Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-48 | **Location:** Sta. 41+599.99, 81.96m Right of US 33 Centerline | **Date Drilled:** 6/27/00

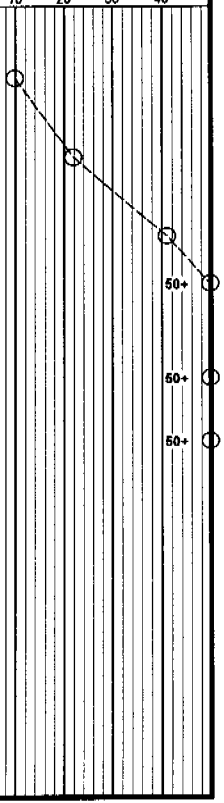
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (prior to core)
1.07 m (after coring, including core water)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Drive	Sample No. Press	Blows per 0.15 m	Rec (m) [in]	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
0	286.14						
0.08 [0.3]	286.06 [938.5]						Topsoil - 0.076 m [3"]
		1		4 4 6	.203 [8]	239 [2.5]	Stiff brown SILTY CLAY (A-6b); trace fine sand; damp.
0.91 [3.0]	285.23 [935.8]						
		2		4 8 14	.279 [11]	383 [4.0]	Hard brown and gray SILT AND CLAY (A-6a); trace fine to coarse sand; damp.
1.68 [5.5]	284.46 [933.3]						
		3		9 17 24	.356 [14]	431+ [4.5+]	Hard red and brown SILT AND CLAY (A-6a); decomposed claystone; damp.
2.44 [8.0]	283.70 [930.8]						
		4		50/.10	.102 [4]		Very dense brown SANDY SILT (A-4a); decomposed siltstone; damp.
3.05 [10]							
		5		30 50/.08	.229 [9]		
3.96 [13.0]	282.18 [925.8]						
		6		50/.13	.127 [5]	---	Hard red and brown SILT AND CLAY (A-6a); decomposed claystone; damp.
4.57 [15]				Core 0.305	Rec .127	RQD 0%	Soft brown and red CLAYSTONE; moderately weathered.
				Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 43%	@ 4.57 m - 4.88 m [15.0' - 16.0'], contains several shears with slickensides .
6.10 [20]							
				Core 1.524 m [60"]	Rec 1.372 m [54"]	RQD 73%	@ 6.86 m - 7.01 m [22.5' - 23.0'], severely weathered.
							@ 7.10 m [23.3'], slickensided shear.
7.62							



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-48	Location:	Sta. 41+599.99, 81.96m Right of US 33 Centerline	Date Drilled:	6/27/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (prior to core)
1.07 m (after coring, including core water)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62 [25]	278.52 [913.8]						**DESCRIPTION**								
		Core 1.524 m [60"]	Rec 2.159 m [85"]	RQD 85%			Soft brown and red CLAYSTONE; moderately weathered.								
							@ 8.47 m [27.8'], becomes red.								
9.14 [30]							@ 9.08 m [29.8'], shear with slickensides.								
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 78%											
							@ 10.09 m - 12.50 m [33.1' - 41.0'], becomes red and gray.								
10.67 [35]															
		Core 1.524 m [60"]	Rec 1.346 m [53"]	RQD 80%											
							@ 12.07 m [39.6'], low angle fracture.								
12.19 [40]							@ 12.44 m [40.8'], low angle fracture.								
		Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 87%											
							@ 13.08 m [42.9'], low angle fracture. @ 13.17 m [43.2'], low angle fracture.								
13.72 [45]															
		Core 1.524 m [60"]	Rec 1.346 m [53"]	RQD 87%											
							@ 14.90 m [48.9'], low angle fracture.								
15.24															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-48	Location:	Sta. 41+599.99, 81.96m Right of US 33 Centerline	Date Drilled:	6/27/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (prior to core)
1.07 m (after coring, including core water)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
15.24 [50]	270.90 [888.8]							Soft brown and red CLAYSTONE; moderately weathered. @ 15.70 m [51.5'], high angle fracture.								
		Core 1.524 m [60"]	Rec 1.295 m [51"]	RQD 83%				@ 16.31 m [53.5'], becomes red and gray.								
16.76 [55]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 90%				@ 17.80 m [58.4'], becomes gray. @ 17.89 m [58.7'], contains calcareous banding.								
18.29 [60]																
18.59 [61.0]	267.55 [877.8]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 93%				Medium hard gray SILTSTONE, micaceous; weathered; contains limestone bedding. @ 19.32 m - 20.33 m [63.4' - 66.7'], moderately weathered and highly broken.								
19.81 [65]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%				@ 20.48 m - 20.54 m [67.2' - 67.4'], claystone clast. @ 20.63 m [67.7'], slightly pyritic.								
20.63 [67.7]	265.51 [871.1]							Hard gray SANDSTONE, fine grained, micaceous, thin bedded, slightly pyritic, weathered, contains occasional limestone laminations.								
21.34 [70]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%												
22.86																

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-48 | **Location:** Sta. 41+599.99, 81.96m Right of US 33 Centerline | **Date Drilled:** 6/27/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (prior to core)
1.07 m (after coring, including core water)

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - % PL Natural LL: 10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
22.86	263.28												
[75]	[863.8]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Hard gray SANDSTONE, fine grained, micaceous, thin bedded, slightly pyritic, weathered, contains occasional limestone laminations.						
24.08	262.06												
[79.0]	[859.8]						Medium hard to hard gray SILTSTONE, micaceous, weathered.						
24.38													
[80]													
24.69	261.45												
[81.0]	[857.8]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard gray CLAYSTONE; weathered, contains limestone clasts.						
25.91													
[85]													
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%									
26.94	259.20												
[88.4]	[850.4]						Hard gray LIMESTONE; argillaceous, weathered, contains siltstone laminations.						
27.43													
[90]							@ 27.07 m - 27.16 m [88.8' - 89.1'], high angle fractures.						
27.74	258.40												
[91.0]	[847.8]						Bottom of Boring - 27.74 m [91.0']						
28.96													
[95]													
30.48													

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-49	Location:	Sta. 41+833.94, 76.00m Right of US 33 Centerline	Date Drilled:	6/30/00 - 7/6/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 0.91 m [3.0'] (after coring, including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
0	286.16														
0.15	286.01						Topsoil - 0.152 m [6"]								
[0.5]	[938.4]	6					Very soft red CLAYSTONE; severely weathered.								
		11 21	.457 [18]	1		---	@ 0.76 m [2.5'], becomes brown with rust staining.								
		14 17 17	.432 [17]	2		96 [1.0]	@ 1.22 m [4.0'], becomes gray.								
1.52		25 50/.13	.279 [11]	3		---								50+	
[5]							@ 1.83 m [6.0'], becomes soft.								
		50/.10	.102 [4]	4		---								50+	
		50/.05	.051 [2]	5		---								50+	
3.05	283.11														
[10]	[928.8]	Core 0.305	Rec 152	RQD 8%			Soft grayish brown CLAYSTONE, calcareous, weathered, broken.								
		Core 1.524 m [60"]	Rec 1.295 m [51"]	RQD 35%											
4.57															
4.69	281.47														
[15.4]	[923.5]	Core 1.524 m [60"]	Rec 1.295 m [51"]	RQD 77%			Medium hard gray SILTSTONE with limestone clasts, weathered, broken, with rust staining.								
6.10															
[20]		Core 1.524 m [60"]	Rec 1.092 m [43"]	RQD 35%											
7.44	278.72														
7.62	[914.4]						Soft gray CLAYSTONE; weathered to severely weathered.								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-49	Location:	Sta. 41+833.94, 76.00m Right of US 33 Centerline	Date Drilled:	6/30/00 - 7/6/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 0.91 m [3.0'] (after coring, including drill water)

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Sample No. Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	DESCRIPTION
7.62 [25]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 70%									Soft to medium hard gray CLAYSTONE, severely weathered.
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 65%									
10.67 [35]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 48%									
11.95 [39.2]	274.21 [899.6]												Medium hard gray SILTSTONE, micaceous, severely weathered.
12.19 [40]		Core 1.524 m [60"]	Rec 1.219 m [48"]	RQD 72%									
13.72 [45]		Core 1.524 m [60"]	Rec 1.118 m [44"]	RQD 30%									
15.24													

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-49	Location:	Sta. 41+833.94, 76.00m Right of US 33 Centerline	Date Drilled:	6/30/00 - 7/6/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 0.91 m [3.0'] (after coring, including drill water)

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
15.24													
[50]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 78%			Medium hard gray SILTSTONE, micaceous, severely weathered.						
16.76													
[55]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 92%			@ 17.10 m [56.1'], red, brown, and gray. @ 17.19 m - 17.34 m [56.4' - 56.9'], gray, calcareous, with limestone clasts.						
18.29													
18.50	267.66												
[60.7]	[878.1]	Core 1.524 m [60"]	Rec 1.295 m [57"]	RQD 83%			Medium hard gray SILTSTONE, calcareous, argillaceous, contains limestone clasts, weathered. @ 19.66 m - 19.93 m [64.5' - 65.4'], near vertical fracture.						
19.81													
[65]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 97%			@ 20.12 m - 20.51 m [66.0' - 67.3'], red and gray.						
23.29	262.87												
[76.4]	[862.4]						Hard gray SANDSTONE; fine grained, slightly argillaceous, moderately weathered.						
21.34													
[70]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%									
22.86													

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-49	Location:	Sta. 41+833.94, 76.00m Right of US 33 Centerline	Date Drilled:	6/30/00 - 7/6/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 0.91 m [3.0'] (after coring, including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
22.86 [75]							
23.16 [76.0]	263.00 [862.9]						Hard gray SANDSTONE; fine grained, slightly argillaceous, moderately weathered.
							Bottom of Boring - 23.16 m [76.0']
24.38 [80]							
25.91 [85]							
27.43 [90]							
28.96 [95]							
30.48							

GRADATION

% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-50	Location:	Sta. 41+880.66, 37.62 m Left of US 33 Cneterline	Date Drilled:	7/5/00

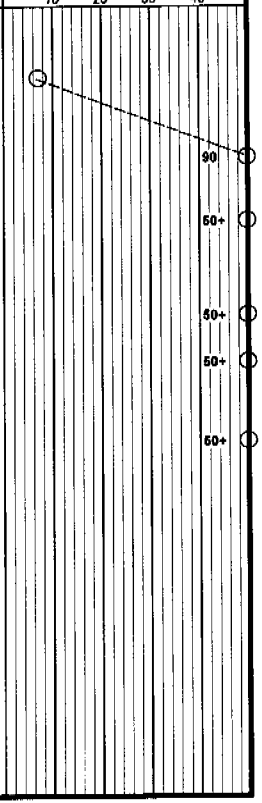
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring, includes drilling water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
0	283.68						
0.06	283.62						Topsoil - 0.051 m [2"]
[0.2]	[930.5]	3 4 3	.203 [8]	1		383 [4.0]	Hard orangish brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.
1.07	282.61						
[3.5]	[927.2]	44 44 46	.457 [18]	2			Very soft brown SHALE; severely weathered.
1.52							
[5]		24 50/.10	.254 [10]	3			
		21 27 50/.13	.432 [17]	4			
3.05							
[10]		50/.13	.127 [5]	5			
4.27	279.41	50/.13	.127	6			@ 4.11 m - 4.24 m [13.5' - 13.9'], contains few limestone fragments.
[14.0]	[916.7]						
4.57		Core 1.524 m [60"]	Rec 1.346 m [53"]	RQD 28%			Soft to medium hard brown SILTSTONE; weathered, broken.
[15]							
4.88	278.80						
[16.0]	[914.7]						Soft brown CLAYSTONE; weathered to severely weathered, very broken.
							@ 5.67 m - 5.79 m [18.6' - 19.0'], red.
6.10		Core 1.524 m [60"]	Rec .610 m [24"]	RQD 13%			
[20]							
							@ 7.32 m [24.0'], red and brown, broken.
7.62							@ 7.51 m [24.6'], slickensided shear.

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-50	Location:	Sta. 41+880.66, 37.62 m Left of US 33 Cneterline	Date Drilled:	7/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring, includes drilling water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	276.06 [905.7]	Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 77%			Soft red and brown CLAYSTONE; weathered to severely weathered, very broken. @ 8.05 m [26.4'], slickensided shear.
9.14 [30]		Core 1.372 m [54"]	Rec 1.372 m [54"]	RQD 65%			@ 9.31 m [30.5'], slickensided shear. @ 9.91 m - 10.00 m [32.5' - 32.8'], high angle fracture with rust staining. @ 10.31 m - 11.84 m [33.8' - 38.8'], very broken zone with slickensided shears.
10.67 [35]		Core 1.676 m [66"]	Rec 1.676 m [66"]	RQD 92%			
12.19 [40]		Core 1.524 m [60"]	Rec 1.168 m [46"]	RQD 26%			@ 12.53 m - 13.41 m [41.1' - 44.0'], very broken zone with slickensided shears.
13.72 [45]		Core 1.524 m [60"]	Rec .838 m [33"]	RQD 7%			
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-50	Location:	Sta. 41+880.66, 37.62 m Left of US 33 Cneterline	Date Drilled:	7/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring, includes drilling water)

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

GRADATION

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	DESCRIPTION
15.24 [50]	268.44 [880.7]		Core 1.524 m [60"]	Rec .940 m [37"]	RQD 20%									Soft red and brown CLAYSTONE; weathered to severely weathered, very broken.
16.46 [54.0]	267.22 [876.7]													
16.76 [55]			Core 1.219 m [48"]	Rec .711 m [28"]	RQD 0%									Soft brown SANDSTONE; weathered.
17.40 [57.1]	266.26 [873.6]													
18.29 [60]			Core 1.829 m [72"]	Rec 1.829 m [72"]	RQD 43%									Soft gray CLAYSTONE; weathered.
19.45 [63.8]	264.23 [866.9]													
19.81 [65]			Core 1.219 m [48"]	Rec 1.184 m [47"]	RQD 83%									Medium hard gray SANDSTONE, fine grained, micaceous, weathered. @ 20.36 m [66.8'], slickensided shear.
20.73 [68.0]	262.95 [862.7]													Bottom of Boring - 20.73 m [68.0']
21.34 [70]														
22.86														

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-51 | Location: Sta. 42+579.97, 41.95m Left of US 33 Centerline | Date Drilled: 6/21/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to coring)
11.58 m [38.0'] (after coring, includes drilling water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	263.38												
0.15	263.23						Topsoil - 0.152 m [6"]						
[0.5]	[863.6]	4 4 8	.406 [16]	1			Medium dense brown SANDY SILT (A-4a), little clay; micaceous (decomposed sandstone); damp.						
1.52		14 17 31	.432 [17]	2									
1.68	261.70												
[5.5]	[858.6]	50/.10	.102 [4]	3			Soft brown SANDSTONE, micaceous, severely weathered.						
		50/.10	.102 [4]	4									
3.05	260.33												
[10]	[854.1]	Core 1.219 m [48"]	Rec 1.219 m [48"]	RQD 100%			Medium hard brown SANDSTONE, fine-grained, micaceous; weathered.						
4.57							@ 4.27 m [14.0'], soft, severely weathered.						
[15]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 52%									
4.88	258.50												
[16.0]	[848.1]						Soft brown CLAYSTONE, weathered to severely weathered.						
							@ 5.64 m - 6.55 m [18.5' - 21.5'], medium hard to soft.						
6.10		Core 1.524 m [60"]	Rec .406 m [16"]	RQD 20%									
[20]													
7.41	255.97												
7.62	[839.8]						Very soft gray CLAYSTONE; severely weathered						

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-51 | **Location:** Sta. 42+579.97, 41.95m Left of US 33 Centerline | **Date Drilled:** 6/21/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to coring)
11.58 m [38.0'] (after coring, includes drilling water)

STANDARD PENETRATION (N): Blows per 0.30 m ○ 10 20 30 40
Moisture Content - %: PL X – Natural ● – LL X; 10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Standard Penetration (N) / Moisture Content - %
7.62 [25]	255.76 [839.1]	Core 1.524 m [60"]	Rec 1.168 m [46"]	RQD 68%			Very soft gray CLAYSTONE, severely weathered. @ 8.29 m - 8.41 m [27.2' - 27.6'], broken zone.							
8.84 [29.0]	254.54 [835.1]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 72%			Very soft brown SANDSTONE, micaceous; severely weathered.							
9.11 [29.9]	254.27 [834.2]						Very soft gray CLAYSTONE, micaceous; severely weathered.							
9.39 [30.8]	253.99 [833.3]						Hard gray SANDSTONE, argillaceous, micaceous, pyritic, slightly calcareous, thin bedded, moderately weathered to weathered.							
10.67 [35]		Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 97%			@ 10.88 m - 10.97 m [35.7' - 36.0'], brown.							
11.00 [36.1]	252.38 [828.0]						Hard gray SANDSTONE, fine to coasre grained, calcareous moderately weathered.							
11.52 [37.8]	251.86 [826.3]						Hard gray LIMESTONE, slightly weathered.							
12.19 [40]		Core 1.219 m [48"]	Rec 1.118 m [44"]	RQD 88%			@ 12.18 m [40.0'], arenaceous and argillaceous.							
12.62 [41.4]	250.76 [822.7]						Hard brown SANDSTONE, coarse grained, slightly weathered to weathered.							
13.11 [43.0]	250.27 [821.1]						Bottom of Boring - 13.11 m [43.0']							
13.72 [45]														
15.24														

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-52	Location:	Sta. 42+659.82, 124.13 m Rt. of US 33 Centerline	Date Drilled:	7/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to coring)
1.83 m [6.0'] (including core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % PL / Natural / LL
0	255.40													
0.20	255.20						Topsoil - 0.203 m [8"]							
[0.7]	[837.3]	6 7 8	.356 [14]	1		311 [3.25]	Very stiff brown and gray SANDY SILT (A-4a); (decomposed shale); damp.							
0.91	254.49													
[3.0]	[834.9]	50/.13	.102 [4]	2			Very soft brown SHALE, micaceous; severely weathered.							50+
		50/.10	.102 [3]	3										50+
2.29	253.11													
[7.5]	[830.4]	Core 0.762 m [30"]	Rec .610 m [24"]	RQD 33%			Medium hard brown SANDSTONE, argillaceous, micaceous, weathered, broken. @ 2.56 m - 2.71 m [8.4' - 8.9'], near vertical fracture with rust staining.							
3.05														
[10]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 60%										
4.57														
[15]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 67%			@ 4.66 m - 4.75 m [15.3' - 15.6'], near vertical fracture with rust staining. @ 5.36 m - 5.55 m [17.6' - 18.2'], becomes gray.							
6.10														
[20]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 80%			@ 6.22 m - 6.60 m [20.4' - 21.6'], gray with dark gray laminae.							
6.74	248.66													
[22.1]	[815.8]						Medium hard light gray LIMESTONE with brown and gray fine grained sandstone, weathered.							
7.62														

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-52	Location:	Sta. 42+659.82, 124.13 m Rt. of US 33 Centerline	Date Drilled:	7/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to coring)
1.83 m [6.0'] (including core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62	247.78														
[25]	[812.9]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 78%			Medium hard light gray LIMESTONE with brown and gray fine grained sandstone, weathered.								
9.14															
9.25	246.15	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 62%											
[30.4]	[807.6]						Soft brown CLAYSTONE; weathered.								
9.94	245.46														
[32.6]	[805.3]						Medium hard brown SANDSTONE, fine grained micaceous, weathered.								
10.67															
[35]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 83%			@ 10.67 m [35.0'], becomes brown and gray.								
12.19															
[40]		Core 1.524 m [60"]	Rec 1.524 m [57"]	RQD 87%											
13.72															
[45]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%											
15.24															

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-52 | Location: Sta. 42+659.82, 124.13 m Rt. of US 33 Centerline | Date Drilled: 7/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to coring)
1.83 m [6.0'] (including core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
15.24	240.16						
[50]	[787.9]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 78%			Medium hard brown and gray SANDSTONE, fine grained micaceous, moderately weathered.
							@ 15.70 m [51.5'], becomes gray.
							@ 15.88 m - 16.00 m [52.1' - 52.5'], very argillaceous, fractured with clay coating.
16.76							
[55]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 92%			@ 16.79 m [55.1'], occasional dark gray laminae present.
18.29							
[60]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 92%			@ 19.42 m [63.7'], carbonaceous laminae.
19.81							
[65]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 93%			@ 20.07 m - 20.27 m [65.8' - 66.5'], medium grained.
20.79	234.61						
[68.2]	[769.7]						Medium hard gray SILTSTONE; contains sandstone laminae, weathered.
21.34							
21.43	233.97	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 0%			Soft black CARBONACEOUS SHALE with occasional coal layer, weathered.
[70.3]	[767.6]						
22.86	232.54						Bottom of Boring - 22.86 m [75.0']

GRADATION: % Aggregate | % G. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

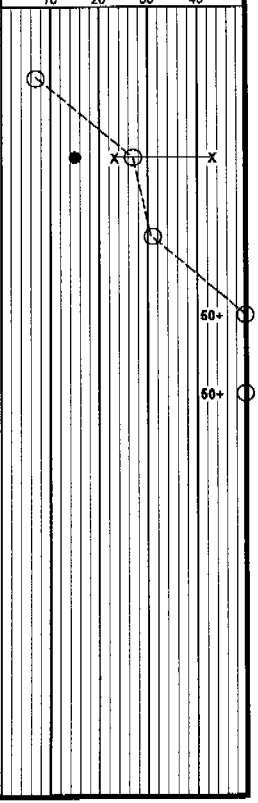
LOG OF: Boring R-53 | **Location:** Sta. 43+090.00, on Centerline of US 33 Centerline | **Date Drilled:** 6/20/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	256.44												
0.09	256.35						Topsoil - 0.102 m [4"]						
[0.3]	[841.0]	2 2 5	.356 [14]	1		359 [3.75]	Very stiff brown SILT AND CLAY (A-6a); little fine to coarse sand; damp.						
0.91	255.53												
[3.0]	[838.4]	5 9 18	.406 [16]	2		431+ [4.5+]	Hard reddish brown CLAY (A-7-6); little fine to coarse sand, trace gravel; damp.	2	5	—	8	44	41
1.52													
[5]		9 11 20	.406 [16]	3		431+ [4.5+]							
2.44	254.00												
[8.0]	[833.3]	27 47 50/.08	.381 [15]	4		431+ [4.5+]	Hard brown SILT AND CLAY (A-6a); little fine to coarse sand (decomposed siltstone); damp.						
3.05													
[10]		35 48 50/.13	.432 [17]	5		431+ [4.5+]							
3.78	252.66												
[12.4]	[828.9]						Bottom of Boring - 3.78 m [12.4']						
4.57													
[15]													
6.10													
[20]													
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-54 | **Location:** Sta. 43+620.08, on Centerline of US 33 Centerline | **Date Drilled:** 6/20/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	264.97													
0.18 [0.6]	264.79 [868.7]						Topsoil - 0.178 m [7"]							
		3 4 4	.457 [18]	1		311 [3.25]	Very stiff brown SILTY CLAY (A-6b); some fine to coarse sand; damp.	0	0	---	35	26	39	
0.91 [3.0]	264.06 [866.3]													
1.37	263.60	8 18	.432				Dense brown SANDY SILT (A-4a); little clay; micaceous; damp.							
1.52 [5.0]	[864.8]	50/.13	[17]	2										50+
		50/.13	.000 [0]	3			Soft brown SANDSTONE, micaceous, severely weathered.							50+
		50/.10	.102 [4]	4										50+
3.05 [10]														
		50/.10	.102 [4]	5										50+
		50/.10	.076 [3]	6										50+
4.57 [15]														
4.97 [16.3]	260.00 [853.0]	50/.10	.102 [4]	7			Bottom of Boring - 4.97 m [16.3']							50+
6.10 [20]														
7.62														

GRADATION

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-55	Location:	Sta. 43+904.98, 0.20 m Right of US 33 Centerline	Date Drilled:	6/19/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % PL / Natural / LL
0	242.31													
0.09 [0.3]	242.22 [794.7]						Topsoil - 0.102 m [4"]							
		3 4 4	.279 [11]	1		431+ [4.5+]	Hard reddish brown CLAY (A-7-6), trace fine to coarse sand, trace gravel; damp.	4	2	---	2	28	67	LL=55%
1.52		5 16 16	.457 [18]	2			@ 1.37 m - 1.52 m [4.5' - 5.0'], slightly organic.							
1.68 [5.5]	240.63 [789.5]													
		23 35 41	.457 [18]	3		431+ [4.5+]	Hard brown SANDY SILT (A-4a), some clay; micaceous (decomposed siltstone); damp.							76
2.44 [8.0]	239.87 [787.0]													
		50/.13	.127 [5]	4			Soft brown SANDSTONE, argillaceous; severely weathered.							50+
3.05 [10]														
3.47 [11.4]	238.84 [783.6]	50/.13	.127 [5]	5										50+
							Bottom of Boring - 3.47 m [11.4']							
4.57 [15]														
6.10 [20]														
7.62														

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

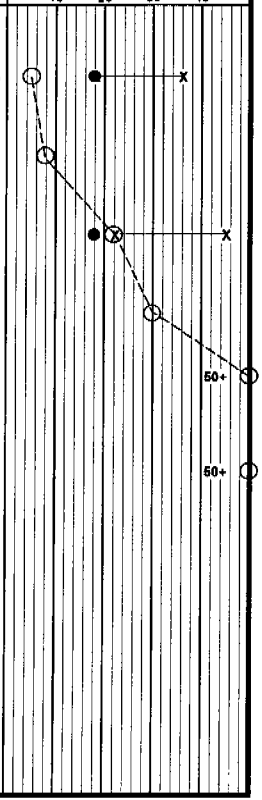
Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-56	Location:	Sta. 43+905.00, 50.03 m Right of US 33 Centerline	Date Drilled:	6/19/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% G. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	231.32						**DESCRIPTION**						
0.24 [0.8]	231.08 [758.1]	3 2 3	.229 [9]	1		431+ [4.5+]	Topsoil - 0.229 m [9"] Hard brown SILTY CLAY (A-6b); "and" fine to coarse sand, trace gravel; damp.	1	6	---	41	18	35
0.91 [3.0]	230.41 [755.9]	4 4 4	.279 [11]	2		335 [3.5]	Very stiff mottled brown and gray CLAY (A-7-6); contains oxidation zones; damp. @ 1.68 m [5.5'], becomes gray; dry-damp.						
1.52 [5]		6 9 13	.356 [14]	3		287 [3.0]		1	1	—	3	35	60
3.05		9 12 18	.457 [18]	4		---							
3.20 [10.5]	228.12 [748.4]	34 50/.08	.203 [8]	5			Very dense gray SILT (A-4b); trace to little clay (decomposed limestone); dry to damp.						
3.96 [13.0]	227.36 [745.9]	33 43 50/.13	.432 [17]	6			Hard gray SILT AND CLAY (A-6a); (decomposed limestone); dry to damp.						
4.54 [14.9]	226.78 [744.0]						Bottom of Boring - 4.54 m [14.9']						
6.10 [20]													
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-57	Location:	Sta. 44+310.00, on Centerline of US 33 Centerline	Date Drilled:	6/19/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	256.86												
0.12	256.74						Topsoil - 0.127 m [5"]						
[0.4]	[842.3]	2											
		2 6	.356 [14]	1		—	Stiff brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.	3	7	—	7	52	32
							@ 0.91 m [3.0'], becomes very dense (decomposed sandstone).						
		16 49	.356										
1.52		50/.08	[14]	2		—							
1.68	255.18												
[5.5]	[837.2]	12		3A		—	Hard gray SILT AND CLAY (A-6a) (decomposed claystone); dry to damp.						
		32 50/.13	.432 [17]	3B		---							
2.44	254.42												
[8.0]	[834.7]	23	.229	4A		---	Hard mottled brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand; contains heavily oxidized patches (decomposed claystone); dry to damp.						
		50/.08	[9]	4B		---							
3.05													
3.20	253.66												
[10.5]	[832.2]	27	.279				Hard gray SILT AND CLAY (A-6a); contains heavily oxidized patches (decomposed claystone); dry to damp.						
		50/.13	[11]	5		---							
3.96	252.90												
[13.0]	[829.7]	50/.13	.127 [5]	6			Soft gray CLAYSTONE, severely weathered.						
4.57													
[15]													
5.00	251.86	50/.13	.127 [5]	7									
[16.4]	[826.3]						Bottom of Boring - 5.00 m [16.4']						
6.10													
[20]													
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+
50+
50+
50+

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-58 | Location: Sta. 44+860.13, 28.49m Rt. of US 33 Centerline | Date Drilled: 05/24/00 & 05/25/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 3.35 m [11.0'] (in augers after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	259.30												
0.08 [0.3]	259.22 [850.4]						Topsoil - 0.076 m [3"]						
		2 2 5	.254 [10]	1		—	Very stiff reddish brown SILTY CLAY (A-6b); trace fine sand; moist.	13	0	—	2	25	60
0.91 [3.0]	258.39 [847.7]												
		15 21 22	.356 [14]	2			Dense brown GRAVEL WITH SAND AND SILT (A-2-4); dry to damp.						
1.52 [5.5]	257.62 [845.2]												
		9 24 41	.381 [15]	3		---	Hard light brown SILT AND CLAY (A-6a); dry to damp.						
		9 10 50/.08	.381 [15]	4		---	@ 2.44 m - 3.81 m [8.0' - 12.5'], trace gravel, trace fine to coarse sand (decomposed siltstone).						
3.05 [10]													
		50/.10	.102 [4]	5		---							
3.81 [12.5]	255.49 [838.2]												
		50/.08	.076 [3]	6		---	Hard brown SILT AND CLAY (A-6a);, trace fine to coarse sand, trace gravel (decomposed siltstone); dry to damp.						
4.57 [15]	254.73 [835.7]	Core 1.219 m [48"]	Rec 1.118 m [44"]	RQD 85%			Hard gray SANDSTONE, micaceous, slightly weathered; cross-bedded. @ 4.79 m - 4.88 m [15.7' - 16.0'], brown. @ 5.12 m - 5.15 m [16.8' - 16.9'], brown. @ 5.61 m - 5.88 m [18.4' - 19.3'], brown.						
5.88	253.42	Core	Rec	RQD									
6.10 [20]	[831.4]	1.524 m [60"]	1.321 m [52"]	35%			Hard gray SANDSTONE, micaceous, thin bedded; slightly weathered. @ 6.61 m [21.7'], brown, weathered. @ 6.66 m - 7.06 m [21.9' - 23.1'], Near vertical fractures with rust staining.						
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

LL=51%
65
50+
50+
50+

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-58 | Location: Sta. 44+860.13, 28.49m Rt. of US 33 Centerline | Date Drilled: 05/24/00 & 05/25/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 3.35 m [11.0'] (in augers after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62	251.68														
[25]	[825.7]	Core 1.524 m [60"]	Rec 1.321 m [52"]	RQD 47%			Medium hard gray CLAYSTONE, micaceous, weathered. @ 7.68 m - 8.02 m [25.2' - 26.3'], broken with rust staining								
9.14		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 28%			@ 8.78 m - 8.90 m [28.8' - 29.2'], limestone. @ 8.90 m [29.2'], contains limestone clasts. @ 9.02 m [29.6'], strongly weathered.								
[30]							@ 9.54 m - 9.91 m [31.3' - 32.5'], near vertical fracture with rust staining.								
10.67		Core 1.524 m [60"]	Rec 1.067 m [42"]	RQD 15%			@ 10.36 m - 11.28 m [34.0' - 37.0'], broken with rust staining.								
[35]															
11.89	247.41														
[39.0]	[811.7]	Core 1.524 m [60"]	Rec .610 m [24"]	RQD 7%			Medium hard red and gray CLAYSTONE; weathered.								
12.19							@ 11.89 m - 13.41 m [39.0' - 44.0'], gas encountered.								
[40]															
13.41	245.89														
[44.0]	[806.7]	Core 1.524 m [60"]	Rec 1.245 m [49"]	RQD 70%			Hard gray SILTSTONE with LIMESTONE and SANDSTONE laminations and clasts, micaceous, pyritic, weathered to moderately weathered.								
13.72															
[45]															
15.24															

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-58 | **Location:** Sta. 44+860.13, 28.49m Rt. of US 33 Centerline | **Date Drilled:** 05/24/00 & 05/25/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 3.35 m [11.0'] (in augers after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m [/in]	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
15.24 [50]	244.06 [800.7]		Core 1.524 m [60"]	Rec 1.321 m [52"]	RQD 43%			Hard gray SILTSTONE with LIMESTONE and SANDSTONE laminations and clasts, micaceous, pyritic, weathered to moderately weathered.
16.76 [55]			Core 0.762 m [30"]	Rec .762 m [30"]	RQD 83%			
17.22 [56.5]	242.08 [794.2]							Bottom of Boring - 17.22 m [56.5']
18.29 [60]								
19.81 [65]								
21.34 [70]								
22.86								

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

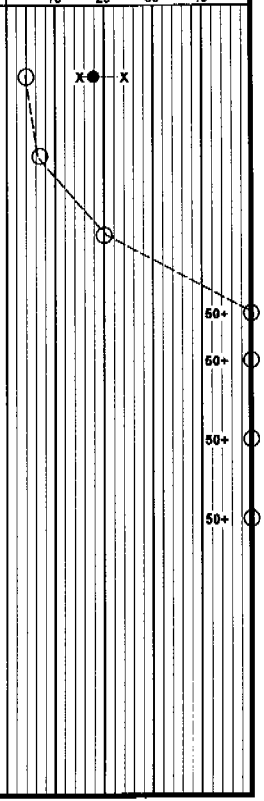
Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-59	Location:	Sta. 44+920.13, 37.85m Lt. of US 33 Centerline	Date Drilled:	05/22/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

STANDARD PENETRATION (N)
Blows per 0.30 m

Moisture Content - %
PL Natural LL

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	222.69												
0.10 [0.3]	222.59 [730.3]						Topsoil - 0.102 m [4"]						
		1 1 3	.254 [10]	1		96 [1.0]	Medium stiff to stiff brown SANDY SILT (A-4a), some clay; slightly organic; damp to moist.	0	10	—	42	23	25
0.91 [3.0]	221.78 [727.6]												
		2 3 4	.229 [9]	2		239 [2.5]	Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.						
1.52 [5]							@ 1.68 m [5.5'], becomes brown and gray and hard.						
		4 9 11	.356 [14]	3		431+ [4.5+]							
2.44 [8.0]	220.25 [722.6]												
		18 38 50/.10	.305 [12]	4			Very soft to soft gray CLAYSTONE, carbonaceous, severely weathered to weathered.						
3.05 [10]													
		50/.08	.076 [3]	5									
		50/.10	.102 [4]	6									
4.57 [15]							@ 4.72 m [15.5'], becomes red and gray.						
5.00 [16.4]	217.69 [714.2]	50/.13	.127 [5]	7			Bottom of Boring - 5.00 m [16.4']						
6.10 [20]													
7.62													



Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-60 | **Location:** Sta. 44+919.65, 53.53m Lt. of US 33 Centerline | **Date Drilled:** 05/23/00

WATER OBSERVATIONS:
Water seepage at: 1.67 m [5.5'], 3.20 m [10.5']
Water level at completion: 3.35 m [11.0'] (after cring, including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	220.34													
		2 2 2	.203 [8]	1			Very loose to loose brown GRAVEL WITH SAND AND SILT (A-2-4), trace to little clay; moist.	33	16	---	28	16	7	
0.91 [3.0]	219.43 [719.9]													
		1 2 2	.254 [10]	2			Very loose to loose gray COARSE AND FINE SAND (A-3a), trace silty clay; damp to moist.							
1.52 [5.5]	218.67 [717.4]													
		50/.13	.102 [4]	3			Soft gray CLAYSTONE, severely weathered to weathered.							50+
		50/.13	.127 [5]	4										50+
3.05 [10.5]	217.14 [712.4]						Soft red and gray SHALE, severely weathered.							
3.47 [11.4]	216.87 [711.5]	50/.13	.127 [5]	5										50+
							Bottom of Boring - 3.47 m [11.4']							
4.57 [15]														
6.10 [20]														
7.62														

GRADATION

Moisture Content - % (PL, Natural, LL)

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-61	Location:	Sta. 45+039.80, 28.65m Lt. of US 33 Centerline	Date Drilled:	05/30-31/00

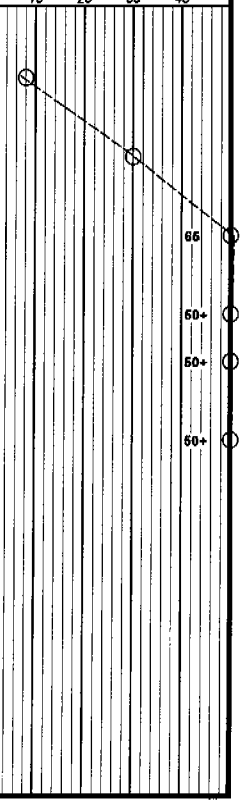
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 1.68 m [5.5'] (after coring, including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
0	248.38						
0.06	248.32						Topsoil - 0.051 m [2"]
[0.2]	[814.7]	2					
		4	.229	1		239	Very stiff brown SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; contains roots; damp.
0.92	247.46	4	[9]			[2.5]	
[3]	[811.9]	8					
		13	.356	2		431+	Hard reddish brown SILT AND CLAY (A-6a), trace fine to coarse sand; calcareous; damp.
1.52		17	[14]			[4.5+]	
[5]		15					
		30	.152	3		431+	
2.44	245.94	35	[6]			[4.5+]	
[8]	[806.9]	20					
		38	.330	4			Soft gray CLAYSTONE, micaceous, severely weathered; Limestone clasts.
3.05		50/.08	[13]				
[10]							
		50/.13	.127	5			
			[5]				
		50/.13	.127	6			
4.57	243.81		[5]				
[15]	[799.9]	Core 1.219 m [48"]	Rec .965 m [38"]	RQD 25%			Soft red, gray, and brown CLAYSTONE, micaceous, severly weathered, arenaceous, contains limestone, siltstone, and sandstone clasts. @ 4.57 m - 7.32 m [15.0' - 24.0'], gas encountered.
6.10		Core 1.524 m [60"]	Rec .584 m [23"]	RQD 12%			
[20]							@ 7.01 m [23.0'], very soft to soft.
7.62							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-61 | Location: Sta. 45+039.80, 28.65m Lt. of US 33 Centerline | Date Drilled: 05/30-31/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 1.68 m [5.5'] (after coring, including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
7.62 [25]	240.76 [789.9]	Core 1.524 m [60"]	Rec .762 m [30"]	RQD 0%			Soft red, gray, and brown CLAYSTONE, micaceous, severly weathered, arenaceous, contains limestone, siltstone, and sandstone clasts.
9.14 [30]		Core 1.524 m [60"]	Rec .483 m [19"]	RQD 0%			@ 7.32 m - 10.36 m [24.0' - 34.0'], gas encountered.
10.36 [34.0]	238.02 [780.9]						Bottom of Boring - 10.36 m [34.0']
10.67 [35]							
12.19 [40]							
13.72 [45]							
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-62 | **Location:** Sta. 45+040.16, 61.75m Lt. of US 33 Centerline | **Date Drilled:** 05/31/00 & 06/01/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 1.52 m [5.0'] (in augers after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
0	256.62						
0.08 [0.3]	256.54 [841.7]						Topsoil - 0.076 m [3"]
		3 4 7	.356 [14]	1		431+ [4.5+]	Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; contains roots; damp.
0.91 [3.0]	255.71 [838.9]						
		35 50/.08	.152 [6]	2			Soft brown SILTSTONE, micaceous, severely weathered.
1.52 [5]							
		50/.10	.076 [3]	3			
		50/.08	.076 [3]	4			
3.05 [10]	253.57 [831.9]	Core 1.219 m [48"]	Rec 1.016 m [40"]	RQD 67%			Soft brown SANDSTONE, micaceous, moderately weathered, slightly broken to massive.
4.57 [15]		Core 1.524 m [60"]	Rec 1.245 m [49"]	RQD 80%			@ 4.57 m - 5.79 m [15.0' - 19.0'], weakly calcareous.
6.10		Core 1.524 m [60"]	Rec 1.372 m [54"]	RQD 38%			@ 5.79 m - 6.31 m [19.0' - 20.7'], becomes broken to very broken.
6.31 [20.7]	250.31 [821.2]						Very soft gray CLAYSTONE, weathered, slightly broken; occasionally calcareous in small bands.
7.62							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

60+ 60+ 60+

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-62	Location:	Sta. 45+040.16, 61.75m Lt. of US 33 Centerline	Date Drilled:	05/31/00 & 06/01/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 1.52 m [5.0'] (in augers after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m [ft]	Sample No. Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62	249.00						
[25]	[816.9]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 40%			Very soft gray CLAYSTONE, weathered, slightly broken, occasionally calcareous in small bands.
9.14		Core 1.524 m [60"]	Rec 1.143 m [45"]	RQD 27%			@ 8.84 m - 10.36 m [29.0' - 34.0'], lost water after run 4
9.24	247.38						
[30.3]	[811.6]						Soft gray SILTSTONE, micaceous, weathered, broken to slightly broken. @ 9.75 m - 10.36 m [32.0' - 34.0'], very broken, strongly weathered.
10.67	245.95	Core 1.524 m [60"]	Rec .660 m [26"]	RQD 0%			@ 10.36 m - 14.94 m [34.0' - 49.0'], gas encountered.
[35]	[806.9]						Soft reddish brown CLAYSTONE, severely weathered, very broken.
11.52	245.10						
[37.8]	[804.1]						Medium hard gray LIMESTONE, weathered, slightly broken.
12.19		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 77%			
12.28	244.34						
[40.3]	[801.6]						Medium hard gray SILTSTONE, micaceous, laminated, weathered, slightly broken.
13.72		Core 1.524 m [60"]	Rec 1.118 m [44"]	RQD 10%			
[45]							
14.17	242.45						
[46.5]	[795.4]						Soft reddish brown CLAYSTONE, calcareous, severely weathered, very broken, contains coarse sand and gravel clasts.
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client: Ohio Department of Transportation	**Project:** ATH-33-40.981		**Job No.** 9821-3200.00
LOG OF: Boring R-62	**Location:** Sta. 45+040.16, 61.75m Lt. of US 33 Centerline	**Date Drilled:** 05/31/00 & 06/01/00	STANDARD PENETRATION (N) Blows per 0.30 m

