



7988 Centerpoint Drive, Suite 100
 Indianapolis, IN 46256
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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-1
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1571032
 PROJECT LOCATION North of Brazil, Indiana Easting 2945928
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/13/13 Hammer Wt. 140 lbs.
 Date Completed 9/13/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector J. Noel Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 701.275										
Asphalt	700.8	0.5		1	SS				8-4-6	
SILTY CLAY LOAM, brown and gray mottled, plastic, non-sticky, non-effervescent			5	2	SS				4-3-4	
				3	SS				4-5-8	
			10	4	SS				4-5-8	
	688.3	13.0		5	SS				3-2-2	Moist from 11-12.5 ft
LOAM, brown (7.5YR 5/4, broken, dry), non-plastic, non-sticky, effervescent, (till fabric) with rocks and pebbles	685.8	15.5	15	6	SS				18-21-21	
SANDSTONE, gray, weathered, fine to very fine sand with mica flakes	682.8	18.5		7	SS				39-50/0.3'	
SANDSTONE, gray, fine to very fine grained, with interbedded shale seams			20	RC-1	RC					RQD=0%, RC-1 from 18.6 ft to 20.0 ft
				RC-2	RC					RQD=26%, RC-2 from 20.0 ft to 25.0 ft
			25	RC-3	RC					RQD=30%, RC-3 from 25.0 ft to 30.0 ft
			30	RC-4	RC					RQD=34%, RC-4 from 30.0 ft to 35.0 ft
COAL	668.8	32.5								
UNDERCLAY, gray	666.1	35.2	35	RC-5	RC					RQD=96%, RC-5 from 35.0 ft to 40.0 ft

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After _____ hours _____ ft.
 ▣ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-1
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1571032
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945928
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started **9/13/13** Hammer Wt. **140** lbs.
 Date Completed **9/13/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **J. Noel** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
UNDERCLAY, gray SHALE, black, with thin sand interbeds	660.8	40.5	40	RC-6	RC					RQD=66%, RC-6 from 40.0 ft to 45.0 ft
			45	RC-7	RC					RQD=100%, RC-7 from 45.0 ft to 50.0 ft
			50	RC-8	RC					RQD=82%, RC-8 from 50.0 ft to 55.0 ft
SANDSTONE, gray, with interbedded shale	647.3	54.0	55	RC-9	RC					RQD=22%, RC-9 from 55.0 ft to 60.0 ft
COAL	643.9	57.4								
SHALE, black	641.3	60.0	60	RC-10	RC					RQD=54%, RC-10 from 60.0 ft to 65.0 ft
SHALE, black, clayey	640.9	60.4								
SHALE, black	640.5	60.8								
SHALE, black	639.5	61.8								
SHALE, black	639.2	62.1								
SANDSTONE, gray and white, fine to medium grained	636.3	65.0	65							
UNDERCLAY, light gray										
Bottom of Test Boring at 65.0 ft										Grouted hole at completion. Capped with bentonite chips and plugged with concrete.

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ▽ At Completion _____ ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-2
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1571395
 PROJECT LOCATION North of Brazil, Indiana Easting 2945943
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/16/13 Hammer Wt. 140 lbs.
 Date Completed 9/16/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 695.046										
SILTY CLAY, dark brown, with sand	691.0	4.0								
SILTY CLAY, brown, moist, with trace sand			5							
			10							
SHALE, gray, weathered	680.5	14.5	15							
	676.5	18.5	20	RC-1	RC					RQD=52%, RC-1 from 19.6 ft to 24.6 ft
Interbedded SHALE and SANDSTONE, gray, slightly weathered, moderately hard, broken			25	RC-2	RC					RQD=10%, RC-2 from 24.6 ft to 29.6 ft Lost water at 26.1 ft
VOID - Open	668.9	26.1								
MINE COLLAPSE - clay, sandy clay, interbedded shale and sandstone fragments	667.4	27.6	30	RC-3	RC					RQD=0%, RC-3 from 29.6 ft to 34.6 ft
	660.8	34.2	35	RC-4	RC					RQD=72%, RC-4 from 34.6 ft to 39.6 ft
UNDERCLAY, light gray	658.0	37.0								
SHALEY SANDSTONE, light gray, unweathered, moderately hard, fissile	655.8	39.2								

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools 33.7 ft.
- ∇ At Completion _____ ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	<u>IDNR - Site 2226</u>	BORING #	<u>BH6-2</u>
PROJECT NAME	<u>Target Grouting Areas - Site 2226</u>	Northing	<u>1571395</u>
PROJECT LOCATION	<u>North of Brazil, Indiana</u>	Easting	<u>2945943</u>
		JOB #	<u>86.05957.0016</u>

DRILLING and SAMPLING INFORMATION

Date Started	<u>9/16/13</u>	Hammer Wt.	<u>140</u> lbs.
Date Completed	<u>9/16/13</u>	Hammer Drop	<u>30</u> in.
Drill Foreman	<u>W. Bates</u>	Spoon Sampler OD	<u>2.0</u> in.
Inspector	<u>S. Bruder</u>	Rock Core Dia.	<u>2.0</u> in.
Boring Method	<u>HSA</u>	Shelby Tube OD	<u>--</u> in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALE, dark gray, unweathered, soft, fissile, few sandstone laminations			45	RC-5	RC					RQD=38%, RC-5 from 39.6 ft to 44.6 ft
										After Run #5, water level 33.7 in drill rods
			49.7	RC-6	RC					RQD=46%, RC-6 from 44.6 ft to 49.6 ft
MINE COLLAPSE - VOIDS, small open and filled, fragments of sandy shale and sandstone	645.3	49.7	50	RC-7	RC					RQD=6%, RC-7 from 49.6 ft to 54.6 ft Lost water at 49.7 ft
			55	RC-8	RC					RQD=0%, RC-8 from 54.6 ft to 59.6 ft
	635.2	59.8	60	RC-9	RC					RQD=14%, RC-9 from 59.6 ft to 64.6 ft
SHALE, dark gray, unweathered, soft										
Bottom of Test Boring at 64.6 ft	630.4	64.6								Install 2 in. PVC with 10 ft screen to 63.7 ft. Bentonite chips 1.0 to 19.6 ft.

Sample Type SS - Driven Split Spoon ST - Pressed Shelby Tube CA - Continuous Flight Auger RC - Rock Core CU - Cuttings CT - Continuous Tube	Depth to Groundwater ● Noted on Drilling Tools <u>33.7</u> ft. ∇ At Completion _____ ft. ▼ After _____ hours _____ ft. ☒ Cave Depth _____ ft.	Boring Method HSA - Hollow Stem Augers CFA - Continuous Flight Augers DC - Driving Casing MD - Mud Drilling HA - Hand Auger
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TEST BORING LOG

CLIENT <u> IDNR - Site 2226 </u>	BORING # <u> BH6-3 </u>
PROJECT NAME <u> Target Grouting Areas - Site 2226 </u>	Northing <u> 1571795 </u>
PROJECT LOCATION <u> North of Brazil, Indiana </u>	Easting <u> 2945942 </u>
	JOB # <u> 86.05957.0016 </u>

DRILLING and SAMPLING INFORMATION

Date Started <u> 9/12/13 </u>	Hammer Wt. <u> 140 </u> lbs.
Date Completed <u> 9/12/13 </u>	Hammer Drop <u> 30 </u> in.
Drill Foreman <u> W. Bates </u>	Spoon Sampler OD <u> 2.0 </u> in.
Inspector <u> S. Bruder </u>	Rock Core Dia. <u> 2.0 </u> in.
Boring Method <u> HSA </u>	Shelby Tube OD <u> -- </u> in.

TEST DATA

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SHALE, dark gray, unweathered, soft, some sandstone laminations			45	RC-6	RC				RQD=36%, RC-6 from 40.0 ft to 45.0 ft
			45	RC-7	RC				RQD=78%, RC-7 from 45.0 ft to 50.0 ft
SANDSTONE, light gray, unweathered, moderately hard, (rooted sandstone)	640.9	49.5	50	RC-8	RC		▽		RQD=80%, RC-8 from 50.0 ft to 55.0 ft
SANDY SHALE, dark gray, unweathered, soft	638.2	52.2							
VOID - Filled	635.9	54.5	55	RC-9	RC				Lost water at 54.5 ft RQD=0%, RC-9 from 55.0 ft to 60.0 ft
			60	RC-10	RC				RQD=54%, RC-10 from 60.0 ft to 65.0 ft
COAL, black	629.2	61.2							
UNDERCLAY, light gray, soft	628.7	61.7							
SHALE, dark gray, unweathered, soft	626.6	63.8							
	625.4	65.0	65						Insert plugged shale trap to top of rock, chips to 15.0 ft, grout to 2.0 ft, chips to 1.0 ft, then concrete
Bottom of Test Boring at 65.0 ft									

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ▽ At Completion 51.4 ft.
- ▽ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-4
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1572169
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945947
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started	9/12/13	Hammer Wt.	140 lbs.
Date Completed	9/12/13	Hammer Drop	30 in.
Drill Foreman	W. Bates	Spoon Sampler OD	2.0 in.
Inspector	S. Bruder	Rock Core Dia.	2.0 in.
Boring Method	HSA	Shelby Tube OD	-- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 687.013									
SILTY CLAY with trace sand and rock fragments			5						
			10						
			15						
CLAYEY SILT with sand and gravel, brown, slightly moist	671.0	16.0							
	667.4	19.6		RC-1	RC				RQD=0%, RC-1 from 18.8 ft to 19.6 ft
SANDSTONE, brown and gray, slightly weathered, moderately hard	666.9	20.1		RC-2	RC				RQD=58%, RC-2 from 19.6 ft to 24.6 ft
SHALE, dark gray, unweathered, moderately hard, thinly laminated and bedded with sandstone (very fine grained)	663.5	23.5							
Interbedded SHALE and SANDSTONE			25	RC-3	RC				RQD=70%, RC-3 from 24.6 ft to 29.6 ft
	655.9	31.1		RC-4	RC				RQD=23%, RC-4 from 29.6 ft to 39.6 ft
VOID - Open							▽		Lost water at 31.1 ft
	651.7	35.3							
VOID - Filled	650.9	36.1							
UNDERCLAY, light gray and light beige, soft									
	647.7	39.3							

Sample Type	Depth to Groundwater	Boring Method
SS - Driven Split Spoon	● Noted on Drilling Tools _____ ft.	HSA - Hollow Stem Augers
ST - Pressed Shelby Tube	▽ At Completion 31.3 ft.	CFA - Continuous Flight Augers
CA - Continuous Flight Auger	▼ After _____ hours _____ ft.	DC - Driving Casing
RC - Rock Core	⊠ Cave Depth _____ ft.	MD - Mud Drilling
CU - Cuttings		HA - Hand Auger
CT - Continuous Tube		



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-4
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1572169
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945947
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started **9/12/13** Hammer Wt. **140** lbs.
 Date Completed **9/12/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
SANDSTONE, gray, unweathered, moderately hard, fine grained	647.5	39.5							
----- UNDERCLAY, light gray, soft, thin sandstone laminations	647.4	39.6							
Bottom of Test Boring at 39.6 ft									

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion **31.3** ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
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- HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-5
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1572687
 PROJECT LOCATION North of Brazil, Indiana Easting 2945940
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/11/13 Hammer Wt. 140 lbs.
 Date Completed 9/11/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 680.972									
10 in. Topsoil	680.2	0.8							
SILTY CLAY, brown, moist			5						
			10						
	666.5	14.5							
SILTY CLAY with rock fragments, brown, hard			15						
	664.1	16.9							
LOAM, yellowish brown (10YR 5/6), slightly moist, slightly plastic, non-effervescent, few limestone fragments	663.6	17.4		RC-1	RC				RQD=16%, RC-1 from 16.9 ft to 20.0 ft
	660.8	20.2							
CLAY LOAM, gray (10YR 5/1), moist, plastic, effervescent			20	RC-2	RC				RQD=0%, RC-2 from 20.0 ft to 25.0 ft
SANDY CLAY, brown and gray, moist, plastic, mixed with limestone fragments			25						
	656.0	25.0							
SHALE, dark gray, unweathered, moderately hard, with sandstone laminations	654.7	26.3		RC-3	RC				RQD=60%, RC-3 from 25.0 ft to 30.0 ft
SHALE, dark gray, unweathered, soft			30						
	651.1	29.9		RC-4	RC				RQD=72%, RC-4 from 30.0 ft to 35.0 ft
SANDSTONE, dark and light gray, unweathered, moderately hard, with shale laminations (rooted sandstone), thinly bedded with soft shale from 35 ft to 35.6 ft			35	RC-5	RC				RQD=58%, RC-5 from 35.0 ft to 40.0 ft
	642.5	38.5							
SHALE, dark gray, unweathered, moderately	641.0	40.0							

