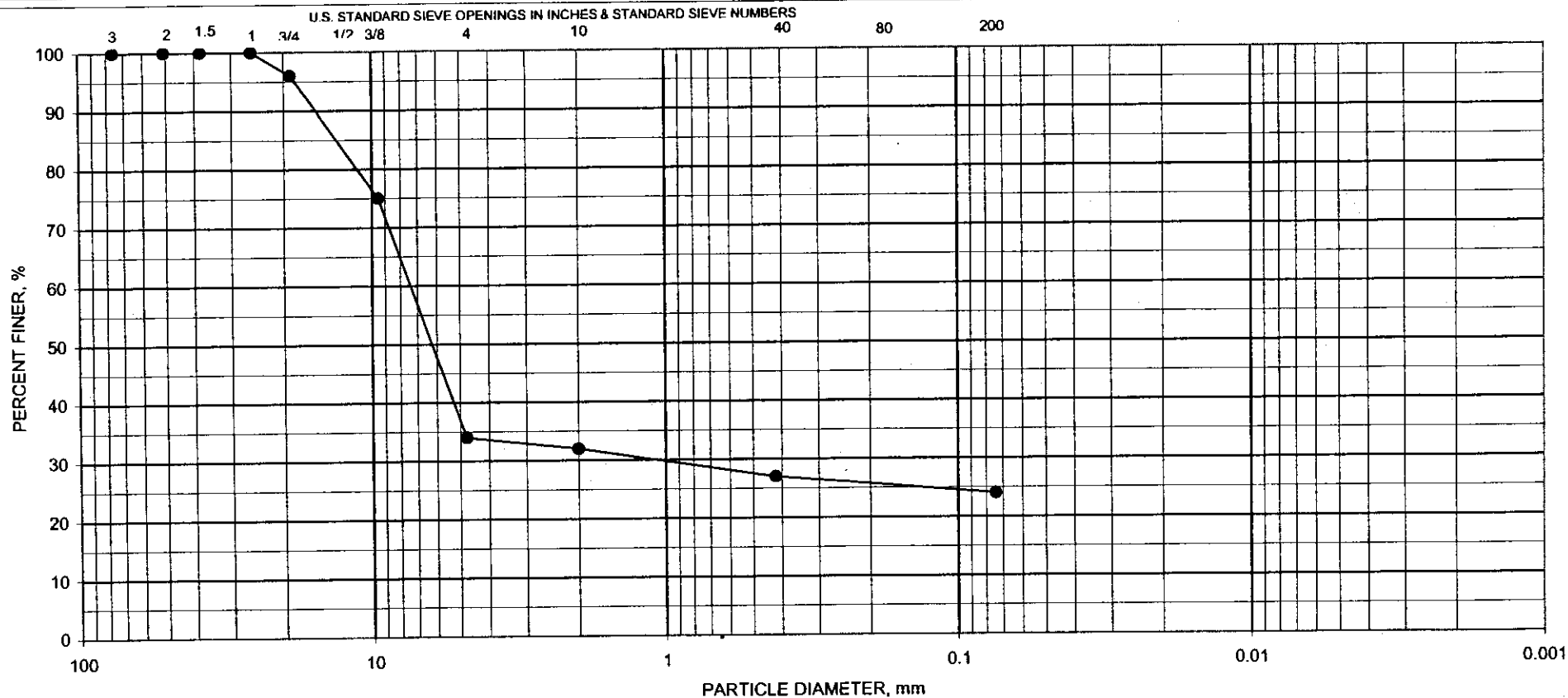
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

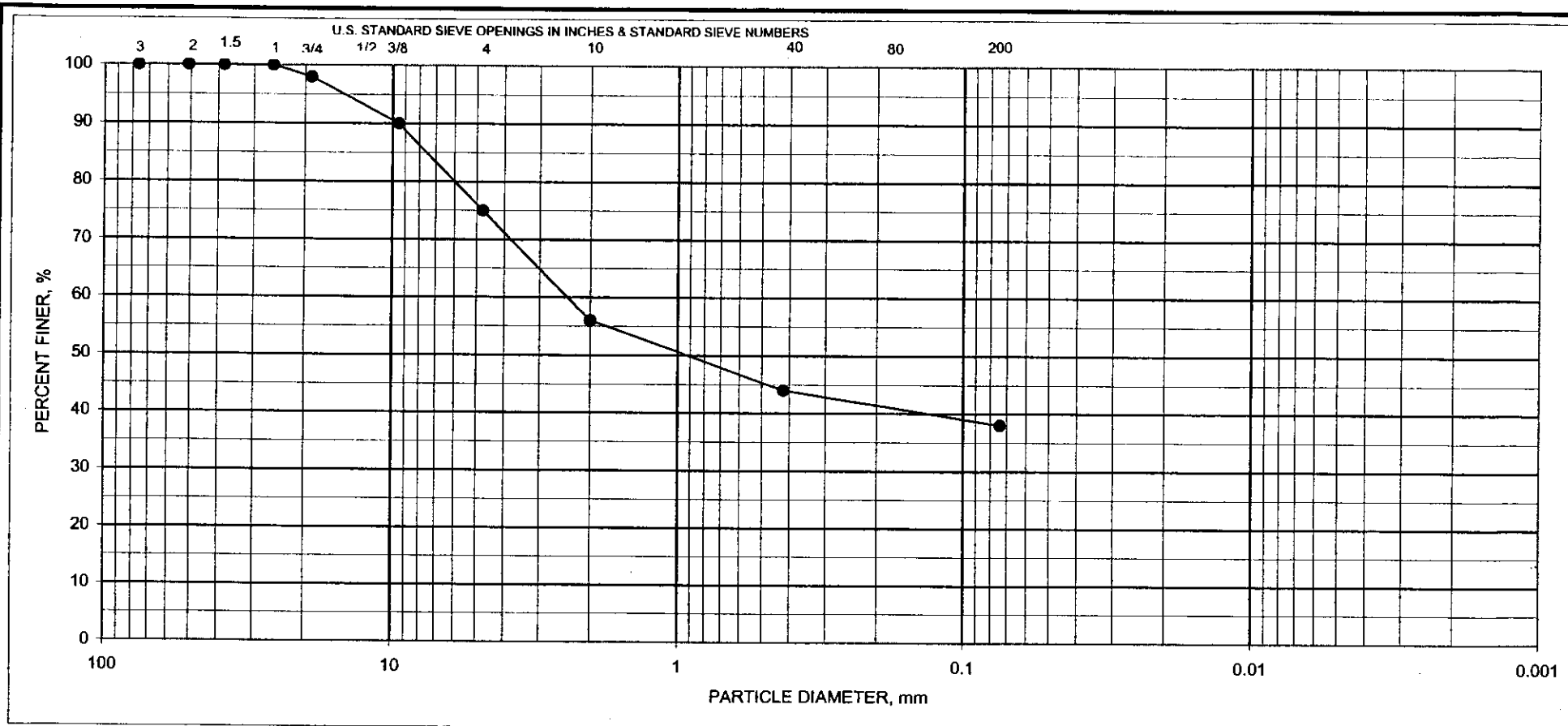
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

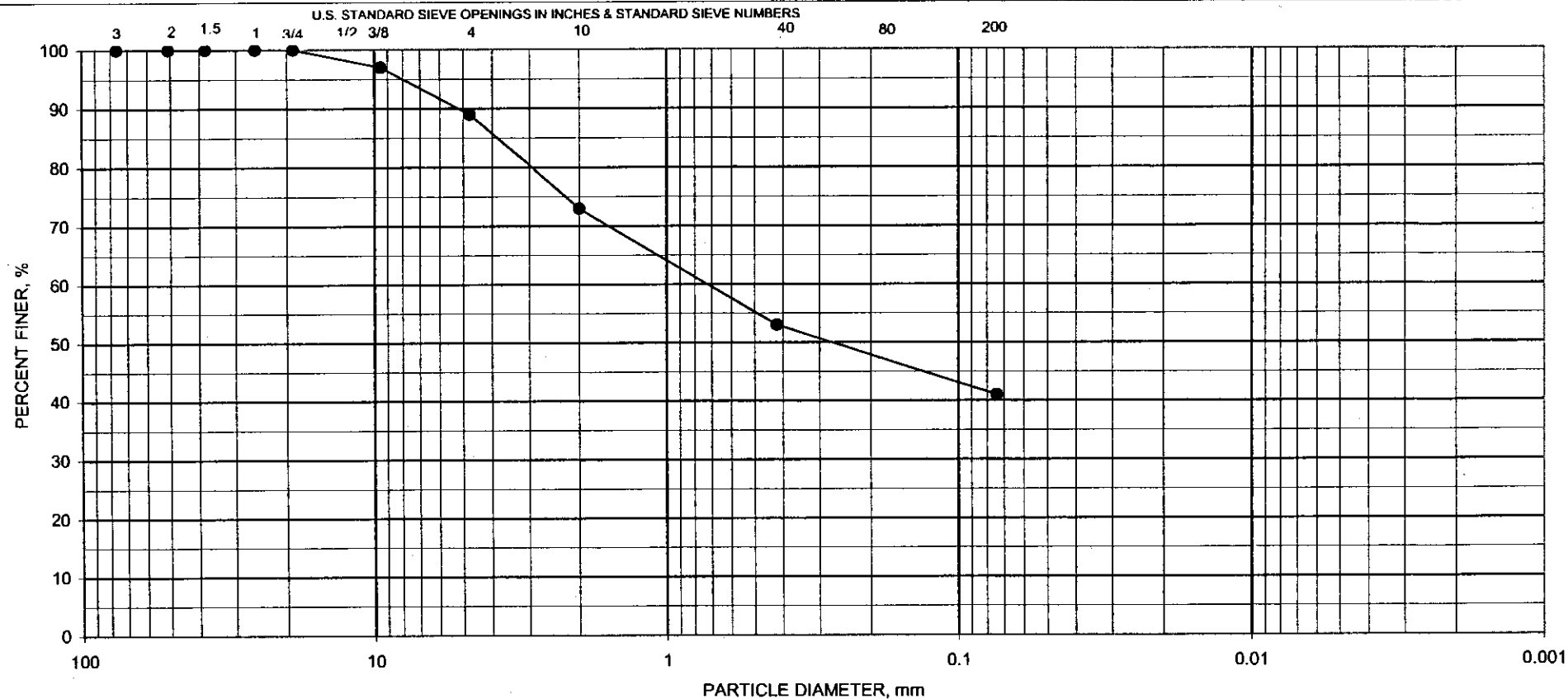
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri

JOB NO.

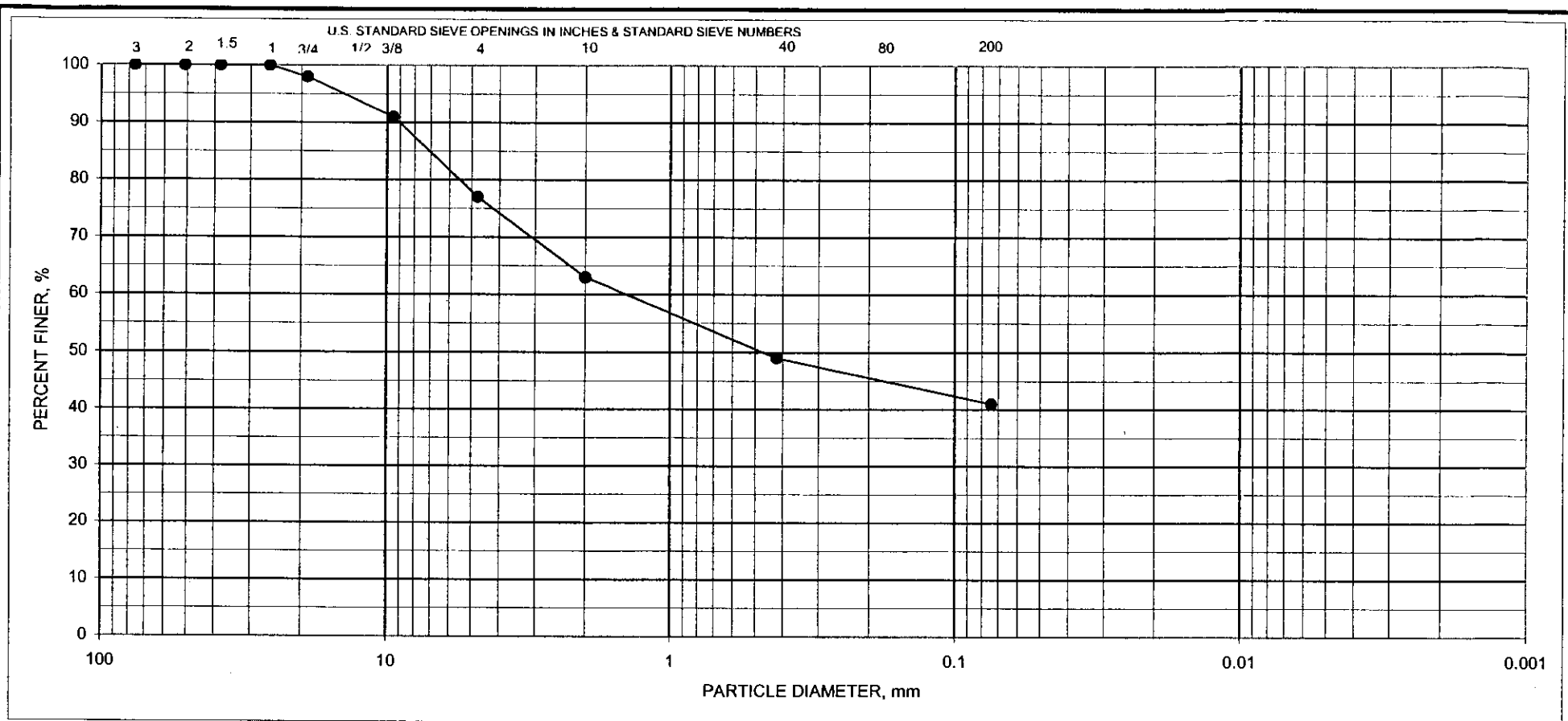
39025019M

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

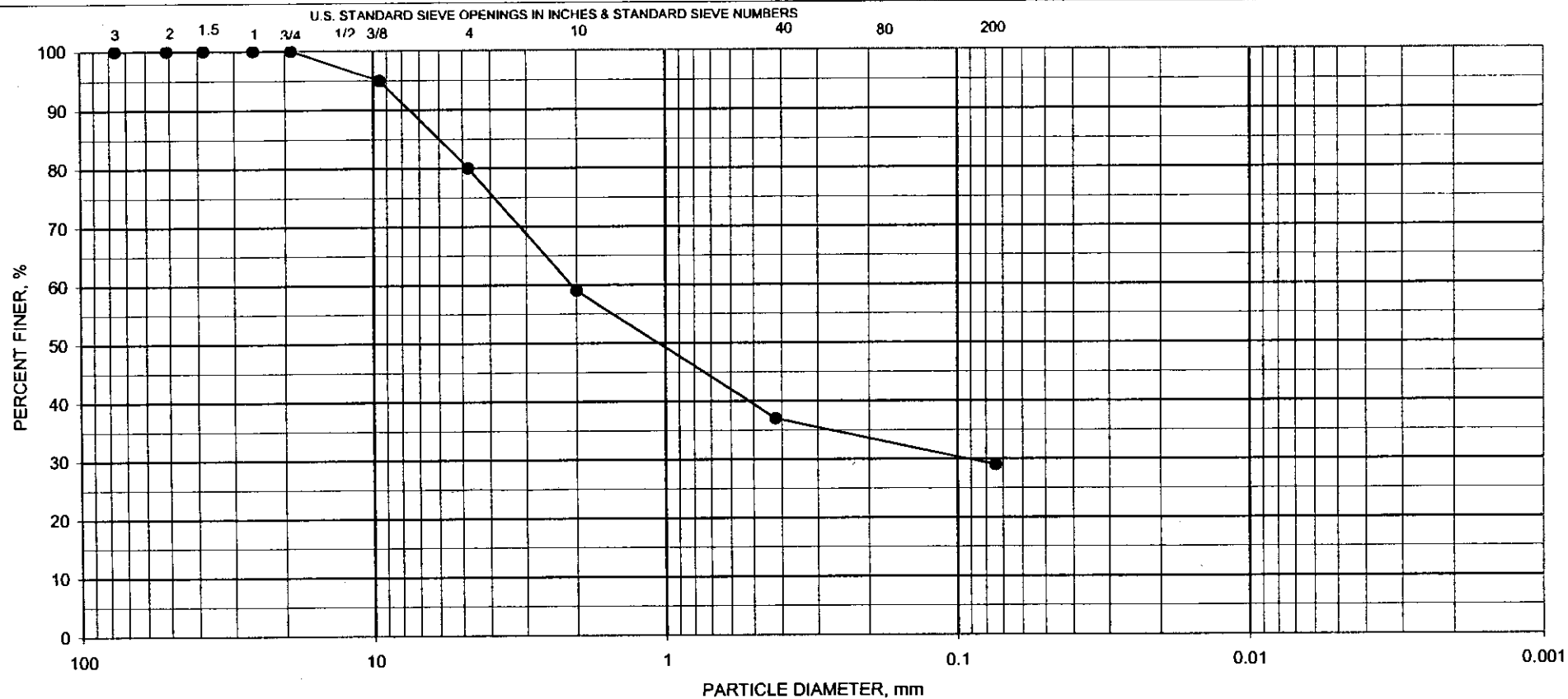
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

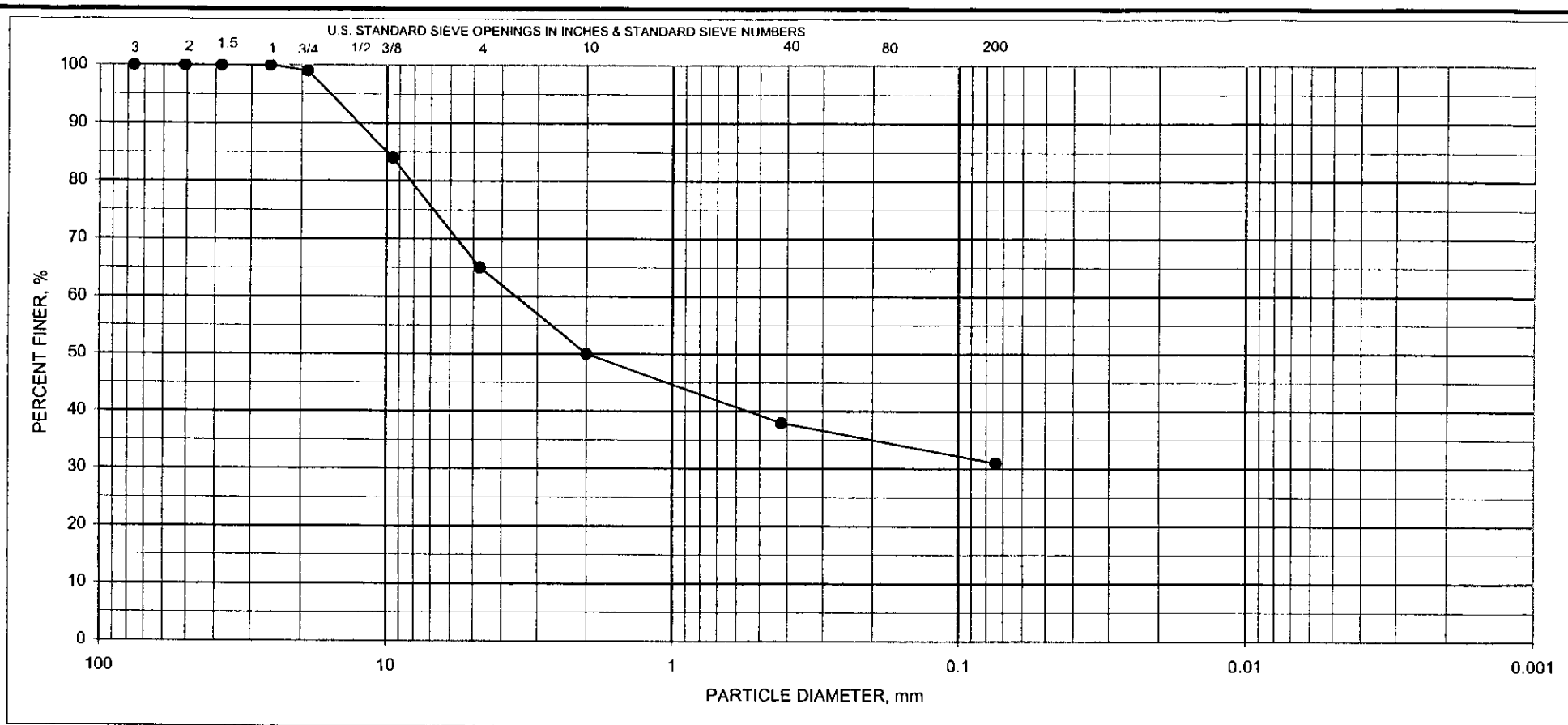
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

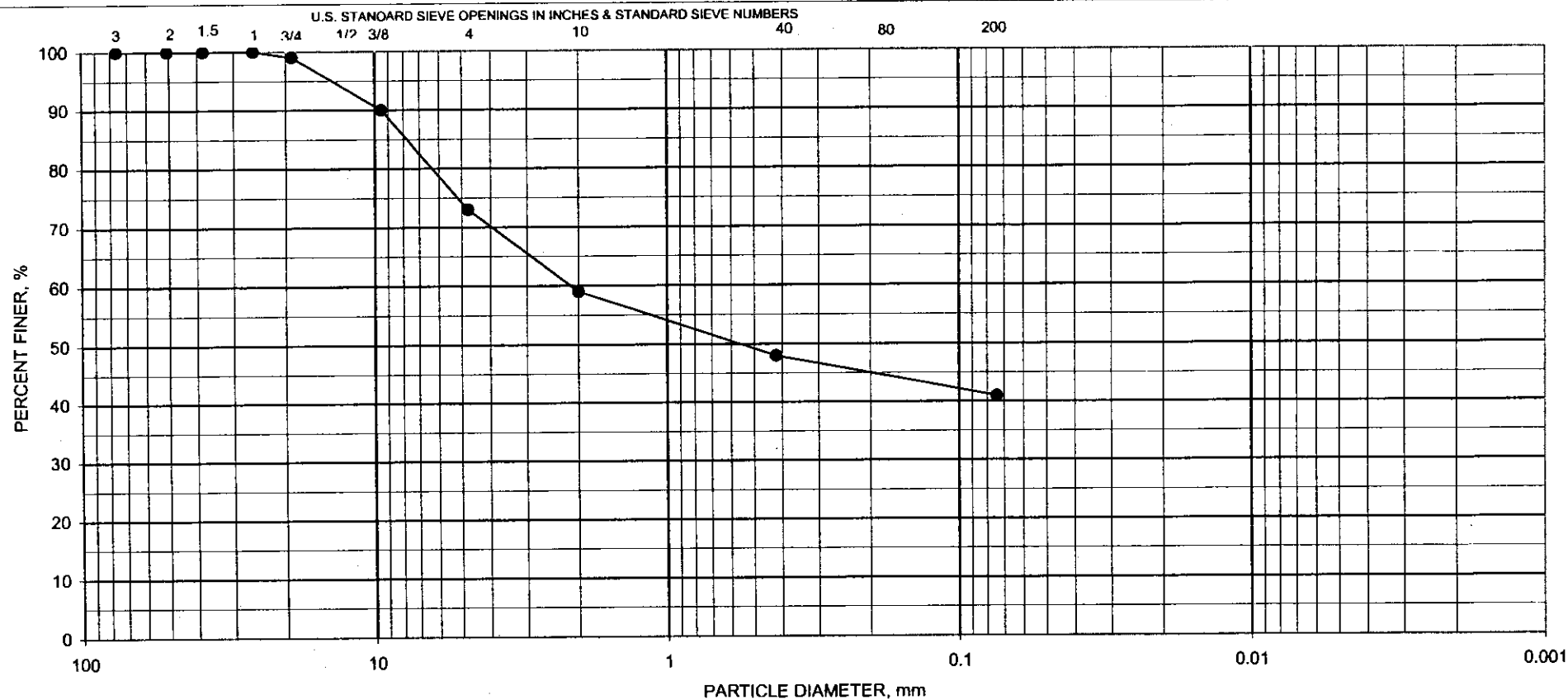
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

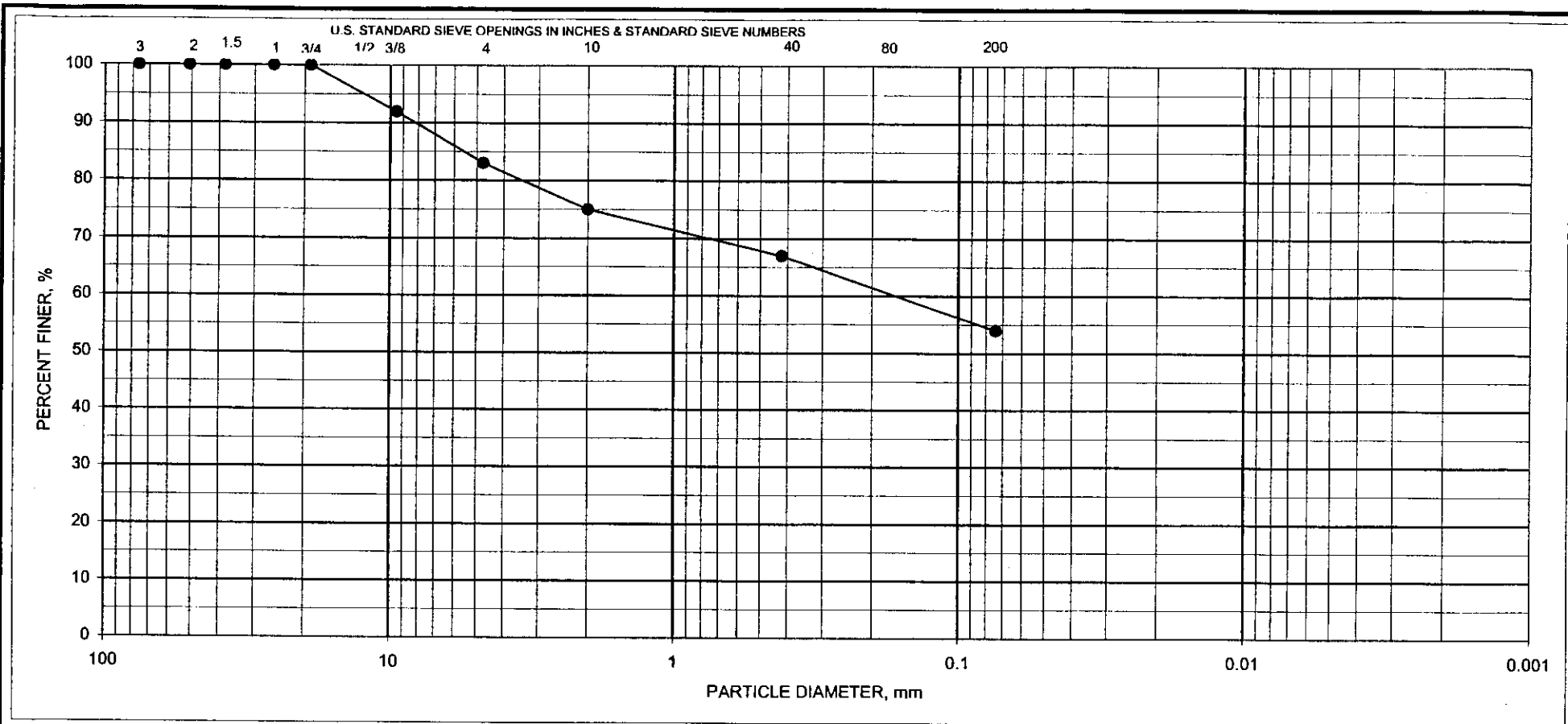
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