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Sample No.	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	WATER OBSERVATIONS: Water seepage at: none. Water level at completion: 1.52 m [5.0'] (in augers after coring)	GRADATION: % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % PL Natural LL
15.24	241.38							**DESCRIPTION**							
[50]	[791.9]	Core 1.524 m [60"]		Rec .940 m [37"]	RQD 0%			Soft reddish brown CLAYSTONE, calcareous, severely weathered, very broken, contains coarse sand and gravel clasts.							
								@ 14.94 m - 17.98 m [49.0' - 59.0'], gas encountered.							
16.76		Core 1.524 m [60"]		Rec .305 m [12"]	RQD 7%										
[55]								@ 17.68 m - 17.98 m [58.0' - 59.0'], arenaceous.							
18.29		Core 0.61 m [24"]		Rec .229 m [9"]	RQD 17%										
[60]								@ 18.29 m [60.0'], becomes gray.							
18.59	238.03														
[61.0]	[780.9]							Bottom of Boring - 18.59 m [61.0']							
19.81															
[65]															
21.34															
[70]															
22.86															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-63	Location:	Sta. 45+019.99, 35.99 m Rt. of US 33 Centerline	Date Drilled:	05/23/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	226.62													
0.06 [0.2]	226.56 [743.3]						Topsoil - 0.051 m [2"]							
		6 6 8	.203 [8]	1		1.50	Medium stiff brown and gray SANDY SILT (A-4a); little clay, trace gravel; contains sandstone fragments; damp.	1	17	---	37	26	19	
0.91 [3.0]	225.71 [740.5]													
		11 17 22	.127 [5]	2			Hard brown COARSE AND FINE SAND (A-3a); trace to little silty clay, trace gravel; damp.							
1.52 [5.5]	224.95 [738.0]													
		50/.08	.076 [3]	3			Soft brown SANDSTONE, severely weathered.							50+
2.44 [8.0]	224.13 [735.3]						@ 2.44 m [8.0'], becomes brown and gray.							
2.68 [8.8]	223.94 [734.7]	50/.10	.102 [4]	4										50+
3.05 [10]							Bottom of Boring - 2.68 m [8.8']							
4.57 [15]														
6.10 [20]														
7.62														

GRADATION

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-64 | **Location:** Sta. 45+020.00, 73.51 m Rt. of US 33 Centerline | **Date Drilled:** 05/23/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	215.93													
0.06 [0.2]	215.87 [708.2]						Topsoil - 0.051 m [2"]							
		2 2 4	.203 [8]	1		192 [2.0]	Stiff to very stiff brown SILT AND CLAY (A-6a); trace fine to coarse sand, trace gravel; moist. @ 0.73 m [2.4'], thin organic layer.	7	11	—	23	31	29	
0.91 [3.0]	215.02 [705.4]													
		50/.10	.102 [4]	2			Soft gray CLAYSTONE, weathered.							
1.52 [5.3]	214.31 [703.1]						Bottom of Boring - 1.62 m [5.3']							
3.05 [10]														
4.57 [15]														
6.10 [20]														
7.62														

GRADATION

Moisture Content - %
PL Natural LL

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-65	Location:	45+399.98, 27.51 m Rt of US 33 Centerline	Date Drilled:	6/15/00-6/16/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none before coring
12.19 m [40.0'] after coring

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL Natural LL
0	236.60													10 20 30 40	
0.10 [0.3]	236.50 [775.9]						Topsoil - 0.102 m [4"]								
		5 6 23	.381 [15]				Dense brown fine to coarse SAND (SP), little silt; damp.								
0.91 [3]	235.69 [773.3]														
		50/.10	.102 [4]				Soft brown SANDSTONE; severely weathered.								50+ 50+
1.52 [5]															
1.98 [6.5]	234.62 [769.6]	50/.10	.102 [4]												50+
		Core 0.762 m [30"]	Rec .432 m [17"]	RQD 30%			Soft to medium hard brown SANDSTONE; severely weathered; slightly broken to broken; fine to coarse grained; weakly cemented; iron staining throughout.								
3.05 [10]		Core 1.524 m [60"]	Rec .660 m [26"]	RQD 0%			@ 3.96 m - 4.27 m [13.0' - 14.0'], weathered to sand, soft to medium hard.								
4.57 [15]		Core 1.524 m [60"]	Rec .965 m [38"]	RQD 63%			@ 4.42 m - 5.58 m [14.5' - 18.3'], slightly broken.								
6.10 [20]		Core 1.524 m [60"]	Rec 1.321 m [52"]	RQD 87%			@ 6.10 m - 7.47 m [20.0' - 24.5'], massive.								
7.62							@ 7.47 m - 8.99 m [24.5' - 29.5'], broken to slightly								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-65	Location:	45+399.98, 27.51 m Rt of US 33 Centerline	Date Drilled:	6/15/00-6/16/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none before coring
12.19 m [40.0'] after coring

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	DESCRIPTION
7.62 [25]	228.98 [751.2]	Core 1.524 m [60"]	Rec .940 m [37"]	RQD 40%									Soft to medium hard brown SANDSTONE; severely weathered; slightly broken to broken; fine to coarse grained; weakly cemented; iron staining throughout.
9.14 [30]		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 98%									@ 8.99 m - 11.28 m [29.5' - 37.0'], massive.
10.67 [35]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 88%									@ 11.28 m - 13.11 m [37.0' - 43.0'], broken to slightly broken.
12.19 [40]		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 82%									
13.26 [46.5]	223.34 [732.7]												Very soft gray CLAYSTONE; severely weathered; very broken.
13.42 [45.0]	223.18 [732.2]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 75%									Soft to medium hard light brown SANDSTONE, argelaceous; laminated; weathered; with claystone lenses to 1". @ 14.33 m - 15.09 m [47.0' - 49.5'], contains thin <.25" clay and coal seams.
15.24													

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-65 | Location: 45+399.98, 27.51 m Rt of US 33 Centerline | Date Drilled: 6/15/00-6/16/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none before coring
12.19 m [40.0'] after coring

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
15.24 [50]	221.36 [726.2]	Core 0.762 m [30"]	Rec .762 m [30"]	RQD 40%			Soft gray CLAYSTONE; very broken; with seams of coal to 2".								
15.85 [52.0]	220.75 [724.2]						Bottom of Boring - 15.85 m [52.0']								
16.76 [55]															
18.29 [60]															
19.81 [65]															
21.34 [70]															
22.86															

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring B-66 | **Location:** Sta. 45+400.03, 29.99m Lt. of US 33 Centerline | **Date Drilled:** 05/26/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	220.54						Topsoil - 0.102 m [4"]						
0.10 [0.3]	220.44 [723.2]	4 5 6	.102 [4]	1			Medium dense brown COARSE AND FINE SAND (A-3a); little silty clay, trace gravel; damp.						
0.92 [3]	219.62 [720.5]	2 2 4	.305 [12]	2		239 [2.5]	Very stiff brown SILT AND CLAY (A-6a); some fine to coarse sand; laminated; damp.	0	8	—	14	45	34
1.52 [5]		6 17 23	.356 [14]	3		239 [2.5]							
3.05 [10]		10 17 21	.406 [16]	4		—	@ 3.20 m [10.5'], becomes hard.						
4.00 [13]	216.54 [710.4]	6 10 15	.305 [12]	5		431+ [4.5+]	@ 3.78 m [12.4'], iron staining present.						
4.57 [15]	215.97 [708.6]	14 17 18	.254 [10]	6			Soft gray CLAYSTONE, weathered.						
6.10 [20]							Bottom of Boring - 4.57 m [15.0']						
7.62													

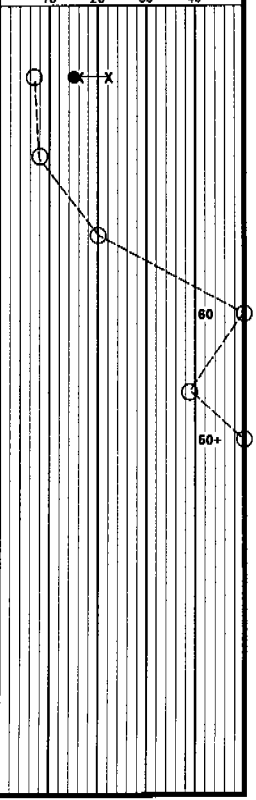
Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-67	Location:	Sta. 45+399.95, 45.53m Lt. of US 33 Centerline	Date Drilled:	05/26/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	217.70						Topsoil - 0.102 m [4"]						
0.10 [0.3]	217.60 [713.9]	3 3 4	.356 [14]	1		287 [3.0]	Very stiff brown SANDY SILT (A-4a); trace gravel; contains roots; damp.	0	8	—	31	38	23
1.52 [5]		3 4 4	.406 [16]	2		192 [2.0]							
		5 9 11	.406 [16]	3		383 [4.0]							
2.44 [8]	215.26 [706.2]	5 30 30	.356 [14]	4			Soft black COAL, weathered.						
3.20 [10.5]	214.50 [703.8]	8 16 23	.432 [17]	5			Soft gray CLAYSTONE, severely weathered to weathered.						
4.24 [13.9]	213.46 [700.3]	50/.13	.127 [5]	6									
4.57 [15]							Bottom of Boring - 4.24 m [13.9']						
6.10 [20]													
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-68	Location:	45+703.56, 0.06 m Lt. Of US 33 Centerline	Date Drilled:	5-11-00

WATER OBSERVATIONS:
Water seepage at: 4.0 m [13']
Water level at completion: 4.88 m [16.0'] (Inside the augers)
1.22 m [4.0'] (Outside the augers)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	204.94													
0.15 [0.5]	204.79 [671.9]	1 2 2	.356 [14]	1	1	96 [1.0]	Topsoil - 0.152 m [6"] Soft to medium stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; contains roots; slightly organic; moist. @ 0.70 m - 0.76 m [2.3' - 2.5'], sand seam.							
1.52		1 WOH 1	.000 [0]	2	2									
1.68 [5.5]	203.26 [666.9]				3		Soft brown SILTY CLAY (A-6b), some fine to coarse sand; moist.							
2.04 [6.7]	202.90 [665.7]	WOH 1 2	.305 [12]	3A		72 [0.75]								
2.44 [8]	202.50 [664.4]			3B			Very loose brown COARSE AND FINE SAND (A-3a), little to some gravel, trace to little silty clay; moist.							
3.05 [10]		6 10 10	.457 [18]	4			Soft gray to dark gray CLAYSTONE; laminated; severely weathered to weathered.							
		50/.13	.127 [5]	5										50+
		50/.08	.076 [3]	6										50+
4.57 [15]														
4.97 [16.3]	199.97 [656.1]	50/.08	.076 [3]	7										50+
							Bottom of Boring - 4.97 m [16.3']							
6.10 [20]														
7.62														

GRADATION

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-69 | **Location:** Sta. 45+805.25, 27.86m Rt. of US 33 Centerline | **Date Drilled:** 5-11-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	213.89												
0.05	213.84						Topsoil - 0.051 m [2"]						
[0.2]	[701.6]	2											
		2	.152				Stiff to very stiff brown SILT AND CLAY (A-6a); little fine to coarse sand, trace gravel, contains roots; moist.						
		3	[6]	1				7	13	---	24	38	17
0.92	212.97												
[3]	[698.7]												
1.19	212.70	6		2A		—	Very stiff gray and dark gray SILT AND CLAY (A-6a); trace to little fine to coarse sand; damp to moist.						
[3.9]	[697.8]	20	.406				@ 1.13 m - 1.16 m [3.7' - 3.8'], organic layer.						
1.52		24	[16]	2B									
[5]							Medium dense gray COARSE AND FINE SAND (A-3a); trace to little silty clay, laminated; damp.						
		8											
		12	.229										
		14	[9]	3									
2.71	211.18	8											
[8.9]	[692.8]	12	.305										
3.05		50/.08	[12]	4			Soft brown and gray CLAYSTONE, severely weathered to highly weathered.						
[10]							@ 3.20 m [10.5'], becomes gray.						
3.44	210.45	50/.08	.076	5									
[11.3]	[690.4]		[3]				Bottom of Boring - 3.44 m [11.3']						
4.57													
[15]													
6.10													
[20]													
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-70	Location:	Sta. 45+860.02, 0.03 m Lt. of US 33 Centerline	Date Drilled:	5-11-00

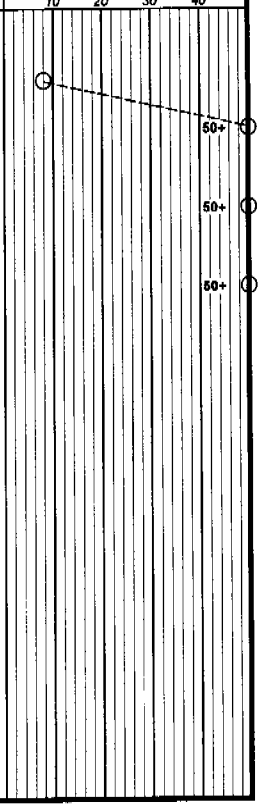
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.15 m [0.5'] (after coring)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	233.15						
0.10	233.05						Topsoil - 0.102 m [4"]
[0.3]	[764.6]	4 3 .5	.203 [8]	1			Loose dark brown GRAVEL WITH SAND AND SILT (A-2-4); damp.
0.92	232.23						
[3]	[761.9]	50/.10	.102 [4]	2			Soft brown and gray SANDSTONE, slightly micaceous, severely weathered to weathered.
1.52							
[5]		50/.08	.076 [3]	3			
		50/.08	.076 [3]	4			
3.05	230.10						
[10]	[754.9]	Core 1.219 m [48"]	Rec 1.143 m [45"]	RQD 94%			Medium hard to hard brown and gray SANDSTONE, micaceous, weathered, slightly broken.
4.57		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 92%			@ 4.63 m [15.2'], weathered to slightly weathered, poorly cemented. @ 4.79 m [15.7'], clay seam with rust stainins.
[15]							
5.24	227.91						
[17.2]	[747.7]						Medium hard gray SANDSTONE; moderately weathered, contains coal blossums, poorly cemented.
6.10		Core 0.762 m [30"]	Rec .762 m [30"]	RQD 77%			
[20]							
6.49	226.66						
[21.3]	[743.6]	Core 0.762 m [30"]	Rec .686 m [27"]	RQD 33%			Soft black COAL and carbonaceous SHALE, very broken, weathered. @ 6.55 m - 7.32 m [21.5' - 24.0'], gas encountered. @ 6.86 m [22.5'], becomes dark gray. @ 7.35 m [24.1'], becomes interbedded with gray and dark brown SANDSTONE.
7.62							



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-70	Location:	Sta. 45+860.02, 0.03 m Lt. of US 33 Centerline	Date Drilled:	5-11-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.15 m [0.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
7.62	225.53												
[25]	[739.9]	Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 87%			Hard gray SANDSTONE, micaceous, moderately weathered, contains thin dark gray laminae. @ 8.69 m - 8.78 m [28.5' - 28.8'], claystone.						
8.84	224.31												
[29.0]	[735.9]						Bottom of Boring - 8.84 m [29.0']						
9.14													
[30]													
10.67													
[35]													
12.19													
[40]													
13.72													
[45]													
15.24													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-71	Location:	Sta. 45+899.81, 28.09 m Lt. of US 33 Centerline	Date Drilled:	5-9-00 & 5-10-00

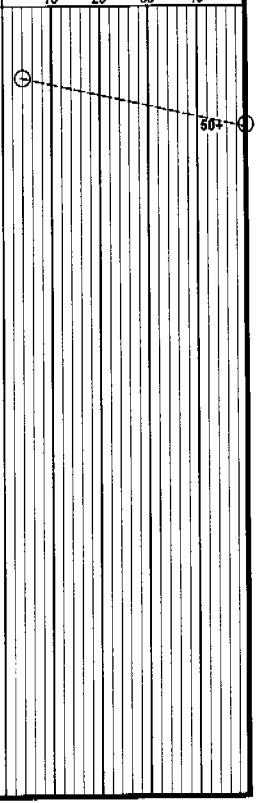
WATER OBSERVATIONS:
Water seepage at: 0.67 m [2.2']
Water level at completion: none (before coring)
4.88 m [16.0'] (after coring)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	247.88						
0.13	247.73						Topsoil - 0.127 m [5"]
[0.4]	[812.8]	1 1 3	.178 [7]	1			Stiff brown SILT AND CLAY (A-6a), trace to little fine to coarse sand; contains roots; damp.
0.92	246.94						
[3]	[810.2]	50/.08	.076 [3]	2			Soft brown SANDSTONE, slightly micaceous, severely weathered to weathered.
1.52	246.34						
[5]	[808.2]	Core 1.219 m [48"]	Rec 1.118 m [44"]	RQD 92%			Medium hard to hard, light gray SANDSTONE, calcareous, micaceous, weathered.
							@ 2.01 m - 2.13 m [6.6' - 7.0'], ligh angle fracture, severely weathered.
2.50	245.36						
[8.2]	[805.0]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Hard, gray LIMESTONE, slightly micaceous, weathered to moderately weathered.
3.05							
[10]							@ 3.64 m [11.9'], low angle fracture.
4.27	243.59						
[14.0]	[799.2]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard to hard, brown SANDSTONE, micaceous, moderately weathered, slightly broken.
4.57							
[15]							
5.03	242.83						
[16.5]	[796.7]						Hard, light gray LIMESTONE, slightly micaceous, moderately weathered to weathered, contains brown and gray micaceous sandstone layers.
		Core 1.524 m [60"]	Rec 1.067 m [42"]	RQD 70%			
6.10							@ 6.04 m [19.8'], becomes broken.
[20]							@ 6.55 m [21.5'], fractured with calcite staining.
7.25	240.61						
[23.8]	[789.4]						Medium hard to hard, brown and gray SANDSTONE, micaceous, slightly broken, contains limestone clasts.
7.62							



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-71	Location:	Sta. 45+899.81, 28.09 m Lt. of US 33 Centerline	Date Drilled:	5-9-00 & 5-10-00

WATER OBSERVATIONS:
Water seepage at: 0.67 m [2.2']
Water level at completion: none (before coring)
4.88 m [16.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
7.62 [25]	240.24 [788.2]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard to hard, brown and gray SANDSTONE, micaceous, slightly broken, contains limestone clasts.								
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 7.32 m - 11.89 m [24.0' - 39.0'], gas encountered.								
							@ 10.30 m [33.8'], near vertical healed fracture.								
10.67 [35]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 10.67 m - 10.73 m [35.0' - 35.2'], low angle clay coated fracture.								
12.19 [40]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 90%			@ 12.01 m - 12.16 m [39.4' - 39.9'], very broken. @ 12.16 m - 12.34 m [39.9' - 40.5'], argillaceous. @ 12.34 m [40.5'], dark brown laminae becomes evident.								
13.72 [45]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 13.99 m [45.9'], very thin clay seam. @ 14.08 m [46.2'], very thin clay seam. @ 14.11 m [46.3'], very thin clay seam. @ 14.17 m [46.5'], becomes very broken, highly fractured.								
15.24							@ 14.94 m - 16.46 m [49.0' - 54.0'], gas encountered.								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-71	Location:	Sta. 45+899.81, 28.09 m Lt. of US 33 Centerline	Date Drilled:	5-9-00 & 5-10-00

WATER OBSERVATIONS:
Water seepage at: 0.67 m [2.2']
Water level at completion: none (before coring)
4.88 m [16.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
15.24	232.62						**DESCRIPTION**								
15.33 [50.3]	232.53 [762.9]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard to hard, brown and gray SANDSTONE.								
15.54 [51.0]	232.32 [762.2]						Soft to medium hard, gray CLAYSTONE, weathered.								
15.85 [52.0]	232.01 [761.2]						Medium hard, gray SILTSTONE, weathered. @ 15.79 m [51.8'], brown clay seams.								
16.55 [54.3]	231.31 [758.9]	Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 92%			Medium hard, brown and gray SANDSTONE, micaceous, weathered.								
16.76 [55]							Hard, gray, fine grained SANDSTONE, micaceous, moderately weathered								
17.47 [57.3]	230.39 [755.9]						@ 16.55 m - 16.92 m [54.3' - 55.5'], argillaceous.								
18.29 [60]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 90%			Medium hard, brown and gray, SANDSTONE, micaceous, weathered, broken. @ 17.83 m [58.5'], clay seam. @ 18.29 m - 18.41 m [60.0' - 60.4'], high angle fracture.								
19.81		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 88%			@ 19.45 m [63.8'], middle angle fracture. @ 19.51 m - 22.56 m [64.0' - 74.0'], gas encountered.								
19.87 [65.2]	227.99 [748.0]						Hard, gray SANDSTONE, argillaceous, micaceous, weathered. @ 19.87 m - 20.06 m [65.2' - 65.8'], contains clay interbeds.								
21.34 [70]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 87%			@ 21.18 m [69.5'], coal becomes evident.								
22.37 [73.4]	225.49 [739.8]						Soft, black COAL, with carbonaceous shale, mod. weathered.								
22.52 [73.9]	225.34 [739.3]						Hard, gray SANDSTONE, argillaceous, micaceous, weathered								
22.86															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-71	Location:	Sta. 45+899.81, 28.09 m Lt. of US 33 Centerline	Date Drilled:	5-9-00 & 5-10-00

WATER OBSERVATIONS:
Water seepage at: 0.67 m [2.2']
Water level at completion: none (before coring)
4.88 m [16.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
22.86 [75]	225.00 [738.2]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Hard, gray SANDSTONE, argillaceous, micaceous, weathered.						
24.08 [79.0]	223.78 [734.2]						Bottom of Boring - 24.08 m [79.0']						
24.38 [80]													
25.91 [85]													
27.43 [90]													
28.96 [95]													
30.48													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-72	Location:	Sta. 45+899.94, 48.58 m Lt. of US 33 Centerline	Date Drilled:	5-8-00 & 5-9-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
13.56 m [44.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m; Moisture Content - % PL Natural LL
0	248.15						**DESCRIPTION**							10 20 30 40
0.33	247.82						Topsoil - 0.33 m [13"]							
[1.1] 0.55	[813.1] 247.60	3 11	.406 [16]		1		Very stiff reddish brown SILTY CLAY (A-6b), trace fine to coarse sand; damp.							
[1.8] 0.92	[812.3] 247.23	21					Dense brown COARSE AND FINE SAND (A-3a), little fine to coarse sand; damp.							
[3] 1.52	[811.1]	50/.08	.076 [3]		2		Soft brown SANDSTONE, argelaceous, severely weathered to weathered.							50+
[5]		50/.08	.076 [3]		3									50+
		50/.08	.076 [3]		4									50+
3.05	245.10													
[10]	[804.1]	Core 1.219 m [48"]	Rec 1.168 m [46"]		RQD 96%		Medium hard to hard, brown, SANDSTONE, micaceous, contains dark brown laminae and claystone clasts, moderately weathered.							
4.57		Core 1.524 m [60"]	Rec 1.524 m [60"]		RQD 100%									
[15]														
6.10		Core 1.524 m [60"]	Rec 1.524 m [60"]		RQD 100%		@ 5.79 m - 7.32 m [19.0' - 24.0'], gas encountered.							
[20]							@ 6.55 m [21.5'], becomes argillaceous and weathered.							
7.62							@ 7.56 m [24.8'], low angle fracture.							

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-72 | Location: Sta. 45+899.94, 48.58 m Lt. of US 33 Centerline | Date Drilled: 5-8-00 & 5-9-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
13.56 m [44.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % PL Natural LL
7.62 [25]	240.53 [789.1]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 92%			Medium hard to hard, brown, SANDSTONE, micaceous, argillaceous, contains dark brown laminae and claystone clasts, weathered.							
9.14 [30]		Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 95%										
10.67 [35]		Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 97%			@ 10.61 m [34.8'], brown and gray.							
12.19 [40]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
13.72 [45]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 87%			@ 13.56 m [44.5'], thin claystone layers become evident.							
15.24							@ 14.54 m [47.7'], clay seam. @ 14.72 m - 14.84 m [48.3' - 48.7'], very broken with clay seams. @ 14.87 m [48.8'], clay seam. @ 15.00 m - 15.21 m [49.2' - 49.9'], broken.							

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

Moisture Content - % PL Natural LL: 10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-72 | **Location:** Sta. 45+899.94, 48.58 m Lt. of US 33 Centerline | **Date Drilled:** 5-8-00 & 5-9-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
13.56 m [44.5'] (after coring)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N): Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
15.24 [50]	232.91 [764.1]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 82%			Medium hard to hard, brown and gray, SANDSTONE, micaceous, weathered.
							@ 16.58 m [54.4'], low angle clay filled fracture. @ 16.73 m [54.9'], middle angle clay filled fracture.
16.76 [55]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 85%			@ 16.82 m [55.2'], claystone clast. @ 16.92 m [55.5'], low angle clay filled fracture. @ 17.04 m [55.9'], 0.05' clay seam. @ 17.10 m - 17.53 m [56.1' - 57.5'], argillaceous with claystone layers.
							@ 17.98 m - 18.75 m [59.0' - 61.5'], slightly broken.
18.29 [60]		Core 1.524 m [60"]	Rec 1.397 m [55"]	RQD 83%			
							@ 18.96 m - 19.26 m [62.2' - 63.2'], argillaceous with claystone laminae.
19.81 [65]		Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 90%			
							@ 20.51 m [67.3'], thin claystone layer.
21.34 [70]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 97%			@ 21.31 m [69.9'], claystone clast.
							@ 21.52 m - 21.70 m [70.6' - 71.2'], contains very thin claystone clasts.
22.46 [73.7]	225.69 [740.4]						Medium hard to hard, gray SANDSTONE, contains black carboniferous shale laminae, micaceous, weathered.
22.86							@ 21.03 m - 22.56 m [69.0' - 74.0'], gas encountered.

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-72	Location:	Sta. 45+899.94, 48.58 m Lt. of US 33 Centerline	Date Drilled:	5-8-00 & 5-9-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
13.56 m [44.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
22.86	225.29														
[75]	[739.1]	Core 1.219 m [48"]	Rec 1.219 m [48"]	RQD 100%			Medium hard to hard gray SANDSTONE, contains black carboniferous shale laminae, micaceous, weathered.								
23.77	224.38														
[78.0]	[736.1]						Bottom of Boring - 23.77 m [78.0']								
24.38															
[80]															
25.91															
[85]															
27.43															
[90]															
28.96															
[95]															
30.48															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-73	Location:	Sta. 46+110.02, 0.18 m Lt. of US 33 Centerline	Date Drilled:	5-8-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.68 m [5.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % (PL Natural LL; 10 20 30 40)
0	239.06						**DESCRIPTION**								
							Topsoil - 0.356 m [14"]								
0.36 [1.2]	238.70 [783.1]	3 4 7	.330 [13]	1		168 [1.75]	Stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	0	12	---	47	22	19		
0.91 [3.0]	238.15 [781.3]	29 39 50/.08	.381 [15]	2			Very dense brown COARSE AND FINE SAND (A-3a), little silt and clay, trace gravel; damp.							50+	
1.52 1.68 [5.5]	237.38 [778.8]	50/.10	.102 [4]	3			Soft brown SANDSTONE, slightly micaceous, severely weathered to weathered.							50+	
		50/.10	.102 [4]	4										50+	
3.05 3.20 [10.5]	235.86 [773.8]	50/.10	.102 [4]	5			Soft dark brown SANDSTONE, micaceous, argillaceous, severely weathered to weathered.							50+	
		50/.13	.127 [5]	6										50+	
4.57 [15]	234.49 [769.3]	Core 1.219 m [48"]	Rec 1.041 m [41"]	RQD 29%			Soft to medium hard brown SILTSTONE, micaceous, argillaceous, weathered, very broken. @ 4.66 m - 4.94 m [15.3' - 16.2'], near vertical fracture.								
5.33 [17.5]	233.73 [766.8]						Hard gray SANDSTONE, micaceous, weathered.								
6.10 [20]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%											
							@ 7.32 m - 8.23 m [24.0' - 27.0'], gas encountered.								
7.62															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-73	Location:	Sta. 46+110.02, 0.18 m Lt. of US 33 Centerline	Date Drilled:	5-8-00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.68 m [5.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
7.62 [25]	231.44 [759.3]	Core 0.914 m [36"]	Rec .914 m [36"]	RQD 100%			Hard gray SANDSTONE, micaceous, weathered.								
		Core 0.61 m [24"]	Rec .610 m [24"]	RQD 100%											
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 8.72 m - 9.05 m [28.6' - 29.7'], laminated with fine siltstone seams, very broken.								
							@ 8.84 m - 11.89 m [29.0' - 39.0'], gas encountered.								
10.67 [35]		Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 95%											
11.89 [39.0]	227.17 [745.3]						@ 11.73 m - 11.89 m [38.5' - 39.0'], iron staining.								
12.19 [40]							Bottom of Boring - 11.89 m [39.0']								
13.72 [45]															
15.24															

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-74 | **Location:** Sta. 46+375.29, 50.07 m Rt. of US 33 Centerline | **Date Drilled:** 5/3/00 - 5/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to core)
3.66 m [12'] (including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m [/in]	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL Natural LL
0	257.80							Topsoil - 0.406 m [16"]								
0.40 [1.3]	257.40 [844.5]	1	1 2 2	.229 [9]	1		144 [1.5]	Stiff reddish brown SILTY CLAY (A-6b); damp to moist.								
								@ 0.91 m [3.0'], becomes very stiff (decomposed claystone).								
			6 10 14	.356 [14]	2		—									
1.52 1.68 [5.5]	256.12 [840.3]							Hard brown SILTY CLAY (A-6b), trace fine to coarse sand; (decomposed claystone); damp.								
			21 45 50/.10	.381 [15]	3		---								50+	
3.05 [10]			20 22 35	.457 [18]	4		---	@ 3.20 m [10.5'], little fine to coarse sand.							57	
			20 50/.13	.279 [11]	5		—								50+	
3.96 [13.0]	253.84 [832.8]		50/.13	.102 [4]	6			Soft dark brown SANDSTONE, slightly micaceous, severely weathered to weathered.							50+	
4.57 4.72 [15.5]	253.08 [830.3]		50/.05	.051 [2]	7			Soft gray LIMESTONE, severely weathered.							50+	
5.33 [17.5]	252.47 [828.3]		Core 0.762 m [30"]	Rec .533 m [21"]	RQD 60%			Hard gray LIMESTONE, slightly weathered. @ 5.49 m [18.0'], water loss.								
6.10 [20]	251.70 [825.8]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Hard brown SANDSTONE, micaceous, slightly weathered to weathered.								
7.56 [24.8]	250.24 [821.0]							Hard gray SANDSTONE, micaceous, moderately weathered to weathered.								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-74	Location:	Sta. 46+375.29, 50.07 m Rt. of US 33 Centerline	Date Drilled:	5/3/00 - 5/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to core)
3.66 m [12'] (including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Sample No. Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62	250.18						**DESCRIPTION**								
[25]	[820.8]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Hard gray SANDSTONE, micaceous, moderately weathered to weathered.								
9.14															
[30]		Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 80%			@ 9.14 m [30.0'], lost water when removing core barrel.								
9.66	248.14														
[31.7]	[814.1]						Very soft to soft gray CLAYSTONE, slightly weathered to weathered.								
9.94	247.86														
[32.6]	[813.2]						Soft to medium hard gray SILTSTONE, slightly weathered to weathered; broken.								
							@ 10.12 m [33.2'], clay seam.								
10.58	247.22						@ 10.30 m [33.8'], clay seam.								
10.67	[811.1]														
[35.0]		Core 1.524 m [60"]	Rec 1.397 m [55"]	RQD 80%			Medium hard gray CLAYSTONE, moderately weathered; contains arenaceous layers.								
							@ 11.98 m - 13.81 m [39.3' - 45.3'], red, slightly weathered to weathered.								
12.19															
[40]		Core 1.524 m [60"]	Rec .406 m [16"]	RQD 0%			@ 12.19 m - 13.72 m [40.0' - 45.0'], severely weathered.								
13.72															
[45]		Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 73%			@ 13.81 m [45.3'], Limestone clasts become evident, weathered.								
14.26	243.54														
[46.8]	[799.0]						Medium hard to hard gray SILTSTONE, weathered.								
15.24							@ 14.84 m [48.7'], low angle fracture.								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-74	Location:	Sta. 46+375.29, 50.07 m Rt. of US 33 Centerline	Date Drilled:	5/3/00 - 5/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to core)
3.66 m [12'] (including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
15.24	242.56						**DESCRIPTION**								
15.42	242.38	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 97%			Medium hard brown CLAYSTONE, moderately weathered.								
[50.6]	[795.2]						Medium hard to hard brown SANDSTONE, slightly micaceous; moderately weathered to weathered. @ 15.64 m [51.3'], clay seam.								
16.00	241.80														
[52.5]	[793.3]						Hard light gray LIMESTONE, slightly weathered.								
16.76															
[55]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%											
17.25	240.55														
[56.6]	[789.2]						Hard brown and gray SANDSTONE, micaceous, moderately weathered; contains dark brown laminae.								
18.29															
[60]		Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 97%											
19.81															
[65]		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 98%											
21.34															
[70]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%											
22.04	235.76														
[72.3]	[773.5]						Hard light gray LIMESTONE, contains Claystone clasts.								
22.86															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-74	Location:	Sta. 46+375.29, 50.07 m Rt. of US 33 Centerline	Date Drilled:	5/3/00 - 5/5/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to core)
3.66 m [12'] (including drill water)

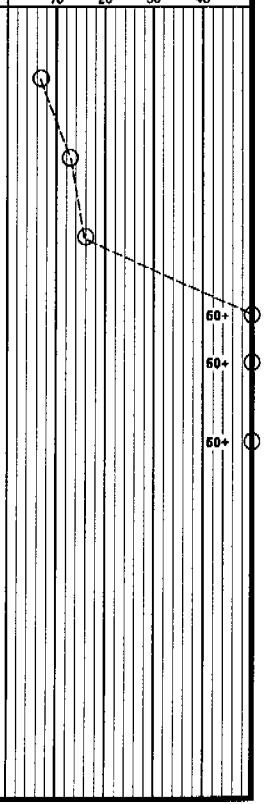
Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
22.86	234.94						**DESCRIPTION**								
[75]	[770.8]	Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 98%			Medium hard brown and gray SANDSTONE, micaceous.								
24.38															
[80]		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 98%			@ 24.41 m [80.1'], clay seam. @ 24.75 m [81.2'], small Claystone clasts.								
25.91	231.89														
[85]	[760.8]						Bottom of Boring - 25.91 m [85.0']								
27.43															
[90]															
28.96															
[95]															
30.48															

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-75 | **Location:** Sta. 46+521.02, 28.90 m Rt. of US 33 Centerline | **Date Drilled:** 5/1/00 & 5/2/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to core)
none (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	247.11						Topsoil - 0.356 m [14"]							
0.37 [1.2]	246.74 [809.5]	2 2 5	.432 [17]	1		192 [2.0]	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; micaceous; damp. @ 0.91 m [3.0'], hard with rootlets.							
1.52		2 5 8	.254 [10]	2		407 [4.25]								
1.68 [5.5]	245.43 [805.2]	5 8 8	.356 [14]	3		431+ [4.5+]	Hard red and brown SILTY CLAY (A-6b), trace gravel; damp.							
2.90	244.21	3 13	.356	4A		431+	@ 2.59 m [8.5'], light brown and dark brown.							
3.05	[801.2]	50/.10	[14]	4B		431+								50+
3.20 [10.5]	243.91 [800.2]	50/.13	.127 [5]	5		[4.5+]	Hard brown SILT (A-4b): (decomposed siltstone); damp. Soft brown SILTSTONE, micaceous, severely weathered.							50+
3.96 [13.0]	243.15 [797.7]	50/.08	.076 [3]	6			Soft brown SANDSTONE, argillaceous, slightly micaceous, severely weathered to weathered.							50+
4.57 [15]	242.54 [795.7]	Core 1.219 m [48"]	Rec 1.143 m [45"]	RQD 94%			Medium hard brown SANDSTONE, micaceous, moderately weathered to weathered, contains dark brown laminae.							
5.39 [17.7]	241.72 [793.1]						Medium hard to hard gray SANDSTONE, calcareous, moderately weathered, slightly micaceous.							
6.10		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
6.22 [20.4]	240.89 [790.3]						Hard brown and gray SANDSTONE, micaceous, moderately weathered. @ 7.04 m - 7.19 m [23.1' - 23.6'], low angle fracture.							
7.62														



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-75	Location:	Sta. 46+521.02, 28.90 m Rt. of US 33 Centerline	Date Drilled:	5/1/00 & 5/2/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (prior to core)
none (after coring)

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	DESCRIPTION
7.62	239.49												
[25]	[785.7]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%									Hard brown and gray SANDSTONE, micaceous, moderately weathered.
8.23	238.88												
[27.0]	[783.7]												Hard light gray SANDSTONE, calcareous, moderately weathered, micaceous.
8.84	238.27												
[29.0]	[781.7]												Medium hard light gray SANDSTONE, micaceous, weathered.
9.14													
[30]													
9.78	237.33												
[32.1]	[778.7]												Hard light gray LIMESTONE, micaceous, moderately weathered.
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 97%									@ 10.49 m [34.4'], brown SANDSTONE bedding becomes evident.
10.67													@ 10.36 m - 11.89 m [34.0' - 39.0'], gas encountered.
[35]													
11.89	235.22												
[39.0]	[771.7]												Bottom of Boring - 11.89 m [39.0']
12.19													
[40]													
13.72													
[45]													
15.24													

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-76	Location:	Sta. 46+520.00, 53.00 m Rt. of US 33 Centerline	Date Drilled:	5/3/00

WATER OBSERVATIONS:
Water seepage at: 1.83 m [6.0']
Water level at completion: none (prior to core)
0.91 m [3.0'] (including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Pass	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40) / Moisture Content - % PL Natural LL (10 20 30 40)
0	249.41						**Topsoil - 0.381 m [15"]**							
0.38 [1.3]	249.03 [817.0]	2 5 9	.457 [18]	1			Medium dense reddish brown COARSE AND FINE SAND (A-3a), little to some silt and clay; damp. @ 0.91 m [3.0'], dark brown, micaceous.							
1.52 [5]		3 6 8	.457 [18]	2										
		8 10 13	.457 [18]	3			@ 2.44 m [8.0'], very dense, brown with trace to little silt and clay.							
3.05 [10]		18 27 38	.457 [18]	4			@ 3.20 m [10.5'], brown and dark brown.							65
3.96 [13.0]	245.45 [805.3]	21 35 43	.457 [18]	5										78
4.57		4 4 5	.229 [9]	6		287 [3.0]	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; damp.							
4.72 [15.5]	244.69 [802.8]	29 27 39	.457 [18]	7		431+ [4.5+]	Hard brown SILT AND CLAY (A-6a), trace to little fine to coarse sand; micaceous; damp.							66
5.49 [18.0]	243.92 [800.3]	50/.13	.127 [5]	8			Soft brown SHALE, severely weathered.							50+
6.10 [20]														
6.40 [21.0]	243.01 [797.3]	50/.05	.051 [2]	9			Soft brown SANDSTONE, severely weathered.							50+
7.32 [24.0]	242.09 [794.3]	50/.08	.076 [3]	10			Medium hard brown and gray SANDSTONE, moderately weathered.							50+
7.62														

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-76 | Location: Sta. 46+520.00, 53.00 m Rt. of US 33 Centerline | Date Drilled: 5/3/00

WATER OBSERVATIONS:
Water seepage at: 1.83 m [6.0']
Water level at completion: none (prior to core)
0.91 m [3.0'] (including drill water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62	241.79													
[25]	[793.3]	Core 1.219 m [48"]	Rec 1.168 m [46"]	RQD 94%										
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
9.14														
[30]														
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
10.67														
[35]														
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
12.19														
[40]														
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
13.72														
[45]														
14.63	234.78													
[48.0]	[770.3]													
15.24														

DESCRIPTION

Medium hard brown and gray SANDSTONE, micaceous, moderately weathered, contains dark brown laminae and claystone clasts.

@ 14.20 m [46.6'], thin claystone layer.