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 41.1 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-5
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1572687
 PROJECT LOCATION North of Brazil, Indiana Easting 2945940
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started 9/11/13 Hammer Wt. 140 lbs.
 Date Completed 9/11/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
hard, fissile, highly crushed/intensely disintergrated at 40 ft				RC-6	RC			▽		RQD=74%, RC-6 from 40.0 ft to 45.0 ft
Interbedded SHALE and SANDSTONE, gray and light gray, unweathered, moderately hard, fissile	636.9	44.1								
VOID: 0.4 ft	636.5	44.5	45	RC-7	RC					Lost water at 44.1 ft RQD=0%, RC-7 from 45.0 ft to 50.0 ft
MINE COLLAPSE: interbedded shale and sandstone, very soft, dark gray shale, coal, sandstone, shale										
	631.0	50.0	50							Plugged hole in top of rock, backfilled with bentonite chips
Bottom of Test Boring at 50.0 ft										

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ▽ At Completion 41.1 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
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- HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-6
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1572993
 PROJECT LOCATION North of Brazil, Indiana Easting 2945933
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/3/13 Hammer Wt. 140 lbs.
 Date Completed 9/4/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 676.814									
SANDY SILT with gravel and rock fragments, brown and gray	675.3	1.5		1	SS			8-7-14	
SANDY SHALE, brown and gray, weathered				2	SS			17-19-30	
			5						
SHALE, gray	670.3	6.5		3	SS			17-24-50/0.1'	
				4	SS			50/0.5'	Auger refusal at 9.0 ft
SHALE, dark gray, unweathered, moderately hard	667.8	9.0	10		RC				RQD=0%, RC-1 from 9.0 ft to 9.8 ft
					RC				RQD=54%, RC-2 from 9.8 ft to 14.8 ft
	663.0	13.8	15		RC				RQD=0%, RC-3 from 14.8 ft to 19.8 ft
COAL									
	656.8	20.0	20		RC				RQD=82%, RC-4 from 19.8 ft to 24.8 ft
SANDSTONE, calcareous, light gray, unweathered, moderately hard, fine grained	655.5	21.3			RC				
			25		RC				RQD=66%, RC-5 from 24.8 ft to 29.8 ft
SHALE, light gray, unweathered, soft, thinly bedded with sandy shale and sandstone (underclay)					RC				
	647.6	29.2	30		RC				RQD=78%, RC-6 from 29.8 ft to 34.8 ft
SANDSTONE, light gray, unweathered, moderately hard, moderately fractured, some clay and shale seams, fine grained, well sorted					RC				
			35		RC				RQD=82%, RC-7 from 34.8 ft to 39.8 ft

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools None ft.
- ∇ At Completion 34.0 ft.
- ▼ After hours ft.
- ⊕ Cave Depth ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	<u> IDNR - Site 2226 </u>	BORING #	<u> BH6-6 </u>
PROJECT NAME	<u> Target Grouting Areas - Site 2226 </u>	Northing	<u> 1572993 </u>
PROJECT LOCATION	<u> North of Brazil, Indiana </u>	Easting	<u> 2945933 </u>
		JOB #	<u> 86.05957.0016 </u>

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/3/13 Hammer Wt. 140 lbs.
 Date Completed 9/4/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
SANDSTONE, light gray, unweathered, moderately hard, moderately fractured, some clay and shale seams, fine grained, well sorted			45	RC-8	RC				RQD=96%, RC-8 from 39.8 ft to 44.8 ft
				RC-9	RC				RQD=86%, RC-9 from 44.8 ft to 49.8 ft
			50	RC-10	RC				RQD=70%, RC-10 from 49.8 ft to 54.8 ft
			55	RC-11	RC				RQD=76%, RC-11 from 54.8 ft to 59.8 ft
			60	RC-12	RC				RQD=98%, RC-12 from 59.8 ft to 64.8 ft
			65	RC-13	RC				RQD=68%, RC-13 from 64.8 ft to 69.8 ft
			70	RC-14	RC				RQD=66%, RC-14 from 69.8 ft to 74.8 ft
			75	RC-15	RC				RQD=50%, RC-15 from 74.8 ft to 79.8 ft

Sample Type

Depth to Groundwater

Boring Method

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

- Noted on Drilling Tools None ft.
- ∇ At Completion 34.0 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-6
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1572993
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945933
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started	9/3/13	Hammer Wt.	140 lbs.
Date Completed	9/4/13	Hammer Drop	30 in.
Drill Foreman	W. Bates	Spoon Sampler OD	2.0 in.
Inspector	S. Bruder	Rock Core Dia.	2.0 in.
Boring Method	HSA	Shelby Tube OD	-- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
SANDSTONE, light gray, unweathered, moderately hard, moderately fractured, some clay and shale seams, fine grained, well sorted			85	RC-16	RC				RQD=56%, RC-16 from 79.8 ft to 84.8 ft
				RC-17	RC				RQD=80%, RC-17 from 84.8 ft to 89.8 ft
				RC-18	RC				RQD=78%, RC-18 from 89.8 ft to 94.8 ft
				RC-19	RC				RQD=72%, RC-19 from 94.8 ft to 99.8 ft
Bottom of Test Boring at 99.8 ft	577.0	99.8						Grouted hole at completion, plugged with bentonite chips	

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools **None** ft.
- ▽ At Completion **34.0** ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-7
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1573407
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945949
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started	9/4/13	Hammer Wt.	140 lbs.
Date Completed	9/14/13	Hammer Drop	30 in.
Drill Foreman	W. Bates	Spoon Sampler OD	2.0 in.
Inspector	S. Bruder	Rock Core Dia.	2.0 in.
Boring Method	HSA	Shelby Tube OD	-- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 688.394										
SILTY CLAY, brown, moist			5							
SHALE, gray, soft	680.4	8.0								
SHALE, gray and dark gray, soft, broken	678.4	10.0	10	RC-1	RC					Auger refusal at 10.0 ft RC-1 from 10.0 ft to 15.0 ft
SHALE, dark gray, slightly weathered, soft, highly broken, thin sandstone laminations	673.4	15.0	15	RC-2	RC					RQD=56%, RC-2 from 15.0 ft to 20.0 ft
SHALE, brownish gray, unweathered, soft, fissile	670.3	18.1	20	RC-3	RC					RQD=28%, RC-3 from 20.0 ft to 25.0 ft
SHALE, brownish gray, soft, broken, thinly bedded with sandstone (2 in.)	666.6	21.8								
SHALE, dark gray, unweathered, moderately hard, slightly broken	663.4	25.0	25	RC-4	RC					RQD=70%, RC-4 from 25.0 ft to 30.0 ft
VOID - Open	659.9	28.5								Lost water at 28.5 ft
MINE COLLAPSE: highly broken, brownish gray shale, sections of unweathered, moderately broken, shale, small open voids	657.9	30.5	30	RC-5	RC					RQD=0%, RC-5 from 30.0 ft to 40.0 ft
			35							

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion **48.0** ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT <u> IDNR - Site 2226 </u>	BORING # <u> BH6-7 </u>
PROJECT NAME <u> Target Grouting Areas - Site 2226 </u>	Northing <u> 1573407 </u>
PROJECT LOCATION <u> North of Brazil, Indiana </u>	Easting <u> 2945949 </u>
	JOB # <u> 86.05957.0016 </u>

DRILLING and SAMPLING INFORMATION

Date Started <u> 9/4/13 </u>	Hammer Wt. <u> 140 </u> lbs.
Date Completed <u> 9/14/13 </u>	Hammer Drop <u> 30 </u> in.
Drill Foreman <u> W. Bates </u>	Spoon Sampler OD <u> 2.0 </u> in.
Inspector <u> S. Bruder </u>	Rock Core Dia. <u> 2.0 </u> in.
Boring Method <u> HSA </u>	Shelby Tube OD <u> - </u> in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
MINE COLLAPSE: highly broken, brownish gray shale, sections of unweathered, moderately broken, shale, small open voids				RC-6	RC				RQD=0%, RC-6 from 40.0 ft to 45.0 ft
			45	RC-7	RC				RQD=0%, RC-7 from 45.0 ft to 47.8 ft
	638.9	49.5		RC-8	RC				RQD=0%, RC-8 from 47.8 ft to 50.0 ft
COAL, black	637.9	50.5	50	RC-9	RC				RQD=34%, RC-9 from 50.0 ft to 55.0 ft
SHALE, grayish brown, broken, soft (underclay)	635.4	53.0							
SHALE, grayish brown, unweathered, moderately hard (underclay)	633.4	55.0	55						Abandon hole with shale trap at 10.0 ft, bentonite chips to 1.0 ft, then concrete to surface
Bottom of Test Boring at 55.0 ft									

Sample Type	Depth to Groundwater	Boring Method
SS - Driven Split Spoon	● Noted on Drilling Tools _____ ft.	HSA - Hollow Stem Augers
ST - Pressed Shelby Tube	∇ At Completion <u> 48.0 </u> ft.	CFA - Continuous Flight Augers
CA - Continuous Flight Auger	∇ After _____ hours _____ ft.	DC - Driving Casing
RC - Rock Core	⊗ Cave Depth _____ ft.	MD - Mud Drilling
CU - Cuttings		HA - Hand Auger
CT - Continuous Tube		



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-8
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1573758
 PROJECT LOCATION North of Brazil, Indiana Easting 2945949
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started 9/15/13 Hammer Wt. 140 lbs.
 Date Completed 9/15/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD - in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 668.29									
SILTY CLAY with trace sand and rock fragments, brown			5						
SHALE, gray and brown, soft	656.8	11.5	10						
LOAM, brown (10YR 4/13), brown, moist	654.5	13.8	15	RC-1	RC				RQD=0%, RC-1 from 13.8 ft to 15.3 ft
SHALE, gray and brown, moderately weathered, soft	653.0	15.3	15	RC-2	RC				RQD=80%, RC-2 from 15.3 ft to 20.3 ft
SHALE, gray, unweathered, soft	650.6	17.7	20						
SHALE, brownish gray, unweathered, soft, fissile, thin sandstone laminations	649.4	18.9	20	RC-3	RC				RQD=60%, RC-3 from 20.3 ft to 25.3 ft
SHALE, dark gray, unweathered, soft, fissile, partial water loss at 22 ft	646.9	21.4	25	RC-4	RC				RQD=64%, RC-4 from 25.3 ft to 30.3 ft
SILTSTONE, dark gray, unweathered, moderately hard	638.0	30.3	30	RC-5	RC				RQD=0%, RC-5 from 30.3 ft to 35.3 ft Lost water at 30.8 ft
VOID - Open	637.5	30.8	30						
MINE COLLAPSE - Interbedded SHALE and SANDSTONE, dark gray, slightly weathered, fissile, broken at 35.3 ft, 40.3 ft, 43.2 ft, no drop in rods or open voids noted	636.2	32.1	35	RC-6	RC				RQD=38%, RC-6 from 35.3 ft to 40.3 ft