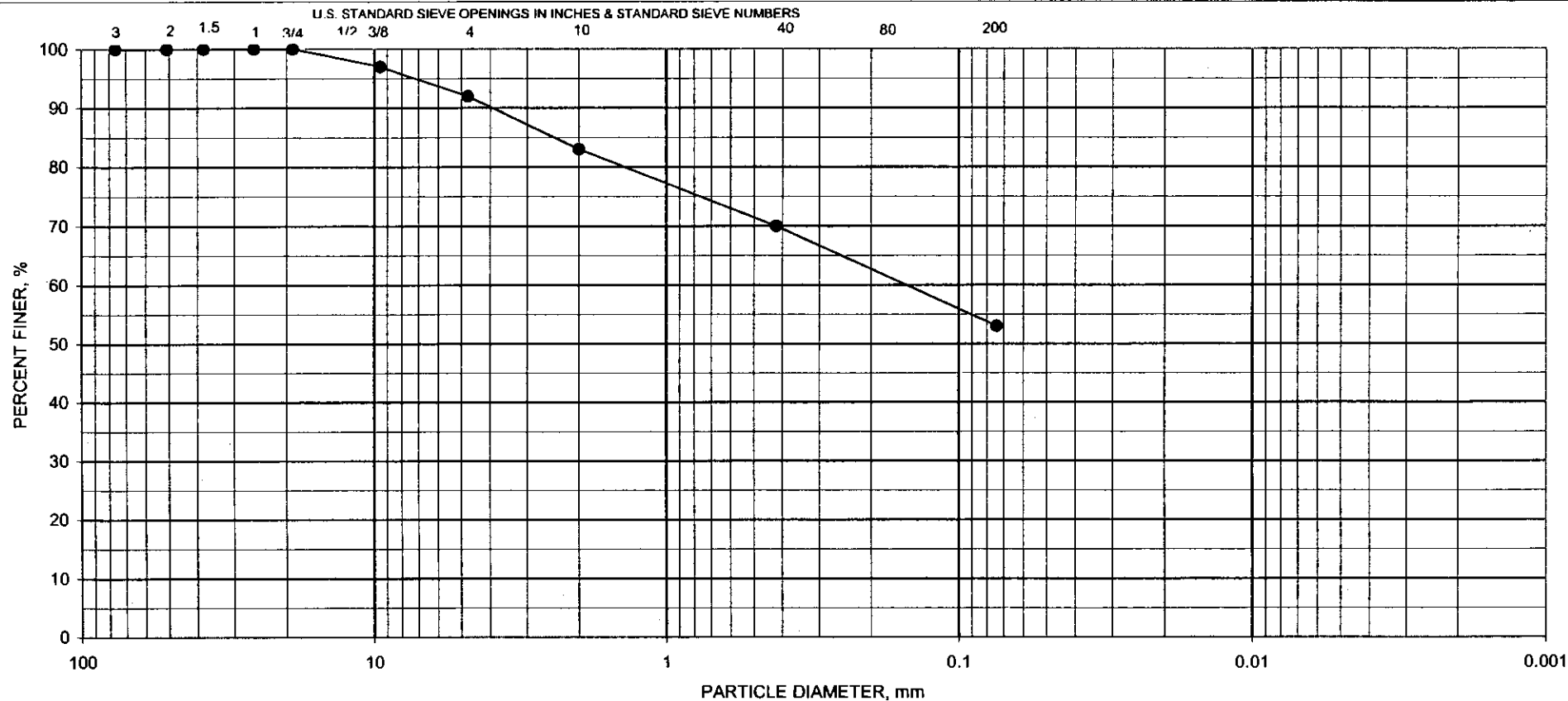
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

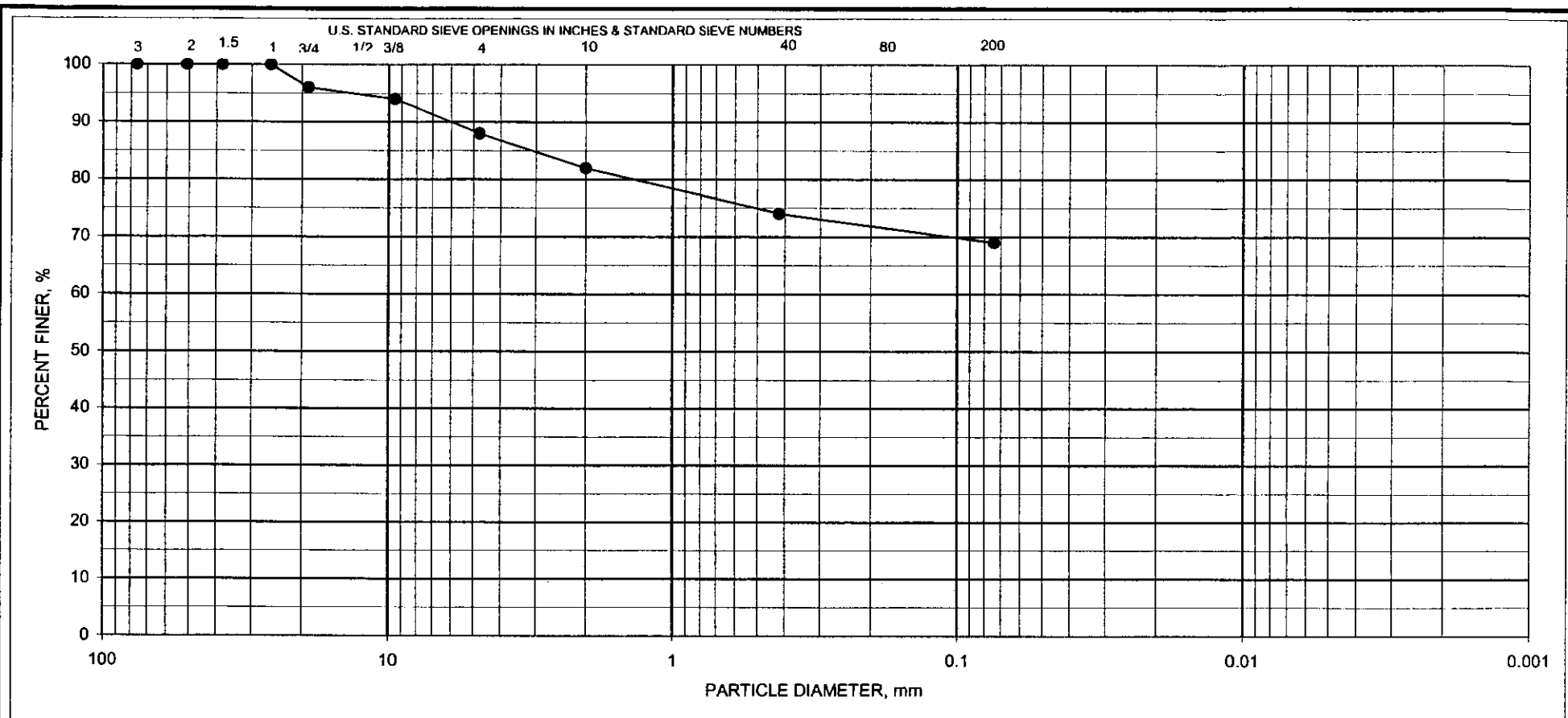
McDonald County, Missouri

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

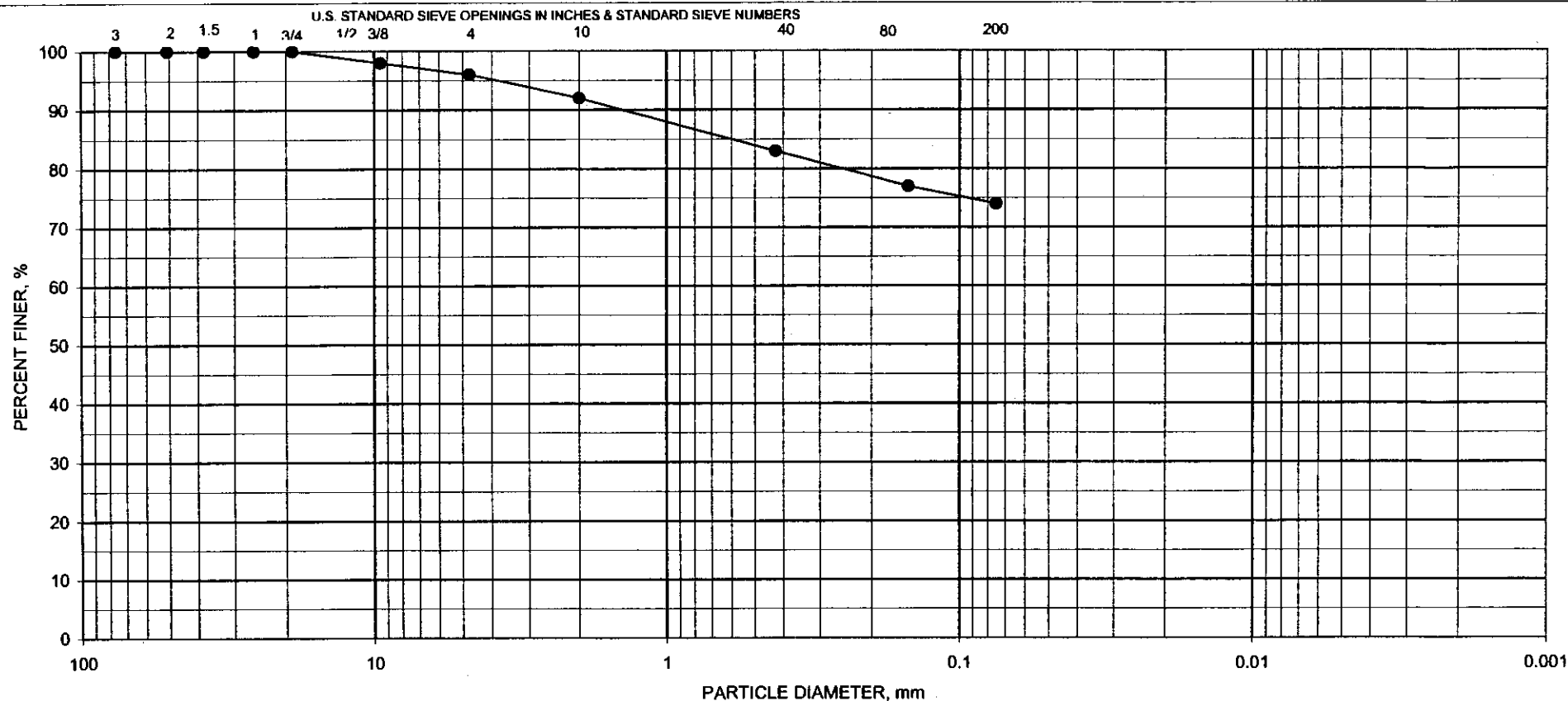
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

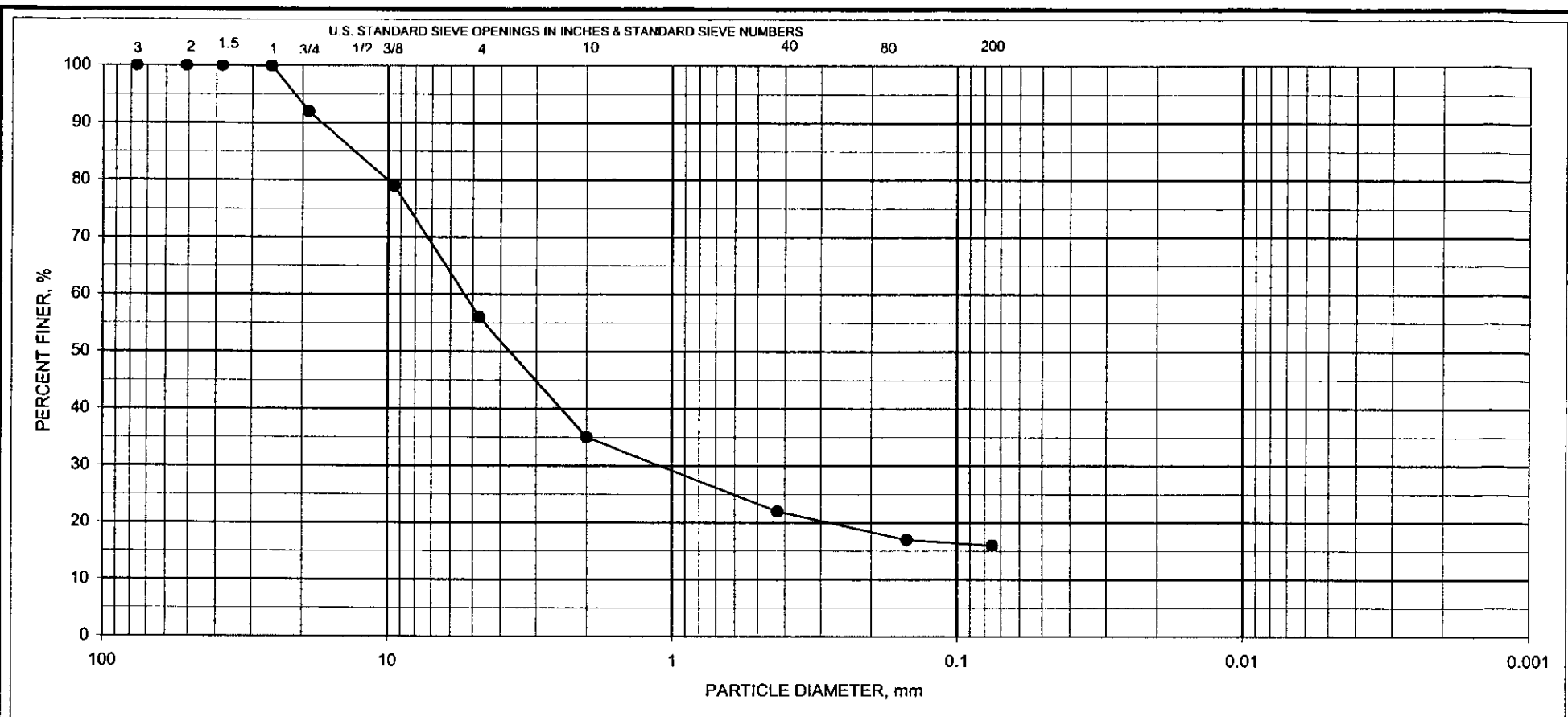
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

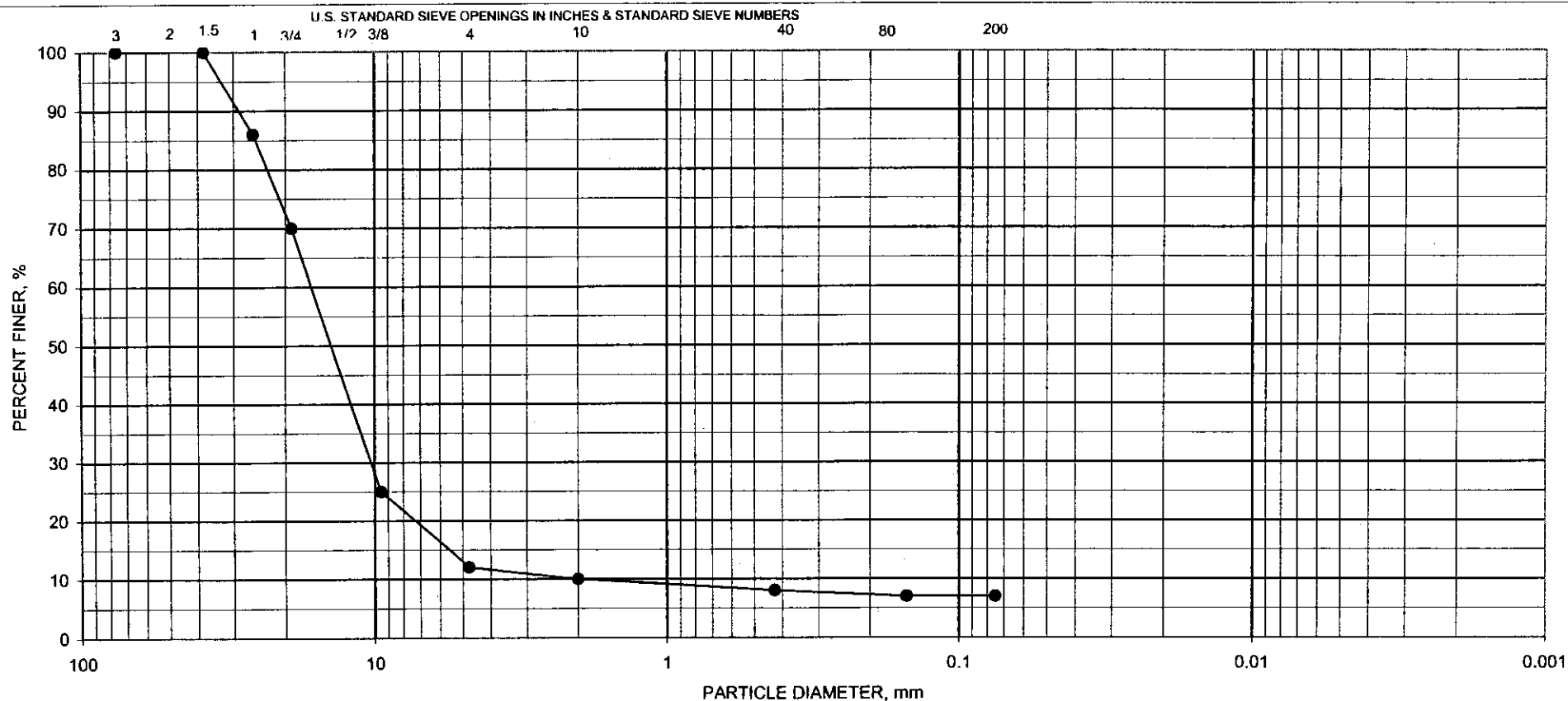
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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-178A	1	0 - 8	Poorly Graded Gravel with Silt	GP-GM	2.6	30	23	7

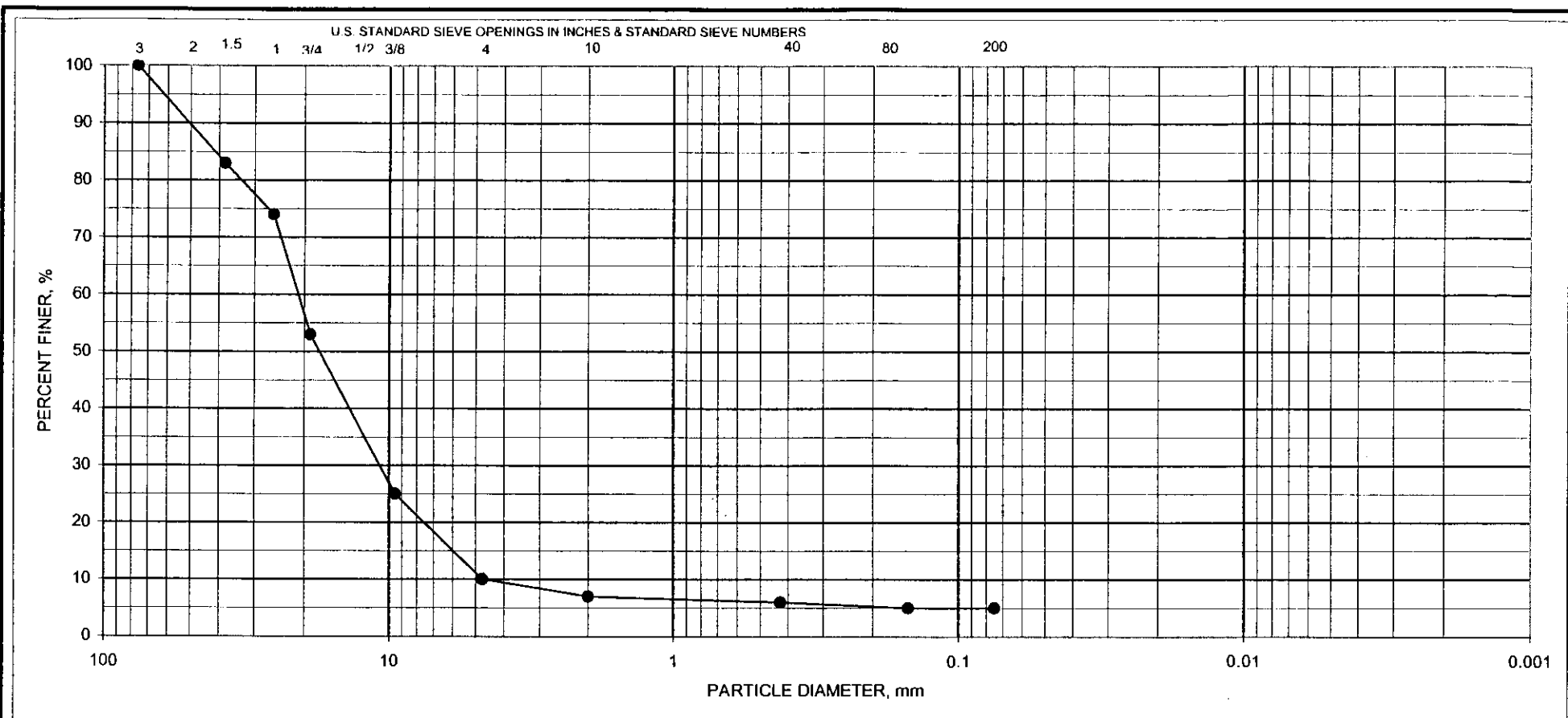
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

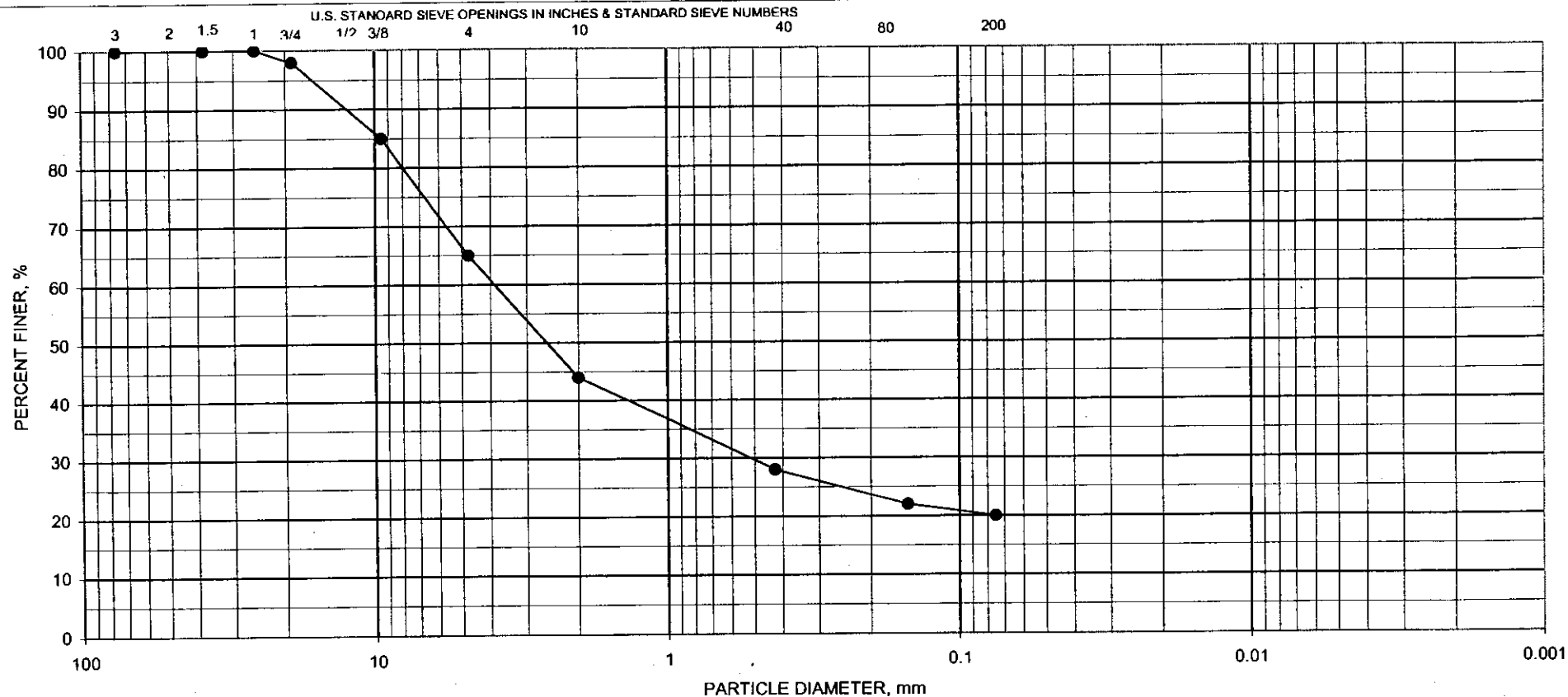
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

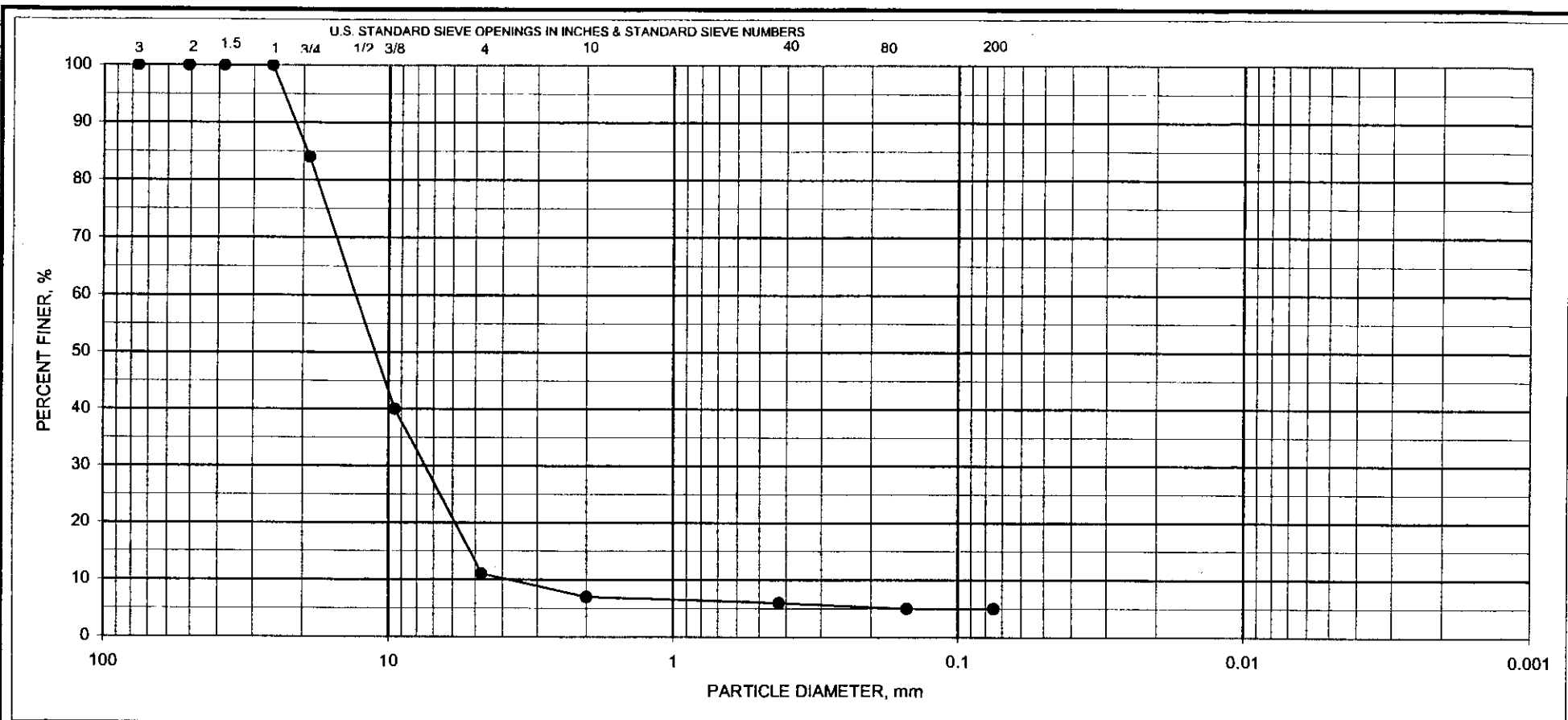
McDonald County, Missouri

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

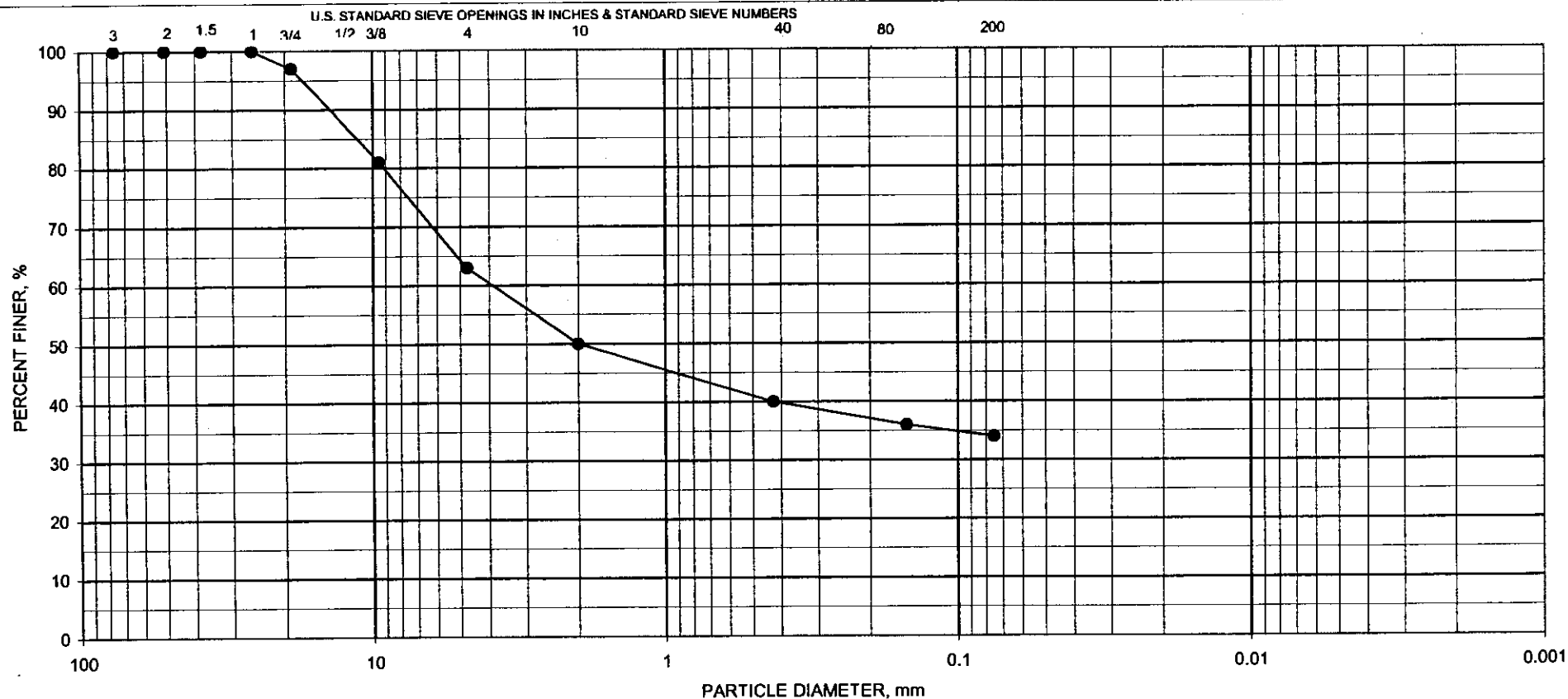
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