Bottom of Boring - 14.63 m [48.0']

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-77 | **Location:** Sta. 46+550.36, on Centerline of US 33 Centerline | **Date Drilled:** 4/30/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	241.00						Topsoil - 0.406 m [16"]							
0.40 [1.3]	240.59 [789.4]	1 1 5	.406 [16]	1		168 [1.75]	Stiff brown SANDY SILT (A-4a); contains roots; damp.	0	3	---	52	22	23	
0.92 [3]	240.08 [787.6]	5 12 20	.457 [18]	2			@ 0.91 m [3.0'], becomes dense.							
1.52 [5]							@ 1.68 m [5.5'], becomes very dense.	0	4	---	60	21	16	
		20 30 50/.10	.406 [16]	3										50+
2.44 [8]	238.56 [782.7]	50/.10	.102 [4]	4			Soft brown SANDSTONE, argillaceous, severely weathered.							50+
3.05 [10]		50/.08	.075 [3]	5										50+
4.18 [13.7]	236.82 [777.0]	50/.05	.051 [2]	6										50+
4.57 [15]							Bottom of Boring - 4.18 m [13.7']							
6.10 [20]														
7.62														

GRADATION

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-78 | **Location:** Sta. 46+570.00, 23.00 m Lt. of US 33 Centerline | **Date Drilled:** 4/30/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	233.69													
							Topsoil - 0.381 m [15"]							
0.38 [1.3]	233.31 [765.4]	3 4 10	.330 [13]	1			Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), gravel; damp.	2	12	1	57	29		Non-plastic
0.91 [3.0]	232.78 [763.7]													
		21 .50/.10	.254 [10]	2			Soft brown SILTSTONE, micaceous, arenaceous, severely weathered.							60+
1.52 1.68 [5.5]	232.01 [761.2]													
		50/.10	.102 [4]	3			Soft brown SANDSTONE, argillaceous, slightly micaceous, severely weathered.							60+
		50/.05	.051 [2]	4										60+
3.05 [10]														
		50/.08	.076 [3]	5										50+
4.21 [13.8]	229.48 [752.9]	50/.08	.076 [3]	6										50+
							Bottom of Boring - 4.21 m [13.8']							
4.57 [15]														
6.10 [20]														
7.62														

GRADATION

Moisture Content - % PL Natural LL

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-79 | **Location:** Sta. 46+860.00, 52.00 m Rt. of US 33 Centerline | **Date Drilled:** 4/24/00

WATER OBSERVATIONS:
Water seepage at: 5.64 m [18.5']
Water level at completion: 1.37 m [4.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40) / Moisture Content - % PL Natural LL (10 20 30 40)
0	250.56						**DESCRIPTION**							
0.09	250.47						Topsoil - 0.102 m [4"]							
[0.3]	[821.8]													
0.43	250.13	2					Stiff brown SILT AND CLAY (A-6a), little to some fine to coarse sand; contains roots; organic; damp to moist.							
[1.4]	[820.6]	3 4	.381 [15]	1A 1B			Hard brown SILT (A-4b), trace fine to coarse sand; damp.							
0.92	249.64													
[3]	[819.0]	15 26 50/.08	.381 [15]	2			Soft brown SANDSTONE, micaceous, argillaceous, severely weathered.							50+
1.52														
[5]		44 50/.08	.229 [9]	3										50+
		50/.13	.127 [5]	4										50+
3.05														
[10]		50/.13	.127 [5]	5										50+
		50/.13	.127 [5]	6										50+
4.57														
[15]		50/.08	.076 [3]	7			@ 5.49 m [18.0'], becomes brown and dark brown.							50+
		37 50/.13	.254 [10]	8										50+
6.10	244.46													
[20]	[802.0]	Core 1.219 m [48"]	Rec .940 m [37"]	RQD 67%			Medium hard brown SANDSTONE, micaceous, weathered @ 6.28 m - 6.34 m [20.6' - 20.8'], broken. @ 6.55 m [21.5'], broken.							
6.86	243.70													
[22.5]	[799.5]						Soft brown CLAYSTONE, severely weathered.							
7.62														

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-79	Location:	Sta. 46+860.00, 52.00 m Rt. of US 33 Centerline	Date Drilled:	4/24/00

WATER OBSERVATIONS:
Water seepage at: 5.64 m [18.5']
Water level at completion: 1.37 m [4.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
7.62	242.94						**DESCRIPTION**						
[25]	[797.1]	Core 1.524 m [60"]	Rec 1.219 m [48"]	RQD 60%			Soft brown CLAYSTONE, severely weathered. @ 7.74 m [25.4'], gray. @ 7.80 m [25.6'], high angle fracture. @ 7.92 m [26.0'], contains limestone and siltstone clasts.						
9.14		Core 1.524 m [60"]	Rec .737 m [29"]	RQD 20%									
[30]							@ 8.84 m - 10.36 m [29.0' - 34.0'], gas encountered, loss water return. @ 10.06 m [33.0'], red and gray.						
10.67		Core 1.524 m [60"]	Rec .508 m [20"]	RQD 0%									
[35]													
11.92	238.64												
[39.1] 12.19	[782.9]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard gray SILTSTONE with interbedded, sandstone, weathered						
[40]													
13.41	237.15												
[44.0] 13.72	[778.1]						Bottom of Boring - 13.41 m [44.0']						
[45]													
15.24													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-80 | Location: Sta. 46+860.00, 28.00 m Rt. of US 33 Centerline | Date Drilled: 4/25/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.83 m [6.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	250.43						Topsoil - 0.127 m [5"]							
0.12	250.31													
[0.4]	[821.2]	1 3 6	.406 [16]	1		335 [3.5]	Very stiff brown SANDY SILT (A-4a), little clay; damp.							69
0.92	249.51													
[3]	[818.6]	12 23 36	.457 [18]	2			Very dense brown COARSE AND FINE SAND (A-3a), trace silty clay; damp.							60+
1.52														
[5]		16 38 50/.13	.432 [17]	3										60+
		37 50/.13	.279 [11]	4										60+
3.05														
[10]		45 50/.10	.254 [10]	5										60+
3.97	246.46													
[13]	[808.6]	50/.13	.127 [5]	6			Soft brown SANDSTONE, micaceous, severely weathered.							60+
4.57														
[15]		50/.10	.102 [4]	7										60+
		50/.13	.127 [5]	8										60+
6.10	244.33													
[20]	[801.6]	Core 1.219 m [48"]	Rec 1.067 m [42"]	RQD 88%			Medium hard, brown SANDSTONE, micaceous, weathered.							
							@ 7.04 m [23.1'], low angle fracture, rust stained.							
7.62														

GRADATION

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-80 | **Location:** Sta. 46+860.00, 28.00' Rt. of US 33 Centerline | **Date Drilled:** 4/25/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.83 m [6.0'] (after coring)

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

GRADATION
% Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
7.62	242.81						
[25]	[796.6]	Core 1.524 m [60"]	Rec 1.194 m [47"]	RQD 62%			Medium hard, brown SANDSTONE, micaceous, weathered.
7.77	242.66						
[25.5]	[796.1]						Soft, brown and gray CLAYSTONE, weathered, to severely weathered.
							@ 8.20 m [26.9'], gray.
							@ 8.38 m [27.5'], very broken.
							@ 8.69 m [28.5'], slightly calcareous.
		Core 1.524 m [60"]	Rec .635 m [25"]	RQD 0%			
9.14							
[30]							
							@ 10.06 m [33.0'], gray, broken.
		Core 1.524 m [60"]	Rec .610 m [24"]	RQD 0%			
10.67							
[35]							@ 10.36 m - 11.89 m [34.0' - 39.0'], gas encountered.
11.89	238.54						
[39.0]	[782.6]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard, gray SILTSTONE, slightly micaceous, weathered.
12.19							
[40]							
13.41	237.02						
[44.0]	[777.6]						Bottom of Boring - 13.41 m [44.0']
13.72							
[45]							
15.24							

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-81	Location:	Sta. 47+054.056, 0.08 m Rt. of US 33 Centerline	Date Drilled:	4/18 & 4/19/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.61 m [2.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
0	247.54														
0.06	247.48						Aggregate Base - 0.076 m [3"]								
[0.2]	[812.0]	21 45 50/.10	.406 [16]	1			Soft, light brown SANDSTONE, fine to coarse grained micaceous, argillaceous, severely weathered.							50+	
1.52	246.02														
[5]	[807.2]	Core 1.829 m [72"]	Rec 1.168 m [46"]	RQD 29%			Soft to medium hard brown SANDSTONE, poorly cemented, micaceous, severely weathered with decomposed layers.								
3.05															
[10]		Core 0.914 m [36"]	Rec .000 m [0"]	RQD 0%											
		Core 1.524 m [60"]	Rec 1.321 m [52"]	RQD 43%											
4.57															
[15]															
5.49	242.05														
[18.0]	[794.1]	Core 1.524 m [60"]	Rec .711 m [28"]	RQD 0%			Soft gray and red CLAYSTONE, contains siltstone and limestone clasts, weathered.								
6.10															
[20]															
7.32	240.22														
[24.0]	[788.1]						Soft to medium hard gray SILTSTONE, weathered.								
7.62															

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-81 | Location: Sta. 47+054.056, 0.08 m Rt. of US 33 Centerline | Date Drilled: 4/18 & 4/19/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.61 m [2.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
7.62 [25]	239.92 [787.1]	Core 1.524 m [60"]	Rec 1.118 m [44"]	RQD 10%			Soft to medium hard gray SILTSTONE, micaceous, broken, contains calcareous banding, weathered. @ 8.35 m [27.4'], high angle fracture.
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 17%			@ 9.60 m - 9.72 m [31.5' - 31.9'], highly weathered, broken.
10.03 [32.9]	237.51 [779.2]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 88%			Hard, gray SANDSTONE, micaceous, pyritic, slightly calcareous with argillaceous interbeds, weathered to slightly weathered.
10.67 [35]							
11.58 [38.0]	235.96 [774.2]						Bottom of Boring - 11.58 m [38.0']
12.19 [40]							
13.72 [45]							
15.24							

GRADATION

% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-82 | **Location:** Sta. 47+045.55, 40.82 m Lt. of US 33 Centerline | **Date Drilled:** 4/20/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	249.14						Aggregate Base - 0.076 m [3"]							
0.09 [0.3]	249.05 [817.1]	5 7 16	.406 [16]	1		239 [2.5]	Very stiff mottled brown and gray SILT AND CLAY (A-6a), trace gravel, trace fine to coarse sand, micaceous, damp to moist.	0	8	—	12	51	30	
1.37	247.77	3 23	.356	2A		168 [1.75]	@ 1.07 m [3.5'], becomes stiff.							
1.52 [5.0]	[812.9]	50/.05	[14]	2B			Soft, brown and gray SHALE, arenaceous, micaceous, severly weathered.							50+
		50/.05	.025 [1]	3										50+
		50/.10	.076 [3]	4										50+
3.05 [10]		Core 1.219 m [48"]	Rec .127 m [5"]	RQD 0%			Soft brown SANDSTONE, micaceous, weathered to severely weathered.							50+
4.57 [15]		Core 1.524 m [60"]	Rec 1.092 m [43"]	RQD 0%										50+
5.73 [18.8]	243.41 [798.6]													50+
6.10 [20]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 10%			Soft gray CLAYSTONE, slightly calcareous, severely weathered, very broken.							50+
6.34 [20.8]	242.80 [796.6]						Soft brown SANDSTONE, micaceous, severely weathered.							50+
7.25 [23.8]							Soft gray and brown CLAYSTONE, slightly calcareous, severely weathered, very broken.							50+
7.62														

Moisture Content - % (PL, Natural, LL)

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-82 | Location: Sta. 47+045.55, 40.82 m Lt. of US 33 Centerline | Date Drilled: 4/20/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

STANDARD PENETRATION (N) Blows per 0.30 m

Moisture Content - % PL Natural LL

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	N	Moisture Content
7.62 [25]	241.52 [792.4]	Core 1.524 m [60"]	Rec .635 m [25"]	RQD 0%			Soft gray and brown CLAYSTONE, slightly calcareous, severely weathered, very broken.							60	
9.14 [30]		Core 1.524 m [60"]	Rec 1.092 m [43"]	RQD 25%			@ 9.17 m [30.1'], becomes broken. @ 9.69 m - 9.91 m [31.8' - 32.5'], slickensided shear. @ 10.09 m [33.1'], limestone clasts become evident. @ 10.24 m - 10.36 m [33.6' - 34.0'], limestone layer. @ 10.36 m - 10.45 m [34.0' - 34.3'], sandstone layer. @ 10.45 m - 10.58 m [34.3' - 34.7'], gray and severely weathered.							50+	
10.58 [35.0]	236.56 [782.7]	Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 67%			Medium hard gray SILTSTONE, slightly micaceous, weathered, contains argillaceous and arenaceous layers.							50+	
12.19 [40]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 11.98 m [39.3'], beomes interbedded with fine grained sandstone.							50+	
13.41 [44.0]							Bottom of Boring - 13.41 m [44.0']							50+	
13.72 [45]															
15.24															

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

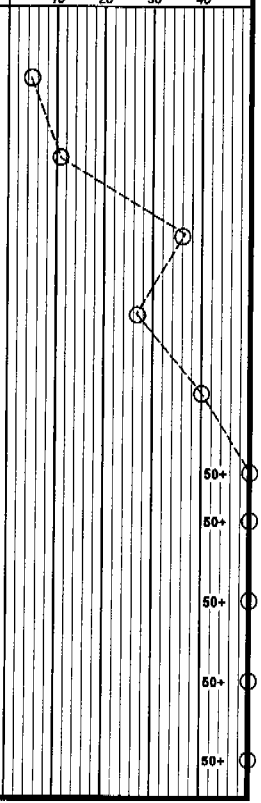
LOG OF: Boring R-83 | **Location:** Sta. 47+179.92, 0.32 m Rt. of US 33 Centerline | **Date Drilled:** 4/20/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	242.24													
0.37 [1.2]	241.87 [793.5]	1					Topsoil - 0.356 m [14"]							
		1 4	.229 [9]	1		215 [2.25]	Very stiff brown and gray SILT AND CLAY (A-6a); slightly organic; contains roots; moist.							
0.92 [3]	241.32 [791.7]													
		3 4 7	.356 [14]	2		215 [2.25]	Very stiff brownish gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist.							
1.52 [5]							@ 1.68 m - 3.20 m [5.5' - 10.5'], becomes red and brown.							
		6 13 23	.356 [14]	3A		431+								
				3B		431+ [4.5+]								
		10 13 19	.406 [16]	4		431+ [4.5+]								
3.05 [10]														
		13 19 21	.178 [7]	5		431+ [4.5+]								
4.42	237.82	4 16	.330											
4.57 [15.0]	[780.2]	50/.13	[13]	6			Soft brownish gray SHALE, micaceous, severely weathered.							
		50/.10	.102 [4]	7										
		50/.08	.076 [3]	8										
6.10														
6.25 [20.5]	235.99 [774.2]	50/.05	.051 [2]	9			Soft gray SANDSTONE, micaceous, severely weathered. @ 6.25 m - 7.01 m [20.5' - 23.0'], calcareous.							
		50/.10	.102 [4]	10										
7.62														

GRADATION

Moisture Content - % PL Natural LL



Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-83 | Location: Sta. 47+179.92, 0.32 m Rt. of US 33 Centerline | Date Drilled: 4/20/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
7.62 [25]	234.62 [769.8]													
		50/.13	.127 [5]	11			Soft gray SANDSTONE, micaceous, severely weathered.							50+
8.78 [28.8]	233.46 [765.9]	50/.10	.102 [4]	12										50+
							Bottom of Boring - 8.78 m [28.8']							
10.67 [35]														
12.19 [40]														
13.72 [45]														
15.24														

GRADATION

Moisture Content - %
PL Natural LL

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-84 | **Location:** Sta. 47+200.08, 28.06 m Lt. of US 33 Centerline | **Date Drilled:** 4/19/00

WATER OBSERVATIONS:
Water seepage at: 11.68 m [38.5']
Water level at completion: none

STANDARD PENETRATION (N) Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	N
0	248.42													
0.21 [0.7]	248.21 [814.3]						Topsoil - 0.203 m [8"]							
		1 2 4	.203 [8]	1			Stiff to very stiff brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; contains roots; damp.							
0.92 [3]	247.50 [812.0]													
		30 30 49	.330 [13]	2			Very dense brown COARSE AND FINE SAND (A-3a), trace silty clay; damp.							79
1.52 1.68 [5.5]	246.74 [809.5]													
		50/.13	.127 [5]	3			Soft brown SANDSTONE, argelaceous, severely weathered, micaceous.							50+
		50/.08	.076 [3]	4										50+
3.05 [10]														
		50/.10	.102 [4]	5										50+
		50/.08	.076 [3]	6										50+
4.57 4.73 [15.5]	243.69 [799.5]													
		13 15 19	.406 [16]	7			Very soft gray CLAYSTONE, severely weathered to weathered. @ 4.72 m - 5.49 m [15.5' - 18.0'], very soft.							
		39 50/.13	.279 [11]	8										50+
6.10 [20]	242.32 [795.0]	Core 1.219 m [48"]	Rec 1.143 m [45"]	RQD 63%			Soft gray CLAYSTONE, weathered.							
7.62														

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-84	Location:	Sta. 47+200.08, 28.06 m Lt. of US 33 Centerline	Date Drilled:	4/19/00

WATER OBSERVATIONS:
Water seepage at: 11.68 m [38.5']
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	240.80 [790.0]	Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 82%			Soft gray CLAYSTONE, weathered.
8.23 [27.0]	240.19 [788.0]						Soft to medium hard gray SANDSTONE, argillaceous, slightly micaceous, weathered.
9.14 [30.0]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 8.84 m [29.0'], becomes intact, slightly argillaceous, moderately weathered.
10.67 [35]		Core 3.048 m [120"]	Rec 2.972 m [117"]	RQD 98%			
12.19 [40]							
13.41 [44.0]	235.01 [771.0]						
13.72 [45]		Core 0.914 m [36"]	Rec .914 m [36"]	RQD 89%			Soft brown and gray SANDSTONE, argillaceous, micaceous, weathered, broken; contains limestone clasts. @ 13.78 m [45.2'], thin severely weathered layer.
14.33 [47.0]	234.09 [768.0]						Bottom of Boring - 14.33 m [47.0']
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-85 | Location: Sta. 47+840.04, 65.12 m Lt. of US 33 Centerline | Date Drilled: 4/14/00

WATER OBSERVATIONS:
Water seepage at: 2.59 m [8.5']
Water level at completion: 5.64 m [18.5']

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [ft]	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL / Natural / LL
0	241.62													
0.34	241.28					Topsoil - 0.33 m [13"]								
[1.1]	[791.6]	1A	1	.356 [14]	144	Stiff brown SILT AND CLAY (A-6a), trace gravel; contains rootlets; moist.								
0.61	241.01	1B	4 5		239 [2.5]									
[2.0]	[790.7]					Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.								
0.91	240.71													
[3.0]	[789.7]		11 16 50/.13	.356 [14]	431+ [4.5+]	Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; micaceous; damp.								
1.52		2												
[5]			35 50/.13	229 [9]	431+ [4.5+]									
		3												
2.44	239.18													
[8.0]	[784.7]		50/.10	.102 [4]		Soft brown SANDSTONE,argillaceous, slightly micaceous, severely weathered.								
		4												
3.05	238.57													
[10]	[782.7]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 93%	Medium hard brown SANDSTONE,argillaceous, slightly micaceous, weathered. @ 3.54 m - 3.63 m [11.6' - 11.9'], calcareous.								
4.57														
[15]			Core 1.524 m [60"]	Rec 1.346 m [53"]	RQD 30%	@ 4.57 m - 5.33 m [15.0' - 17.5'], gray. @ 5.52 m [18.1'], becomes light gray and brown. @ 5.52 m - 6.10 m [18.1' - 20.0'], slightly calcareous.								
6.10														
[20.0]			Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 93%	@ 6.10 m - 7.01 m [20.0' - 23.0'], becomes light gray and @ 6.10 m - 7.19 m [20.0' - 23.6'], calcareous.								
7.19	234.43													
[23.6]	[769.1]					Medium hard gray SANDSTONE, fine grained micaceous; weathered								
7.62														

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-85 | **Location:** Sta. 47+840.04, 65.12 m Lt. of US 33 Centerline | **Date Drilled:** 4/14/00

WATER OBSERVATIONS: Water seepage at: 2.59 m [8.5']
Water level at completion: 5.64 m [18.5']

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - % PL Natural LL: 10 20 30 40

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	234.00 [767.7]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 83%			Medium hard gray SANDSTONE, fine grained micaceous; weathered.
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 82%			@ 9.14 m [30.0'], 0.05 m [0.15'] clay seam. @ 9.69 m - 9.81 m [31.8' - 32.2'], clay seam.
10.67 [35]		Core 3.048 m [120"]	Rec 3.023 m [119"]	RQD 95%			@ 10.67 m - 10.79 m [35.0' - 35.4'], fine to medium grained.
12.19 [40.0]							@ 12.77 m - 13.08 m [41.9' - 42.9'], fine to medium grained.
13.53	228.09						
13.72 [45.0]	[748.3]	Core 2.438 m [96"]	Rec 2.413 m [95"]	RQD 81%			Medium hard dark gray SILTSTONE, micaceous, weathered, with fine to medium grained sandstone.
15.24							

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-85	Location:	Sta. 47+840.04, 65.12 m Lt. of US 33 Centerline	Date Drilled:	4/14/00

WATER OBSERVATIONS:
Water seepage at: 2.59 m [8.5']
Water level at completion: 5.64 m [18.5']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
15.24	226.38														
15.39 [50.5]	[742.7]						Medium hard dark gray SILTSTONE, micaceous, weathered, with fine to medium grained sandstone.								
16.15 [53.0]	225.47 [739.7]						Medium hard brown SANDSTONE, fine grained, micaceous, slightly arrillaceous, weathered.								
16.76 [55]							Bottom of Boring - 16.15 m [53.0']								
18.29 [60]															
19.81 [65]															
21.34 [70]															
22.86															

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-86 | Location: Sta. 47+939.99, 45.01 m Lt. of US 33 Centerline | Date Drilled: 4/17/00

WATER OBSERVATIONS:
Water seepage at: 3.35 m [11']
Water level at completion: 3.96 m [13.0'] (before coring)
1.83 m [6.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	237.21												
							Topsoil - 0.406 m [16"]						
0.40 [1.3]	236.81 [776.9]	1 1 3	.356 [14]	1		144 [1.5]	Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; contains roots; damp to moist.						
0.91 [3.0]	236.30 [775.3]						Very stiff to hard reddish brown SILTY CLAY (A-6b), trace fine to coarse sand; damp.						
1.52		2 3 5	.279 [11]	2		383 [4.0]							
1.68 [5.5]	235.53 [772.7]						Hard reddish brown and light brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.						
2.44 [8.0]	234.77 [770.2]	4 8 23	.330 [13]	3		431 [4.5]							
		24 50/.10	.254 [10]	4			Soft, light brown SILTSTONE, micaceous, argillaceous, severely weathered to decomposed.						
3.05 [10]	234.16 [768.2]												
		50/.05	.051 [2]	5			Soft, light brown, SANDSTONE, fine to coarse grained, micaceous, severely weathered.						
4.11	233.10												
4.33 [14.2]	232.88 [764.0]	Core 2.997 m [118"]	Rec 2.997 m [118"]	RQD 87%			Medium hard, gray SANDSTONE, calcareous, micaceous, contains siltstone layers, weathered.						
4.57 [15]							Hard, brown SANDSTONE, argillaceous, micaceous, weathered @ 4.36 m - 4.57 m [14.3' - 15.0'], highly broken with high angle fractures, severely weathered. @ 5.18 m [17.0'], becomes brown and gray.						
6.10 [20]	231.11 [758.2]						Hard, gray SILTSTONE, micaceous, weathered, contains occasional claystone layers. @ 6.83 m [22.4'], high angle fracture.						
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-86	Location:	Sta. 47+939.99, 45.01 m Lt. of US 33 Centerline	Date Drilled:	4/17/00

WATER OBSERVATIONS:
Water seepage at: 3.35 m [11']
Water level at completion: 3.96 m [13.0'] (before coring)
1.83 m [6.0'] (after coring)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
7.62 [25]	229.59 [753.2]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 98%			Hard, gray SILTSTONE, micaceous, weathered, contains occasional claystone layers.
8.87 [29.1]	228.34 [749.1]						@ 8.84 m [29.0'], low angle rust stained fracture. Hard, gray and brown SANDSTONE, slightly broken, weathered to severely weathered.
9.14 [30]							@ 8.86 m [29.4'], low angle rust stained fracture. @ 9.39 m [30.8'], low angle rust stained fracture. @ 9.62 m [31.5'], low angle rust stained fracture. @ 9.08 m [29.8'], clay seam. @ 9.69 m - 9.88 m [31.8' - 32.4'], argillaceous with clay layers.
10.67 [35]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			@ 10.15 m [33.3'], becomes gray, weathered to slightly weathered.
12.19 [40]							@ 11.31 m [37.1'], high angle fracture. @ 11.52 m [37.8'], shale clast.
13.20 [43.3]	224.01 [734.9]						@ 12.44 m [40.8'], shale clasts.
13.72 [45]							Bottom of Boring - 13.20 m [43.3']
15.24							

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-87 | **Location:** Sta. 48+100.02, 0.07 m Lt of US33 Centerline | **Date Drilled:** 6/30/00 - 7/6/00

WATER OBSERVATIONS:
Water seepage at: 1.83 m [6.0']
Water level at completion: 11.43 m [37.5'] (prior to coring)
2.21 m [7.3'] (including core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % PL / Natural / LL
0	230.14													
0.24	229.90						Topsoil - 0.229 m [9"]							
[0.8]	[754.3]	2 14 35	.457 [18]	1			Very dense dark brown COARSE AND FINE SAND (A-3a), trace silty clay; micaceous; damp.							
0.91	229.23													
[3.0]	[752.1]	50/.10	.102 [4]	2			Soft, brown SANDSTONE, fine to coarse grained, micaceous, slightly argillaceous, severely weathered to decomposed.							
1.52														
[5]		50/.10	.102 [4]	3			@ 1.83 m [6.0'], becomes nonargillaceous.							
		50/.13	.127 [5]	4										
3.05	227.09													
[10]	[745.1]	Core 1.219 m [48"]	Rec .432 m [17"]	RQD 0%			Soft to medium hard brown SANDSTONE, fine to medium grained, micaceous, weathered to severely weathered.							
4.57		Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 63%										
[15]														
6.10		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 57%			@ 6.10 m [20.0'], occasional rust staining present.							
[20]														
7.62														

GRADATION

STANDARD PENETRATION (N) Blows per 0.30 m

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-87	Location:	Sta. 48+100.02, 0.07 m Lt of US33 Centerline	Date Drilled:	6/30/00 - 7/6/00

WATER OBSERVATIONS:
Water seepage at: 1.83 m [6.0']
Water level at completion: 11.43 m [37.5'] (prior to coring)
2.21 m [7.3'] (including core water)

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	DESCRIPTION
7.62 [25]	222.52 [730.1]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 57%									Soft to medium hard brown SANDSTONE, fine to medium grained, micaceous, weathered to severely weathered.
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 53%									
10.67 [35]		Core 1.524 m [60"]	Rec 1.372 m [54"]	RQD 53%									
11.89 [39.0]	218.25 [716.0]												Bottom of Boring - 11.89 m [39.0']
12.19 [40]													
13.72 [45]													
15.24													

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-88 | **Location:** Sta. 48+194.71, 34.22 m Rt. of US 33 Centerline | **Date Drilled:** 4/18/00

WATER OBSERVATIONS:
Water seepage at: 1.83 m [6.0']
Water level at completion: none

STANDARD PENETRATION (N) — Blows per 0.30 m

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % (PL / Natural / LL)
0	214.20													
0.09 [0.3]	214.11 [702.5]						Topsoil - 0.102 m [4"]							
		1 1 1	.254 [10]	1		48 [0.5]	Loose brown SILT (A-4b), little fine to coarse sand; moist to wet.	0	2	—	14	74	9	Non-plastic
0.91 [3.0]	213.29 [699.8]													
		1 1 1	.457 [18]	2			Very loose grayish brown SANDY SILT (A-4a), some silt and clay; moist.	0	19	—	43	22	16	
1.52 1.68 [5.5]	212.52 [697.2]													
		WOH 1 1	.457 [18]	3			Very loose gray COARSE AND FINE SAND (A-3a), some silt and clay; contains rootlets; wet.							
2.44 [8.0]	211.76 [694.8]													
		50/.08	.076 [3]	4			Soft gray SHALE, severely weathered.							
3.05 3.20 [10.5]	211.00 [692.3]													
		32 12 10	.203 [8]	5			Very soft gray CLAYSTONE, severely weathered. @ 3.20 m - 3.96 m [10.5' - 13.0'], contains limestone clasts.							
		16 14 30	.203 [8]	6			@ 3.96 m - 5.49 m [13.0' - 18.0'], pyritic.							
4.57 [15]														
		25 50/.13	.254 [10]	7										
		50/.13	.127 [5]	8			@ 5.49 m - 6.25 m [18.0' - 20.5'], red and gray.							
6.10 [20]														
		50/.08	.076 [3]	9										
7.01 [23.0]	207.19 [679.8]													
		50/.13	.127 [5]	10			Very soft to soft gray and dark gray SHALE, severely weathered.							
7.62														

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-88 | Location: Sta. 48+194.71, 34.22 m Rt. of US 33 Centerline | Date Drilled: 4/18/00

WATER OBSERVATIONS:
Water seepage at: 1.83 m [6.0']
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL / Natural / LL
7.62 [25]	206.58 [677.8]														
		34 40 50/.13	.305 [12]	11			Very soft to soft gray and dark gray SHALE, severely weathered.								
8.35 [27.4]	205.85 [675.4]														60+
							Bottom of Boring - 8.35 m [27.4']								
9.14 [30]															
10.67 [35]															
12.19 [40]															
13.72 [45]															
15.24															

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-89 | Location: Sta. 48+229.28, 0.39 m Rt. of US 33 Centerline | Date Drilled: 4/13/00

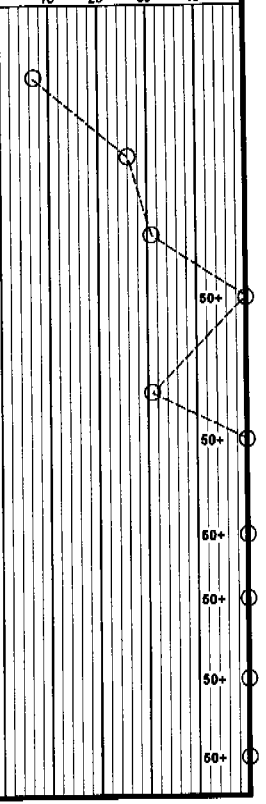
WATER OBSERVATIONS:
Water seepage at: 4.88 m [16.0']
Water level at completion: 9.27 m [30.4']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	223.82						
0.12 [0.4]	223.70 [733.9]						Topsoil - 0.127 m [5"]
		1 1 6	.356 [14]	1		96 [1.0]	Soft to medium stiff brown SILT AND CLAY (A-6a), some fine to coarse sand; contains rootlets; moist.
0.91 [3.0]	222.91 [731.3]						
		11 13 13	.457 [18]	2			Medium dense brown COARSE AND FINE SAND (A-3a), trace to little clay and silt; moist.
1.52 [5]							
		5 10 21	.457 [18]	3			@ 1.68 m [5.5'], becomes dense.
		32 50/.08	.229 [9]	4			@ 2.44 m - 3.20 m [8.0' - 10.5'], very dense.
3.05 [10]							@ 3.20 m [10.5'], brown and gray.
		11 14 17	.381 [15]	5			
3.96 [13.0]	219.86 [721.3]						
		50/.13	.127 [5]	6			Soft brown SANDSTONE, slightly micaceous, severely weathered, friable.
4.57 [15]							@ 4.88 m [16.0'], brown and gray, argillaceous, and micaceous.
		37 50/.08	.229 [9]	7A 7B			@ 5.03 m [16.5'], contians coal blossoms.
		50/.10	.102 [4]	8			
6.10 [20]							
		50/.08	.076 [3]	9			@ 6.40 m - 7.62 m [21.0' - 25.0'], contains seepage.
		50/.08	.076 [3]	10			
7.62							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-89	Location:	Sta. 48+229.28, 0.39 m Rt. of US 33 Centerline	Date Drilled:	4/13/00

WATER OBSERVATIONS:
Water seepage at: 4.88 m [16.0']
Water level at completion: 9.27 m [30.4']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% G. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL Natural LL
7.62 [25]	216.20 [709.3]	50/.08	.076 [3]	11			Soft dark gray SHALE, slightly carbonaceous, weathered.							50+	
		15 50/.13	.279 [11]	12			@ 8.72 m [28.6'], coal blossom.							50+	
9.14 [30]															
9.54 [31.3]	214.28 [703.0]	50/.10	.102 [4]	13			Bottom of Boring - 9.54 m [31.3']							50+	
10.67 [35]														50+	
12.19 [40]															
13.72 [45]															
15.24															

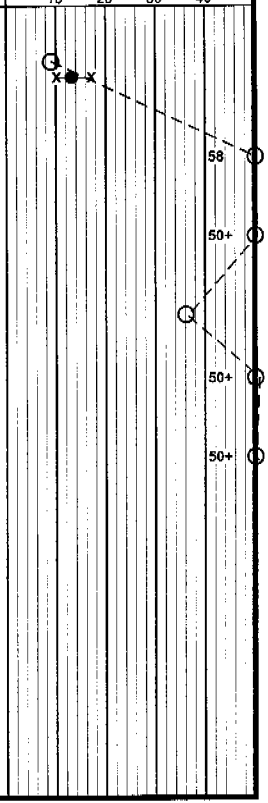
Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-91	Location:	Sta. 48+379.99, 10.00m Lt. of US 33 Mainline	Date Drilled:	4/12/00-4/13/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.5 (after coring)

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL, Natural, LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	233.43												
0.09 [0.3]	233.33 [765.5]						Topsoil - 0.102 m [4"]						
		1 1 8	.381 [15]	1		215 [2.25]	Very stiff brown SILT AND CLAY (A-6a), some to "and" fine to coarse sand; contains roots; damp.	0	9	--	50	23	18
0.91 [3.0]	232.51 [762.8]												
		12 29 29	.457 [18]	2			Very dense brown COARSE AND FINE SAND (A-3a), little to some silty clay; contains roots; micaceous, damp.						
1.52 [5.5]	231.75 [760.3]												
		31 44 50/.13	.457 [18]	3			Soft, brown, fine to coarse grained SANDSTONE, micaceous, severely weathered to decomposed.						
2.44 [8.0]	230.98 [757.8]												
		9 12 24	.279 [11]	4			Very soft, brown SILTSTONE, argillaceous, arenaceous, micaceous, severely weathered to decomposed.						
3.05 [10]													
		17 50/.03	.178 [7]	5			@ 3.35 m [11.0'], becomes soft and non-arenaceous.						
							@ 4.11 m [13.5'], becomes non-argillaceous.						
4.42	229.00	21 50/.08	.229 [9]	6									
4.57 [15.0]	[751.3]	Core 1.016 m [40"]	Rec 1.016 m [40"]	RQD 88%			Hard, gray, SANDSTONE, argillaceous, fine to very fine grained, micaceous, weathered.						
							@ 5.39 m [17.7'], becomes brown. @ 5.46 m - 5.58 m [17.9' - 18.3'], arenaceous shale layer.						
							@ 5.90 m - 6.07 m [19.4' - 19.9'], thin clay seam. @ 5.97 m [19.6'], very thin incomplete shale laminae.						
6.10 [20]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 6.25 m [20.5'], sandstone clasts.						
7.62													



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-91	Location:	Sta. 48+379.99, 10.00m Lt. of US 33 Mainline	Date Drilled:	4/12/00-4/13/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.5 (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62							**DESCRIPTION**								
[25]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			Hard, brown, SANDSTONE, argillaceous, fine to very fine grained, micaceous, weathered.								
9.14 [30]							@ 8.84 m - 8.93 m [29.0' - 29.3'], claystone, broken with slickensided shears. @ 8.93 m - 9.05 m [29.3' - 29.7'], interbedded sandstone and claystone. @ 9.60 m [31.5'], clay seam.								
10.67 [35]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			@ 11.09 m - 12.65 m [36.4' - 41.5'], friable.								
12.19 [40]							@ 13.17 m - 13.38 m [43.2' - 43.9'], argillaceous.								
13.72 [45]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 98%			@ 14.75 m [48.4'], becomes friable.								
15.24															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-91	Location:	Sta. 48+379.99, 10.00m Lt. of US 33 Mainline	Date Drilled:	4/12/00-4/13/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
1.5 (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
15.24 [50]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 98%			Hard, brown, SANDSTONE, argillaceous, fine to very fine grained, micaceous, weathered.						
							@ 15.51 m - 15.67 m [50.9' - 51.4'], claystone layer.						
							@ 15.82 m - 15.91 m [51.9' - 52.2'], broken.						
16.46 [54.0]	216.97 [711.8]												
16.76 [55]							Bottom of Boring - 16.46 m [54.0']						
18.29 [60]													
19.81 [65]													
21.34 [70]													
22.86													

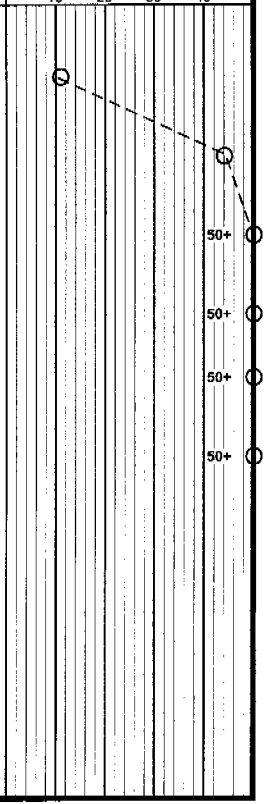
STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-92	Location:	Sta. 48+480.00, 30.00m Lt. of US 33 Mainline	Date Drilled:	4/11/00-4/12/00

WATER OBSERVATIONS:
Water seepage at: 14.6'
Water level at completion: 14.6' (before coring)
34' (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40) / Moisture Content - % PL Natural LL (10 20 30 40)
0	231.37						**DESCRIPTION**							
0.12	231.25						Topsoil - 0.127 m [5"]							
[0.4]	[758.7]	1												
		2	.406	1			Medium dense brown COARSE AND FINE SAND (A-3a), some silty clay; contains organic plant material, micaceous; damp to moist.							
		9	[16]											
		13					@ 1.07 m [3.5'], becomes dense and organic plant material disappears.							
		18	.432											
1.52		26	[17]	2										
[5]		24					@ 1.83 m [6.0'], becomes very dense, trace silty clay.							
		47	.432											
2.44	228.93	50/.13	[17]	3										50+
[8.0]	[751.1]	33					Soft, brown SANDSTONE, fine to coarse grained, severely weathered to decomposed.							
		53	.406											
3.05		50/.10	[16]	4										50+
[10]		31	.279				@ 3.35 m [11.0'], becomes micaceous and slightly argillaceous.							
		50/.13	[11]	5										50+
4.42	226.95	30	.203											
		50/.76	[8]	6										50+
4.57	[744.6]													
[15.0]		Core	Rec	RQD			Medium hard, brown SANDSTONE, slightly broken, argillaceous, weathered.							
		2.743 m [108"]	2.210 m [87"]	76%			@ 4.72 m - 4.82 m [15.5' - 15.8'], claystone seam.							
6.10														
[20]							@ 6.80 m [22.3'], clay seam.							
							@ 7.01 m - 7.07 m [23.0' - 23.2'], clay coated fractures.							
7.62														



Client: Ohio Department of Transportation	Project: ATH-33-40.981	Job No. 9821-3200.00
LOG OF: Boring R-92	Location: Sta. 48+480.00, 30.00' Lt. of US 33 Mainline	Date Drilled: 4/11/00-4/12/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: 14.6' (before coring)
34' (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62	223.75						**DESCRIPTION**	GRADATION							
[25]	[734.1]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			Medium hard, brown SANDSTONE, slightly broken, argillaceous, moderately weathered. @ 8.08 m [26.5'], clay seam. @ 8.41 m - 9.60 m [27.6' - 31.5'], friable.								
9.14															
[30]															
10.67		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%											
[35]															
12.19							@ 12.07 m - 13.41 m [39.6' - 44.0'], severely weathered, broken.								
[40]															
							@ 13.29 m - 13.41 m [43.6' - 44.0'], highly broken.								
13.72		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 13.41 m [44.0'], gas encountered.								
[45]															
14.94	216.43														
[49.0]	[710.1]						Bottom of Boring - 14.94 m [49.0']								
15.24															

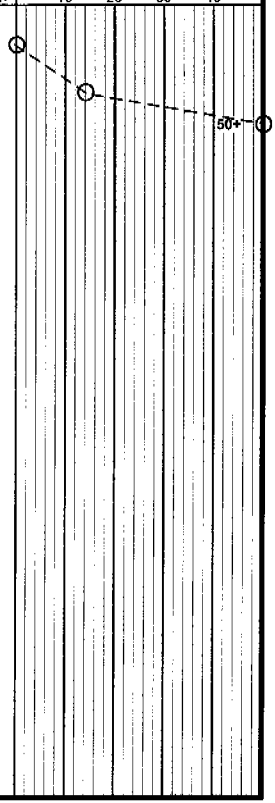
Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-93	Location:	Sta. 48+478.12, 29.38m Rt. of US 33 Mainline	Date Drilled:	4/19/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	219.70												
		WOH	.000				Topsoil - 0.457 m [18"]						
		WOH	[0]										
0.46	219.24	WOH											
[1.5]	[719.3]	6					Medium dense brown and gray COARSE AND FINE SAND (A-3a), trace silty clay; moist.						
		8	.305										
1.07	218.63	21	[12]	1			Soft, brown SANDSTONE, argillaceous, micaceous, severely weathered.						
1.16	218.54	50/.08	.076	2									
[3.8]	[717.0]		[3]										
1.52							Bottom of Boring - 1.16 m [3.8"]						
[5]													
							Note: Boring sampled by hand using light, cable-percussion drilling equipment.						
3.05													
[10]													
4.57													
[15]													
6.10													
[20]													
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: Ohio Department of Transportation	Project: ATH-33-40.981	Job No. 9821-3200.00
LOG OF: Boring R-94	Location: Sta. 48+619.91, on Centerline of US 33 Mainline	Date Drilled: 4/11/00

WATER OBSERVATIONS:
Water seepage at: 28.5'
Water level at completion: 8.53 m [28.0']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	221.12												
0.15	220.97						Topsoil - 0.152 m [6"]						
[0.5]	[725.0]	1 1 2	.457 [18]	1			Very loose brown COARSE AND FINE SAND (A-3a), some to "and" silty clay; contains roots; moist.						
		1 2 4	.457 [18]	2			@ 1.07 m [3.5'], becomes loose, brown and gray, contains "and" silty clay.	0	18	—	45	21	16
1.52													
[5]		2 4 8	.457 [18]	3			@ 1.83 m [6.0'], becomes medium dense, slightly micaceous, contains trace silty clay.						
		3 8 10	.406 [16]	4									
3.05													
3.20	217.92												
[10.5]	[715.0]	24 50/.13	.279 [11]	5			Soft gray SILTSTONE, micaceous, argillaceous, severely weathered to decomposed.						
		31 50/.08	.203 [8]	6									
4.57													
[15]		52 50/.08	.203 [8]	7			@ 4.88 m [16.0'], non-micaceous.						
		20 50/.13	.279 [11]	8			@ 5.64 m [18.5'], becomes argillaceous, micaceous.						
6.10													
[20]		41 50/.10	.254 [10]	9			@ 6.40 m - 6.86 m [21.0' - 22.5'], contains organic fossiliferous plant material and coal deposits.						
7.01	214.11												
[23.0]	[702.5]	28 50/.13	.279 [11]	10			Soft, black COAL.						
7.62													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+
50+
50+
50+

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-94	Location:	Sta. 48+619.91, on Centerline of US 33 Mainline	Date Drilled:	4/11/00

WATER OBSERVATIONS:
Water seepage at: 28.5'
Water level at completion: 8.53 m [28.0']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
7.62 [25]	213.60 [700.5]	50/.08	.076 [3]	11			Soft, gray SILTSTONE, argillaceous, severely weathered to decomposed.							50+	
8.81 [28.9]	212.31 [696.5]	50/.13	.127 [5]	12										50+	
9.14 [30]							Bottom of Boring - 8.81 m [28.9']								
10.67 [35]															
12.19 [40]															
13.72 [45]															
15.24															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-95	Location:	Sta. 48+780.84, 30.34m Lt. of US 33 Mainline	Date Drilled:	4/5/00-4/11/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL Natural LL
0	231.24														
		7 19 34	.432 [17]	1			Very dense brown GRAVEL WITH SAND (A-1-b): (decomposed sandstone); damp.							53	
		24 50/.10	.254 [10]	2										50+	
1.52 [5]															
		41 50/.10	.254 [10]	3										50+	
		4 50 50/.03	.330 [13]	4										50+	
3.05 3.20 [10.5]	228.04 [748.2]														
		50/.13	.127 [5]	5			Soft brown SANDSTONE, micaceous; severely weathered.							50+	
		50/.13	.127 [5]	6										50+	
4.57 [15]	226.67 [743.7]	Core 2.743 m [108"]	Rec 2.362 m [93"]	RQD 86%			Medium hard brown SANDSTONE, micaceous; poorly cemented; broken; weathered; contains argillaceous clasts; friable.								
6.10 [20]							@ 6.46 m [21.2'], very thin clay seam.								
7.62							@ 7.28 m [23.9'], very thin clay seam. @ 7.32 m - 10.36 m [24.0' - 34.0'], no water return.								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-95	Location:	As per plan	Date Drilled:	4/5/00-4/11/00

Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62	223.62													
[25]	[733.7]	Core 3.048 m [120"]	Rec 2.896 m [114"]	RQD 90%										
9.14														
[30]														
		Core 1.524 m [60"]	Rec 1.295 m [51"]	RQD 85%										
10.67														
[35]														
		Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 68%										
12.19														
[40]														
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										
13.72														
[45]														
15.24														

Medium hard brown SANDSTONE, micaceous; poorly cemented; broken; weathered; contains argillous clasts; friable.
@ 7.32 m - 10.36 m [24.0' - 34.0'], no water return.