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion 46.5 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-8
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1573758
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945949
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started	9/15/13	Hammer Wt.	140 lbs.
Date Completed	9/15/13	Hammer Drop	30 in.
Drill Foreman	W. Bates	Spoon Sampler OD	2.0 in.
Inspector	S. Bruder	Rock Core Dia.	2.0 in.
Boring Method	HSA	Shelby Tube OD	- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
MINE COLLAPSE - Interbedded SHALE and SANDSTONE, dark gray, slightly weathered, fissile, broken at 35.3 ft, 40.3 ft, 43.2 ft, no drop in rods or open voids noted			45	RC-7	RC				RQD=85%, RC-7 from 40.3 ft to 45.3 ft
			49.8	RC-8	RC	▽			RQD=0%, RC-8 from 45.3 ft to 50.3 ft
SHALE, black, unweathered, fissile	618.5	49.8	50	RC-9	RC				RQD=26%, RC-9 from 50.3 ft to 55.3 ft
SHALE with COAL, black	615.6	52.7	55	RC-10	RC				RQD=42%, RC-10 from 55.3 ft to 60.3 ft
SHALE, brownish gray and gray, soft, fissile, crushed at 57 ft (underday)	613.3	55.0	60						
Bottom of Test Boring at 60.3 ft	608.0	60.3							Installed shale trap with capped pipe to 13.8 ft, chips to 12.0 ft, grout to 3.0 ft, chips to 1.0 ft, concrete then topsoil

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater

● Noted on Drilling Tools _____ ft.
▽ At Completion **46.5** ft.
▼ After _____ hours _____ ft.
☒ Cave Depth _____ ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling
HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-9
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1574166
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945974
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started	9/11/13	Hammer Wt.	140 lbs.
Date Completed	9/11/13	Hammer Drop	30 in.
Drill Foreman	W. Bates	Spoon Sampler OD	2.0 in.
Inspector	C. Bishop	Rock Core Dia.	2.0 in.
Boring Method	HSA	Shelby Tube OD	-- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 646.565									
SHAILE, brown, weathered	643.2	3.4							
SHAILE, gray, fissile, with some sandstone lenses (less than 1 centimeter thick)			5	RC-1	RC				RQD=0%, RC-1 from 3.4 ft to 4.7 ft
				RC-2	RC				RQD=50%, RC-2 from 4.7 ft to 9.7 ft
MINE COLLAPSE, dark gray, shale with some sandstone lenses (less than 1 centimeter thick), incompetent (broken)	637.4	9.2	10	RC-3	RC				Lost water at 9.2 ft RQD=0%, RC-3 from 9.7 ft to 14.7 ft
MINE COLLAPSE, dark black shale, with coal and angular sandstone gravel	631.6	15.0	15	RC-4	RC				Small filled voids with collapse rock in RC-3. RQD=0%, RC-4 from 14.7 ft to 19.7 ft Filled open void from 15-18.6 ft. Pushed with water pressure.
SHAILE, gray to dark gray, clayey (underclay)	628.0	18.6	20	RC-5	RC				RQD=30%, RC-5 from 19.7 ft to 24.7 ft
SHAILE, light gray (underclay)	620.8	25.8	25	RC-6	RC				RQD=64%, RC-6 from 24.7 ft to 29.7 ft
			30	RC-7	RC				RQD=64%, RC-7 from 29.7 ft to 34.7 ft
SHAILE, light gray to dark gray, coal trace	614.6	32.0	35	RC-8	RC				RQD=62%, RC-8 from 34.7 ft to 39.7 ft

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools **17.0** ft.
- ∇ At Completion _____ ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-9
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1574166
 PROJECT LOCATION North of Brazil, Indiana Easting 2945974
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/11/13 Hammer Wt. 140 lbs.
 Date Completed 9/11/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector C. Bishop Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALE, light gray to dark gray, coal trace	605.6	41.0		RC-9	RC					RQD=64%, RC-9 from 39.7 ft to 44.7 ft
SANDY SHALE, light gray, thinly bedded with siltstone			45	RC-10	RC					RQD=56%, RC-10 from 44.7 ft to 49.7 ft
Bottom of Test Boring at 49.7 ft	596.9	49.7								Plugged core hole with shale trap, backfilled with bentonite chips, plugged at the surface with concrete.

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools 17.0 ft.
- ▽ At Completion _____ ft.
- ▼ After _____ hours _____ ft.
- ☒ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-10
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1574574
 PROJECT LOCATION North of Brazil, Indiana Easting 2945984
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/15/13 Hammer Wt. 140 lbs.
 Date Completed 9/15/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD - in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. increments	Remarks
SURFACE ELEVATION 629.301									
SILTY SAND and GRAVEL, brown and black	627.3	2.0		1	SS			7-5-3	
SILTY SAND, brown, moist	625.8	3.5							
SILTY SAND, brown, moist, fine to coarse			5	2	SS			4-2-2	
	623.3	6.0							
SAND with gravel, brown, wet, fine to coarse				3	SS			2-4-6	
	621.1	8.2							
SANDY SHALE, grayish brown, soft, slightly weathered			10	RC-1	RC				RQD=73%, RC-1 from 9.0 ft to 10.1 ft
					RC				RQD=86%, RC-2 from 10.1 ft to 15.1 ft
	613.8	15.5							
SANDSTONE, light gray, unweathered, moderately hard, moderately fractured, fine grained			20	RC-3	RC				RQD=88%, RC-3 from 15.1 ft to 20.1 ft
			25	RC-4	RC				RQD=66%, RC-4 from 20.1 ft to 25.1 ft
			30	RC-5	RC				RQD=66%, RC-5 from 25.1 ft to 30.1 ft
			35	RC-6	RC				RQD=68%, RC-6 from 30.1 ft to 35.1 ft
Bottom of Test Boring at 35.1 ft	594.2	35.1							Grouted hole at completion by tremie. Plugged at the surface with concrete.

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools 6.0 ft.
 ∇ At Completion 6.9 ft.
 ∇ After _____ hours _____ ft.
 ⊕ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226
 PROJECT NAME Target Grouting Areas - Site 2226
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH6-11
 Northing 1574964
 Easting 2945981
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started 9/15/13 Hammer Wt. 140 lbs.
 Date Completed 9/15/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 644.834									
SILT with sand and gravel, brown to dark brown	640.8	4.0							
SILTY CLAY with trace sand and rock fragments, brown, moist			5						
SANDY CLAY, dark brown, very moist	634.8	10.0	10						
SANDSTONE, weathered	632.8	12.0							
SANDSTONE, brown, slightly weathered, moderately hard, medium grained, well sorted	631.1	13.7	15	RC-1	RC				Auger refusal at 13.7 ft
SANDSTONE, light gray, with gray sandstone laminations, unweathered, moderately hard, medium grained, well sorted	630.3	14.5		RC-2	RC				RQD=0%, RC-1 from 13.7 ft to 14.5 ft RQD=92%, RC-2 from 14.5 ft to 19.5 ft
			20	RC-3	RC				RQD=76%, RC-3 from 19.5 ft to 24.5 ft
			25	RC-4	RC				RQD=94%, RC-4 from 24.5 ft to 29.5 ft
			30	RC-5	RC				RQD=80%, RC-5 from 29.5 ft to 34.5 ft
			35	RC-6	RC				RQD=88%, RC-6 from 34.5 ft to 39.5 ft Lost water at 35.0 ft

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion 12.6 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT <u> IDNR - Site 2226 </u>	BORING # <u> BH6-11 </u>
PROJECT NAME <u> Target Grouting Areas - Site 2226 </u>	Northing <u> 1574964 </u>
PROJECT LOCATION <u> North of Brazil, Indiana </u>	Easting <u> 2945981 </u>
	JOB # <u> 86.05957.0016 </u>

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/15/13 Hammer Wt. 140 lbs.
 Date Completed 9/15/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD - in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SANDSTONE, light gray, with gray sandstone laminations, unweathered, moderately hard, medium grained, well sorted	595.3	49.5		RC-7	RC					RQD=76%, RC-7 from 39.5 ft to 44.5 ft
				RC-8	RC					RQD=76%, RC-8 from 44.5 ft to 49.5 ft
Bottom of Test Boring at 49.5 ft										Grouted hole at completion, plugged at the surface with bentonite chips covered by concrete.

Sample Type

Depth to Groundwater

Boring Method

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

- Noted on Drilling Tools _____ ft.
- ▽ At Completion 12.6 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-12
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1575368
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945986
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

Date Started	9/9/13	Hammer Wt.	140 lbs.
Date Completed	9/9/13	Hammer Drop	30 in.
Drill Foreman	W. Bates	Spoon Sampler OD	2.0 in.
Inspector	S. Bruder	Rock Core Dia.	2.0 in.
Boring Method	HSA	Shelby Tube OD	- in.

TEST DATA

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 663.377									
SILTY CLAY with trace sand and rock fragments, brown, moist			5						
SHALE, brown, weathered	653.4	10.0	10						
SHALE, dark gray, slightly weathered, very soft	651.9	11.5							
			15	RC-1	RC				RQD=0%, RC-1 from 13.6 ft to 14.6 ft
				RC-2	RC				RQD=44%, RC-2 from 14.6 ft to 19.6 ft
SANDY SHALE, dark gray, unweathered, soft	645.6	17.8	20	RC-3	RC				RQD=100%, RC-3 from 19.6 ft to 24.6 ft
SHALE, dark gray, unweathered, with thin sandstone laminations, fissile	638.8	24.6	25	RC-4	RC				RQD=74%, RC-4 from 24.6 ft to 29.6 ft
SANDSTONE, dark gray, unweathered, moderately hard	632.7	30.7	30	RC-5	RC				RQD=44%, RC-5 from 29.6 ft to 34.6 ft
SANDY SHALE, dark gray, unweathered, moderately hard	630.3	33.1							Lost water at 33.1 ft
COAL with SHALE			35	RC-6	RC				RQD=16%, RC-6 from 34.6 ft to 39.6 ft
SHALE, dark gray, unweathered, moderately	625.1	38.3							

<p>Sample Type</p> <p>SS - Driven Split Spoon</p> <p>ST - Pressed Shelby Tube</p> <p>CA - Continuous Flight Auger</p> <p>RC - Rock Core</p> <p>CU - Cuttings</p> <p>CT - Continuous Tube</p>	<p>Depth to Groundwater</p> <p>● Noted on Drilling Tools _____ ft.</p> <p>▽ At Completion 33.6 ft.</p> <p>▼ After _____ hours _____ ft.</p> <p>⊠ Cave Depth _____ ft.</p>	<p>Boring Method</p> <p>HSA - Hollow Stem Augers</p> <p>CFA - Continuous Flight Augers</p> <p>DC - Driving Casing</p> <p>MD - Mud Drilling</p> <p>HA - Hand Auger</p>
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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-12
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1575368
 PROJECT LOCATION North of Brazil, Indiana Easting 2945986
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/9/13 Hammer Wt. 140 lbs.
 Date Completed 9/9/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
hard, fissile				RC-7	RC				RQD=36%, RC-7 from 39.6 ft to 44.6 ft
SHALE, dark gray, slightly weathered, soft	619.8	43.6							
SHALE, light gray (brownish gray), unweathered, soft, sandstone seam, highly broken at approximately 47 ft	618.8	44.6	45	RC-8	RC				RQD=38%, RC-8 from 44.6 ft to 49.6 ft
SHALE, dark gray, slightly weathered, very soft, fissile	614.9	48.5	50	RC-9	RC				RQD=50%, RC-9 from 49.6 ft to 54.6 ft
SANDY SHALE, light gray, unweathered, moderately hard	609.6	53.8	55	RC-10	RC				RQD=84%, RC-10 from 54.6 ft to 59.6 ft
SANDY SHALE, brownish gray, unweathered, moderately hard, very fine grained, with sandstone seams	603.6	59.8	60	RC-11	RC				RQD=78%, RC-11 from 59.6 ft to 64.6 ft
			65	RC-12	RC				RQD=70%, RC-12 from 64.6 ft to 69.6 ft
			70	RC-13	RC				RQD=86%, RC-13 from 69.6 ft to 74.6 ft
Bottom of Test Boring at 74.6 ft	588.8	74.6							Set 2 in. PVC piezometer screened from 30 ft to 40 ft. Shale trap at 13.6 ft.