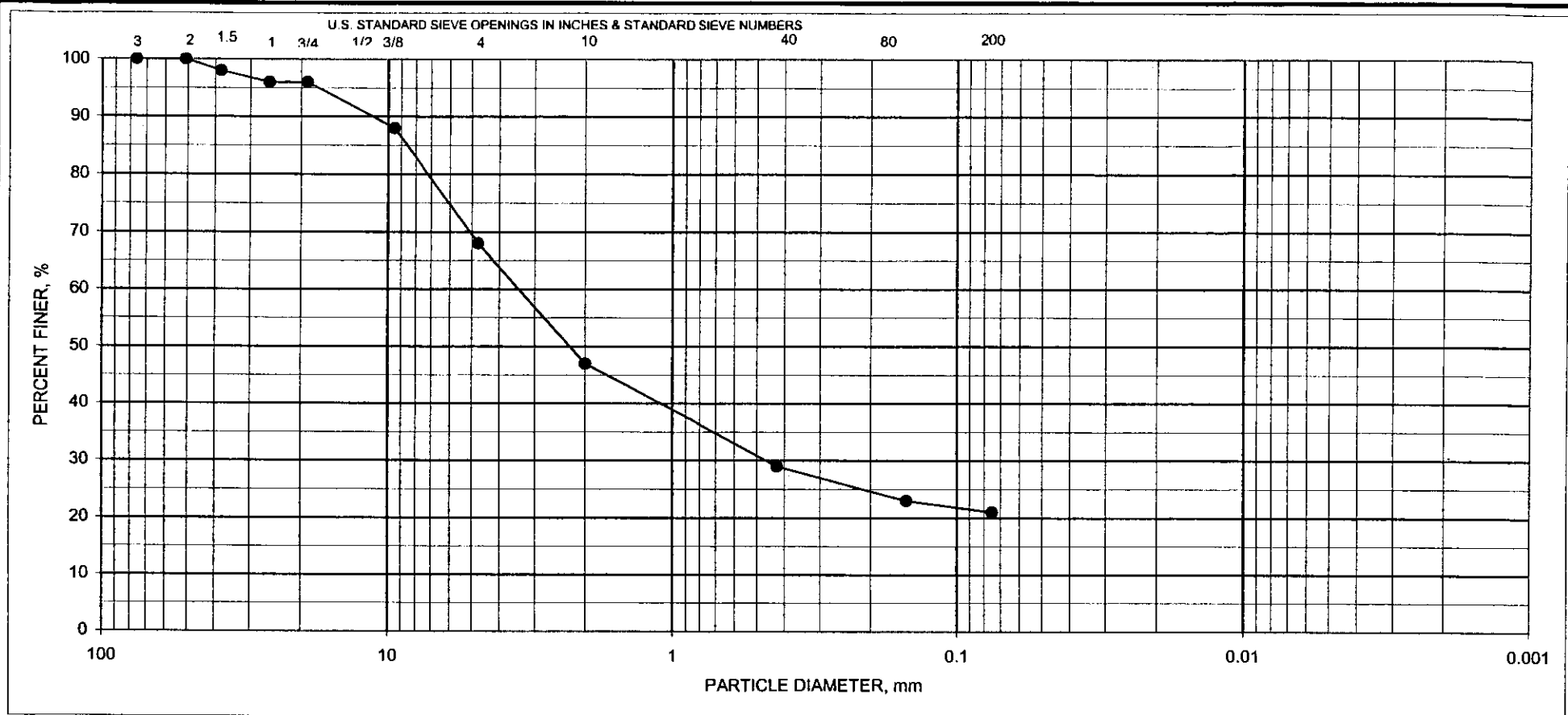
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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-189	Bulk	2 to 22.8 feet	Silty Sand with Gravel	SM	3.6	20	17	3

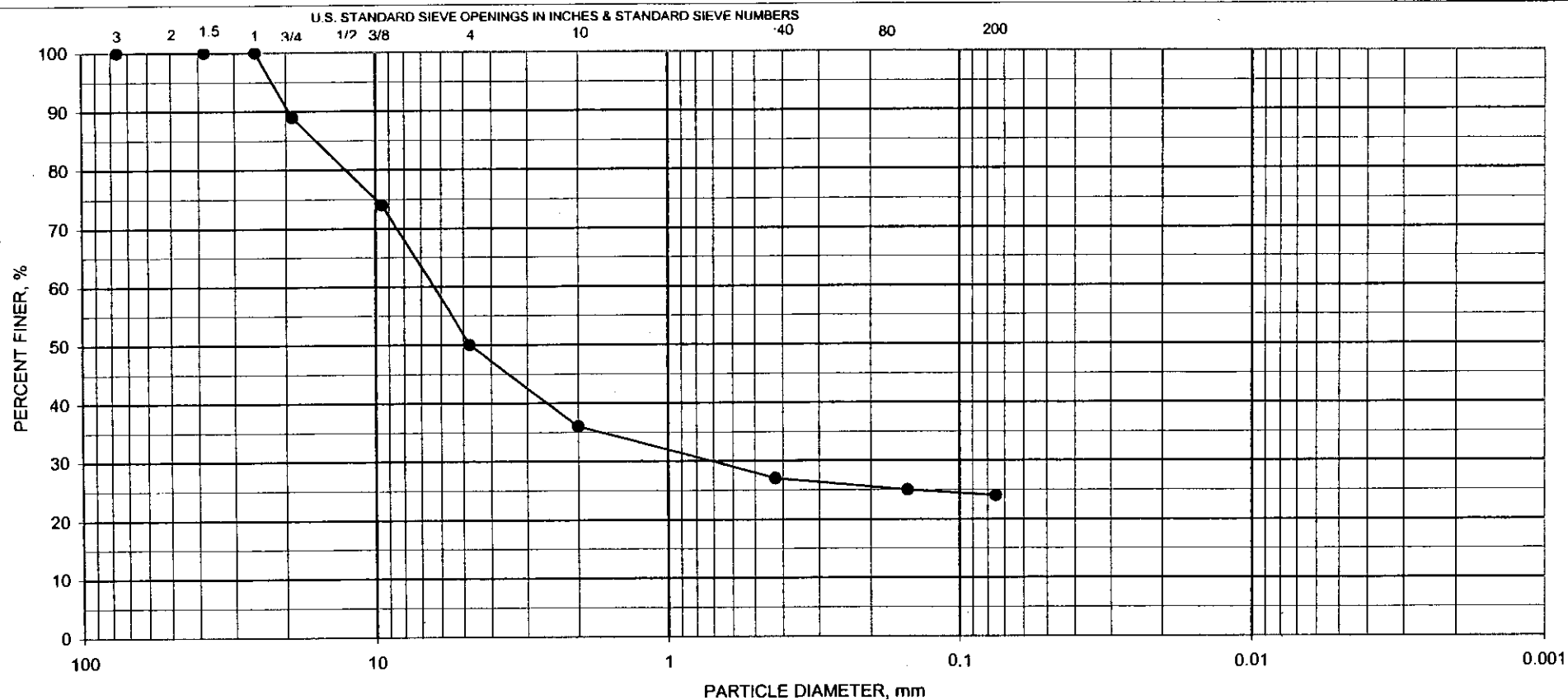
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

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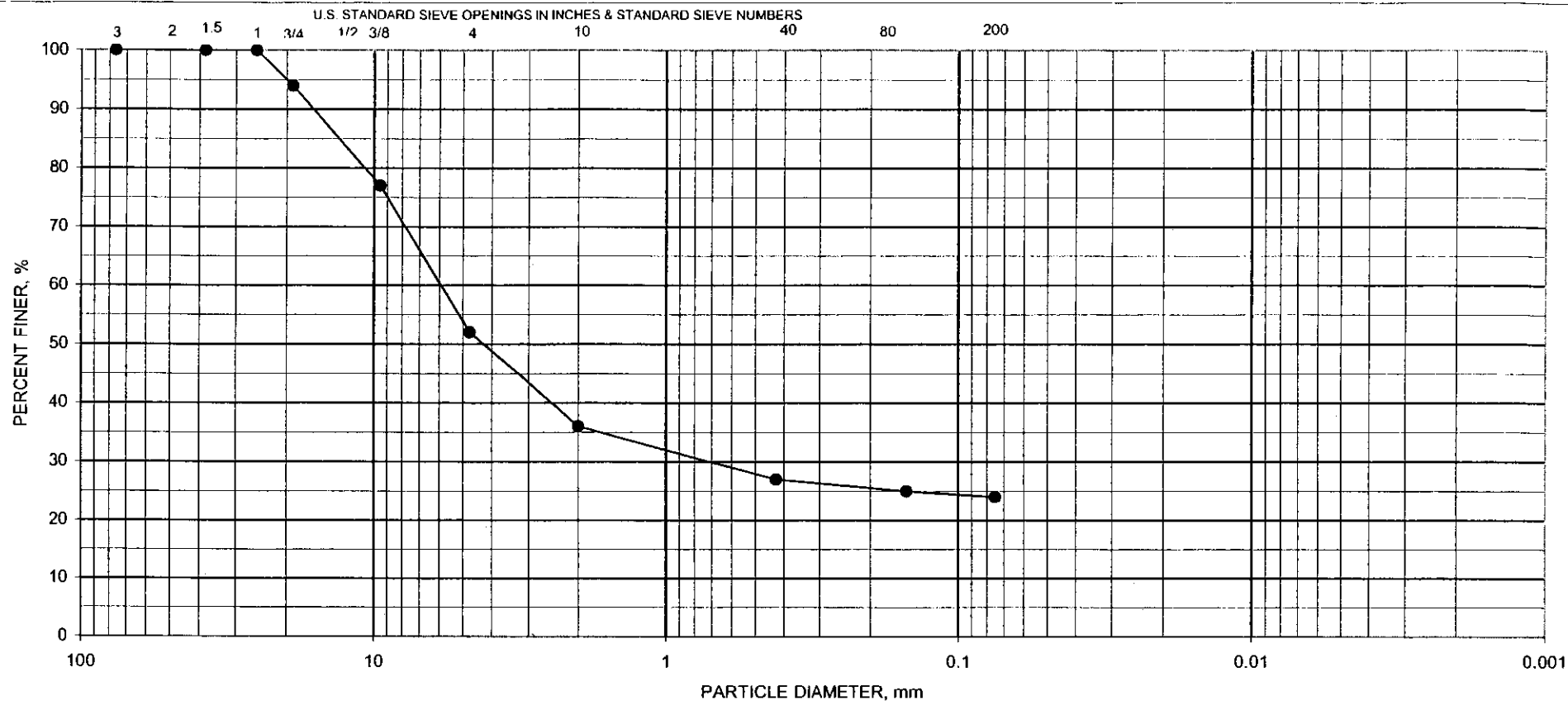
McDonald County, Missouri

JOB NO. 39025019M

DATE November 2003

**Terracon**

183



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

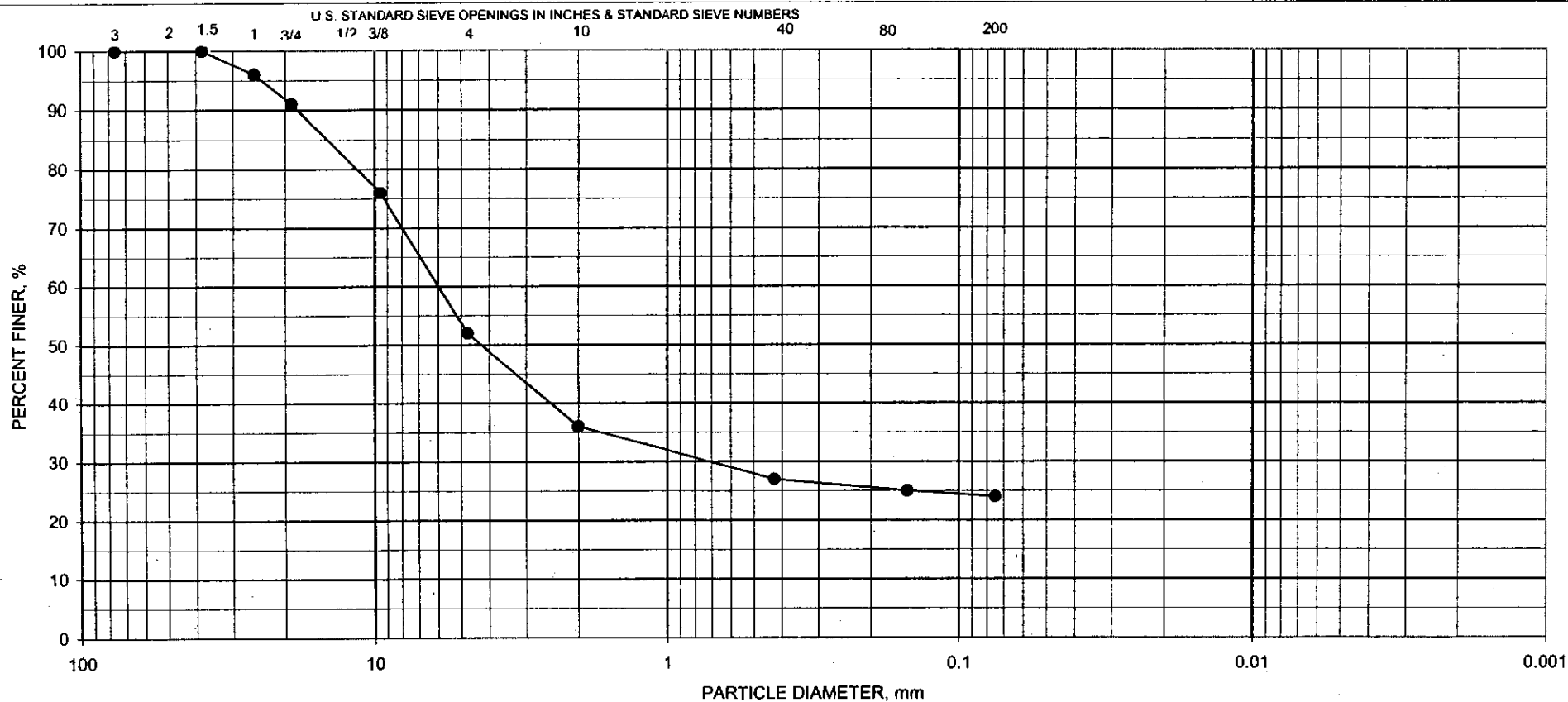
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

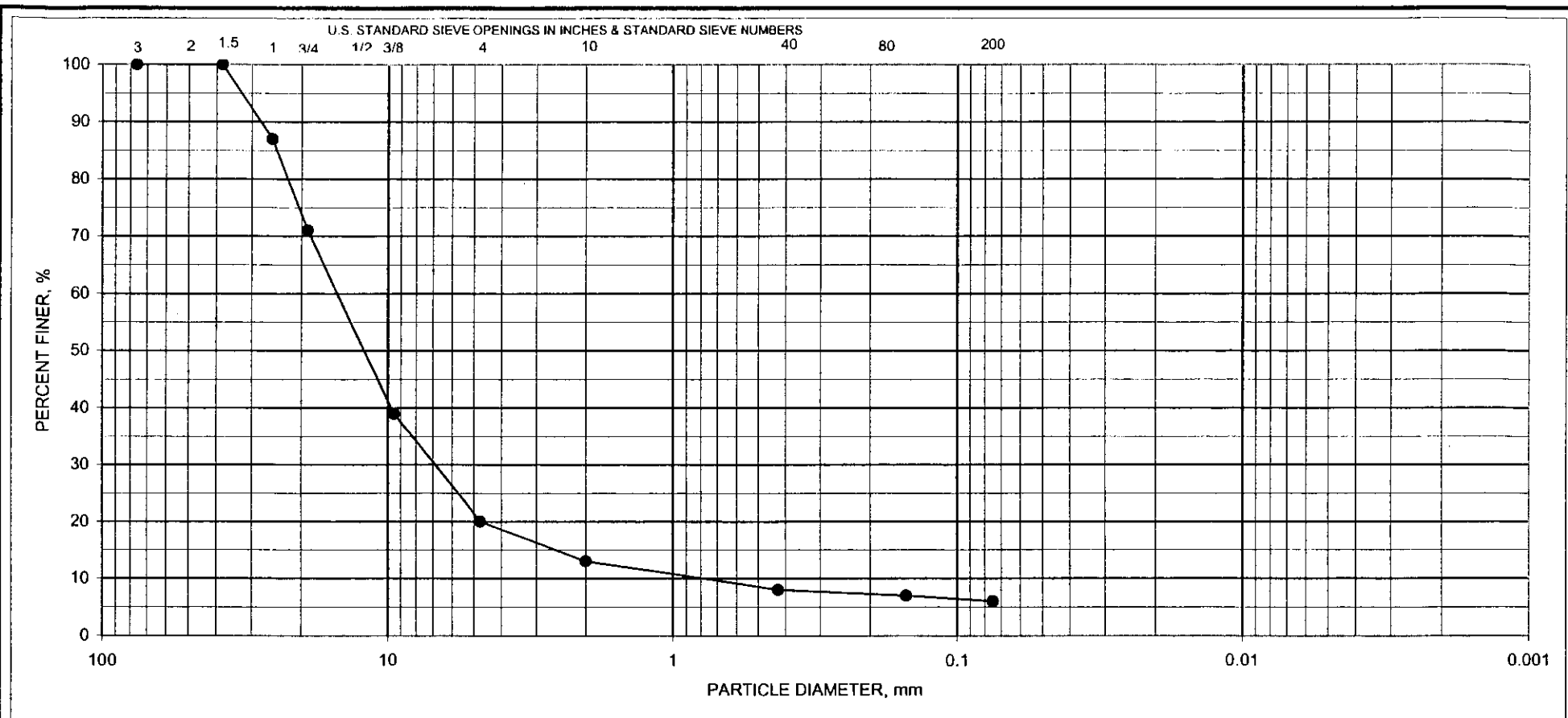
McDonald County, Missouri

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

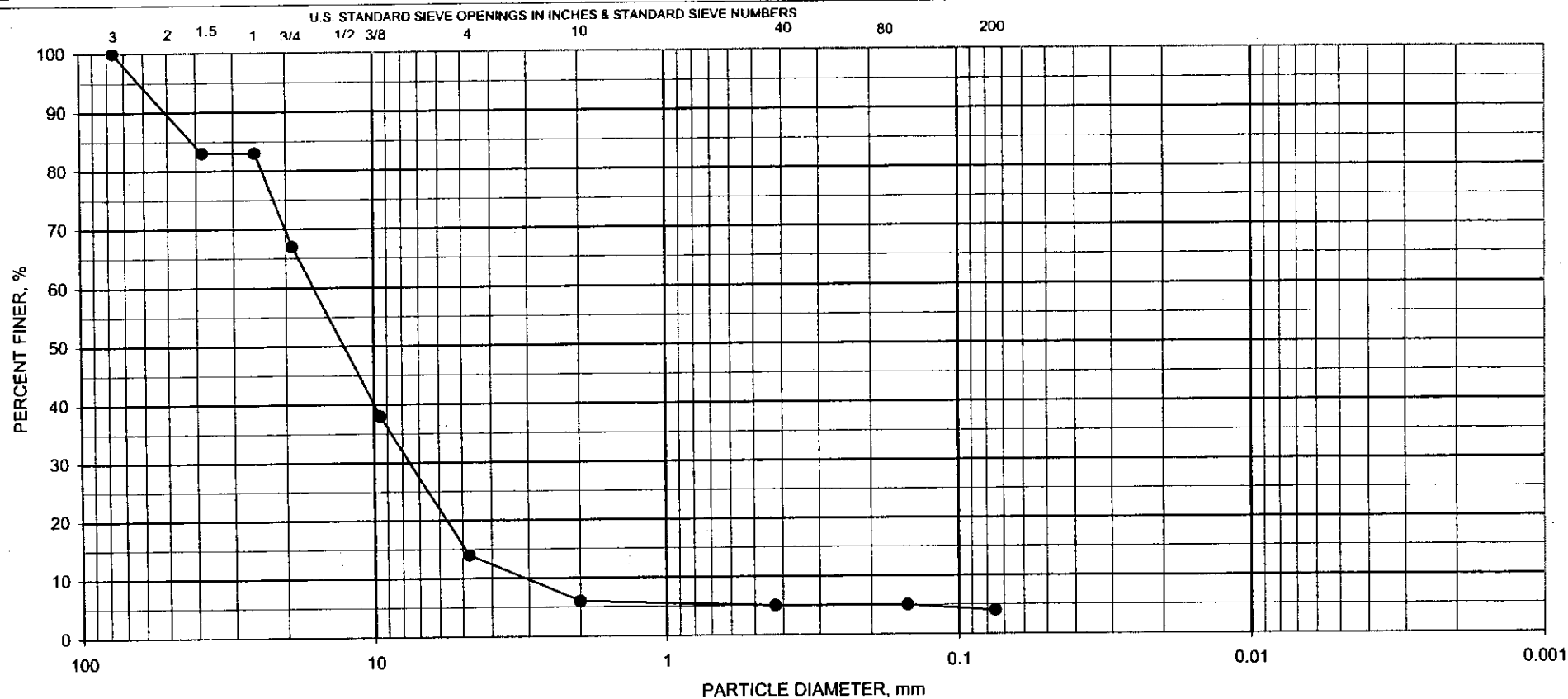
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

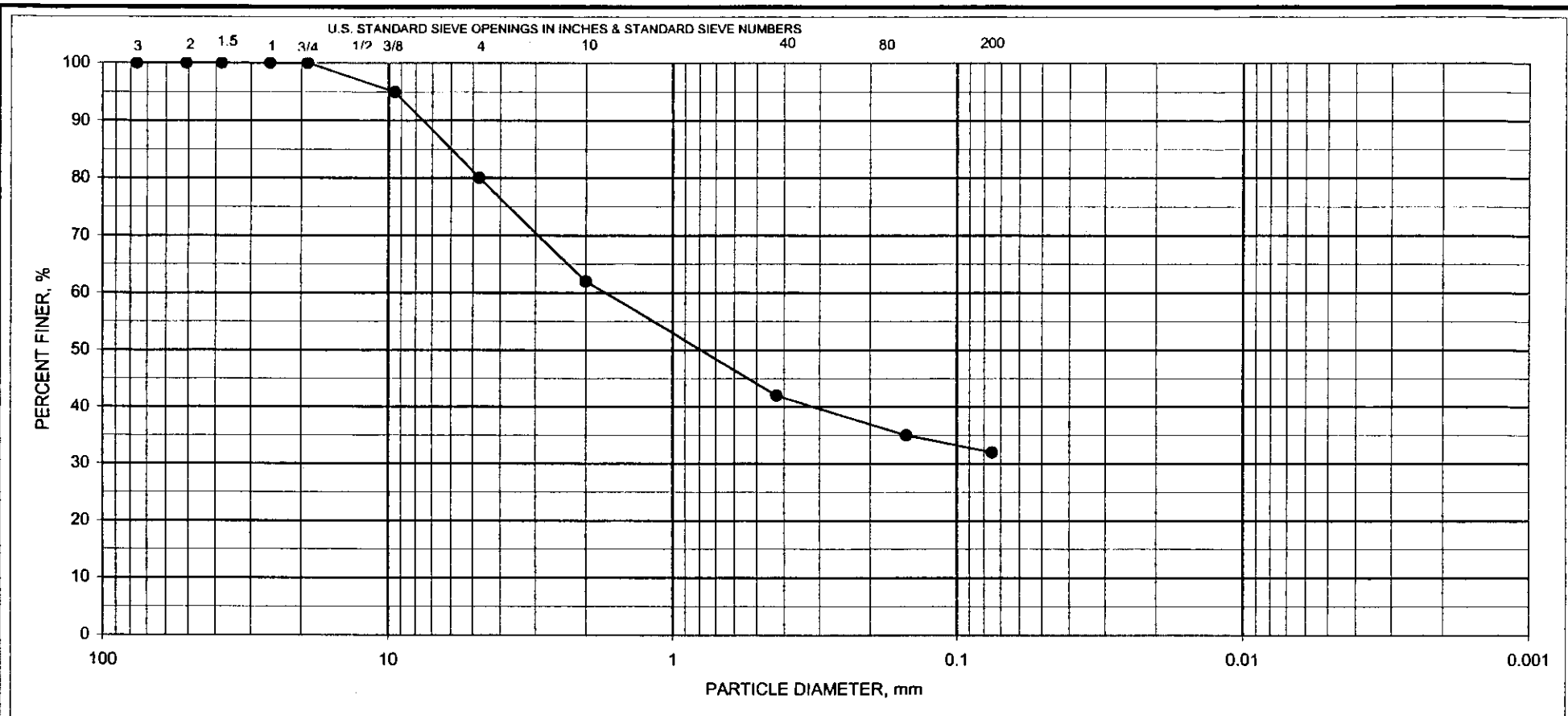
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

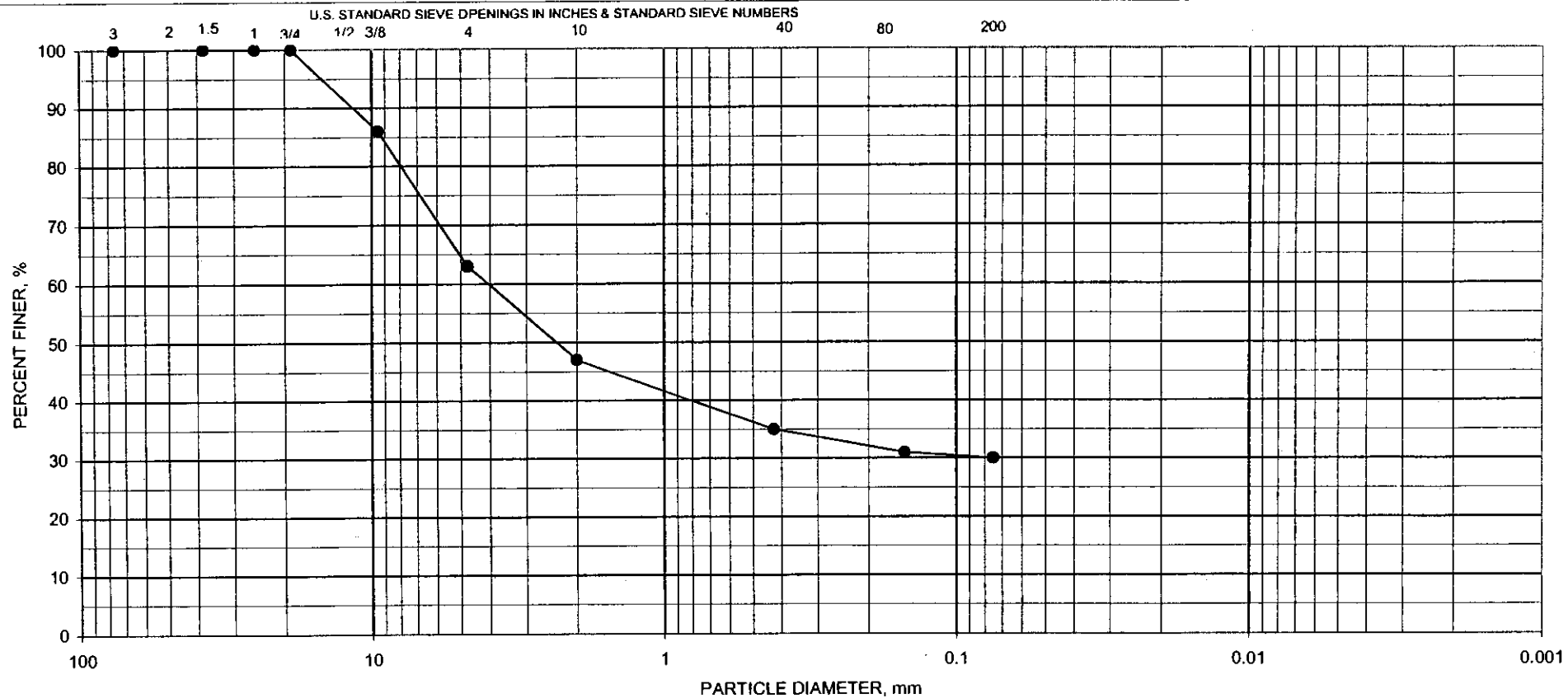
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