@ 8.87 m - 8.99 m [29.1' - 29.5'], clay seam.

@ 9.14 m - 10.36 m [30.0' - 34.0'], reddish brown.

@ 9.69 m - 9.78 m [31.8' - 32.1'], highly broken.

@ 10.91 m [35.8'], high angle fracture.

@ 11.89 m [39.0'], highly broken to broken.

@ 12.13 m - 12.37 m [39.8' - 40.6'], contains carbonaceous layers.

@ 13.41 m - 19.20 m [44.0' - 63.0'], no water recovery.

@ 14.36 m [47.1'], horizontal fracture.

@ 14.84 m [48.7'], low angle fracture.
@ 15.00 m - 15.09 m [49.2' - 49.5'], highly broken.
@ 15.00 m - 16.46 m [49.2' - 54.0'], contains carbonaceous and coal stringers.

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-95 | **Location:** Sta. 48+780.84, 30.34m Lt. of US 33 Mainline | **Date Drilled:** 4/5/00-4/11/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
15.24 [50]	216.00 [708.7]	Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 93%			Medium hard brown SANDSTONE, micaceous; poorly cemented; broken; weathered; contains argillous clasts; friable. @ 15.64 m - 15.70 m [51.3' - 51.5'], gray. @ 15.88 m - 15.97 m [52.1' - 52.4'], gray. @ 16.28 m - 16.43 m [53.4' - 53.9'], gray.
16.76 [55]		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 87%			@ 16.64 m - 16.79 m [54.6' - 55.1'], gray with coal stringers. @ 17.43 m - 17.89 m [57.2' - 58.7'], near vertical fracture, highly weathered. @ 17.60 m - 17.72 m [57.8' - 58.2'], highly broken. @ 17.83 m - 17.91 m [58.5' - 58.8'], gray.
17.92 [58.8]	213.32 [699.9]	Core 1.524 m [60"]	Rec 1.346 m [53"]	RQD 22%			Soft black COAL, weathered.
18.29 [60]							
18.62 [61.1]	212.62 [697.6]						Soft gray CLAYSTONE, weathered to slightly weathered.
19.05 [62.5]	212.19 [696.2]						Medium hard to hard gray LIMESTONE, weathered. @ 19.35 m [63.5'], broken.
19.48 [63.9]	211.76 [694.8]	Core 1.524 m [60"]	Rec .305 m [12"]	RQD 0%			Soft gray CLAYSTONE, slightly micaceous; contains siltstone clasts; slightly weathered.
19.81 [65]							@ 19.51 m - 21.40 m [64.0' - 70.2'], highly broken.
21.34 [70]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 88%			@ 21.03 m - 22.56 m [69.0' - 74.0'], encountered gas. @ 21.79 m - 21.92 m [71.5' - 71.9'], highly broken. @ 22.31 m - 22.37 m [73.2' - 73.4'], reddish.
22.86							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-95	Location:	Sta. 48+780.84, 30.34m Lt. of US 33 Mainline	Date Drilled:	4/5/00-4/11/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
6.40 m [21.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [ft]	Drive	Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	GRADATION
22.86	208.38							**DESCRIPTION**							
[75]	[683.7]		Core 1.524 m [60"]	Rec .483 m [19"]	RQD 8%			Very soft brown SANDSTONE, poorly cemented; weathered.							
23.90	207.34														
[78.4]	[680.2]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 95%			Soft gray, red, and brown CLAYSTONE, slightly micaceous; arenaceous.							
24.38															
[80]															
25.60	205.64														
[84.0]	[674.7]							Bottom of Boring - 25.60 m [84.0']							
25.91															
[85]															
27.43															
[90]															
28.96															
[95]															
30.48															

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97	Location:	Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled:	3/21/00-3/23/00

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
0	247.00							Topsoil - 0.356 m [14"]								
0.37 [1.2]	246.63 [809.1]	1	4 8 18	.356 [14]				Medium dense brown COARSE AND FINE SAND (A-3a), some silty clay; damp.								
0.91 [3.0]	246.09 [807.4]	2	50/.13	.127 [5]				Soft brown, SANDSTONE, fine to coarse grained, micaceous, argillaceous; severely weathered to decomposed.								50+
1.52 [5]		3	50/.10	.102 [4]				@ 1.83 m [6.0'], becomes severely weathered.								50+
2.29 [7.5]	244.71 [802.8]	4	50/.13	.127 [5]				Soft brown SILTSTONE, micaceous; severely weathered to decomposed.								50+
3.05 [10]		5	17 50/.13	.279 [11]												50+
3.96 [13.0]	243.04 [797.4]	6	12 27 38	.330 [13]				Very soft dark brown CLAYSTONE, severely weathered to decomposed.								65
4.57 [15.5]	242.28 [794.9]	7	50/.08	.076 [3]				Soft gray SILTSTONE, severely weathered.								50+
5.33 [17.5]	241.67 [792.9]							Soft dark gray SHALE, argillaceous, severely weathered.								
5.94 [20.0]	241.06 [790.9]	8	33 50/.10	.254 [10]												50+
6.10			Core 1.219 m [48"]	Rec .813 m [32"]	RQD 67%			Soft to medium hard gray CLAYSTONE, slightly weathered to weathered, broken								
7.62								@ 7.32 m [24.0'], highly broken.								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97	Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled: 3/21/00-3/23/00		

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % (PL, Natural, LL)
7.62	239.38												
[25]	[785.4]	Core 1.524 m [60"]	Rec .686 m [27"]	RQD 0%		Soft to medium hard gray CLAYSTONE; slightly weathered to weathered, broken @ 8.84 m [29.0'], limestone.							
9.14		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 75%									
[30]													
9.51	237.49												
[31.2]	[779.2]					Medium hard gray SILTSTONE, micaceous, weathered, contains limestone clasts. @ 10.73 m [35.2'], thin clay seam. @ 10.76 m - 10.82 m [35.3' - 35.5'], limestone lense.							
10.36	236.64												
[34.0]	[776.4]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%		Medium hard brown SILTSTONE, arenaceous, micaceous, slightly calcareous, weathered.							
10.67													
10.82	236.18												
[35.5]	[774.9]					Medium hard to hard brown SANDSTONE, micaceous, weathered. @ 10.82 m - 12.07 m [35.5' - 39.6'], argillaceous, very thin bedded. @ 12.07 m [39.6'], becomes light brown. @ 12.07 m - 12.65 m [39.6' - 41.5'], calcareous.							
12.19													
[40]													
13.72		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%		@ 13.56 m - 13.96 m [44.5' - 45.8'], calcareous.							
[45]													
15.24													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97	Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled: 3/21/00-3/23/00		

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	DESCRIPTION
15.24 [50]	231.76 [760.4]											Hard light brown SANDSTONE, micaceous, slightly weathered.
		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%								
16.76 [55]												
18.29 [60]												
		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 99%								
19.81 [65]												
21.34 [70]												@ 21.17 m [69.4'], horizontal fracture. @ 21.20 m [69.6'], horizontal fracture. @ 21.29 m - 21.34 m [69.8' - 70.0'], limestone lense. @ 21.34 m - 21.52 m [70.0' - 70.6'], calcareous. @ 21.55 m [70.7'], becomes weathered.
21.79 [71.5]	225.21 [738.9]											Medium hard brown CLAYSTONE, arenaceous, weathered, broken. @ 21.98 m [72.1'], becomes dark gray and slightly weathered.
22.86												

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97		Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled:	3/21/00-3/23/00

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [in]	Drive	Press	DESCRIPTION
22.86 [75]	224.14 [735.4]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 98%		Medium hard dark gray CLAYSTONE, arenaceous; slightly weathered. @ 23.26 m [76.3'], horizontal fracture. @ 24.08 m - 24.17 m [79.0' - 79.3'], fracture zone. @ 24.48 m [80.3'], high angle fracture, rust stained., @ 24.66 m - 24.84 m [80.9' - 81.5'], becomes brown, broken, and micaceous. @ 24.84 m [81.5'], clay seam.
24.38 [80]							
24.84 [81.5]	222.16 [728.9]						Hard brown SANDSTONE, micaceous, weathered. @ 25.18 m [82.6'], low angle fractrure.
25.91 [85]			Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%		@ 26.21 m [86.0'], hole caved after removal of the core steel. @ 26.97 m [88.5'], low angle fractrure.
27.43 [90]							@ 27.95 m [91.7'], low angle fractrure. @ 28.01 m [91.9'], low angle fractrure. @ 28.07 m - 28.35 m [92.1' - 93.0'], gray. @ 28.65 m [94.0'], brown and gray interbeds.
28.96 [95]			Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%		@ 29.00 m [95.2'], low angle fracture. @ 29.18 m [95.8'], clay coated low angle fracture. @ 29.00 m - 30.02 m [95.2' - 98.5'], weathered to slightly weathered. @ 30.02 m [98.5'], gray and low angle fracture.
30.48							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97	Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled: 3/21/00-3/23/00		

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

STANDARD PENETRATION (N) Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec (m) [in]	Drive	Press	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.48 [100]	216.52 [710.4]						Hard gray SANDSTONE, micaceous, weathered.						
32.00 [105]			Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 90%								
32.77 [107.5]	214.23 [702.8]						Medium hard dark gray CLAYSTONE, pyritic, broken, weathered to slightly weathered.						
33.53 [110]							@ 34.35 m [112.7'], carbonaceous.						
34.44 [113.0]	212.56 [697.4]						Soft to medium hard black COAL, weathered.						
35.05 [115]	211.95 [695.4]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 81%		Medium hard gray CLAYSTONE, broken fractures, calcareous, arenaceous, weathered, contains limestone clasts.						
							@ 35.14 m - 35.63 m [115.3' - 116.9'], fractured zone.						
36.58 [120]							@ 36.27 m - 37.67 m [119.0' - 123.6'], fractured zone.						
38.10													

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97	Location:	Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled:	3/21/00-3/23/00

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
38.10 [125]	208.90 [685.4]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 93%			Medium hard gray CLAYSTONE, broken fractures, calcareous, arenaceous, weathered, contains limestone clasts.
							@ 38.59 m [126.6'], becomes pyritic.
							@ 39.01 m [128.0'], fractured with clay infilling.
							@ 39.20 m [128.6'], healed fracture.
39.62 [130]							@ 39.81 m [130.6'], color change to red gray and brown.
							@ 39.90 m [130.9'], low angle fracture with clay infilling.
							@ 40.51 m [132.9'], low angle fracture with clay infilling.
							@ 40.84 m [134.0'], becomes very arenaceous.
41.15 [135]		Core 3.048 m [120"]	Rec 2.972 m [117"]	RQD 91%			
42.67 [140]							@ 42.67 m - 46.94 m [140.0' - 154.0'], gas pockets encountered.
43.13 [141.5]	203.87 [668.9]						@ 43.13 m [141.5'], clay seam.
							Hard gray SANDSTONE, micaceous, argillaceous, pyritic, weathered.
43.89 [144.0]	203.11 [666.4]						@ 43.74 m - 43.89 m [143.5' - 144.0'], vertical fracture.
44.20 [145]		Core 3.048 m [120"]	Rec 3.023 m [119"]	RQD 95%			Medium hard gray CLAYSTONE, micaceous, broken, slightly weathered to weathered, contains clay seams throughout.
45.72							

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-97	Location:	Sta. 49+001.73, 105.42m Rt. of US 33 Mainline	Date Drilled:	3/21/00-3/23/00

WATER OBSERVATIONS:
Water seepage at: 0.91 m [3.0']
Water level at completion: dry (before coring)
dry (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
45.72 [150]	201.28 [660.4]						Medium hard gray CLAYSTONE, micaceous, broken, slightly weathered to weathered, contains clay seams throughout.								
46.94 [154.0]	200.06 [656.4]						Bottom of Boring - 46.94 m [154.0']								
47.24 [155]															
48.77 [160]															
50.29 [165]															
51.82 [170]															
53.34															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-98	Location:	Sta. 49+176.75, 43.42m Rt. of US 33 Mainline	Date Drilled:	03/14/00

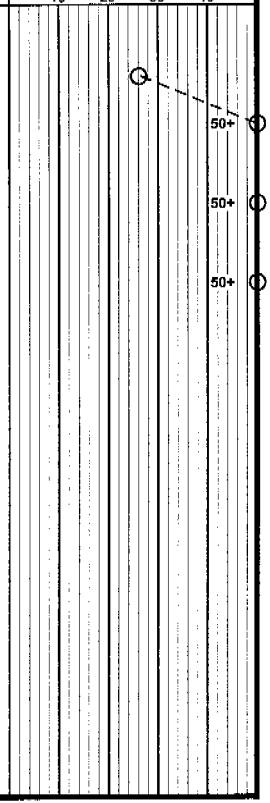
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	219.85						
0.30	219.55						Topsoil - 0.305 m [12"]
[1.0]	[720.3]	8					
		4	.178		1		Medium dense brown COARSE AND FINE SAND (A-3a); micaceous; damp.
0.91	218.94	22	[7]				
[3.0]	[718.3]						
		50/.10	.102		2		Soft brown SANDSTONE, fine to coarse grained, micaceous, severely weathered to decomposed.
1.52			[4]				
[5]							
		50/.08	.076		3		
			[3]				
		50/.13	.127		4		
			[5]				
3.05	216.80						
[10]	[711.3]	Core 1.219 m [48"]	Rec 1.219 m [48"]	RQD 100%			Soft to medium hard brown SANDSTONE, poorly cemented, micaceous, weathered to severely weathered.
							@ 3.05 m - 3.35 m [10.0' - 11.0'], high angle fracture with partial clay coating and gray along break.
							@ 3.38 m - 4.27 m [11.1' - 14.0'], highly broken.
		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			
4.57							
[15]							
							@ 5.59 m - 5.65 m [18.4' - 18.5'], gray.
							@ 6.02 m - 6.11 m [19.8' - 20.0'], gray with black laminae.
6.10							
[20]							
							@ 6.55 m [21.5'], gray with dark gray and black laminae.
							@ 7.13 m - 7.16 m [23.4' - 23.5'], claystone layer.
7.32	212.53						
[24.0]	[697.3]						Medium hard gray SILTSTONE, argillaceous, weathered.
7.62							



Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-98	Location:	Sta. 49+176.75, 43.42m Rt. of US 33 Mainline	Date Drilled:	03/14/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) — Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL — Natural — LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62	212.23						
[25]	[696.3]	Core 3.048 m [120"]	Rec 2.845 m [112"]	RQD 90%			Medium hard gray SILTSTONE, argilllaceous, weathered @ 7.96 m [26.1'], slightly weathered claystone.
8.05	211.80						
[26.4]	[694.9]						Soft black COAL.
8.63	211.22						
[28.3]	[693.0]						Medium hard gray SILTSTONE, weathered, slightly broken , contains rock clasts.
9.14							
[30]							@ 8.75 m [28.7'], high angle slickensided shear. @ 9.17 m [30.1'], slightly weathered, broken.
		Core 3.048 m [120"]	Rec 1.346 m [53"]	RQD 23%			@ 10.36 m - 10.49 m [34.0' - 34.4'], limestone.
10.67							
[35]							
12.19							
[40]							
13.41	206.44						
[44.0]	[677.3]	Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 93%			Soft to medium hard red, brown, gray CLAYSTONE, slightly weathered.
13.72							
[45]							
14.94	204.91						
[49.0]	[672.3]						Bottom of Boring - 14.94 m [49.0']
15.24							

Client: Ohio Department of Transportation | **Project:** ATH-33-40.981 | **Job No.** 9821-3200.00

LOG OF: Boring R-99 | **Location:** Sta. 49+267.17, 34.50m Rt. of US 33 Mainline | **Date Drilled:** 03/29/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (before coring)
5.24 m [17.2'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	222.75													
0.15 [0.5]	222.60 [730.3]						Topsoil - 0.152 m [6"]							
0.61 [2.0]	222.14 [728.8]	2 4 4	.356 [14]	1A 1B		335 [3.5]	Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; micaceous; organic with rootlets; damp.	8	19	—	31	29	14	
1.22 [4.0]	221.53 [726.8]	4 50/.13	.229 [9]	2			Loose brown COARSE AND FINE SAND (A-3a), some silty clay; micaceous; damp.							50+
1.52 [5.5]	221.07 [725.3]						Soft light brown and gray SHALE, argillaceous, decomposed.							
		50/.10	.102 [4]	3			Soft light brown, fine to coarse grained SANDSTONE, argillaceous, micaceous, severely weathered.							50+
		50/.10	.102 [4]	4										50+
3.05 [10]	219.70 [720.8]	Core 1.219 m [48"]	Rec 1.092 m [43"]	RQD 90%			Medium hard brown and light gray SANDSTONE, micaceous, weathered.							
4.57 [15]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			@ 5.46 m [17.9'], horizontal fracture.							
6.10 [20]							@ 6.31 m [20.7'], horizontal fracture. @ 6.43 m [21.1'], 0.05' clay seam.							
7.62														

GRADATION

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-99	Location:	Sta. 49+267.17, 34.50m Rt. of US 33 Mainline	Date Drilled:	03/29/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (before coring)
5.24 m [17.2'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
7.62 [25]	215.13 [705.8]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 93%			Medium hard brown and light gray SANDSTONE, micaceous, weathered. @ 7.80 m [25.6'], horizontal fracture. @ 7.83 m [25.7'], horizontal fracture. @ 7.86 m [25.8'], gray. @ 8.60 m - 8.69 m [28.2' - 28.5'], 45° bedding plane broken with rust staining. @ 8.69 m - 9.20 m [28.5' - 30.2'], horizontal fracture, rust stained, brown. @ 8.96 m [29.4'], color change to gray. @ 8.99 m - 9.11 m [29.5' - 29.9'], fractured with rust staining. @ 9.36 m - 9.42 m [30.7' - 30.9'], broken. @ 9.75 m - 10.70 m [32.0' - 35.1'], near vertical fracture.							
9.14 [30]															
10.70 [35.1]	212.05 [695.7]	Core 1.524 m [60"]	Rec 1.219 m [48"]	RQD 53%			Soft black COAL, broken, weathered.								
11.06 [36.3]	211.69 [694.5]						Hard gray SANDSTONE, pyritic, slightly weathered.								
11.13 [36.5]	211.62 [694.3]						Medium hard gray SILTSTONE, pyritic, micaceous, weathered. @ 11.92 m - 12.04 m [39.1' - 39.5'], argillaceous, slightly weathered.								
12.04 [40.0]	210.71 [691.3]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 47%			Soft black COAL, broken, weathered.								
12.19 [42.0]	209.95 [688.8]						Soft to medium hard gray CLAYSTONE, slightly micaceous, weathered to severely weathered.								
13.72 [45]		Core 1.524 m [60"]	Rec .584 m [23"]	RQD 25%			@ 14.23 m [46.7'], very broken with occaisonal slickensides, contains interbedded limestones and limestone clasts.								
15.24															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-99	Location:	Sta. 49+267.17, 34.50m Rt. of US 33 Mainline	Date Drilled:	03/29/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (before coring)
5.24 m [17.2'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No.	Blows per 0.15 m	Rec. (m) [in]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
15.24 [50]	207.51 [680.8]		Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 42%			Soft to medium hard gray CLAYSTONE, slightly micaceous, pyritic, weathered to severely weathered, contains limestone clasts
			Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 70%			
16.76 [55]								
17.98 [59.0]	204.77 [671.8]		Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 95%			Soft to medium hard red and gray CLAYSTONE, weathered
18.29 [60]								@ 18.93 m - 19.00 m [62.1' - 62.3'], gray.
								@ 19.51 m [64.0'], becomes red, gray, and brown intermixed.
			Core 1.524 m [60"]	Rec .813 m [32"]	RQD 53%			
19.81 [65]								
			Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 45%			
21.34 [70]								
21.64 [71.0]	201.11 [659.8]							Medium hard gray SILTSTONE, broken, weathered to slightly weathered.
22.86								@ 22.56 m [74.0'], slightly broken.

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-99	Location:	Sta. 49+267.17, 34.50m Rt. of US 33 Mainline	Date Drilled:	03/29/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry (before coring)
5.24 m [17.2'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
22.86	199.89						**DESCRIPTION**						
[75]	[655.8]	Core 2.286 m [90"]	Rec 2.159 m [85"]	RQD 94%			Medium hard gray SILTSTONE, slightly broken, weathered to severely weathered.						
24.38													
[80]													
24.84	197.91												
[81.5]	[649.3]						Bottom of Boring - 24.84 m [81.5']						
25.91													
[85]													
27.43													
[90]													
28.96													
[95]													
30.48													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-100	Location:	Sta. 49+265.95, 101.88m Rt. of US 33 Mainline	Date Drilled:	3/23/00 & 3/24/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
10.97 m [36.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	232.87						
0.34	232.53						Topsoil - 0.33 m [13"]
[1.1]	[762.9]	2					
		2 .5	.330 [13]	1		431+ [4.5+]	Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.
0.91	231.96						
[3.0]	[761.0]	24					
		42 50/.10	.406 [16]	2			Soft light brown SILTSTONE, argillaceous, micaceous, severely weathered to decomposed.
1.52							
[5]							
		29 50/.05	.203 [8]	3			@ 1.83 m [6.0'], becomes severely weathered.
		50/.13	.127 [5]	4			
3.05	229.82						
[10]	[754.0]	Core 1.219 m [48"]	Rec .991 m [39"]	RQD 75%			Medium hard brown SILTSTONE, micaceous, arenaceous, weathered to severely weathered. @ 3.20 m - 3.29 m [10.5' - 10.8'], high angle, rust stained fracture. @ 3.81 m [12.5'], clay seam. @ 3.87 m - 3.93 m [12.7' - 12.9'], horizontal fracture. @ 4.39 m - 4.45 m [14.4' - 14.6'], gray.
4.54	228.33	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			
[14.9]	[749.1]						Hard brown SANDSTONE, micaceous, very thin bedded, slightly broken, weathered. @ 4.69 m - 4.82 m [15.4' - 15.8'], gray. @ 4.75 m - 4.82 m [15.6' - 15.8'], claystone layer. @ 5.03 m - 5.12 m [16.5' - 16.8'], gray. @ 5.58 m - 5.61 m [18.3' - 18.4'], high angle fracture.
5.70	227.17						
[18.7]	[745.3]						
6.10							Medium hard gray SILTSTONE with claystone interbeds, slightly micaceous, weathered. @ 6.07 m - 6.22 m [19.9' - 20.4'], sandstone layers. @ 6.46 m - 6.55 m [21.2' - 21.5'], severely weathered.
[20]							@ 7.07 m - 7.13 m [23.2' - 23.4'], severely weathered.
7.62							@ 7.41 m [24.3'], claystone, severely weathered.

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+
50+

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-100	Location:	Sta. 49+265.95, 101.88m Rt. of US 33 Mainline	Date Drilled:	3/23/00 & 3/24/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
10.97 m [36.0'] (after coring)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	225.25 [739.0]	Core 3.048 m [120"]	Rec 3.023 m [119"]	RQD 99%			Soft brown CLAYSTONE, severely weathered
8.05 [26.4]	224.82 [737.6]						Hard light gray SANDSTONE, fine to coarse grained, calcareous, slightly micaceous, weathered to slightly weathered.
9.14 [30]							@ 9.30 m [30.5'], becomes noncalcareous.
9.69 [31.8]	223.18 [732.2]						Hard brown and gray SANDSTONE, fine to medium grained, poorly cemented, slightly broken with rust staining. @ 9.85 m [32.3'], void encountered, lost water return.
10.67		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 94%			
10.82 [35.5]	222.05 [728.5]						Soft to medium hard brown SILTSTONE with clay interbeds, severely weathered.
11.40 [37.4]	221.47 [726.6]						Hard light gray and brown, SANDSTONE, fine to medium grained, poorly cemented, micaceous, weathered.
12.19 [40]							@ 13.41 m - 23.01 m [44.0' - 75.5'], no water return.
13.72 [45]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 95%			@ 14.02 m - 14.36 m [46.0' - 47.1'], contains interbedded black carbonaceous claystone, broken and fractured, severely weathered. @ 14.36 m [47.1'], color change to brown.
15.24							

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-100	Location:	Sta. 49+265.95, 101.88m Rt. of US 33 Mainline	Date Drilled:	3/23/00 & 3/24/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
10.97 m [36.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Rec (m) [in]	Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
15.24 [50]	217.63 [714.0]						Hard gray and brown SANDSTONE, fine to medium grained, micaceous, poorly cemented, weathered. @ 15.39 m [50.5'], color change to gray with dark gray laminae.
		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			@ 13.41 m - 23.01 m [44.0' - 75.5'], no water return.
16.76 [55]							@ 16.92 m [55.5'], horizontal clean fracture.
18.29 [60]							
		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 78%			
19.81 [65]							
20.67 [67.8]	212.20 [696.2]						Medium hard dark gray CLAYSTONE, pyritic, severely weathered.
21.34 [70]							
21.52 [70.6]	211.35 [693.4]						Soft black COAL
							@ 22.28 m - 22.56 m [73.1' - 74.0'], carbonaceous shale.
22.68 [74.4]	210.19 [689.6]						@ 22.59 m - 22.68 m [74.1' - 74.4'], underclay / claystone.

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring R-100 | Location: Sta. 49+265.95, 101.88m Rt. of US 33 Mainline | Date Drilled: 3/23/00 & 3/24/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
10.97 m [36.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
22.86	210.01														
[75]	[689.0]	Core 0.762 m	Rec .635 m	RQD 33%			Hard gray LIMESTONE, argillaceous, broken with clay, weathered. @ 23.32 m - 23.41 m [76.5' - 76.8'], medium hard, black coal seam.								
		Core 0.762 m [30"]	Rec .762 m [30"]	RQD 37%											
24.08	208.79														
[79.0] 24.38	[685.0]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 95%			Medium hard gray SILTSTONE, slightly carbonaceous, weathered. @ 24.20 m [79.4'], slickensided shear. @ 24.60 m [80.7'], slickensided shear. @ 24.38 m - 24.44 m [80.0' - 80.2'], hard, gray limestone layer with high angle fracture.								
[80] 24.84	208.03														
[81.5]	[682.5]						Soft gray CLAYSTONE, broken, contains limestone clasts, severely weathered.								
		Core 3.048 m [120"]	Rec 1.880 m [74"]	RQD 23%											
25.91															
[85]															
27.43															
[90]															
28.65	204.22														
[94.0] 28.96	[670.0]	Core 1.524 m [60"]	Rec 1.321 m [52"]	RQD 78%			Medium hard gray, red, dark gray, and brown CLAYSTONE, slightly broken, weathered. @ 28.99 m - 29.02 m [95.1' - 95.2'], fractured zone. @ 29.11 m - 29.20 m [95.5' - 95.8'], fractured zone. @ 29.29 m - 29.69 m [96.1' - 97.4'], carbonaceous.								
[95]															
30.48															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-100	Location:	Sta. 49+265.95, 101.88m Rt. of US 33 Mainline	Date Drilled:	3/23/00 & 3/24/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
10.97 m [36.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Sample No. Blows per 0.15 m	Sample No. Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
30.48 [100]	202.39 [664.0]														
30.94 [101.5]	201.93 [662.5]	Core 1.524 m [60"]	Rec 1.270 m [50"]	RQD 65%			Medium hard gray and brown CLAYSTONE, slightly broken, weathered.								
32.00 [105]		Core 3.048 m [120"]	Rec 2.794 m [110"]	RQD 92%			Medium hard gray SILTSTONE, micaceous, contains limestone clasts, weathered.								
33.53 [110]							@ 31.49 m - 31.70 m [103.3' - 104.0'], medium hard to hard, gray LIMESTONE interbedded with siltstone, weathered.								
35.05 [115]		Core 1.829 m [72"]	Rec 1.753 m [69"]	RQD 94%			@ 31.70 m - 32.46 m [104.0' - 106.5'], broken, weathered to severely weathered.								
36.58 [120]	196.29 [644.0]						@ 32.16 m [105.5'], high angle slickensided shear.								
38.10							@ 33.22 m - 33.83 m [109.0' - 111.0'], broken, weathered to severely weathered.								
							@ 34.90 m - 36.15 m [114.5' - 118.6'], broken, weathered to severely weathered.								
							@ 35.97 m [118.0'], slightly pyritic.								
							Bottom of Boring - 36.58 m [120.0']								

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-101	Location:	Sta. 49+379.86, 64.96m Rt. of US 33 Mainline	Date Drilled:	3/30/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.76 m [2.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
0	218.75						Topsoil - 0.356 m [14"]								
0.37	218.38														
[1.2]	[716.5]	1													
		4	.330				Medium dense brown COARSE AND FINE SAND (A-3a), some silty clay; micaceous; damp.								
		7	[13]	1											
0.91	217.84														
[3.0]	[714.7]														
		40	203				Soft brown and gray SANDSTONE, micaceous, severely weathered to decomposed.								
		50/.05	[8]	2										50+	
1.52															
[5]															
		50/.08	.076											50+	
			[3]	3											
3.05	215.70														
[10]	[707.7]	Core 1.219 m [48"]	Rec 1.219 m [48"]		RQD 77%		Medium hard brown and gray SANDSTONE, poorly cemented, weathered @ 3.41 m - 3.51 m [11.2' - 11.5'], high angle fracture. @ 3.99 m - 4.08 m [13.1' - 13.4'], highly broken zone.								
4.48	214.27														
[14.7]	[703.0]	Core 1.524 m [60"]	Rec 1.422 m [56"]		RQD 90%		Soft to medium hard dark gray SILTSTONE, argillaceous, broken, weathered. @ 4.82 m - 4.97 m [15.8' - 16.3'], high angle fracture with rust staining.								
[15]															
5.79	212.96														
[19.0]	[698.7]	Core 1.524 m [60"]	Rec .711 m [28"]		RQD 12%		Soft brown SANDSTONE, fine grained, severely weathered to weathered.								
6.10															
[20]															
6.86	211.89														
[22.5]	[695.2]						Soft gray SILTSTONE, argillaceous, contains carbonaceous layers, severely weathered.								
7.32	211.43														
[24.0]	[693.7]						Soft black COAL, weathered to severely weathered.								
7.62															

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-101	Location:	Sta. 49+379.86, 64.96m Rt. of US 33 Mainline	Date Drilled:	3/30/00

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.76 m [2.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	211.13 [692.7]	Core 1.524 m [60"]	Rec 1.372 m [54"]	RQD 12%			Soft black COAL, weathered to severely weathered.
7.99 [26.2]	210.76 [691.5]						Soft gray CLAYSTONE, highly fractured, severely weathered.
							@ 8.50 m - 8.69 m [27.9' - 28.5'], coal seam.
							@ 8.84 m [29.0'], fractured with plant fragments.
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 47%			@ 9.39 m - 9.60 m [30.8' - 31.5'], limestone layer.
							@ 9.78 m - 9.60 m [32.1' - 31.5'], 0.15' limestone layer.
							@ 10.18 m - 11.98 m [33.4' - 39.3'], highly broken.
10.67 [35]		Core 1.524 m [60"]	Rec .762 m [30"]	RQD 0%			
12.19 [40]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 95%			@ 12.07 m - 12.13 m [39.6' - 39.8'], limestone layer.
							@ 12.56 m [41.2'], becomes pyritic.
13.41 [44.0]	205.34 [673.7]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Soft to medium hard red, brown, and gray CLAYSTONE, slightly broken with numerous slickensides, weathered.
13.72 [45]							
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client:	Ohio Department of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring R-101	Location:	Sta. 49+379.86, 64.96m Rt. of US 33 Mainline	Date Drilled:	3/30/00

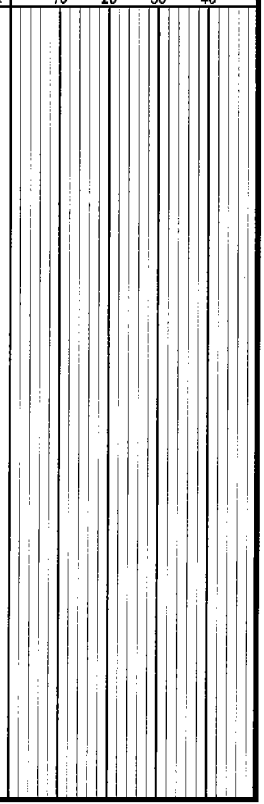
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: none (before coring)
0.76 m [2.5'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
15.24 [50]	203.51 [667.7]	Core 1.524 m [60"]	Rec 1.143 m [45"]	RQD 58%			Soft to medium hard red, brown, and gray CLAYSTONE, slightly broken with numerous slickensides, weathered. @ 16.37 m [53.7'], becomes dark gray.
16.76 [55]		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 98%			@ 16.95 m [55.6'], becomes gray. @ 17.34 m - 17.65 m [56.9' - 57.9'], limestone layer.
18.29 [60]	200.46 [657.7]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Medium hard to hard gray SILTSTONE, micaceous, pyritic, slightly weathered to weathered.
19.81 [65]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 19.51 m - 21.03 m [64.0' - 69.0'], gas pockets encountered. @ 20.09 m - 20.36 m [65.9' - 66.8'], argillaceous, severely weathered.
21.03 [69.0]	197.72 [648.7]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			Soft to medium hard gray CLAYSTONE, contains limestone clasts, slightly micaceous, weathered.
21.34 [70]							
22.56 [74.0]	196.19 [643.7]						Bottom of Boring - 22.56 m [74.0']
22.86							

GRADATION: % Aggregate, % C. Sand, % M. Sand, % F. Sand, % Silt, % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40



Client: Ohio Department of Transportation	**Project:** ATH-33-40.981		**Job No.** 9821-3200.00
LOG OF: Boring SB-26	**Location:** Sta. 48+860.00, 19.50 m left of US 33 centerline	**Date Drilled:** 2/1/00	

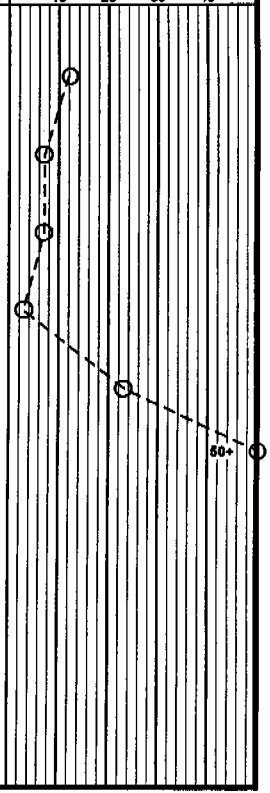
WATER OBSERVATIONS:
Water seepage at: 1.86 m [6.1'], 1.92 m [6.3']
Water level at completion: dry prior to core 1.07 m [3.5']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Pass	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	201.66												
0.20 [0.7]	201.46 [660.9]						Topsoil - 0.203 m [8"]						
		3 7 5	.229 [9]	1		239 [2.5]	Very stiff dark brown SILT AND CLAY (A-6a), little fine to coarse sand; moist.						
							@ 1.07 m - 1.52 m [3.5' - 5.0'], becomes stiff, brown.						
1.52 [5]		2 3 4	.305 [12]	2		168 [1.75]							
		2 3 4	.330 [13]	3	1	24 [0.25]	@ 1.83 m - 3.81 m [6.0' - 12.0'], soft, gray, with some fine to coarse sand.						
							@ 2.59 m - 3.66 m [8.5' - 12.0'], contains few coal fragments.						
3.05 [10]		1 1 2	.381 [15]	4	2	24 [0.25]							
3.66 [12.0]	198.00 [649.6]	2 3 20	.381 [15]	5A 5B		48 [0.5]							
4.42	197.24	30 50/.00	.127 [5]	6			Severly weathered gray SHALE, micaceous.						
4.57 [15.2]	[647.1] 197.03 [646.4]	Core 0.533 m [21"]	Rec .533 m [21"]	RQD 100%			Medium hard gray fine grained SANDSTONE, micaceous; weathered.						
5.18 [17.0]	196.46 [644.6]	Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%			Hard light gray LIMESTONE, micaceous, arenaceous; weathered to slightly weathered.						
6.10 [20]							Medium hard to hard gray fine to medium grained SANDSTONE, micaceous; weathered to slightly weathered.						
7.62													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-26 | Location: Sta. 48+860.00, 19.50 m left of US 33 centerline | Date Drilled: 2/1/00

WATER OBSERVATIONS:
Water seepage at: 1.86 m [6.1'], 1.92 m [6.3']
Water level at completion: dry prior to core
1.07 m [3.5']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
7.62 [25]	194.04 [636.8]						Medium hard to hard gray fine to medium grained SANDSTONE, micaceous; weathered to slightly weathered.
7.99 [26.2]	193.67 [635.4]						Bottom of Boring - 7.99 m [26.2']
9.14 [30]							
10.67 [35]							
12.19 [40]							
13.72 [45]							
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-29 | Location: Sta. 48+940.13, 7.11 m left of US 33 centerline | Date Drilled: 2-8-00

WATER OBSERVATIONS:
Water seepage at: 3.51 m [11.5']
Water level at completion: dry prior to coring
2.13 m [7.0'] after coring

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % (PL X — Natural — LL X)
0	209.36 [686.9]						Topsoil - 0.406 m [16"]							
0.40 [1.3]	208.96 [685.6]	2 2 4	.305 [12]	1		192 [2.0]	Stiff brown SILT AND CLAY (A-6a); damp.							
0.91 [3.0]	208.45 [683.9]	2 3 8	.229 [9]	2		431+ [4.5+]	Hard brown and red SILTY CLAY (A-6b); (decomposed shale); damp.							
1.52 [5]														
1.83 [6.0]	207.53 [680.9]	6 10 11	.229 [9]	3		431+ [4.5+]	Hard red CLAY (A-7-6); (decomposed claystone); damp.							
2.44 [8.0]	206.92 [678.9]	17 27 33	.381 [15]	4			Soft brown SHALE; severely weathered.							
3.05														
3.20 [10.5]	206.16 [676.4]	15 18 43	.305 [12]	5			Soft purple and brown CLAYSTONE; severely weathered.							
3.96 [13.0]	205.40 [673.9]	27 29 47	.279 [11]	6			Soft to medium hard gray SHALE, arenaceous; severely weathered.							
4.57 [15]														
		18 29 50/.10	.356 [14]	7										
		50/.08	.076 [3]	8			@ 5.64 m [18.5'], becomes weathered.							
6.10 [20]	203.26 [666.9]	Core 1.219 m [48"]	Rec .635 m [25"]	RQD 38%			@ 6.10 m - 7.32 m [20.0' - 24.0'], slightly broken.							
							@ 6.77 m - 6.98 m [22.2' - 22.9'], vertical fracture with rust staining.							
7.41 [24.3]	201.95 [662.6]						Soft to medium hard red CLAYSTONE; weathered.							

