BORING LOG NO. BR80ULT-5

PROJECT: IMN-035-4(158)87--0E-77

CLIENT: HDR Engineering Inc
Omaha, Nebraska

SITE: I-80 from NEMM to US 65 Stage 5
Des Moines, Iowa

LOCATION
Northing: 603618 Easting: 1627780
Station: 5173+31 Offset: 88
Surface Elev.: 832.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS	SAMPLE NO.	ROCK CORE COMPRESSIVE STRENGTH (psi)	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	STRENGTH TEST: CONFINING PRESSURE (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI
0.3	832	**Approx. 4" Topsoil**														
		FILL - DARK BROWN AND BROWN STIFF CLAY (Fill), moist (USCS: Fill - Lean Clay, Trace Sand) (Iowa LRFD Description: Stiff Silty Clay Fill)			■	18	2-2-3 N=5	1								
4.0	828															
		DARK GRAY CLAYEY SAND (Alluvium), moist (USCS: Clayey Sand, Trace Gravel) (Iowa LRFD Description: Silty Sand)	5		□	16	4000 (HP)	2		UU	4913	9.3	4	16	110	31-17-14
					■	16	2-3-3 N=6	3								
9.0	823															
		BROWN FINE SAND (Alluvium), moist (USCS: Fine Sand, With Clay Seams) (Iowa LRFD Description: Silty Sand)	10	▼	□	18		4								
					■	18	1-2-4 N=6	5								
14.5	817.5			▽												
		GRAY SILTSTONE*	15		■	18	9-20-22 N=42	6								
16.5	815.5															
		GRAY SHALE*			■	16	8-10-15 N=25	7								
19.0	813															
		BROWN SHALE*	20		■	18	14-10-10 N=20	8								
					■	18	10-11-16 N=27	9								
24.0	808															
		BROWN SHALE* , With Interbedded Sandstone	25		■	18	15-18-69 N=87	10								
26.5	805.5															
		BROWN GRAY SHALE*			■	18										

Stratification lines are approximate. In-situ, the transition may be gradual.
*Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

Hammer Type: Automatic
Drill Hole

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with Auger Cuttings after delayed water level readings

Notes:

WATER LEVEL OBSERVATIONS

▽ *14' While Sampling*
▼ *10.5' on 8/13/2021*
▩ *11' WCI on 8/13/2021*

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 08-12-2021 | Boring Completed: 08-12-2021
Drill Rig: 897 | Driller: CN
Project No.: 08205294

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. IADOT_SMART_LOG 08205294 NEMM STAGE 5 -- 2021-09-28.GPJ TERRACON_DATATEMPLATE.GDT 9/29/21

BORING LOG NO. BR80ULT-5

PROJECT: IMN-035-4(158)87--0E-77

CLIENT: HDR Engineering Inc
Omaha, Nebraska

SITE: I-80 from NEMM to US 65 Stage 5
Des Moines, Iowa

LOCATION
Northing: 603618 Easting: 1627780
Station: 5173+31 Offset: 88
Surface Elev.: 832.1 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS	SAMPLE NO.	ROCK CORE COMPRESSIVE STRENGTH (psi)	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	STRENGTH TEST: CONFINING PRESSURE (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI
		BROWN GRAY SHALE* *(continued)*														
	29.0	803														
		GRAY SHALE* , With Interbedded Siltstone	30			18	16-35-46 N=81	11								
	30.5	801.5				10	30-20-18 N=38	12								
	31.1	**GRAY SILTSTONE*** 801														
		Auger and Spoon Refusal at 31.1 Feet				1	100/1" SEAT	13								

Stratification lines are approximate. In-situ, the transition may be gradual.
*Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.

Hammer Type: Automatic
Drill Hole

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with Auger Cuttings after delayed water level readings

Notes:

WATER LEVEL OBSERVATIONS

- *14' While Sampling*
- *10.5' on 8/13/2021*
- *11' WCI on 8/13/2021*

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 08-12-2021 | Boring Completed: 08-12-2021
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BORING LOG NO. BR80ULT-6

PROJECT: IMN-035-4(158)87--0E-77

CLIENT: HDR Engineering Inc
Omaha, Nebraska

SITE: I-80 from NEMM to US 65 Stage 5
Des Moines, Iowa

LOCATION
Northing: 603594 Easting: 1627838
Station: 5173+83 Offset: 54
Surface Elev.: 824.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.3	824	**Approx. 4" Topsoil**
		BROWN STIFF CLAY (Alluvium), moist (USCS: Lean Clay, Trace Sand) (Iowa LRFD Description: Stiff Silty Clay)
3.0	821.5	
		BROWN FINE SAND (Alluvium), moist (USCS: Fine Sand) (Iowa LRFD Description: Silty Sand) Driller's note: cobbles encountered from about 7.5 to 9.5 feet.
9.5	815	
		BROWN GRAY FIRM CLAY (Residual Shale), moist (USCS: Fat Clay, Trace Sand) (Iowa LRFD Description: Firm Silty Clay)
14.0	810.5	
		BROWN SANDSTONE*
19.0	805.5	
		BROWN HIGHLY WEATHERED SHALE*
24.5	800	
		OLIVE GRAY SHALE* , Sandy, Glauconitic

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS	SAMPLE NO.	ROCK CORE COMPRESSIVE STRENGTH (psi)	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI
5	■	10	2-2-2 N=4	1							
10	■	16	45-5-6 N=11	2							
15	■	18	18-14-17 N=31	3							
20	■	18	8-14-21 N=35	4							
	■	3	21-50/1"	5							
25			REC: 94% RQD: 67%	Run 1	6387				8	136	

WATER LEVEL OBSERVATIONS: ▽

Stratification lines are approximate. In-situ, the transition may be gradual.
*Classification estimated from core samples. Petrographic analysis may reveal other rock types.