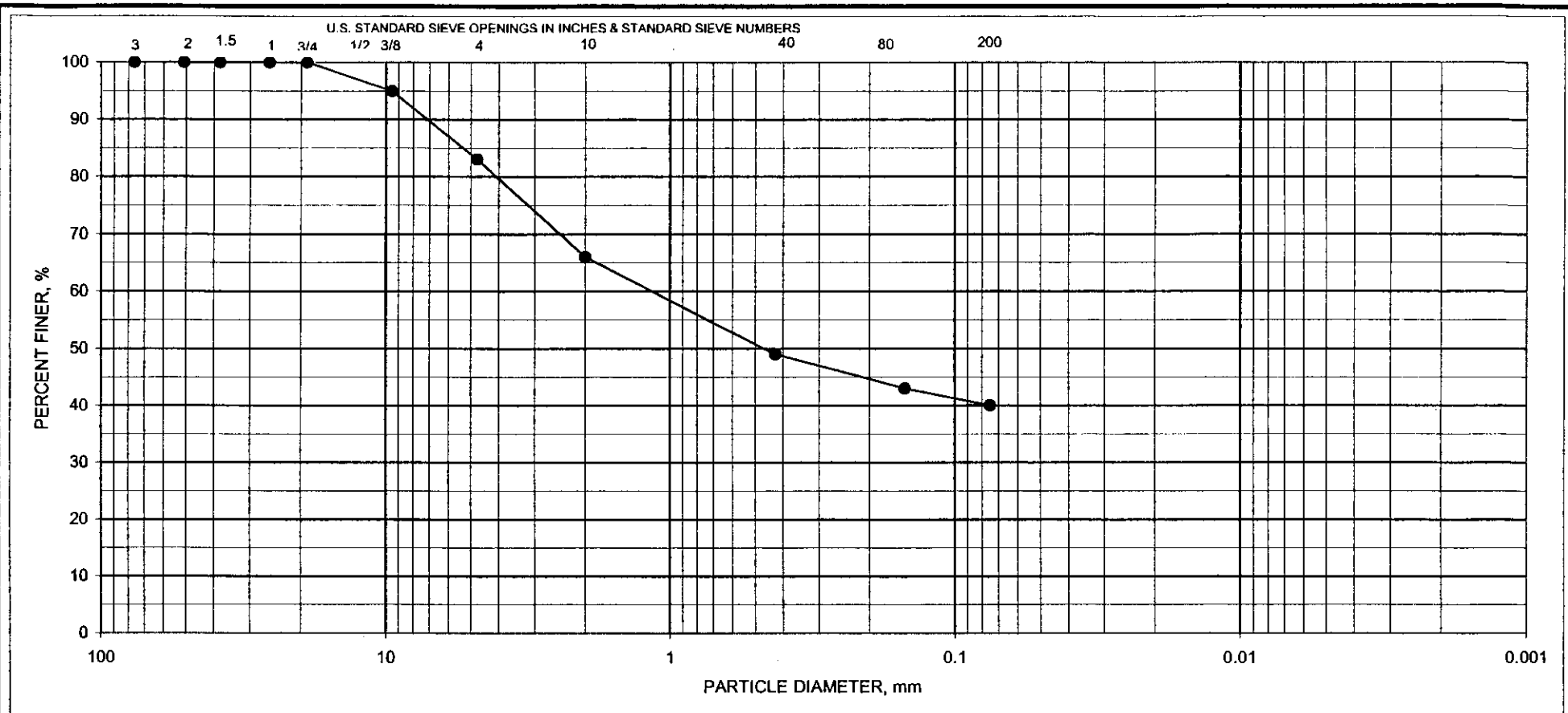
McDonald County, Missouri

JOB NO. 39025019M

DATE November 2003

**Terracon**

387



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

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

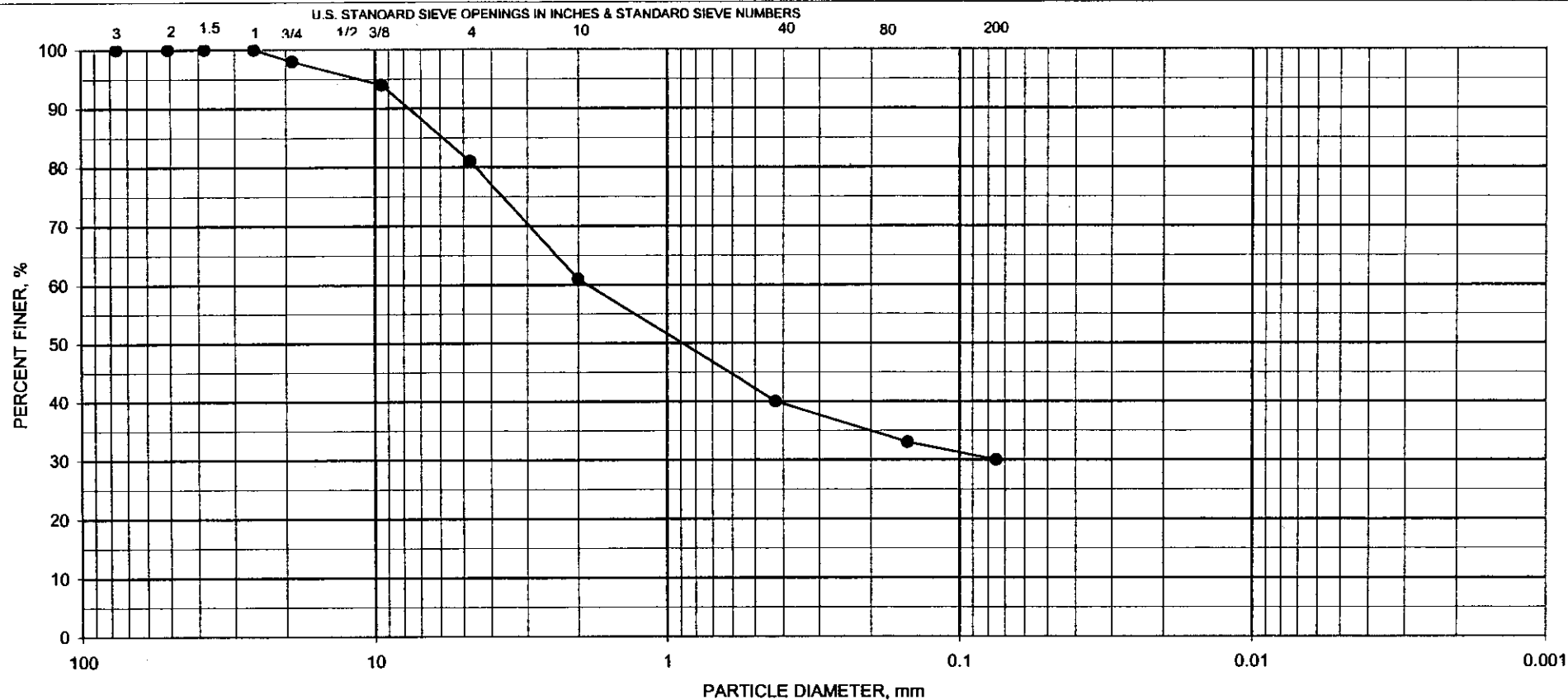
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

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McDonald County, Missouri

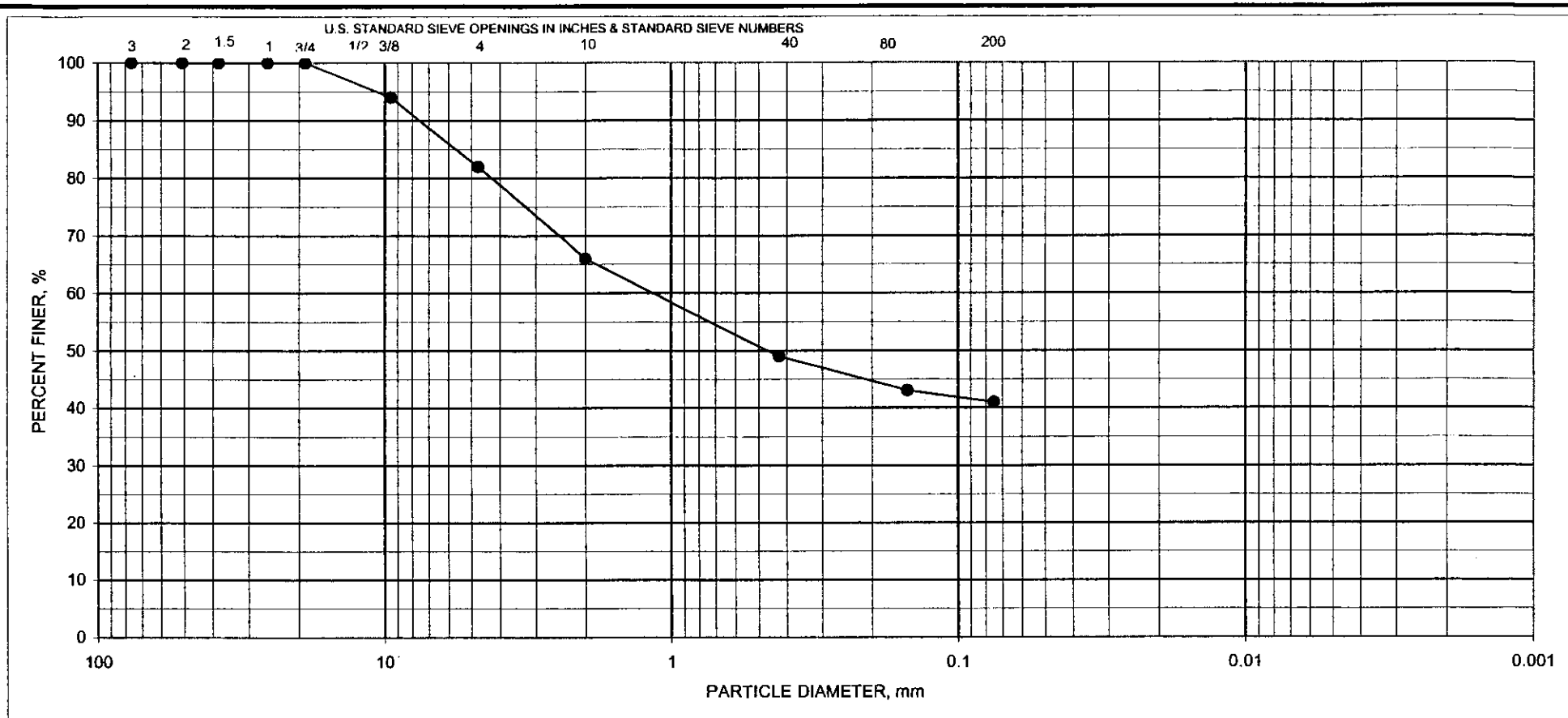
JOB NO. 39025019M

DATE April 2003

**Terracon**

685





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

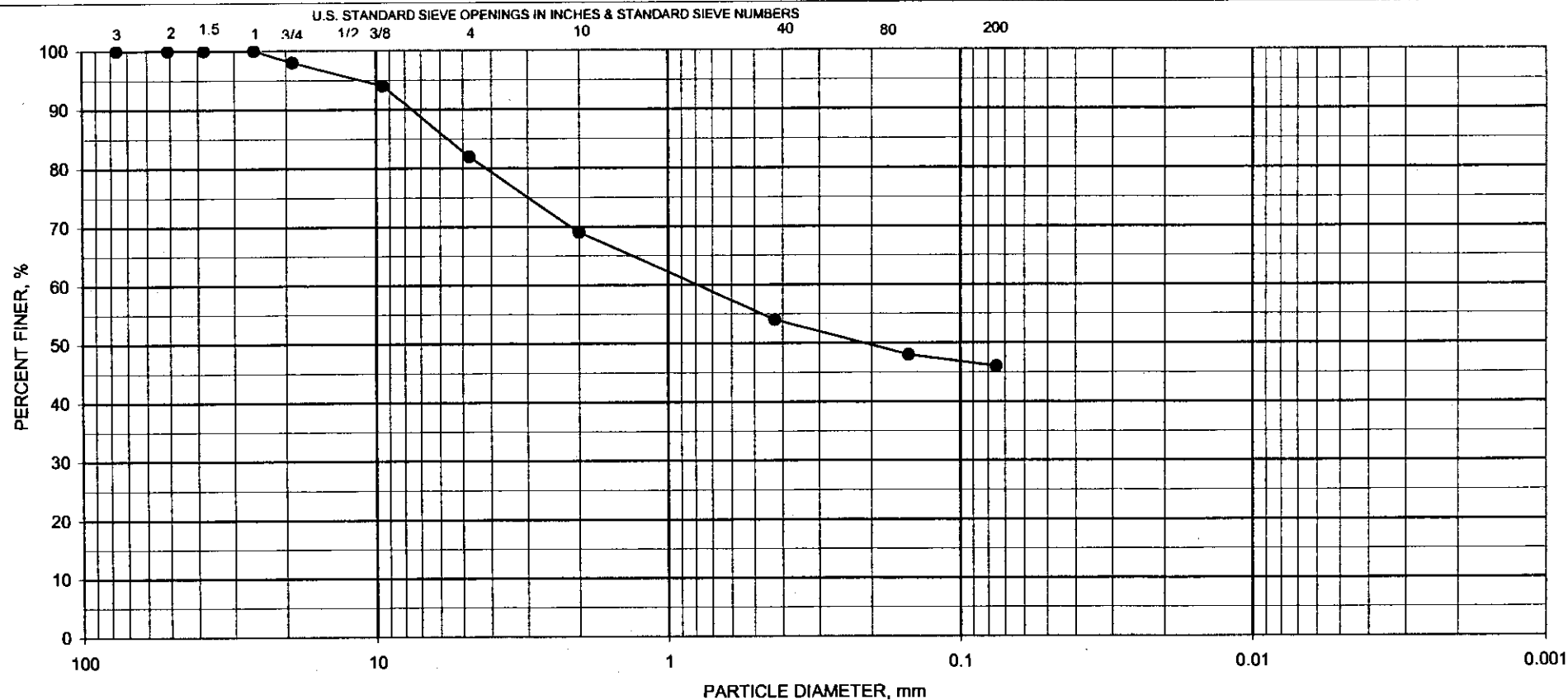
PROJECT I 49 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

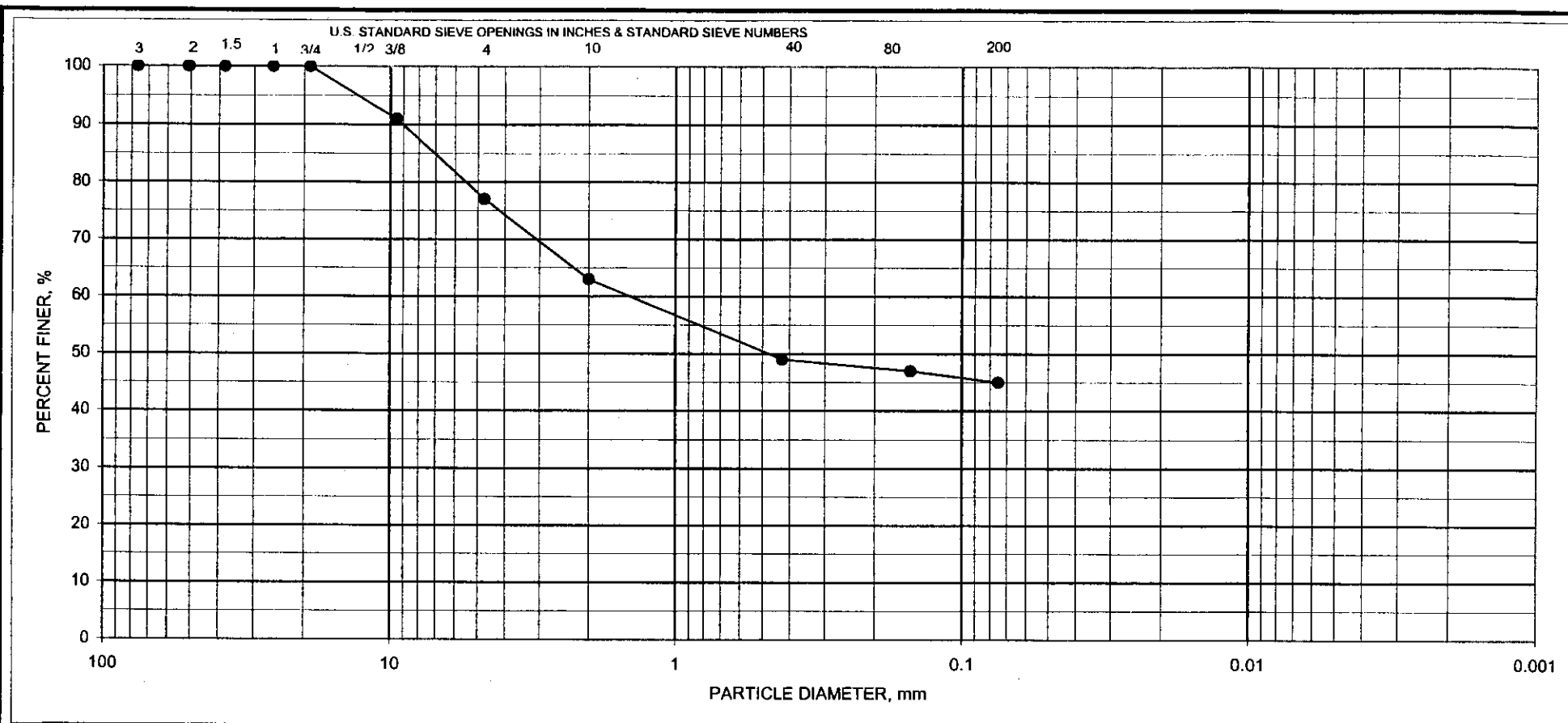
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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

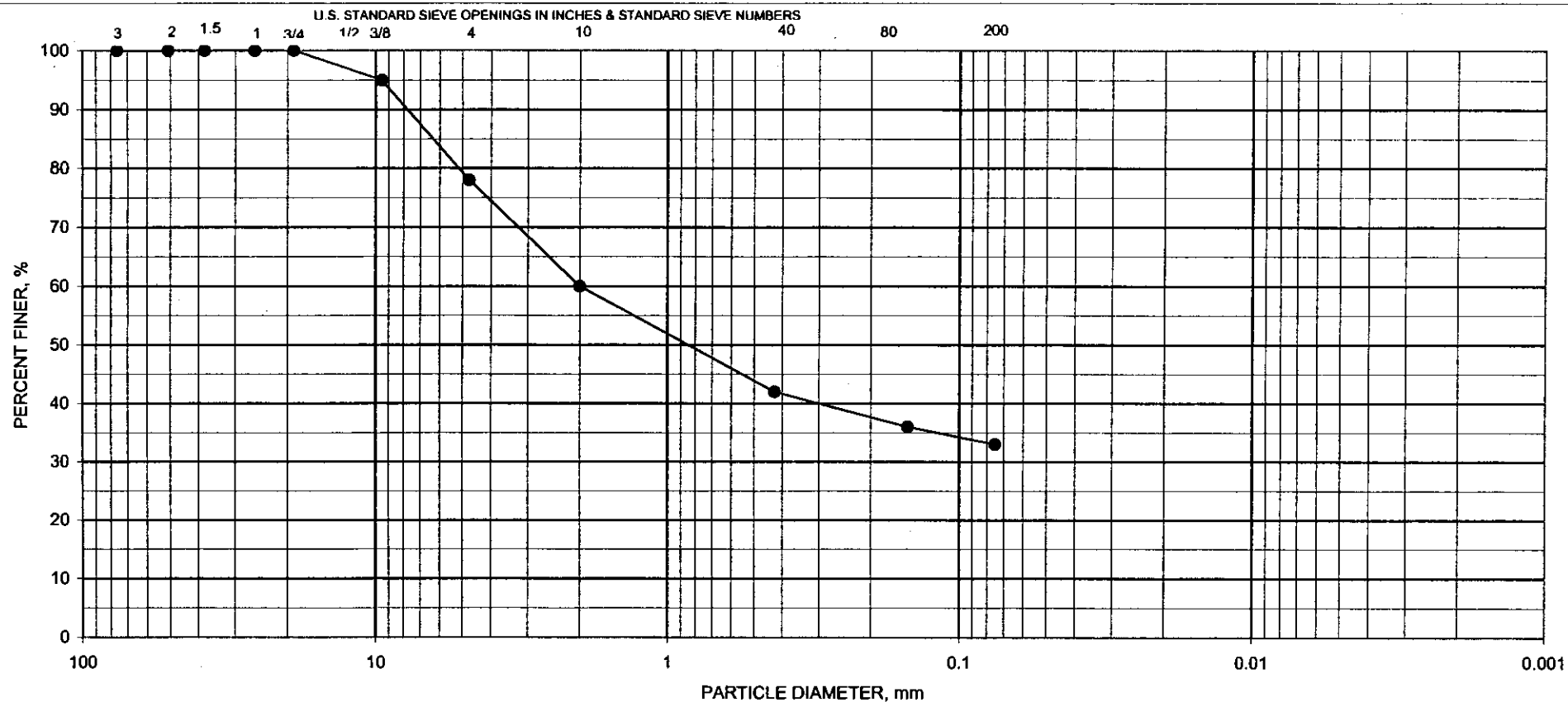
PROJECT 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

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 State Line

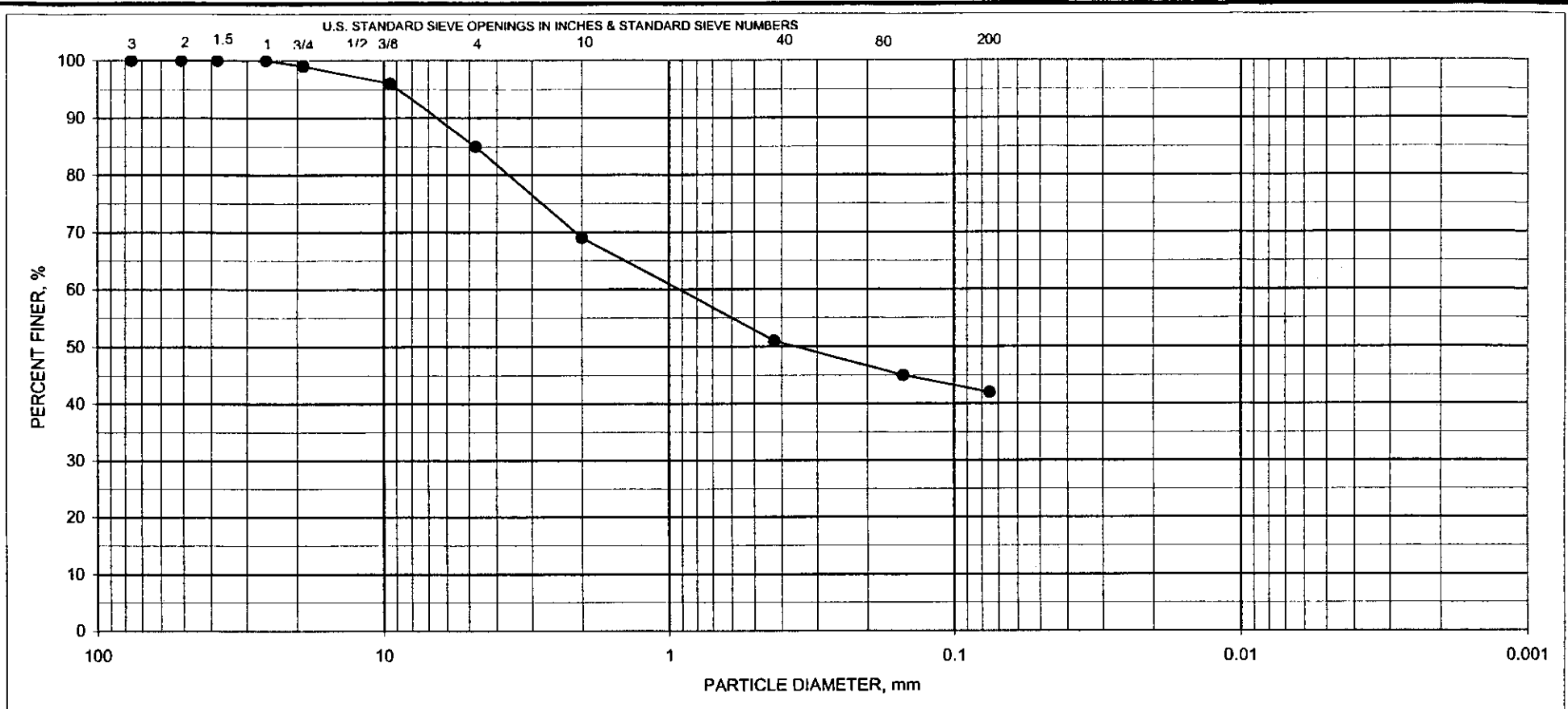
McDonald County, Missouri

JOB NO. 39025019M

DATE April 2003

**Terracon**

393



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

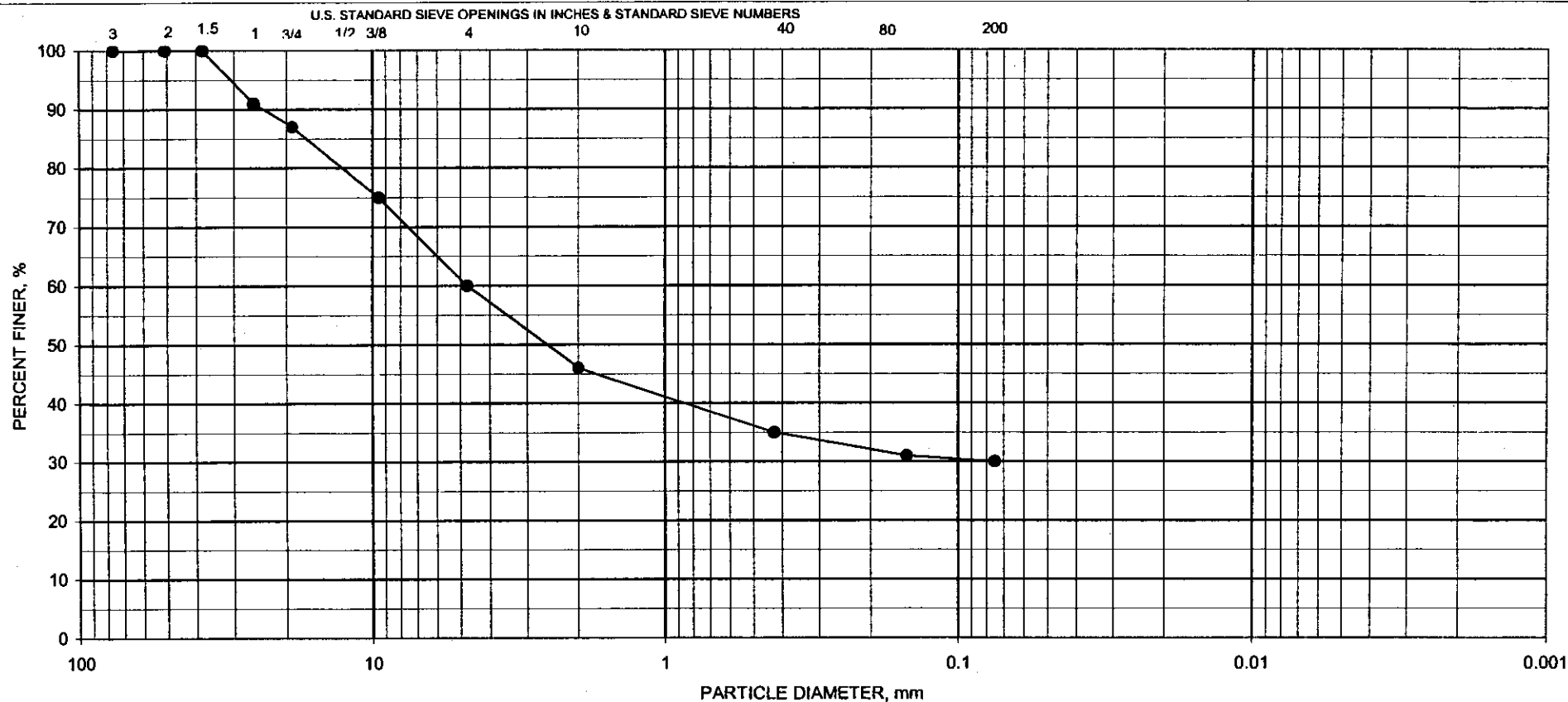
GRAIN SIZE DISTRIBUTION CURVE

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





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 149 - Missouri Project Number J7P0601 - Pineville, Missouri to Arkansas State Line