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL X — Natural — LL X; 10 20 30 40

60

61

76

50+

50+

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-29 | Location: Sta. 48+940.13, 7.11 m left of US 33 centerline | Date Drilled: 2-8-00

WATER OBSERVATIONS:
Water seepage at: 3.51 m [11.5']
Water level at completion: dry prior to coring
2.13 m [7.0'] after coring

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION
7.62 [25]	201.74 [661.9]	Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 95%			Soft to medium hard red CLAYSTONE; weathered.
8.02 [26.3]	201.34 [660.8]						Medium hard gray SHALE, arenaceous; weathered.
9.14 [30]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 8.84 m - 9.94 m [29.0' - 32.6'], weathered to severely weathered.
9.94 [32.6]	199.42 [654.3]						Soft to medium hard red CLAYSTONE; weathered to severely weathered.
10.36 [34.0]	199.00 [652.9]						Bottom of Boring - 10.36 m [34.0']
10.97 [35]							
12.19 [40]							
13.72 [45]							
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL X—●—X LL (Natural); 10 20 30 40

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

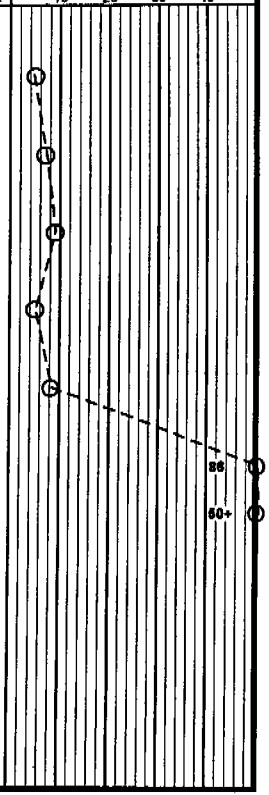
LOG OF: Boring SB-30 | Location: Sta. 48+840.60, 5.80 m right of US 33 centerline | Date Drilled: 1-18-00

WATER OBSERVATIONS:
Water seepage at: 2.65 m [8.7'], 2.77 m [9.1']
Water level at completion: dry (before coring)
1.22 m [4.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m^2) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	202.10												
0.25	201.85						Topsoil - 0.254 m [10"]						
[0.8]	[662.2]	2 3 2	.356 [14]	1		215 [2.25]	Stiff to very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand; contains roots, slightly organic; moist.						
1.52		2 3 4	.330 [13]	2		—							
[5]							@ 1.68 m - 2.59 m [5.5' - 8.5'], rust-stained, contains few coal fragments, no roots or organics.						
		3 4 5	.254 [10]	3		120 [1.25]							
2.59	199.51												
[8.5]	[654.6]	2 3 2	.254 [10]	4			Loose brown SANDY SILT (A-4a), little clay; contains sandstone and coal fragments; moist.						
3.05													
[10]													
3.35	198.75												
[11.0]	[652.1]	2 3 5	.279 [11]	5			Very soft gray SHALE, micaceous; severely weathered.						
							@ 4.11 m - 4.27 m [13.5' - 14.0'], gray, brown and reddish brown, contains sandstone fragments.						
4.27	197.83	29		6A									
[14.0]	[649.0]	35 51	.457 [18]	6B			Very dense dark brown SANDY SILT (A-4a), little silty clay, trace gravel; severely weathered sandstone; damp to moist.						
4.57													
[15]													
4.88	197.22												
[16.0]	[647.0]	50/.05	.051	7			Medium hard brown SANDSTONE; severely weathered;						
5.36	196.74	Core 0.61 m [24"]	Rec .610 m [24"]	RQD 67%			@ 5.03 m - 5.36 m [16.5' - 17.6'], becomes hard, gray.						
[17.6]	[645.5]	Core 0.61 m [24"]	Rec .610 m [24"]	RQD 92%			Hard gray LIMESTONE, arenaceous; slightly weathered.						
6.13	195.97												
[20.1]	[642.9]	Core 1.829 m [72"]	Rec 1.829 m [72"]	RQD 100%			Hard gray SANDSTONE; weathered to slightly weathered.						
							@ 7.21 m - 7.24 m [23.6' - 23.8'], argillaceous. @ 7.32 m [24.0'], very thin argillaceous layer.						
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-30 | Location: Sta. 48+840.60, 5.80 m right of US 33 centerline | Date Drilled: 1-18-00

WATER OBSERVATIONS:
Water seepage at: 2.65 m [8.7'], 2.77 m [9.1']
Water level at completion: dry (before coring)
1.22 m [4.0'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	194.48 [638.1]						Hard gray SANDSTONE; unweathered.
8.08 [26.5]	194.02 [636.5]						@ 7.88 m [25.9'], becomes calcareous.
							Bottom of Boring - 8.08 m [26.5']
9.14 [30]							
10.67 [35]							
12.19 [40]							
13.72 [45]							
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client: Ohio Department of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-33 | Location: Sta. 48+922.57, 19.52 m left of US 33 centerline | Date Drilled: 2-9-00

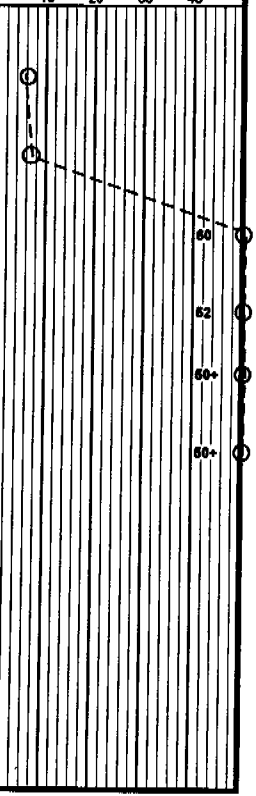
WATER OBSERVATIONS:
Water seepage at: 1.10 m [3.6']
Water level at completion: dry prior to coring
6.10 m [20.0'] after coring

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	208.02 [682.5]						
0.46 [1.5]	207.56 [681.0]	2 3 3	.279 [11]	1		239 [2.5]	Topsoil - 0.457 m [18"]
0.91 [3.0]	207.11 [679.5]						Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand, little gravel; damp.
1.52 [5]		1 1 6	.178 [7]	2		239 [2.5]	Very stiff red and gray CLAY (A-7-6); damp.
1.98 [6.5]	206.04 [676.0]	7 30 30	.279 [11]	3A 3B		–	Soft brown SHALE, arenaceous; severely weathered.
3.05 [10]		12 20 32	.330 [13]	4			@ 2.59 m [8.5'], becomes gray.
		39 50/.08	.228 [9]	5			
4.57 [15]	203.45 [667.5]	44 50/.13	.279 [11]	6			Soft to medium hard brown SHALE; severely weathered to weathered.
		Core 1.219 m [48"]	Rec .762 m [30"]	RQD 63%			
6.10 [20]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 6.55 m [21.5'], moderately hard, weathered.
7.32 [24.0]	200.70 [658.5]						@ 6.52 m [21.4'] & 6.95 m [22.8'], 45° slickensided shear.
7.62							Bottom of Boring - 7.32 m [24.0']

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: Ohio Deparment of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-34 | Location: Sta. 49+180.00, on US-33 centerline | Date Drilled: 2/14/00

WATER OBSERVATIONS:
Water seepage at: 1.37 m [4.5'], 3.84 m [12.6']
Water level at completion: 1.22 m [4.0'] (before and after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	212.31													
0.08	212.23						Topsoil - 0.076 m [3"]							
[0.3]	[696.3]	8 4 4	.102 [4]	1		—	Medium stiff to stiff brown and gray SANDY SILT (A-4a), little clay; petroleum odor; damp.							
0.76	211.55													
[2.5]	[694.1]						Black decomposed COAL							
1.07	211.24													
[3.5]	[693.0]	17 41 50/.10	.279 [11]	2		431+ [4.5+]	Hard dark gray SILT AND CLAY (A-6a); (decomposed claystone); damp.							
1.52														
[5]														
1.83	210.48													
[6.0]	[690.6]	24 50/.05	.178 [7]	3		431+ [4.5+]	Very soft to soft gray CLAYSTONE; severely weathered.							
		42 50/.05	.203 [8]	4		431+ [4.5+]								
3.05														
[10]		27 50/.08	.203 [8]	5		431+ [4.5+]								
		30 50/.08	.178 [7]	6		431+ [4.5+]								
4.57														
[15]		50/.08	.076 [3]	7		—								
		24 47 50/.08	.381 [15]	8A 8B		---	@ 5.49 m [18.0'], seepage. @ 5.64 m [18.5'], petroleum odor.							
6.10	206.21													
[20.0]	[676.5]	Core 1.397 m [55"]	Rec 1.295 m [51"]	RQD 80%			Soft to medium hard red and gray CLAYSTONE, arenaceous; severely weathered. @ 6.10 m - 6.22 m [20.0' - 20.4'], broken zone. @ 6.61 m [21.7'], clay seam. @ 6.86 m - 7.13 m [22.5' - 23.4'], broken zone.							
							@ 7.47 m [24.5'], clay seam.							
7.62														

GRADATION

Moisture Content - %
PL Natural LL

50+
50+
50+
50+
50+
50+
50+

Client: Ohio Deparment of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-34 | Location: Sta. 49+180.00, on US-33 centerline | Date Drilled: 2/14/00

WATER OBSERVATIONS:
Water seepage at: 1.37 m [4.5'], 3.84 m [12.6']
Water level at completion: 1.22 m [4.0'] (before and after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [in]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m	Moisture Content - % PL Natural LL
7.62 [25]	204.69 [671.6]	Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 88%			Soft to medium hard gray, brown red, and black CLAYSTONE, broken, arenaceous; severely weathered.							10 20 30 40	10 20 30 40
9.14 [30.0]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%			@ 9.51 m - 10.09 m [31.2' - 33.1'], contains several slickensided shears.								
10.18 [33.4]	202.13 [663.2]						Medium hard gray SANDSTONE, argillaceous; severely weathered.								
10.67 [35]		Core 3.048 m [120"]	Rec 3.048 m [120"]	RQD 100%											
12.19 [40]															
13.59	198.72														
13.72 [45.0]	[652.0]						Bottom of Boring - 13.59 m [44.6']								
15.24															

Client:	Ohio Deparment of Transportation	Project:	ATH-33-40.981	Job No.	9821-3200.00
LOG OF:	Boring SB-35	Location:	Sta. 48+676.95, on US-33 centerline	Date Drilled:	2/21/00

WATER OBSERVATIONS:
Water seepage at: 1.07 m [3.5'] - 1.92 m [6.3']
Water level at completion: dry

STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	N
0	207.93 [682.2]						Topsoil - 0.381 m [15"]							
0.38 [1.3]	207.55 [680.9]	WOH WOH	.229 [9]	1		48 [0.5]	Soft gray SILT AND CLAY (A-6a); slightly organic; moist.							
0.91 [3.0]	207.02 [679.2]	WOH 1	.356 [14]	2			Very loose gray SANDY SILT (A-4a), trace gravel; moist to wet.							
1.52 [5]	206.41	2				---								
1.92 [6.3]	205.49 [675.9]	9 17	.279 [11]	3		239 [2.5]	Very stiff gray and brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; (decomposed shale); damp.							
2.44 [8.0]	204.73 [674.2]	13 50/.13	.254 [10]	4		---	Soft gray SILTSTONE, arenaceous; severely weathered.							50+
3.05 [10.5]	204.12 [671.7]	42 47 38	.406 [16]	5		---	Soft gray SHALE; severely weathered to weathered.							85
3.20	203.97	9 16 50/.10	.229 [9]	6		431+ [4.5+]								50+
4.57 [15]	202.96	50/.08	.076 [3]	7		---								50+
4.97 [16.3]	[665.9]						Bottom of Boring - 4.97 m [16.3']							
6.10 [20]														
7.62														

Client: Ohio Deparment of Transportation | Project: ATH-33-40.981 | Job No. 9821-3200.00

LOG OF: Boring SB-36 | Location: Sta. 48+302.40, on US-33 centerline | Date Drilled: 2/21/00

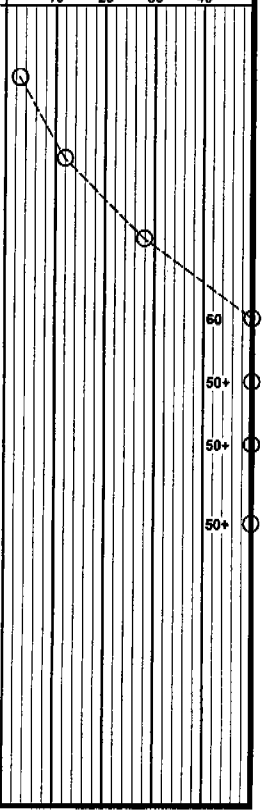
WATER OBSERVATIONS:
Water seepage at: 1.07 m [3.5'] - 1.83 m [6.0']
Water level at completion: 1.49 m [4.9']

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec [in] (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	221.33						
0.25	221.08						Topsoil - 0.254 m [10"]
[0.8]	[725.3]	WOH					Very loose brown SANDY SILT (A-4a); contains organic material; damp to moist.
		2	.127				
0.91	220.42	1	[5]				
[3.0]	[723.2]	B					Medium dense brown and gray COARSE AND FINE SAND (A-3a), trace clayey silt; damp to moist.
		7	.203				
1.52		5	[8]				
[5]							
		1					
2.13	219.20	1	.229				
[7.0]	[719.2]	27	[9]				Severely weathered brown SANDSTONE, micaceous, argillaceous.
		13					
		10	.356				
3.05		50	[14]				
[10]							
		23	.203				
		50/.08	[8]				
		50/.13	.127				
			[5]				
4.57							
[15]							
4.94	216.39	50/.05	.051				
[16.2]	[709.9]		[2]				Bottom of Boring - 4.94 m [16.2']
6.10							
[20]							
7.62							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-7 | Location: 39+650.2, 24.7 m Lt. of US 33 centerline | Date Drilled: 11/8/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
7.32 m [24.0'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer - (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m (10 20 30 40)	Moisture Content - % PL Natural LL (10 20 30 40)
0	258.23														
0.34 [1.1]	257.89 [846.1]	5 6 12	.330 [13]	1		431+ [4.5+]	Topsoil - 0.33 m [13"]								
							Hard brown SILT AND CLAY (A-6a); decomposed claystone; damp.								
		6 8 10	.152 [6]	2		431+ [4.5+]									
1.52 [5]	256.71 [842.2]	Core 0.61 m [24"]	Rec .381 m [15"]	RQD 42%			Hard gray SANDSTONE, fine grained, micaceous; slightly weathered.								
1.80 [5.9]	256.43 [841.3]						Medium hard brown SANDSTONE, fine to medium grained, micaceous; weathered; friable. @ 2.19 m - 2.32 m [7.2' - 7.6'], decomposed layer.								
		Core 1.524 m [60"]	Rec 1.448 m [57"]	RQD 52%			@ 2.56 m - 2.59 m [8.4' - 8.5'], vertical fracture. @ 2.71 m - 2.77 m [8.9' - 9.1'], clay seam.								
2.90 [9.5]	255.33 [837.7]						Hard gray SANDSTONE, fine grained, micaceous; slightly weathered.								
		Core 1.524 m [60"]	Rec 1.346 m [53"]	RQD 68%											
4.05 [13.3]	254.18 [833.9]						Hard gray LIMESTONE; moderately weathered. @ 4.42 m - 4.57 m [14.5' - 15.0'], contains fine to medium sand.								
4.57 [15]															
4.85 [15.9]	253.38 [831.3]						Soft to medium hard brown SANDSTONE; fine to medium grained, severely weathered. @ 5.55 m - 5.61 m [18.2' - 18.4'] & 6.22 m - 6.43 m [20.4'-21.1'] clayey decomposed layers.								
		Core 1.524 m [60"]	Rec 1.321 m [52"]	RQD 35%			@ 5.76 m [18.9'], 6.52 m [21.4'], 6.71 m [22.0'], clayey seams.								
6.10 [20]															
		Core 1.524 m [60"]	Rec 1.397 m [55"]	RQD 28%			@ 6.71 m - 6.77 m [22.0' - 22.2'], severely weathered.								
7.62															

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-7 | Location: 39+650.2, 24.7 m Lt. of US 33 centerline | Date Drilled: 11/8/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
7.32 m [24.0'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer - (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
7.62 [25]	250.61 [822.2]						Soft to medium hard brown SANDSTONE; fine to medium grained, severely weathered.						
		Core 1.524 m [60"]	Rec .965 m [36"]	RQD 28%			@ 7.77 m - 8.11 m [25.5' - 26.6'], highly friable with clay seams. @ 8.14 m - 8.23 m [26.7' - 27.0'], clayey layer.						
9.14 [30]													
		Core 1.524 m [60"]	Rec 1.041 m [41"]	RQD 25%			@ 9.72 m [31.9'] & 9.85 m [32.3'], clay seam.						
10.67 [35]							@ 10.33 m - 10.36 m [33.9' - 34.0'], vertical fracture. @ 10.52 m - 11.19 m [34.5' - 36.7'], severely weathered with possible loss.						
11.28 [37.0]	246.95 [810.2]	Core 1.524 m [60"]	Rec .940 m [37"]	RQD 0%			Soft to moderately hard gray SANDSTONE, argillaceous; weathered; friable, slightly carbonaceous.						
12.19 [40]													
12.80 [42.0]	245.43 [805.2]	Core 1.524 m [60"]	Rec 1.422 m [56"]	RQD 55%			Soft dark gray SHALE, carbonaceous.						
13.29 [43.6]	244.94 [803.6]						Hard gray SANDSTONE; fine to medium grained, slightly weathered.						
13.72													
13.93 [45.7]	244.30 [801.5]						Medium hard dark gray SANDSTONE, silty and argelaceous; severely weathered.						
14.33 [47.0]	243.90 [800.2]						Bottom of Boring - 14.33 m [47.0']						
15.24													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-8 | Location: 39+683.1, 5.5 m Lt. of US 33 centerline | Date Drilled: 11/10/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
1.15 m [3.8'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	238.63												
		4 6 7	.432 [17]	1		431+ [4.5+]	Topsoil removed by dozer ~ 0.406 m [16"] Hard dark brown SILT AND CLAY (A-6a); damp.						
1.07 [3.5]	237.56 (779.4)												
1.28	237.35	6 9 10	.356 [14]	2A		24 [0.25]	Soft gray SILT (A-4b); organic; moist.						
1.52 [5.0]	[778.7]			2B		431+ [4.5+]	Very stiff to hard brown, light brown and gray SILTY CLAY (A-6b), some fine to coarse sand, some gravel; coluvial soil; damp.						
		6 8 9	.254 [10]	3		431+ [4.5+]							
3.05 [10]		6 6 8	.457 [18]	4		335 [3.5]							
3.35 [11.0]	235.28 [771.9]	4 5 7	.279 [11]	5		96 [1.0]	Stiff to very stiff dark brown SILT AND CLAY (A-6a), some to "and" gravel, some fine to coarse sand; coluvial soil; moist.						
4.57 [15]		2 4 5	.381 [15]	6		287 [3.0]							
5.03 [16.5]	233.60 [766.4]	8 22 28	.457 [18]	7		431+ [4.5+]	Hard gray SILT AND CLAY (A-6a); decomposed siltstone; damp.						
5.64 [18.5]	232.99 [764.4]	50/.08	.076 [3]	8			Limestone fragments						
6.10	232.53						Very soft brown CLAYSTONE; severely weathered.						
6.25	232.38	Core	Rec	RQD			Hard gray LIMESTONE; weathered.						
6.31	232.32 [762.2]	1.524 m [60"]	1.067 m [42"]	63%			Medium hard gray CLAYSTONE, slightly calcareous; weathered						
7.62													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-8 | Location: 39+683.1, 5.5 m Lt. of US 33 centerline | Date Drilled: 11/10/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
1.15 m [3.8'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	231.01 [757.9]	Core 1.524 m [60"]	Rec 1.473 m [58"]	RQD 80%			Medium hard red and gray CLAYSTONE; weathered.
8.02	230.61 [756.6]						Medium hard gray SILTY CLAYSTONE, slightly calcareous; weathered. @ 8.44 m [27.7'], slickensided shear.
8.69	229.94 [754.4]						Medium hard gray SILTSTONE, slightly calcareous; weathered; contains limestone clasts.
9.14 [30]	229.49 [752.9]						Bottom of Boring - 9.14 m [30.0']
10.97 [35]							
12.19 [40]							
13.72 [45]							
15.24							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-9 | Location: 39+721.5, 19.8 m Lt. of US 33 centerline | Date Drilled: 11/10/99

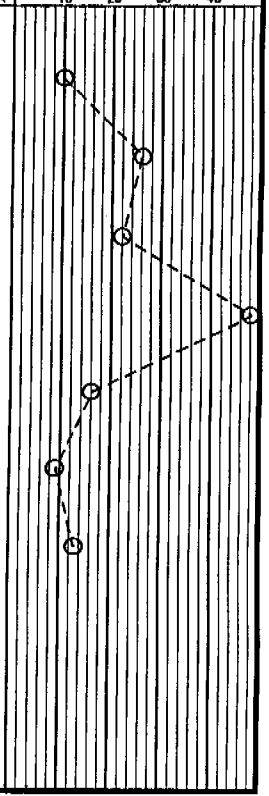
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
1.14m [3.75'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	234.98						**DESCRIPTION**						
0.23 [0.75]	234.75 [770.2]						Topsoil removed by dozer ~ 0.229 m [9"]						
		3 4 6	.432 [17]	1		311 [3.25]	Very stiff brown SILTY CLAY (A-6b), trace to little fine to coarse sand; damp.						
1.07 [3.5]	233.91 [767.4]												
		9 11 15	.457 [18]	2		431+ [4.5+]	Hard brown and light brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; ; damp.						
1.52 [5]													
1.83 [6.0]	233.15 [764.9]	9 10 12	.406 [16]	3			Medium dense dark brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp.						
		16 13 35	.381 [15]	4			@ 2.59 m [8.5'], dense and light brown.						
3.05 [10]													
3.51 [11.5]	231.47 [759.4]	7 8 8	.432 [17]	5		120 [1.25]	Stiff brown SILTY CLAY (A-6b); contains fine sand seams; moist.						
4.11 [13.5]	230.87 [757.4]	3 4 5	.330 [13]	6			Loose light brown, dark brown and gray GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp to moist.						
4.57 [15]													
5.18 [17.0]	229.80 [753.9]	3 4 9	.432 [17]	7		—	Hard purple, brown and gray SILTY CLAY (A-6b); severely weathered claystone; damp.						
6.10 [20]													
6.40	228.58 [749.9]	Core 3.048 m [120"]	Rec 2.794 m [110"]	RQD 75%			Soft to medium hard gray SILTY CLAYSTONE; weathered. @ 6.40 m - 7.01 m [21.0' - 23.0'], slightly calcareous.						
							@ 7.41 m [24.3'], contains limestone clasts.						
7.62							@ 7.62 m [25.0"], contains limestone clasts.						

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40



Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-9 | Location: 39+721.5, 19.8 m Lt. of US 33 centerline | Date Drilled: 11/10/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
1.14m [3.75'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
7.62 [25]	227.36 [745.9]	Core 3.048 m [120"]	Rec 2.794 m [110"]	RQD 75%			Soft to medium hard gray SILTY CLAYSTONE; weathered.						
7.96	227.02 [744.8]						Medium hard gray SILTSTONE; weathered.						
9.14 [30]													
9.45 [31]	225.53 [739.9]						Bottom of Boring - 9.45 m [31.0']						
10.67 [35]													
12.19 [40]													
13.72 [45]													
15.24													

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-10 | Location: 39+743.0, 5.5 m Lt. of US 33 centerline | Date Drilled: 11/11/99

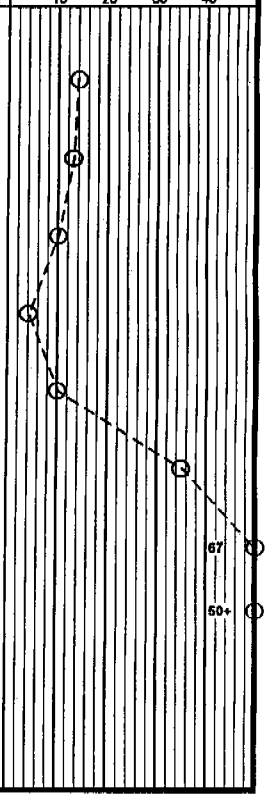
WATER OBSERVATIONS:
Water seepage at: 3.5 m [11.5']
Water level at completion: dry prior to coring
0.98m [3.2'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	[ft] Rec (m)	Sample No. Drive	Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	231.30						
0.30	231.00						Topsoil - 0.305 m [12"]
[1.0]	[757.9]	2					
0.61	230.69	4	.432	1		287	Very stiff dark brown SILT (A-4b), trace fine sand; slightly organic; damp.
[2.0]	[756.9]	10	[17]			[3.0]	
1.07	230.23						Medium dense brown COARSE AND FINE SAND (A-3a), trace silty clay, trace gravel; damp.
[3.5]	[755.3]	6					
		5	.457				
1.52		8	[18]	2		383	Hard brown, gray and black SILTY CLAY (A-6b), trace fine to coarse sand; damp.
[5]						[4.0]	
1.83	229.47						
[6.0]	[752.9]	5					
		5	.381				
		5	[15]	3			Medium dense brown COARSE AND FINE SAND (A-3a), some clayey silt, trace gravel; damp to moist.
2.59	228.71						
[8.5]	[750.4]	1					
		2	.457				Soft brown and gray SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; moist.
3.05		2	[18]	4		48	@ 2.62 m - 2.68 m [8.6' - 8.8'], coal and carbonaceous shale fragments.
[10]						[0.5]	
3.51	227.79						
[11.5]	[747.3]	4					
		4	.406				Medium dense brown and red GRAVEL WITH SAND (A-1-b); moist to wet.
		6	[16]	5			
4.11	227.19						
[13.5]	[745.4]	6					
		21	.432				Hard gray SILTY CLAY (A-6b); decomposed silty shale; damp.
4.57		14	[17]	6		431+	
[15]						[4.5+]	
		14					
		31	.457				
		36	[18]	7		431+	
						[4.5+]	
		40	.229				@ 5.64 m [18.5'], becomes severely weathered silty shale.
		50/.08	[9]	8		431+	
6.10	225.20					[4.5+]	
[20]	[738.8]	Core	Rec	RQD			
		3.048	2.794	92%			Soft gray SHALE; severely weathered.
6.52	224.78	m	m				
	[737.5]	[120"]	[110"]				Hard gray SANDSTONE, fine to medium grained, micaceous; slightly weathered.
7.62							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) — Blows per 0.30 m (10 20 30 40)

Moisture Content - % (PL Natural LL; 10 20 30 40)



Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-10 | Location: 39+743.0, 5.5 m Lt. of US 33 centerline | Date Drilled: 11/11/99

WATER OBSERVATIONS:
Water seepage at: 3.5 m [11.5']
Water level at completion: dry prior to coring
0.98m [3.2'] (with core water)

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	223.68 [733.9]	Core 3.048 m [120"]	Rec 2.794 m [110"]	RQD 92%			Hard gray SANDSTONE, fine to medium grained, micaceous; slightly weathered.
9.14	222.16						@ 9.11 m [29.9'], very thin clay seam.
[30]	[728.9]						Bottom of Boring - 9.14 m [30.0']
10.67 [35]							
12.19 [40]							
13.72 [45]							
15.24							

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-11 | Location: 39+781.4, 19.8 m Lt. of US 33 centerline | Date Drilled: 11/10/99

WATER OBSERVATIONS:
Water seepage at: 1.83 - 2.29 m [6.0' - 7.5']
Water level at completion: 0.94 m [3.1'] prior to coring 2.88
m [9.4'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	229.52													
0.24	229.28						Topsoil - 0.254 m [10"]							
[0.8]	[752.2]	2												
		2	.356	1		144	Stiff dark brown SANDY SILT (A-4a), some clay; moist.							
0.91	228.61	2	[14]			[1.5]		0	4	—	28	41	27	
[3.0]	[750.0]													
		2					Loose brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; moist.							
1.52		2	.127	2										
[5]		2	[5]					9	25	—	31	22	14	
							@ 1.83 m [6.0'], wet.							
		1												
2.29	227.23	2	.381	3										
[7.5]	[745.5]	24	[15]					17	21	—	31	21	11	
		50/.08	.076	4		—	Hard gray SILT AND CLAY (A-6a); decomposed siltstone; damp.							
			[3]											
3.05														
[10]							@ 3.35 m [11.0'], soft gray SILTSTONE, severely weathered to weathered.							
3.51	226.01	54	.076											
[11.5]	[741.5]	50/.00	[3]	5			Hard gray SILTSTONE; slightly weathered.							
		Core 0.61 m	Rec .508 m	RQD 18%										
4.48	225.04	Core 3.048 m	Rec 3.048 m	RQD 94%										
4.57	[738.3]	[120"]	[120"]											
[15]							Hard gray SANDSTONE, fine to medium grained, micaceous; slightly weathered.							
							@ 5.00 m - 5.12 m [16.4' - 16.8'], calcareous layer.							
							@ 5.24 m - 5.35 m [17.2' - 17.5'], calcareous layer.							
							@ 5.39 m - 5.43 m [17.7' - 17.8'], calcareous layer.							
							@ 5.84 m - 5.85 m [19.1' - 19.2'], calcareous layer.							
6.10														
[20]							@ 6.25 m - 6.28 m [20.5' - 20.6'], calcareous layer.							
6.43	223.09													
	[731.9]						Hard gray SILTSTONE; slightly weathered.							
7.16	222.36													
[23]	[729.5]						Bottom of Boring - 7.16 m [23.5']							
7.62														

Moisture Content - %
PL Natural LL
10 20 30 40

50+

50+

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-12 | Location: 39+803.2, 5.4 m Lt. of US 33 centerline | Date Drilled: 11/1/99

WATER OBSERVATIONS:
Water seepage at: 1.22 m [4.0']
Water level at completion: 0.76 m [2.5'] (before coring)
2.68 m [8.8'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m
0	229.42													
0.37 [1.2]	229.05 [751.5]						Topsoil - 0.356 m [14"]							
		1 2 2	.381 [15]	1		192 [2.0]	Stiff to very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand; moist.	0	6	—	28	46	21	
0.91 [3.0]	228.51 [749.7]													
		2 2 10	.279 [11]	2			Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace to little clay; damp.	38	21	—	15	16	10	
1.52 [6]														
1.83 [6.0]	227.59 [746.7]	24 50/.10	.254 [10]	3		—	Hard gray SANDY SILT (A-4a); decomposed to severely weathered siltstone; damp.							50+
		50/.13	.127 [5]	4		—								50+
3.05 [10]														
		38 50/.05	.203 [8]	5		—								
4.18	225.24													
4.27	225.15 [738.7]	50/.08	.076	6			Hard gray SANDSTONE; contains a vertical fracture. Soft gray CLAYSTONE, arenaceous; weathered.							50+
4.57 [15]		Core 1.219 m [48"]	Rec 1.092 m [43"]	RQD 73%										
4.91	224.51 [736.6]						Hard gray SANDSTONE, micaceous; slightly weathered. @ 5.12 m - 5.24 m [16.8' - 17.2'], calcareous . @ 5.55 m - 5.90 m [18.2' - 19.4'], calcareous .							
6.10 [20]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 95%			@ 6.16 m - 6.36 m [20.2' - 20.9'], argillaceous. @ 6.61 m - 6.71 m [21.7' - 22.0'], argillaceous.							
7.62		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 100%										

GRADATION

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL — Natural — LL; 10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-12 | Location: 39+803.2, 5.4 m Lt. of US 33 centerline | Date Drilled: 11/1/99

WATER OBSERVATIONS:
Water seepage at: 1.22 m [4.0']
Water level at completion: 0.76 m [2.5'] (before coring)
2.68 m [8.8'] (after coring)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer - (kN/m²) [tsf]	DESCRIPTION
7.62 [25]	221.80 [727.7]						Hard gray SANDSTONE, micaceous; slightly weathered.
8.44	220.98 [725.0]						@ 8.32 m - 8.40 m [27.3' - 27.5'], 45° fracture. @ 8.17 m - 8.44 m [26.8' - 27.7'], argillaceous.
							Bottom of Boring - 8.44 m [27.7']
9.14 [30]							
10.67 [35]							
12.19 [40]							
13.72 [45]							
15.24							

GRADATION

% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-13 | Location: 39+840.5, 16.8 m Lt. of US 33 centerline | Date Drilled: 11/1-11/4/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
0.82 m [2.7'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer - (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	234.32												
							Topsoil - 0.381 m [15"]						
0.38	233.94 [767.5]	2 13 4	.279 [11]	1		359 [3.75]	Very stiff to hard brown, red and gray SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; colluvial soil; damp.						
1.52 [5]		3 6 8	.279 [11]	2		431+ [4.5+]							
		8 9 10	.305 [12]	3		431+ [4.5+]							
3.05 [10]		2 3 5	.381 [15]	4		287 [3.0]							
3.35 [11.0]	230.97 [757.8]	12 24 37	.279 [11]	5		—	Hard gray SANDY SILT (A-4a); decomposed siltstone; damp. damp.						
4.11 [13.5]	230.21 [755.3]	21 50/.15	.203 [8]	6		—	Hard brown and gray SILT AND CLAY (A-6a); decomposed shale; damp.						
4.57 [15]		37 50/.15	.305 [12]	7		—							
5.64 [18.5]	228.68 [750.3]	33 50/.15	.305 [12]	8			Soft gray CLAYSTONE, severely weathered						
5.87 [19.25]	228.45 [749.5]	Core 0.838 m [33"]	Rec .533 m [21"]	RQD 30%			Soft gray CLAYSTONE; weathered.						
6.10 [20]		Core 1.524 m [60"]	Rec .559 m [22"]	RQD 22%			@ 6.71 m [22.0'], gray and red mottled.						
7.62													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

61
50+
50+
50+

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-13 | Location: 39+840.5, 16.8 m Lt. of US 33 centerline | Date Drilled: 11/1-11/4/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
0.82 m [2.7'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [lb]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Moisture Content - % PL / Natural / LL
7.62 [25]	226.70 [743.8]						Soft red CLAYSTONE; weathered.							
		Core 1.524 m [60"]	Rec 1.397 m [55"]	RQD 45%			@ 8.99 m [29.5'], gray and red mottled.							
9.14 [30]														
9.57	224.75 [737.4]						Medium hard gray SILTSTONE; moderately weathered.							
		Core 1.524 m [60"]	Rec 1.499 m [59"]	RQD 78%			@ 9.66 m [31.7'], becomes calcareous.							
10.67 [35]							@ 10.67 m - 10.79 m [35.0' - 35.4'], partially healed fracture. @ 10.97 m - 11.06 m [36.0' - 36.3'], near vertical @ 11.09 m - 11.16 m [36.4' - 36.6'], limestone layer. @ 11.34 m [37.2'], clay seam.							
		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 97%										
12.19 [40]														
12.62	221.70													
12.80	221.52 [726.8]						Hard gray SANDSTONE, calcareous; slightly weathered.							
							Bottom of Boring - 12.80 m [42.0']							
13.72 [45]														
15.24														

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

GRADATION: % Aggregate, % C. Sand, % M. Sand, % F. Sand, % Silt, % Clay

Moisture Content - %: PL X — Natural ● — LL X; 10 20 30 40

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-14 | Location: 39+854.7, 9.2 m Lt. of US 33 centerline | Date Drilled: 11/10 & 11/11/99

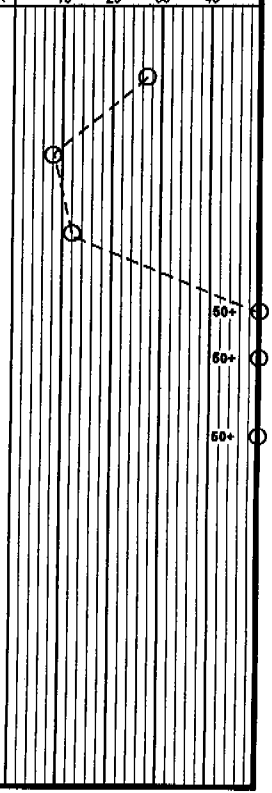
WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
8.93 m [29.3'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [ft]	Rec (m) [ft]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION
0	246.50						
0.46	246.04	2					Topsoil - 0.457 m [18"]
0.61 [2.0]	245.89 [806.7]	13 14	.330 [13]	1		287 [3.0]	Very stiff brown and dark brown SILT AND CLAY (A-6a); organic; damp.
1.07 [3.5]	245.43 [805.2]	4					Dense light brown GRAVEL (A-1-a); severely weathered to decomposed sandstone; damp.
1.52 [5]		4 4	.203 [8]	2		431+ [4.5+]	Hard brown SILT AND CLAY (A-6a), some fine to coarse sand; damp.
1.83 [6.0]	244.67 [802.7]	4					
2.59 [8.5]	243.91 [800.2]	5 7	.229 [9]	3			Medium dense brown and gray GRAVEL (A-1-a); severely weathered sandstone; damp.
3.05 [10.0]		5 11 50/.13	.330 [13]	4A 4B		431+ [4.5+]	Hard black and dark brown SILTY CLAY (A-6b); decomposed shale; damp. @ 2.90 m [9.5'], color change to brown and gray.
3.35 [11.0]	243.15 [797.7]	50/.08	.051 [2]	5		—	Hard gray SILT AND CLAY (A-6a); decomposed sandy siltstone; damp.
4.24	242.26	50/.13	.127	6		—	
4.34	242.16	Core	Rec	RQD			Medium hard dark gray and light gray SILTSTONE; laminated.
4.57 [15.0]	[784.5]	1.143 m [45"]	1.143 m [45"]	80%			Soft dark gray SHALE, carbonaceous; severely weathered.
5.39 [17.7]	241.11 [791.0]	Core 1.524 m [60"]	Rec .432 m [17"]	RQD 0%			Soft gray SANDSTONE; fine to medium grained, severely weathered.
6.10 [20]							
6.98 [22.9]	239.52 [785.8]	Core 1.219 m [48"]	Rec 1.219 m [48"]	RQD 0%			@ 6.77 m - 6.98 m [22.2' - 22.9'], Soft SHALE, carbonaceous, severely weathered. Soft brown SANDSTONE; fine to medium grained, severely weathered. @ 7.47 m - 7.56 m [24.5' - 24.8'], Soft gray SHALE, severly weathered
7.62							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N) Blows per 0.30 m: 10 20 30 40

Moisture Content - %: PL Natural LL; 10 20 30 40



Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-14 | Location: | Date Drilled: 11/10 & 11/11/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
8.93 m [29.3'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Blows per 0.30 m 10 20 30 40	Moisture Content - % PL Natural LL 10 20 30 40
7.62 [25]	238.68 [783.7]						Soft brown SANDSTONE,fine to medium grained; severely weathered.								
8.05 [26.4]	238.45 [782.3]						Soft gray SHALE; severely weathered.								
		50/.08	.076 [3]	7											50+
9.14 [30]		50/.05	.051 [2]	8											50+
10.49	236.01	Core 1.372 m [54"]	Rec .686 m [27"]	RQD 19%			@ 10.24 m [33.6'], slightly calcareous.								
10.67 [35.0]	[774.3]						Medium hard gray LIMESTONE; weathered.								
12.19 [40]		Core 1.524 m [60"]	Rec 1.524 m [60"]	RQD 88%			@ 11.58 m [38.0'], becomes interbedded with weathered medium hard SHALE. @ 11.70 m - 11.77 m [38.4' - 38.6'], near vertical fracture. @ 12.22 m - 12.28 m [40.1' - 40.3'], ~30° fracture. @ 12.51 m - 12.65 m [41.0' - 41.5'], broken and fractured. @ 12.68 m - 12.80 m [41.6' - 42.0'], near vertical fracture.								
13.50 [44.3]	233.00 [764.4]	Core 1.524 m [60"]	Rec 1.270 m [50"]	RQD 47%			@ 13.29 m [43.6'], broken.								
13.72 [45]							Soft to medium hard red CLAYSTONE; weathered.								
14.57	231.93 [760.9]						@ 14.39 m - 14.45 m [47.2' - 47.4'], calcareous SILTSTONE, weathered. @ 14.45 m [47.4'], color change to purple and brown.								
15.24							Bottom of Boring - 14.57 m [47.8']								

GRADATION

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-15 | Location: 39+888.6, 19.8 m Lt. of US 33 centerline | Date Drilled: 11/11/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
1.37 m [4.5'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m [lb]	Rec (m)	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	244.44												
0.43	244.01 [800.6]	2 6 6	.356 [14]	1			Topsoil - 0.432 m [17"]						
							Medium dense to dense light brown GRAVEL WITH SAND (A-1-b); decomposed to severely weathered sandstone; damp.						
		24 50/.05	.203 [8]	2									
1.52 [5]													
		39 50/.08	.229 [9]	3									
		17 48 50/.08	.356 [14]	4									
3.05 [10]													
3.35	241.09												
3.47 [11.4]	240.97 [790.6]	32 50/.10	.254 [10]	5A 5B		— —	Hard dark brown SILTY CLAY (A-6b); decomposed shale; damp. Hard brown and gray SILT AND CLAY (A-6a); decomposed siltstone; damp.						
		24 28 50/.13	.356 [14]	6		431+ [4.5+]							
4.57 [15]													
4.88 [16.0]	239.56 [786.0]	22 38 50/.10	.432 [17]	7A 7B		— —	Hard black SILT AND CLAY (A-6a); decomposed carbonaceous shale with coal stringers; damp.						
5.64 [18.5]	238.80 [783.5]	17	.254										
5.85	238.59	50/.10	[10]	8		431+ [4.5+]	Hard gray SILTY CLAY (A-6b); decomposed shale; damp.						
6.10 [20.0]	[782.8]	Core	Rec	RQD									
6.40	238.04	0.305	.000	0%			Very soft black COAL; CORE LOSS.						
[21.0] 6.71	[781.0] 237.73	Core 1.524	Rec 1.448	RQD 55%			Soft dark gray SHALE, carbonaceous; weathered; LOSS.						
6.86 [22.5]	237.58 [779.5]	m [60"]	m [57"]				Medium hard gray SHALE, calcareous; weathered; broken. Hard gray LIMESTONE; moderately weathered. @ 7.04 m - 7.19 m [23.1' - 23.6'], Soft SHALE, weathered. @ 7.19 m - 7.38 m [23.6' - 24.2'], vertical fracture. @ 7.41 m - 7.80 m [24.3' - 25.6'], Soft SHALE weathered.						
7.62													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

50+
50+
50+
50+
50+
50+

Client: ODOT District 10 | Project: ATH-33-40.891 (US 33 over Pratts Fork) | Job No. 9821-3200.00

LOG OF: Boring SB-15 | Location: | Date Drilled: 11/11/99

WATER OBSERVATIONS:
Water seepage at: none
Water level at completion: dry prior to coring
1.37 m [4.5'] (with core water)

Depth (m) [ft]	Elev. (m) [ft]	Blows per 0.15 m	Rec (m) [in]	Sample No. Drive	Sample No. Press	Hand Penetrometer (kN/m²) [tsf]	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
7.62 [25]	236.82 [777.0]						Hard gray LIMESTONE; moderately weathered.						
7.92 [26.0]	236.52 [776.0]	Core 1.524 m [60"]	Rec 1.092 m [43"]	RQD 58%			Soft gray CLAYSTONE, calcareous; weathered.						
9.14 [30]													
9.45	234.99 [771.0]						Bottom of Boring - 9.45 m [31.0']						
							Driller's note: hole caved in after completion.						
10.67 [35]													
12.19 [40]													
13.72 [45]													
15.24													

GRADATION

STANDARD PENETRATION (N)
Blows per 0.30 m
10 20 30 40

Moisture Content - %
PL Natural LL
10 20 30 40

OHIO DEPARTMENT OF TRANSPORTATION

1980 West Broad Street
P. O. Box 899
Columbus, Ohio 43216-0899

Reply to:
Office of Materials Management
1600 West Broad Street, Columbus, Ohio 43223-1298

October 25, 2000

Dodson-Stilson, Inc.
6121 Huntley Road
Columbus, Ohio 43229-1003

Attention: Mr. Todd Willis, P.E., P.S.
Project Manager

Re: ATH-33-40.981, PID 18288
Stage 2 Geotechnical Review - 2nd Submittal

Gentlemen:

We have completed our review of the October 16, 2000 resubmittal of the subject project. Revised and marked-up cross-sections were included, as well as charts regarding the culvert undercuts.