- Sample Type**
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

- Depth to Groundwater**
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 33.6 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

- Boring Method**
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger



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TEST BORING LOG

CLIENT <u> IDNR - Site 2226 </u>	BORING # <u> BH6-13 </u>
PROJECT NAME <u> Target Grouting Areas - Site 2226 </u>	Northing <u> 1575688 </u>
PROJECT LOCATION <u> North of Brazil, Indiana </u>	Easting <u> 2945993 </u>
	JOB # <u> 86.05957.0016 </u>

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/10/13 Hammer Wt. 140 lbs.
 Date Completed 9/10/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler, Graphics Recovery, Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 670.843									
SILTY CLAY, brown, moist			5						
			10						
	656.1	14.7	15	RC-1	RC		▽		Auger refusal at 14.7 ft RQD= % , RC-1 from 14.7 ft to 19.7 ft
LOAM, light brownish gray (10YR 6/2), and very soft, dark gray shale			20	RC-2	RC				RQD= % , RC-2 from 19.7 ft to 24.7 ft
	648.2	22.6	25	RC-3	RC				RQD= % , RC-3 from 24.7 ft to 26.7 ft
COAL, black, depth estimated			26.7	RC-4	RC				RQD=100%, RC-4 from 26.7 ft to 29.7 ft
SANDY SHALE (underclay), light gray, unweathered, soft			30	RC-5	RC				RQD=62%, RC-5 from 29.7 ft to 34.7 ft
	644.1	26.7	35	RC-6	RC				RQD=78%, RC-6 from 34.7 ft to 39.7 ft
SHALE, dark gray, unweathered, soft, some sandstone laminations									
	637.7	33.1							

Sample Type	Depth to Groundwater	Boring Method
SS - Driven Split Spoon	● Noted on Drilling Tools _____ ft.	HSA - Hollow Stem Augers
ST - Pressed Shelby Tube	▽ At Completion <u> 12.0 </u> ft.	CFA - Continuous Flight Augers
CA - Continuous Flight Auger	▼ After _____ hours _____ ft.	DC - Driving Casing
RC - Rock Core	⊠ Cave Depth _____ ft.	MD - Mud Drilling
CU - Cuttings		HA - Hand Auger
CT - Continuous Tube		



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-13
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1575688
 PROJECT LOCATION North of Brazil, Indiana Easting 2945993
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/10/13 Hammer Wt. 140 lbs.
 Date Completed 9/10/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
SHALE, dark gray, unweathered, soft, some sandstone laminations				RC-7	RC				RQD=70%, RC-7 from 39.7 ft to 44.7 ft
SANDSTONE, dark gray, unweathered, moderately hard, with shale laminations (rooted sandstone)	626.1	44.7	45	RC-8	RC				RQD=70%, RC-8 from 44.7 ft to 49.7 ft
Interbedded SHALE and SANDSTONE, dark gray, unweathered, moderately hard, fissile	625.2	45.6							
COAL, black	620.0	50.8	50	RC-9	RC				RQD=28%, RC-9 from 49.7 ft to 54.7 ft
SHALE, dark gray, unweathered, moderately hard	617.8	53.0							
COAL, black	616.8	54.0							
SHALE, dark gray, unweathered, soft, fissile, with coal laminations	615.8	55.0	55	RC-10	RC				RQD=22%, RC-10 from 54.7 ft to 59.7 ft
SHALE, dark gray and light gray, unweathered, soft	613.6	57.2							
Bottom of Test Boring at 59.7 ft	611.1	59.7							Grouted hole at completion. Plugged with bentonite chips covered with concrete at the surface.

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ▽ At Completion 12.0 ft.
 ▼ After _____ hours _____ ft.
 ⊠ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger



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TEST BORING LOG

CLIENT IDNR - Site 2226 BORING # BH6-14
 PROJECT NAME Target Grouting Areas - Site 2226 Northing 1576156
 PROJECT LOCATION North of Brazil, Indiana Easting 2945998
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/10/13 Hammer Wt. 140 lbs.
 Date Completed 9/10/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD - in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 670.383									
SILTY CLAY with trace sand, brown, moist				1	SS			4-3-4	
				2	SS			3-3-4	
	663.9	6.5	5						
SILTY CLAY with trace sand and rock fragments				3	SS			4-4-4	
	661.4	9.0							
SANDY SILTY CLAY, brown, very moist	660.9	9.5	10	4	SS			3-3-4	
SANDY LOAM, light yellowish brown (10YR 6/4), slightly moist, effervescent, slightly plastic				5	SS			23-39-50/0.4'	
	655.5	14.9	15						
SANDY LOAM, light brownish gray (10YR 6/2), effervescent, limestone fragments at 20 ft				RC-1	RC				RQD=0%, RC-1 from 13.9 ft to 15.0 ft
				RC-2	RC				RQD=0%, RC-2 from 15.0 ft to 20.0 ft
			20						
	645.4	25.0		RC-3	RC				RQD=0%, RC-3 from 20.0 ft to 25.0 ft
GLACIAL TILL, fragments of sandstone, shale				RC-4	RC				RQD= % , RC-4 from 25.0 ft to 27.0 ft
	640.6	29.8		RC-5	RC				RQD= % , RC-5 from 27.0 ft to 30.0 ft
SHALE, dark gray, soft, few thin sandstone laminations	639.0	31.4	30	RC-6	RC				RQD=60%, RC-6 from 30.0 ft to 35.0 ft
SANDSTONE with shale laminations, dark gray (YR 5/2), unweathered, moderately hard	636.9	33.5							
	636.4	34.0							
SHALE, dark gray, unweathered, soft	634.6	35.8	35	RC-7	RC				RQD=44%, RC-7 from 35.0 ft to 40.0 ft
COAL, black									
SHALE, gray, unweathered, soft	632.3	38.1							
COAL, black	631.3	39.1							

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ▽ At Completion _____ ft.
 ▼ After _____ hours _____ ft.
 ⊠ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger



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TEST BORING LOG

CLIENT	IDNR - Site 2226	BORING #	BH6-14
PROJECT NAME	Target Grouting Areas - Site 2226	Northing	1576156
PROJECT LOCATION	North of Brazil, Indiana	Easting	2945998
		JOB #	86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started **9/10/13** Hammer Wt. **140** lbs.
 Date Completed **9/10/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **-** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)									
SHALE, gray, soft, disintergrated at 39.2 ft to 39.8 ft	628.4	42.0		RC-8	RC				RQD=80%, RC-8 from 40.0 ft to 45.0 ft
SHALE, gray, unweathered, moderately hard, with thin sandstone laminations	626.0	44.4							
Interbedded SHALE and SANDSTONE, gray, unweathered, moderately hard			45	RC-9	RC				RQD=70%, RC-9 from 45.0 ft to 50.0 ft
			50	RC-10	RC				RQD=78%, RC-10 from 50.0 ft to 55.0 ft
	615.4	55.0	55						
Bottom of Test Boring at 55.0 ft									

- | | | |
|------------------------------|-------------------------------------|--------------------------------|
| Sample Type | Depth to Groundwater | Boring Method |
| SS - Driven Split Spoon | ● Noted on Drilling Tools _____ ft. | HSA - Hollow Stem Augers |
| ST - Pressed Shelby Tube | ▽ At Completion _____ ft. | CFA - Continuous Flight Augers |
| CA - Continuous Flight Auger | ▼ After _____ hours _____ ft. | DC - Driving Casing |
| RC - Rock Core | ⊠ Cave Depth _____ ft. | MD - Mud Drilling |
| CU - Cuttings | | HA - Hand Auger |
| CT - Continuous Tube | | |

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-1
 Northing 1571005
 Easting 2943926
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/18/13 Hammer Wt. 140 lbs.
 Date Completed 9/18/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 651.789										
SANDY SILT, dark brown, with gravel	650.9	0.9								
SANDY SILT, brown, slightly moist, with gravel	648.2	3.6		1	SS				7-7-8	
CLAY LOAM, yellowish brown (10YR 6/6), moist, plastic, non-effervescent	645.7	6.1		5	RC-1	RC				RQD=?%, RC-1 from 3.6 ft to 4.6 ft
	645.7	6.1			RC-2	RC				RQD=62%, RC-2 from 4.6 ft to 9.6 ft
UNDERCLAY, light gray	643.4	8.4								
SANDSTONE, light gray, unweathered, moderately hard	640.1	11.7		10	RC-3	RC				RQD=54%, RC-3 from 9.6 ft to 14.6 ft
SHALE, dark gray, unweathered, soft, thin sandstone laminations				15	RC-4	RC				RQD=78%, RC-4 from 14.6 ft to 19.6 ft
				20	RC-5	RC				RQD=22%, RC-5 from 19.6 ft to 24.6 ft
	628.3	23.5								Retrieved 0.3 ft core from previous run
SANDSTONE, dark gray, unweathered, moderately hard, rooted structures				25	RC-6	RC				RQD=66%, RC-6 from 24.6 ft to 29.6 ft
	623.3	28.5								
SHALE, dark gray, unweathered, soft, fissile	622.2	29.6		30	RC-7	RC				RQD=0%, RC-7 from 29.6 ft to 34.6 ft
VOID - MINE COLLAPSE, filled, shale and some coal fragments										Lost water at 29.6 ft
	617.2	34.6								
SHALE, dark gray, unweathered, soft, fissile				35	RC-8	RC				RQD=78%, RC-8 from 34.6 ft to 39.6 ft
	612.2	39.6								Set 2 in. PVC with 10 ft screen to 37.5 ft

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion 33.8 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-2
 Northing 1570995
 Easting 2944288
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 10/2/13 Hammer Wt. 140 lbs.
 Date Completed 10/2/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 676.968										
SANDY SILTY CLAY, brown, moist			5							
	670.0	7.0								
SANDY SILTY CLAY, brown, very moist			10							
	664.0	13.0								
SHALE, gray			15							
	658.5	18.5								
CLAYEY SHALE, dark gray and brown, very soft			20	RC-1	RC					RQD=0%, RC-1 from 18.5 ft to 19.5 ft
	655.1	21.9		RC-2	RC					RQD=18%, RC-2 from 19.5 ft to 24.5 ft
COAL, black			25	RC-3	RC					RQD=52%, RC-3 from 24.5 ft to 29.5 ft
	650.1	26.9						▽		Lost water at 24.5 ft
UNDERCLAY, beige, soft			30	RC-4	RC					RQD=26%, RC-4 from 29.5 ft to 34.5 ft
	647.8	29.2								
SANDSTONE, light beige, moderately hard, slightly weathered, thin clay laminations			35	RC-5	RC					RQD=38%, RC-5 from 34.5 ft to 39.5 ft
	645.1	31.9								
SHALE, dark gray, slightly weathered, soft, fissile, broken from 34.0-35.5 ft, thin sandstone laminations										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ▽ At Completion 26.7 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-3
 Northing 1570992
 Easting 2944729
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/18/13 Hammer Wt. 140 lbs.
 Date Completed 9/18/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 680.907										
SILTY CLAY, brown, moist			5							
SILTY CLAY, dark brown, with sand and rock fragments	664.9	16.0	10							
SANDSTONE, light gray and gray, slightly weathered, moderately hard	662.1	18.8	15							
SANDSTONE, light brown, slightly weathered, moderately hard	656.8	24.1	20	RC-1	RC					RQD=0%, RC-1 from 19.2 ft to 20.0 ft
				RC-2	RC					RQD=7%, RC-2 from 20.0 ft to 25.0 ft
SANDSTONE, light gray, unweathered, moderately hard	652.9	28.0	25	RC-3	RC					RQD=53%, RC-3 from 25.0 ft to 30.0 ft
SHALE, dark gray, soft	650.9	30.0	30	RC-4	RC					RQD=14%, RC-4 from 30.0 ft to 35.0 ft
COAL, black	650.0	30.9								
			35	RC-5	RC					RQD=20%, RC-5 from 35.0 ft to 40.0 ft
UNDERCLAY, light gray, soft	644.4	36.5								
	640.9	40.0								

- Sample Type**
- SS - Driven Split Spoon
 - ST - Pressed Shelby Tube
 - CA - Continuous Flight Auger
 - RC - Rock Core
 - CU - Cuttings
 - CT - Continuous Tube

- Depth to Groundwater**
- Noted on Drilling Tools _____ ft.
 - ▽ At Completion 3.8 ft.
 - ▼ After _____ hours _____ ft.
 - ⊠ Cave Depth _____ ft.