McDonald County, Missouri

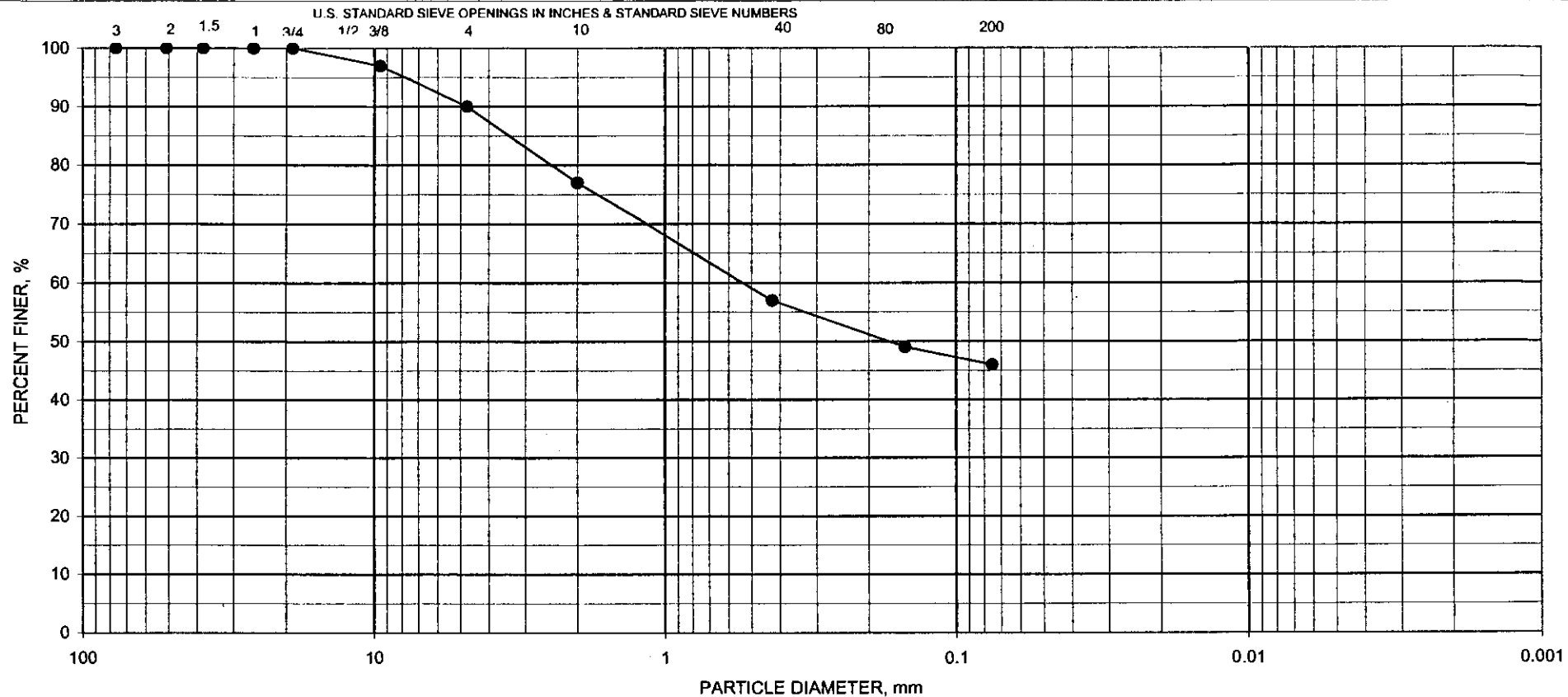
JOB NO. 39025019M

DATE April 2003

**Terracon**

595





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

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McDonald County, Missouri

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DATE April 2003

**Terracon**

### 10.3 Standard Compaction Results

## 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

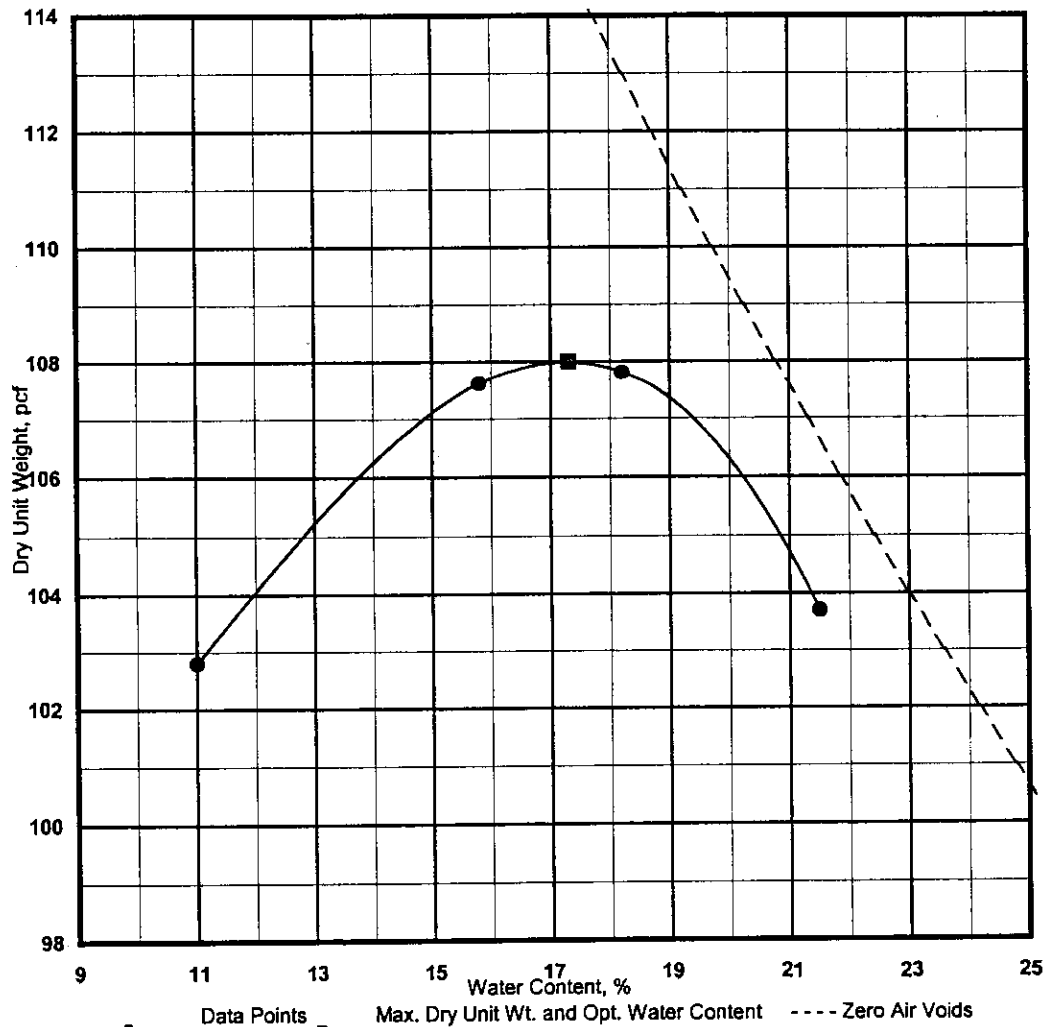
## TEST RESULTS

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

Zero air voids for specific gravity of 2.70



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-33 0 to 5.5 feet  
Sample Description: \_\_\_\_\_

### TEST RESULTS

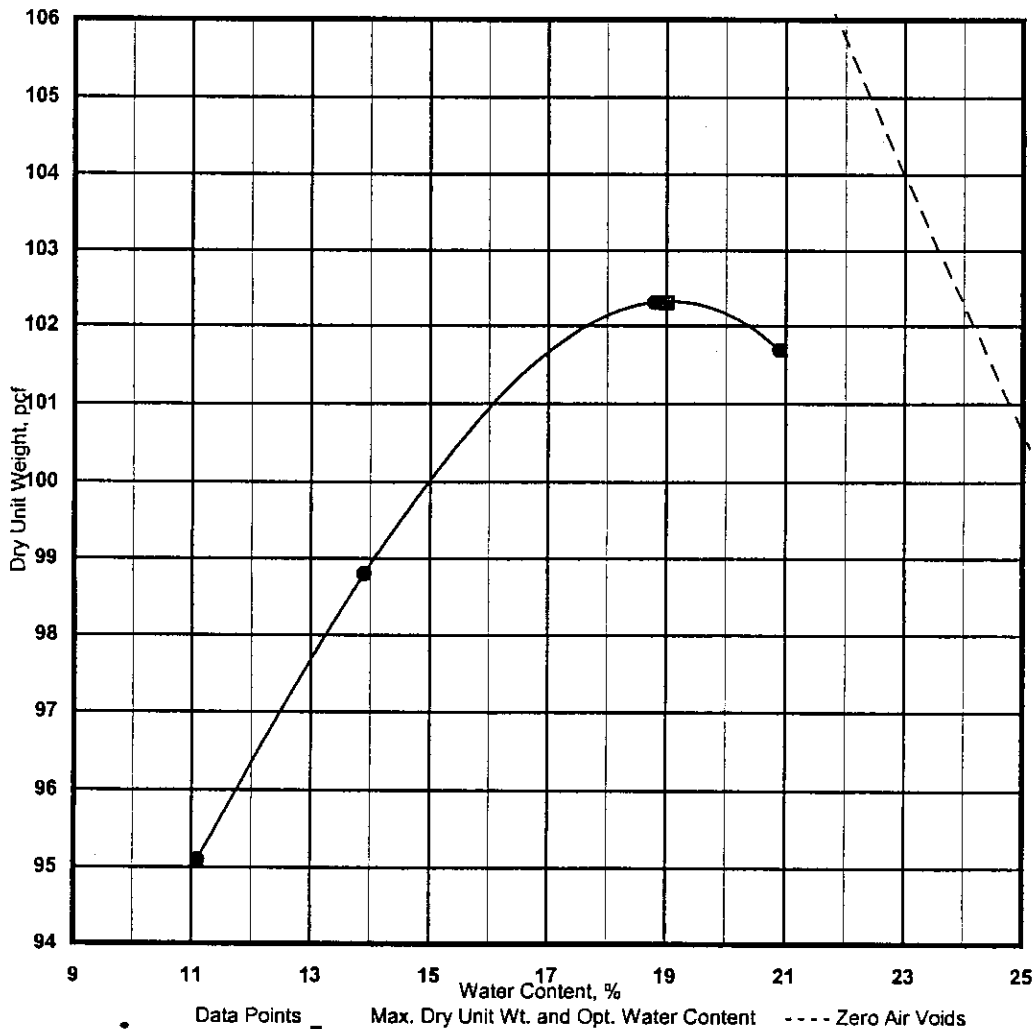
Maximum Dry Unit Wt.: 102.3 pcf  
Optimum Water Content: 19.0 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

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



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-39 2 to 35 feet  
Sample Description: \_\_\_\_\_

### TEST RESULTS

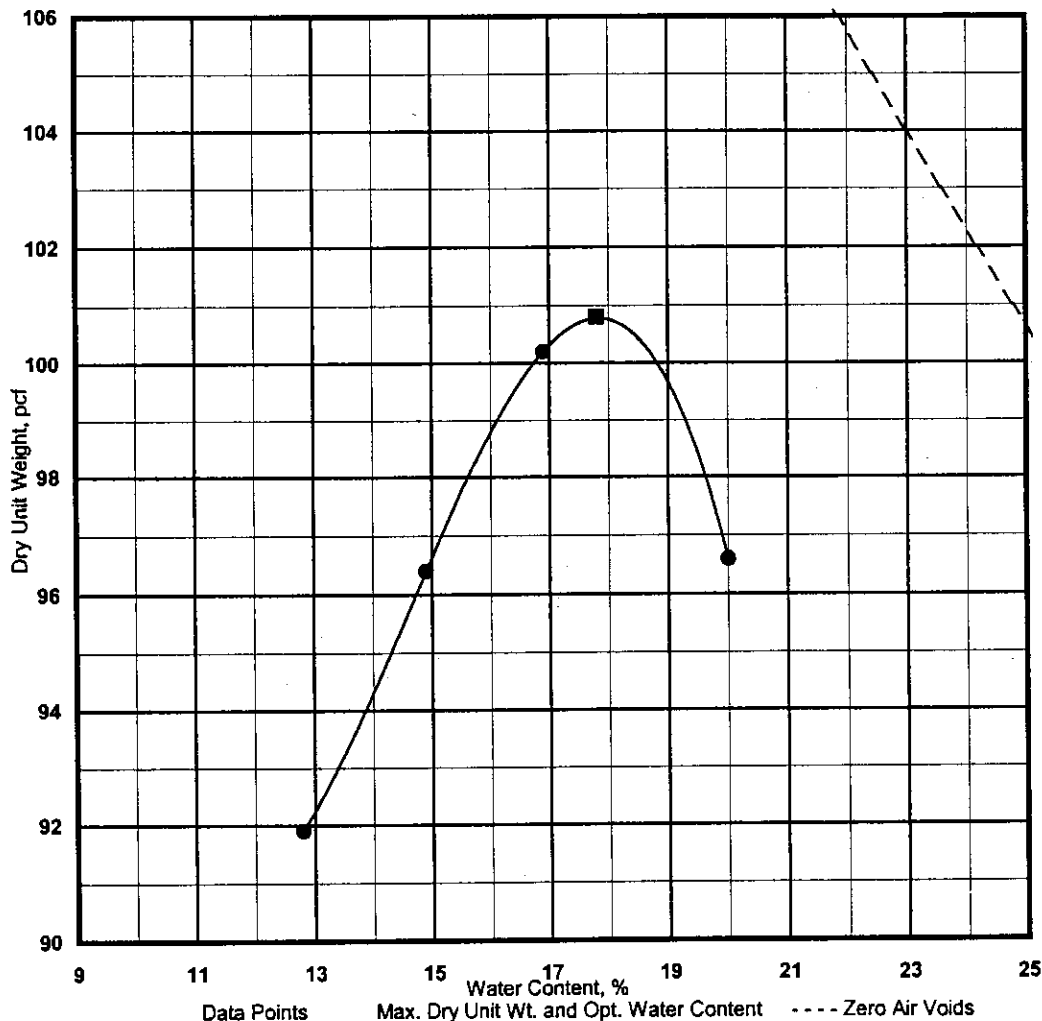
Maximum Dry Unit Wt.: 100.8 pcf  
Optimum Water Content: 17.8 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

Liquid Limit: 30 Plastic Limit: 20  
Plasticity Index: 10  
% passing # 200 sieve: 38

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-88 3.0 to 20.0 feet  
Sample Description: \_\_\_\_\_

## TEST RESULTS

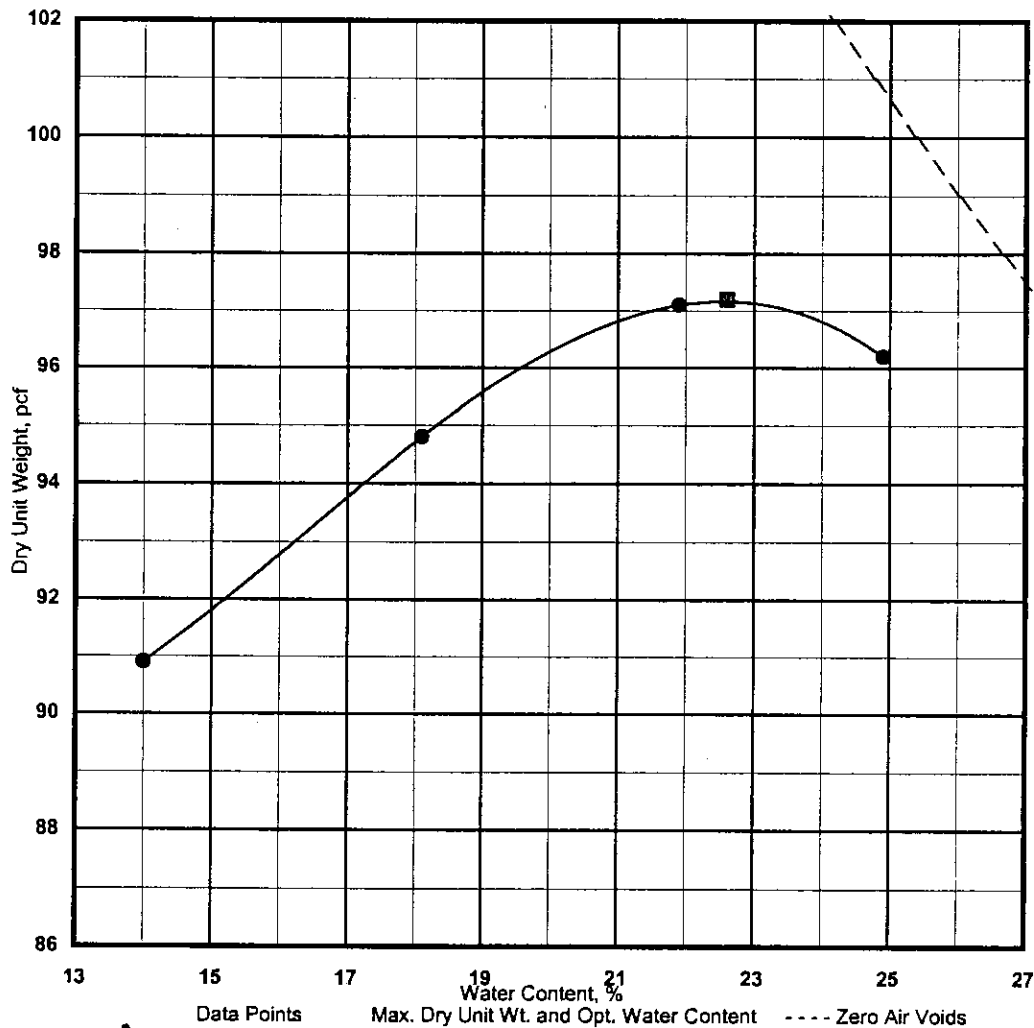
Maximum Dry Unit Wt.: 97.2 pcf  
Optimum Water Content: 22.6 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

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





## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-125 1 to 25 feet  
Sample Description: \_\_\_\_\_

### TEST RESULTS

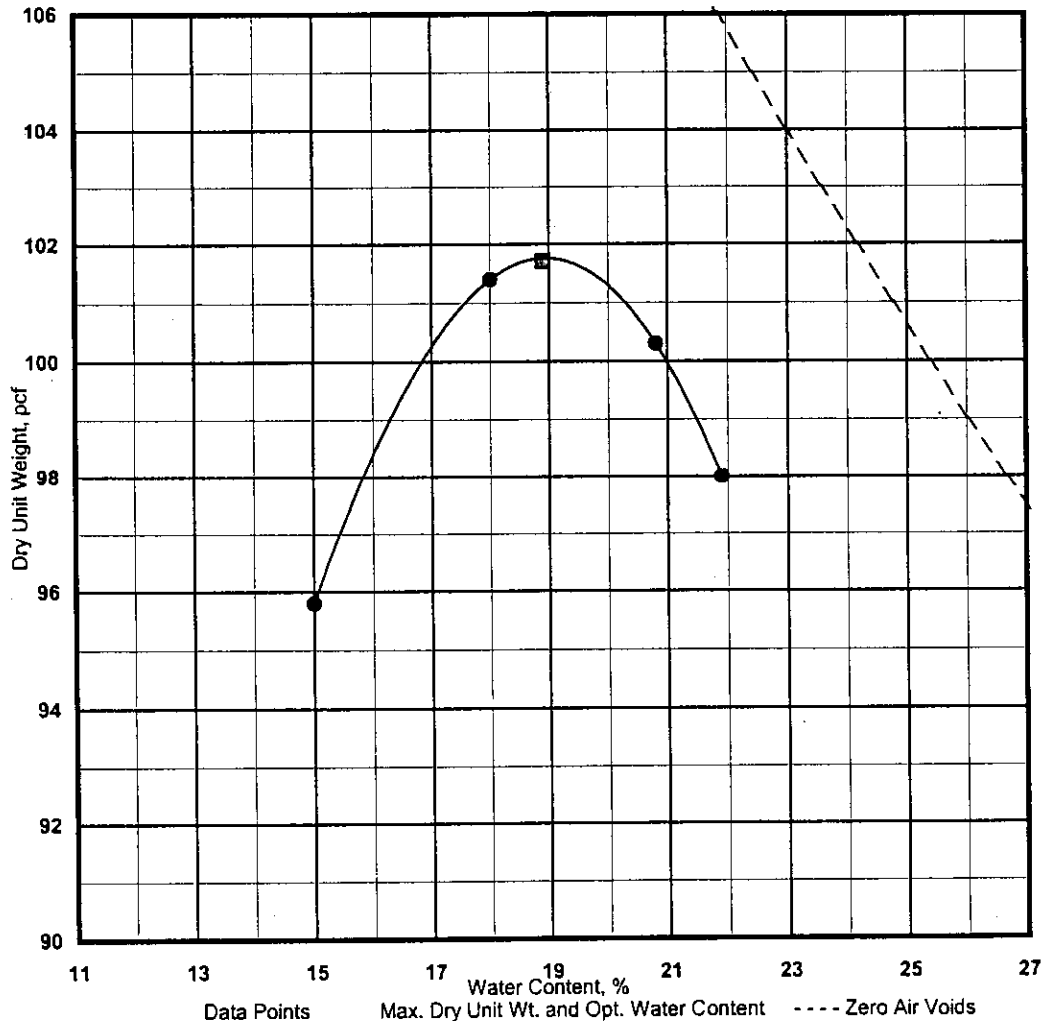
Maximum Dry Unit Wt.: 101.7 pcf  
Optimum Water Content: 18.9 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

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



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-153 4 to 30 feet  
Sample Description: \_\_\_\_\_

## TEST RESULTS

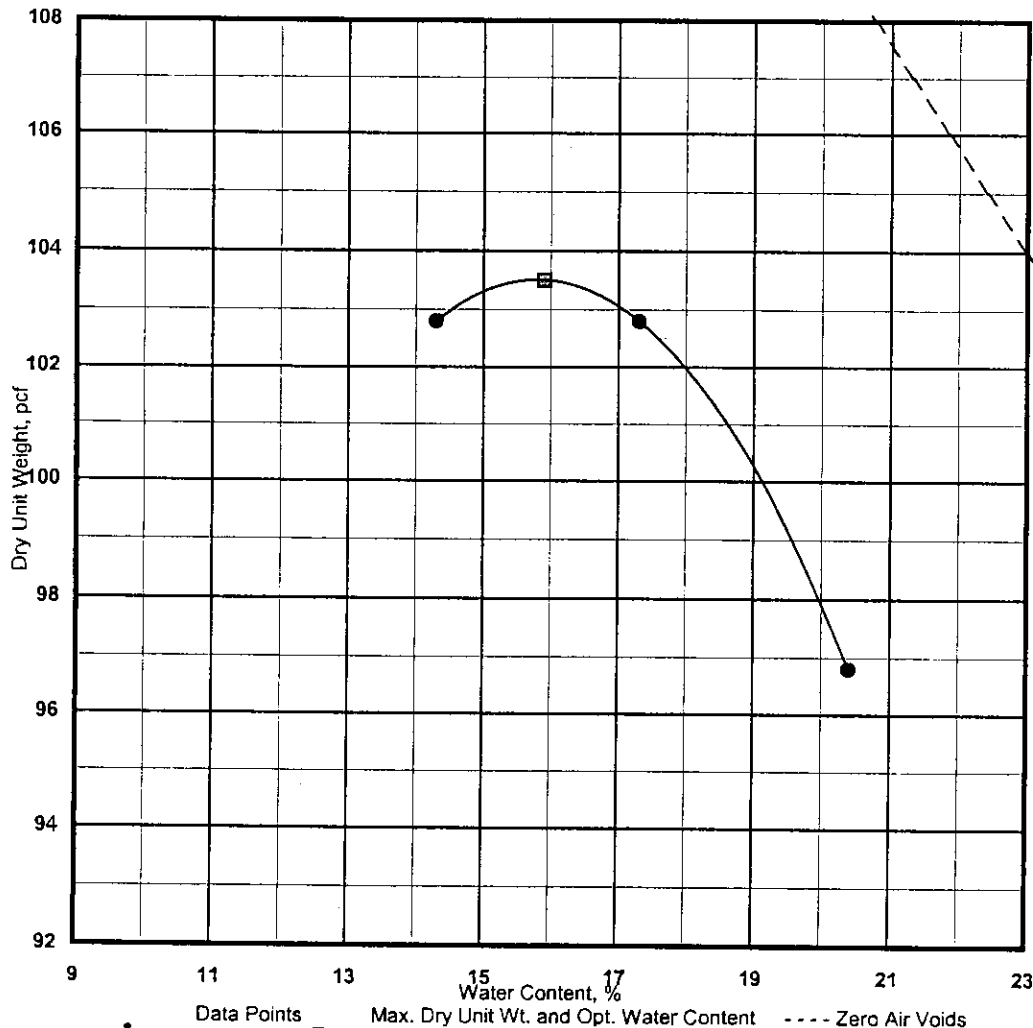
Maximum Dry Unit Wt.: 103.5 pcf  
Optimum Water Content: 15.9 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

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



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-164 1.0 to 32.0 feet  
Sample Description: \_\_\_\_\_

## TEST RESULTS

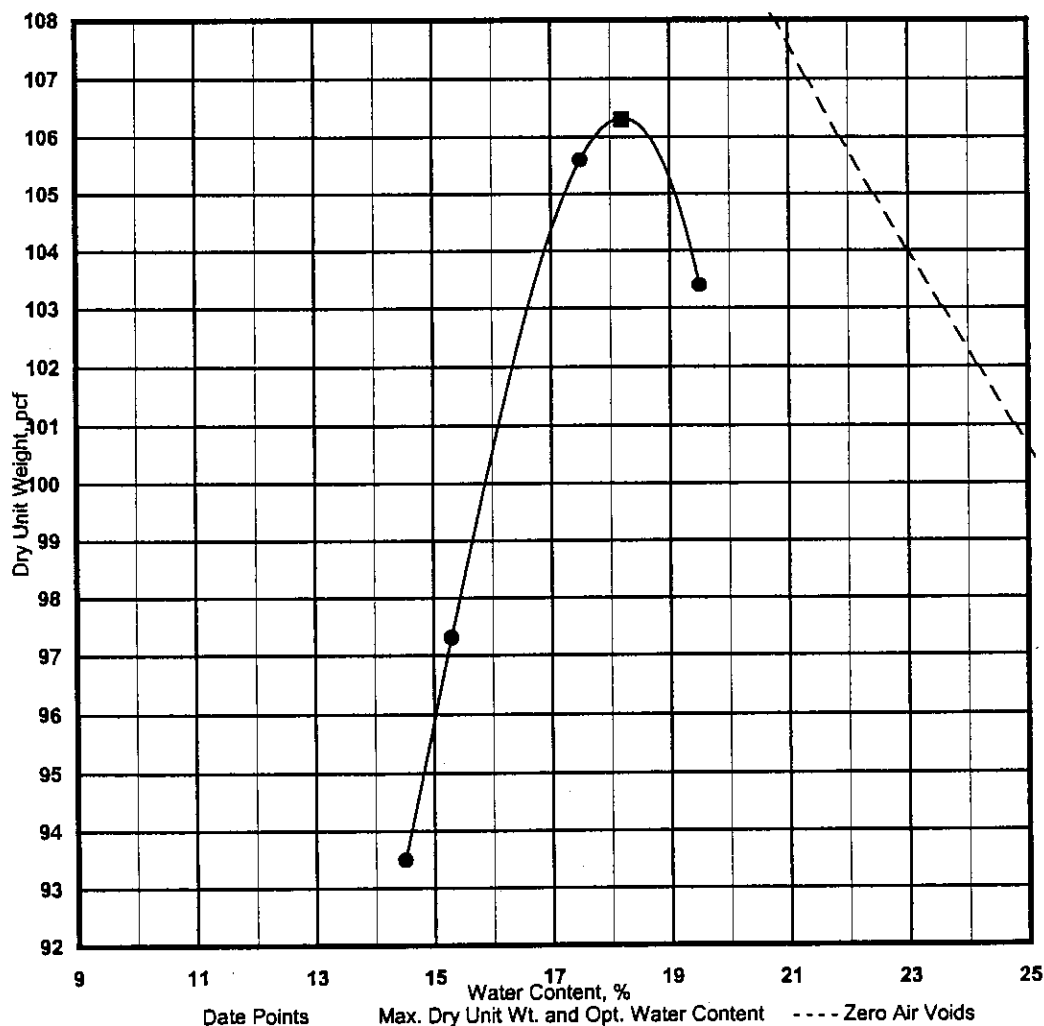
Maximum Dry Unit Wt.: 106.3 pcf  
Optimum Water Content: 18.2 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical ☒ Manual

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



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-177 0 to 13.0 feet  
Sample Description: \_\_\_\_\_