Most of the work on the cross-sections appears to be done. There still may be work to be done at the following stations:

40+100 R	Back & forward stas. have 4:1 exit slopes. A 3:1 slope is shown for this location.
41+860 R	For four lane work, exit slope is drawn at 4:1, but labeled 3:1.
41+940, 960	Unsuitable material present. Should be shown 0.5m below proposed subgrade in cuts. We expect wet clays at proposed subgrade more than rock.
43+140, 160	Benches need to be shown.
43+520-560	The 10:1 on the left should be changed to a 2:1.
44+820 R	A 4:1 should be used instead of the 10:1.
46+880-900	Undercut appears to be twice as thick as needed, or is this related to the culvert undercut?
48+100 R	For four lane work, change the 4:1 to 3:1.
48+780 L	Add 2:1 between 1/2:1 and 4:1.
49+560 R	Show bench.
49+560-660	Bench areas were not cross-hatched as per the legend.

We have enclosed marked-up sheets as necessary.

We agree with the proposed handling of the soft material at several of the culvert locations. Since the proposed undercuts are somewhat complicated in location and application, we recommend that a chart or table, such as what was provided to us, be included on the plans. Station limits, depth of removal, width of cuts, intent of removal, and quantities should be included. It would be very difficult to express these undercuts accurately in drawing form only.

It appears that there may be a slight difference in interpretation as to where the coal seam is located from Sta. 49+180 to 49+340. Since the intent is for the 10:1 bench to be located at the top of the coal seam in this area, a note should be included alerting the Contractor to this intent. They should be able to modify the bench location in the field as they uncover the coal seam.

No plan notes were submitted. We assume that all necessary notes will be included in the plans.

Regarding the quantities for special benching, a little clarification may be needed. Showing actual bench location and dimensions on the cross-sections, and including Note R102, allows the Contractor to have quantities to bid for and get paid for, so we are more likely to get these benches performed compared to specification benching described in Item 203. The quantities of cut and fill should be included on the cross-sections to be carried to the General Summary.

Please resubmit corrected cross-sections along with any marked-up plans enclosed. Although we are asking for another submission, the Stage 2 Geotechnical Review is essentially complete.

Please feel free to contact us should you have any questions.

Respectfully,

Eugene C. Geiger, P.E.
Geotechnical Engineering Coordinator

Encl.

ECG/SAS

cc: S. Eldabaja - G. Collins - J. Townley - S. Sommers - Reading File - File

MEMO

To: Brent Downing
From: Dorothy Adams
Subject: ATH-33-40.981, Culvert Recommendations
Date: September 28, 2000

We have reviewed the letter from ODOT dated September 25, 2000 regarding the slope review submittal and the cross sections for the above-referenced project. Everything mentioned in the letter appears to be included in the current cross sections except for two items: 1) removal of unsuitable material, as mentioned on page 2 and 2) settlement concerns at selected culverts, as mentioned on page 3.

Regarding the removal of unsuitable material, in general, we concur with ODOT's recommendations The existing soil should be removed to the specified depth below the proposed subgrade in cut sections and below the existing ground surface in fill sections. However, it should be noted that some of these areas traverse valleys with steep slopes where it may not be possible to overexcavate the specified amount of soil.

Two sections mentioned in the letter (Sta. 46+880 to 46+920 and Sta. 48+180 to 48+220) are located along proposed culverts which cross the mainline at angles of 37° and 45°. Because of the skew, some portions of these two culverts extend beyond the areas specified for overexcavation. Consequently, we have modified the areas to be overexcavated to include the entire valley along the culvert. These modifications are included in the attached table.

Regarding the concern about settlement of culverts under large fills, we have prepared the recommendations in the attached table. Rather than perform settlement analyses at each culvert location in question, we recommend overexcavation of any unsuitable or soft soils. The amount of overexcavation is generally 0.9 meters or less, which in many cases, will be required regardless of the soil conditions to place the pipes at the desired elevations.

Please note that a coal seam was encountered at the location of Culvert No. 34. The recommendations include removal of this coal seam where it is within one meter of the invert elevation.

Because of the variation in the existing grade, both excavation and fill placement will be necessary to construct the culverts. Excavation in rock is anticipated below depths of 2.0 to 2.5 meters. A granular material should be used for fill below the pipe, according to Item 603, ODOT Construction and Material Specifications.

For clarification, I confirmed with Steve Sommers at ODOT that the special benches do refer to the benches shown at the base of some of the proposed embankments where a side hill fill occurs. He suggested that if you call out the quantities for cut and fill for the special benches in the notes as we discussed, that this should be referenced on the cross sections as well.

Please feel free to call if you have any questions.

Dorothy

ATH-33 40-981 Culvert Overexcation Recommendations Due to Soft, Very Loose, or Unsuitable Soils
(unless otherwise noted, the width of overexcavation is limited to the width of the pipe trench.)

Culvert Ref No.	Proposed Centerline Station	Boring No.	Elevation	Station	Offset	Recommendations (overexcavation below existing ground surface, as measured along pipe, L = left, R = right of centerline)
24	40+394.806	SB-53	226.64	40+457.61	71.05 m L	0.9 m, entire length of pipe
24	40+394.806	SB-52	229.91	40+344.43	84.67 m R	0.9 m, entire length of pipe
25	40+884.113	SB-51	239.03	40+884.10	CL	1.5 m, from 26 m right of CL to right end of pipe
28	42+116.376	B-99	256.00	42+086.97	4.97 m L	0.5 m, entire length of pipe
29a	42+768.328	SB-50	244.77	42+765.34	0.62 m L	none
30	43+039.346	SB-49	247.12	43+054.84	3.71 m L	none
31	43+776.488	SB-46	225.29	43+776.49	CL	2.4 m, entire length of pipe
48	43+940.776	SB-45	241.42	43+927.02	2.77 m L	none
32	44+415.818	SB-44	232.29	44+420.41	6.09 m R	none
33	44+939.506	SB-43	223.53	44+946.93	1.82 m R	none
34	45+305.668	SB-42	215.38	45+305.24	4.40 m R	overexcavate coal seam to elevation 212.0 between 10 m L and 37 m R
35	46+023.462	SB-41	220.91	46+020.87	CL	none
36	46+904.720	SB-40	238.84	46+898.31	4.16 m L	for embankment: 0.9 m between Sta. 46+880 and 46+920, as specified by ODOT for culvert: 0.9 m, entire length pipe
37	47+140.528	SB-39	233.83	47+143.36	1.12 m R	none
38	47+608.921	SB-38	223.80	47+610.18	2.09 m R	none
47	47+748.890	SB-37	225.52	47+749.13	0.27 m L	none
40	48+142.751	B-149	216.10	48+159.60	23.78 m R	0.5 m, between left end pipe and 24 m R, below elevation 216.0 (width varies, see plan)
40	48+142.751	R-88	214.20	48+194.71	34.22 m R	for embankment: 0.9 m between Sta. 48+180 and 48+220, as specified by ODOT for culvert: 2.4 m, between 24 m R and right edge embankment, below elevations 214.0 to 216.0 (width varies, see plan)
41	48+302.124	SB-36	221.33	48+302.40	CL	0.9 m, entire length of pipe
43	48+674.532	SB-35	207.93	48+676.95	CL	for embankment: 1.2 m between Sta. 48+640 and 48+700, as specified by ODOT for culvert: 1.7 m, entire length of pipe
44	49+173.478	SB-34	212.31	49+180.00	CL	none

Please note that due to the variations in the existing grade, some excavation and fill is expected to construct the pipe, regardless of the above recommendations. All topsoil , generally less than 0.3 meters thick, should be stripped prior to placement of the pipe. Excavation in rock is generally anticipated below depths of 2.0 to 2.5 meters.

OVEREXCAVATION QUANTITIES

TO BE ADDED TO THE GENERAL SUMMERY

		Excavation Dimensions			
Culvert No.		Width	Depth	Length	Volume
24		2.75	0.9	156.1695	386.5195
25		1.85	1.5	29.5147	81.90329
28		1.85	0.5	138.646	128.2476
31		2.575	2.4	265.9378	1643.496
34*		1.876		174.6379	327.6207
36		1.35	0.9	126.1102	153.2239
40LP			0.5	728.16	364.08
40RP			2.4	1355.91	3254.184
40SR			0.9	2940.23	2646.207
41		1.35	0.9	86.5	105.0975
43SR			1.2	4359.52	5231.423
43		1.7	1.7	129.6	374.544
					m^3

Project: ATH-33-40.981
Date : 10/13/00
Calculated by: Ethan Schwartz

* = Figured by multiplying width of trench and area from culvert to elevation specified by ODOT.
LP = Length column represents an area measured from left end of pipe to specified distance from centerline.
Volume figured by multiplying the given area by an ODOT specified depth
RP = Length column represents an area measured from right end of pipe to specified distance from centerline.
Volume figured by multiplying the given area by an ODOT specified depth
SR = Length column represents an area covering a specified station range.
Volume figured by multiplying area of range by an ODOT specified depth.

OHIO DEPARTMENT OF TRANSPORTATION

1980 West Broad Street
P. O. Box 899
Columbus, Ohio 43216-0899

Reply to:
Office of Materials Management
1600 West Broad Street, Columbus, Ohio 43223-1298

September 25, 2000

Dodson-Stilson, Inc.
6121 Huntley Road
Columbus, Ohio 43229-1003

Attention: Mr. Todd Willis, P.E., P.S.
Project Manager

Re: ATH-33-40.981, PID 18288
Slope Review Submittal

Gentlemen:

We have completed our review of the Stage 2 submittal of the subject project. On August 25, 2000, we had finished reviewing the mainline cross-sections when it became apparent that our revised slopes would, in some cases, extend beyond the proposed right-of-way. At an August 28, 2000 meeting, the marked-up cross-sections were returned to DLZ. We received mainline cross-sections, corrected based on our recommendations and the resolution of the right-of-way issues, along with the side road plans and a final soils plan set on September 13 and 14, 2000. This correspondence covers our review of these submittals. Segments of this letter were intended to be included on the August 25 review, so some of the stated recommendations may already be completed.

On the cross-sections we have shown our estimated rock and soil cut-slopes for the 4-lane layout, and now the two-lane layout. Our main changes deal with the assumed thickness of the sandstone layers and the depth of overburden. We have also indicated areas where we feel granular material should be placed at the base of proposed fills. This is to allow compaction of the embankment material over wet, soft stream and ditch areas. We have shown changes throughout the mainline cross-sections, as well as on the TR 412, SR 681 and Old US 33 cross-sections. Stations 51+300 to 51+340 were missing from SR 681. Although it was listed on the Title Sheet, we assume there is no longer any Service Road 19.

There are several sections where coal seams will be present at subgrade or in the cut-slopes. When it occurred in the middle of a 2:1 cut, we kept it at 2:1. From Sta. 49+180 to 49+340, the coal was present immediately below sandstone. The intent is for the bench shown on these sections to be at the top of the coal layer.

Special benches are indicated on some of the cross-sections. Please calculate the quantities of excavation and embankment required and include them in the plans. Also, please include Note R102 in the General Notes. Some mainline benches have been added or changed, and CR 89 has some benches shown as well.

The end of the 30.980 section needs to correspond to the beginning of the 40.981 section. This includes a matching of the cut-slopes. The cut-slopes shown on our original marked-up set correspond to those shown at the end of the 30.980 section. Please coordinate the matching of the cut-slopes at the projects intersection.

It also came to our attention that the ditch fore-slopes on the 30.980 project were different than those shown for the 40.981 project, with a resulting approximately 4 m difference in the location of each ditch bottom in cut sections. This became evident when we tried to align the cut-slopes at the overlap stations between projects. We do not know if both fore-slopes are acceptable in general, but they need to at least match at the overlap stations on the plans. We leave it to the Consultants and District to determine the proper layout and we will address any changes at the resubmittals.

In several locations, the borings indicated wet, weak or unsuitable material near proposed subgrade or immediately beneath proposed embankment. This material should be removed from within the following stations:

41+940 - 41+980	Wet silty clays	0.5 m below existing groundline or below proposed subgrade, whichever is deeper
46+880 - 46+920	Weak A-4b silt	0.9 m below existing groundline or below proposed subgrade, whichever is deeper
48+180 - 48+220	Soft A-4b and clay	0.9 m below existing groundline or below proposed subgrade, whichever is deeper
48+640 - 48+700	Soft, loose clay, sand	1.2 m below existing groundline or below proposed subgrade, whichever is deeper

The width of this removal shall be 0.3 m beyond the edge of pavement in proposed cuts and the toe of the embankment in proposed fills. The excavated material shall be replaced with 203 Embankment.

The borings indicate 3-4 meters of soft silt and clay material present below the proposed embankment from Station 51+200 to 51+280 on SR 681. We recommend that the embankment be built up to the level of subgrade, then a waiting period of 30 days occur prior to final grading and paving.

There are several locations where conduits are being located under large fills, with soft soils as foundation material. Have any calculations been done to check for possible excessive or differential settlement? This could be a problem, especially at Culverts 24, 25, 28, 33, 40, and 43.

Please make the above recommended changes and resubmit the corrected plans. The revised plans should be quarter-size sheets, and both marked up sets enclosed should be returned as well so we have these sets to compare.

Please feel free to contact us should you have any questions.

Respectfully,

Eugene C. Geiger

Eugene C. Geiger, P.E.
Geotechnical Engineering Coordinator

Encl.

ECG/SAS

cc: S. Eldabaja - G. Collins - J. Townley - S. Sommers - Reading File - [redacted]

Dodson Stilson

Dodson-Stilson, Inc.
A DLZ Company
ENGINEERS • ARCHITECTS • SCIENTISTS
6121 Huntley Road
COLUMBUS, OHIO 43229
(614) 848-4141
FAX (614) 848-6712

LETTER OF TRANSMITTAL

DATE	JOB NO.
9-18-00	9821-1016-00

ATTENTION: STEVE SOMMERS

RE: ATH-33-40.981

TO ODOT

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☒ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1		42	US 33 MAINLINE CROSS SECTIONS

SEP 2000 RECEIVED

THESE ARE TRANSMITTED as checked below:

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☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

STEVE,

HERE ARE THE CROSS SECTION SHEETS THAT YOU REQUESTED AS PER OUR PHONE CONVERSATION. PLEASE FEEL FREE TO GIVE ME A CALL WITH ANY QUESTIONS AND/OR COMMENTS.

BRENT DOWNING

COPY TO _____

SIGNED: BT

If enclosures are not as noted, kindly notify us at once.

DLZ

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Columbus, Ohio 43229

(614) 848-4141
Fax (614) 848-6712

LETTER OF TRANSMITTAL

DATE 9-14-00	JOB NO. 9821-3200.00
ATTENTION Steve Sommers	
RE: ATH-33-40.981	

TO Ohio Department of Transportation
Office of Materials Management
1600 West Broad Street
Columbus, Ohio 43223

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	9-14-00		Soil Profile - Roadway Borings

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☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 20 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS This set is complete except that sheets 111 through 133 show the old cross sections. Sheets with the revised cross sections will be transmitted as soon as possible

COPY TO _____

SIGNED: Dorothy Adams

If enclosures are not as noted, notify us at once.

DLZ

ENGINEERS • ARCHITECTS • SCIENTISTS

6121 Huntley Road
Columbus, Ohio 43229

(614) 848-4141
Fax (614) 848-6712

LETTER OF TRANSMITTAL

DATE 9/13/00	JOB NO.
ATTENTION STEVE SOMMERS	
RE: ATH-33-40.981	

TO ODOT - Geotech

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
	1 set		Revised ML x-sections per ODOT-Geotech recommendations
	1 set		ML & side road plans
	1 set		side road x-sections for review

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☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 20 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

SEP 2000
RECEIVED

COPY TO _____

SIGNED: Pete V

If enclosures are not as noted, notify us at once.

DLZ

TRANSMITTAL LETTER

6121 HUNTLEY ROAD COLUMBUS, OH 43229-1003
PHONE: (614) 888-0040 FAX: (614) 848-6712

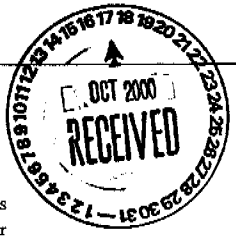
DATE: October 16, 2000

TO: Ohio Department of Transportation
Office of Materials Management
1600 West Broad Street
Columbus, Ohio 43223-1298

PROJECT: ATH-33-40.981

ATTENTION: Eugene C. Geiger, P.E.

ACCOUNT NO:



WE ARE SENDING THE FOLLOWING MATERIAL:

- ☐ Shop Drawings
- ☐ Samples
- ☐ Copy of Letter
- ☒ Prints
- ☐ Tracings
- ☐ Request for Payment
- ☐ Details
- ☐ Specifications
- ☐ Change Order

OTHER:

DATE	COPIES	DESCRIPTION
10-16-00	1	Revised Mainline Cross Sections per Slope Review Comments
10-16-00	1	Revised Side Road Cross Sections per Slope Review Comments
10-16-00	1	Revised Culvert Detail Sheets per Slope Review Comments
10-16-00	1	Stage I and II Marked Up Slope Review Sets

THESE ARE FORWARDED:

- ☒ For your use
- ☒ For approval
- ☐ For correction
- ☐ For your files
- ☐ Reviewed as noted
- ☐ For review and comment

REMARKS: Here are the modified slopes for the ATH-33-40.981 project as per your comments. Please feel free to give me a call with any questions and/or comments.

BY: Todd Willis, P.E., P.S.

CC: Doug Morgan, Saleh El-dabaja, File

TITLE: Project Manager

MEETING MINUTES
September 12, 2000

Location: Central Office, Room B Ground Floor
Subject: Progress meeting for ATH/MEG-33-30.980/40.981

Attendees:

Saleh El-dabaja-ODOT	Jennifer Townley-ODOT	George Collins-ODOT
Debbie Fought-ODOT	Doug Morgan-ODOT	Bob Campbell-ODOT
Connie Gillum-ODOT	Ronald Riser-ODOT	Tom Davis-ODOT
Ken Dollison-ODOT	Dianna Hulsey-ODOT	Steve Sommers-ODOT
Noel Akala-ODOT	Wayne Pace-ODOT	Wayne Callahan-ODOT
Brent Downing-DLZ	Chuck Murphy-DLZ	Bud Naylor-DLZ
Pete Nix-DLZ	Johnny Ng-DLZ	Phil Schroeder-GF
Joseph Rikk Jr-GF	Tony Meacham-ME	Terry Winebrenner-ME
Ron Richards-ME	Erik Brokamp-ME	

SOILS

- DLZ - We got approval from Gene Geiger's office to change the slope of the top layer of soil (at cut locations) from 4:1 to 3:1. Even so, we still have 2 places where the construction limits are beyond the current R/W lines. We also have a couple of areas where the construction limits are close to the current R/W lines. Right now, there are 2 properties affected by these changes in construction limits. Our R/W section is aware of the changes, however, we are not sure if those changes have been made.

- ODOT - Steve Sommers has indicated that he has not yet received all of the information that was due him for the review of the soils on the DLZ project. The District is concerned about the delay of the information on the additional borings. The final R/W is past due for completion, and any changes that may come from this review, will only further delay the final R/W plans.

- DLZ - All of the additional soil borings are complete, however, changes to the slopes based on these additional borings have not all been made to the cross-sections. We will have all of the information to Steve Sommers on Thursday, September 21.

SCHEDULES

- DLZ - We will be submitting stage 3 for review on October 3, 2000. All of our bridges will be submitted for detail review by October 30, 2000. The first bridge will be submitted on September 26, 2000.

- GF/ME - Our Stage 3 submittal date has not yet been set by the District. The District has asked to delay our Stage 3 submittal date to provide ample time to review the DLZ section. Our Bridges will all be submitted for detail review on November 30, 2000.

ROW

- ODOT - Skip Logan had a discussion with Saleh at one of latest TRAC meetings. He has been upset with the handling of his property appraisal. He has stated that the appraisal used comps that were far away from his property. He said he has several comps that are closer to his property. Someone needs to meet with Mr. Logan to determine if his comps are valid, and if so, use them to in the appraisal.

- GF/ME - Ron Richards will call Mr. Logan and set up a meeting to discuss his concerns.

- ODOT - Kevin O'Grady will be leaving SE Region and Wayne Callahan will be assuming Kevin's duties.

- DLZ - Our final ROW plans will be submitted to the District by September 29, 2000. We will also submit the plans to the designated Court Houses for checking.

- GF/ME - Our final ROW plans will be sent to the District at the beginning of October.

UTILITIES

- ODOT - We need to make sure that we have all of the existing utility easements shown on the ROW plans. Texas Eastern has submitted a relocation cost and sketch of proposed work. Columbia Gas has an 18" line on the DLZ project, they may need some CADD files in order to expedite their relocation plan.

- DLZ - We have shown the Columbia Gas utility easement on our plans.

- GF/ME - We have discovered an AT&T easement for a fiber optic line that was not discovered during the court research. Phil Schroeder wants a copy of the Texas Eastern relocation sketch. We sent the City of Athens utility relocation plan to the District. We would like to have a meeting set up with the District and the City of Athens to discuss the plan.

- ODOT - Dianna Hulsey will contact the City of Athens and set up a meeting to discuss the utility relocation on Albany Road. The meeting will be set up for the week of September 25 thru September 29. (The Meeting has been set, and will be on Thursday, September 21 at 9:30 in Athens.)

STRUCTURES

- ODOT - At the last meeting, there was a question about how much information the Consultants need to show on the plans for the reinforcing, since we are not supplying a reinforcing list with these projects. Do we need to show typical bar marks, or just the size and spacing of the reinforcing (along with a general shape of the bar)? Lloyd Welker and Jeff Crace have both said they would still like to have the typical bar marks shown.

- DLZ - Johnny Ng does not agree with the decision by L. Welker and Jeff Crace. He would like to have a meeting with Jeff Crace after this meeting.

- ODOT - We held a brief meeting with Jeff Crace, Jawdat Siddiqi, Tariq Mohammad, Doug Morgan, Johnny Ng and Joseph Rikk. As a result of this meeting, it was decided that the ODOT typical bar marks were not needed. The Consultants were instructed to provide a bar size, bar spacing and a general shape. The Consultants will have to make sure that reinforcing bars are detailed so that the fabricator will be able to detail the reinforcing bars correctly.

OPEN DISCUSSION

- ME/GF - All of our total take appraisals are completed, have been reviewed by SE Region and are in Ron Richards department. To date, Peter Chen's property is completed. We have a total of 21 total takes. At this time, 4 offers have been accepted and 3 other offers are pending.

- DLZ - We have 6 total take parcels on our project. At the present, one offer has been accepted. By next week, we will have made offers to all of the remaining total takes. It is Bud Naylor's opinion that the Story property at the corner of S.R. 681 and existing US33 will have to be appropriated. Bud has indicated that they are way apart on the price.

The next meeting will be on Tuesday, October 10, 2000
@ 12:30 p.m. at Central Office on the first floor room 1C.

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COLUMBUS, OHIO 43229

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FAX (614) 848-6712

LETTER OF TRANSMITTAL

DATE	JOB NO.
21 July 00	9821-3200.00

ATTENTION: Scott Summers

RE: ATH-33-40.981

Corrected sheets

TO Scott Sommers
ODOT - Central office
Columbus, OH

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			Corrected plan views for ATH-33-40.981

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REMARKS _____

COPY TO _____

SIGNED: Paul Pauntz

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COLUMBUS, OHIO 43229
(614) 848-4141
FAX (614) 848-6712

LETTER OF TRANSMITTAL

DATE	JOB NO.
11 July 02	9821-3200.00

ATTENTION: GENE GEIGER, P.E.

RE: PARTIAL SUBMITTAL - 'DRAFT'
ATH-33-40.981
SOIL PROFILES
MAINLINE

TO ODOT
1600 West Broad St., Room 2033
Columbus, OH 43223

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☑ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			LAST 5 Sheets of ATH-33-40.981 FOR REVIEW (Sta 48+270 to 49+890.950)

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☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS GENE -
ATTACHED ARE THE SHEETS DISCUSSED FOR THE PARTIAL DRAFT SUBMITTAL FOR ATHENS 33.

COPY TO _____

SIGNED: [signature]

If enclosures are not as noted, kindly notify us at once.

Boring Locations
ATH-33-40.981
Mainline Borings (Drilled by Resource International)

Boring No.	Station	Offset (m)	Northing (m)	Easting (m)	Elevation (m)
B-80	39+577.378	24.9909L	135684.5000	637599.8000	273.40
B-81	39+777.419	0.0009R	135483.1000	637608.7000	229.60
B-82	40+027.356	0.0042R	135236.7000	637650.6000	269.90
B-83	40+227.359	0.3271R	135042.2000	637696.1000	247.10
B-84	40+337.259	0.2835R	134940.8000	637738.4000	231.90
B-85	40+447.258	50.2547R	134817.9000	637750.9000	256.30
B-86	40+467.197	0.3248R	134828.6000	637803.8000	245.90
B-87	40+567.188	0.0901R	134749.4000	637864.8000	246.00
B-88	40+707.294	80.0373R	134590.9000	637895.1000	271.90
B-89	40+747.261	0.0112L	134612.6000	637981.9000	263.40
B-90	40+771.194	27.9655L	134612.6000	638018.7000	259.00
B-91	41+025.279	0.0034R	134401.4000	638162.7000	261.00
B-92	41+227.215	0.2908L	134245.3000	638290.7000	263.30
B-93	41+317.162	49.6911R	134144.7000	638294.9000	227.50
B-94	41+327.197	50.3362L	134184.3000	638387.3000	229.20
B-95	41+527.134	29.6807R	133967.4000	638390.1000	293.10
B-96	41+687.280	50.3007L	133823.6000	638498.6000	256.90
B-97	41+817.004	49.9867R	133685.3000	638409.0000	291.00
B-98	41+926.954	0.0258L	133579.4000	638467.1000	270.20
B-99	42+086.973	4.9654L	133420.2000	638484.0000	256.00
B-100	42+223.044	19.5239L	133285.6000	638508.7000	281.00
B-101	42+347.984	1.9858R	133159.4000	638496.6000	270.00
B-102	42+471.921	41.9632L	133039.1000	638549.7000	274.00
B-103	42+647.018	0.0238R	132861.6000	638523.0000	259.10
B-104	42+826.994	0.0404L	132684.9000	638556.6000	252.70
B-105	42+927.063	49.9490L	132604.2000	638631.8000	261.40
B-106	43+087.068	0.0253R	132439.4000	638641.5000	255.80
B-107	43+227.000	50.0165L	132330.2000	638742.3000	274.90
B-108	43+227.081	49.9866R	132291.0000	638650.3000	269.20
B-109	43+227.041	0.0150L	132310.6000	638696.3000	272.30
B-110	43+427.061	0.0456R	132126.5000	638774.5000	263.90
B-111	43+577.027	0.0156R	131988.5000	638833.2000	267.80
B-112	43+746.977	0.0062R	131832.1000	638899.7000	232.70
B-113	43+907.068	50.0272R	131665.2000	638916.3000	231.50
B-114	43+907.027	0.0256R	131684.8000	638962.3000	214.40
B-114A	43+886.981	74.9973L	131732.6000	639023.5000	258.40
B-115	44+056.993	0.0044L	131546.8000	639021.0000	248.10
B-116	44+187.035	60.0098L	131450.6000	639127.1000	276.20
B-117	44+328.840	0.8185R	131296.3000	639126.6000	252.70
B-118	44+446.988	0.0247L	131187.9000	639173.6000	226.80
B-119	44+627.074	40.0243R	131006.5000	639207.2000	261.70
B-120	44+747.011	0.0455L	130911.8000	639291.0000	271.70
B-121	44+907.061	0.0261L	130764.5000	639353.6000	242.90
B-122	*NOT DRILLED*				
B-123	45+126.250	73.1596L	130591.3960	639506.6590	264.60
B-124	45+127.032	0.0002R	130562.0530	639439.6370	259.00
B-125	45+127.032	49.9998R	130542.4910	639393.6230	257.30

Boring Locations
ATH-33-40.981
Mainline Borings (Drilled by Resource International)

Boring No.	Station	Offset (m)	Northing (m)	Easting (m)	Elevation (m)
B-126	45+322.032	51.9999R	130362.2520	639468.0740	211.00
B-127	45+530.032	1.0002L	130191.5680	639598.2270	205.90
B-128	45+627.032	0.0004L	130101.9090	639635.2570	204.80
B-129	45+807.032	60.0005R	129912.7820	639650.4620	206.30
B-130	45+827.031	0.0004R	129917.8510	639713.5040	222.30
B-131	45+887.031	49.9999L	129882.1960	639782.9930	248.20
B-132	45+927.032	0.0004R	129825.8220	639752.6280	247.10
B-133	45+967.032	25.0009R	129779.2290	639745.2700	238.90
B-134	46+032.032	57.9997R	129706.5000	639740.3320	217.50
B-135	46+207.032	0.0004R	129568.1410	639862.1750	255.50
B-136	46+331.032	62.0000L	129478.2820	639967.7470	263.00
B-137	46+377.032	49.9996R	129392.1300	639882.6720	258.10
B-138	46+527.031	0.0002L	129273.6490	639987.3720	243.60
B-139	46+697.032	5.9998L	129119.5470	640059.4040	249.60
B-140	46+827.032	0.0004L	128997.5620	640104.7440	251.60
B-141	47+057.032	4.0006R	128784.3300	640191.0470	244.20
B-142	47+227.032	0.0004R	128629.4460	640261.2390	247.00
B-143	47+327.014	40.0127L	128553.6000	640337.1390	247.90
B-144	47+467.035	0.0745L	128411.1840	640360.8680	233.00
B-145	47+577.040	0.1238L	128314.7250	640413.7200	226.60
B-146	47+727.049	0.1899L	128187.5830	640493.2580	222.00
B-147	47+867.059	0.4689L	128073.9400	640574.9840	234.10
B-148	48+027.028	3.5998L	127947.5190	640673.0540	235.70
B-149	48+159.595	23.7839R	127824.8460	640730.2830	216.10
B-150	*NOT DRILLED*				
B-151	48+386.167	50.7115L	127687.6420	640925.3710	235.50
B-152	48+386.957	10.7187L	127663.1180	640893.7700	233.60
B-153	48+546.926	13.8823L	127536.7170	640991.8660	233.90
B-154	48+682.613	19.4411R	127407.9940	641046.1950	207.80
B-155	48+761.786	23.1327L	127369.9310	641127.6330	231.00
B-156	48+866.253	20.7475L	127283.9150	641188.0580	201.30
B-157	49+010.009	99.2765L	127196.3700	641333.7900	201.80
B-158	49+021.564	38.3466L	127157.1120	641285.6190	214.10
B-159	49+036.877	40.3164R	127107.5490	641222.6490	239.00
B-160	49+169.576	52.3357L	127022.5960	641360.8840	203.00
B-161	49+309.887	38.8738L	126879.5440	641390.9590	204.20

One's marked w/"X" can be eliminated. Given by phone to P. Nix & P. Painter 3/8/00. ECG.

ADDITIONAL ATH-33 BORINGS
JOB NO. 9821-3200.00
METRIC

m	~~39+635~~	37.5 Rt.	4.5	S.H.C/F >3m Fill 1:1	
m	~~39+635~~	63.5 Rt.	4.5	S.H.C/F >3m Fill @ E.E.	
m	~~40+030~~	58.0 Rt.	18.0	S.H.C. - use B-82 for x-sect.	
X L	40+300	50.5 Lt.	4.5	Additional Coverage	
H	~~40+488~~	37 Lt.	8.0	Transition + B-86 G.P. Hole - Missing Coverage	
H	~~40+604~~	51.5 ~~Rt.~~	15	Transition + B-87 G.P. Hole - Missing Coverage	
m	40+825	CL	19	Transition + Coverage	
X L	40+990	CL	3	Transition	
H	~~41+230~~	CL	6	Redrill geoprobe hole B-92 - Missing Cut	
H	41+600	82 Rt.	27	Redrill geoprobe hole B-96	If only drill one boring drill Rt. 82
H	41+600	CL	15	Transition - Coverage	
H	~~41+818~~	76 Rt.	19.5	B-97 Not deep enough - B/S max cut	
H	~~41+900~~	42 Lt.	18	B-98 Not deep enough - max cut - transition coverage	
X L	42+190	CL	3	Transition	
X L	42+340	CL	3	Transition	
m	~~42+580~~	CL	13	Coverage (B-103 G.P.)	
H	~~42+680~~	Rt. 124	22	Cut Coverage	
✓ L	~~43+090~~	CL	3	Redrill B-106 G.P.	
X L	43+332	CL	3	Transition	
✓ L	43+620	CL	3	Transition	
H	~~43+905~~	Rt. 50	3	Redrill B-113 Geoprobe	poss. drill only one?
H	43+905	CL	3	Redrill B-114 Geoprobe + Questionable Location	
X L	44+105	CL	3	Transition	
✓ L	~~44+310~~	CL	5	Redrill B-117 Coverage	
X H	44+860	Rt. 48.5	12.5	S.H.C. >10m - B.S.	IF only drill one boring drill Rt 28.
H	~~44+860~~	Rt. 28.5	17	S.H.C. >10m - U/S D.L.	

✓L	~~44~~+920	Lt. 36	3	S.H.F. >10 - 1:1	
✓L	~~44~~+920	Lt. 54	3	S.H.F. >10 - E.S.	
H	~~45~~+040	Lt. 62	18.5	S.H.C/F >3m Cut - (13.5) + Cover Transition	IF only drill one boring drill Rt 62
H	~~45~~+040	Lt. 28	10	S.H.C. >3m - U/S D.L.	
M-H	~~45~~+020	Rt. 36	3	S.H.F. >10m - 1:1	IF only dri one boring drill Rt 73.
M-H	~~45~~+020	Rt. 73.5	3	S.H.F. >10m - E.S.	
H	~~45~~+400	Rt. 28	15.5	S.H. C/F - missing cut area coverage	
H-M	~~45~~+400	Lt. 30	8	S.H. C/F >10m Fill - 1:1	
M-H	~~45~~+400	Lt. 45.5	8	S.H. C/F >10m Fill - E.S.	
H	~~46~~+700	CL	10	Stability	
H	~~46~~+800	Rt. 27.5	7	S.H. C/F >3m Fill - 1:1	
H	~~46~~+860	CL	8	Transition + Coverage	
H	~~45~~+900	Lt. 48.5	23	S.H.C. >10m - B.S. + Coverage	IF only drill one boring dri Lt. 48.5
H	~~45~~+900	Lt. 28	23	S.H.C. >10m - U/S D.L. + Coverage	
H	~~46~~+110	CL	11	Transition + Missed Coverage	
H	~~46~~+375	Rt. 50	25.1	Redrill B-137 (short) + Coverage	
H	~~46~~+520	Rt. 53	12.5	S.H. C/F - B.S. Missing Coverage	IF only dri one boring drill Rt 53
H	~~46~~+520	Rt. 28	11.6	S.H. C/F - U/S D.L. - Missing Coverage	
✓L	~~46~~+558	CL	3	Transition	
M	~~46~~+570	Lt. 23	3	S.H. C/F - Fill 1:1	
XL	46+606	CL	3	Transition	
XL	46+700	Rt. 28	10	Cut - coverage ~1m below grade	
H	~~46~~+860	Rt. 52	13.5	S.H.C. - B.S. - Existing boring does not meet grade + transition	IF only drill one
H	~~46~~+860	Rt. 28	8	S.H.C. - W.S. - D.L. overburden thickness	
H	~~47~~+040	Lt. 40	13.3	Missing Top Cut Coverage	
H	~~47~~+040	CL	9	Auger Refusal then Core	Pickup new roadway
✓L-M	~~47~~+180	CL	9	Transition and Coverage	
H	~~47~~+200	Lt. 28	11	S.H.C. - U/S D.L. - Boring does not cover cut	
H	~~47~~+840	Lt. 65	16	S.H.C. - B.S. (CL boring missing top to grade)	

H	[illegible]	Lt. 45	12.5	B-148 Short - Coverage
L	[illegible]	CL	12	Transition + Coverage
m	[illegible]	Rt. 30	3	S.H. C/F >3m Fill - 1:1
L	[illegible]	CL	9.5	Transition + Coverage
H	48+260	28 Lt.	12.5	Transition and cut coverage (GP boring missing cut)
H	[illegible]	Lt. 10	13	B-151 does not meet grade coverage
H	[illegible]	Lt. 30	14.8	S.H.C. >10m - U/S D.L.
L	48+480	Lt. 30	3	S.H.C. @ ground surface - overburden thickness
L	[illegible]	CL	7	Transition + Coverage
H	[illegible]	Lt. 28.5	23	S.H.C. >10m - U/S D.L. (B-155 just above grade)
L	[illegible]	CL	4	Transition and coverage (to Bridge borings)
H	[illegible]	Rt. 114	38.5	S.H.C. >10m - B.S. - deep boring does not meet grade
XH	49+020	Rt. 28	30	S.H.C. >10m - U/S D.L. - deep boring does not meet grade
H	[illegible]	Rt. 48.5	9	S.H.C. <10 - Max Cut
H	[illegible]	Rt. 104	50	S.H.C. >10m - B.S.
H	[illegible]	Rt. 31	19.5	S.H.C. >10m - U/S D.L.
XL	49+260	Lt. 32	3	S.H.C. >10m - Confirm D/S Rx @ D.L.
H	[illegible]	Rt. 65	18.4	S.H.C. <3m - B.S.
H	49+400	Lt. 95	31.0	S.H.C. >10m - B.S.

IF only drill one boring drill Rt. 114

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Dodson Stilson

Dodson-Stilson, Inc.
A DLZ Company
ENGINEERS • ARCHITECTS • SCIENTISTS
6121 Huntley Road
COLUMBUS, OHIO 43229
(614) 848-4141
FAX (614) 848-6712

LETTER OF TRANSMITTAL

DATE 14 Feb 00 | JOB NO. 9821-3200
ATTENTION Gene Geiger
RE: ATH-33-40.981
Proposed Additional Roadway Borings

TO ODOT
1600 West Broad St., Rm 2033
Columbus, OH 43223

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2			Additional Boring List w/ Prioritized listing.
1			3 sheets - Plan topo for project.

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS
Mr Geiger -

Each boring location has a low, medium, high or in between classification. Also if you decide to only go with one boring instead of two for side hill cuts we put our recommendation for which one. If you have questions please call. Thanks

COPY TO _____

SIGNED: Paul Painter

If enclosures are not as noted, kindly notify us at once.

OHIO DEPARTMENT OF TRANSPORTATION

1980 West Broad Street
P. O. Box 899
Columbus, Ohio 43216-0899

Reply to:
Office of Materials Management
1600 West Broad Street, Columbus, Ohio 43223-1298

September 27, 1999

Dodson-Stilson, Inc.
6121 Huntley Road
Columbus, OH 43229-1003

Attn: Mr. Todd D. Willis, P.E., P.S.
Project Manager

Re: ATH-33-40.981, PID 18288
Preliminary Slope Recommendations

Dear Mr. Willis:

Reference is made to your September 10, 1999 letter outlining the recommended preliminary cut and fill slope scheme for the subject project, the Soil Profile, and preliminary cross-sections. We are in general agreement with the scheme proposed. The scheme listed below indicates some minor changes to that which you have proposed. Note that for consistency, this letter with similar text is being sent to Gannett Fleming for use on the adjacent ATH-33-30.980 project. Also, please note that these recommendations are general in nature and some fine-tuning may be required upon a more detailed review of the preliminary plans and subsurface information.

CUT SLOPES

Extend a 2:1 backslope to 1.5m above the back of the ditch and provide a 4.5m wide bench sloped at 10:1.

Soil. This includes are materials which were penetrated by the split-spoon sampler. Use a 2:1 slope where the thickness is less than approximately 1.5m. Use a 4:1 slope where thicker than approximately 1.5m. It may be necessary to transition over a couple of cross-sections between these two conditions, where they are present. Exceptions may be made to the 4:1 slopes if they would result in a thin sliver cut.

Shale and Mudstone. Use a 2:1 slope. Provide a 4.5m wide bench sloped at 10:1 at approximate 12.5m vertical intervals in the shale and/or mudstone. Likewise, provide the bench at the

interface where shale and/or mudstone is overlain by sandstone or siltstone.

Sandstone and Siltstone. Use a 1/2:1 slope where thicker than approximately 3m. Use a 2:1 slope where the thickness is less than approximately 3 m.

FILL SLOPES

Use 3:1 fill slopes for the ATH-33-30.980 project. For the ATH-33-40.981 project, use fill slopes of 2:1, except where the foundation is cohesive soils with N less than 4 or potentially unstable shales or mudstone.

Sidehill fills should be constructed utilizing Special Benching, generally on stable rock.

Please feel free to contact us should you have any questions.

Respectfully,

Eugene C. Geiger

Eugene C. Geiger, P.E.
Geotechnical Engineering Coordinator

c. S. Eldabaja, D. Briggs, Reading File, File

Dodson Stilson

Dodson-Stilson, Inc.
ENGINEERS • ARCHITECTS • SCIENTISTS
A DLZ Company

September 8, 1999

Ohio Department of Transportation
Office of Materials Management
1600 West Broad Street
Columbus, Ohio 43223

Attn: Mr. Gene Geiger

Re: ATH-33-40.981
Station 39+600 to 49+891
Embankment Fill and Cut Slope Design
DSI Job No. 9821-3200-00

Dear Mr. Geiger:

Enclosed are our proposed cross sections for the southern half of the Athens 33 project for your review. Also enclosed for your reference are the soil profiles and subsurface investigation reports for the entire project. It should be noted that the following recommendations are preliminary and need to be confirmed by field reconnaissance and stability analyses. The field reconnaissance is expected to be performed in late September or early October.