- Boring Method**
- HSA - Hollow Stem Augers
 - CFA - Continuous Flight Augers
 - DC - Driving Casing
 - MD - Mud Drilling
 - HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-3
 Northing 1570992
 Easting 2944729
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/18/13 Hammer Wt. 140 lbs.
 Date Completed 9/18/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
Interbedded SHALE and SANDSTONE, light gray, unweathered, moderately hard, fissile				RC-6	RC					RQD=42%, RC-6 from 40.0 ft to 45.0 ft
			45	RC-7	RC					RQD=60%, RC-7 from 45.0 ft to 50.0 ft
SHALE, dark gray, unweathered, soft, fissile	633.9	47.0								
			50	RC-8	RC					RQD=72%, RC-8 from 50.0 ft to 55.0 ft
			55	RC-9	RC					RQD=56%, RC-9 from 55.0 ft to 60.0 ft
SANDSTONE, dark gray, unweathered, moderately hard, with shale laminations, rooted structures	625.3	55.6								
			60	RC-10	RC					RQD=49%, RC-10 from 60.0 ft to 64.5 ft
COAL, black	619.1	61.8								
			65	RC-11	RC					RQD=38%, RC-11 from 64.5 ft to 70.0 ft
UNDERCLAY, gray	616.3	64.6								
SHALE, dark gray, unweathered, fissile	615.8	65.1								
			70							
Bottom of Test Boring at 70.0 ft	610.9	70.0								Grouted hole at completion, plugged with chips, patched with concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 3.8 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-4
 Northing 1570983
 Easting 2945152
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/17/13 Hammer Wt. 140 lbs.
 Date Completed 9/17/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 679.596										
SILTY CLAY, brown, moist, with sand	673.6	6.0	5					▽		
SILTY CLAY, gray, moist, with trace sand and rock fragments	671.1	8.5								
SANDY SILT, brown, slightly moist	669.6	10.0								
SANDSTONE, brown, weathered	667.6	12.0								
SANDSTONE, light brown, slightly weathered, moderately hard, highly broken, very fine grained, well sorted, thin claystone laminations at 17.2 ft	661.6	18.0	15	RC-1	RC					RQD=29%, RC-1 from 13.6 ft to 14.8ft
				RC-2	RC					RQD=8%, RC-2 from 14.8 ft to 19.8 ft
SANDSTONE, light gray, unweathered, moderately hard	654.6	25.0	20	RC-3	RC					RQD=62%, RC-3 from 19.8 ft to 24.8 ft
SANDY SHALE, dark gray, unweathered, soft, thinly laminated with sandstone	654.6	25.0	25	RC-4	RC					RQD=70%, RC-4 from 24.8 ft to 29.8 ft
	646.0	33.6	30	RC-5	RC					RQD=90%, RC-5 from 29.8 ft to 34.8 ft
SANDSTONE, dark gray, unweathered, moderately hard, thin shale laminations	644.5	35.1	35	RC-6	RC					RQD=36%, RC-6 from 34.8 ft to 39.8 ft
SHALE, dark gray, unweathered, soft, fissile	642.9	36.7								
COAL, black										

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ▽ At Completion 3.3 ft.
- ▽ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-4
 Northing 1570983
 Easting 2945152
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/17/13 Hammer Wt. 140 lbs.
 Date Completed 9/17/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
UNDERCLAY, gray and light gray	638.8	40.8		RC-7	RC					RQD=70%, RC-7 from 39.8 ft to 44.8 ft
	634.5	45.1	45	RC-8	RC					RQD=70%, RC-8 from 44.8 ft to 49.8 ft
Interbedded SHALE and SANDSTONE, light gray, unweathered, moderately hard, fissile	632.4	47.2								
SHALE, dark gray, unweathered, moderately hard and soft, sandstone laminations			50	RC-9	RC					RQD=28%, RC-9 from 49.8 ft to 54.8 ft
	624.8	54.8	55	RC-10	RC					RQD=86%, RC-10 from 54.8 ft to 59.8 ft
SHALEY SANDSTONE, dark gray, unweathered, moderately hard			60	RC-11	RC					RQD=96%, RC-11 from 59.8 ft to 64.8 ft
			65	RC-12	RC					RQD=64%, RC-12 from 64.8 ft to 69.8 ft
COAL, black	610.9	68.7	70	RC-13	RC					RQD=54%, RC-13 from 69.8 ft to 74.8 ft
UNDERCLAY, gray	608.1	71.5								
SHALE, gray, unweathered, soft	607.1	72.5								
	604.8	74.8								
Bottom of Test Boring at 74.8 ft										Grouted hole at completion, plugged with concrete and chips

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion 3.3 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-5
 Northing 1570969
 Easting 2945505
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/17/13 Hammer Wt. 140 lbs.
 Date Completed 9/17/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 690.108										
SANDY SILT, gray and brown, slightly moist, with gravel and clay	687.1	3.0		1	SS				3-3-3	
SILTY CLAY, brown and gray, moist, with trace sand	684.1	6.0	5	2	SS			▽	3-2-3	
SILTY CLAY, brown, moist, with trace sand, gravel and rock fragments				3	SS				3-3-4	
				4	SS				2-2-3	
	678.1	12.0	10	5	SS			●	0-0-0	
CLAYEY SAND, brown, wet	676.1	14.0		6	SS				16-50/0.4'	
SANDSTONE, brown, decomposed	675.1	15.0	15		RC-1					RQD=50%, RC-1 from 15.0 ft to 20.0 ft
SHALEY SANDSTONE, brown and light gray, moderately weathered, moderately hard, thin claystone laminations	674.4	15.7			RC					
Interbedded SHALE and SANDSTONE, gray, moderately hard, fissile	671.1	19.0	20		RC-2					RQD=74%, RC-2 from 20.0 ft to 25.0 ft
SANDY SHALE, dark gray, unweathered, soft, few sandstone laminations					RC					
					RC-3					RQD=98%, RC-3 from 25.0 ft to 30.0 ft
					RC					
					RC-4					RQD=68%, RC-4 from 30.0 ft to 35.0 ft
	657.6	32.5	30		RC					
COAL, black								▽		
	654.1	36.0	35		RC-5					RQD= not recorded, RC-5 from 35.0 ft to 40.0 ft
UNDERCLAY, light gray										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools 11.0 ft.
 ▽ At Completion 4.6 ft.
 ▼ After 12 hours 33.4 ft.
 ▨ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-5
 Northing 1570969
 Easting 2945505
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/17/13 Hammer Wt. 140 lbs.
 Date Completed 9/17/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALE, gray, unweathered, soft, thinly laminated with sandstone	649.4 648.3	40.7 41.8		RC-6	RC					RQD=64%, RC-6 from 40.0 ft to 45.0 ft
SHALE, dark gray, unweathered, soft, thin sandstone laminations			45	RC-7	RC					RQD=44%, RC-7 from 45.0 ft to 50.0 ft
SHALEY SANDSTONE, dark gray, unweathered, moderately hard, rooted structures	641.4	48.7	50	RC-8	RC					RQD=82%, RC-8 from 50.0 ft to 55.0 ft
			55	RC-9	RC					RQD=40%, RC-9 from 55.0 ft to 60.0 ft
COAL, black, shale seam from 59.6-59.9 ft	633.0	57.1								
SHALE, gray and dark gray	630.1 629.2	60.0 60.9	60	RC-10	RC					RQD=84%, RC-10 from 60.0 ft to 65.0 ft
SANDY UNDERCLAY, light beige	626.6	63.5								
SANDSTONE, light beige, unweathered, moderately hard,	625.1	65.0	65							
Bottom of Test Boring at 65.0 ft										Grouted hole at completion, plugged with chips and concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools 11.0 ft.
 ∇ At Completion 4.6 ft.
 ▼ After 12 hours 33.4 ft.
 ☒ Cave Depth ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT **IDNR - Site 2227**
 PROJECT NAME **Target Grouting Areas - Site 2227**
 PROJECT LOCATION **North of Brazil, Indiana**

BORING # **BH7-6**
 Northing **1570944**
 Easting **2946412**
 JOB # **86.05957.0016**

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started **9/19/13** Hammer Wt. **140** lbs.
 Date Completed **9/19/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 692.356										
SILTY CLAY, brown, moist			5							
SANDY CLAY, brown, moist	677.4	15.0	15							
SILTY CLAY, brown, moist, with trace sand and rock fragments	672.4	20.0	20							
SILTY CLAY, dark brown	668.4	24.0	25							
Augered to 29 ft	665.4	27.0								
VOID, dry, 4 1/4 center bit dropped to 33.5 ft.	663.4	29.0	30							
Blind drilled - 33.5 to 39.1 ft	658.9	33.5	35							
	653.3	39.1								

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ▽ At Completion **42.6** ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-6
 Northing 1570944
 Easting 2946412
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/19/13 Hammer Wt. 140 lbs.
 Date Completed 9/19/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
MINE COLLAPSE - shaley sandstone and small voids	649.6	42.8		RC-1	RC					NO RQD, RC-1 from 39.1 ft to 40.0 ft
				RC-2	RC					RQD=38%, RC-2 from 40.0 ft to 45.0 ft
UNDERCLAY, light gray			45							
				RC-3	RC					RQD=32%, RC-3 from 45.0 ft to 50.0 ft
SANDY SHALE, dark gray, unweathered, moderately hard, thin sandstone laminations, fissile	644.5	47.9								
			50	RC-4	RC					RQD=52%, RC-4 from 50.0 ft to 55.0 ft
			55	RC-5	RC					RQD=68%, RC-5 from 55.0 ft to 60.0 ft
SHALEY SANDSTONE, dark gray, unweathered, moderately hard	635.4	57.0								
			60	RC-6	RC					RQD=100%, RC-6 from 60.0 ft to 65.0 ft
SHALE, dark gray, unweathered, moderately hard	628.8	63.6								
			65	RC-7	RC					RQD=88%, RC-7 from 65.0 ft to 70.0 ft
Bottom of Test Boring at 70.0 ft	622.4	70.0	70							Plugged hole with 5 bags of chips and capped with concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 42.6 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-7
 Northing 1570932
 Easting 2946741
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/19/13 Hammer Wt. 140 lbs.
 Date Completed 9/20/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 687.845										
11 in. Topsoil	686.9	0.9								
SILT, light brown and brown	684.8	3.0		1	SS				6-4-4	
CLAYEY SILT, gray with brown				2	SS				5-4-4	
			5							
				3	SS				5-6-6	
SILTY CLAY, gray and brown, with little sand	679.8	8.0		4	SS				4-4-6	
			10							
				5	SS				4-4-4	
SILTY CLAY, brown and gray	674.8	13.0		6	SS				4-6-10	
			15							
				7	SS				5-6-8	
SILTY CLAY, gray with brown, with trace sand and rock fragments, with little sand at 21.0 ft	669.8	18.0		8	SS				5-8-10	
			20							
				9	SS				6-8-8	
SILTY CLAY, brown, with some sand and rock fragments	664.8	23.0		10	SS				5-17-20	
			25							
				11	SS				8-11-17	
SILTY SAND, brown, moist, with clay and rock fragments	661.8	26.0		12	SS				9-17-18	
			30							
				13	SS				9-11-17	
			33.0							
SANDY SHALE, gray, weathered	654.8	34.0		14	SS				55/0.5'	
SANDSTONE, light gray, unweathered, moderately hard, thinly laminated with shale, broken	653.8	34.0		RC-1	RC					RQD=0%, RC-1 from 34.0 ft to 35.0 ft RQD=16%, RC-2 from 35.0 ft to 40.0 ft
			35							
COAL, black, void or loose coal from 39.0-39.5 ft and from 39.5-40.0 ft	650.9	36.9		RC-2	RC					Lost water at 36.9 ft Depth to groundwater is 39.7 ft after Run #3