## TEST RESULTS

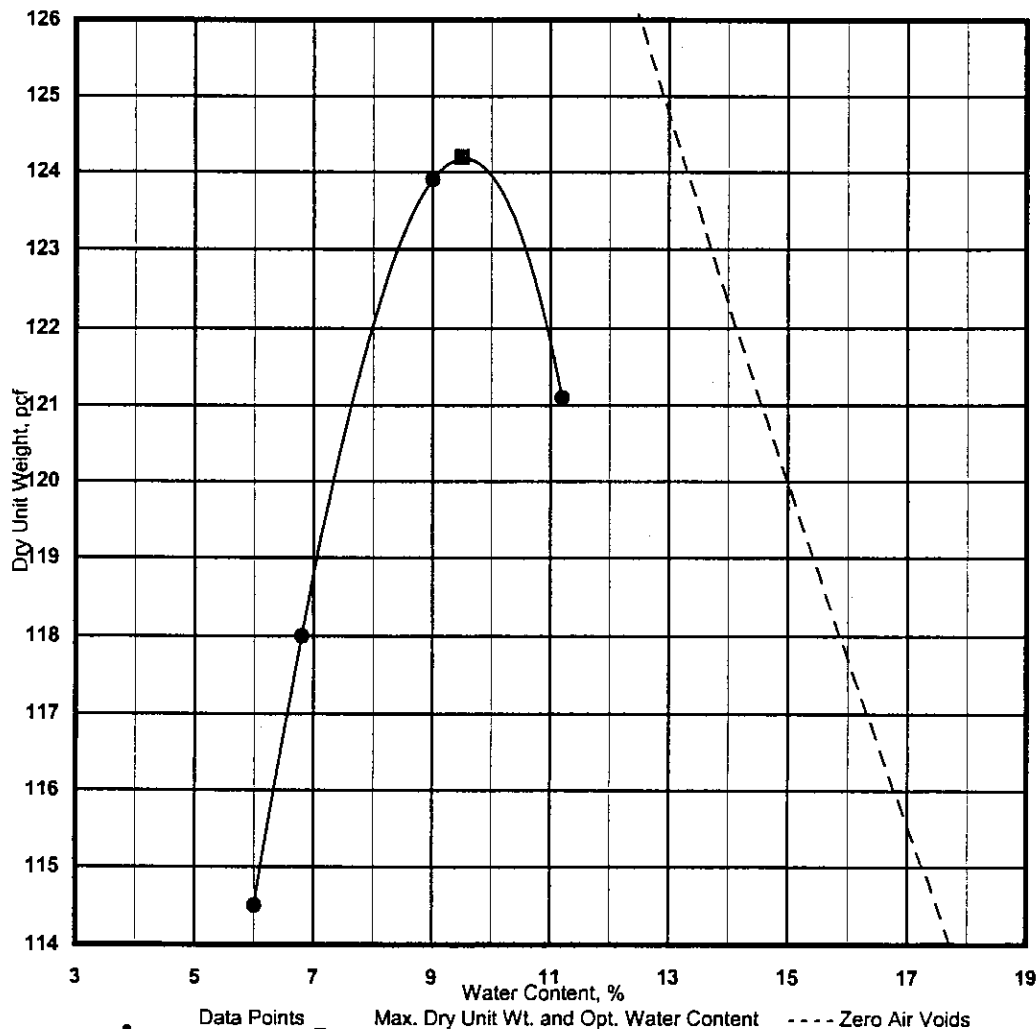
Maximum Dry Unit Wt.: 124.2 pcf  
Optimum Water Content: 9.5 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: AASHTO T99  
Rammer: \_\_\_\_\_ Mechanical X Manual

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



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-204 0.5 to 21.5 feet  
Sample Description: \_\_\_\_\_

## TEST RESULTS

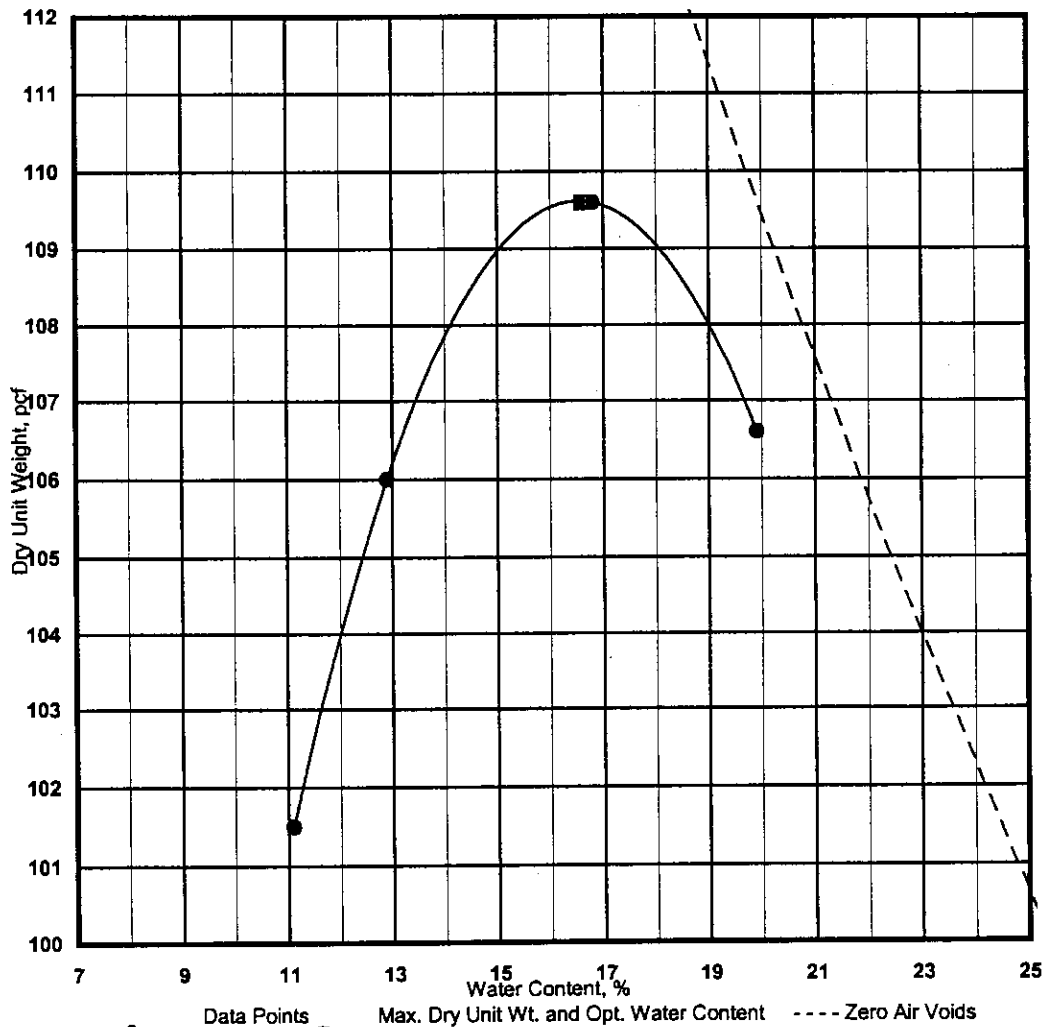
Maximum Dry Unit Wt.: 109.6 pcf  
Optimum Water Content: 16.6 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method A  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

Liquid Limit: 24 Plastic Limit: 19  
Plasticity Index: 5  
% passing # 200 sieve: 32

Reviewed by: SPB

Zero air voids for specific gravity of 2.70



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-224 0 to 10.0 feet  
Sample Description: \_\_\_\_\_

### TEST RESULTS

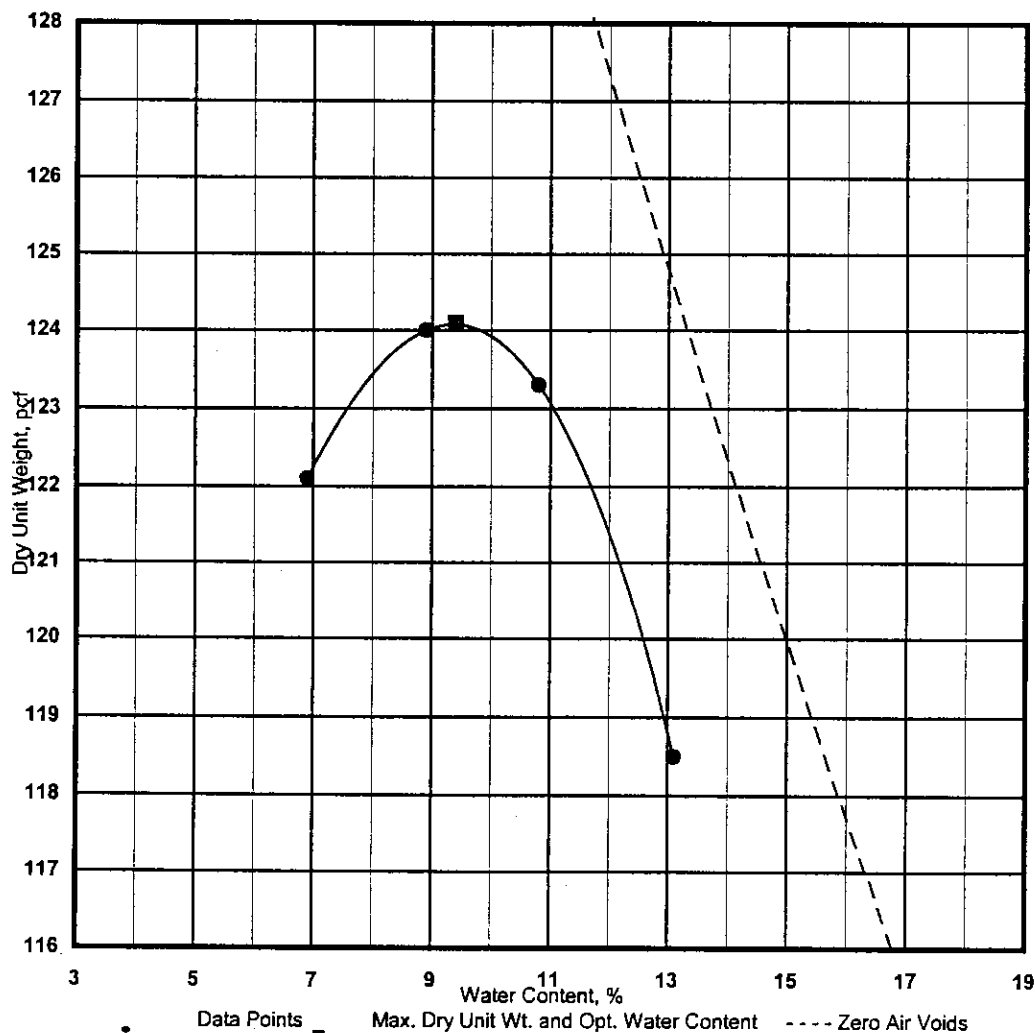
Maximum Dry Unit Wt.: 124.1 pcf  
Optimum Water Content: 9.4 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical \_\_\_\_\_ ☒ Manual

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





## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-227 0 to 20.0 feet  
Sample Description: \_\_\_\_\_

**TEST RESULTS**

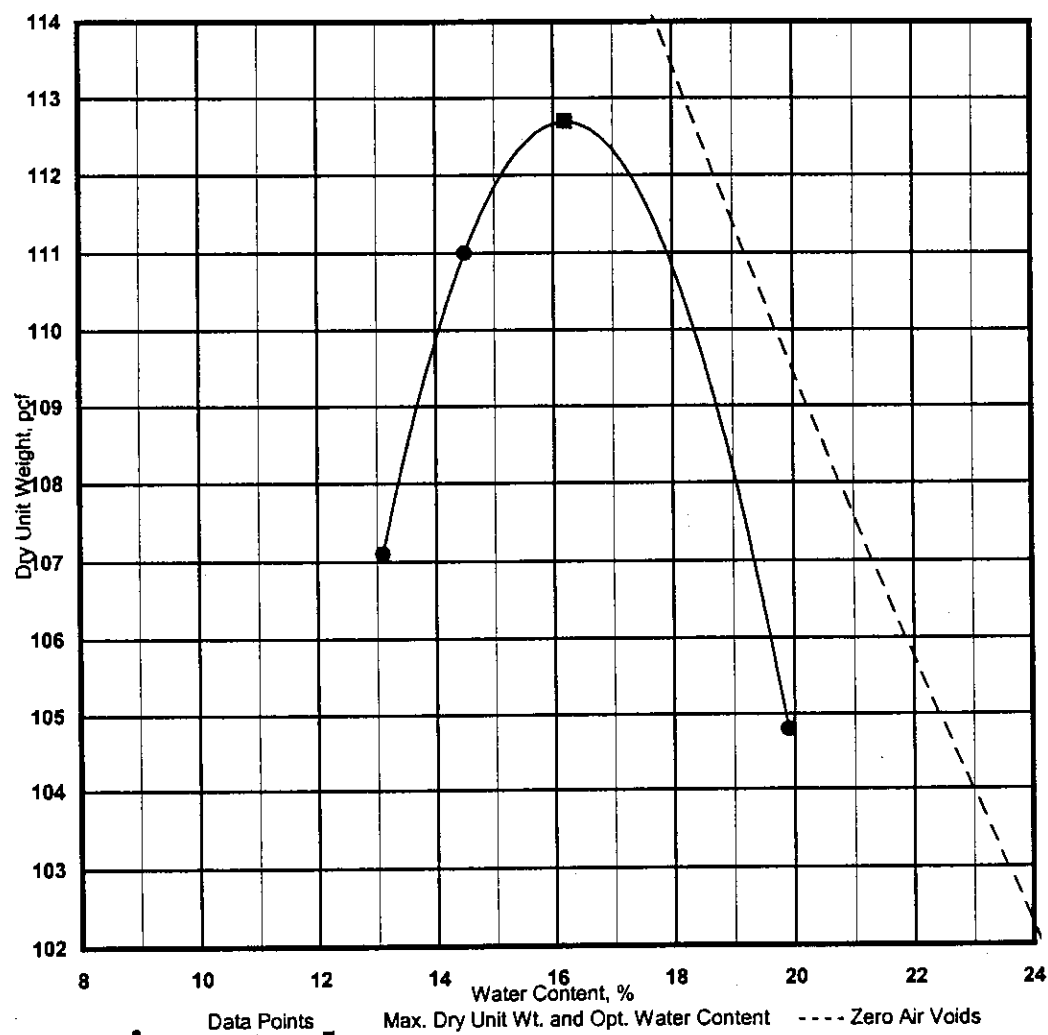
Maximum Dry Unit Wt.: 112.7 pcf  
Optimum Water Content: 16.2 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method A  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

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



## 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

Project No.: 39025019M Date: April 2003

Source Material: MC-272 6.0 to 13.5 feet  
Sample Description: \_\_\_\_\_

## TEST RESULTS

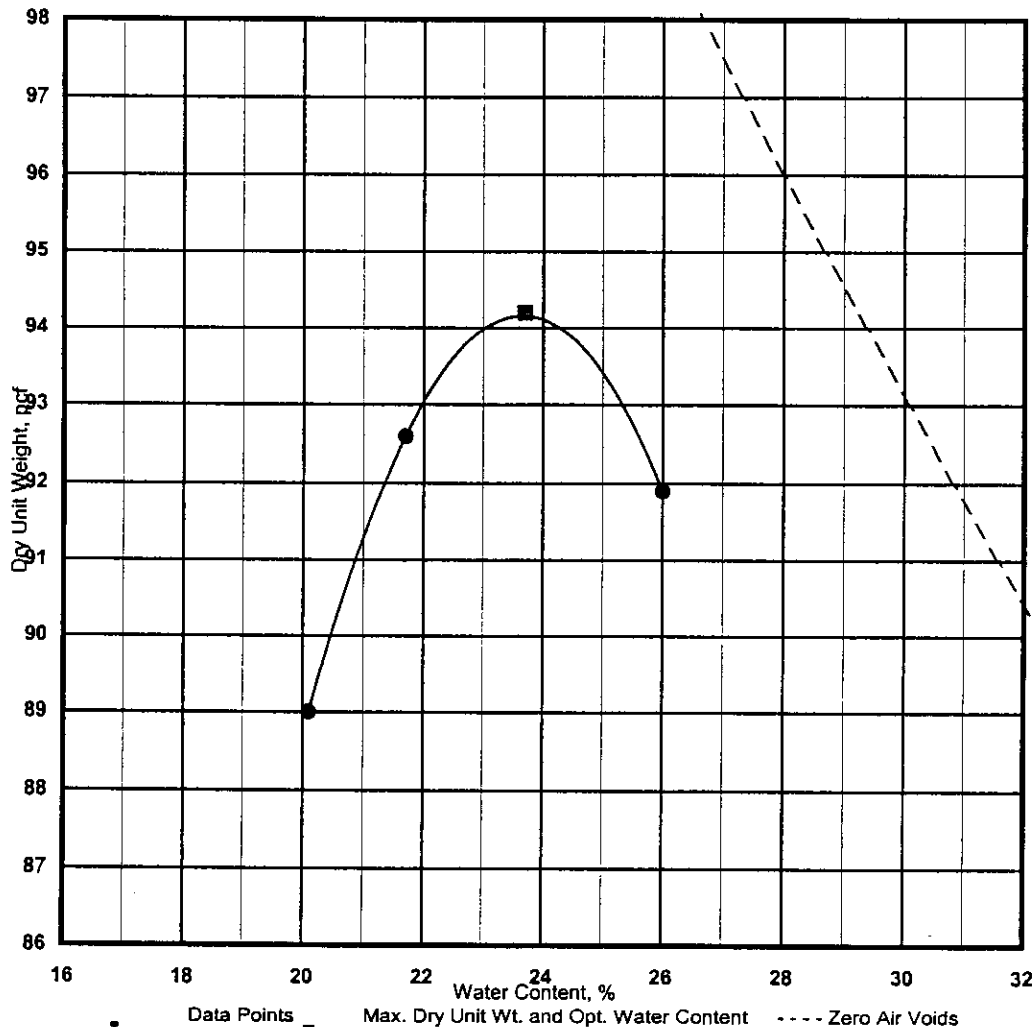
Maximum Dry Unit Wt.: 94.2 pcf  
Optimum Water Content: 23.7 %

Material Designation: \_\_\_\_\_ Sample date: \_\_\_\_\_  
Test Method: AASHTO T99  
Test Procedure: Method C  
Sample Preparation: Wet Preparation  
Rammer: \_\_\_\_\_ Mechanical X Manual

Liquid Limit: 34 Plastic Limit: 26  
Plasticity Index: 8  
% passing # 200 sieve: 42

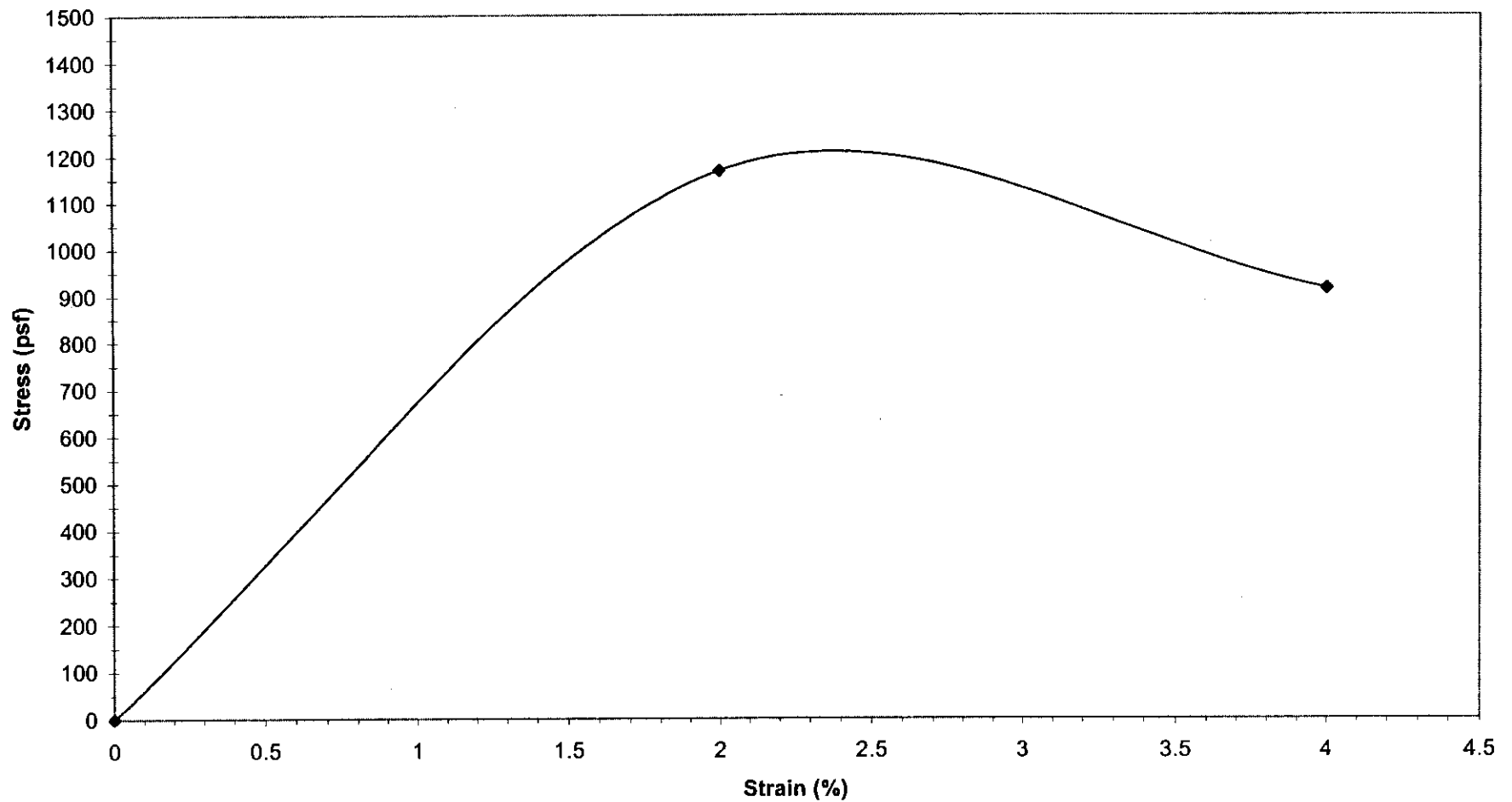
Reviewed by: \_\_\_\_\_ SPB

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**



**Dry Unit Weight of Soil**

Field Sampled by Shelby Tube

ASTM D-1587

ASTM D-2166

10930 East 56th Street  
Tulsa, Oklahoma 74146  
(918)250-0461Job Name: 149 Missouri Project J7P0601Project No.: 39025019M Date: January 2003Pineville, Missouri to Arkansas State LineBoring MC-57 Sample ST-2 Depth 5.5 to 6.6 feetRecovery 13"Qp 1.5 tsfSample Description Sandy Lean Clay, Red Brown**Unit Weight Data**

Mold Wt. 1072.4

---

Mold + Soil 2104.1

---

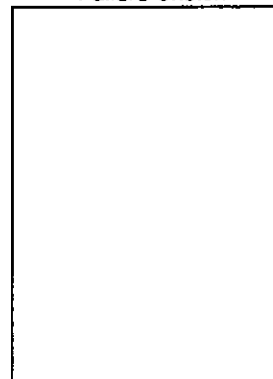
Mass 1031.7 2.275  
gms = lbs.

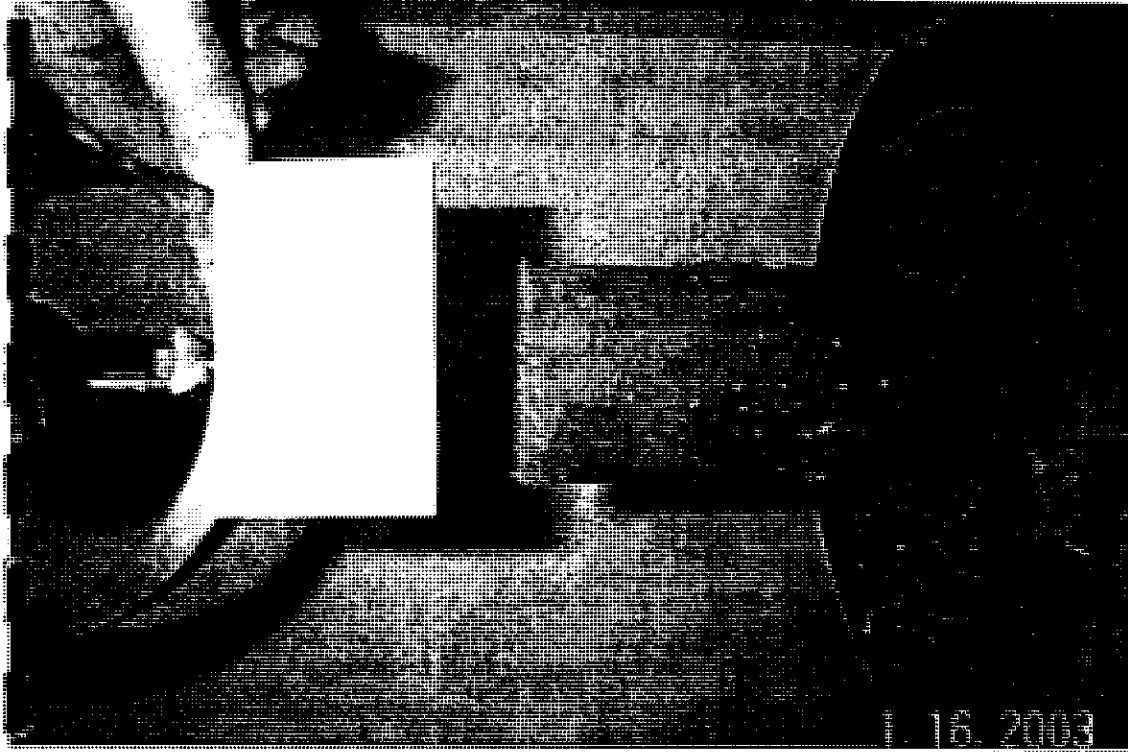
**Tube Sample Geometry**

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

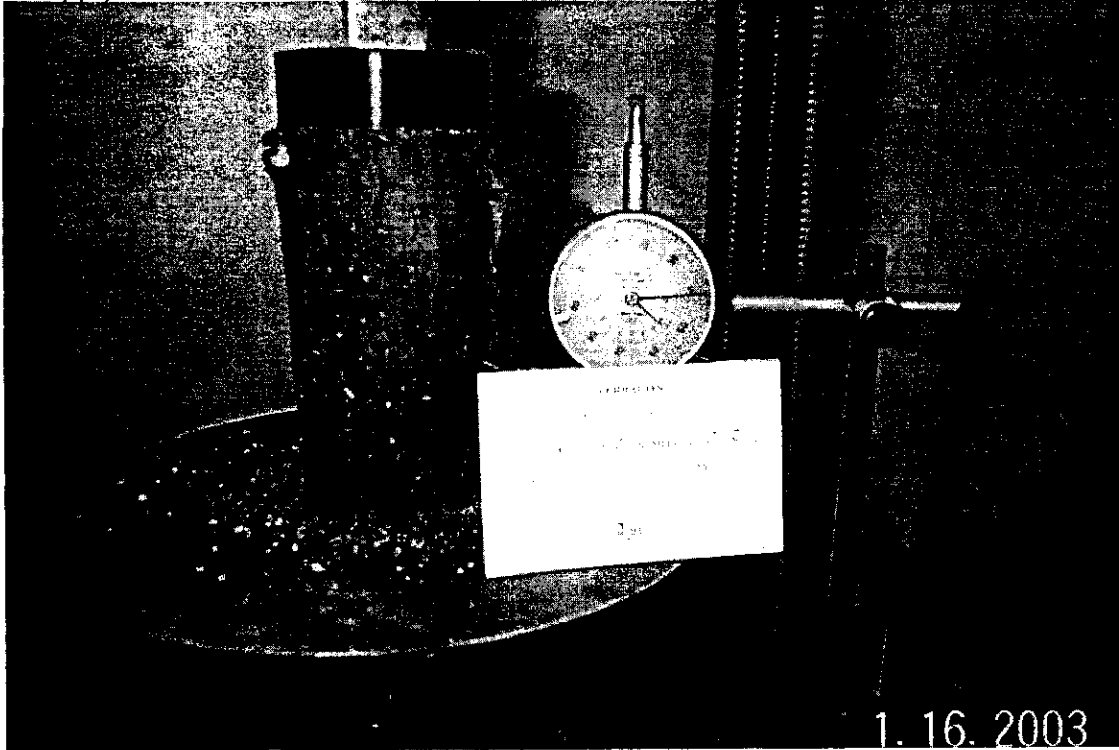
**Moisture Content**Tare No# t-6Tare No#       Wet Wt + Tare 120.6 gWet Wt + Tare        gDry Wt + Tare 105.9 gDry Wt + Tare        gTare Wt. 23.3 gTare Wt.        gWt of Water 14.7 gWt of Dry Soil 82.6 g**Moisture Content**17.8 %Wt of Water        gWt of Dry Soil        g**Moisture Content**%**3" Shelby 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)qu= 1200 psfDry Density  
96.1 (pcf)su= 600 psf