Hammer Type: Automatic
Drill Hole

Advancement Method:
Hollow Stem Auger: 0-24'
Diamond Bit: 24.5'-50.5'

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

Notes:

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 08-11-2021 | Boring Completed: 08-11-2021
Drill Rig: 897 | Driller: CN
Project No.: 08205294

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PROJECT: IMN-035-4(158)87--0E-77

CLIENT: HDR Engineering Inc
Omaha, Nebraska

SITE: I-80 from NEMM to US 65 Stage 5
Des Moines, Iowa

LOCATION
Northing: 603594 Easting: 1627838
Station: 5173+83 Offset: 54
Surface Elev.: 824.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS	SAMPLE NO.	ROCK CORE COMPRESSIVE STRENGTH (psi)	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI
29.0	795.5													
OLIVE GRAY SHALE* , Sandy, Glauconitic *(continued)*						REC: 97% RQD: 77%	Run 2							
GRAY SHALE* , Occasionally Sandy Occasional shale seams below about 30.5 feet		30				REC: 99% RQD: 70%	Run 3	147				10	134	
		35				REC:100 % RQD: 73%	Run 4	1809				10	132	
		40				REC: 100% RQD: 88%	Run 5							
		45				REC: 100% RQD: 97%	Run 6	956				6	143	
50.5	774	50												
Boring Terminated at 50.5 Feet														

Stratification lines are approximate. In-situ, the transition may be gradual.
*Classification estimated from core samples. Petrographic analysis may reveal other rock types.

Hammer Type: Automatic
Drill Hole

Advancement Method:
Hollow Stem Auger: 0-24'
Diamond Bit: 24.5'-50.5'

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

Notes:

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 08-11-2021 | Boring Completed: 08-11-2021
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BORING LOG NO. BR80ULT-7

PROJECT: IMN-035-4(158)87--0E-77

CLIENT: HDR Engineering Inc
Omaha, Nebraska

SITE: I-80 from NEMM to US 65 Stage 5
Des Moines, Iowa

LOCATION
Northing: 603710 Easting: 1628006
Station: 5175+71 Offset: 135
Surface Elev.: 832.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.3	832	**Approx. 4" Topsoil**
		DARK BROWN FIRM CLAY (Alluvium), moist (USCS: Lean Clay, With Sand)
7.0	825.5	
		BROWN FINE TO COARSE SAND (Alluvium), wet (USCS: Fine to Coarse Sand, Trace Clay)
10.5	822	
		BROWN GRAY HIGHLY WEATHERED SHALE*
24.0	808.5	
		GRAY HIGHLY WEATHERED SHALE*

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS	SAMPLE NO.	ROCK CORE COMPRESSIVE STRENGTH (psi)	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI
	S			PB-A							34-18-16
	■	18	7-5-4 N=9	1							
5	□	8	9000+ (HP)	2					10	100	
	■	18	2-2-2 N=4	3							
	S			PB-B							
10	□	15	0 (HP)	4							
	■	13	6-10-12 N=22	5							
15	□	17	9000+ (HP)	6							
	■	18	12-21-36 N=57	7							
	S			PB-C							
20	■	18	9-16-15 N=31	8							
	■	8	42-100/4"	9							
	▪	2	100/3" SEAT	10							
25	▮▮		REC: 92% RQD: 100%	Run 1							

Stratification lines are approximate. In-situ, the transition may be gradual.
*Classification estimated from core samples. Petrographic analysis may reveal other rock types.

Hammer Type: Automatic
Drill Hole

Advancement Method:
0-24' Hollow Stem Auger, 24'-51.5' Diamond Bit

Abandonment Method:
Boring backfilled with Auger Cuttings and/or Bentonite

Notes:
PB-A obtained from about 0.3 to 7 feet.
PB-B obtained from about 7 to 10.5 feet.
PB-C obtained from about 10.5 to 20.5 feet.

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 08-30-2021 | Boring Completed: 08-30-2021
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Project No.: 08205294

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Omaha, Nebraska

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Des Moines, Iowa

LOCATION
Northing: 603710 Easting: 1628006
Station: 5175+71 Offset: 135
Surface Elev.: 832.5 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY ()	FIELD TEST RESULTS	SAMPLE NO.	ROCK CORE COMPRESSIVE STRENGTH (psi)	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI
			30				REC: 93% RQD: 100%	Run 2	1166				7	140	
			35				REC: 85% RQD: 97%	Run 3							
			40				REC: 83% RQD: 100%	Run 4	63				7	138	
			45				REC: 95% RQD: 100%	Run 5							
			50				REC: 95% RQD: 100%	Run 6	1591				6	143	

GRAY HIGHLY WEATHERED SHALE* *(continued)*

silty with occasional limestone stringers below about 36.5 feet

51.5 781

Boring Terminated at 51.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.
*Classification estimated from core samples. Petrographic analysis may reveal other rock types.

Hammer Type: Automatic
Drill Hole

Advancement Method:
0-24' Hollow Stem Auger, 24'-51.5' Diamond Bit

Abandonment Method:
Boring backfilled with Auger Cuttings and/or Bentonite

Notes:

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600 SW 7th St, Ste M
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