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 65.8 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-7
 Northing 1570932
 Easting 2946741
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/19/13 Hammer Wt. 140 lbs.
 Date Completed 9/20/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION (continued)	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
UNDERCLAY, gray, sandy from 45.0-45.8 ft	646.8	41.0		RC-3	RC					RQD=80%, RC-3 from 40.0 ft to 45.0 ft
			45							
SHALE, dark gray, unweathered, soft, fissile	641.8	46.0		RC-4	RC					RQD=64%, RC-4 from 45.0 ft to 50.0 ft
			50							
			55							
			59.5							RQD=72%, RC-5 from 50.0 ft to 55.0 ft
SANDSTONE, gray, unweathered, rooted structures, small void	628.3	59.5								Lost water again at 59.5 ft
MINE COLLAPSE, open voids from 57.5-59.0 ft and 65.5-67.0 ft, filled voids-shale	627.3	60.5		RC-6	RC					RQD=60%, RC-6 from 55.0 ft to 60.0 ft
			60							RQD=20%, RC-7 from 60.0 ft to 65.0 ft
			65							
			65							RQD=18%, RC-8 from 65.0 ft to 70.0 ft
			66.2							Water at 66.2 ft after Run #9
			68.1							Set well at 68.1 ft, see diagram
COAL, with shale	617.8	70.0								
COAL, black	616.2	71.6		RC-7	RC					RQD=20%, RC-7 from 60.0 ft to 65.0 ft
	615.2	72.6								
SANDSTONE, beige, slightly weathered, moderately hard	614.0	73.8								
UNDERCLAY, beige	612.8	75.0		RC-8	RC					RQD=20%, RC-8 from 70.0 ft to 75.0 ft
Bottom of Test Boring at 75.0 ft			75							

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion 65.8 ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT **IDNR - Site 2227**
 PROJECT NAME **Target Grouting Areas - Site 2227**
 PROJECT LOCATION **North of Brazil, Indiana**

BORING # **BH7-8**
 Northing **1570923**
 Easting **2947092**
 JOB # **86.05957.0016**

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started **9/23/13** Hammer Wt. **140** lbs.
 Date Completed **9/25/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 686.897										
SANDY SILT, light brown	681.9	5.0	5							
SILTY CLAY, dark brown, moist			10					▽		
SILTY CLAY, gray, slightly moist, trace sand and rock fragments	671.9	15.0	15							
COAL and SHALE, approximate depth	663.9	23.0	25							
UNDERCLAY, gray	659.9	27.0								
SHALE, dark gray, unweathered, soft, thin sandstone laminations	658.1	28.8		RC-1	RC					RQD=75%, RC-1 from 28.8 ft to 30.0 ft
SHALEY SANDSTONE, dark gray, unweathered, moderately hard, very fine grained	656.9	30.0	30	RC-2	RC					RQD=80%, RC-2 from 30.0 ft to 35.0 ft
			35	RC-3	RC					RQD=94%, RC-3 from 35.0 ft to 40.0 ft

- Sample Type**
- SS - Driven Split Spoon
 - ST - Pressed Shelby Tube
 - CA - Continuous Flight Auger
 - RC - Rock Core
 - CU - Cuttings
 - CT - Continuous Tube

- Depth to Groundwater**
- Noted on Drilling Tools _____ ft.
 - ▽ At Completion **12.0** ft.
 - ▽ After _____ hours _____ ft.
 - ⊠ Cave Depth _____ ft.

- Boring Method**
- HSA - Hollow Stem Augers
 - CFA - Continuous Flight Augers
 - DC - Driving Casing
 - MD - Mud Drilling
 - HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-8
 Northing 1570923
 Easting 2947092
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/23/13 Hammer Wt. 140 lbs.
 Date Completed 9/25/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALEY SANDSTONE, dark gray, unweathered, moderately hard, very fine grained	643.2	43.7		RC-4	RC					RQD=74%, RC-4 from 40.0 ft to 45.0 ft
COAL	641.6	45.3	45							
SHALE, black	641.2	45.7		RC-5	RC					RQD=82%, RC-5 from 45.0 ft to 50.0 ft
UNDERCLAY, light gray and light beige										
	636.1	50.8	50							
SANDSTONE, light gray, unweathered, moderately hard, very fine grained, thinly bedded with light gray sandy shale	634.7	52.2		RC-6	RC					RQD=82%, RC-6 from 50.0 ft to 55.0 ft
SHALE, light beige, unweathered, soft	632.4	54.5								
SHALE, dark gray and black, unweathered, soft, fissile, thin sandstone laminations			55		RC-7	RC				RQD=48%, RC-7 from 55.0 ft to 60.0 ft
			60		RC-8	RC				RQD=38%, RC-8 from 60.0 ft to 65.0 ft
			65		RC-9	RC				RQD=16%, RC-9 from 65.0 ft to 70.0 ft
COAL, black	620.4	66.5								
UNDERCLAY, shaley, dark gray/black, soft	616.8	70.1	70		RC-10	RC				RQD=56%, RC-10 from 70.0 ft to 75.0 ft
	612.7	74.2								
SANDY SHALE, gray, unweathered, moderately hard	611.9	75.0	75							
Bottom of Test Boring at 75.0 ft										Grouted hole at completion, plugged with chips, patched with concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 12.0 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-9
 Northing 1570911
 Easting 2947433
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/25/13 Hammer Wt. 140 lbs.
 Date Completed 9/25/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 685.547										
SANDY SILT, brown, slightly moist, trace gravel	682.5	3.0		1	SS				7-5-5	
SILTY CLAY, gray and brown, moist, trace sand, little sand at 9.5 ft			5	2	SS				4-5-8	
				3	SS				3-3-5	
				4	SS				3-4-5	
SANDY SILT, gray and brown, slightly moist, with gravel and trace clay	675.0	10.5	10	5	SS				32-38-42	
SILTY SAND, gray, moist, with gravel	671.3	14.2	15	6	SS				12-22-28	
COAL, decomposed	669.0	16.5	17.0	7	SS				13-7-10	
UNDERCLAY, gray	668.5									
SHALE, dark gray and gray, unweathered, soft, thin sandstone laminations from 28.8 ft, fissile	664.5	21.0	20	8	SS				13-11-22	
				9	SS				15-35-50/0.3'	
SANDY SHALE, gray and dark gray, unweathered	655.0	30.5	30	RC-1	RC				RQD=88%, RC-1 from 24.4 ft to 25.2 ft RQD=82%, RC-2 from 25.2 ft to 30.2 ft	
				RC-2	RC					
				RC-3	RC					
COAL, black	650.4	35.1	35	RC-4	RC				RQD=64%, RC-4 from 35.2 ft to 40.2 ft	
SANDY SHALE, dark gray, unweathered	646.8	38.7								
SILTSTONE, light gray/beige, unweathered	646.4	39.1								

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After 12 hours 41.6 ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2227
 PROJECT NAME Target Grouting Areas - Site 2227
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH7-9
 Northing 1570911
 Easting 2947433
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/25/13 Hammer Wt. 140 lbs.
 Date Completed 9/25/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SANDY SHALE, grayish beige, soft, unweathered, clayey			45	RC-5	RC			▼		RQD=62%, RC-5 from 40.2 ft to 45.2 ft
				RC-6	RC					RQD=80%, RC-6 from 45.2 ft to 50.2 ft
			50	RC-7	RC					RQD=100%, RC-7 from 50.2 ft to 55.2 ft
SHALE, dark gray, unweathered, moderately hard	633.5	52.0								
	632.6	52.9								
SHALE, light beige, unweathered, moderately hard, thinly bedded with very fine sandstone			55	RC-8	RC					RQD=76%, RC-8 from 55.2 ft to 60.2 ft
SANDSTONE, light beige, unweathered, moderately hard	629.2	56.3								
			60	RC-9	RC					RQD=96%, RC-9 from 60.2 ft to 65.2 ft
			65	RC-10	RC					RQD=58%, RC-10 from 65.2 ft to 70.2 ft Retrieved 0.2 ft core from previous run
SANDY SHALE, dark gray, unweathered, soft, thin sandstone laminations	617.0	68.5								
			70	RC-11	RC					RQD=42%, RC-11 from 70.2 ft to 75.2 ft
Bottom of Test Boring at 75.2 ft	610.3	75.2	75							Grouted hole at completion, plugged with chips, patched with concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After 12 hours 41.6 ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-1
 Northing 1570840
 Easting 2949822
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/26/13 Hammer Wt. 140 lbs.
 Date Completed 9/26/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 701.497										
SILTY CLAY, light brown and brown, moist	698.5	3.0		1	SS				6-5-5	
SILTY CLAY, brown and gray, moist, trace gravel			5	2	SS				3-3-4	
				3	SS				3-3-5	
SANDSTONE, brown, decomposed	692.5	9.0	10	4	SS				13-38-50/0.3'	
SHALE, gray, weathered	689.9	11.6		5	SS				14-21-39	
SHALE, dark gray, unweathered, soft, siltstone laminae at 24.5 ft	687.2	14.3	15	RC-1	RC					RQD=100%, RC-1 from 14.3 ft to 15.0 ft
				RC-2	RC					RQD=94%, RC-2 from 15.0 ft to 20.0 ft
			20	RC-3	RC					RQD=70%, RC-3 from 20.0 ft to 25.0 ft
COAL, black	676.6	24.9	25	RC-4	RC					RQD=28%, RC-4 from 25.0 ft to 30.0 ft
UNDERCLAY, light gray, soft, shaley	673.1	28.4	30	RC-5	RC					RQD=42%, RC-5 from 30.0 ft to 35.0 ft
SHALE, gray, unweathered, soft, fissile, sandy	668.7	32.8	35	RC-6	RC					RQD=58%, RC-6 from 35.0 ft to 40.0 ft

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After _____ hours _____ ft.
 ⊠ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-1
 Northing 1570840
 Easting 2949822
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/26/13 Hammer Wt. 140 lbs.
 Date Completed 9/26/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALE, gray, unweathered, soft, fissile, sandy	660.9	40.6		RC-7	RC					RQD=90%, RC-7 from 40.0 ft to 45.0 ft
SANDSTONE, gray, unweathered, moderately hard, rooted	657.2	44.3								
COAL, black	654.4	47.1	45	RC-8	RC					RQD=54%, RC-8 from 45.0 ft to 50.0 ft
UNDERCLAY, light gray, sandy	651.5	50.0	50							
Bottom of Test Boring at 50.0 ft										

- | | | |
|------------------------------|-------------------------------------|--------------------------------|
| Sample Type | Depth to Groundwater | Boring Method |
| SS - Driven Split Spoon | ● Noted on Drilling Tools _____ ft. | HSA - Hollow Stem Augers |
| ST - Pressed Shelby Tube | ▽ At Completion _____ ft. | CFA - Continuous Flight Augers |
| CA - Continuous Flight Auger | ▼ After _____ hours _____ ft. | DC - Driving Casing |
| RC - Rock Core | ☒ Cave Depth _____ ft. | MD - Mud Drilling |
| CU - Cuttings | | HA - Hand Auger |
| CT - Continuous Tube | | |

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-2
 Northing 1570821
 Easting 2950365
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/26/13 Hammer Wt. 140 lbs.
 Date Completed 9/26/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 706.889										
SILTY CLAY, brown, moist			5							
SILTY CLAY, brown, moist, trace sand and few gravel	698.9	8.0	10							
SILTY CLAY, brown, moist, little sand and trace gravel	692.9	14.0	15							
SHALE, gray, weathered	689.9	17.0								
SHALE, black, with coal	688.6	18.3		RC-1	RC					RQD=0%, RC-1 from 18.3 ft to 19.5 ft
COAL, black	687.9	19.0		RC-2	RC					RQD=40%, RC-2 from 19.5 ft to 24.5 ft
UNDERCLAY, light gray/light beige	684.4	22.5								
SHALE, dark gray, unweathered, soft, fissile	680.6	26.3	25	RC-3	RC					RQD=90%, RC-3 from 24.5 ft to 29.5 ft
			30	RC-4	RC					RQD=78%, RC-4 from 29.5 ft to 34.5 ft
SHALEY SANDSTONE, gray, unweathered, moderately hard, rooted	672.4	34.5								
MINE COLLAPSE -VOID, 1.5 ft open void, then mine collapse, followed by 1.0 open voids, then collapse, then 1.0 ft open void and collapse	671.7	35.2	35	RC-5	RC					RQD=14%, RC-5 from 34.5 ft to 39.5 ft Water at 34.5 ft after Run #6

- Sample Type**
- SS - Driven Split Spoon
 - ST - Pressed Shelby Tube
 - CA - Continuous Flight Auger
 - RC - Rock Core
 - CU - Cuttings
 - CT - Continuous Tube

- Depth to Groundwater**
- Noted on Drilling Tools _____ ft.
 - ▽ At Completion _____ ft.
 - ▼ After _____ hours _____ ft.
 - ⊠ Cave Depth _____ ft.