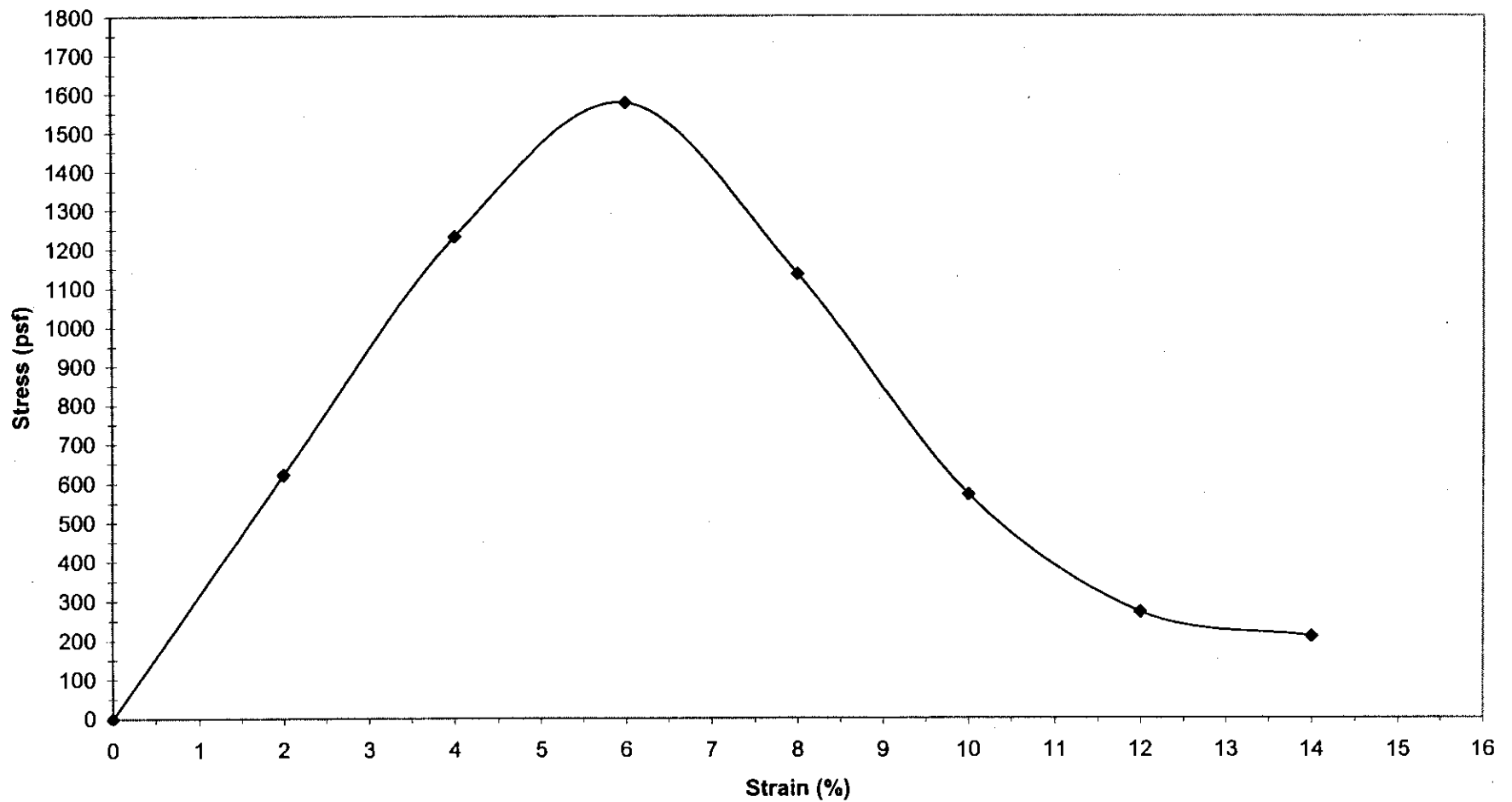






414

**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**



## 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 Dry Soil 90.5 g

**Moisture Content**  
25.1 %

Wt of Water        g  
Wt of Dry Soil        g

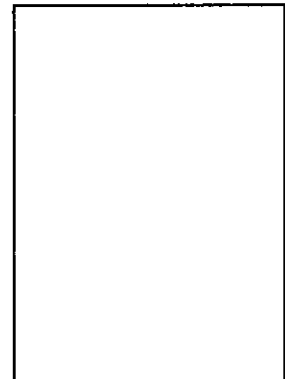
**Moisture Content**  
      %

### 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



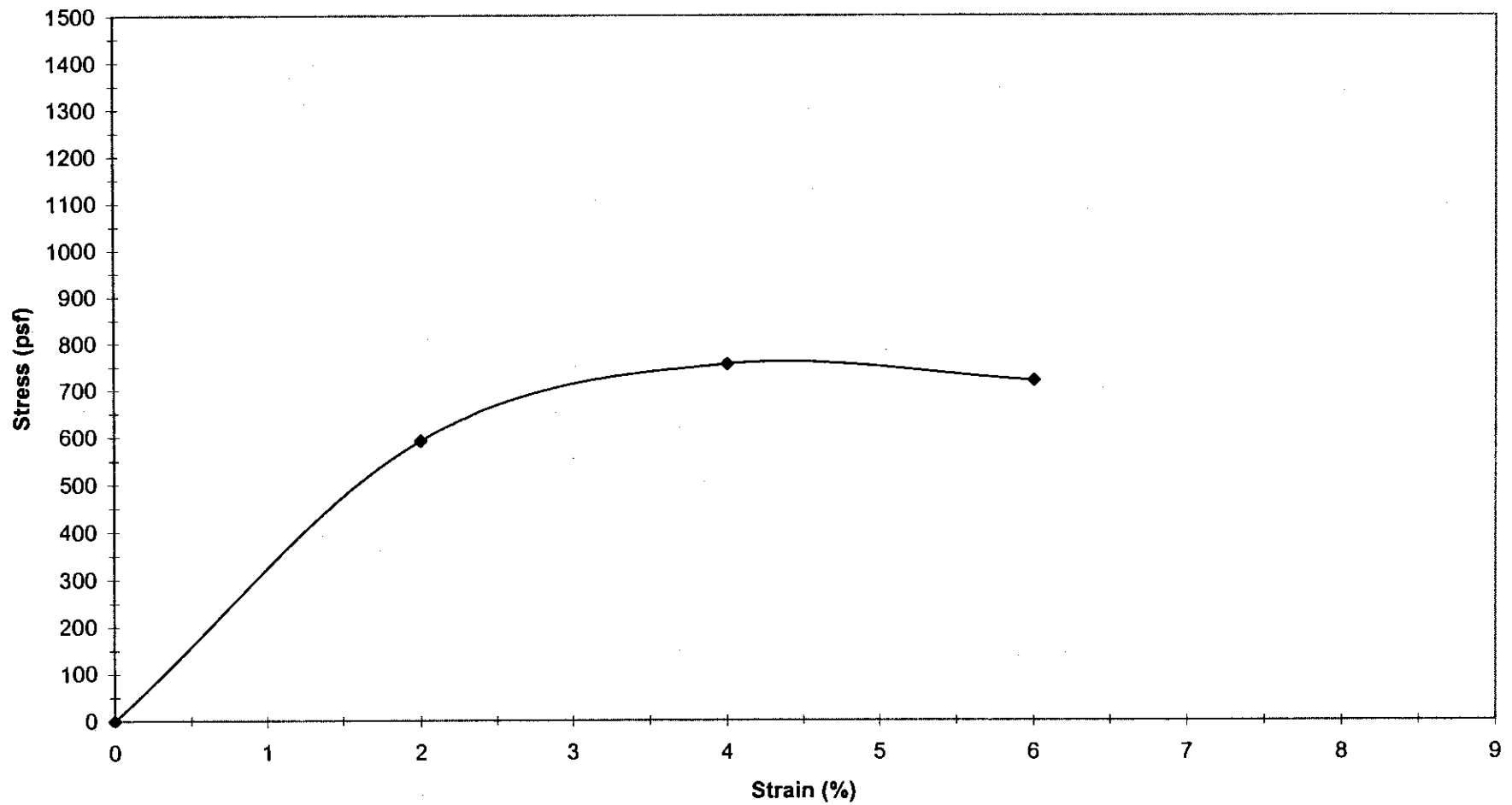
**Wet Density**  
117.6 (pcf)

**qu=** 1550 psf

**Dry Density**  
94.1 (pcf)

**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**



**Dry Unit Weight of Soil**

Field Sampled by Shelby Tube

ASTM D-1587

ASTM D-2166

10930 East 56th Street  
Tulsa, Oklahoma 74146  
(918)250-0461Job Name: I 49 Missouri Project J7P0601Project No.: 39025019M Date: April 2003Pineville, Missouri to Arkansas State LineBoring MC-142 Sample ST-3 Depth 8 to 9.5 feetRecovery 10"Qp 4.0 tsfSample Description Lean Clay, with gravel - Red Brown**Unit Weight Data**Mold Wt. 1073.5Mold + Soil 2149.2Mass 1075.7 2.372  
gms = lbs.**Tube Sample Geometry**Do= 2.813 in. Initial DiameterAo= 6.215 sq. in. Initial AreaAo= 0.0432 sq. ft.Lo= 5.594 in. Initial LengthVo= 34.74 cu. in. Initial VolumeVo= 0.0201 cu. Ft.Lo/Do= 2.0**Moisture Content**Tare No# 31Tare No#     Wet Wt + Tare 487.5 gWet Wt + Tare      gDry Wt + Tare 413.7 gDry Wt + Tare      gTare Wt. 118.5 gTare Wt.      gWt of Water 73.8 gWt of Dry Soil 295.2 g**Moisture Content**

25.0 %

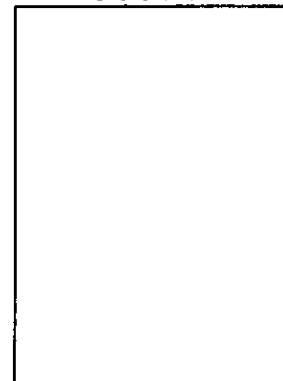
Wt of Water      gWt of Dry Soil      g**Moisture Content**

%

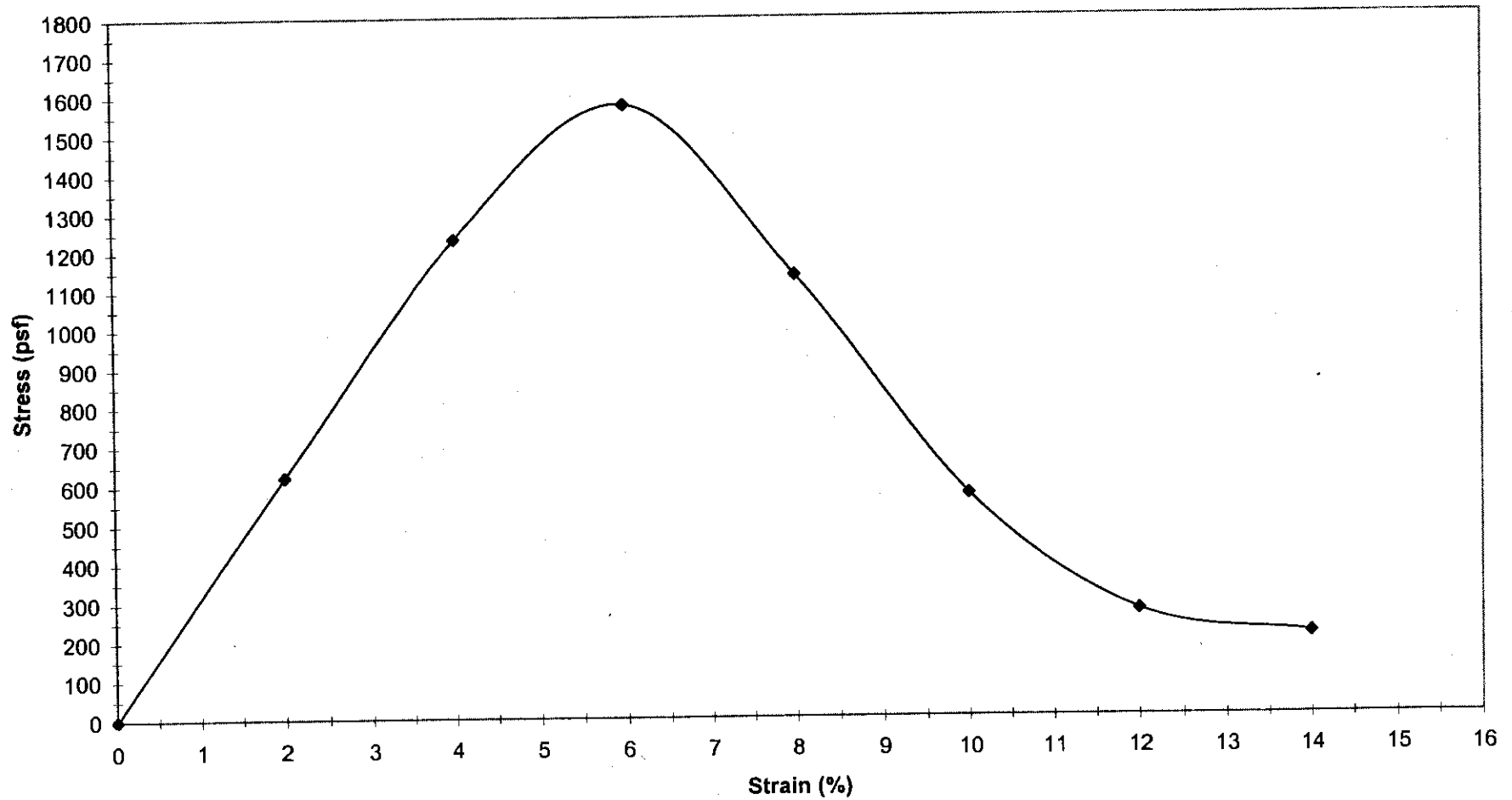
**3" Shelby Tube Sample**Proving Ring     

Failure Sketch

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

Wet Density  
118.0 (pcf)qu= 760 psfDry Density  
94.4 (pcf)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**



6/1/2



**Dry Unit Weight of Soil**

Field Sampled by Shelby Tube

ASTM D-1587

ASTM D-2166

10930 East 56th Street  
Tulsa, Oklahoma 74146  
(918)250-0461Job Name: I 49 Missouri Project J7P0601Project No.: 39025019M Date: January 2003Pineville, Missouri to Arkansas State LineBoring MC-148 Sample ST-3 Depth 8.0 to 9.5 feetRecovery 12.5" Qp 3.25 tsf Sample Description Lean Clay, with gravel, trace sand, Red Brown**Unit Weight Data**Mold Wt. 1072.5Mold + Soil 2180.5Mass 1108 2.443

gm = lbs.

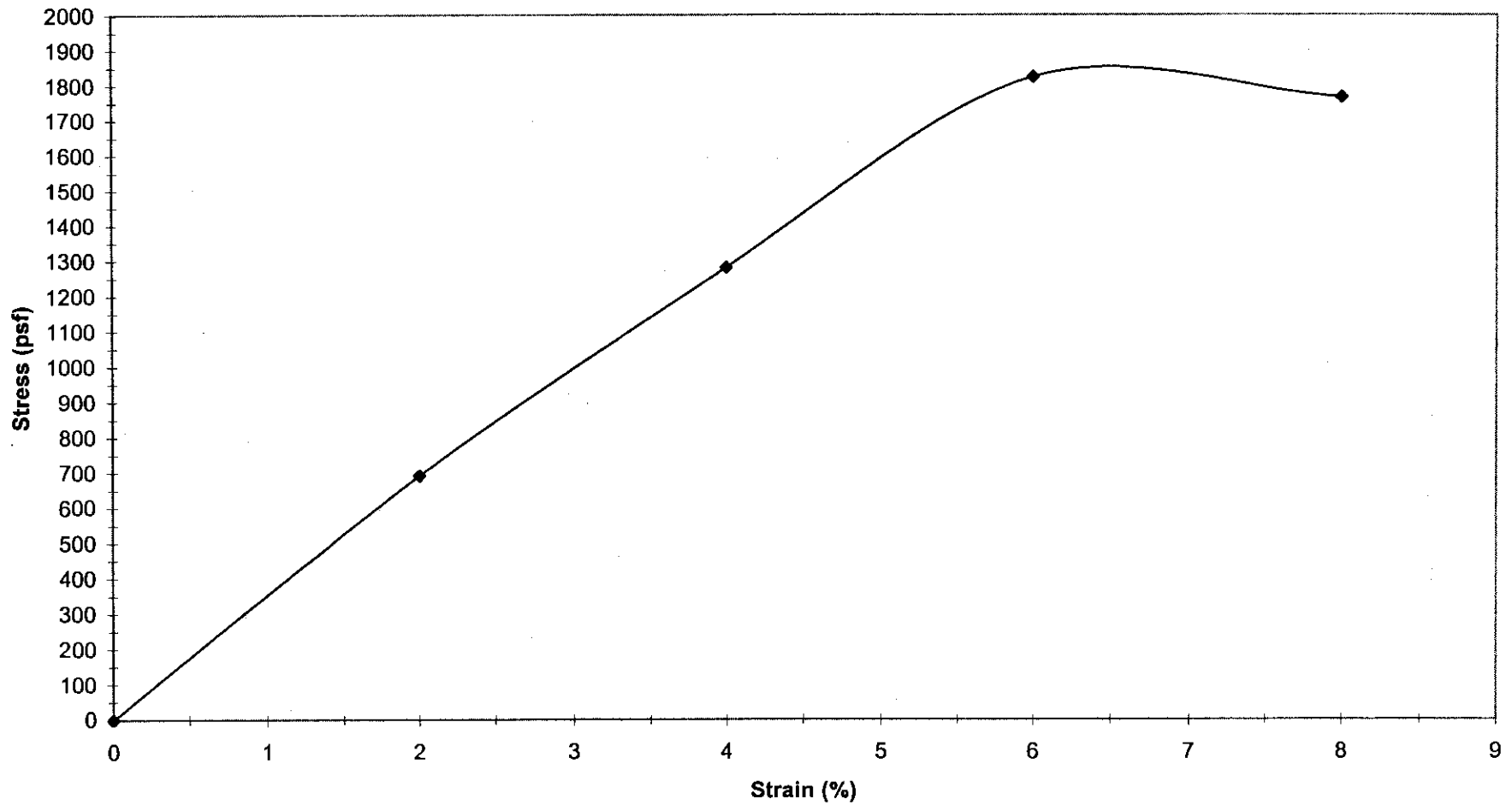
**Tube Sample Geometry**Do= 2.813 in. Initial DiameterAo= 6.215 sq. in. Initial AreaAo= 0.0432 sq. ft.Lo= 5.594 in. Initial LengthVo= 34.74 cu. in. Initial VolumeVo= 0.0201 cu. Ft.Lo/Do= 2.0**Moisture Content**Tare No# t46Tare No#       Wet Wt + Tare 123.5 gWet Wt + Tare        gDry Wt + Tare 107.3 gDry Wt + Tare        gTare Wt. 21.2 gTare Wt.        gWt of Water 16.2 gWt of Dry Soil 86.1 g**Moisture Content**18.8 %Wt of Water        gWt of Dry Soil        g**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)qu= 1550 psfDry Density  
102.3 (pcf)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**



12h

**Dry Unit Weight of Soil**

Field Sampled by Shelby Tube

ASTM D-1587

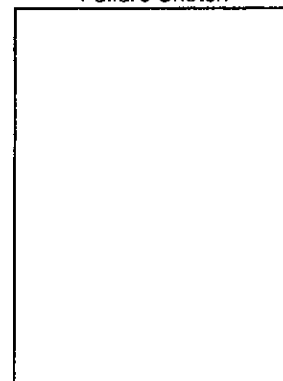
ASTM D-2166

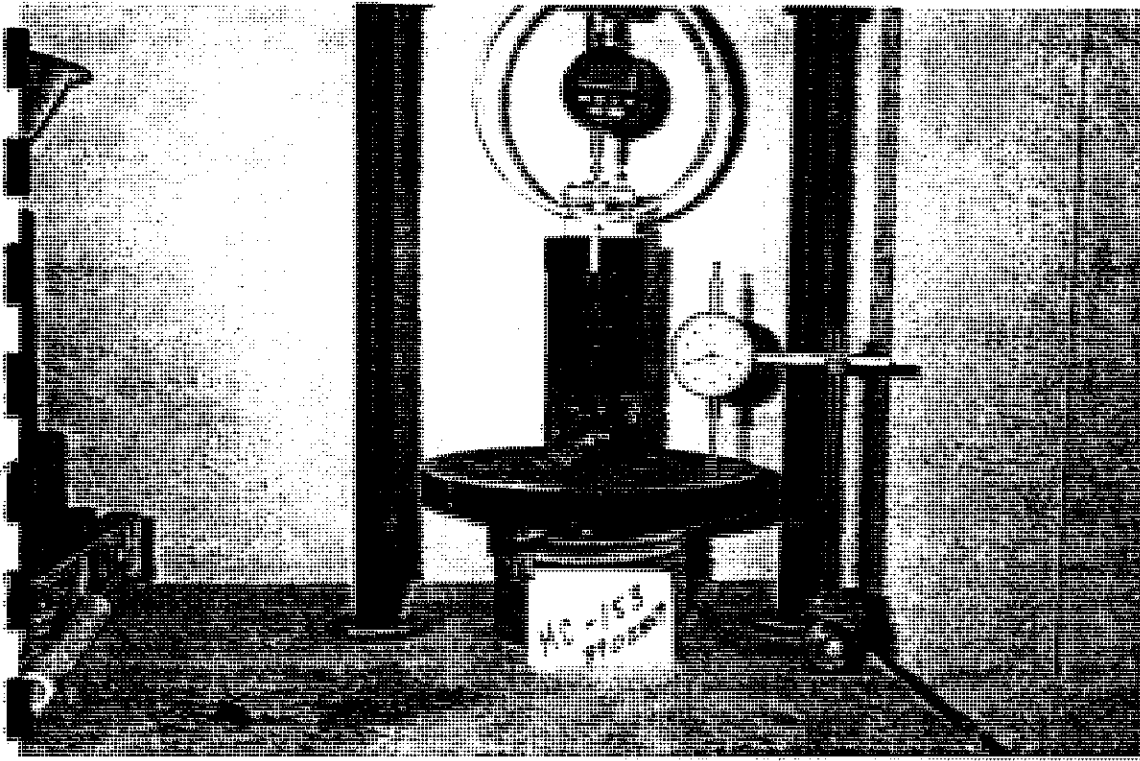
10930 East 56th Street  
Tulsa, Oklahoma 74146  
(918)250-0461Job Name: I 49 Missouri Project J7P0601Project No.: 39025019M Date: January 2003Pineville, Missouri to Arkansas State LineBoring MC-153 Sample ST-3Depth 8.5 to 9.4 feetRecovery 14"Qp 2.0 tsfSample Description Fat Clay, with sand, trace gravel - Red Brown**Unit Weight Data**Mold Wt. 1072.5Mold + Soil 2199.1Mass 1126.6 2.484

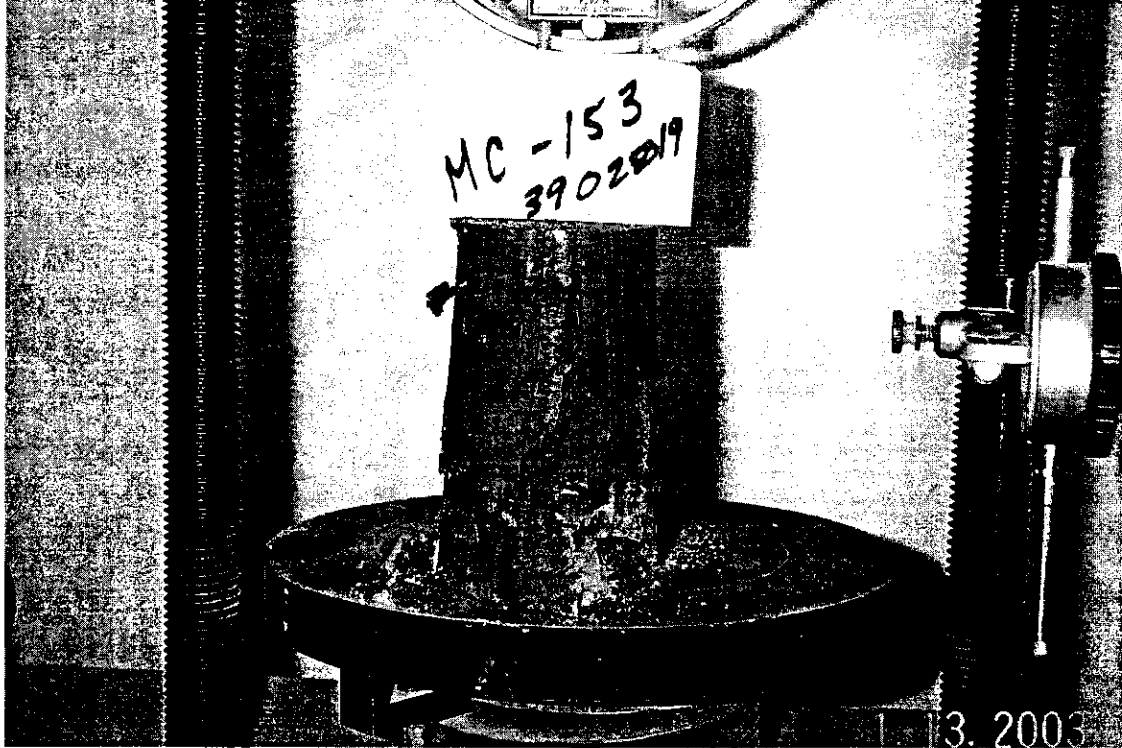
gms = lbs.