As the attached documentation explains, 2H:1V cut slopes are proposed in the mudstone and shale bedrock, whereas 1/2H:1V cut slopes are proposed for the sandstone and siltstone. Fall benches are included 1.5 meters above the drainage ditch and every 12.5 meters above the first bench. Using these guidelines, approximately 2.1 million cubic meters of sandstone and 2.1 million cubic meters of shale and mudstone will be removed in the cut sections.

The soil is generally less than one meter thick and frequently composed of an indurated clay or weathered shale, so a flatter cut in the soil is generally not used. In cases where the soil thickness exceeds 1.5 meters, a 4H:1V slope is used.

In cases where sandstone occurs above the shale, a 2H:1V slope is maintained in the sandstone as well due to stability concerns. Where this occurs, an additional bench is also shown at the base of the sandstone.

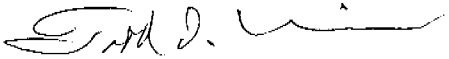
In most areas of the project south of Station 39+600, it is believed that 2H:1V fill embankment slopes can be utilized. However, in areas where the foundation consists of weak, highly compressible soils or rests on a slope of shale and/or mudstone, 3H:1V slopes are recommended. Using these guidelines approximately 3.7 million cubic meters of compacted fill will be required to construct the embankments.

6121 Huntley Road • Columbus, Ohio 43229-1003 • (614) 848-4141 • FAX (614) 848-6712
With Offices Throughout Ohio, Indiana and Michigan

Please feel free to call myself or Pete Nix if you have any questions about this project.

Sincerely,

DODSON-STILSON, INC., a DLZ Company



Todd D. Willis, P.E., P.S.
Project Manager

TDW/cb

Enclosures

cc: Mr. Doug Briggs, ODOT - District 10

I:\SECT\9821\320000\GEIGER.DAA

MEMO

To: Todd Willis
From: Dorothy Adams
Subject: Rock Cut Recommendations, ATH-33-40.891
Date: May 21, 1999

We have reviewed the borings drilled for the roadway subsurface exploration and the rock cut recommendations presented by Resource International for the above mentioned project. Attached are our recommendations based on the borings information provided.

In general, there were two predominate types of rocks encountered: a very soft to medium hard shale or mudstone, much of which is also identified as "redbeds" in southeastern Ohio, and a medium hard sandstone. Minor amounts of medium hard siltstone and limestone were also encountered. Coal seams were not observed.

For the very soft to medium hard shale, we recommend that the rock be cut to a 2 horizontal to 1 vertical slope. If necessary, the shale may be cut as steep as 1:1. The medium hard sandstone and siltstone may be cut to a ½ horizontal to 1 vertical slope.

In addition, we present the following general recommendations:

1. The soil should be cut to a 2H:1V or flatter slope. Bedrock is generally shallow in Athens and Meigs Counties, however, the soil thickness at the boring locations ranged from 0.1 to 7.2 meters. If the soil layer above the rock is thicker than 3.0 meters, then a 3.0-meter wide bench should be cut along the base of the soil layer.

2. It is recommended that a 4.5-meter wide fall bench be constructed 1.5 meters above the roadside ditch. A 1:1 slope may be used between the ditch and the fall bench.

3. Where the rock cut height exceeds 12.5 meters, it is recommended that a 4.5-meter wide sidehill bench be constructed. Where the rock cut height exceeds 25.0 meters, a second sidehill bench will be necessary. All sidehill benches should be graded to allow for positive drainage along the slope to reduce flows over the exposed rock.

Details of the rock cut recommendations are in the attached table.

cc: Brent Downing

ATH 33-40.981 CUT SECTIONS DODSON-STILSON, INC.

Section Information					Height of Cut (m)		Rock Cut Recommendations					
Begin Station	End Station	Side	Referenced Boring (s)	Soil Thickness (m)	Left	Right	Elev. of Cut (m)	Rock Type[1]	Cut Slope (Sb)	Ditch Slope[2]	No. Sidehill Benches	Remarks
39+500	39+620	Both	B-78 B-79 B-80	4.0 1.3 1.7	18-22	10-19	262 to soil ditch to 262	4 2	2H:1V ½H:1V	1:1	0-1	Cut bench at shale/sandstone interface at approx el. 262 m
39+620	39+675	Left	B-81	2.2	0-18	-	262 to soil ditch to 262	4 2	2H:1V ½H:1V	1:1	0-1	Cut bench at shale/sandstone interface at approx el. 262 m
39+835	39+936	Right	-		-	7-12	ditch to soil	4	2H:1V	1:1	0	
39+936	40+140	Both	B-82	2.1	3-6	5-17	255 to soil ditch to 255	4 2	2H:1V 1/2H:1V	1:1	0-1	
40+140	40+180	Right	B-83	7.2	-	0-6	entire cut	Soil	2H:1V	1:1	0	
40+420	40+480	Right	B-85 B-86	0.6 0.8	-	0-6	ditch to soil	2	1/2H:1V	1:1	0	
40+560	40+700	Right	B-87	1.5	-	0-14	254 to soil ditch to 254	4 2	2H:1V 1/2H:1V	1:1	0-1	
40+700	40+820	Both	B-88 B-89 B-90	1.8 1.2 1.2	3-5	6-18	256 to soil ditch to 256	4 2	2H:1V 1/2H:1V	1:1	0-1	
40+900	41+040	Right	B-91	3.2	-	0-4	258 to daylight ditch to 258	soil 2	2H:1V 1/2H:1V	1:1	0	
41+220	41+240	Both	B-92	1.7	2-5	0-3	262 to daylight ditch to 262	soil 2	2H:1V 1/2H:1V	1:1	0	
41+240	41+257.162	Left	B-92	1.7	0-5	-	262 to daylight ditch to 262	soil 2	2H:1V 1/2H:1V	1:1	0	
41+423	41+640	Both	B-95	1.6	3-19	8-30	entire cut	4	2H:1V	1:1	0-2	
41+660	41+740	Right	B-96	1.7	-	11-14	entire cut	4	2H:1V	1:1	0-1	
41+740	41+940	Both	B-97 B-98	0.9 1.7	4-20	0-25	entire cut	4	2H:1V	1:1	0-1	
41+940	41+980	Left	B-98	1.7	1-6	-	entire cut	soil	2H:1V	1:1	0	
42+180	42+300	Both	B-100	1.0	0-11	0-9	entire cut	4	2H:1V	1:1	0	
42+300	41+340	Left	B-101	4.0	0-7	-	entire cut	4	2H:1V	1:1	0	
42+400	42+540	Left	B-102	3.0	0-4	-	entire cut	4	2H:1V	1:1	0	
43+160	43+200	Left	B-106 B-107 B-108 B-109	0.1 2.6 2.6 1.0	2-6	-	entire cut	4	2H:1V	1:1	0	Medium hard sandstone may be encountered in ditch

1 - Rock types: 2 = sandstone or siltstone
4 = mudstone or redbed shale

2 - Ditch slope of 2H:1V generally used

Revised 9/2/99

Section Information					Height of Cut (m)		Rock Cut Recommendations					
Begin Station	End Station	Side	Referenced Boring (s)	Soil Thickness (m)	Left	Right	Elev. of Cut (m)	Rock Type[1]	Cut Slope (Sb)	Ditch Slope[2]	No. Sidehill Benches	Remarks
43+200	43+340	Both	B-106 B-107 B-108 B-109	0.1 2.6 2.6 1.0	2-11	0-6	entire cut	4	2H:1V	1:1	0	Medium hard sandstone may be encountered in ditch
43+480	43+620	Both	B-111	1.2	0-4	2-7	ditch to soil	2	1/2H:1V	1:1	0	
43+620	43+640	Right	B-111 B-112	1.2 0.7	-	3-5	ditch to soil	2	1/2H:1V	1:1	0	
44+120	44+300	Both	B-116 B-117	1.0 2.3	4-19	0-9	259 to soil ditch to 259	4 2	2H:1V 1/2H:1V	1:1	0-1	
44+580	44+660	Right	B-119	1.0	-	2-11	256 to soil ditch to 256	4 2	2H:1V 1/2H:1V	1:1	0	
44+660	44+880	Both	B-120	1.6	5-19	11-22	252 to soil ditch to 252	4 2	2H:1V 1/2H:1V	1:1	0-1	
44+880	44+920	Right	B-121	1.2	-	0-4	ditch to soil	2	1/2H:1V	1:1	0	
45+020	45+060	Left	-	-	6	-	244 to soil ditch to 244	4 2	2H:1V 1/2H:1V	1:1	0	
45+060	45+260	Both	B-123 B-124 B-125	2.0 2.4 1.1	0-25	0-20	256 to soil 251 to 256 244 to 251 ditch to 244	4 2 4 2	2H:1V 1/2H:1V 2H:1V 1/2H:1V	1:1	0-1	Cut slope above elevation 251 at 2H:1V
45+380	45+460	Right	B-126 B-127	3.3 1.8	-	0-6	entire cut	4	2H:1V	1:1	0	
45+840	45+880	Left	B-130 B-131	3.0+ 1.0	6-19	-	ditch to soil	2	1/2H:1V	1:1	0-1	
45+880	46+000	Both	B-131 B-132	1.0 0.9	0-19	0-11	ditch to soil	2	1/2H:1V	1:1	0-1	
46+100	46+520	Both	B-135 B-136 B-137 B-138	0.9 1.0 1.8 1.0	4-28	2-22	entire cut	2,4	2H:1V	1:1	0-2	
46+520	46+620	Right	B-138	1.0	-	2-10	entire cut	4	2H:1V	1:1	0	
46+620	46+880	Both	B-139 B-140	1.7 1.0	0-10	2-10	243 to soil ditch to 243	2 4	1/2H:1V 2H:1V	1:1	0	Cut slope above elevation 243 at 2H:1V
46+880	46+900	Right	B-140	1.0	-	2-6	entire cut	4	2H:1V	1:1	0	
46+960	47+000	Left	B-140 B-141	1.0 0.1	2-9	-	entire cut	4	2H:1V	1:1	0	

1 - Rock types: 2 = sandstone or siltstone
4 = mudstone or redbed shale

2 - Ditch slope of 2H:1V generally used

Section Information					Height of Cut (m)		Rock Cut Recommendations					
Begin Station	End Station	Side	Referenced Boring (s)	Soil Thickness (m)	Left	Right	Elev. of Cut (m)	Rock Type[1]	Cut Slope (Sb)	Ditch Slope[2]	No. Sidehill Benches	Remarks
47+000	47+120	Both	B-141	0.1	0-10	0-6	ditch to soil	2	1/2H:1V	1:1	0	
47+160	47+180	Left	B-142	2.0	4-8	-	entire cut	4	2H:1V	1:1	0	
47+180	47+460	Both	B-142 B-143 B-144	2.0 2.6 3.0+	0-14	1-9	239 to soil ditch to 239	4 2	2:1 1/2H:1V	1:1	0-1	
47+680	47+720	Left	B-146	1.5	3	-	entire cut	4	2H:1V	1:1	0	
47+780	47+860	Left	B-147	2.0	4-9	-	232 to daylight ditch to 232	soil 2	2H:1V 1/2H:1V	1:1	0	
47+860	47+900	Both	B-147	2.0	3-9	0-3	232 to daylight ditch to 232	soil 2	2H:1V 1/2H:1V	1:1	0	
47+900	47+940	Left	B-147 B-148	2.0 1.7	3-9	-	232 to daylight ditch to 232	soil 2	2H:1V 1/2H:1V	1:1	0	
47+940	48+100	Both	B-148	1.7	0-10	3-7	ditch to soil	2	1/2H:1V	1:1	0	
48+180	48+340	Left	B-149 B-150	2.6 1.0	2-10	-	entire cut	4	2H:1V	1:1	0	
48+340	48+640	Both	B-151 B-152 B-153	3.7 1.9 2.6	1-14	0-13	ditch to soil	2	1/2H:1V	1:1	0-1	
48+720	48+800	Both	B-154 B-155	2.5 2.8	6-18	0-11	216 to soil ditch to 216	2 4	1/2H:1V 2H:1V	1:1	0-1	Cut slope above elevation 216 at 2H:1V
48+920	48+980	Right	B-156 B-157	3.7 2.9	-	0-31	216 to soil ditch to 216	2 4	1/2H:1V 2H:1V	1:1	0-2	Cut slope above elevation 216 at 2H:1V
48+980	49+280	Both	B-157 B-158 B-159 B-160	2.9 2.7 1.9 2.6	0-9	7-36	216 to soil ditch to 216	2 4	1/2H:1V 2H:1V	1:1	0-2	Cut slope above elevation 216 at 2H:1V
49+280	49+340	Right	B-161	2.6	-	9-25	entire cut	soil	2H:1V	1:1	0-1	
49+340	49+540	Both	-	-	-	-	entire cut	soil	2H:1V	1:1	0	
49+720	49+890.95	Left	-	-	-	-	entire cut	soil	2H:1V	1:1	0	

1 - Rock types: 2 = sandstone or siltstone
4 = mudstone or redbed shale

2 - Ditch slope of 2H:1V generally used

ESTIMATE OF QUANTITY OF SHALE AND
MUDSTONE FROM CUT SECTIONS
PROJECT ATH-33-40.981
STATION 39+500 TO 49+891
DODSON-STILSON, INC.

Station		Location of Shale & Mudstone
From	To	
39+500	39+675	Above el. 262
39+835	40+160	Above el. 261
40+420	40+480	None
40+580	40+820	Above el. 256
40+920	41+120	None
41+200	41+251	Above el. 261
41+414	43+340	Everything
43+420	44+080	None
44+100	44+320	Above el. 260
44+580	45+000	Above el. 256
45+000	45+240	Between el. 244-248
45+300	45+440	Everything
45+840	46+240	None
46+260	46+600	Left of CL: above el 248 and below elevation 242
46+260	46+600	Right of CL: none
46+620	46+920	Below el. 244
46+960	47+100	None
47+160	47+440	Above el. 240
47+780	47+920	Above el. 232
47+940	48+100	None
48+340	48+800	None
48+927	49+120	Below el. 216
49+140	49+891	Everything

Any station not listed may be assumed to consist entirely of shale and/or mudstone.

Revised 9/2/99

MEMO

To: Brent Downing
From: Dorothy Adams-DAA
Subject: ATH-33-40.981, Additional Cut and Fill Recommendations
Date: September 3, 1999

Following are the revised cut and fill recommendations for the above-mentioned project, as we discussed on Thursday, September 2, 1999. Please disregard the previous memo on this subject dated August 24, 1999.

Embankment slopes of 3 horizontal to 1 vertical are recommended for the following fill sections:

40+160 to 40+300	
41+660 to 41+720	
41+940 to 42+200	
42+300 to 42+560	
45+800 to 45+860	acceptable as shown with 2:1 and 3:1 slopes
48+120 to 48+200	
48+640 to 48+700	
48+800 to 48+960	

It is expected that a bridge will be used instead of the embankment between Stations 45+600 and 45+800. All other fill sections may be designed with 2:1 slopes.

In the following cut sections, the soil should cut at a 4:1 slope:

41+900 to 41+940	top 1.7 meters, left slope only
44+700 to 44+760	top 1.8 meters, right slope only
45+080 to 45+200	top 2.4 meters, left slope only
47+240 to 47+360	top 2.6 meters, left slope only
47+780 to 47+900	top 2.0 meters, left slope only
48+360 to 48+400	top 2.1 meters, left slope only
48+740 to 48+780	top 2.1 meters, left slope only
48+980 to 49+100	top 1.9 meters

Assumptions for embankment slopes:

All slopes to be 2H:1V unless 1) more than one split-spoon sample had a standard penetration value of 4 or less in cohesive soil, OR 2) underlying bedrock consisted of potentially unstable shales and mudstones. Of particular concern are sections where the proposed embankment rests on an existing slope.

Assumptions for soil cuts:

Soil to be cut at a 4H:1V slope only where soil thickness exceeds 1.5 meters.

CUT-SLOPE ALTERATIONS
ATH-33-40.981

Limiting Stations	Maximum Increase (Meters)		Comments
	Left	Right	
39+600 to 39+657	12		Change most of ½:1 to 2:1 Change top 3 meters of 2:1 to 4:1
39+940 to 40+140	3	13	Change some of ½:1 to 2:1 Change top 4-6m of 2:1 to 4:1
40+440 to 40+480		20	Change upper 3 meters of ½:1 to 4:1
40+600 to 40+780		10	Change upper 3-4 meters of 2:1 to 3:1 or 4:1
41+240 to 41+500	7	18	Change upper 2-6 meters of 2:1 to 4:1
41+560 to 41+920	7	26	Change upper 3-8 meters of 2:1 to 3:1 or 4:1
42+200 to 42+320	7	8	Change 2:1 to 4:1
42+440 to 42+480	6		Change 2:1 to 3:1
43+200 to 43+300	6	3	Change upper 3 meters of 2:1 to 4:1
43+480 to 43+640		6	Change ½:1 to 2:1
44+100 to 44+300	10	8	Change upper 4-5 meters of 2:1 to 4:1
44+600 to 44+900	8	12	Change ½:1 to 2:1 Change upper 4 meters of 2:1 to 4:1 or 3:1
45+100 to 45+240	12		Change upper 4-6 meters of ½:1 or 2:1 to 4:1
45+840 to 45+980	7	4	Change top 3 meters of ½:1 to 2:1
46+380 to 46+540	5	10	Change upper 3-5 meters of 2:1 to 4:1
46+700 to 46+740	4		Change upper 3 meters to 4:1 from 2:1
46+980 to 47+080	6	6	Change upper 4 meters of ½:1 to 2:1
47+160 to 47+240	11	3	Change upper 3 meters of 2:1 to 4:1
47+280 to 47+320		3	Change upper 3 meters of 2:1 to 4:1
47+360 to 47+420	4	4	Change upper 3 meters of 2:1 to 4:1
47+940 to 48+100	16	9	Change upper 4 meters of ½:1 to 4:1
48+340 to 48+620	24	12	Change some ½:1 to 2:1 Change some ½:1 to 4:1
48+720 to 48+760	9	4	Change upper 3 meters of ½:1 to 4:1

CUT-SLOPE ALTERATIONS
ATH-33-40.981

Limiting Stations	Maximum Increase (Meters)		Comments
	Left	Right	
48+800 to 48+800	6		change upper 3 meters of ½:1 to 2:1
48+936 to 48+943		13	change upper 2 meters of 2:1 to 4:1
49+140 to 49+160		2	change upper 2 meters of 2:1 to 4:1

8/16/99

Carib. – can work with red-bed, if proper construction inspection is done, soil is compacted at optimum (3:1), using rock core center

Define 'soil' + 'rock'; mix soil + red-bed to make embankment material

Need to check settlement of embankments

Dodson — Other area – soil a little better

Mostly 3:1, some 2:1 fills

(½ red-bed/rock) 4 mil cut … ↑ zone, core

for 4-lane ↑ 4.2 mil fill

Compare cost between 3:1 and 2:1 zone

cuts 1/10 sandstone, benches, 2:1 other spots

ATH-33-30.980/40.981

Mtg 7/20/99

NAME	ORG	PH
GENE GEIGER	ODOT-MAT MGT	275-1318
KIRK BEACH	"	275-1342
Steve Sommers	"	275-1356
Joe Rossie	Gannett Fleming	794 9424
PHIL SCHROEDER	"	"
Pete Nix	DSI	848-4141
TODD WILLIS	"	"
BRENT DOWNING	DSI	848-4141
MITCH WEBER	GANNETT FLEMING	794-9424
DOUG FERGUS	ODOT P-10	740-373-0216
DOUG MORGAN	"	"
SALEH ELDARAJA	"	"

ATH-33-30.980

May 12, 1999

Ohio Department of Transportation - District 10
Attention Mr. Douglas Briggs
338 Muskingum Drive
Marietta, Ohio 45750-0658

RE: Geotechnical Aspects of Embankment Fill and Cut Slope Design
U.S. 33 Athens – Darwin Project (ATH – 33-30.980)
Athens/Meigs County, Ohio

Mr. Douglas Briggs:

Presented herewith is an explanation and summary of the geotechnical review for Station 26+500 through Station 39+600 of the aforementioned project. This letter has been written per the request of The Ohio Department of Transportation (ODOT), District 10 to outline Gannet Fleming's concerns about the proposed highway alignment, as well as to suggest possible alternatives that may be available at this time for this project.

Project Profile and Geological Conditions

The section of highway assigned to Gannett Fleming begins at the intersection of Richland Avenue and Pomeroy Road (the present US 33) in Athens, Ohio and extends in a southerly direction for a distance of about 6 miles. At its present location, the proposed corridor traverses a region predominated by residual soils formed from Pennsylvanian aged sedimentary bedrock of the Marietta Plateau. Sandstone, siltstone, shale, clay shale/mudstone, along with occasional, deeper, thinly bedded coal seams dominate the bedrock profile along the proposed roadway corridor. Of particular concern are the soft shale and clay shale/mudstone units referred to as "Red beds", which appear dark maroon/purplish to red in color with occasional light gray marbling. These materials weather fairly quickly when exposed to form residual clays and silty clay soils of high plasticity and fairly low shear strength. As a result, many of the natural slopes formed in these materials exhibit signs of instability such as leaning trees (where vegetated) and toe bulges ("hummocky" appearance). More dramatic evidence of the innate instability in these materials can be found in constructed cut slopes and fill embankments along Interstate 77 and Interstate 70, as well as US 50 and US 33.

Present Cut/Fill Slope Recommendations and Rational

Based upon the proposed plans and profile elevations, substantial cuts and fills are planned for this project. Some of these cuts and fills are on the order of 30 to 40 meters in

magnitude. According to the information provided in the preliminary subsurface investigation by Resource International (Report No. W-7139), these cuts and fills will be constructed predominantly in, or with, these Red bed materials or residual soils derived from these Red beds. Approximately one-third of the laboratory index tests utilized to classify the residual clay and silty clay soils on this project corridor indicated materials of high plasticity (Liquid Limits higher than 50). An empirical correlation between these index tests and shear strengths yield conservative phi angle (angle of internal friction) estimates ranging from as low as 15 degrees to about 28 degrees. Utilizing a simplified infinite slope analysis, and choosing a phi angle ranging from 18 to 20 degrees, a preliminary slope ratio of 4 horizontal (H) to 1 vertical (V) has been chosen. If it is assumed that zero cohesion is available, this slope ratio would result in a factor of safety (F.S.) ranging from about 1.3 to about 1.45 with the aforementioned phi angles. Generally a F.S. of 1.5 is recommended for slope design. By choosing a 4H to 1V slope ratio for the weak soils in this project, there is the somewhat unconservative assumption that some cohesion is available over the design life of the project.

In some segments along the project alignment, relatively durable rock units comprised of massive sandstone, siltstone, isolated limestone layers and somewhat durable sandy to silty shale will be encountered in the road cuts. The combination of relatively high phi angles (greater than 40 to 45 degrees), unconfined shear strength values in excess of 25 to 30 Mpa, and slake durability values in excess of about 75 to 80 percent, accommodates steeper slope ratios in these materials. For this project, it is proposed to use 0.5H to 1V for the limestone, sandstone, and siltstone cuts and 1 H to 1 V slope ratios in cuts made in the less durable silty to sandy shale materials. Where these materials are encountered above the Red bed deposits in sufficient thicknesses to justify a change in a slope ratio, a three meter bench is recommended to reduce the possibility of undermining and subsequent rock falls in the harder more competent bedrock units.

Presently, it is proposed that the new highway will be a four lane divided roadway for slightly more than 2 miles south of the Richland Avenue intersection in Athens, then continue as a two-lane highway for the duration of its path in Athens County. Eventually, this alignment is to be upgraded to be a four-lane highway for the entire length of the project. Based upon how the project's first stage is to be constructed, it is estimated that approximately 6 million cubic meters of material has to be placed for embankment (fill) construction, while about 5.4 million cubic meters of material has to be excavated (cut). This would create a net shortage of fill material on the Gannett Fleming section of the project. Furthermore, it is roughly estimated that no more than about 500,000 cubic meters (less than 10 percent) of the cut material volume is comprised of what is considered durable rock. As a result, it is highly probable that the embankment fills for this project will be mostly comprised of materials derived from the Red bed deposits, which for reasons previously outlined, are not considered conducive to the steeper slopes often specified for standard ODOT construction (2H to 1V slope ratios). For this reason, it is proposed that 3H to 1V or flatter slope ratios be utilized for the embankment fills. This recommendation is rendered with the assumption that the material will be placed as a soil fill and that some granular material will be partially mixed in the fill as a result of the

excavation and placement activities that will effectively increase the long-term strength characteristics of the embankment soil.

Cut Slope Alternative - Additional Testing

It should be noted that the aforementioned cut and fill slope ratio proposals are based primarily upon laboratory index test results with subsequent empirical shear strength correlations, typical experimental data obtained in somewhat similar materials, and, more importantly, experience with typical cut and fill slopes in the same geological formation. As a result, an effort is made to hopefully utilize a higher degree of conservatism. In the cut slope areas, the final slope will be comprised of materials that are naturally in place. The only way to justify the use of steeper slopes, which require higher shear strengths, would be to more accurately determine the soil parameters affecting long-term slope stability. To this end, specialized laboratory tests, such as three point triaxial tests, done specifically for this project would be necessary. Once the additional data is developed, a more comprehensive, computer-aided slope stability analysis should then performed to examine different failure mechanisms. Ideally, the additional laboratory work and analysis will afford a higher degree of confidence in determining what can be done and what to expect in the cut slope areas.

Embankment Fill Slope Alternatives

The fill slope areas of the project offer more flexibility for the designer, primarily because there is somewhat more control of the embankment composition. One option is to utilize durable rock buttresses at the embankment bases. This would provide a zone of material with higher shear strength characteristics at a critical location on the roadway fills, thus increasing the overall slope stability and possibly accommodating steeper slopes. Another option is to stabilize the Red bed materials prior to placement by mixing them with lime or cement and increase the shear strength of the proposed fill soil. A third option is to utilize a mechanically stabilized earth embankment in which a geogrid type material is placed in specified lifts as the embankment is constructed. This would result in a zone of reinforced earth with a higher effective shear strength characteristics that acts like a wall to intercept potential failure planes. One more option this letter will address is very similar to the rock toe buttress concept, which is the concept of building the embankments using an inner core and an outer shell. The inner core would consist of the residual clay and silty clay soils and the outer shell would consist of granular soils derived from durable rock. Any of these four options would have to be further analyzed for overall stability to determine how they should be designed and subsequent feasibility. They also have their drawbacks.

Rock Toe Buttress

The rock toe buttresses will require a zoned type of construction and careful inspection as the embankments are built to make sure the buttresses are placed in the correct locations. Secondly, there will be a need to segregate and stockpile the durable rock material as it is excavated during construction. These inspection and segregation processes will increase

the construction time needed for the embankments. Thirdly the buttress concept is also limited by the availability of durable rock fill in the cut sections which may or may not be enough to complete all of the buttresses for the project. In the event that durable rock material must be imported to the project site, it should be noted that "local" rock quarries within a 20 to 25 mile radius of the project may not have the capacity to supply material in sufficient quantities for these buttresses. This is based upon an Ohio Mineralogical Industries Report of 1994, which indicated that the combined production from quarries in counties adjacent to the project site amounted to about 700,000 cubic meters in that particular year. Another consideration is the cost associated with hauling very large quantities of material over a potential 40 to 50 mile round trip. If a substantially greater amount of durable rock fill is needed than is available in the present road cuts, this buttress concept may be out of the question.

Soil Stabilization

Chemical stabilization/improvement of the embankment soils would require preconstruction preparation to develop trial mixtures, perform subsequent lab tests, and establish the desired strength characteristics to determine the amount of additive needed for the soils. Once the project goes to construction the contractor has to develop a method to effectively and thoroughly mix the cementatious additive to large quantities of soil prior to placement, probably utilizing pug mills or other mixing equipment. The feasibility and success of the soil stabilization will depend on the amount and cost of the lime or cement additives and the efficiency with which the soil can be treated.

Soil Reinforcement

The third option of geogrid stabilization will be affected by the material costs associated with the geogrid quantities required for the project. Then there is the need for the embankment construction to be thoroughly and carefully observed to insure that the soil reinforcement is appropriately installed. It is very likely that the geogrid placement operations and subsequent construction observation, coupled with the sizable embankments proposed for this project, will increase the construction time. Depending upon contractor competence, this increase in construction time could be substantial. The feasibility of this option will ultimately depend on the relative benefits from decreasing the mass embankment quantities (i.e. steeper slopes) versus the relative costs associated with the geogrid, increased construction time, and the possible need for other specified materials.

Inner Core/Outer Shell Construction

The final option of inner core/outer shell construction (and any variations of such) is usually associated with embankment dam design, where the inner core performs as a relatively impervious barrier and the outer shell provides stability via gravity and increased shear resistance. With this type of construction, the outer shell is generally much larger than the inner core, requiring a substantial volume of durable rock material to complete

construction. For this reason, this method would have the same material limitation (limestone/dolomite and sandstone availability and haul distances) as the toe buttress. Another consideration is the construction inspection and increased construction time necessary to insure that the inner core and outer shell is properly placed. Finally, there is the issue of construction sequencing. The reason is that the inner core is generally constructed with steep (1H to 1V or steeper) side slopes with this method. In this project, the inner core will be constructed with residual soils that have been unstable at these slope ratios, meaning that the core must not be exposed for extended periods of time during construction. Otherwise, construction time embankment failures, which tend to involve deep failure zones and large soil masses, will probably occur. Ideally, the outer shell and inner core should be constructed simultaneously to essentially avoid core exposure.

Summary

The earthwork quantities associated with this project are immense and, for the reasons stated in this letter, involve materials that are not compatible with typical ODOT embankment and cut slope construction methods. As a result, Gannett Fleming has proposed alternatives to these typical ODOT specifications that we feel should be used with this project to provide long term stability. These include 3H to 1V embankment fill slopes, 4H to 1V cut slopes in the residual Red bed materials, 1H to 1V cut slopes in the silty to fine sandy gray shale bedrock units, and ½H to 1V cut slopes in the sandstone, limestone, and siltstone bedrock units. Since there are substantial costs associated with implementing this set of recommendations, an attempt has been made to establish some possible alternatives that may allow more typical ODOT construction practices and decrease the amount of land acquisition required for this project. One alternative involves more comprehensive testing of the insitu materials, which may reveal the availability of higher long-term shear strengths. Other alternatives are associated with construction and include rock toe buttresses, soil improvement via lime or cement additives, soil reinforcement, and inner core/outer shell construction. Each of these construction alternatives, while potentially beneficial to the project, have their limitations and an attempt has been made to briefly discuss what they are.

If there are any questions regarding the content of this letter/report, please contact this office.

Sincerely,

Gannett Fleming Engineers and Architects, P.C.

John R. Kenny, P.E.
Vice President
Manager, Ohio Office

MDH

AGENDA
Cut Slope Design and Embankment Fill Considerations
ATH-33 Athens to Darwin Final Design Project
Station 29+500 to 39+600

1. **Statement of Problem in Brief**

1.1. Natural materials in GF design section are principally composed of soft, highly fractured rock and weak residual clay soils.

1.1.1. Problem strata are described as mottled red-gray or gray-purple Mudstone, Shale, Claystone, and Clay-Shale.

1.1.1.1. Predominant in the northern and southern one-third of GF section.

1.1.1.2. Cuts as deep as 40 meters are required.

1.1.1.3. Slickensides commonly identified.

1.1.1.4. Core loss up to100%, typically ≈ 25 to 35%.

1.1.1.5. RQD often 0%, estimated average less than 30%.

1.1.1.6. Soil Profile Report cites "mudstone and some shale … deteriorated when exposed to water." and "rock condition was typically so poor that it was difficult to identify the transition from soil to rock".

1.1.2. Residual soils from the weak 'redbeds' are also potentially problematic.

1.1.2.1. Soil strata thickness varies from 1.0 to 5.0 meters, ≈ 2.0 meters.

1.1.2.2. With respect to cut slopes, the residual soils will have shear strengths lower than the 'parent' rock material.

1.1.2.3. Soils testing determined most of the redbed residual soils are high plasticity clays.

1.1.2.3.1. About one-third of the samples tested from GF's section had Liquid Limits (LL) >50 %; however this soil represents more than one-half of the soil stratigraphy in GF's section. LL as high as 74% were determined.

1.1.2.4. High LL correlate to high Compression Indices (C_c) which indicate a high settlement potential.

1.1.2.5. Soil Profile Report cites "natural moisture contents... are typically at or well above their corresponding Plastic Limits" (PL).

1.2. **Consequences to the Project**

1.2.1. It is GF opinion that 'standard' 2:1 cut and embankment slopes are not appropriate for our section of the project where the redbeds predominate.

1.2.1.1. GF's experience with redbeds in Ohio, West Virginia, and western Pennsylvania indicates that the shear strength of the redbed mudstone can be as low as 12° and generally falls between 16° –19°. The results of over a dozen shear strength tests are represented on the attached summaries.

1.2.1.2. GF presented our approach to developing preliminary slope ratios for 4:1 slopes in the weak rock and residual soils of the redbeds.

✓ 1.2.1.2.1. GF recommended and the District has authorized additional drilling and testing for the 'roadway' portion of the project to determine shear strength, slaking and consolidation characteristics of the suspect strata.

1.2.2. The percentage of durable rock available for embankment construction is limited.

1.2.2.1. Preliminary material balance calculations indicate that about 6 million m^3 are required for embankment construction. However, only 5.4 million m^3 are to be excavated. This indicates a slight imbalance and a net fill requirement for the section.

1.2.2.2. The preliminary estimates of available durable sandstone, limestone, and siltstone from the required excavation is only 500,000 m^3, (<10% of the fill needed.

1.2.2.3. As a result, it is probable that a significant amount of borrow will be need to construction standard 2:1 embankment or the redbed soil and rock strata will have to be used for embankment construction. Both alternatives have potentially undesirable consequences.

1.2.2.3.1. If durable rock is brought in to construct the embankments, the construction cost will be significantly impacted due to import of durable material and waste of material from the required excavation.

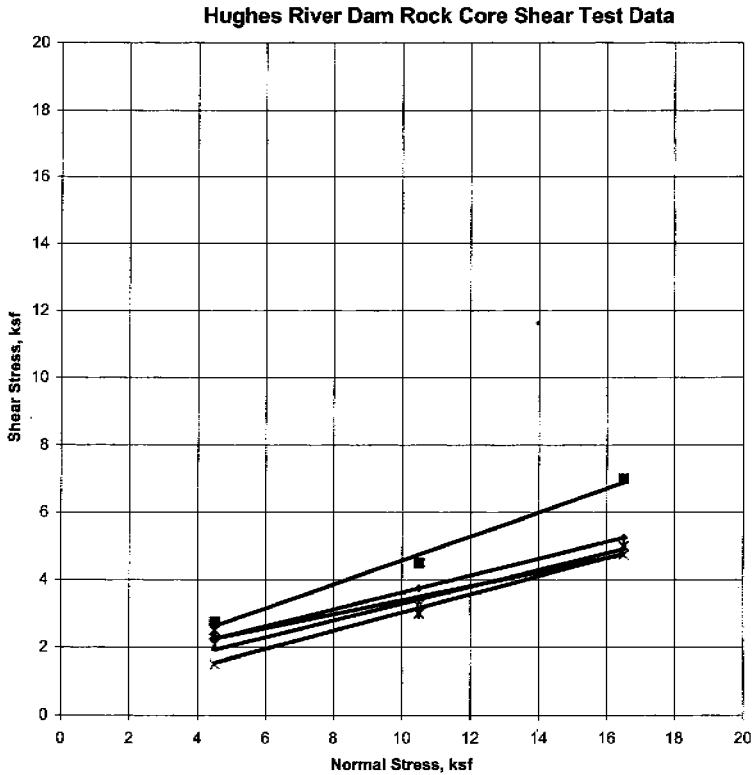
1.2.3. The residual redbed soil potentially will cause handling and placement problems for construction of embankments.

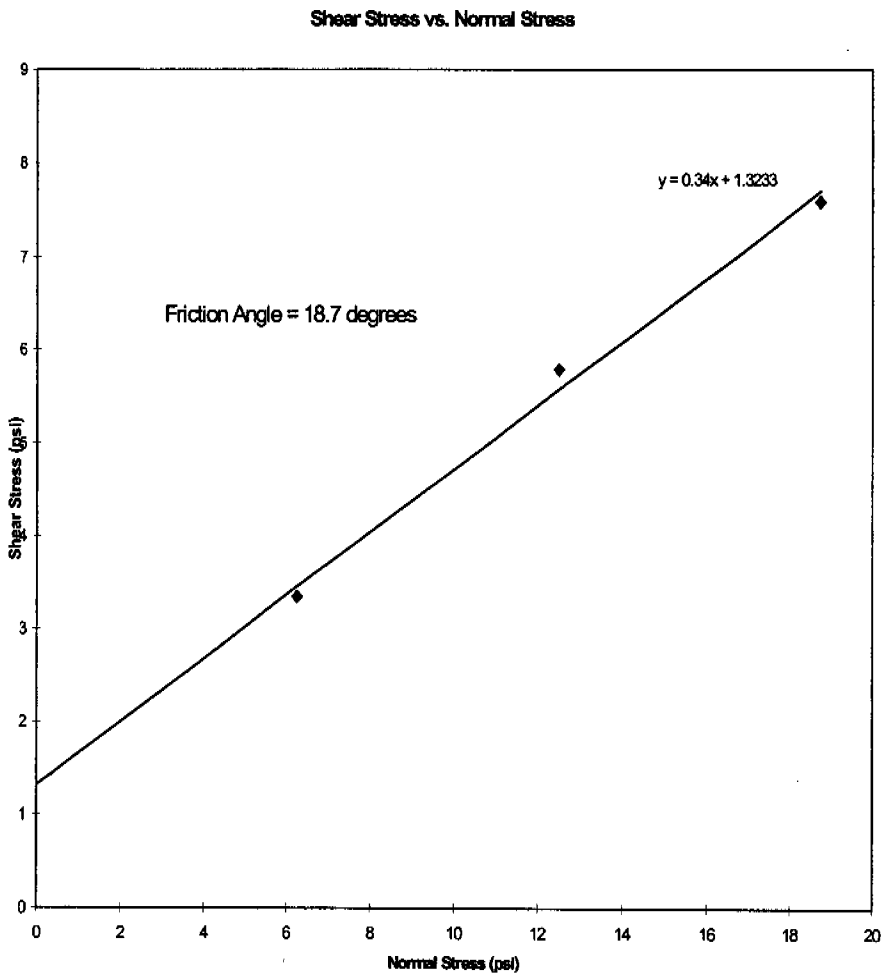
1.2.3.1. As stated in 1.1.2.5., the natural moisture content of the residual soils is at or significantly greater than the PL. The optimum moisture content to place clay soils is typically 2 to 4% greater than the soil's PL. This may require significant drying or admixture procedures in the field prior to placement of these soils in embankment construction.

1.2.3.2. The high LL indicate a high potential for settlement of embankment construction of the residual soils.

The aforementioned problems are not insurmountable; however, the issues do require that ODOT and GF come to a consensus on the best approach to mitigate the problems. Several alternatives have been presented to ODOT in GF letter to Mr. Briggs in May 1999.

Ramp areas would need to be 2:1 for spacing between ramps + N


Hughes River Dam Rock Core Shear Test Data
Shear Stress, ksf
Normal Stress, ksf
0
2
4
6
8
10
12
14
16
18
20


Shear Stress vs. Normal Stress
y = 0.34x + 1.3233
Friction Angle = 18.7 degrees
Shear Stress (psi)
Normal Stress (psi)
0
1
2
3
4
5
6
7
8
9
0
2
4
6
8
10
12
14
16
18
20

Daily Trip Report
Office of Construction Administration

DTR01-7/03

NAME: Randall E. Morris
State Construction Geotechnical Engineer
& District 9 & 10 Advisory Construction Engineer

FIELD TRIP DATE: July 29, 2003

TOTAL TRAVEL TIME: 3 HRS

DISTRICT/PROJECT: 3 HRS

PROJECT INFORMATION

DISTRICT: 10
C-R-S: MEG-33-5.810
PROJECT NUMBER: 425-01

TYPE: New Construction
BID AMOUNT: 41 Million
STATUS: 61% complete

COMMENTS AND CONCERNS:

Chris Merklin, Bill Christensen and I met with the Project Engineer Jamie Hendershot to further assess the slide at stations of 36+520 to 36+620 left.

Chris reviewed his preliminary design with us. Some explanation was given about what to expect during the excavation.

The toe is to be benched into a black-grey shale and drained with drains from the top to bottom of the cut slope. Some of the survey data was not accurate enough to depict all of contours on the cross sections.

Many issues were discussed. Chris will make his recommendation on or before July 31, 2003 to Doug Morgan in Production. Doug will digitize the fix and calculate the quantities and give it to Construction.

This slide is the critical path of the project. It needs completed by the end of August to keep the project on schedule.