- Boring Method**
- HSA - Hollow Stem Augers
 - CFA - Continuous Flight Augers
 - DC - Driving Casing
 - MD - Mud Drilling
 - HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-2
 Northing 1570821
 Easting 2950365
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/26/13 Hammer Wt. 140 lbs.
 Date Completed 9/26/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
sequence, 2-6 in. open voids from 42.5-45.5 ft, followed by mine collapse				RC-6	RC					RQD=20%, RC-6 from 39.5 ft to 44.5 ft
	661.2	45.7	45	RC-7	RC					RQD=76%, RC-7 from 44.5 ft to 49.5 ft
SHALEY SANDSTONE, dark gray, unweathered, moderately hard	660.1	46.8								
UNDERCLAY, light gray, soft	658.4	48.5								
SANDY SHALE, light gray, unweathered, moderately hard	657.4	49.5								
Bottom of Test Boring at 49.5 ft										

- Sample Type**
- SS - Driven Split Spoon
 - ST - Pressed Shelby Tube
 - CA - Continuous Flight Auger
 - RC - Rock Core
 - CU - Cuttings
 - CT - Continuous Tube

- Depth to Groundwater**
- Noted on Drilling Tools _____ ft.
 - ▽ At Completion _____ ft.
 - ▼ After _____ hours _____ ft.
 - ⊠ Cave Depth _____ ft.

- Boring Method**
- HSA - Hollow Stem Augers
 - CFA - Continuous Flight Augers
 - DC - Driving Casing
 - MD - Mud Drilling
 - HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-3
 Northing 1570809
 Easting 2950743
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/26/13 Hammer Wt. 140 lbs.
 Date Completed 9/26/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 710.653										
SILTY CLAY, brown, moist			5							
SILTY CLAY, black, moist, trace coal fragments	694.7	16.0	10							
CLAYEY SHALE, gray, soft, slightly weathered (underclay)	693.2	17.5	15							
COAL, decomposed, broken - no recovery	688.6	22.1	20	RC-1	RC					RQD=80%, RC-1 from 18.6 ft to 19.6 ft
SHALE, dark gray/black, broken, trace coal	686.1	24.6	25	RC-2	RC					RQD=14%, RC-2 from 19.6 ft to 24.6 ft
UNDERCLAY, light gray, soft, slightly weathered	684.7	26.0	30	RC-3	RC					RQD=68%, RC-3 from 24.6 ft to 29.6 ft
SANDSTONE, light gray, unweathered, moderately hard, very fine grained	682.4	28.3	35	RC-4	RC					RQD=34%, RC-4 from 29.6 ft to 34.6 ft
MINE COLLAPSE-SANDSTONE, light gray, slightly weathered, moderately hard, with clay laminations	681.1	29.6								Lost water at 30.0 ft
MINE COLLAPSE-CLAYEY SHALE, light gray, moderately weathered, soft	678.2	32.5								
MINE COLLAPSE-SHALE, dark gray/black, unweathered, soft	676.7	34.0								
MINE COLLAPSE-SANDSTONE, gray, unweathered, moderately hard	675.0	35.7		RC-5	RC					RQD=70%, RC-5 from 34.6 ft to 39.6 ft
	672.0	38.7								Water after Run #8 at 36.3 ft

- Sample Type**
- SS - Driven Split Spoon
 - ST - Pressed Shelby Tube
 - CA - Continuous Flight Auger
 - RC - Rock Core
 - CU - Cuttings
 - CT - Continuous Tube

- Depth to Groundwater**
- Noted on Drilling Tools _____ ft.
 - ∇ At Completion _____ ft.
 - ▼ After _____ hours _____ ft.
 - ⊠ Cave Depth _____ ft.

- Boring Method**
- HSA - Hollow Stem Augers
 - CFA - Continuous Flight Augers
 - DC - Driving Casing
 - MD - Mud Drilling
 - HA - Hand Auger





CLIENT **IDNR - Site 2228**
 PROJECT NAME **Target Grouting Areas - Site 2228**
 PROJECT LOCATION **North of Brazil, Indiana**

BORING # **BH8-3**
 Northing **1570809**
 Easting **2950743**
 JOB # **86.05957.0016**

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started **9/26/13** Hammer Wt. **140** lbs.
 Date Completed **9/26/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
MINE COLLAPSE-SHALE, dark gray, moderately weathered, soft, broken, small 0.5 ft void at 39.1 ft, additional 6 in. voids, trace coal from 44.5-45.6 ft	665.1	45.6	45	RC-6	RC					RQD=18%, RC-6 from 39.6 ft to 44.6 ft
SANDSTONE, light gray/beige, unweathered, moderately hard, very fine grained	661.1	49.6		RC-7	RC					RQD=78%, RC-7 from 44.6 ft to 49.6 ft
Bottom of Test Boring at 49.6 ft										Set piezometer at 48.8 ft with 10 ft screen

- | | | |
|------------------------------|-------------------------------------|--------------------------------|
| <u>Sample Type</u> | <u>Depth to Groundwater</u> | <u>Boring Method</u> |
| SS - Driven Split Spoon | ● Noted on Drilling Tools _____ ft. | HSA - Hollow Stem Augers |
| ST - Pressed Shelby Tube | ∇ At Completion _____ ft. | CFA - Continuous Flight Augers |
| CA - Continuous Flight Auger | ▼ After _____ hours _____ ft. | DC - Driving Casing |
| RC - Rock Core | ☒ Cave Depth _____ ft. | MD - Mud Drilling |
| CU - Cuttings | | HA - Hand Auger |
| CT - Continuous Tube | | |

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-4
 Northing 1570777
 Easting 2951208
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 10/1/13 Hammer Wt. 140 lbs.
 Date Completed 10/1/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector J. Noel Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 715.998										
SILT LOAM, gray (10YR 5/1, broken, dry), non-plastic, sticky, non-effervescent	713.0	3.0		1	SS				10-6-5	
CLAY, reddish gray mottled (10YR 5/3 to 10YR 6/1, broken, moist), plastic, sticky	710.5	5.5	5	2	SS				1-2-1	
SILTY CLAY, brown (10YR 5/3, broken, moist), non-plastic, slightly sticky			10	3	SS				4-4-4	
				4	SS				2-2-3	Mottled brown and gray 8.5-10 ft
				5	SS				3-4-5	
				6	SS				2-3-5	
COAL	701.2	14.8	15	7	SS			3-6-7		
UNDERCLAY, gray (gley 17/1, broken, dry)	698.0	18.0	20	8	SS			6-7-12		
SHALE, dark gray, laminated, with plant fossils			25	9	SS				6-9-25	
				RC-1	RC				RQD=43%, RC-1 from 23.6 ft to 25.0 ft	
				RC-2	RC				RQD=36%, RC-2 from 25.0 ft to 30.0 ft	
SHALE, black	687.5	28.5	30							
SANDSTONE, fine grained	686.3	29.7	35							
				RC-3	RC					RQD=86%, RC-3 from 30.0 ft to 35.0 ft
SHALEY COAL	680.2	35.8								
	679.9	36.1		RC-4	RC					RQD=88%, RC-4 from 35.0 ft to 40.0 ft
CLAYSTONE (UNDERCLAY), gray	677.8	38.2								
SHALE, gray										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After _____ hours _____ ft.
 ⊠ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-4
 Northing 1570777
 Easting 2951208
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 10/1/13 Hammer Wt. 140 lbs.
 Date Completed 10/1/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector J. Noel Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALE, gray	675.3	40.7		RC-5	RC					RQD=64%, RC-5 from 40.0 ft to 45.0 ft
SHALE, black, with sandstone laminations			45	RC-6	RC					Water level after Run #10 at 41.4 ft
	667.3	48.7								RQD=20%, RC-6 from 45.0 ft to 50.0 ft
MINE COLLAPSE-VOID	667.2	48.8								Lost water at 48.7 ft
MINE COLLAPSE-SHALE	666.8	49.2	50	RC-7	RC					Drilling through collapse zone 48.7 ft
MINE COLLAPSE-VOID	666.7	49.3								RQD=0%, RC-7 from 50.0 ft to 55.0 ft
MINE COLLAPSE-White SANDSTONE and black SHALE, laminated, fine grained			55	RC-8	RC					RQD=0%, RC-8 from 55.0 ft to 60.0 ft
			60	RC-9	RC					RQD=8%, RC-9 from 60.0 ft to 65.0 ft
MINE COLLAPSE-SHALEY CLAYSTONE, black, red and black mottled, weathered	654.0	62.0								RQD=24%, RC-10 from 65.0 ft to 70.0 ft
UNDERCLAY, gray	649.6	66.4	65	RC-10	RC					Set well at 67.3 ft
SHALE, black, laminated	648.6	67.4								
	646.0	70.0	70							
Bottom of Test Boring at 70.0 ft										

- | | | |
|------------------------------|-------------------------------------|--------------------------------|
| Sample Type | Depth to Groundwater | Boring Method |
| SS - Driven Split Spoon | ● Noted on Drilling Tools _____ ft. | HSA - Hollow Stem Augers |
| ST - Pressed Shelby Tube | ∇ At Completion _____ ft. | CFA - Continuous Flight Augers |
| CA - Continuous Flight Auger | ▼ After _____ hours _____ ft. | DC - Driving Casing |
| RC - Rock Core | ⊠ Cave Depth _____ ft. | MD - Mud Drilling |
| CU - Cuttings | | HA - Hand Auger |
| CT - Continuous Tube | | |

CLIENT **IDNR - Site 2228**
 PROJECT NAME **Target Grouting Areas - Site 2228**
 PROJECT LOCATION **North of Brazil, Indiana**

 BORING # **BH8-5**
 Northing **1571358**
 Easting **2951227**
 JOB # **86.05957.0016**
DRILLING and SAMPLING INFORMATION
TEST DATA

 Date Started **9/27/13** Hammer Wt. **140** lbs.
 Date Completed **9/27/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 704.172										
SILTY CLAY, brown and gray, moist	701.2	3.0								
SILTY CLAY, brown, moist			5							
	693.2	11.0	10							
SILTY CLAY, brown, moist, trace sand and gravel	691.2	13.0								
SANDSTONE, light gray and brown, slightly weathered, moderately hard, very fine grained	688.4	15.8	15	RC-1	RC					RQD=58%, RC-1 from 14.9 ft to 19.9 ft
SANDY SHALE, light gray, slightly weathered, soft, thin sandstone laminations	684.6	19.6								
SANDSTONE, light gray, unweathered, moderately hard, thin claystone laminations, fissile	680.7	23.5	20	RC-2	RC					RQD=18%, RC-2 from 19.9 ft to 24.9 ft
COAL, black	678.1	26.1	25	RC-3	RC					RQD=20%, RC-3 from 24.9 ft to 29.9 ft
UNDERCLAY, light beige										
			30	RC-4	RC					RQD=88%, RC-4 from 29.9 ft to 34.9 ft
	670.0	34.2								
SANDSTONE, brownish gray, moderately weathered, moderately hard and soft, coarse grained	669.1	35.1	35	RC-5	RC					RQD=84%, RC-5 from 34.9 ft to 39.9 ft
SHALE, light gray and beige, unweathered, soft, fissile, sandy, thinly bedded with fine grained sandstone	664.4	39.8								