**Tube Sample Geometry**Do= 2.813 in. Initial DiameterAo= 6.215 sq. in. Initial AreaAo= 0.0432 sq. ft.Lo= 5.594 in. Initial LengthVo= 34.74 cu. in. Initial VolumeVo= 0.0201 cu. Ft.Lo/Do= 2.0**Moisture Content**Tare No# t14Tare No#     Wet Wt + Tare 130.8 gWet Wt + Tare      gDry Wt + Tare 111.5 gDry Wt + Tare      gTare Wt. 23.5 gTare Wt.      gWt of Water 19.3 gWt of Dry Soil 88 g**Moisture Content**21.9 %Wt of Water      gWt of Dry Soil      g**Moisture Content**%**3" Shelby Tube Sample**Proving Ring     **Failure Sketch**

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

Wet Density  
123.6 (pcf)qu= 1850 psfDry Density  
101.3 (pcf)su= 925 psf



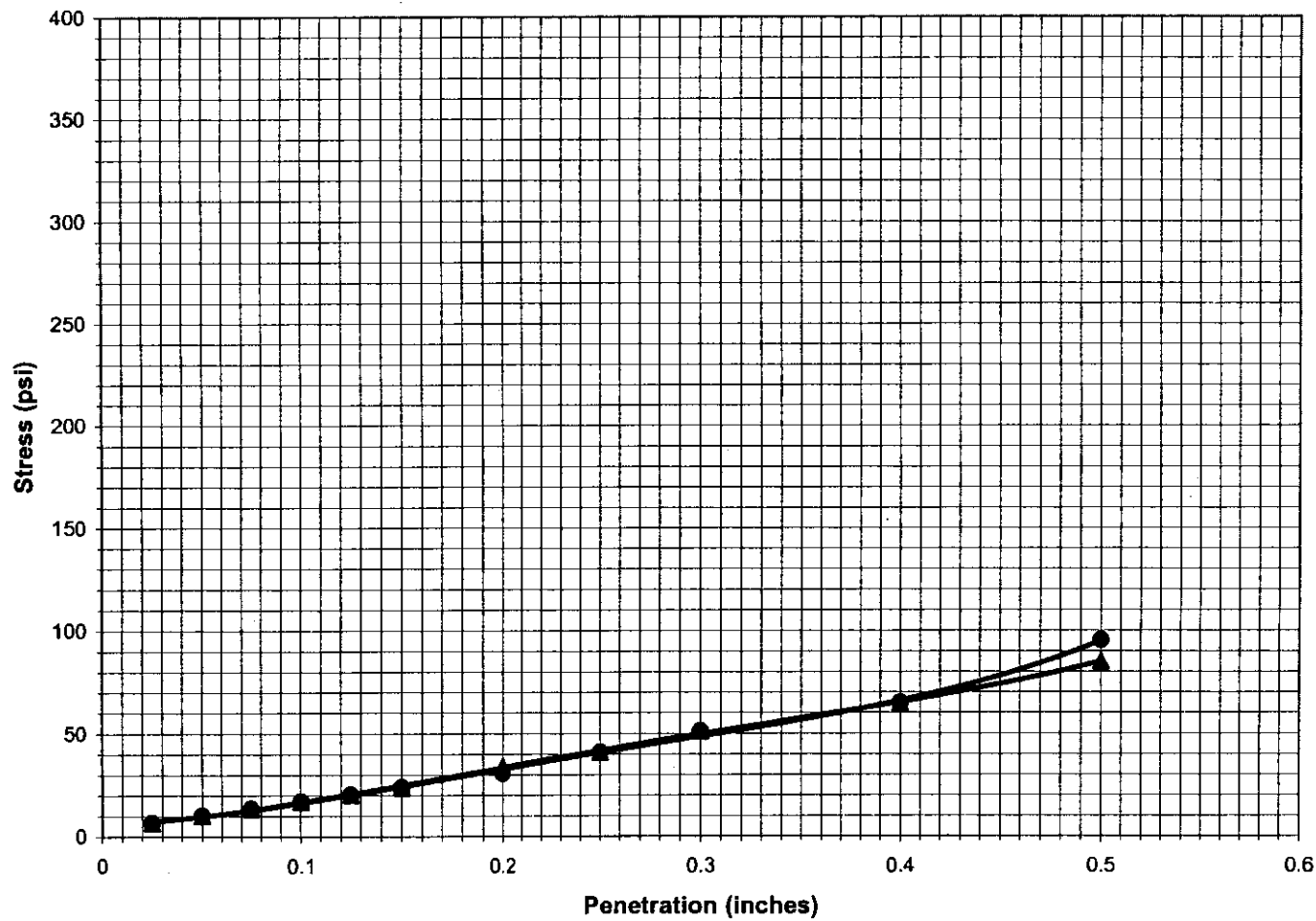


424

### 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

# 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.<sup>2</sup>): 3.14 MC-3: 5 to 16.3 Feet  
 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. <sup>3</sup> ):	123.9	124.9	124.9
	Dry Density (lb./ft. <sup>3</sup> ):	112.0327015	103.43958	104.5962038

Top As Soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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
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

1.7

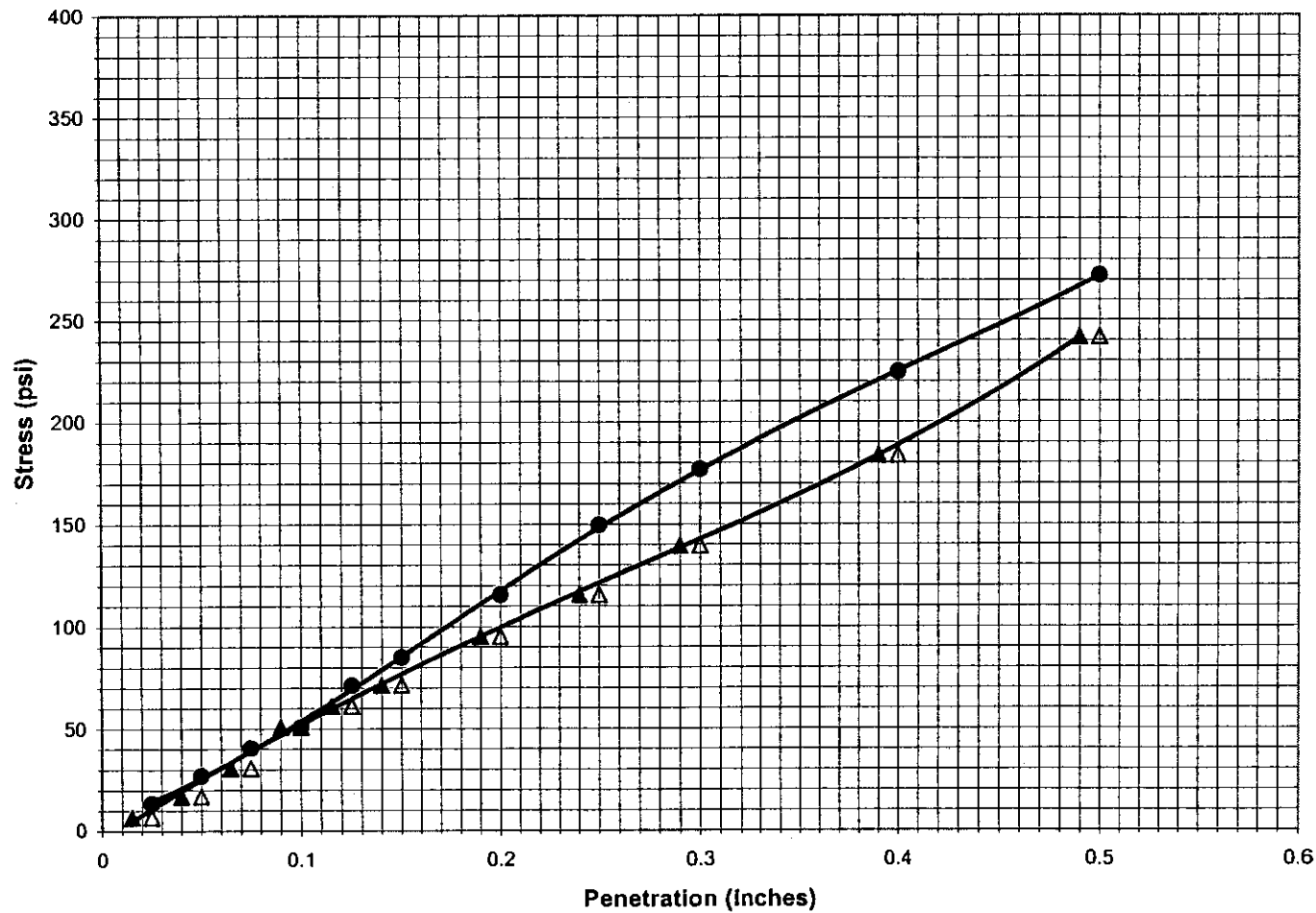
Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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
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

1.7

<b>Density Correction</b>	
Final Moisture Content	19.39194
Final Moist Wt of Soil	4247.6
Dry Weight of Soil	3557.694
<b>Initial Moisture Content</b>	
Initial Moisture Wt of Soil	4213.2
Weight of Water initial	655.5
Initial Moisture Content	18.4
<b>Initial Density of Soil</b>	
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



○ Top As Soaked  
△ Bottom As soaked  
● Corrected Top, As Soaked  
▲ Corrected Bottom, As Soaked

Corrected CBR Top  
As Soaked = 5.1

Corrected CBR Bottom  
As Soaked = 5.1

# 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.<sup>2</sup>): 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	8027.3	8027.3
	Wt. Empty Mold (g):	4129.6	4129.6	4129.6
	Wt. Moist Soil (g):	3942.8	3897.9	3897.9
Results:	Wet Density (lb./ft. <sup>3</sup> ):	115.9	114.6	114.6
	Dry Density (lb./ft. <sup>3</sup> ):	98.82491805	97.424799	97.4148195

## Top As Soaked

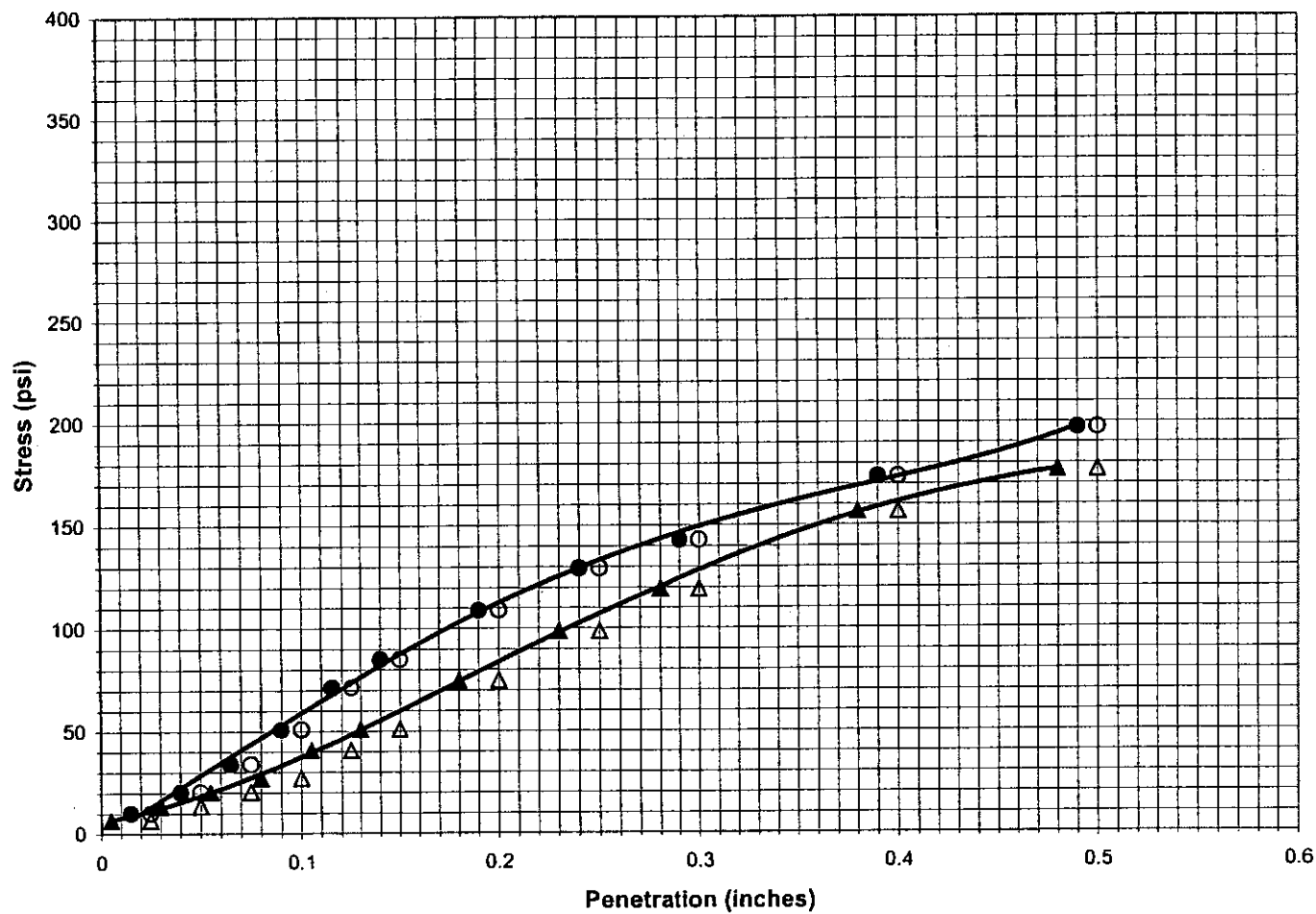
Penetration (in.)	Load Dial (dlv.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	Uncorrected CBR Value
0.025	4	13.6		0.025
0.050	8	27.2		0.050
0.075	12	40.9		0.075
0.100	15	51.1		5.11 0.100
0.125	21	71.5		0.125
0.150	25	85.1		0.150
0.200	34	115.8		7.72 0.200
0.250	44	149.8		0.250
0.300	52	177.0		0.300
0.400	66	224.7		0.400
0.500	80	272.4		0.500

## Bottom As soaked

Penetration (in.)	Load Dial (dlv.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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

<b>Density Correction</b>	
Final Moisture Content	17.63945
Final Moist Wt of Soil	3897.9
Dry Weight of Soil	3313.429
<b>Initial Moisture Content</b>	
Initial Moisture Wt of Soil	3942.8
Weight of Water Initial	629.4
Initial Moisture Content	18.0
<b>Initial Density of Soil</b>	
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**

Input: Diameter of Penetration Piston (in.): 2 39025019M  
 Calcs: Area of Penetration Piston (in.<sup>2</sup>): 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	2083.2
	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
	Wt. Moist Soil (g):	3891.3	3890.4	3890.4
Results:	Wet Density (lb./ft. <sup>3</sup> ):	114.4	114.4	114.4
	Dry Density (lb./ft. <sup>3</sup> ):	100.7128147	98.255023	99.05128018

**Top As Soaked**

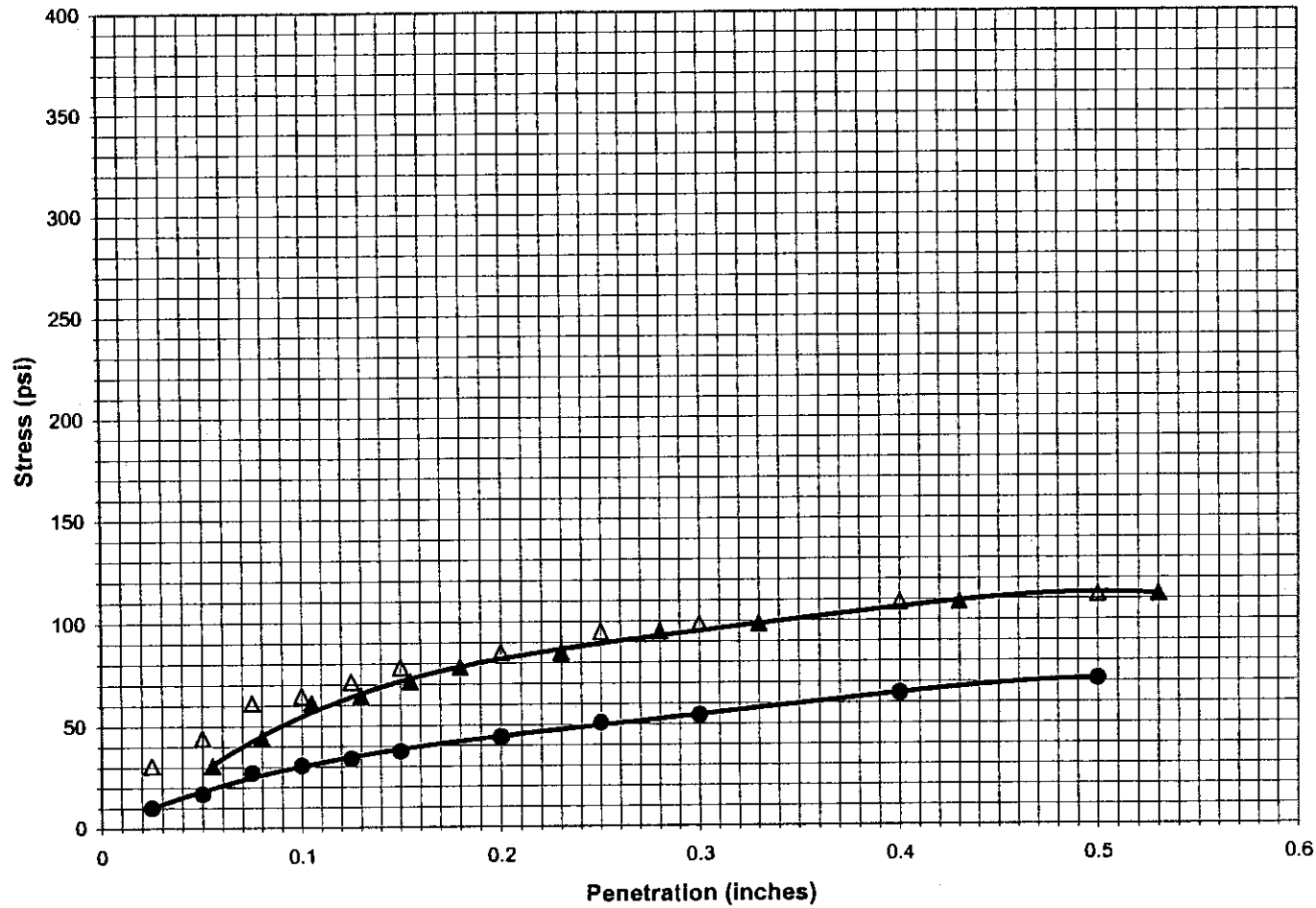
Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	Uncorrected CBR Value
0.025	3	10.2		0.015
0.050	6	20.4		0.040
0.075	10	34.0		0.065
0.100	15	51.1	5.11	0.090
0.125	21	71.5		0.115
0.150	25	85.1		0.140
0.200	32	109.0	7.26	0.190
0.250	38	129.4		0.240
0.300	42	143.0		0.290
0.400	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. <sup>2</sup> )	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

<b>Density Correction</b>	
Final Moisture Content	15.47328
Final Moist Wt of Soil	3890.4
Dry Weight of Soil	3369.091
<b>Initial Moisture Content</b>	
Initial Moisture Wt of Soil	3891.3
Weight of Water initial	522.2
Initial Moisture Content	15.5
<b>Initial Density of Soil</b>	
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



# 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.<sup>2</sup>): 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. <sup>3</sup> ):	114.8	120.5	120.5
	Dry Density (lb./ft. <sup>3</sup> ):	99.21361463	94.541176	97.19874441

## Top As Soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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	0.100
0.125	10		34.0	0.125
0.150	11		37.5	0.150
0.200	13		44.3	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

3.1

## Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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	0.130
0.125	21		71.5	0.155
0.150	23		78.3	0.180
0.200	25		85.1	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

5.5

## Density Correction

Final Moisture Content 24.01395  
 Final Moist Wt of Soil 4100.0  
 Dry Weight of Soil 3308.08

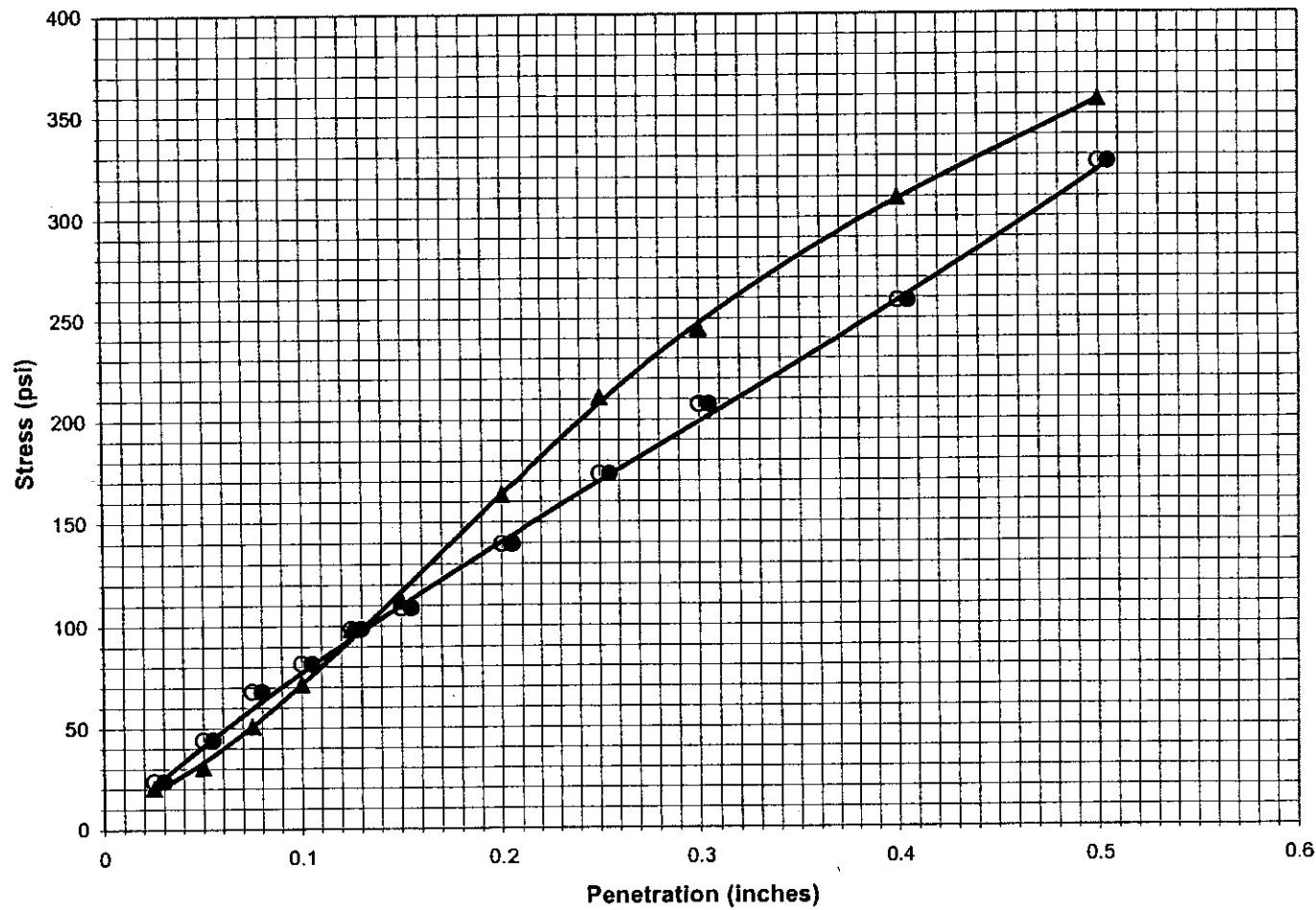
## Initial Moisture Content

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

hsh

## 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.<sup>2</sup>): 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. <sup>3</sup> ):	123.8	125.0	125.0
	Dry Density (lb./ft. <sup>3</sup> ):	105.4295431	105.35714	105.4533475

**Top As Soaked**

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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
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

7.8

**Bottom As soaked**

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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
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

7.2

**Density Correction**

Final Moisture Content 18.55811  
 Final Moist Wt of Soil 4252.5  
 Dry Weight of Soil 3586.849

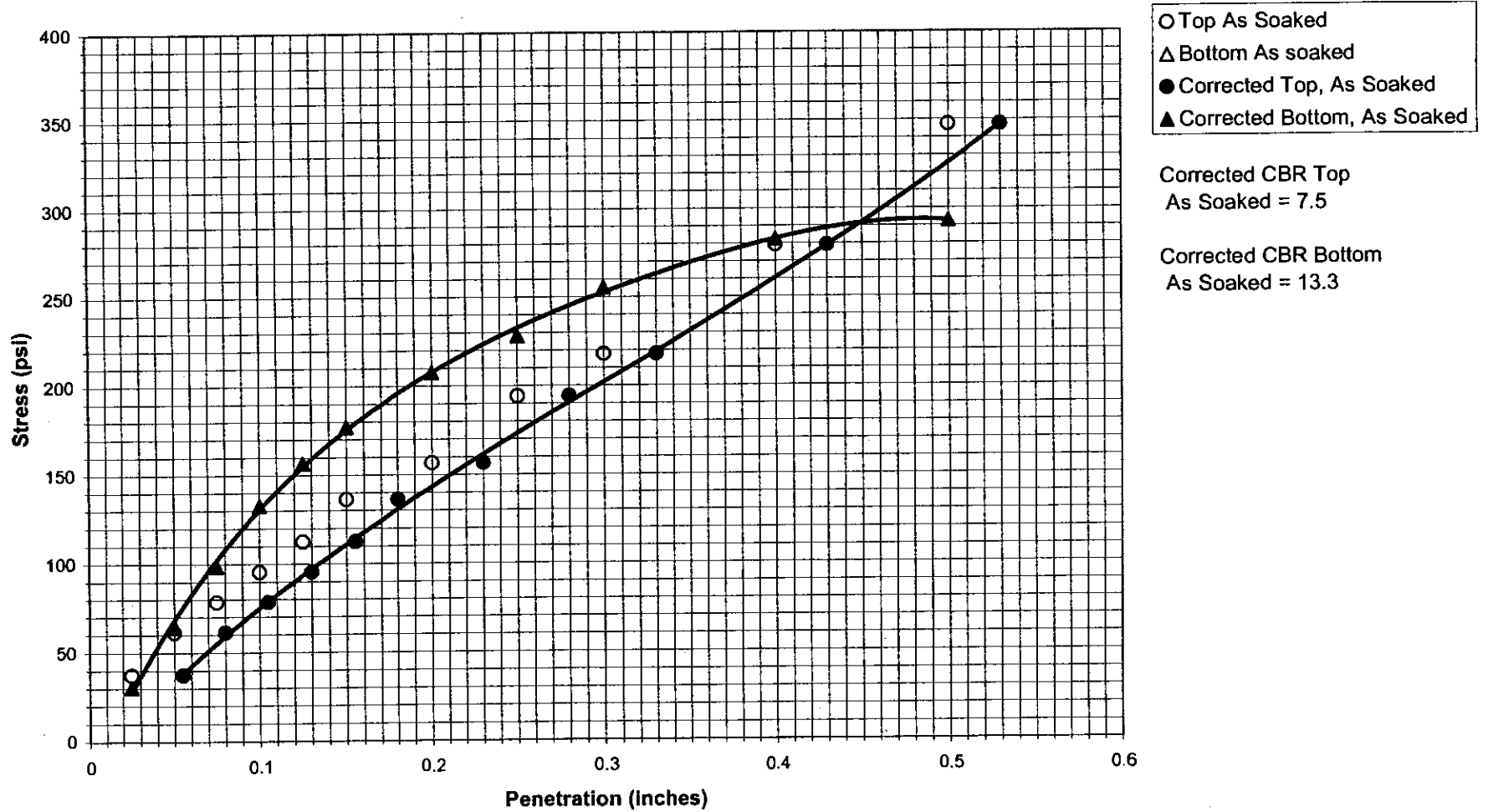
**Initial Moisture Content**

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



# 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.<sup>2</sup>): 3.14 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. <sup>3</sup> ):	116.7	121.3	121.3
	Dry Density (lb./ft. <sup>3</sup> ):	101.6482125	99.786968	102.1245899

## Top As Soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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	0.130
0.125	33		112.4	0.155
0.150	40		136.2	0.180
0.200	46		156.6	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

7.5

## Bottom As soaked

Penetration (in.)	Load Dial (div.)	Load (lbs.)	Stress (lb./in. <sup>2</sup> )	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	38		132.8	0.100
0.125	48		156.6	0.125
0.150	52		177.0	0.150
0.200	61		207.7	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

13.3

## 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



## MEMORANDUM

Missouri Department of Transportation  
Transportation Planning  
2217 St. Marys Blvd.

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

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	

We are providing updated estimates of average daily traffic and 18-kip ESAL units for the above project as requested.

<u>US 71</u>	<u>ADT</u>	Daily ESAL Units (Two Way)	
		<u>Flexible</u>	<u>Rigid</u>
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

<u>Route 90</u>	<u>ADT</u>	Daily ESAL Units (Two Way)	
		<u>Flexible</u>	<u>Rigid</u>
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



January 31, 2002

Page Two

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

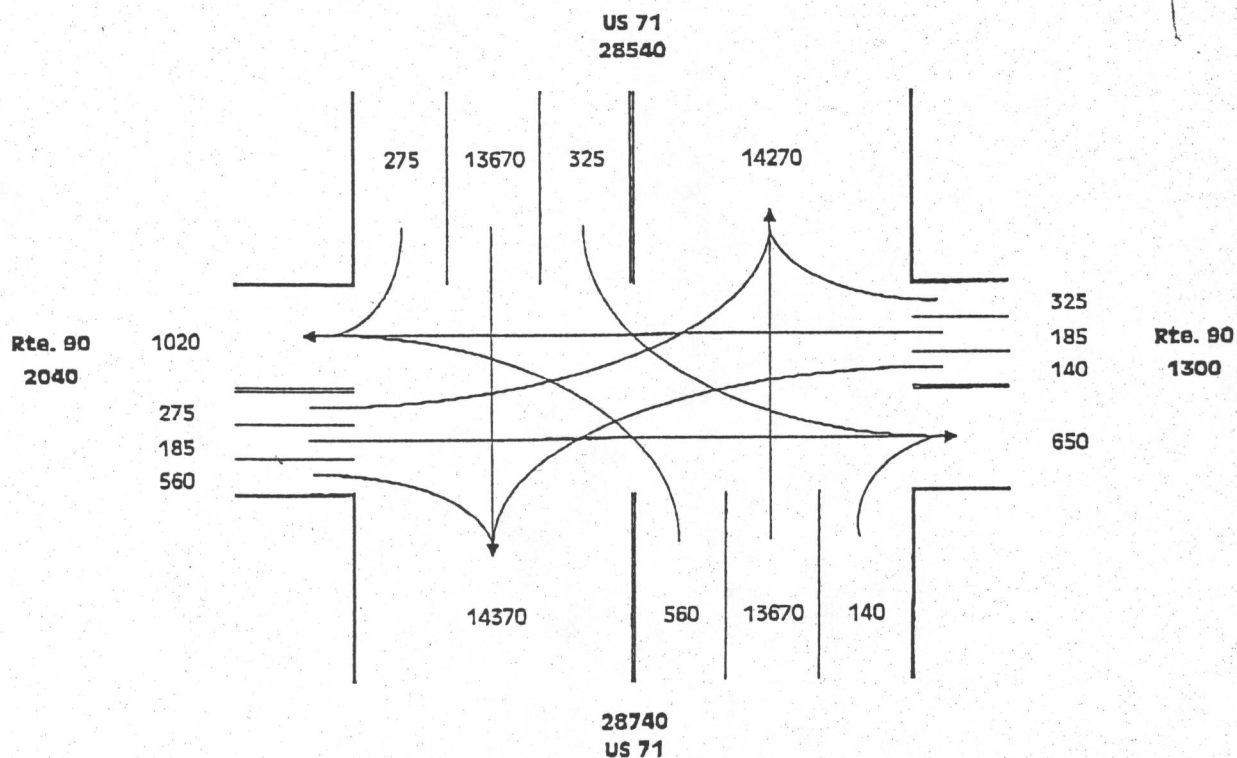
# Missouri Highway and Transportation Department Transportation Management Systems Turning Movement Diagram and Summary

Station Location: McDonald County  
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: \_\_\_\_\_

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