PROJECT INFORMATION

DISTRICT: 10
C-R-S: ATH/MEG-33-40.9
PROJECT NUMBER: 246-01

TYPE: New Construction
BID AMOUNT: $ 33 Million
STATUS: 67 % complete

COMMENTS AND CONCERNS:

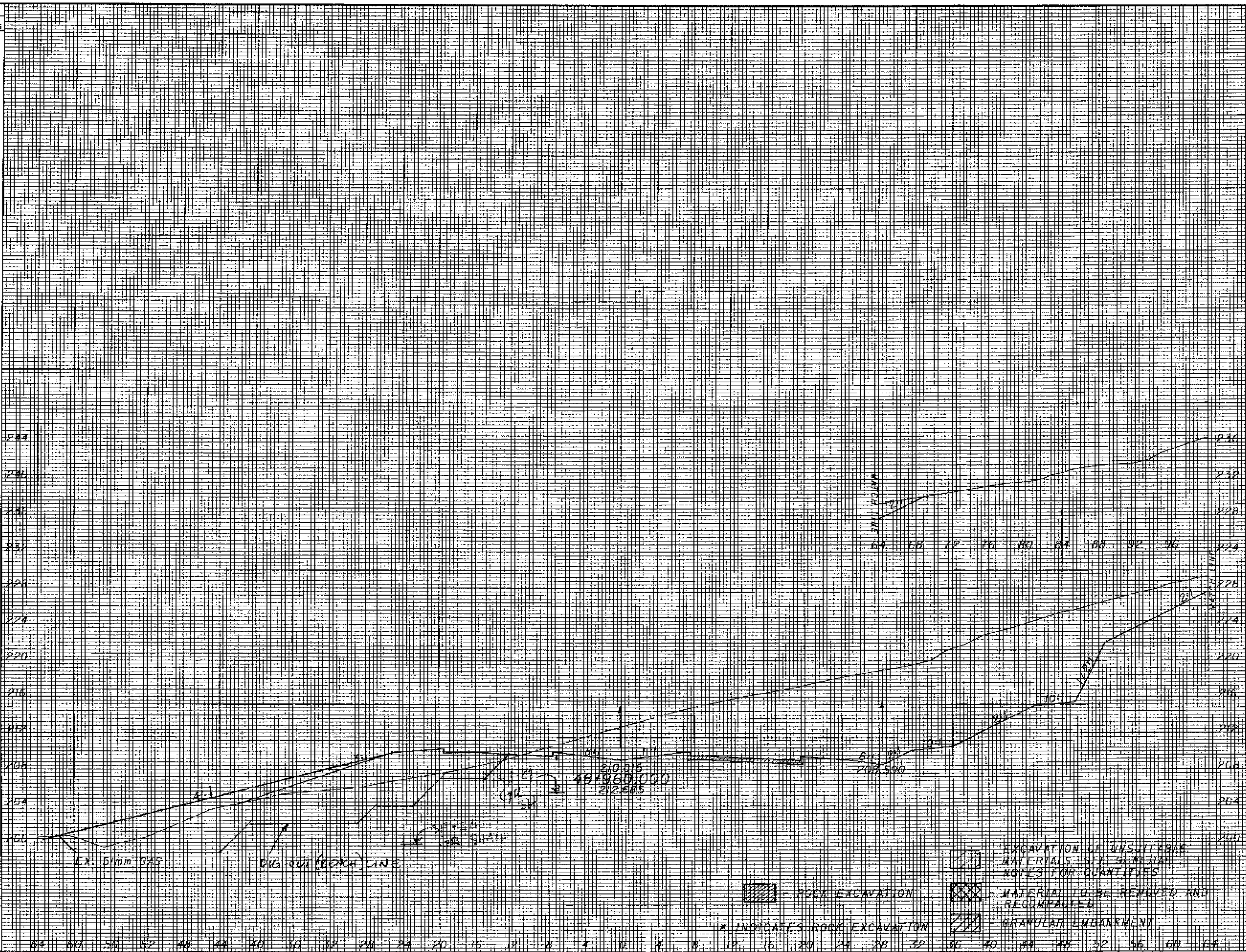
We briefly stopped by the project to look at the slide repair designed by Chris Merklin, which was in progress. The District changed the toe bench width to miss a gas line, were not taking compaction tests in the fill, had somewhat changed the benching slope configuration, did not encounter expected shale in the upper benches and added the rock in the toe but did not place the drainage in the benches.

ATH-33-30.981 SLIDE REMEDIATION

We visited two other projects, a project in District 10 under design and a project in District 5 under construction. The DCE requested us to evaluate a potential rock fall problem on an area to be blasted within the next few months.

cc: OCA Administrator
DCE
File

SEEDING	
END WIDTH	SQ. METERS
95	
	711
95	711



END AREA		VOLUME	
CUT	FILL	CUT	FILL
485	52		
*6			
		3378	425
		*47	
ROCK TOTAL		*47	
SHEET TOTAL		3378	425

CALCULATED BBD CHECKED TDW

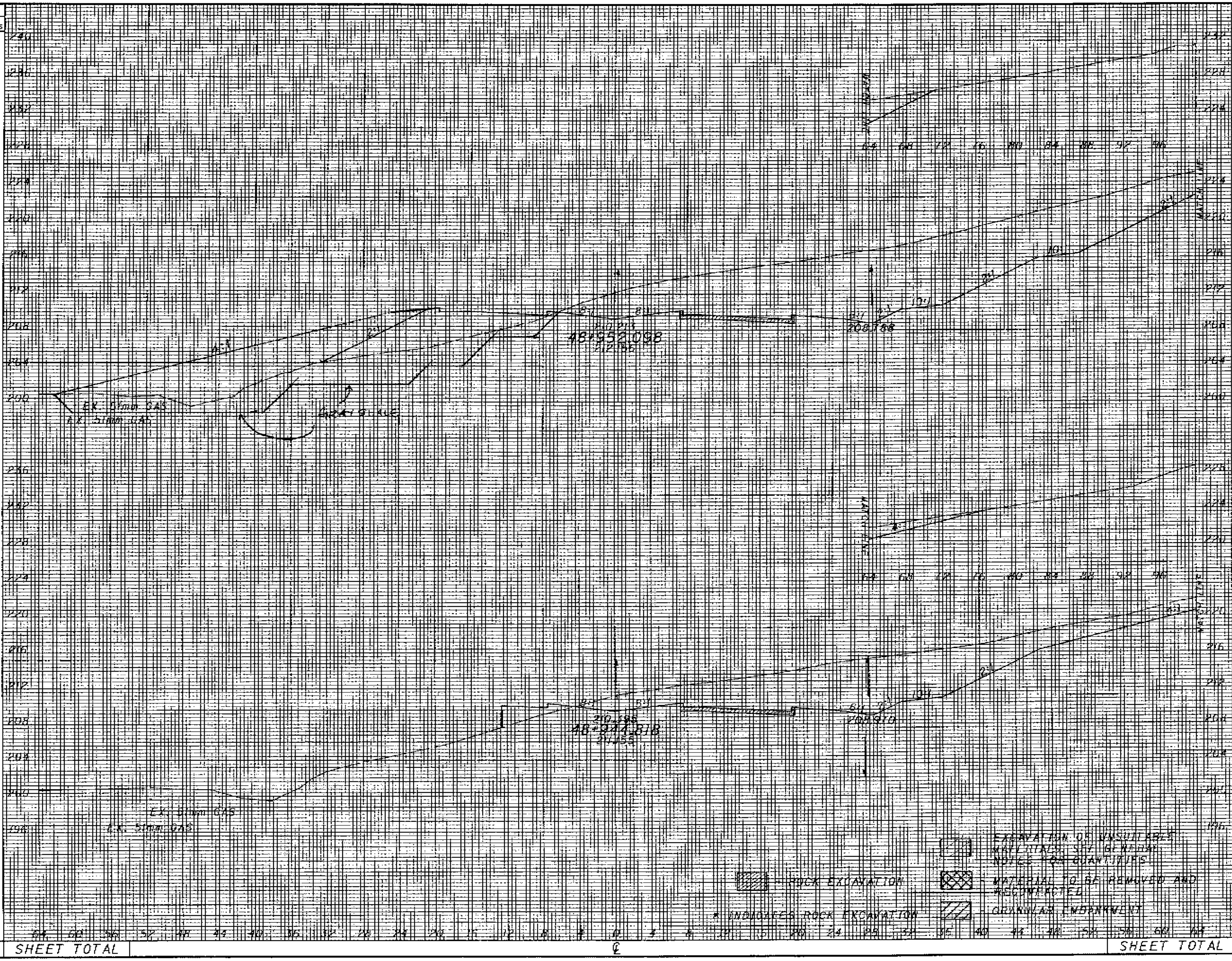
CROSS SECTIONS - US 33
STA. 48+960.000

ATH-33-40.981

437/949

CROSS SECTIONS - US 33
STA. 48+944.818 TO STA. 48+952.098

ATH-33-40.981



SEEDING END WIDTH	SEEDING SQ. METERS	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		370 *6	55		
85				2154 *43	236
	582				
		222 *6	9		
75				1445 *33	43
	523				
		ROCK TOTAL		*76	
160	1105	SHEET TOTAL		3599	279

02/07/2001 05:25:37 PM

- original design

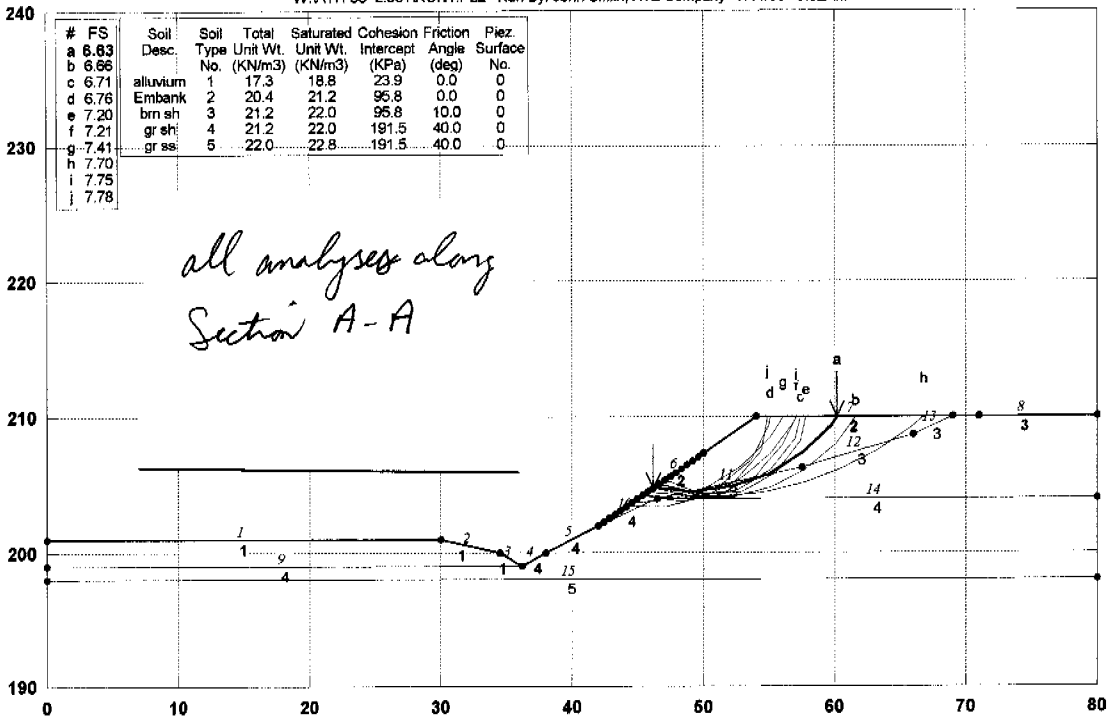
MEG-33-0581 circle, short term

W:\ATH-33~2.981\RUN1.PL2 Run By: John Smith, XYZ Company 7/11/03 9:52AM

#	FS
a	6.63
b	6.66
c	6.71
d	6.76
e	7.20
f	7.21
g	7.41
h	7.70
i	7.75
j	7.78

Soil Desc.	Soil Type No.	Total Unit Wt. (KN/m3)	Saturated Unit Wt. (KN/m3)	Cohesion Intercept (KPa)	Friction Angle (deg)	Piez. Surface No.
alluvium	1	17.3	18.8	23.9	0.0	0
Embank	2	20.4	21.2	95.8	0.0	0
brn sh	3	21.2	22.0	95.8	10.0	0
gr sh	4	21.2	22.0	191.5	40.0	0
gr ss	5	22.0	22.8	191.5	40.0	0

all analyses along Section A-A



PCSTABL5M/si FSmin=6.63

Safety Factors Are Calculated By The Modified Bishop Method

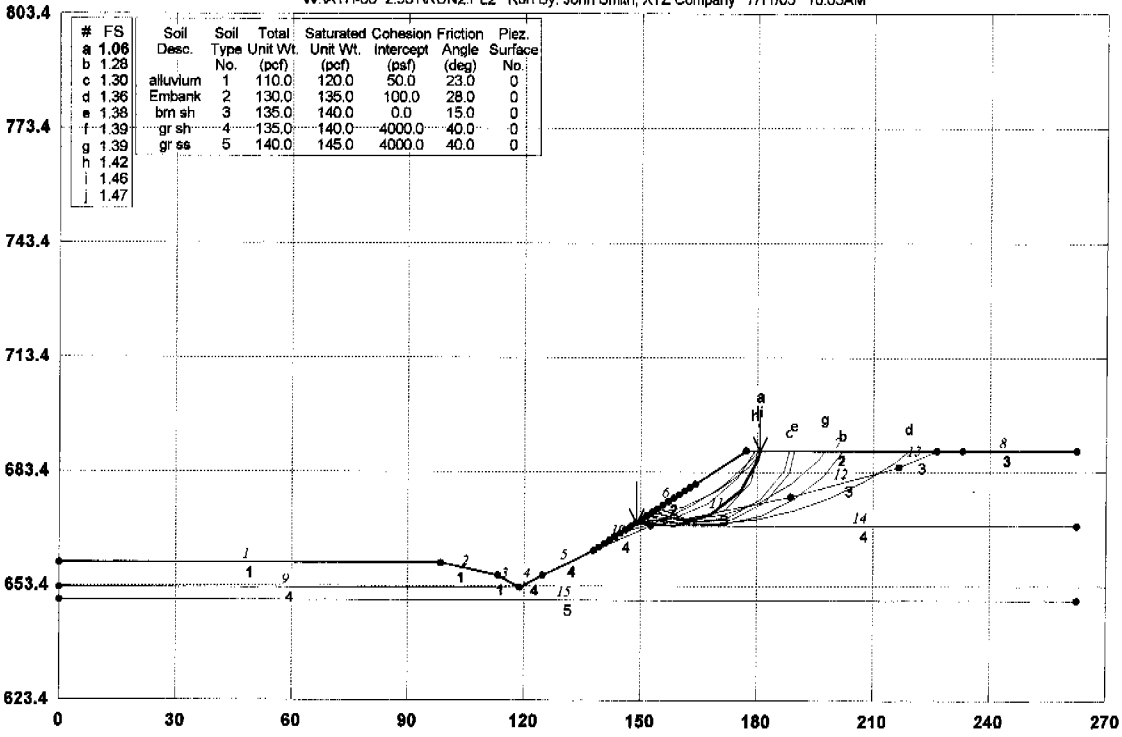
original design

MEG-33-0581 circle, long term

W:\ATH-33~2.981\RUN2.PL2 Run By: John Smith, XYZ Company 7/11/03 10:05AM

#	FS
a	1.06
b	1.28
c	1.30
d	1.36
e	1.38
f	1.39
g	1.39
h	1.42
i	1.46
j	1.47

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
alluvium	1	110.0	120.0	50.0	23.0	0
Embank	2	130.0	135.0	100.0	28.0	0
bm sh	3	135.0	140.0	0.0	15.0	0
gr sh	4	135.0	140.0	4000.0	40.0	0
gr ss	5	140.0	145.0	4000.0	40.0	0



PCSTABL5M/si FSmin=1.06

Safety Factors Are Calculated By The Modified Bishop Method

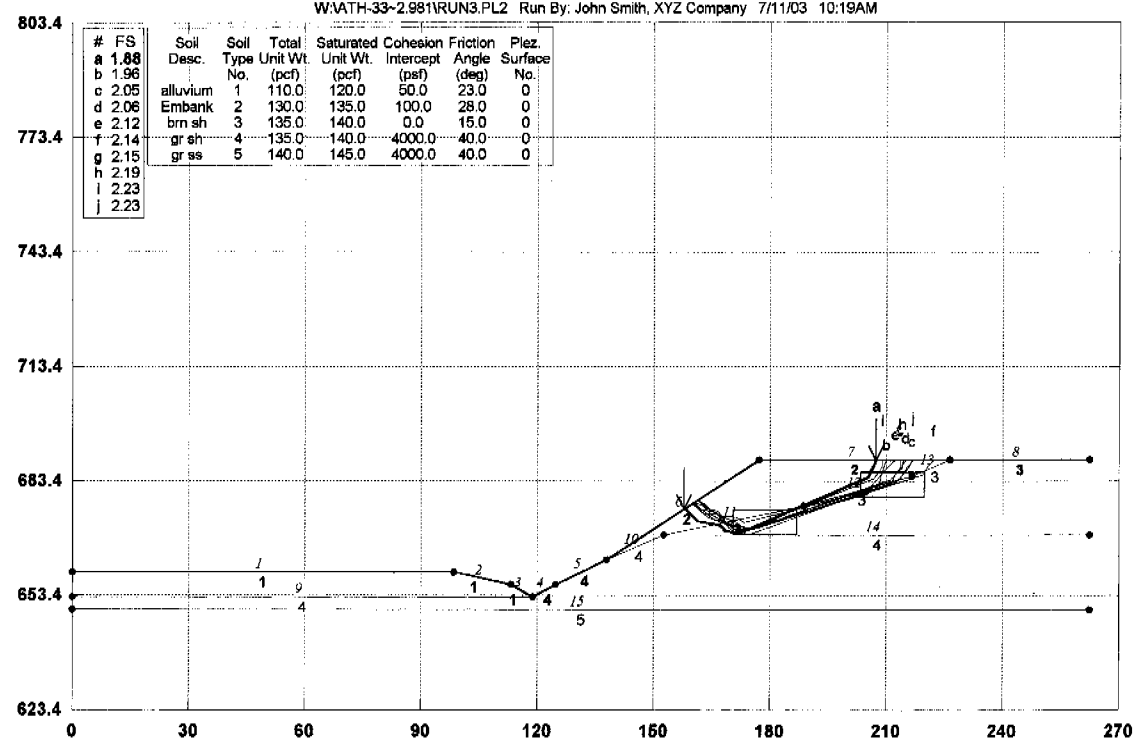
original design

MEG-33-0581 block, long term

W:\ATH-33~2.981\RUN3.PL2 Run By: John Smith, XYZ Company 7/11/03 10:19AM

#	FS
a	1.88
b	1.96
c	2.05
d	2.06
e	2.12
f	2.14
g	2.15
h	2.19
i	2.23
j	2.23

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Plez. Surface No.
alluvium	1	110.0	120.0	50.0	23.0	0
Embank	2	130.0	135.0	100.0	28.0	0
brn sh	3	135.0	140.0	0.0	15.0	0
gr sh	4	135.0	140.0	4000.0	40.0	0
gr ss	5	140.0	145.0	4000.0	40.0	0



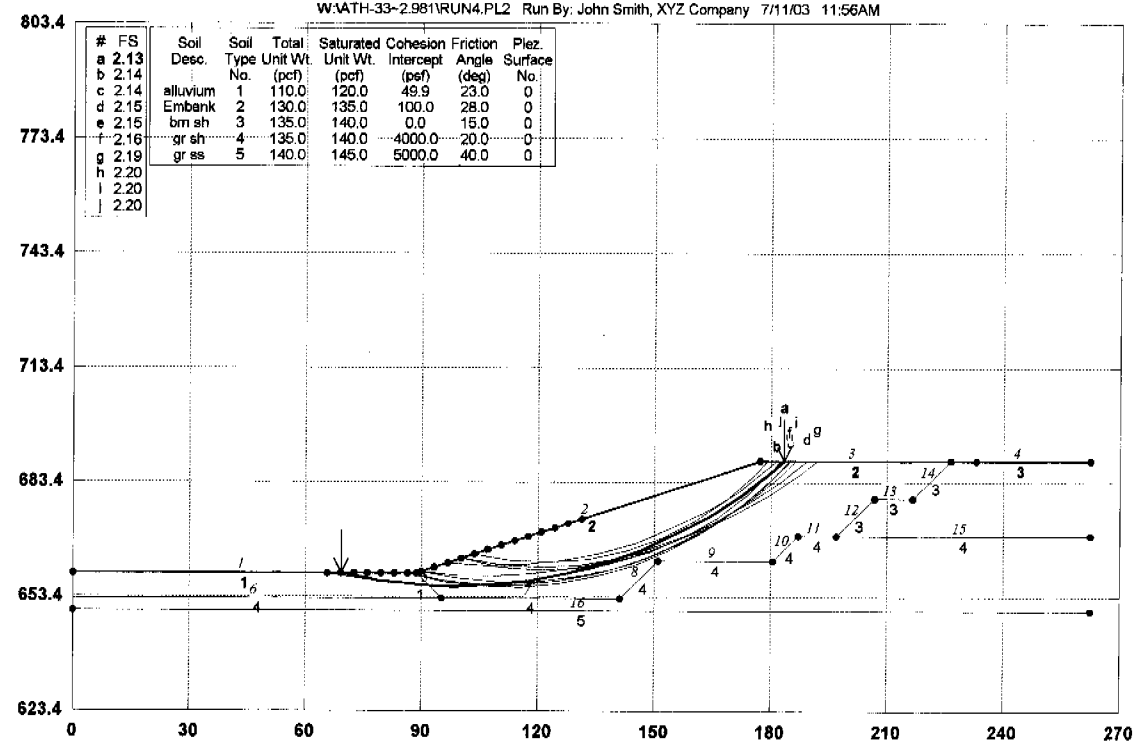
PCSTABL5M/si FSmin=1.88

Safety Factors Are Calculated By The Modified Janbu Method

Fix

MEG-33-0581 circle, long term with dig out 3:1

W:\ATH-33~2.981\RUN4.PL2 Run By: John Smith, XYZ Company 7/11/03 11:56AM



#	FS
a	2.13
b	2.14
c	2.14
d	2.15
e	2.15
f	2.16
g	2.19
h	2.20
i	2.20
j	2.20

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
alluvium	1	110.0	120.0	49.9	23.0	0
Embank	2	130.0	135.0	100.0	28.0	0
bm sh	3	135.0	140.0	0.0	15.0	0
gr sh	4	135.0	140.0	4000.0	20.0	0
gr ss	5	140.0	145.0	5000.0	40.0	0

PCSTABL5M/si FSmin=2.13

Safety Factors Are Calculated By The Modified Bishop Method

SIED

FIELD DATA - SOIL LOG

Project Code: 1 2 7 8 | Project Identification: MEG. 33 - 5.810 (Co., Rt., Br.No./Seq.No.)

Station | Offset | SEE DRAWING | Order Code 01

Location No. B2 | Over: SLIDE

Pier-Abut. |

Started: 6-24-03 | Equipment: B53

Completed: 6-24-03 | Water Level: [redacted]

Depth Feet	Samples	Elevation	Description
0			EXCAVATED GROUND
	(4)		BRN. CLAY W/STN. FRAGS 2.5'-4.0 (1.2) B 5-4-4 R 18"
5			BRN. SHALEY CLAY
	(5)		5.0-6.5 B 18-18-17 R 18"
	(6)		BRN. SHALEY CLAY 7.5'-10.0 (2.74) B 8-11-23 R 18"
10			BRN SHALEY CLAY
	(7)		10.0-11.5 B 20-19-24 R 18"
	(8)		BRN CLAY SHALE 12.5'-12.8 (3.9) B 50 R 3"
15			BRN. SHALEY CLAY
	(9)		15.0-16.5 B 22-31-48 R 18"
	(10)		GREY SHALEY CLAY 17.5'-18.5' (5.64) B 28-50 R 12"
20			GREY SHALEY CLAY
	(11)		20.0-21.0 (6.4) B 39-62 R 12"
			TUBE WET AT 22.0
			GREY SHALEY CLAY
25	(12)		25.0-26.0 B 40-63 R 12"

Form TE-6 DOT-Revised 1/92

7.92

25		
30	(13)	WEAK GREY SHALE 30.0-30.5' (9.3) B 78 R 6"
		PUT CORE BARREL IN AT 30.5'
35		GREY CLAY SHALE 30.5-35.0 CORED REC. 4.5' (10.67)
40		GREY CLAY SHALE TO GREY SNDY SHALE 35.0-40.0 CORED REC. 5.0
45		E.O.B. 40.0 (12.2m)
50		
55		
60		

Remarks: DRILLER CARE-1

Party: SABO, PROCTOR

Chief of Party: McLEISH

FIELD DATA - SOIL LOG

Project Code: 1 3 7 8

Project Identification: MEG. 33 - 5.810

Co., Rt., Br.No./Sec.No.

Station: [illegible] + [illegible] Offset: . 6 M L + SEE DRAWING

Order Code: 0 1

Location No. B1 Over: SLIDE

Pier-Abut.

Started: 6-23-03 Equipment: B53

Completed: 6-23-03 Water Level: [illegible] BY MACH

ELEV .01

Depth Feet	Samples	Elevation	Description
0			0.5' TOPSOIL
			BRN. SNDY CLAY
	1		2.5-4.0 BD-3-3 R 12"
			MORE WET AT 4.0
5			BRN. SHALEY CLAY
	2		5.0-6.5 B14-7-19 R 16"
			GREY SHALEY CLAY
	3		7.5-8.0 B50 R 6"
10			AUGERED TO 10.0 TOP OF
			SANDSTONE 9.0
			PUT CORE BARREL IN AT 10.0
15			GOOD GREY SANDSTONE
			10.0-15.0 CORED REC 5.0
20			GOOD GREY SANDSTONE
			15.0-20.0 CORED REC 4.7
			E.O.B. 20.0
25			

Depth Feet	Samples	Elevation	Description
25			
30			
35			
40			
45			
50			
55			
60			

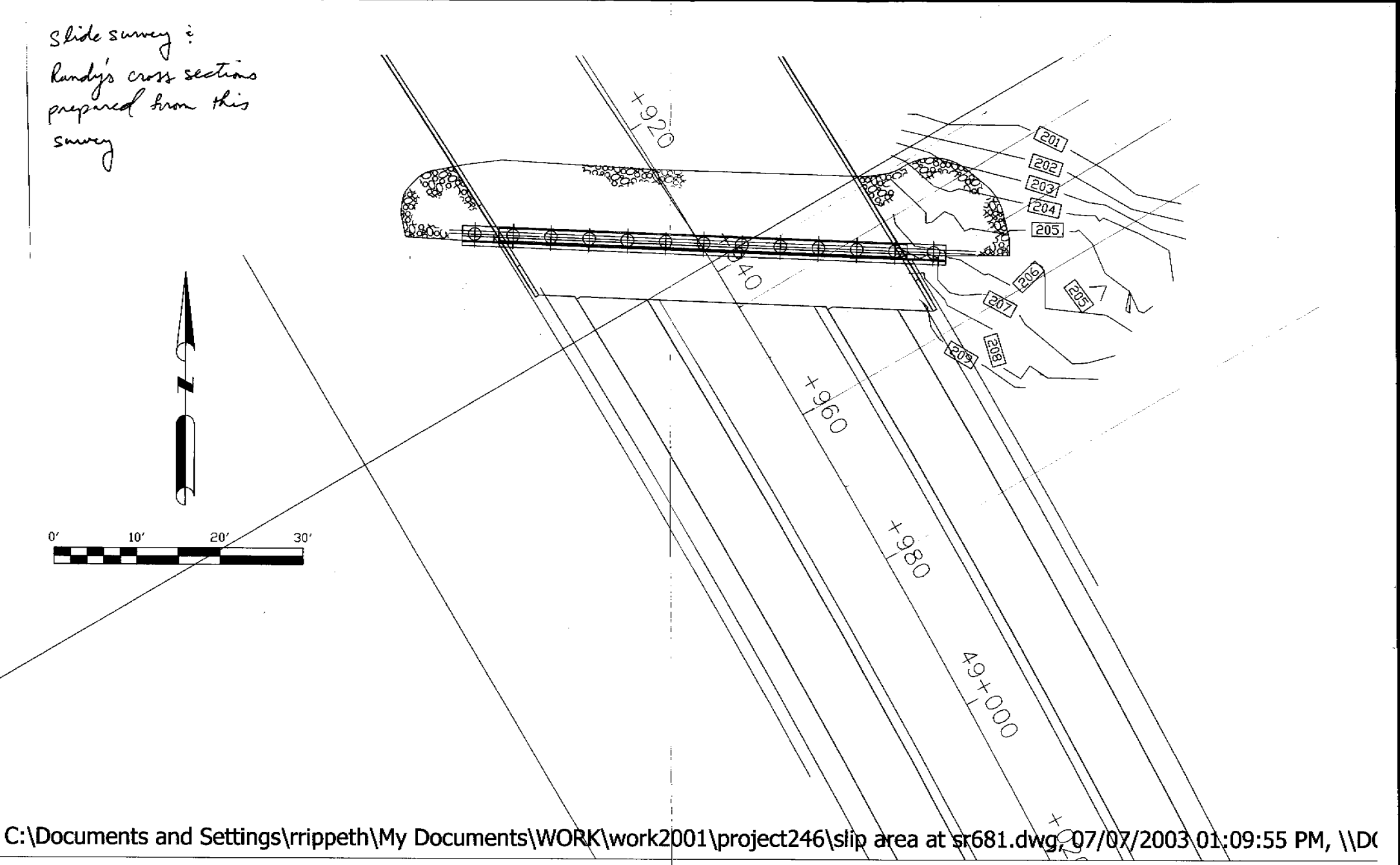
Remarks: DRILLER SABO

Party: CAREY, PROCTOR

Chief of Party: McLEISH

Form TE-6
DOT-Revised 1/92

Slide survey :
Randy's cross sections prepared from this survey



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site visit on
6/5/03

RESEARCH & DEVELOPMENT

Bridge C End of
project (ATH-73-40.981)

ODOT 246-01

Cross section ~~448~~ 436
48+940 (new abut)

- work w/ 48+952 cross-section
- mud flow-type failure

Office of Research and Development • Ohio Department of Transportation
1980 West Broad Street • Columbus, OH 43223
614-644-8135 (phone) • 614-995-7047 (fax)
research@dot.state.oh.us • http://www.dot.state.oh.us/divplan/research

KOKER DRILLING COMPANY

DRILLED SHAFT REPORT

SHAFT NO.: 29

DATE PREPARED : 4/20/2002

Job Name:: O. D. O. T. 246-01 **Job Number::** F-6413-02

General Contractor: Smith & Johnson **Architect:**

Rig Number: 12 **EWO #:** 0

DATES	START	FINISH
EXCAVATION:	4/16/2002	4/16/2002
CONCRETING	4/16/2002	4/16/2002

WEATHER	APPROX. TEMP. 65
DESCRIPTION : Sunny	

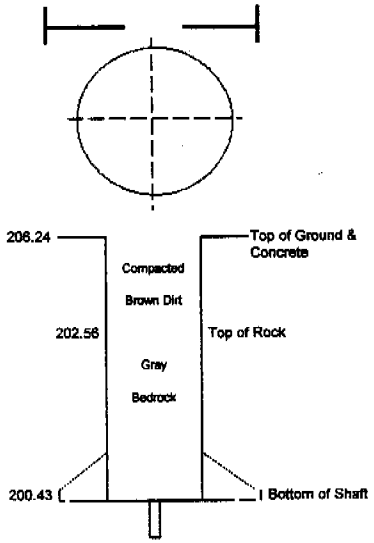
SHAFT NO.: 29	PLAN	AS BUILT
Diameter Top of Shaft	60	60
Diameter Bottom of Shaft	60	60
Diameter of Bell	N/A	N/A
Elevation Top of Ground	206.24	206.24
Elevation Top of Concrete	206.24	206.24
Elevation Top of Rock	203.26	202.56
Elevation Bottom of Shaft	201.16	200.43
Cubic Yards of Concrete	11.3	11.5

CASEING USED N/A" ID X N/A ' N/A "
N/A" ID X N/A ' N/A"

TEST PROBE N/A" Ø X N/A"

Obstruction Removal : N/A
Time : N/A
Equip. Used N/A
Excess Concrete : N/A
Description : N/A
N/A
N/A
N/A

SKETCH **NOT TO SCALE**



SKETCH NOTES :

REMARKS : Drilled shaft, set full lenth cage after iron workers cut, poured concrete to grade.

APPROVED BY : Russell Lee, Smith & Johnson

PREPARED BY : Leonard N. Cluley Sr., KOKER DRILLING COMPANY

KOKER DRILLING COMPANY P.O. Box 250 11444 N. Dixie Drive Vandalia, OH 45377 Dayton (937) 667-1425 Fax (937) 667-0578

D19 C-351

INSPECTION RECORD FOR DRILLED SHAFTS

Project No.: 01-246 | Bridge No.: May-33-05810 | Structure File No.: 5300584

Drilling Contractor: Keker Drilling Co | Project Engineer: Pete Stanfield / John Hook

Type & Model of Drilling Machinery: Watson 2500 | Type of Bedrock: Med Hard Gray Slate

Max. Contiguous Torque ~~[N-m]~~ (Ft-Lb): 81,000 Ft lbs | Cost above the Bedrock [$/LM] (~~$/LF~~): #271.00

CROWD (Max. Cont. Downward Force) ~~[N]~~ (Lbs): 38,000 lbs | Cost in the Bedrock [$/LM] (~~$/LF~~): #1,470.00

Cost of Concrete Pumping [$/LM] ($/LF): —

DRILLED SHAFT NUMBER Forward Abutment			UNITS	#31	#30	#29		
Date & Time of Drilling	Started	Date	—	4/16/02	→	→		
		Time	(Hr.)	7:00	7:50	8:45		
	Finished	Date	—	4/16/02	→	→		
		Time	(Hr.)	7:45	8:40	9:30		
Approximate Elevation of Top of Overburden			[m] (Ft)	206.24	→	→		
Length of Drilled Shafts above the Bedrock Socket	Elev. top of Conc. ~~Theoretical~~		[mm] (Ft)	206.24	→	→		
	Through Overburden		[mm] (Ft)	2.74	3.53	3.68		
	Pay Length		[mm] (Ft)	2.74	3.53	3.68	(9.95)	Ref# 274
Obstructions Encountered	Number		—	—	—	—		
	Size		[mm] (in)	—	—	—		
	Time of Removal		(Hr.)	—	—	—		
Length of Drilled Shafts in the Bedrock Socket	Elev. Top of Socket		[m] (Ft)	203.50	202.71	202.56		
	Elev. Bottom of Socket		[m] (Ft)	201.37	200.58	200.43		
	Length of Socket		(mm) (Ft)	2.13	2.13	2.13	(6.39)	Ref# 275
Steel Casing	Casing Thickness		[mm] (in)	—	—	—		
	Casing Left in Place		[mm] (Ft)	—	—	—		
Reinforcing Steel	Vertical	Bar Size Number	—	36mm	→	→		
		No. of Bars	—	20	→	→		
	Spiral	Bar Size Number	—	13mm	→	→		
		Pitch	(mm) (in)	115mm	→	→		
Concrete	Slump		[mm] ~~(in)~~	140	→	→		
	Cylinder Strength f'c		[MPa](psi)	34.3/32.8	→	→		
	Air Temperature		[C] ~~(F)~~	30° C.	→	→		
	Time to Place Conc.		(Hr.)	OK	→	→		
	Quantity		[CM] (CY)	58.106	→	→	(ALSO INCLUDES 20, 21, 22)	
Tolerances	Deviations from Plumb	N-S	[mm] (in)	OK	→	→		
		E-W	[mm] (in)	OK	→	→		
	Deviations of Column Top Center from Plan Loc. Horizontal		~~[mm]~~ (in)	2"	1½"	¼"	Along	Abutment
				1½"	2½"	1"	Across	Abutment
[redacted] Shaft Diameter (Bedrock / [redacted]m)			[mm] ~~(in)~~	1525	→	→		
Constructed Diameter ([redacted] / Overburden)			[mm] ~~(in)~~	1525	→	→		

PROJECT ENGINEER'S COMMENTS: On BACK, please comment on location and extent of cavities, procedures for controlling water, unexpected subsurface conditions and suggestions on improving the plans.

Lo - 55°
Hi - 88°
Sunny & clear

State of Ohio
Department of Transportation
INSPECTOR'S DAILY REPORT Tues

246 Co./Rt./Sec. AK-33-40.981 Diary Date 4/16/02 I.D.R. # _____

Check if additional Sheet Required. Page ___ of ___

CONTRACTOR'S HOURS WORKED AND NUMBER OF EMPLOYEES

Contractor	Supt./Foreman	Hours			Number of Employees			
		From	To	Total	Super.	Skilled	Labor	Other
Koken Drilling	Len Cluley	7:00	6:30	11	1	2		

Description of Work: Drilled shafts and poured concrete to elevations and alignment provided by S&J Co.

Contractor	Supt./Foreman	Hours			Number of Employees			
		From	To	Total	Super.	Skilled	Labor	Other
S&J	Russell Lee	7:00	6:30	11	2	1	1	

Description of Work: Layout placement of drilled shafts and directed Iron workers on building and cutting cages to required Lengths. Rod shoulders assisted Rod in AM hours in preparation for Pier #2.

Contractor	Supt./Foreman	Hours			Number of Employees			
		From	To	Total	Super.	Skilled	Labor	Other

Description of Work: _____

CONTRACTOR'S EQUIPMENT

Contractor	Equipment Nbr.	Equipment Type	Idel (Yes/No)
Koken Drilling Co		Watson Rotary Drilling	
	266	Foreman Pickup Truck	
		Utility Truck	
S&J		Foreman Pickup Truck	

EMPLOYEE DATA

Employee	Nbr. Hours Worked	Work Code	License Number
John Hook	12	51-91	10T2

*OT Explanation: _____

DOT-1633

PAY ITEMS

Ref. Nbr.	EW Nbr.	Part. Code	Description of Work	Location	Quantity Lump Sum All
274		03	Drilled Shafts 1525mm Above Bedrock	℄ Sta 48+935.521	19.98 m
275		03	" " 1525" Into Bedrock	"	6.39 m
273		03	" " 1370" " "	℄ Sta 48+904.073	4.8 m

GENERAL REMARKS

Drilled And poured Concrete on Shafts #29 to #31 Along Forward Abutment. (This completed the forward Abutment shafts) 76 yds of CLASS "S" Concrete was received from Smith Concrete - Athens, Ohio. The first truck load was tested And cylinders 3 & 3A were made. Drilled shafts #20 to 22, Along PIER #2 were Also drilled and poured. Bedrock was discovered AT A higher elevation than shown on plans. (Core holes were taken at each Abutment only) Cages were cut to required length by iron workers.

* Drilled shaft Form C-351 has more information.

SPECIAL NOTES

Shaft #20 - The concrete elev. - 200.64 was poured today. The remaining Approx 3' of height on 1525mm shaft will be poured Later.

P.E./P.S. Initials

John Hook
Inspector's Signature

Chris Merklin
06/20/03 07:33 AM

To: William Stanforth/Construction/D10/ODOT@ODOT, Charles Mansfield/Construction/D10/ODOT@ODOT
cc: Hank Hager/Geotech/CEN/ODOT@ODOT, Jamie Hendershot/Construction/D10/ODOT@ODOT, Randy Morris/Construction/CEN/ODOT@ODOT
Subject: MEG-33-5.810 slide

CORRECTION: Please stake a boring at 48+960, 15 meters left, rather than 950, as stated below.

Christopher Merklin, P.E.
ODOT - Office of Geotechnical Engineering
1600 West Broad Street
Columbus, Ohio 43223
ph: 614-275-1361 fax: 614-275-1354
email: chris.merklin@dot.state.oh.us

Pete/Charlie:

Do you have any electronic pictures of the slide at 48+940? If so, please send them.

Can you please survey the existing ground and create a topographic plan view? Also, I will need cross-sections at 48+952.098, 48+960, 48+970 (all showing existing groundline).

We would like to drill two borings at this site. Since you seem to be in more of a hurry here than the other slide (at 36+570), we will drill this one starting Monday. Please stake borings at stations 48+950, 50 meters left and 15 meters left. The boring at 50 meters left is an ideal location. According to the plans, the boring falls between the stream and a gas line, about 5 meters from both. If this location doesn't work, my second choice is at 48+935, 60 meters left, on the other side of the gas lines (there appears to be 4 gas lines in this area!).

Please provide the drillers with the necessary access to these boring locations, including dozer access. Also, please provide the drillers with the station, offset, and elevation of the boring locations before they leave the site.

If you have any questions, please call.

Christopher Merklin, P.E.
ODOT - Office of Geotechnical Engineering
1600 West Broad Street
Columbus, Ohio 43223
ph: 614-275-1361 fax: 614-275-1354
email: chris.merklin@dot.state.oh.us

inter-office communication

to: Saleh Edldabaja date: 8/26/03

from: Mark Stouffer, P.E., Operations

subject: Report of Landslide Investigation - MEG-33-5.810

Transmitted herewith are the results of the drilling, sampling and testing phases of the landslide investigation made for the subject project.

The enclosed design file consists of two logs of borings which are to be attached to the plans.

If there are any questions, please call Mark Stouffer at 275-1307.

If any design assistance is needed, please call Chris Merklin at 275-1361.

Jack

cc: C. Merklin
R. Morris

State of Ohio
Department of Transportation
Office of Geotechnical Engineering

METRIC PROJECT

LOG OF BORING

Date Started 6/23/03 Sampler: Type 34.93 mm Dia. _____ Water Elev. 199.98m Project Identification: MEIGS
Date completed 6/23/03 Approx. MEG-33-5.81O (3.6mi.)
Boring No. B-1 Station & Offset 100+000, 42.1m LT. OF BL Surface Elev. 201.20 m LANDSLIDE INVESTIGATION

Elev.	Depth	Std. Pen./ RQD	Rec. m	Loss m	Description	Sample No.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
201.20	0														
201.05		AUGERED			0.15m TOPSOIL										VISUAL
200.44	1.0	2/3/3			BROWN SANDY SILT (REC. 0.30m)	1	0	20	50	17	13	NP	NP	19	A-3a
199.68					TOP OF ROCK										
	2.0	14/7/19			BROWN SILTY CLAY (REC. 0.39m)	2	0	9	7	26	58	35	15	12	A-6a
198.91		50(0.15)			GRAY BROKEN AND JOINTED CLAY-SHALE (REC. 0.15m)	3	-	-	-	-	-	-	-	-	VISUAL
198.46	3.0	AUGERED			SANDSTONE (DRILLER'S DESCRIPTION)	-	-	-	-	-	-	-	-	-	VISUAL
198.16															
	4.0		1.52	0.00	SANDSTONE, GRAY, LIGHT GRAY AT THE BOTTOM, SLIGHTLY MICACEOUS, FIRM, FINE-GRAINED, THIN TO MEDIUM-BEDDED, JOINTED IN THE UPPER PORTION, WITH SCATTERED THICK BROKEN AND JOINTED SEAMS BELOW; INTERBEDDED WITH A THICK GRAY HIGHLY WEATHERED SHALE SEAM IN THE LOWER PORTION. CORE LOSS 3 % R.Q.D. IS 37										
	5.0	37	1.43	0.09											
195.10	6.0				BOTTOM OF BORING										

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95