Sample Type

 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater

 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method

 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-5
 Northing 1571358
 Easting 2951227
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 9/27/13 Hammer Wt. 140 lbs.
 Date Completed 9/27/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SANDY SHALE, dark gray, unweathered, moderately hard, thin sandstone laminations, trace coal	659.7	44.5		RC-6	RC					RQD=64%, RC-6 from 39.9 ft to 44.9 ft
SANDY SHALE, gray, unweathered, moderately hard	658.2	46.0	45	RC-7	RC					RQD=94%, RC-7 from 44.9 ft to 49.9 ft
SANDSTONE, gray, unweathered, moderately hard, shaley sections	653.6	50.6	50	RC-8	RC					RQD=84%, RC-8 from 49.9 ft to 54.9 ft
SANDSTONE, light gray, unweathered, moderately hard	649.7	54.5								
SHALEY SANDSTONE, gray, unweathered, moderately hard	646.0	58.2	55	RC-9	RC					RQD=72%, RC-9 from 54.9 ft to 59.9 ft
SANDSTONE, light gray, unweathered, moderately hard	642.7	61.5	60	RC-10	RC					RQD=62%, RC-10 from 59.9 ft to 64.9 ft
SHALE, gray, soft	641.6	62.6								
SANDSTONE, light gray, unweathered, moderately hard	640.6	63.6								
SHALE, dark gray/black, clayey, broken	637.2	67.0	65	RC-11	RC					RQD=100%, RC-11 from 64.9 ft to 69.9 ft
SANDSTONE, light gray, unweathered, moderately hard, fine grained	634.3	69.9								
Bottom of Test Boring at 69.9 ft										Grouted hole at completion, plugged with chips, patched with concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion _____ ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT **IDNR - Site 2228**
 PROJECT NAME **Target Grouting Areas - Site 2228**
 PROJECT LOCATION **North of Brazil, Indiana**

BORING # **BH8-6**
 Northing **1571824**
 Easting **2951249**
 JOB # **86.05957.0016**

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started **10/1/13** Hammer Wt. **140** lbs.
 Date Completed **10/1/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 700.582										
SILTY CLAY, brown, moist, trace sand			5							
SILTY CLAY, brown and gray, moist, trace sand and gravel	684.6	16.0								
SANDY SHALE, gray, slightly weathered, soft	683.6	17.0								
SHALEY SANDSTONE, gray, moderately weathered, moderately hard	680.6	20.0	20	RC-1	RC					RQD=0%, RC-1 from 19.1 ft to 20.0 ft
				RC-2	RC					RQD=16%, RC-2 from 20.0 ft to 25.0 ft
SANDY SHALE, dark gray, moderately weathered, soft	676.1	24.5	25	RC-3	RC					RQD=16%, RC-3 from 25.0 ft to 30.0 ft
COAL, black	675.6	25.0								
UNDERCLAY, light gray, soft	672.8	27.8								
SANDY SHALE, gray, unweathered, soft and moderately hard	669.0	31.6	30	RC-4	RC					RQD=94%, RC-4 from 30.0 ft to 35.0 ft
			35	RC-5	RC					RQD=92%, RC-5 from 35.0 ft to 40.0 ft
SHALE, gray, unweathered, soft and moderately hard, thin sandstone seam at 48.9 ft	662.6	38.0								

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ∇ At Completion **6.5** ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-6
 Northing 1571824
 Easting 2951249
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 10/1/13 Hammer Wt. 140 lbs.
 Date Completed 10/1/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SHALE, gray, unweathered, soft and moderately hard, thin sandstone seam at 48.9 ft				RC-6	RC					RQD=94%, RC-6 from 40.0 ft to 45.0 ft
			45	RC-7	RC					RQD=86%, RC-7 from 45.0 ft to 50.0 ft
			50	RC-8	RC					RQD=74%, RC-8 from 50.0 ft to 55.0 ft
	648.0	52.6								
SANDSTONE, gray, slightly weathered, moderately hard, thinly bedded with shale			55	RC-9	RC					RQD=38%, RC-9 from 55.0 ft to 60.0 ft
	641.9	58.7								
SANDY SHALE, dark gray, unweathered, soft	640.6	60.0	60	RC-10	RC					RQD=78%, RC-10 from 60.0 ft to 65.0 ft
SANDSTONE, light gray, unweathered, moderately hard, very fine grained			65	RC-11	RC					RQD=98%, RC-11 from 65.0 ft to 70.0 ft
			70							
Bottom of Test Boring at 70.0 ft	630.6	70.0								Grout hole at completion, plugged with chips, patched with concrete

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater
 ● Noted on Drilling Tools _____ ft.
 ∇ At Completion 6.5 ft.
 ▼ After _____ hours _____ ft.
 ☒ Cave Depth _____ ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger

CLIENT **IDNR - Site 2228**
 PROJECT NAME **Target Grouting Areas - Site 2228**
 PROJECT LOCATION **North of Brazil, Indiana**

 BORING # **BH8-7**
 Northing **1572073**
 Easting **2951240**
 JOB # **86.05957.0016**
DRILLING and SAMPLING INFORMATION
TEST DATA

 Date Started **9/30/13** Hammer Wt. **140** lbs.
 Date Completed **9/30/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 696.909										
SILTY SAND, brown, trace clay										
	690.9	6.0	5							
SILTY CLAY, brown, moist, trace sand			10							
	678.2	18.7	15							
MINE COLLAPSE-SANDSTONE, light beige, broken, mixed with crushed shale, clay and small pieces of coal			20	RC-1	RC					RQD=0%, RC-1 from 18.7 ft to 20.0 ft
				RC-2	RC					RQD=0%, RC-2 from 20.0 ft to 25.0 ft
								▽		Depth to groundwater 22.2 ft after Run #6
MINE COLLAPSE-CLAY, dark gray, very soft	671.9	25.0	25	RC-3	RC					RQD=28%, RC-3 from 25.0 ft to 30.0 ft
MINE COLLAPSE-SHALEY SANDSTONE, light gray, slightly weathered, soft and moderately hard, broken at 26.2 ft	670.7	26.2								
MINE COLLAPSE-VOID	668.1	28.8	30	RC-4	RC					Lost water at 28.8 ft
	664.4	32.5								RQD=50%, RC-4 from 30.0 ft to 35.0 ft
UNDERCLAY, beige, soft			35	RC-5	RC					RQD=74%, RC-5 from 35.0 ft to 40.0 ft
	657.8	39.1								
	656.9	40.0								

Sample Type

 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Depth to Groundwater

 ● Noted on Drilling Tools _____ ft.
 ▽ At Completion **22.4** ft.
 ▾ After _____ hours _____ ft.
 ⊠ Cave Depth _____ ft.

Boring Method

 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling
 HA - Hand Auger


CLIENT **IDNR - Site 2228**
 PROJECT NAME **Target Grouting Areas - Site 2228**
 PROJECT LOCATION **North of Brazil, Indiana**

BORING # **BH8-7**
 Northing **1572073**
 Easting **2951240**
 JOB # **86.05957.0016**

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started **9/30/13** Hammer Wt. **140** lbs.
 Date Completed **9/30/13** Hammer Drop **30** in.
 Drill Foreman **W. Bates** Spoon Sampler OD **2.0** in.
 Inspector **S. Bruder** Rock Core Dia. **2.0** in.
 Boring Method **HSA** Shelby Tube OD **--** in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
COAL, black				RC-6	RC					RQD=100%, RC-6 from 40.0 ft to 45.0 ft
SANDY SHALE, brown, unweathered, moderately hard	651.9	45.0	45							Set well at 41.7 ft
Bottom of Test Boring at 45.0 ft										

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools _____ ft.
- ▽ At Completion **22.4** ft.
- ▼ After _____ hours _____ ft.
- ⊠ Cave Depth _____ ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-8
 Northing 1572533
 Easting 2951248
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 10/3/13 Hammer Wt. 140 lbs.
 Date Completed 10/3/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
SURFACE ELEVATION 690.791										
ASPHALT, subbase	689.5	1.3								Hand clear to 5.0 ft
SILTY CLAY, brown, moist				1	HA					
				2	HA					
	685.3	5.5	5							
SILTY CLAY, brown and gray, moist, trace sand and gravel				3	SS				3-4-5	
				4	SS				2-3-7	
	680.3	10.5	10							
SILTY CLAY, brown, slightly moist, some sand and gravel				5	SS				13-15-17	
				6	SS				10-13-16	
			15							
	673.8	17.0		7	SS				9-4-6	Water at 15.8 ft Run #7
SILTY SAND, gray, moist, trace clay										
	671.3	19.5		8	SS				16-18-50/0.4'	
SANDY SHALE, gray, decomposed	670.6	20.2	20							
MINE COLLAPSE-SANDSTONE and filled voids, light gray, slightly weathered, moderately hard, small filled voids, sections of highly broken sandstone					RC-1					RQD=18%, RC-1 from 20.7 ft to 25.2 ft Lost water at 22.1 ft
			25		RC-2					RQD=7%, RC-2 from 25.2 ft to 30.2 ft
	660.2	30.6	30							
MINE COLLAPSE-SANDY SHALE, dark gray (wood at 30.6 ft)	659.7	31.1			RC-3					RQD=94%, RC-3 from 30.2 ft to 35.2 ft
SANDY UNDERCLAY, light beige										
	656.0	34.8	35							
SANDY SHALE, dark gray, unweathered, moderately hard	655.4	35.4			RC-4					RQD=76%, RC-4 from 35.2 ft to 40.2 ft
SANDY SHALE, light gray, unweathered, soft and moderately hard, thinly bedded with sandstone										

Sample Type

Depth to Groundwater

Boring Method

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

- Noted on Drilling Tools 16.0 ft.
- ∇ At Completion ft.
- ▼ After hours ft.
- ⊠ Cave Depth ft.

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger

CLIENT IDNR - Site 2228
 PROJECT NAME Target Grouting Areas - Site 2228
 PROJECT LOCATION North of Brazil, Indiana

BORING # BH8-8
 Northing 1572533
 Easting 2951248
 JOB # 86.05957.0016

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started 10/3/13 Hammer Wt. 140 lbs.
 Date Completed 10/3/13 Hammer Drop 30 in.
 Drill Foreman W. Bates Spoon Sampler OD 2.0 in.
 Inspector S. Bruder Rock Core Dia. 2.0 in.
 Boring Method HSA Shelby Tube OD -- in.

SOIL CLASSIFICATION	Stratum Elevation, ft	Stratum Depth, ft	Depth Scale, ft	Sample No.	Sample Type	Sampler Graphics	Recovery Graphics	Groundwater	Standard Penetration Test, Blows per 6 in. Increments	Remarks
(continued)										
SANDY SHALE, light gray, unweathered, soft and moderately hard, thinly bedded with sandstone	648.1	42.7		RC-5	RC					RQD=32%, RC-5 from 40.2 ft to 42.7 ft
SHALEY SANDSTONE, light gray and beige, unweathered, moderately hard	645.6	45.2	45	RC-6	RC					RQD=68%, RC-6 from 42.7 ft to 45.2 ft Core block
SANDSTONE, light gray/beige, unweathered, moderately hard, very fine grained			50	RC-7	RC					RQD=74%, RC-7 from 45.2 ft to 50.2 ft
			55	RC-8	RC					RQD=96%, RC-8 from 50.2 ft to 55.2 ft
			60	RC-9	RC					RQD=84%, RC-9 from 55.2 ft to 60.2 ft
			65	RC-10	RC					RQD=90%, RC-10 from 60.2 ft to 65.2 ft
			70	RC-11	RC					RQD=44%, RC-11 from 65.2 ft to 70.2 ft
SANDSTONE, gray, unweathered, moderately hard, thin black shale laminations	623.3	67.5								
CLAY, dark gray, very soft	622.0	68.8								
SHALE, dark gray, soft	621.1	69.7								
Bottom of Test Boring at 70.2 ft	620.6	70.2								

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater

- Noted on Drilling Tools 16.0 ft.
- ▽ At Completion ft.
- ▼ After hours ft.
- ⊠ Cave Depth ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger