



US Army Corps
of Engineers



Lower Missouri River Jefferson City L-142 Flood Risk Management Feasibility Study

Final Feasibility Report and Integrated Environmental Assessment

Appendix A4 Geotechnical Borings

July 2026



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

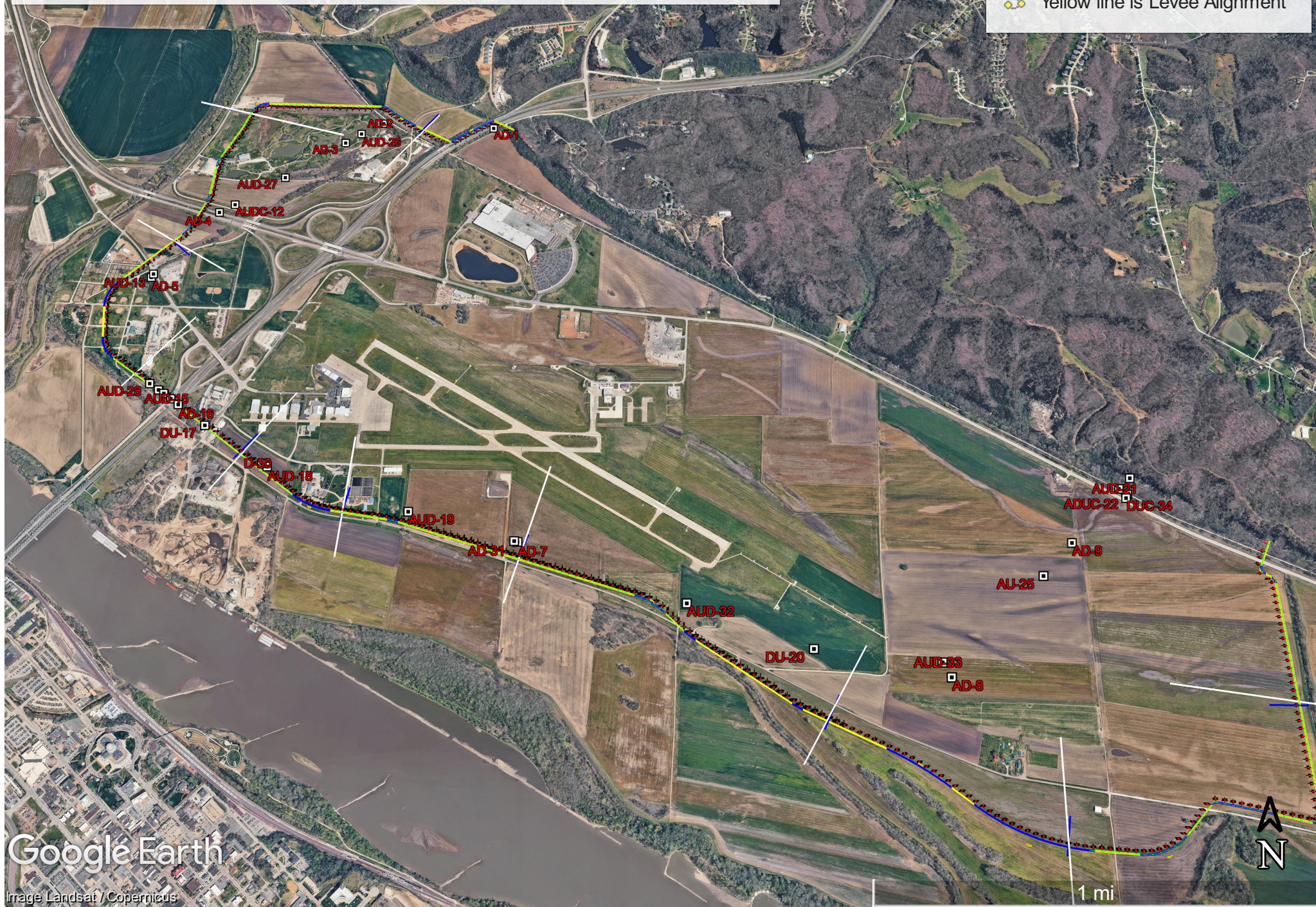
USACE Boring Data

Historical USACE BORINGS

Did not show Borings associated with Historical Borrow Areas (Not same for this project)

Legend

- ▣ USACE HISTORIC BORINGS
- Yellow line is Levee Alignment



R-bar Test Results : L-1420

Laboratory	Boring Number	Sample	Depth in feet	Effective Parameters		Material					Confining	Confining	USCS Class	Reported Soil Parameters		Test Date
				p' (tsf)	q' (tsf)	LL	PI	W, %	γmoist pcf	e _o	e _r	Stress, tsf		Cohesion, psf	φ, Degrees	
ER-DC (WES)	AUDC-12	W-20	4.5 - 6.4	0.378	0.116	36	13	26.8	115.64	0.8354	0.821	0.5	CL	0	28.8	10/22/2001
				0.687	0.278			27.9	112.94	0.8949	0.8516	1				
				0.953	0.379			27.7	114.3	0.8701	0.8064	2				
ER-DC (WES)	AUD-13	W-20	5.5 - 7.4	1.678	0.998	SM	SM	28.6	117.03	0.84	0.8220	0.5	SM	0	35.9	10/23/2001
				2.532	1.517	SM	SM	30.6	115.97	0.884	0.848	1				
				2.879	1.526	SM	SM	31.4	118.65	0.854	0.796	2				
ER-DC (WES)	AUD-13	W-30	9.0 - 10.0	4.15	2.584	SM	SM	26.9	118.91	0.766	0.733	0.5	SM	0	37	10/24/2001
				4.17	2.4	SM	SM	25.1	120.6	0.716	0.674	1				
				6.627	3.878	SM	SM	26.8	117.54	0.784	0.739	2				
ER-DC (WES)	AUD-19	W-30	7.0 - 8.9	0.38	0.18	36	12	36	115.74	1.022	0.965	0.50	CL	0	29.4	10/26/2001
				0.45	0.190			35.5	116.26	1.032	0.95	10				
				1.03	0.43			32.9	118.28	1.004	0.88	20				
ER-DC (WES)	DU-20	W-20	4.5 - 6.4	0.712	0.269	33	8	34.6	119.66	0.967	0.944	0.5	ML	0	29.1	10/30/2001
				1.061	0.3420			35	117.99	1.001	0.918	10				
				0 1.610	0.677			34.70	118.94	0.98	0.871	2				
ER-DC (WES)	AUD-21	W-3	7.5 - 9.4	0.211	0.1790	72	50	41.50	113.05	1.188	1.134	0.50	CH	250	8.4	10/31/2001
				1.315	0.316			41.8	113.58	1.182	1.012	10				
				0.724	0.214			42.7	111.88	1.229	1.139	2				
ER-DC (WES)	AU-25	W-1	2.5 - 4.40	0.870	0.37	33	10	22.0	113.87	0.816	0.746	0.5	ML	0	26.7	11/06/2001
				1.4	0.67			22.2	115	0.791	0.719	1				
				1.85	0.83			23.3	115.4	0.802	0.692	2				
MAXIM (KC)	AUDC-22	W-4	10.0 - 12.00	0.78	0.48	85	63	32.8	115.67	0.934	0.885	0.5	CH	160	29.3	05/06/2002
				1.3	0.7			32.8	117.27	0.909	0.855	1				
MAXIM (KC)	AUD-26	W-10	2.0 - 3.5	0.63	0.57	67	47	30.7	122.6	0.798	0.788	0.5	CH	560	25.5	05/06/2002
				1.16	0.63			30.7	122.6	0.799	0.750	1				
				2.43	1.25			30.7	122.6	0.796	0.703	2				
MAXIM (KC)	AUD-27	W-2	4.50 6.5	0.66	0.57	61	45	29.9	122.24	0.791	0.775	0.5	CH	140	33.4	05/06/2002
				1.2	0.66			29.9	122.24	0.791	0.747	1				
				2.34	1.26			29.9	122.89	0.781	0.738	2				
MAXIM (KC)	AUD-32	W-1	2.0 - 3.9	0.84	0.6	54	37	26.3	114.18	0.829	0.772	0.5	CH	520	25.1	06/04/2002
				2.52	1.3			26.1	117.78	0.771	0.698	2				
MAXIM (KC)	Remolded 90% ASTM D-6980	A35/A36 Sacks	< 5' - 0	0.42	0.38	44	26	21.2	114.66	0.762	0.697	0.5	CL	100	34.3	05/10/2002
				0.95	0.57			21.2	113.69	0.777	0.683	1				
				1.65	0.95			21.2	113.44	0.78	0.649	2				
MAXIM (KC)	Remolded 95% ASTM D-698	A36/A36 Sacks	< 5'	0.93	0.73	44	26	21.8	122.29	0.678	0.652	0.5	CL	700	28	06/04/2002
				1.25	0.9			22	122.73	0.676	0.631	1				
				2.25	1.38			21.9	122.5	0.677	0.627	2				

Boring Designation

AD-1

DRILLING LOG				DIVISION Northwestern		INSTALLATION				Sheet 1 of 1					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO						10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.61 E: -92.16				VERTICAL NGVD29 LOCATION METHOD:					
2. HOLE NUMBER AD-1		3. DRILLING AGENCY USACE-NWK				11. DATE BORING STARTED Apr 05 1993		COMPLETED Apr 05 1993							
4. NAME OF DRILLER R. Hunter						12. HAMMER TYPE EFFICIENCY (%)									
5. EQUIPMENT						13. SIZE AND TYPE OF BIT									
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 550.0'									
7. THICKNESS OF OVERBURDEN 25.0'						15. ELEVATION GROUND WATER 538.0' - 15 minutes after drilling									
8. DEPTH DRILLED INTO ROCK						16. TOTAL NUMBER CORE BOXES									
9. TOTAL DEPTH OF BORING 25.0'						17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist									
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
546.00	4.00	4 8 9	17		Brown, moist, soft										7" Auger, from cuttings, cleanout with 2 1/2 in spoon; D=3.5 R=0
					Brown, moist, stiff	75	Jan 1								
541.20	8.80	5 9 9	18		Brown, wet, soft, fine sand with 30% clay; soft/compact										from cuttings; D=3.5 R= 0; cleanout with 2 1/2 in spoon
					Gray, moist, stiff, Occ. (fine) sand throughout	67	Jan 2								
537.90	12.10	1 3 8	11		Gray, moist, stiff, Occ. (fine) sand throughout										from cuttings, D=3.5 R= 0, cleanout with 2 1/2 in spoon
					Gray, wet, stiff to medium stiff, fine sand with 30-40% clay	73	Jan 3								
532.60	17.40	1 5 12	17		Gray, wet, medium compact, fine/medium grained										from cuttings, D=3.5 R= 0, cleanout with 2 1/2 in spoon
531.90	18.10				Light brown tan, wet, medium compaction, fine sand	87	Jan 4								
529.80	20.20	16 23 23	46		Borehole finished at 25.0										from cuttings, D=3.5 R= 0, cleanout with 2 1/2 in spoon
525.00	25.00					60	Jan 5								

Boring Designation

AD-2

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 1					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
2. HOLE NUMBER AD-2					3. DRILLING AGENCY USACE-NWK			LOCATION METHOD:					
4. NAME OF DRILLER R. Hunter					11. DATE BORING Apr 08 1993			COMPLETED Apr 08 1993					
5. EQUIPMENT					12. HAMMER TYPE			EFFICIENCY (%)					
6. DIRECTION OF BORING Vertical					DEG FROM VERTICAL 0		BEARING						
7. THICKNESS OF OVERBURDEN 24.6'					14. ELEVATION SURFACE 550.0'			- No water level taken after drilling					
8. DEPTH DRILLED INTO ROCK					15. ELEVATION GROUND WATER 535.9'								
9. TOTAL DEPTH OF BORING 24.6'					16. TOTAL NUMBER CORE BOXES			17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist					
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
546.90	3.10		Brown, stiff, Damp, roots		Jar 1								D= 4.6 R=4.3
545.40	4.60		Dark brown, very stiff, Damp		Jar 2								
541.70	8.30		Light brown and gray, moist, very stiff to stiff, damp/moist, mottled appearance		Jar 3								D= 5 R= 5
530.70	19.30		Light brown tan, moist, loose, Damp/moist, fine (sand), clay seam at 18.8 feet		Jar 4								D= 5 R= 4
					Jar 5								D= 5 R= 1.7
					Jar 6								D= 5 R= 1.4
525.40	24.60		Brown, loose, Saturated, fine/med sand- 30%/ 70%		Jar 7								
			Borehole finished at 24.6										

Boring Designation

AD-3

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 1						
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.61 E: -92.17			VERTICAL NGVD29 LOCATION METHOD:						
2. HOLE NUMBER AD-3		3. DRILLING AGENCY USACE-NWK			11. DATE BORING STARTED Apr 05 1993		COMPLETED Apr 05 1993							
4. NAME OF DRILLER R. Hunter					12. HAMMER TYPE EFFICIENCY (%)									
5. EQUIPMENT					13. SIZE AND TYPE OF BIT									
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 550.0'								
7. THICKNESS OF OVERBURDEN 24.5'					15. ELEVATION GROUND WATER 537.2' - overnight									
8. DEPTH DRILLED INTO ROCK					16. TOTAL NUMBER CORE BOXES									
9. TOTAL DEPTH OF BORING 24.5'					17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS	
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
548.00	2.00		Brown, moist, stiff, Fill; occ. sand											
547.00	3.00		Brown, moist, stiff, 2 feet= top of natural ground		Jar 1									D= 4.5 R= 3.5
			Brown gray, moist, stiff, occ. sand, occ. rust stains; grades into clayey sand											
544.00	6.00			Jar 2										
			Light brown, moist, medium compact; fine sand with 10-20% clay											
542.00	8.00			Jar 3										D= 3.0 R= 4.7
			Light brown tan, moist, medium compact; damp/moist; clean, fine; 13-13.5 feet clay seam											
				Jar 4										
536.50	13.50				Jar 5								D= 5.0 R= ?; 13.1 feet encountered water level during drilling	
			Brown, loose, Saturated, coarse/med											
				Jar 6										
531.90	18.10												D= 5.0 R= 3.0	
			Brown, loose, saturated, fine; coarsened with depth											
				Jar 7										
525.50	24.50				Jar 8								D= 5.0 R= ?	
			Borehole finished at 24.5											

Boring Designation

AD-4

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AD-4				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES N: 38.60 E: -92.17									
4. NAME OF DRILLER R. Hunter				11. DATE BORING Apr 06 1993		COMPLETED Apr 06 1993									
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)									
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING									
7. THICKNESS OF OVERBURDEN 25.0'				14. ELEVATION SURFACE 550.0'		15. ELEVATION GROUND WATER 537.9'									
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papeirnik, Field Geologist									
9. TOTAL DEPTH OF BORING 25.0'				13. SIZE AND TYPE OF BIT											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
547.30	2.70			15	Brown, moist, medium density; occ. sand 0-5%										D= 3.5 R= 0; from cuttings, clenout with 2 1/2 in spoon
		3			Brown dark brown, stiff to very stiff, Damp	87	Jar 1								
544.60	5.40	6			Brown, moist, stiff, Sandy Clay; Clay with 40-50% fine sand										
		9		23											D= 3.5 R= 0; from cuttings, 2 1/2 in spoon
541.20	8.80	3			Brown light brown, moist, loose, fine sand; micaceous; 18.5-19 feet clay seam	80	Jar 2								
		11													
		12		10											D= 3.5 R= 0; cleanout with 2 1/2 in spoon, from cuttings, 12.1 water level encountered during drilling
		4													
		5													
		5		8											D= 3.5 R= 0; cleanout with 2 1/2 in spoon
		2													
528.40	21.60	4													
		4		25											D= 3.5 R= 0; cleanout with 2 1/2 in spoon, from cuttings
		2			Brown, loose, loose/medium consistency; saturated; fine-med sand - 50-50%										
525.00	25.00	10													
		15													
					Borehole finished at 25.0										

Boring Designation

AD-5

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 2					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
2. HOLE NUMBER AD-5					3. DRILLING AGENCY USACE-NWK			LOCATION COORDINATES N: 38.60 E: -92.18					
4. NAME OF DRILLER R. Hunter					11. DATE BORING Apr 07 1993			COMPLETED Apr 07 1993					
5. EQUIPMENT					12. HAMMER TYPE			EFFICIENCY (%)					
6. DIRECTION OF BORING Vertical					DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 548.0'				
7. THICKNESS OF OVERBURDEN 35.0'					15. ELEVATION GROUND WATER 535.5'		Water level not obtained after drilling						
8. DEPTH DRILLED INTO ROCK					16. TOTAL NUMBER CORE BOXES								
9. TOTAL DEPTH OF BORING 35.0'					17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papeirnik, Field Geologist								
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
544.50	3.50		Light brown, stiff, (fill); silty sandy lean clay; damp; clay with 10-20% fine sand; roots		Jar 1								D= 5 R= 4.5
539.20	8.80		Dark brown, stiff, (Fill); silty lean clay; Damp		Jar 2								D= 5 R= 5
534.20	13.80		Dark gray, very stiff, (fill); silty lean clay; damp; occ. sand; sand content increases with depth		Jar 3								D= 5 R= 5; 12.5 feet water encountered while drilling
526.90	21.10		Gray, Top of natural ground; medium compaction; fine sand with 20-30% clay; occ sand seams (14.5-15ft)		Jar 4								D= 5 R= 2; material not feeding up barrel
523.80	24.20		Dark gray, dense, Saturated; silt with 40-50% fine sand		Jar 6								D= 5 R= 3.5; material not feeding up barrel well
520.00	28.00		Light gray, wet, Medium soft; 24.2-24.7 feet fat clay ; 26.2-27 feet clayey sand seam		Jar 7								D= 5 R= 5
			Dark gray, stiff, Saturated; organics (leaves); fine/med sand with 30-40% clay; 29.5-29.6 feet fat clay seam		Jar 8								

(continued on next page)

DRILLING LOG (Cont Sheet)				INSTALLATION				Sheet 2 of 2						
PROJECT L-142 Levee Jefferson City Jefferson City, MO				COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)				VERTICAL NGVD29						
				LOCATION COORDINATES N: 38.60 E: -92.18				LOCATION METHOD:						
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY						REMARKS		
						Gravel	Sand	Fines	LL	PI	MC		ASTM Class	
517.40	30.60		Dark gray, stiff, Saturated; organics (leaves); fine/med sand with 30-40% clay; 29.5-29.6 feet fat clay seam										D= 5 R= 4	
				Gray, Medium; saturated; fine-med grained sand (75%/25%)		Jan 9								
514.00	34.00													
513.00	35.00		Light gray, wet, stiff, close to a fat clay		Jan 10									
			Borehole finished at 35.0											

Boring Designation

AD-6

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AD-6				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES N: 38.59 E: -92.17									
4. NAME OF DRILLER R. Hunter				11. DATE BORING Apr 07 1993		COMPLETED Apr 07 1993									
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)									
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING									
7. THICKNESS OF OVERBURDEN 25.0'				14. ELEVATION SURFACE 545.0'		15. ELEVATION GROUND WATER 537.2'									
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR									
9. TOTAL DEPTH OF BORING 25.0'				17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
541.90	3.10				Dark brown light brown, moist, stiff, (fill); silty lean clay; trash, gravel, etc.		Jan 1								D= 3.5 R= 0; cleanout with 2 1/2 in spoon
		4		11	Light brown, moist, stiff, Clayey silt; top of natural ground; 0-10% fine sand; silt with 30-40% clay	53	Jan 2								
		4													
		7													
537.60	7.40				Brown, Medium compaction; saturated; fine sand with 20% silt, clay										D= 3.5 R= 0; cleanout with 2 1/2 in spoon; water level 7.8' while drilling
		5		19		80	Jan 3								
		9													
		10													
532.50	12.50				Brown tan, Medium compaction/loose; saturated; fine sand; clean; 19.2-19.7 feet fat clay seam										D= 3.5 R=0; cleanout with 2 1/2 in spoon
		1		26		60	Jan 4								
		12													
		14													
525.30	19.70				Light gray, loose, Saturated; occ. fine gravel (s-banded); fine-coarse sand (36%/60%); 10% med sand	100	Jan 5								D= 3.5 R= 0; cleanout with 2 1/2 in spoon
		6		21											
		8													
		13													
520.00	25.00														D= 3.5 R= 0
		20		47											
		25													
		22					93	Jan 6							
					Borehole finished at 25.0										

Boring Designation

AD-7

DRILLING LOG				DIVISION Northwestern		INSTALLATION				Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.59 E: -92.16				VERTICAL NGVD29 LOCATION METHOD:									
2. HOLE NUMBER AD-7		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Apr 06 1993		COMPLETED Apr 06 1993											
4. NAME OF DRILLER R. Hunter				12. HAMMER TYPE				EFFICIENCY (%)									
5. EQUIPMENT				13. SIZE AND TYPE OF BIT													
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 544.0'											
7. THICKNESS OF OVERBURDEN 25.0'				15. ELEVATION GROUND WATER 535.0'		- after drilling											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES													
9. TOTAL DEPTH OF BORING 25.0'				17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist													
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS		
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class			
540.20	3.80	3	16		Brown dark brown, moist, stiff		Jar 1								D= 3.5 R= 0; cleanout with 2 1/2 spoon		
		8															
537.80	6.20	8	16		Brown, moist, medium compaction; fine sand with 30-40% clay	73	Jar 2								D= 3.5 R= 0; cleanout with 2 1/2 in spoon		
		9	12		Brown, moist, loose, fine grained; micaceous; 0-10% clay; 8.5-9 feet clayey sand seam; cleaner with depth; saturated with depth	73	Jar 3								D= 3.5 R= 0; cleanout with 2 1/2 in spoon		
		7															
		5															
		5	20			80	Jar 4								D= 3.5 R= 0; cleanout with 2 1/2 in spoon		
		10															
		10															
524.80	19.20	5	25		Brown tan, loose, loose/med; saturated; med sand; occ. fine sand; clean	60	Jar 5								D= 8.5 R= 0; cleanout with 2 1/2 in spoon		
		9															
		16															
		10	38			87	Jar 6								D= 3.5 R= 0; cleanout with 2 1/2 in spoon		
		15															
519.00	25.00	23															
					Borehole finished at 25.0												

Boring Designation

AD-8

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 1					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
2. HOLE NUMBER AD-8					3. DRILLING AGENCY USACE-NWK			LOCATION COORDINATES N: 38.58 E: -92.14					
4. NAME OF DRILLER R. Hunter					11. DATE BORING Apr 06 1993			COMPLETED Apr 06 1993					
5. EQUIPMENT					12. HAMMER TYPE			EFFICIENCY (%)					
6. DIRECTION OF BORING Vertical					DEG FROM VERTICAL 0		BEARING						
7. THICKNESS OF OVERBURDEN 24.6'					14. ELEVATION SURFACE 540.0'			- No water level taken after drilling					
8. DEPTH DRILLED INTO ROCK					15. ELEVATION GROUND WATER 534.8'								
9. TOTAL DEPTH OF BORING 24.6'					16. TOTAL NUMBER CORE BOXES			17. SIGNATURE AND TITLE OF INSPECTOR Chrisopher Papiernik, Field Geologist					
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
537.70	2.30		Brown, moist, stiff		Jar 1								D= 4.6 R= 4.3
534.00	6.00		Brown, wet to moist, medium compaction; fine sand with 20-25% clay; 3.3-3.4 feet clay seam		Jar 2								D= 5 R= 2.3; material not feeding up tube; 5.2 feet, water encountered during drilling
524.30	15.70		Brown, medium; saturated; fine sand; 0-5 % clay content		Jar 3								D= 5 R= 3.3; material not feeding up barrel
519.70	20.30		Light brown, loose, loose/medium; saturated; clean; fine, medium sand (50/50); occ. wood		Jar 4								D= 5 R= 4.4
515.40	24.60		Gray with brown, medium compaction; saturated; fine sand; occ. wood		Jar 5								D= 5 R= 4.7; all material not feeding up
			Borehole finished at 24.6		Jar 6								

Boring Designation

AD-9

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 1					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
2. HOLE NUMBER AD-9					3. DRILLING AGENCY USACE-NWK			LOCATION METHOD:					
4. NAME OF DRILLER R. Hunter					11. DATE BORING Apr 07 1993			COMPLETED Apr 07 1993					
5. EQUIPMENT					12. HAMMER TYPE			EFFICIENCY (%)					
6. DIRECTION OF BORING Vertical					DEG FROM VERTICAL 0		BEARING						
7. THICKNESS OF OVERBURDEN 24.7'					14. ELEVATION SURFACE 545.0'			- water level not taken after drilling					
8. DEPTH DRILLED INTO ROCK					15. ELEVATION GROUND WATER 536.0'								
9. TOTAL DEPTH OF BORING 24.7'					16. TOTAL NUMBER CORE BOXES			17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist					
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
543.50	1.50		Dark brown, stiff, Damp		Jar 1								D= 4.7 R= 4.8
542.60	2.40		Brown, moist, stiff, Clay with 10-20% fine sand										
541.70	3.30		Yellow brown, medium; damp; fine sand with 10-20% clay		Jar 2								
			Gray brown, medium; damp; occ. rust stains; fine sand		Jar 3								D= 5 R= 5; water level 9' while drilling
538.20	6.80												
			Gray brown, moist, stiff to very stiff, iron oxide staining, occ. sand 0-10%; very close to a fat clay		Jar 4								
													D= 5 R= 5
530.90	14.10												
			Brown, medium; saturated; fine sand; clean; micaceous; occ. rust staining		Jar 5								
													D= 5 R= 4
524.30	20.70				Jar 6								
			Gray with brown, medium compaction; saturated; gray with brown lenses; fine sand; micaceous										
520.30	24.70				Jar 7								D= 5 R= 4
			Borehole finished at 24.7										

Boring Designation

AD-10

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 1					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
2. HOLE NUMBER AD-10					3. DRILLING AGENCY USACE-NWK			LOCATION COORDINATES N: 38.59 E: -92.13					
4. NAME OF DRILLER R. Hunter					11. DATE BORING Apr 06 1993			COMPLETED Apr 07 1993					
5. EQUIPMENT					12. HAMMER TYPE			EFFICIENCY (%)					
6. DIRECTION OF BORING Vertical					DEG FROM VERTICAL 0		BEARING						
7. THICKNESS OF OVERBURDEN 19.6'					14. ELEVATION SURFACE 540.0'			water level after drilling was not obtained					
8. DEPTH DRILLED INTO ROCK					15. ELEVATION GROUND WATER 529.7'			obtained					
9. TOTAL DEPTH OF BORING 19.6'					16. TOTAL NUMBER CORE BOXES			17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist					
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
539.00	1.00		Dark brown, moist, stiff		Jar 1								D= 4.6 R= 4.5
			Brown, moist to wet, medium; occ. sand; high silt content +50%		Jar 2								
537.40	2.60		Brown, moist, stiff		Jar 3								
533.40	6.60		Brown, wet, medium comp; wet/saturated; rusty brown; fine sand with 30-40% clay; micaceous; 12.9-13.4 feet clay seam		Jar 4								D= 5 R= 4; material not feeding up
					Jar 5								
526.60	13.40		Brown, loose, loose/med; saturated; med-fine sand (20%/70%); micaceous; occ. fine gravel; sub rounded		Jar 6								
520.40	19.60		Borehole finished at 19.6		Jar 7								D= 5 R= 2.6; material not feeding up tube

Boring Designation

AUDC-12

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 4									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AUDC-12		3. DRILLING AGENCY USACE-NWK		11. DATE BORING Aug 17 2001		LOCATION METHOD: COMPLETED Aug 17 2001									
4. NAME OF DRILLER D. Marquis				12. HAMMER TYPE EFFICIENCY (%)											
5. EQUIPMENT				13. SIZE AND TYPE OF BIT											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 554.0'									
7. THICKNESS OF OVERBURDEN 109.7'				15. ELEVATION GROUND WATER 539.9'											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 109.7'				17. SIGNATURE AND TITLE OF INSPECTOR Rachel Francks, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
549.50	4.50				Grayish brown, medium stiff to stiff, Damp: occ. gravel (0-2'), logged by cuttings, roots, lignite; hairline fracture (2-2.5')		Wax 1 Jar 1								Cleanout Push-1 Time: 8 secs Pressure: 1000lbs Push: 2' Recov: 2' (.5, .25, .4) Cleanout
547.00	7.00				Brown, wet, soft, fracture @ 4.9'		Wax 2 Jar 2								Push-2 5" Shelby Tube Time: 7 sec Pressure: 1000 Push: 2' Recov: 2' (torv: .2, .2, .25) Clean Out
545.70	8.30				Brown, wet, soft, Sandy Silt (fine); lignite		Wax 3 Jar 3								Push-3 5" Shelby Tube Time: 7 sec Pressure: 1000psi Push: 2' Recov: 2' (torv: .01, .01, .01) Clean out
544.10	9.90				Brown, wet, soft, Silty Lean Clay; lignite stains; fracture @ 9.6 and 9.9'; really wet to saturated at fractures		Wax 4 Jar 4								Push-4 Time: 7 sec Pressure: 1000psi Push: 2' Recov: 2' (.1, .07, .1) Push-5 Time: 10 sec Press: 1000psi Push- 2' Recov: 1.7' Cleanout Cleanout
542.80	11.20				Brown, wet, soft, Clayey Silt; lignite present; fracture @ 10.2'		Wax 5 Jar 5								
542.50	11.50				Brown, wet, silty fine sand; slightly compacted										
539.00	15.00				Grayish brown to reddish brown, Fine-grained, silty sand; medium compact; damp										
534.00	20.00	12 12 10	22		Reddish brown, moist, Sand (fine); well sorted	100	Jar 6								
529.00	25.00	8 10 8	18		Brown, moist, medium dense, Sand (fine to medium grained)	67	Jar 7								Clean Out
524.00	30.00	6 8 10	18		Brown, wet, loose, Fine to coarse grained sand, somewhat well sorted	60	Jar 8								Cleanout
					Brown, wet, medium dense to loose, Sand (fine to very coarse grained) with pebbles; poorly sorted										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.60

E: -92.17

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
519.00	35.00	12	28		Brown, wet, medium dense to loose, Sand (fine to very coarse grained) with pebbles; poorly sorted	87	Jar 9								Cleanout
		16													
514.00	40.00	11	30		Brown, Fine grained sand; medium compact; well sorted; saturated	87	Jar 10								Cleanout
		13													
		17													
509.00	45.00	9	20		Brown, loose, Fine grained sand to pebbles; medium compact to loose; saturated; poorly sorted	100	Jar 11								Cleanout
		10													
		10													
504.00	50.00	11	WO		Brown, wet, medium dense to loose, Sand (fine to pebbles); poorly sorted	100	Jar 12								Clean out
503.50	50.50	27	69		Gray, moist, Fine grained sand; medium compact; well sorted	100	Jar 13								Cleanout
503.00	51.00	38			Gray, moist, very dense, Fine grained sand; well sorted										
		31			Loose, Pebbles; well sorted; saturated; multi-colored										
499.00	55.00		29		Gray, wet, medium dense to loose, Sand (coarse to large pebbles with clay); poorly sorted	100	Jar 14								Clean Out
		12													
		14													
496.00	58.00	15	27		Gray, loose, Coarse sand to large pebbles with clay; poorly sorted; medium compact to loose; saturated	67	Jar 15								Cleanout
494.00	60.00														
489.00	65.00	15	18		Gray, wet, loose, Coarse sand to large pebbles with clay; medium compact to loose; poorly sorted	67	Jar 16								Cleanout
		12													
		15													
		10	18		Gray, loose to very loose, Coarse sand to large pebbles with some clay; poorly sorted, subangular to rounded; saturated	67	Jar 16								Cleanout
		8													
		10													

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

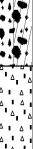
NGVD29

LOCATION COORDINATES

N: 38.60

E: -92.17

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
479.00	75.00		30		Gray, loose to very loose, Coarse sand to large pebbles with some clay; poorly sorted, subangular to rounded; saturated	100	Jar 17								Clean Out
		10													
		12													
474.00	80.00	18	20		Gray, very loose, Coarse sand to large pebbles with clay; poorly sorted, subangular to rounded; saturated	100	Jar 18								Cleanout
		16													
		10													
469.00	85.00	10	23		Gray, wet, very loose, Sand (coarse to large pebbles w/ some clay; poorly sorted; subangular to rounded	100	Jar 19								Clean Out
		8													
		12													
464.00	90.00	11	26		Grayish, very loose, Coarse sand to small pebbles; subangular to rounded; moderate sorting; saturated	67	Jar 20								Cleanout
		17													
		14													
459.00	95.00	12	20		Wet, very loose, Sand (very coarse to small pebbles); subangular to rounded; moderately well sorted; multicolored	100	Jar 21								Clean Out
		10													
		10													
457.00	97.00	12	30		Grayish, wet, very loose, Coarse sand to large pebbles with clay; some spots of soft cohesion; subangular to rounded; poor sorting; wet to saturated	100	Jar 22								Set 100.4' of casing; 4" flush cleanout with 2 5/8" rock bit; Driller miscounted rods and cleaned out 5' of bedrock, called into office was instructed to continue boring without redrill.
		14													
		16													
					LIMESTONE, limestone with vugs present										
							Box 1								

(continued on next page)

AUDC-12

USACE FORM 1836 Boring Designation AUDC-12 Sheet 4 of 4

DRILLING LOG				DIVISION Northwestern		INSTALLATION				Sheet 1 of 3					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO						10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)				VERTICAL NGVD29					
2. HOLE NUMBER AUD-13						3. DRILLING AGENCY USACE-NWK				LOCATION COORDINATES N: 38.60 E: -92.18					
4. NAME OF DRILLER M. Cooney						11. DATE BORING Jul 31 2001				COMPLETED Aug 01 2001					
5. EQUIPMENT						12. HAMMER TYPE Automatic, 140 lb									
6. DIRECTION OF BORING Vertical						DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 553.0'					
7. THICKNESS OF OVERBURDEN 71.5'						15. ELEVATION GROUND WATER 548.9' - free water									
8. DEPTH DRILLED INTO ROCK						16. TOTAL NUMBER CORE BOXES									
9. TOTAL DEPTH OF BORING 71.5'						17. SIGNATURE AND TITLE OF INSPECTOR Ronald Parker, Field Geologist									
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
550.00	3.00	3	15		Brown, stiff, Damp; few limestones gravels	73	Jan 1								Clean-out 1 5 5/8" rock bit
548.90	4.10	7			Light grayish brown, stiff, Damp; siltier than above, micaceous		Wax 1								Push-1 Time: 15 sec Pressure: 1200psi D: 2 R: 2 (Torvane: .35, .55, .40)
		8						Jan 2							
		1	3		Light grayish brown, wet, soft, alternating light-gray brown and dark-gray bands of clayey silts; micaceous throughout; free water; roots	100	Jan 3								
		1						Wax 2							Push-2 Time: 10 sec Pressure: 1000psi D: 2 R: 1.8 (Torv: .25, .15, .15)
		1	3					Jan 4							
		1						Jan 5							
542.80	10.20	2						Wax 3							Push-3 Time: 15 sec Pressure: 1200psi D: 2 R: 2.2 (Torv: .07, .06, .02)
		6	16		Light grayish brown, wet, loose, Very fine sand; free water	100	Jan 6								
		10						Jan 7							
		2	9											Clean-out-2 with 4 1/4" rock bit	
		3					47	Jan 8							
		6												Clean-out-3 with 4 1/4" rock bit	
533.00	20.00	4	15		Light gray and light brown, wet, loose, Fine and medium sand; alternating cones from medium to fine light-gray to brown to tan; with occasional coarse lenses; thin layers of coarse sand intervals between 20-30'		Jan 9								
		7												Clean-out-4 with 4 1/4" rock bit	
		8													
		4	16				80	Jan 10							
		8												Clean-out-5 with 4 1/4" rock bit	
523.00	30.00	8													
		9			Light gray to gray, loose, Fine to medium sand; saturated										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 3

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.60

E: -92.18

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
513.00	40.00	18	28		Light gray to gray, loose, Fine to medium sand; saturated	67	Jan 11								Clean-out-6 with 4 1/4" rock bit
		10													
		3	16			80	Jan 12								
		5													
501.50	51.50	11			Light to gray, loose, Medium to coarse sand; saturated										Clean-out-7 with 4 1/4" rock bit
		3	16			73	Jan 13								
		7													
		9													
498.00	55.00	0	12		Light gray, loose, Coarse and gravelly sand; saturated; determine by chattering of rig while rock-biting the clean-out interval	53	Jan 14								Clean-out-8 with 4 1/4" rock bit
		4													
		8													
		10	24			60	Jan 15								
		12			Light gray, loose, Confirmed sample of coarse to gravelly sand; saturated; limestone gravel clasts; subrounded; chert, black and light gray										Clean-out-9 with 4 1/4" rock bit
		10	17				Jan 16								
		7													
		10													
		9	19			67	Jan 17								Clean-out-10 with 4 1/4" rock bit
		9													
		10													
		9	19												
		9				100	Jan 18								Clean-out-11 with 4 1/4" rock bit
		9													
		10													
		10													
		9	19												Clean-out-12 with a 4 1/4" rock bit
		9													
		10													
		10													

(continued on next page)

AUD-13

USACE FORM 1836 Boring Designation AUD-13 Sheet 3 of 3

DRILLING LOG				DIVISION Northwestern		INSTALLATION				Sheet 1 of 3					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO						10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.59 E: -92.17				VERTICAL NGVD29					
2. HOLE NUMBER AUD-14		3. DRILLING AGENCY USACE-NWK				11. DATE BORING Aug 02 2001		STARTED Aug 02 2001		COMPLETED Aug 03 2001					
4. NAME OF DRILLER M. Cooney						12. HAMMER TYPE Automatic									
5. EQUIPMENT						13. SIZE AND TYPE OF BIT									
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 549.0'									
7. THICKNESS OF OVERBURDEN 71.5'						15. ELEVATION GROUND WATER 545.0'									
8. DEPTH DRILLED INTO ROCK						16. TOTAL NUMBER CORE BOXES									
9. TOTAL DEPTH OF BORING 71.5'						17. SIGNATURE AND TITLE OF INSPECTOR Ronald Parker, Field Geologist									
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
547.00	2.00	3	8		Dark brown, moist, medium stiff, roots	80	Jar 1								Clean-out-1 with 5 5/8" rock bit
546.30	2.70	4			Dark brown, moist, stiff		Wax 1								
545.00	4.00	4			Tan to light brown, moist, Clayey silt to sand; loosely compact; soft-moist										
		0	2		Tan to light brown, soft, Clayey silt; loosely compact; saturated	80	Jar 3								Push-1 Time: 12 sec Pressure: 1500psi D: 2 R: 1.9 (Torv: >1, .08, .15)
		1													
		1													
		0	4				Jar 4								Clean-out-2 with 5 5/8" rock bit
		2													
		2													
534.00	15.00						Jar 5								Push-2 Time: 10 sec Pressure: 900 D: 2 R: .7 (sample fell out of shelby tube)
		2	3		Gray, very soft, Very fine silty sand; loosely compact; saturated	33	Jar 6								Clean-out-3 with 4 1/4" rock bit
		2													
		1													
528.50	20.50	2	21		Gray, loose, Fine-sand; saturated	73	Jar 7								Clean-out-4 with 4 1/4" rock bit
		9													
		12													
			16				Jar 8								Clean-out-5 with 4 1/4" rock bit
		2					Jar 9								Clean-out-6 with 4 1/4" rock bit
		7													
		9													

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 3

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.59

E: -92.17

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
		14 15	29		Gray, loose, Fine-sand; saturated	87	Jan 10								Clean-out-7 with 4 1/4" rock bit
		6 6 10	16			87	Jan 11								Clean-out-8 with 4 1/4" rock bit
		10 8 9	17			80	Jan 12								Clean-out-9 with 4 1/4" rock bit
		5 10 10	20			67	Jan 13								Clean-out-10 with 4 1/4" rock bit
499.00	50.00	6 10 10	20		Gray, loose, Fine to medium sand; saturated	80	Jan 14								Clean-out-11 with 4 1/4" rock bit
494.00	55.00	5 5 5	10		Gray, loose, Medium to coarse sand and gravel; saturated	20	Jan 15								Clean-out-12 with 4 1/4" rock bit; contains a lot of coarse gravel, rig chattered
492.50	56.50				Gray, loose, Coarse sand and gravel; saturated; limestone cobbles; well-rounded										
		18 8 9	17			100	Jan 16								Clean-out-13 with 4 1/4" rock bit
		11 14 15	29			100	Jan 17								

(continued on next page)

AUD-14

USACE FORM 1836 Boring Designation AUD-14 Sheet 3 of 3

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 3									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AD-15		3. DRILLING AGENCY USACE-NWK		11. DATE BORING Aug 01 2001		COMPLETED Aug 02 2001									
4. NAME OF DRILLER M. Cooney				12. HAMMER TYPE		EFFICIENCY (%)									
5. EQUIPMENT				13. SIZE AND TYPE OF BIT											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE '									
7. THICKNESS OF OVERBURDEN 71.5'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 71.5'				17. SIGNATURE AND TITLE OF INSPECTOR Ronald Parker, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	5.00				Brown, dry, medium stiff, SILTY LEAN CLAY; roots, cobbles and limestone, brick		Bag 1								D= 5 R= .6; collected sample from cuttings
	11.00				Light brown to brown, moist, soft, Silty fat clay; soft to medium; damp to moist; mottled, still has limestone clasts		Bag 2								D= 5 R= 2.5
	20.50				Dark brown, moist, soft, Silty lean to fat clay; limestone cobbles, more cobbles in 15-20' Auger, rig chattered from 17-20'		Bag 3								D= 5 R= 2
	21.50				Light brown, moist, soft, Silty fat clay; gets siltier near base		Jar 2								
	25.00				Light grayish brown, wet, very soft, Clayey silty sand; measured water line in hole at 22' (free water)		Bag 4								D= 5 R= 3; changed from augers to mud rotary, clean-out with 4 1/4" rock bit to 25'
		7 9 14	23		Light brown to light grayish brown, loose, Very fine sand; saturated; occasional streaks of organics	100	Jar 3								Clean-out 1 with 4 1/4" rock bit
		4													

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 3

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
		7 8	15		Light brown to light grayish brown, loose, Very fine sand; saturated; occasional streaks of organics	80	Jar 4								Clean-out with 4 1/4" rock bit
	35.00														
	35.70	4 7 7	14		Grayish brown to gray, soft, saturated	87	Jar 5								Clean-out with 4 1/4" rock bit
					Gray, loose, saturated; fine-sand		Jar 6								
	40.00														Clean-out with 4 1/4" rock bit
		7 9 9	18		Gray, loose, Medium to coarse sand; saturated	73	Jar 7								
															Clean-out with 4 1/4" rock bit
		8 7 5	12			60	Jar 8								
															Clean-out with 4 1/4" rock bit
		3 5 6	11			53	Jar 9								
															Clean-out with 4 1/4" rock bit
		7 8 9	17			60	Jar 10								
															Clean-out with 4 1/4" rock bit
		6 12 13	25			80	Jar 11								
	65.00														Clean-out with 4 1/4" rock bit; drill rig chattering during clean-out from 65-70. Probably more gravelly sand
		14 9 10	19		Gray, loose, Coarse to gravelly sand; saturated; granite, chert, and limestone gravel, well rounded	100	Jar 12								

(continued on next page)

DRILLING LOG (Cont Sheet)					INSTALLATION					Sheet 3 of 3					
PROJECT L-142 Levee Jefferson City Jefferson City, MO					COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)					VERTICAL NGVD29					
					LOCATION COORDINATES					LOCATION METHOD:					
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
					Gray, loose, Coarse to gravelly sand; saturated; granite, chert, and limestone gravel, well rounded										Clean-out with 4 1/4" rock bit
	71.50	13 12 14	26			67	Jan 13								
					Borehole finished at 71.5										

Boring Designation

AD-16

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 3									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AD-16				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES									
4. NAME OF DRILLER M. Cooney				11. DATE BORING Jul 24 2001		COMPLETED Jul 27 2001									
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)									
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING									
7. THICKNESS OF OVERBURDEN 71.5'				14. ELEVATION SURFACE 552.0'		15. ELEVATION GROUND WATER									
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR									
9. TOTAL DEPTH OF BORING 71.5'				Ronald Parker, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
547.00	5.00				Dark brown, dry, very soft, Gravelly silty lean clay; very soft to medium; gravel to cobble-size clasts										Gray limestone cobble clogged inner barrel sampler
		2	5		Light brown, moist to wet, very soft, silty to sandy; sands- very fine- distinct sand grains; zones of free water; see some laminated zones, water level at 7.7 feet on 7-30-01 before grouting hole	87	Jar 1								Auger 2
		2													
		3													
			9												
540.00	12.00	4			Light gray, loose to soft, Very fine sand; saturated; free water, some organic zones, micaceous	80	Jar 2								Auger 3
		4													
		4													
		5													
			WO												
			H												
532.00	20.00														Stopped on 7-24-01, started on 7-26-01; clean-out: mud rotary with 4 1/4" rock bit to 20'; flood sump
		2	4		Light gray, wet, very soft, Silty lean clay; back is clay- not sure where clay started; could start in the clean out area from 16.5-20'	27	Jar 4								
		2													
		2													
			10		Light gray, wet, loose, Very fine sand; wet and saturated; <10% clay	40	Jar 5								Clean-out: mud rotary with 4 1/4" rock bit
527.00	25.00	4													
		5													
		5													
522.00	30.00	4			Gray, wet, loose, Medium to coarse sand; wet and saturated; no clay to very little; cuttings in clean-out (4 showed loose coarse sand toe)										Clean-out 3

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 3

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
517.00	35.00	4	8		Gray, wet, loose, Medium to coarse sand; wet and saturated; no clay to very little; cuttings in clean-out (4 showed loose coarse sand toe)	53	Jar 6								Clean-out 4
		4													
512.00	40.00	3	10		Gray, wet, loose, Coarse sand to gravelly sand; wet and saturated; no clay	33	Jar 7								Clean-out 5
		5													
		5					Jar 8: taken from cuttings								
		3	7		Gray, wet, loose, Gravelly sand; wet and saturated; limestone gravel, well rounded gravel, chert gravel, clean gravelly sand; contain some coal clasts (black coal)	13	Jar 9								Clean-out 6
		3													
		4													
		5	9			33	Jar 10								Clean-out 7
		5													
		4													
		6	21			33	Jar 11								Clean-out; stop on 7-26-01, start on 7-27-01
		11													
497.00	55.00	10													
		21	24		Tan to grayish tan, wet, loose, Coarse sand; wet and saturated; finer than previous interval; not as clean as above	40	Jar 12								Clean-out 9
		11													
		13													
		15	29			40	Jar 14								Clean-out 10
		15													
487.00	65.00	14													
		13	25		Light gray, wet, loose, Coarse to gravelly sand; wet and saturated; limestone gravel, well rounded, not as clean as above	33	Jar 15								
		12													
		13													

(continued on next page)

DRILLING LOG (Cont Sheet)					INSTALLATION					Sheet 3 of 3					
PROJECT L-142 Levee Jefferson City Jefferson City, MO					COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)					VERTICAL NGVD29					
					LOCATION COORDINATES					LOCATION METHOD:					
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
480.50	71.50		18		Light gray, wet, loose, Coarse to gravelly sand; wet and saturated; limestone gravel, well rounded, not as clean as above	47	Jar 16								Clean-out 11
					Borehole finished at 71.5										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER DU-17		3. DRILLING AGENCY USACE-NWK		11. DATE BORING Aug 02 2001		LOCATION COORDINATES N: 38.59 E: -92.17 LOCATION METHOD:									
4. NAME OF DRILLER D. Marquis				12. HAMMER TYPE		COMPLETED Aug 02 2001 EFFICIENCY (%)									
5. EQUIPMENT				13. SIZE AND TYPE OF BIT											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 555.0'									
7. THICKNESS OF OVERBURDEN 9.0'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 9.0'				17. SIGNATURE AND TITLE OF INSPECTOR Rachel Francks, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
		8	17		Brown to light gray, dry, loose, Gravel and rockfill; wood chips and some garbage present; poor sorting		Jar 1								Clean out overburden 5 8/9" tricone roller bit; bag sample Variflow drill fluid
551.00	4.00														
550.50	4.50				Topsoil										Cleanout
					Brownish gray, moist, stiff, Fat Silty Clay; hydrocarbons present		Wax 21								Push 1 Time: 9 sec Pressure: 1000 Push: 2' Recov: 2' (torvane: .15, .2 5, .4)
548.00	7.00														Cleanout
					Brownish gray, moist, stiff to soft, Gravely Clay to Sand (poorly sorted); more hydrocarbons present; clay silty @ top to sandy		Wax 32								Push 2 Time: 9 sec Pressure: 900psi Push: 2' Recov: 1.5' (torv: .2, .05, .05) lost bottom .5' (sand) Stop due to hydrocarbon contamination
546.00	9.00														
					Borehole finished at 9.0										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 3									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.59 E: -92.17		VERTICAL NGVD29 LOCATION METHOD:									
2. HOLE NUMBER AUD-18		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Aug 09 2001		COMPLETED Aug 09 2001									
4. NAME OF DRILLER M. Cooney				12. HAMMER TYPE Automatic, 140 lb EFFICIENCY (%)											
5. EQUIPMENT				13. SIZE AND TYPE OF BIT											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 549.0'									
7. THICKNESS OF OVERBURDEN 71.5'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 71.5'				17. SIGNATURE AND TITLE OF INSPECTOR Rachel Francks, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
545.80	3.20				Dark brown, Fat silty clay; Damp										Clean-out overburden
545.00	4.00				Fat clay intermixed with sand cracked and vugs present		Wax 1								Push-1 Time: 15 sec Pressure: 900psi Pushed: 2'
544.00	5.00				Light brown, Clayey sand; medium; damp		Jar 1								Recovered: 2' (torvane: .45, .5 5, .15)
542.50	6.50				Light brown, soft, Silty clay; damp; intermixed with pockets of sand; .25' loss off top of sample		Wax 2								Clean-out Push-2 Time: 12 sec Pressure: 950psi Pushed: 2; Recovered: 2' (torv: .2, .2, .05)
					Light brown, soft, Sand; damp		Jar 2								Clean-out
539.00	10.00														
		6			Light brown, moist, loose, Sand (fine grained); loose and damp to medium compact; very good sorting	67	Jar 3								539
		4													
		9													
534.00	15.00														Clean-out
		10			Light brown, moist, Medium grain sand; medium compact; very good sorting	53	Jar 4								534
		9													
		7													
529.00	20.00														Clean-out
		0			Light brown, moist, Fine grained sand; medium impact; very good sorting	27	Jar 5								529
		4													
		8													
524.00	25.00														Clean-out
		0													
		12			Gray brown, moist, loose, Fine to medium grain sand; moderate sorting	100	Jar 6								524
		19													
		12													
519.00	30.00														Clean-out
		6			Brown, wet, loose, Medium to coarse sand with some small pebbles; poor sorting; subangular to rounded; multicolored										519

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 3

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.59

E: -92.17

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
514.00	35.00	7	13		Brown, wet, loose, Medium to coarse sand with some small pebbles; poor sorting; subangular to rounded; multicolored	100	Jar 7								Clean-out
		6													
509.00	40.00	10	39		Gray, wet, loose, Medium to coarse sand with small to medium pebbles; poor sorting; subangular to rounded; multicolored	67	Jar 8								Clean-out
		16													
504.00	45.00	5	15		Gray, wet, loose, Silty sand (coarse) with small to large pebbles; poor sorting; subangular to rounded; multicolored	60	Jar 9								Clean-out
		5													
499.00	50.00	8	12		Gray, loose, Clayey sand (coarse) with small to medium pebbles; poorly sorted; mostly rounded; saturated	33	Jar 10								Clean-out
		5													
494.00	55.00	7	16		Gray, wet, loose, Clayey coarse sand with small to large pebbles; poorly sorted; subangular; rounded	100	Jar 11								Clean-out
		9													
489.00	60.00	17	39		Gray, loose, Small to large pebbles with some clay; poorly sorted; mostly rounded; saturated; pebbles- multicolored; clay-gray	27	Jar 12								Clean-out
		19													
484.00	65.00	13	29		Gray, loose, Coarse clayey sand to large pebbles; saturated; very poor sorting; subangular to rounded	87	Jar 13								Clean-out
		14													
		11	21		Gray, loose, Clayey coarse sand to large pebbles; saturated; very poor sorting; subangular to rounded	100	Jar 14								
		10													

(continued on next page)

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USACE FORM 1836 Boring Designation AUD-18 Sheet 3 of 3

AUD-19

USACE FORM 1836 Boring Designation AUD-19 Sheet 1 of 3

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 3

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.59

E: -92.16

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
519.00	34.00	9	11		Gray brown, loose, Sand (fine); saturated; silty; banded with silt and clay layers	87	Jan 10								Recov: 2' (Torv: .1, .05, .1) Clean out Push-8 Time: 6 sec Pressure: 1000psi Push: 2' Recov: 1.3' lost bottom of sample Clean out Clean out 3 5/8' tricone roller bit Clean out 3 5/8' tricone roller bit Clean out 3 5/8" tricone roller
		2													
513.00	40.00	6	15		Gray, loose, Silty fine sand; saturated	61	Jan 11								Clean out Clean out 3 5/8' tricone roller bit Clean out 3 5/8' tricone roller bit Clean out 3 5/8" tricone roller
		7													
		8													
507.50	45.50	5	12		Loose, Sand (coarse to medium); subangular; saturated; multi-colored	27	Jan 12								Clean out 3 5/8" split spoon
		6													
		6													
507.50	45.50	13	15		Gray, loose, Silty fine sand; saturated; 50' coarse sand band; band of clay @ 50.7'; med sand @ 51'; coarse sand @ 55.7'	80	Jan 13								Clean out 3 5/8" tricone roller bit
		9					Jan 14								
		6													
507.50	45.50	9	13			73	Jan 15								Clean out 3 5/8' tricone roller bit
		7													
		6													
507.50	45.50	11	21			60	Jan 16								Clean out 3 5/8" tricone roller bit
		11													
		10													
493.00	60.00	36	25		Coarse gravel; coarse sand to gravel @ 60.3'; subangular; @ 61'; coarse angular gravel, L.S.; 65.2' coarse gravel; 65.5' L.S. chunk; 65.6' silty gravelly clay layer	87	Jan 17								Clean out 3 5/8" tricone roller bit losing water @ 60'
		18													
		7													
493.00	60.00	17	34			47	Jan 18								Clean out 3 5/8" tricone
		17													
		17													

(continued on next page)

AUD-19

USACE FORM 1836 Boring Designation AUD-19 Sheet 3 of 3

Boring Designation

DU-20

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 4									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER DU-20				3. DRILLING AGENCY USACE-NWK		LOCATION METHOD:									
4. NAME OF DRILLER D. Marquis				11. DATE BORING Aug 01 2001		COMPLETED Aug 01 2001									
5. EQUIPMENT				12. HAMMER TYPE Automatic, 140 lb		EFFICIENCY (%)									
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING									
7. THICKNESS OF OVERBURDEN 71.5'				14. ELEVATION SURFACE 554.0'		15. ELEVATION GROUND WATER									
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR									
9. TOTAL DEPTH OF BORING 71.5'				Brenda Adams, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
															Cleanout overburden 5 5/8" tricone roller bit
550.20	3.80				Brownish gray, moist, stiff, Fat Clay; lignite present		Wax 1								Push-1 Time: 10 sec Pressure: 1800psi Push: 2' Recov: 2' (Torv: .5, .55, .4 5)
550.00	4.00				Brownish gray, moist, medium stiff, Clayey, Sandy Silt		Jar 1								
549.50	4.50				Blank										
					Grayish brown, moist, medium dense, Sandy Silt; well sorted		Wax 2								Cleanout 5 5/8" tricone roller bit Push-2 Time: 8 sec Pressure: 800psi Push: 2' Recov: 2' (torv: .05, .03, . 09)
							Jar 2								
547.00	7.00				Grayish brown to dark brown, moist to wet, soft to very soft, Clayey Silt to Silty Sand; well sorted		Wax 3								
							Jar 3								Cleanout 5 5/8" tricone roller Push-3 Time: 10 sec Pressure: 1200psi Push: 2' Recov: 2' (torv: .05, .05, . 05) Cleanout 5 5/8" tricone roller bit
		1	3												
		2													
															Cleanout 5 5/8"
		1													
539.00	15.00														
		4	20		Dark brown to brown, moist, very soft to soft, Silt to Sand; well sorted	60	Jar 5								
		10													

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.58

E: -92.14

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
534.00	20.00	10	18		Dark brown to brown, moist, very soft to soft, Silt to Sand; well sorted										Cleanout 4 1/4"
529.00	25.00	16	18		Grayish brown, moist, very soft to soft, Silty Sand to Sand; well sorted	57	Jar 6								Cleanout 4 1/4"
		12													
		6													
524.00	30.00	11	36		Grayish brown, moist, soft, Sand	67	Jar 7								Cleanout 4 1/4"
		16													
		20													
519.00	35.00	14	47		Brownish gray, moist to wet, very soft, Silty Sand	67	Jar 8								Cleanout 4 1/4"
		22													
		25													
		3	12		Brownish gray, moist to wet, very soft, Coarse Sand	47	Jar 9								
		5													

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.58

E: -92.14

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
514.00	40.00	7	17		Brownish gray, moist to wet, very soft, Coarse Sand										Cleanout 4 1/4"
509.00	45.00	6	17		Dark gray, moist to wet, very soft, Coarse Sand	67	Jan 10								Cleanout 4 1/4"
		6													
		11													
504.00	50.00	11	34		Dark gray, moist to wet, soft, Silty Sand	40	Jan 11								Cleanout 4 1/4"
		15													
		19													
499.00	55.00	14	60		Dark gray, moist, soft, Silty Sand	67	Jan 12								Cleanout 4 1/4"
		24													
		36													
		4	14		Dark gray, moist, soft, Silty Sand	30	Jan 13								Cleanout 4 1/4"
		8													

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 4 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.58

E: -92.14

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
494.00	60.00	6	23		Dark gray, moist, soft, Silty Sand										Cleanout 4 1/4"
489.00	65.00	10	23		Dark gray, moist to wet, loose, Small Gravel to Coarse Sand; some silt and fine sand throughout	33	Jan 14								Cleanout 4 1/4"
		11													
		12													
482.50	71.50	11	40		Dark gray, wet, Small Gravel to Silty Sand; some silt and fine sand throughout	60	Jan 15								Cleanout 4 1/4"
		19													
		21													
		6	32		Borehole finished at 71.5										
		11													
		21													

Boring Designation

AUDC-21

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 2									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AUDC-21		3. DRILLING AGENCY USACE-NWK		11. DATE BORING Aug 06 2001		LOCATION COORDINATES N: 38.59 E: -92.13									
4. NAME OF DRILLER M. Cooney				12. HAMMER TYPE		LOCATION METHOD: EFFICIENCY (%)									
5. EQUIPMENT				13. SIZE AND TYPE OF BIT											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 555.0'									
7. THICKNESS OF OVERBURDEN 47.5'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 47.5'				17. SIGNATURE AND TITLE OF INSPECTOR Rachel Francks, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
552.50	2.50				Dark brown, Gravely fat clay; medium; damp; mottled; gravel gray		Bag 1								Over burden bag sample
551.80	3.20				Dark brown, Fat clay with gravel; roadfill; medium; damp; mottled										
550.00	5.00				Brown, Sandy clay, well sorted; medium consistency; damp; mottled with red brown and gray		Jar 1								Clean out
549.20	5.80				Brown gray, stiff, Gravely sandy fat clay; poorly sorted, vugs; damp; mottled										
548.70	6.30				Gray brown, soft, Silty clay; well sorted; some vugs; damp		Jar 2								Clean out 3 3/4" hollow stem Auger
547.50	7.50				Dark gray brown, very stiff, Fat clay; damp										
					Very dark brown, stiff, Fat clay; lignite present w bottom 1' Fall out present in top .5'; damp; band of silt .1' @ 11.7'		Jar 3								Clean out 3 3/4" Hollow Stem Auger
542.50	12.50						Jar 4								Clean out
541.10	13.90				Brownish gray, Sandy Clay, mottled with lignite; medium; damp										
540.00	15.00				Brownish gray, soft, Clayey sand; well sorted; damp		Jar 5								Clean out
		2 7 12	19		Brown, moist, Clayey sand to sand; moderately to well sorted; medium consistency	67	Jar 6								Clean out
535.00	20.00														
		3 8 8	16		Grayish brown to gray, wet, soft, Silty sand to sand; poorly sorted; wet to saturated	67	Jar 7								Clean out
530.00	25.00														
		9 10 10	20		Gray brown, soft, Silty sand; poorly sorted; saturated	100	Jar 8								Clean out
525.00	30.00				Gray, wet, loose, Fine to coarse sand; poorly sorted; subangular; medium compact to loose										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 2

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.59

E: -92.13

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
520.00	35.00	5	13		Gray, wet, loose, Fine to coarse sand; poorly sorted; subangular; medium compact to loose	67	Jan 9								Clean out
		8													
518.00	37.00	6	56		Gray, wet, loose, Fine to coarse sand; poorly sorted; subangular; 36' shale layer	100	Jan 10								Set 38.4' of casing, 4" flush clean out with 36.9 bottom with 2 1/8" rock bit
		50													
507.50	47.50				LIMESTONE AND CHERT, Limestone vugs interspaced throughout, chert nodules	95	Pull 1								
						113	Box 1 Pull 2 Box 2								
					Borehole finished at 47.5										

Boring Designation

AUDC-22

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 2										
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.59 E: -92.13		VERTICAL NGVD29 LOCATION METHOD:										
2. HOLE NUMBER AUDC-22		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Aug 14 2001		COMPLETED Aug 14 2001										
4. NAME OF DRILLER D. Marquis				12. HAMMER TYPE Automatic, 140 lb EFFICIENCY (%)												
5. EQUIPMENT				13. SIZE AND TYPE OF BIT 3.75" HSA NX												
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 555.0'										
7. THICKNESS OF OVERBURDEN 41.5'				15. ELEVATION GROUND WATER												
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES												
9. TOTAL DEPTH OF BORING 41.5'				17. SIGNATURE AND TITLE OF INSPECTOR Rachel Francks, Field Geologist												
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
552.50	2.50				Roadfill; Stiff Fat Clay, gravel, damp										Auger-1 3 3/4" Clean out overburden	
550.00	5.00				Dark brown, stiff, Fat Clay; damp		Wax 1 Jar 1									Push-1 Time: 9 sec Press: 800lbs Push: 2' Rec: 2' (torv: .3, .4, .35)
547.50	7.50				Dark brown, stiff, Fat Clay; damp; mottled with lignite and specks of darker brown clay		Wax 2 Jar 2									Auger-2 3 3/4" Clean out Push-2 Time: 8 sec Press: 1000lbs Push: 2' Rec: 2' Auger-3 3 3/4" Clean out
542.50	12.50				Gray brown, stiff, Fat Clay; damp; mottled with lignite		Wax 3 Jar 3									Push-3 Time: 10 sec Press: 1200lbs Push: 2 Rec: 2 (torv: .5, .35, .4)
540.00	15.00				Gray brown, soft, Sandy Clay; damp; some lignite; sample was dropped		Wax 4 Jar 4				85	63	33		Auger-4 3 3/4" Clean out Push-4 Time: 9 sec Press: 900psi Rec: 2' Push: 2' (torv: .45, .5, .5 5)	
537.50	17.50				Gray to grayish brown, soft, Layers of clayey sand intramixed with fat clay; Clay: gray, damp, with lignite Sand: fine grained		Wax 5 Jar 5									Clean out Push-5 Time: 9 sec Pressure: 700psi Push: 2' Rec: 2' (torv: .4, .35, .4)
532.50	22.50	4 6 8	14		Gray, Sandy Clay: .5', gray, stiff, damp ; Sand: fine grained, well sorted, dense, damp, red brown	67	Jar 7								Clean out Push-6 Time: 6 sec Press: 1000psi Push: 2' Rec: 2' (torv: .2, .05, .1 5)	
527.50	27.50	4 7 6	13		Gray, moist, dense, Fine Grained Sand; well sorted	100	Jar 8									Clean out Clean out Clean out 4 1/4" Auger
		5 6 7	13			100	Jar 9								Clean out with 2	

(continued on next page)

AUDC-22

USACE FORM 1836 Boring Designation AUDC-22 Sheet 2 of 2

DRILLING LOG			DIVISION Northwestern		INSTALLATION			Sheet 1 of 1					
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
					LOCATION COORDINATES N: 38.59 E: -92.13		LOCATION METHOD:						
2. HOLE NUMBER AU-25		3. DRILLING AGENCY USACE-NWK			11. DATE BORING Aug 07 2001		COMPLETED Aug 08 2001						
4. NAME OF DRILLER M. Cooney					12. HAMMER TYPE EFFICIENCY (%)								
5. EQUIPMENT					13. SIZE AND TYPE OF BIT 3.75" HSA								
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 551.0'							
7. THICKNESS OF OVERBURDEN 7.0'					15. ELEVATION GROUND WATER								
8. DEPTH DRILLED INTO ROCK					16. TOTAL NUMBER CORE BOXES								
9. TOTAL DEPTH OF BORING 7.0'					17. SIGNATURE AND TITLE OF INSPECTOR Brenda Adams & Rachel Francks, Field Geologist								
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
548.50	2.50		Grayish brown, stiff, Silty lean clay; damp; tilled									Overburden clean out	
548.00	3.00		Dark red brown, stiff, damp; mottled										
547.00	4.00		Reddish and light brown, Silty to sandy clay; medium; damp; mottled										
546.00	5.00		Brown, Clayey sand; soft to medium; damp									Clean-out	
544.00	7.00		Brown, Sandy silty clay to sand; damp										
			Borehole finished at 7.0										

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USACE FORM 1836 Boring Designation AUD-26 Sheet 1 of 1

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1										
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29										
2. HOLE NUMBER AUD-27				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES N: 38.60 E: -92.17										
4. NAME OF DRILLER D. Marquis				11. DATE BORING Feb 14 2002		LOCATION METHOD: COMPLETED										
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)										
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING										
7. THICKNESS OF OVERBURDEN 20.0'				13. SIZE AND TYPE OF BIT 6.625" HSA		14. ELEVATION SURFACE 552.0'										
8. DEPTH DRILLED INTO ROCK				15. ELEVATION GROUND WATER		16. TOTAL NUMBER CORE BOXES										
9. TOTAL DEPTH OF BORING 20.0'				17. SIGNATURE AND TITLE OF INSPECTOR Ronald Parker, Field Geologist												
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
551.00	1.00				Gray brown, moist to wet, soft, Silty Fat Clay; roots, topsoil										Auger-1 with 7" Hollow stem auger	
					Light brown to tan, moist, soft, Silty Fat Clay											
548.80	3.20						Wax 1								Push-1 Time: 6 sec Pressure: 800psi D: 2' R: 2' (Torv: .75, .73, .90)	
546.80	5.20				Gray brown, moist, soft, Silty Fat Clay; slightly stiffer than unit above; torvane reading higher											
545.00	7.00				Light brown to tan, moist, soft, Silty Fat Clay; stiffer than unit above; torvane reading higher; mottled in places with gray and brown		Wax 2				61	16	30		Auger-2 with 7" HSA Push-2 Time: 9 sec Pressure: 1100psi D: 2' R: 2' (Torv: .8, 1, >1)	
543.60	8.40				Light brown with grayish brown, moist, soft to very soft, Clayey Silt to Silty Clay; low torvane reading; 50% clay, 50% silts		Jar 2									
542.40	9.60				Light brown to tan, wet, soft, Clayey Silty Fine Sand; has cohesion but predominantly, fine sand; 70% sand, 30% clay		Jar 3								Auger-3 with 7" HSA Push-3 Time: 9 sec Pressure: 1000psi D: 2' R: 2' (Torv: .3, .34, .1)	
					Light brown to tan, wet, loose, Fine Sand; well sorted, well rounded		Jar 4									
539.60	12.40	2	4				Jar 5								Auger-4 With 7" HSA Push-4 Time: 6 sec Pressure: 900psi D: 2' R: 2' Auger-5 with HSA	
539.40	12.60	2			Light gray brown, wet, soft	93	Jar 6									
					Light gray brown, wet, loose, Fine Sand; wet to saturated; mottled gray, brown, and yellow; well sorted, well rounded; weathering		Jar 7									
		2	12												Auger-6 with 7" HSA	
		4														
		8					100	Jar 8								
532.00	20.00															
					Borehole finished at 20.0											

DRILLING LOG				DIVISION Northwestern		INSTALLATION				Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)				VERTICAL NGVD29									
2. HOLE NUMBER AUD-28				3. DRILLING AGENCY USACE-NWK				LOCATION COORDINATES N: 38.59 E: -92.17		LOCATION METHOD:							
4. NAME OF DRILLER D. Marquis				11. DATE BORING Feb 21 2002		STARTED Feb 21 2002		COMPLETED Feb 21 2002									
5. EQUIPMENT				12. HAMMER TYPE				EFFICIENCY (%)									
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING		13. SIZE AND TYPE OF BIT 3.75" HSA									
7. THICKNESS OF OVERBURDEN 20.0'				14. ELEVATION SURFACE 552.0'		15. ELEVATION GROUND WATER		16. TOTAL NUMBER CORE BOXES									
8. DEPTH DRILLED INTO ROCK				17. SIGNATURE AND TITLE OF INSPECTOR		Christopher Papiernik, Field Geologist		9. TOTAL DEPTH OF BORING 20.0'									
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS		
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class			
547.50	4.50			3	Brown, moist, very loose, Clayey Sand/ Silty Sand; sand content is fine to very fine; laminated; occ. pebbles and organics; man made dominantly very fine sand		Jan 1								Auger-1 3 3/4" Hollow Stem Auger; Drive: 2		
547.00	5.00	1															Auger-2 3 3/4" HSA D: .5
546.00	6.00	2															
				10	Brown, moist, soft, laminated, Sandy Fat Clay with Silt Brown, moist, medium dense, Clayey Sand/ Silty Sand; sand content is very fine to fine sand; dominantly very fine sand; laminated		Jan 3								Auger-3 3 3/4" HSA D: 2.5; clean out with 2" SS		
542.00	10.00	3															
		4															
				14	Brown, moist, laminated, Clayey Sand/ Silty Sand; sand content is very fine to fine; dominantly very fine		Jan 4								Auger-4 3 3/4" HSA Clean out with 2" SS		
		6															
		8															
532.00	20.00	4		14	Borehole finished at 20.0										Auger-5 3 3/4" HSA D: 3.5 Clean out with 2" SS		
		6															
		8															

Boring Designation

D-30

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 4									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84) LOCATION COORDINATES N: 38.59 E: -92.17		VERTICAL NGVD29 LOCATION METHOD:									
2. HOLE NUMBER D-30		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Feb 26 2002		COMPLETED Feb 26 2002									
4. NAME OF DRILLER D. Marquis				12. HAMMER TYPE EFFICIENCY (%)											
5. EQUIPMENT				13. SIZE AND TYPE OF BIT											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 544.0'									
7. THICKNESS OF OVERBURDEN 70.0'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 70.0'				17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
540.50	3.50				Dark brown, soft to medium stiff, Silty Fat Clay; contains roots, rootlets and organic debris (corn stalk materials)										Mud Rotary-1 3 1/4" rock bit D: 3.5 used bentonite mud; tools for measuring mud properties, not available
		0	2		Brown to dark brown, soft to stiff, Silty Fat Clay; damp; occ. fine gravel void 1/4"	40	Jan 1				40	17	38		
		1													
535.20	8.80	1	3		Dark bluish gray, Silty Sand/Clayey Sand; saturated; Sand content: fine to very fine, dominantly very fine	80	Jan 2								Mud-rotary-2 3 1/4" DB D: 3.5
		0													
		3													
530.50	13.50														Mud-Rotary-3 3 1/4" DB D: 3.5
529.90	14.10	7	8		Bluish gray, soft to medium stiff, Sandy Fat Clay; sand content very fine	53	Jan 3								
		5			Brown, Clayey Sand; saturated; sand content: fine, well sorted sand		Jan 4								
		3													Set 3" flush joint casing (FJC) set 15.4' stick up .7,

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

N: 38.59

E: -92.17

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
525.50	18.50				Brown, Clayey Sand; saturated; sand content: fine, well sorted sand										clean out with 2 7/8", tricone bit to 15 Mud Rotary-4 2 7/8"RB D: 3.5
		18	44		Dark bluish gray, Well Sorted Sand; saturated; sand content: fine, < 15% clay content	80	Jar 5								Mud Rotary-5 2 7/8" RB D: 3.5
		23													
		21													
520.50	23.50														
		1	4		Dark bluish gray, wet, soft to medium stiff, Silty Fat Clay with Sand; wet to saturated; sand content: very fine to fine, dominantly very fine	80	Jar 6								Mud Rotary-6 2 7/8" RB D: 3.5
		2													
		2													
516.50	27.50														
		4	13		Dark bluish gray, Poorly Sorted Sand; saturated; sand content: very fine to coarse, subangular to rounded, spherical, < 15% clay content	47	Jar 7								Mud Rotary-7 2 7/8" RB D: 3.5
		8													
		5													
		8	12			73	Jar 8								
		6													
		6													

(continued on next page)

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USACE FORM 1836 Boring Designation D-30 Sheet 3 of 4

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USACE FORM 1836 Boring Designation D-30 Sheet 4 of 4

Boring Designation

AD-31

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1										
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29										
2. HOLE NUMBER AD-31				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES N: 38.59 E: -92.16										
4. NAME OF DRILLER Ken Wood				11. DATE BORING Feb 20 2002		COMPLETED Feb 21 2002										
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)										
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING										
7. THICKNESS OF OVERBURDEN 20.0'				13. SIZE AND TYPE OF BIT 3.75" HSA		14. ELEVATION SURFACE 644.0'										
8. DEPTH DRILLED INTO ROCK				15. ELEVATION GROUND WATER		16. TOTAL NUMBER CORE BOXES										
9. TOTAL DEPTH OF BORING 20.0'				17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist												
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
643.00	1.00				Brown to dark brown, moist, medium stiff, Silty Fat Clay; contains roots and rootlets										Auger-1 3 3/4" Hollow Stem Auger, Drive: 3.5; @3.5' end 02/20/2002	
		3	9		Brown to dark brown, moist, medium stiff, Silty Fat Clay	67	Jan 1				79	22	33			
		4														Auger-2 3 3/4" HSA; D-3.5 clean out with 2" SS
		5														
635.30	8.70	4	17		Brown to tan, dry to moist, medium dense, Well Sorted Sand; contains very fine to fine sand; <15% clay content	100	Jan 2									
		8													Auger-3 3 3/4" HSA D: 3.5; clean out with 2" SS	
		9														
		5	17													
		8														Auger-4 3 3/4" HSA D:3.5
		9														
625.50	18.50	8	20		Brown to tan, wet, medium dense, Well Sorted Sand; contains very fine to fine sand; <15% clay content	100	Jan 4									
624.00	20.00	11														
					Borehole finished at 20.0											

AUD-32

USACE FORM 1836 Boring Designation AUD-32 Sheet 1 of 1

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER AUD-33		3. DRILLING AGENCY USACE-NWK		11. DATE BORING Feb 22 2002		COMPLETED Feb 22 2002									
4. NAME OF DRILLER D. Marquis				12. HAMMER TYPE		EFFICIENCY (%)									
5. EQUIPMENT				13. SIZE AND TYPE OF BIT 3.75" HSA											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 545.0'									
7. THICKNESS OF OVERBURDEN 20.0'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 20.0'				17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
543.00	2.00				Dark brown, soft to medium stiff, Silty Fat Clay; damp; contains roots, rootlets, and organic debris (corn stalk material)										Auger-1 3 3/4: Hollow Stem Auger Drive: 2
542.00	3.00				Brown, Clayey Sand/Silty; damp; sand content fine to very fine; dominantly very fine		Jan 1								
		8	26		Light brown to tan, Well Sorted Sand; damp; sand content very fine to fine; dominantly fine; < 15% clay content occ laminated	100	Jan 2								Push-1 D: 1.9 R: unknown ET: 10 sec Pressure: 1400psi (torv: NSC) Extruder tray broke, too much sand in sample Auger-2 3 3/4" HSA D: 4 Auger-3 3 3/4" HSA D: 3 clean out with 2" split spoon
		13													
		13													
		11	31			100	Jan 3								Auger-4 3 3/4" HSA D: 3.5 clean out with 2" split spoon
		16													
		15													
		3	20			100	Jan 4								Auger-5 3 3/4" HSA D: 3.5 clean out with 2" split spoon; water in hole approx 16.5' BGS
		7													
		13													
525.00	20.00	3	17			100	Jan 5								
		7			Borehole finished at 20.0										
		10													

Boring Designation

DUC-34

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 4									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29									
2. HOLE NUMBER DUC-34				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES									
4. NAME OF DRILLER M. Stone				11. DATE BORING May 30 2002		COMPLETED Jun 01 2002									
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)									
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING									
7. THICKNESS OF OVERBURDEN 50.5'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER									
8. DEPTH DRILLED INTO ROCK 9.0'				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR									
9. TOTAL DEPTH OF BORING 59.5'				Brenda Adams, Field Geologist											
ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY						REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	2.00				Grayish brown, moist, medium stiff, Silty Lean Clay; < 5% silt										Cleanout 5 7/8" tricone bit
	4.50				Dark gray brown, moist, stiff, Fat Clay around 5-10% silt; mottled gray, dark gray brown; iron spots throughout		Wax 1								Push-1 Time: 12 sec Pressure: 850psi Push: 2' Recov: 2' (torv: .8, .9, .9) Cleanout
							Jar 1						27		
					Gray to dark grayish brown, moist, stiff, Fat Clay; occ. gravel		Wax 2								Push-2 Time: 11 sec Pressure: 1000psi Push: 1' Recov: 1' (torv: .9, >1) Cleanout 5 7/8" tricone roller bit
							Jar 2						26		
							Wax 3								Push-3 Time: 11 sec Pressure: 800psi Push: 2' Recov: 2' (torv: .75, .8, .9) Cleanout
							Jar 3				67	23	26		
	12.20						Wax 4								Push-4 Time: 12 sec Pressure: 800psi Push: 2' Recov: 2' (torv: .9, .7, .75) Cleanout 5 7/8" tricone
					Brownish gray, moist, medium stiff, Silty Lean Clay; about 30% silt		Jar 4				35	18	48		
	15.00														Push-5 Time: 8 sec Pressure: 800psi Push: 2'
		1			Gray to bluish gray, moist to wet, medium stiff to soft, Fat Clay; some fine sand and silt on top of sample; 20.8ft lignite layer		Jar 5						47		
		2	3												

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
		1			Gray to bluish gray, moist to wet, medium stiff to soft, Fat Clay; some fine sand and silt on top of sample; 20.8ft lignite layer										Cleanout 5 7/8" tricone
							Wax 5								Push-6 Time: 9 sec Pressure: 600psi Push: 2' Recov: 2' (torv: .35, .35, .3)
							Jar 6						42		Cleanout 5 7/8" tricone
							Wax 6								Push-7 Time: 9 sec Pressure: 550psi Push: 2' Recov: 2' (torv: .3, .35, .3)
-21.10							Jar 7						33		
		0			Bluish gray, wet, soft, Sandy Silt; 21.2 ft sample fracture when tray came off; banded layers of sandy silt and silty sand (very fine)		Jar 8						24		
		1	12			100									
		11													
															Cleanout 5 7/8" tricone
26.50															
		6			Blue gray, wet, medium dense, Fine Silty Sand		Jar 9								
		15	28			100									
		13													Cleanout
31.50															
		9			Gray, wet, dense, Silty Sand (fine)		Jar 10								
		20	41			100									
		21													Cleanout

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 4

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

World Geodetic System Longitude / Latitude (WGS 84)

VERTICAL

NGVD29

LOCATION COORDINATES

LOCATION METHOD:

ELEV	DEPTH	BLOWS/ 0.5ft	N	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	36.50		17		Gray, wet, dense, Silty Sand (fine)										
		6			Gray, wet, medium dense, Fine Silty Sand	67	Jan 11								
		10													
		7													

(continued on next page)

DUC-34

USACE FORM 1836 Boring Designation DUC-34 Sheet 4 of 4

A-35

Sheet 1 of 1

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1	
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29	
2. HOLE NUMBER A-36				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES	
4. NAME OF DRILLER D. Marquis				11. DATE BORING		STARTED	
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)	
6. DIRECTION OF BORING		DEG FROM VERTICAL		BEARING		14. ELEVATION SURFACE	
7. THICKNESS OF OVERBURDEN		5.0'		15. ELEVATION GROUND WATER		16. TOTAL NUMBER CORE BOXES	
8. DEPTH DRILLED INTO ROCK				17. SIGNATURE AND TITLE OF INSPECTOR			
9. TOTAL DEPTH OF BORING		5.0'		Field Geologist			

ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.30		Topsoil, LEAN CLAY (CL) grayish brown, moist, soft, trace roots, Silty								30		
	4.00		FAT CLAY (CH) light brown and tan, moist, soft, Silty								24		
	5.00		SILTY SAND (SM) light brown and tan, moist, soft, Clayey										
			Borehole finished at 5.0										

Boring Designation

A-37

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER A-37				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER K. Wood				11. DATE BORING Feb 13 2001		LOCATION METHOD:							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING				DEG FROM VERTICAL		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Ronald Parker, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	2.50		LEAN CLAY (CL) grayish brown, moist, soft, few roots, Silty						48	17	26		
	4.00		LEAN CLAY (CL) light brown to tan, moist, soft, Silty and Sandy								24		
	5.00		SILTY SAND (SM) light brown to tan, wet, soft, Silty and Sandy					35	21	27			
			Borehole finished at 5.0										

Boring Designation

A-38

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER A-38				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER Ken Wood and Crew				11. DATE BORING Feb 13 2002		COMPLETED							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Ronald Parker, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.50		Topsoil, gray brown, moist, soft, roots										
	3.10		Light brown tan, moist, soft								22		
	5.00		Light brown to tan, moist, soft, mostly silty sand					34	20	22			
			Borehole finished at 5.0										

Boring Designation

HA-39

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-39				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone, J. Harris				11. DATE BORING May 29 2002		COMPLETED May 29 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.00		Dark grayish brown, moist, Clayey Sandy Silt; around 30% silt		Shak11								
			Dark gray brown, moist, stiff, Silty Lean Clay; around 5-10% silt										
	4.30		Dark brown, wet to moist, medium stiff, Silty Lean Clay										
	5.00		Borehole finished at 5.0										

Boring Designation

HA-41

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-41				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/J. Harris				11. DATE BORING May 29 2002		COMPLETED May 29 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 10.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 10.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
	1.00		Grayish brown, moist, medium stiff, Silty Lean Clay; around 30% silt		Jar 1	Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.70		Grayish brown, moist, medium stiff, Silty Lean Clay; around 15% silt										
	2.30		Grayish brown, wet, medium stiff, Very Fine Sandy Silt; around 5% clay										
	4.30		Grayish brown, moist, medium stiff, Silty Lean Clay; 10-5% silt										
	7.20		Grayish brown, moist, medium stiff, Clayey Sandy Silt; 5% clay and 5% very fine sand		Sack 1								
	10.00		Grayish brown, wet, medium stiff to stiff, Clayey Sandy Silt		Jar 2								
			Borehole finished at 10.0										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-42				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/J. Harris				11. DATE BORING May 29 2002		COMPLETED May 29 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	2.00		Dark gray brown, moist, medium stiff, Silty Lean Clay										
	3.00		Grayish brown, wet, soft, Very Fine Sandy Silt										
	5.00		Brownish gray, wet, soft, Very Fine Sandy Silt										
			Borehole finished at 5.0										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1								
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29								
2. HOLE NUMBER HA-43				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES								
4. NAME OF DRILLER M. Stone/J. Harris				11. DATE BORING May 29 2002		COMPLETED May 29 2002								
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)								
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING								
7. THICKNESS OF OVERBURDEN 6.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER								
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR								
9. TOTAL DEPTH OF BORING 6.0'				Brenda Adams, Field Geologist										
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS	
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	1.00		Gray, moist, medium stiff, Clayey Sandy Silt		S10011									
	2.00		Brown, moist, medium stiff, Silty Lean Clay: around 30% silt											
	2.50		Tan, moist, loose, Sand (fine)											
	5.00		Dark gray brown, moist, stiff, Silty Lean Clay; <5% silt											
	6.00		Tan, moist, loose, Sand (fine)											
			Borehole finished at 6.0											

HA-44

USACE FORM 1836 Boring Designation HA-44 Sheet 1 of 1

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-45				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/J. Harris				11. DATE BORING May 29 2002		COMPLETED May 29 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.7'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.7'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
	1.40		Dark grayish brown, moist, stiff, Silty Lean Clay; 5-20% silt		Shank11	Gravel	Sand	Fines	LL	PI	MC	ASTM Class	Hit a large rock
	2.00		Grayish brown, moist, medium dense, Clayey Silt; 5-10% clay										
	2.70		Dark grayish brown, moist, medium stiff, Silty Lean Clay										
	3.80		Tan, moist, loose, Sand: fine and silty with gravel										
	5.70		Brownish gray, wet, soft to medium stiff, Clay Silt										
			Borehole finished at 5.7										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-46				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER K. Wood, D. Payne, D. Marquis				11. DATE BORING Feb 20 2002		COMPLETED Feb 20 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Christopher Papiernik, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.50		Dark brown, moist, soft to medium stiff, Silty Fat Clay; @ 0-.5' contains corn stalk material, roots, and rootlets		Jar 1								Drive: 5
	4.00		Brown, moist, soft, Clayey Silt with sand; decreasing clay content with depth		Jar 2								
	5.00		Brown to tan, moist, loose, Silty Sand/Clayey Sand; contains very fine sand		Jar 3								
			Borehole finished at 5.0										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-46A				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/ J. Harris				11. DATE BORING May 30 2002		COMPLETED May 30 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	2.80		Brownish gray, moist, stiff, Silty Lean Clay; 5-15% silt										
	5.00		Brownish gray, moist, medium stiff to stiff, Clayey Silt										
			Borehole finished at 5.0										

Boring Designation

HA-47

DRILLING LOG			DIVISION Northwestern		INSTALLATION		Sheet 1 of 1						
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO					10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)			VERTICAL NGVD29					
2. HOLE NUMBER HA-47					3. DRILLING AGENCY USACE-NWK			11. DATE BORING Feb 20 2002					
4. NAME OF DRILLER K. Wood, D. Payne, D. Marquis					12. HAMMER TYPE			COMPLETED Feb 20 2002					
5. EQUIPMENT					13. SIZE AND TYPE OF BIT			LOCATION COORDINATES					
6. DIRECTION OF BORING Vertical					DEG FROM VERTICAL 0		BEARING						
7. THICKNESS OF OVERBURDEN 5.0'					14. ELEVATION SURFACE								
8. DEPTH DRILLED INTO ROCK					15. ELEVATION GROUND WATER								
9. TOTAL DEPTH OF BORING 5.0'					16. TOTAL NUMBER CORE BOXES								
					17. SIGNATURE AND TITLE OF INSPECTOR Christopher Papiernik, Field Geologist								
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
	2.00		Dark brown to brown, moist, soft to medium stiff, Silty Fat Clay; @0-.5' contains corn stalk material, roots, and rootlets; @0-1.5' dark brown; @.5-2' brown		Shark12	Gravel	Sand	Fines	LL	PI	MC	ASTM Class	Drive: 5
	3.00		Brown, moist, soft, Clayey Silt with Sand; decreasing clay content with depth		Jar 2								
	5.00		Brown to tan, moist, loose, Silty Sand/ Clayey Sand; contains very fine sand		Shark31								
			Borehole finished at 5.0										

Boring Designation

HA-48

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2HOLE NUMBER HA-48				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4NAME OF DRILLER K. Wood, D. Payne, D. Marquis				11. DATE BORING Feb 20 2002		COMPLETED Feb 20 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Chrisopher Papiernik, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.50		Dark brown, moist, soft to medium stiff, Silty Fat Clay; @0-.5' contains cornstalk material, roots, and rootlets; @.5-1' contains roots and rootlets		Jar 1								Drive: 5
	5.00		Brown to tan, moist, loose, Silty Sand/ Clayey Sand; contains very fine sand		Shank 21								
			Borehole finished at 5.0										

Boring Designation

HA-49

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-49				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER K. Wood, D. Payne, D. Marquis				11. DATE BORING Feb 20 2002		COMPLETED Feb 20 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Chrisopher Papiernik, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	0.30		Dark brown, moist, soft to medium stiff, Silty Fat Clay; contains roots, rootlets, and corn stalk material										
	0.80		Brown, moist, loose to medium dense, Clayey Sand; contains fine to very fine sand, poorly sorted		Jar 3								
	3.50		Dark brown, moist, soft to medium stiff, Silty Fat Clay		Shark12								Drive: 5
	5.00		Brown, moist, soft, Clayey Silt with Sand; decreasing clay content with depth		Shark23								
			Borehole finished at 5.0										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1								
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29								
2. HOLE NUMBER HA-50				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES								
4. NAME OF DRILLER M. Stone/ J. Harris				11. DATE BORING May 29 2002		COMPLETED May 29 2002								
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)								
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING								
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER								
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR								
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist										
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS	
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	0.50		Grayish brown, moist, stiff, Silty Lean Clay; around 10% silt		Shack11									
	1.80		Dark grayish brown, moist, stiff, Lean Clay											
	2.40		Dark grayish brown, moist, stiff, Silty Lean Clay; around 30% silt											
	3.60		Dark grayish brown, moist, stiff, Lean Clay; <5% silt											
	5.00		Brownish gray, wet, stiff, Silty Lean Clay; around 30% silt											
			Borehole finished at 5.0											

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-51				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/ J. Harris				11. DATE BORING May 30 2002		COMPLETED May 30 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.1'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.1'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	1.50		Dark gray brown, moist, medium stiff to stiff, Fat Clay		Jar 1								
	2.00		Dark gray brown, moist, stiff, Silty Lean Clay; around 18% silt										
	2.50		Dark brownish gray, moist, soft, Clayey Silt; around 30-40% clay										
	5.10		Brown gray, moist, stiff, Silty Lean Clay; around 5% silt										
			Borehole finished at 5.1										

Boring Designation

HA-52

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-52				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/ J. Harris				11. DATE BORING May 30 2002		COMPLETED May 30 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	5.00		Very dark brown, moist, stiff, Silty Lean Clay; around 5-10% silt		Jar 1								
			Borehole finished at 5.0										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-53				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone				11. DATE BORING May 30 2002		COMPLETED May 30 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
			Very dark brown, moist, stiff, Fat Clay; 5-10% silt		Jar 1								
	3.20												
	3.50		Brownish gray, wet, stiff, Silty Lean Clay; around 30-40% silt		Jar 2								
			Brownish gray, moist, stiff, Lean Clay										
	5.00				Jar 3								
			Borehole finished at 5.0										

Boring Designation

HA-54

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-54				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/ J. Harris				11. DATE BORING May 30 2002		COMPLETED May 30 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
	1.50		Dark grayish brown, moist, medium stiff, Fat Clay		Jar 1	Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	3.60		Brownish gray, moist, stiff, Silty Lean Clay; around 10% silt										
	4.10		Brown gray, moist, stiff, Clayey Silt; some very fine sand (<5%)		Jar 2								
	5.00		Brown gray, wet, stiff, Clayey Silt; some very fine sand (<5%)										
			Borehole finished at 5.0										

Boring Designation

HA-55

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-55		3. DRILLING AGENCY USACE-NWK		11. DATE BORING May 30 2002		COMPLETED May 30 2002							
4. NAME OF DRILLER M. Stone/ J. Harris				12. HAMMER TYPE		EFFICIENCY (%)							
5. EQUIPMENT				13. SIZE AND TYPE OF BIT									
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE '							
7. THICKNESS OF OVERBURDEN 5.0'				15. ELEVATION GROUND WATER									
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES									
9. TOTAL DEPTH OF BORING 5.0'				17. SIGNATURE AND TITLE OF INSPECTOR Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	0.80		Dark gray brown, moist, medium stiff, Fat Clay										
	1.50		Dark gray brown, moist, stiff, Silty Lean Clay; around 10-5% silt										
	3.00		Dark gray brown, moist, stiff, Silty Lean Clay; around 20% silt and <5% very fine sand		Jar 1								
	5.00		Gray, wet, stiff, iron oxide staining, Fat Clay										
			Borehole finished at 5.0										

Boring Designation

HA-56

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-56				3. DRILLING AGENCY USACE-NWK		LOCATION COORDINATES							
4. NAME OF DRILLER M. Stone/ J. Harris				11. DATE BORING May 30 2002		COMPLETED May 30 2002							
5. EQUIPMENT				12. HAMMER TYPE		EFFICIENCY (%)							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 5.0'				14. ELEVATION SURFACE		15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR							
9. TOTAL DEPTH OF BORING 5.0'				Brenda Adams, Field Geologist									
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	3.70		Dark gray brown, moist, medium stiff, Fat Clay; 1.4-1.6' silty zone		Shak11								
	5.00		Dark gray brown, wet, medium stiff, Fat Clay										
			Borehole finished at 5.0										

Boring Designation

HA-57

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM World Geodetic System Longitude / Latitude (WGS 84)		VERTICAL NGVD29							
2. HOLE NUMBER HA-57				3. DRILLING AGENCY USACE-NWK		11. DATE BORING May 31 2002							
4. NAME OF DRILLER J. Harris				12. HAMMER TYPE		COMPLETED May 31 2002							
5. EQUIPMENT				13. SIZE AND TYPE OF BIT		LOCATION COORDINATES							
6. DIRECTION OF BORING Vertical				DEG FROM VERTICAL 0		BEARING							
7. THICKNESS OF OVERBURDEN 3.8'				14. ELEVATION SURFACE		LOCATION METHOD:							
8. DEPTH DRILLED INTO ROCK				15. ELEVATION GROUND WATER		EFFICIENCY (%)							
9. TOTAL DEPTH OF BORING 3.8'				16. TOTAL NUMBER CORE BOXES		17. SIGNATURE AND TITLE OF INSPECTOR Brenda Adams, Field Geologist							
ELEV	DEPTH	LEGEND	FIELD CLASSIFICATION OF MATERIALS (Description)	% REC	Samp No.	LABORATORY							REMARKS
						Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	2.00		Brownish gray, moist, stiff, Silty Lean Clay; <5% silt		Jar 1								Driller refusal
	3.80		Brown, moist, stiff, Silty Lean Clay; around 5% silt										
			Borehole finished at 3.8										

Historic Layne-Western Borings

Legend

- CA 13 Levee Alignment
- Layne Western Borings

Boring Labels: LW-1, LW-2, LW-3, LW-4, LW-5, LW-6, LW-7, LW-8, LW-9, LW-10, LW-11, LW-12, LW-13, LW-14, LW-15, LW-16, LW-17, LW-18, LW-19, LW-20, LW-21, LW-22, LW-23, LW-24, LW-25, LW-26, LW-27, LW-28, LW-29, LW-30, LW-31, LW-32, LW-33, LW-34, LW-35, LW-36, LW-37, LW-38, LW-39, LW-40, LW-41, LW-42, LW-43, LW-44, LW-45, LW-46, LW-47, LW-48, LW-49, LW-50, LW-51, LW-52, LW-53, LW-54, LW-55, LW-56, LW-57, LW-58, LW-59, LW-60, LW-61, LW-62, LW-63, LW-64, LW-65, LW-66, LW-67, LW-68, LW-69, LW-70, LW-71, LW-72, LW-73, LW-74, LW-75, LW-76, LW-77, LW-78, LW-79, LW-80, LW-81, LW-82, LW-83, LW-84, LW-85, LW-86, LW-87, LW-88, LW-89, LW-90, LW-91, LW-92, LW-93, LW-94, LW-95, LW-96, LW-97, LW-98, LW-99, LW-100.

Scale: 1 mi

North Arrow: N

Google Earth

Image Landsat / Copernicus

- CA 13 Levee Alignment
- Layne Western Borings

- ▣ Layne Western Borings

Image Landsat / Copernicus

Layne Western Drilling Report
Department Borings

PRELIMINARY
RESULTS OF SUBSURFACE INVESTIGATION
JEFFERSON CITY MEMORIAL AIRPORT LEVEE
JEFFERSON CITY, MISSOURI

LAYNE-WESTERN COMPANY, INC.
225 Grand Avenue
Kirkwood, Missouri 63122

Once a channel develops the velocity of seepage increases with increasing head. Under critical conditions the velocity is sufficient to lift sand, forming "sand boils", which could lead to continuing piping and levee crevasses. An example of a sand boil is shown on Figure 3. This photo was taken from "Underseepage and It's Control - Mississippi River Levees", by Turnbull and Mansur, and published by the Army Corps of Engineers.

To prevent lifting of the clay stratum, its submerged unit weight must be equal to the up-lift pressure. As an example, the total unit weight of the clay is about 125 pcf (pounds per cubic foot) and its submerged weight is approximately 62.6 pcf (about the unit weight of water). Therefore, each foot of artisan head would require about 1 foot of clay overburden. If the levee is to provide protection for a piezometric elevation of 556.0 feet msl, 16 feet of clay would be needed where the ground elevation was 540 feet msl. At any location the protected elevation can be computed by adding the clay thickness to the ground elevation.

FIELD INVESTIGATION

Illustrated on the Boring Location Sketch, Figure 4, are the approximate locations of each soil boring. They were performed at the site to allow the description of the stratigraphic

profile and to monitor the piezometric elevation. Two recording piezometers were installed; one in Boring 2 landward of the levee, the other in Boring 3, riverward. Each penetrated the non-cohesive substratum to bedrock, which varied from about 92 to 82 feet in Borings 2 and 3, respectively. The installed apparatus provides a continuous record of the piezometric elevation.

Along the proposed levee centerline 12 borings (Borings 1 and 4 through 14) were performed. Borings 1, 7 and 8 extended to the underlying rock, while the remaining terminated at about 30 feet. Samples were obtained in each boring to provide materials for classification and testing. Two-inch plastic pipe was installed in the deep borings to allow periodic observations of the piezometric elevation.

In the proposed borrow area, 20 borings (Borings A through T) were accomplished to determine the depth of cohesive material. Representative auger samples were retained at each change in material. The depth of these borings varies from 5 to 20 feet.

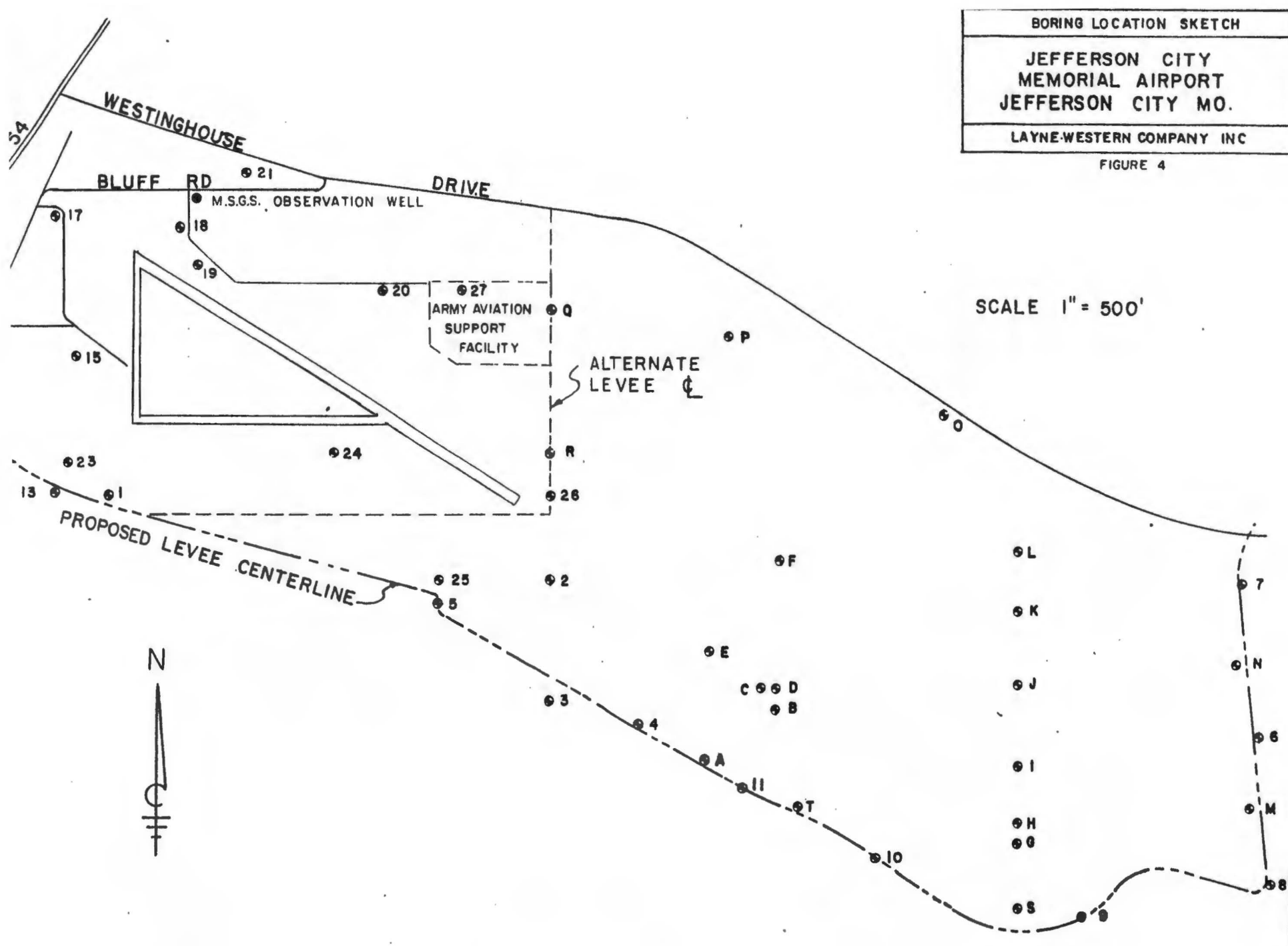
In the west section, 13 borings (Borings 15 through 27) were performed to describe the soils profile. Those borings extended to about 14 feet with soil sampling at 2.5-foot intervals.

BORING LOCATION SKETCH

JEFFERSON CITY
MEMORIAL AIRPORT
JEFFERSON CITY MO.

LAYNE-WESTERN COMPANY INC

FIGURE 4



Representative samples were obtained with a split-spoon sampler during the Standard Penetration Test, except for the auger samples in Borings A through T. The split-spoon (2" O.D. 1-3/8" I.D.) was driven with a 140-pound weight free-falling 30 inches. The number of blows to drive the sampler three successive 6-inch increments (total penetration 18 inches) was recorded. The total blows for the last 12 inches of penetration, referred to as the "N" value, (an indication of the consistency or relative density) are presented on the Records of Subsurface Exploration, located in the Appendix.

Throughout the field investigation relevant information was recorded by the drilling foreman on the Field Boring Logs. They included sampling intervals, results of the Standard Penetration Test, and a visual description of the samples. Those logs were returned to our laboratory, with the samples, to aid in the description of the stratigraphy.

LABORATORY TESTING

The soil samples obtained during the field investigation were visually classified in our laboratory. That classification in conjunction with the field boring logs were used to prepare the Records of Subsurface Exploration.

A P P E N D I X

NOTATION USED ON RECORD OF SUBSURFACE EXPLORATION

9/12	—	Blows/Ft. — The number of blows (N) of a 140 pound hammer falling 30 inches to drive a "standard" split-barrel sampler (1-3/8" I.D., 2" O.D.) for the last 12 inches of penetration. Count and recording is made for each 6 inch interval $9/12 = 21$.		
81/2"	—	Number of blows (81) to drive a "standard" split-barrel sampler a certain number of inches (2).		
ST/D	—	Sampler (ST) advanced for the last 12 inches by the weight on only the drill rods (D); (ST/DH) if the drill rods can be pushed the last 12 inches by hand (H).		
SS	—	Split-barrel sampler 1-3/8" I.D.	TYPE	— Sample type
2S	—	Split-barrel sampler 2" I.D.	A	— Retractable type auger
3S	—	Split-barrel sampler 3" I.D.	W	— Wash sample
Pist.	—	Piston sampler, using 3" O.D. Shelby Tube	R	— Refusal, sampler could not be advanced further
ST	—	Shelby tube sampler 2" O.D.	RB	— Rock bit
3T	—	Shelby tube sampler 3" O.D.	RC	— Rock core
CA	—	Continuous flight auger	NX	— 2-1/8" Dia. rock core
Qu	—	Unconfined compression strength expressed tsf	BX	— 1-5/8" dia. rock core
Qp	—	Calibrated penetrometer value	AX	— 1-3/16" dia. rock core
U	—	Uncontrolled rate of strain value	MC	— Natural moisture content in %
D	—	Unit dry weight psf	DCI	— Dry cave-in
WCI	—	Wet cave-in		— Water level
HA	—	Hollow Auger	BAR	— Before auger removal
G _s	—	Specific Gravity	AAR	— After auger removal
			NO.	— Sample number
			ELEV.	— Elevation
			WB	— Wash boring

RECORD OF SUBSURFACE EXPLORATION

BORING 1 CONTRACT G-1031

FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 4/22/76 DATE COMPLETED 4/22/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Shallow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	EP
99% < #200 Sieve								549.2	SURFACE	
	SS	1	1/2						Brown silty fine SAND	
	SS	2	2/2					544.7		
	SS	3	2/3						Gray and brown silty CLAY	1
	SS	4	2/2							
	SS	5	5/4					537.2		
	SS	6	2/2						Gray and brown SILT	1
	SS	7	2/2						With gray clay partings below 17.5'	
	SS	8	12/14					530.2		2
	SS	9	16/20 5						Brown silty fine SAND	2
	SS	10	12/25						Gray below 25'	3
	SS	11	12/18							3
									Con't	4

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 1 Con't CONTRACT G-1031



FOREMAN POPELUS LOGGED BY Schwartz DATE STARTED 4/22/76 DATE COMPLETED 4/22/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
	SS	12	7/11						Con't	
	SS	13	7/8						Coarse to fine below 40'	45
	SS	14	12/15							50
	SS	15	10/12							55
	SS	16	10/12						With gravel below 60'	60
	SS	17	6/8							65
	SS	18	15/16							70
	SS	19	14/16							75
									Con't	80

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

LAYNE-WESTERN COMPANY INC.

RECORD OF SUBSURFACE EXPLORATION

BORING 1 Con't CONTRACT G-1031

FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 4/22/76 DATE COMPLETED 4/22/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	EP
No Recovery	SS	20	8/14						Con't	
	SS	21	16/18							
	SS	22								
	SS	23	10/15							
								451.2	Refusal	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 2 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								546.0	SURFACE	
	SS	1	2/2						Brown silty CLAY	5
	SS	2	3/4							
	SS	3	5/5					537.5		
69% < #200 Sieve	SS	4	5/5						Brown sandy SILT with clay seams	10
28% < #200 Sieve	SS	5	5/6					534.0		
	SS	6	9/7						Brown silty fine SAND	15
	W	7								20
	W	8								25
	W	9							Coarse to fine from 30' to 50.0'	30
	W	10							Gray from 35.0' to 50.0'	35
									Con't	40

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

FOREMAN Pattus LOGGED BY Schwartz DATE STARTED 4/25/76 DATE COMPLETED 4/25/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Follow Auger and CASING None
Water Rotary
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 3 CONTRACT G-1031

FOREMAN Petlus LOGGED BY Schwartz DATE STARTED 5/4/76 DATE COMPLETED 5/4/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger and CASING NONE
Jefferson City, Missouri Water Rotary

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								542.0	SURFACE	
	SS	1	4/6							
	SS	2	1/1						Dark brown silty CLAY	5
	SS	3	3/2							
	SS	4	2/3						Very silty below 11.0'	10
	SS	5	6/8					529.5		
	W	6							Brown silty fine SAND	15
	W	7							Gray medium to fine from 20.0' to 27'	20
	W	8							Coarse to fine with gravel from 27' to 35.0'	25
	W	9								30
	W	10							Gray clay layer with sand and gravel from 35.0' to 36.5'	35
									Con't	40

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 3 Con't CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
	W	11							Con't	
									Gray medium to fine with gravel from 40' to 45'	45
	W	12							Coarse to fine below 45'	
										50
	W	13								
										55
	W	14								
										60
	W	15								
										65
										70
	W	16								
										75
									Con't	80

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger and Water Rotary CASING None
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 3 Cont' CONTRACT G-1031



FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 5/4/76 DATE COMPLETED 5/4/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger and CASING None
Jefferson City, Missouri Water Rotary

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPT
	W	17							Con't	
									Coarse GRAVEL below 80'	85
								455.5	Refusal	90

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 4 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								546.7	SURFACE	—
	SS	1	3/4							
	SS	2	2/2							5
	SS	3	2/3							
30% < #200 Sieve	SS	4	6/6					537.7		10
22% < #200 Sieve	SS	5	15/17							
	SS	6	6/6							15
	SS	7	10/12							20
	SS	8	2/4							25
	SS	9	29/16							30
								516.2	End	35

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 5 CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								547.0	SURFACE	
	SS	1	4/5							
	SS	2	6/8						Dark brown silty CLAY	5
	SS	3	2/3							
	SS	4	5/8					538.0		10
16% < #200 Sieve	SS	5	6/8							
10% < #200 Sieve	SS	6	6/9							15
	SS	7	4/5						Brown silty fine SAND	20
No Recovery	SS	8	2/4							25
No Recovery	SS	9	8/9							30
								516.5	End	35

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

FOREMAN Pettus LOGGED BY Schwartz DATE STARTED 5/5/76 DATE COMPLETED 5/5/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 6 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEP.
								547.2	SURFACE	
	SS	1	3/5						Dark brown silty CLAY	
	SS	2	5/8						Gray and brown below 7'	
	SS	3	2/3							
	SS	4	4/5						With sand partings from 12.5' to 14.0'	10
	SS	5	2/2						With fine sand below 15'	15
	SS	6	1/1							
62 3/4" #200 Sieve	SS	7	1/2					530.2	Brown sandy SILT	2
	SS	8	4/5							
								525.7	End	2

GROUND WATER DEPTH AT COMPLETION 17.0' AFTER _____ HRS. AFTER _____ HRS.

5'

FOREMAN Pattua LOGGED BY Parazak DATE STARTED 5/10/76 DATE COMPLETED 5/10/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Miss. ori

RECORD OF SUBSURFACE EXPLORATION

BORING 7 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								547.3	SURFACE	
	SS	1	2/2						Dark brown silty CLAY	5
	SS	2	5/6						Gray and brown below 7'	
	SS	3	3/4							10
	SS	4	3/4							
	SS	5	3/4							15
	SS	6	3/4						With fine sand below 16.0'	
	SS	7	2/2							
	SS	8	5/6					527.8	Brown silty fine SAND w/clay seams to 22' Gray below 23.5'	20
	SS	9	5/8							25
	SS	10	3/6							30
	SS	11	4/7						Medium to fine below 34'	35
	SS	12	6/7						Con't	40

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

FOREMAN Pettus LOGGED BY Parazak DATE STARTED 5/11/76 DATE COMPLETED 5/11/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 7 Con't CONTRACT G-1031

FOREMAN Pettus LOGGED BY Parazak DATE STARTED 5/11/76 DATE COMPLETED 5/11/76
 LOCATION Jefferson City, Mo. AIRPORT BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
									Con't	
	SS	13	18/14							
	SS	14	10/22							
								495.8	Refusal	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

RECORD OF SUBSURFACE EXPLORATION

BORING 8 CONTRACT G-1031

FOREMAN Pattus LOGGED BY Parazak DATE STARTED 5/11/76 DATE COMPLETED 5/12/76
 LOCATION Jefferson City Mo. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPT
								547.1	SURFACE	
	SS	1	4/5						Dark brown silty CLAY	5
	SS	2	4/4							
	SS	3	2/2						Gray and brown below 8.5'	10
	SS	4	4/5							
	SS	5	5/7					535.1	Brown sandy SILT	
87% < #200 Sieve	SS	6	3/4						With silty clay layer and organic matter from 14.0' to 15.5'	15
	SS	7	5/9					529.1	Brown silty fine SAND	20
									Medium to fine from 20.0' to 31.0'	
	SS	8	6/8						Gray below 24'	25
	SS	9	8/8							30
	SS	10	14/16							35
	SS	11	3/4						With gravel from 39.0' to 40.5'	40
									Con't	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 8 Con't CONTRACT G-1031

FOREMAN Peltus LOGGED BY Parazak DATE STARTED 5/11/76 DATE COMPLETED 5/12/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	FEET
									Con't	
	SS	12	16/20							4
	SS	13	7/11						Coarse to fine from 49.0' to 78.0'	5
	SS	14	10/12						With gravel below 54.0'	5
	SS	15	11/13							6
	SS	16	8/12							6
	SS	17	8/12							7
	SS	18	13/16							7
	SS	19	12/14						Con't	8

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

RECORD OF SUBSURFACE EXPLORATION

BORING 8 Con't CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
									Con't	
	SS	20	11/10							85
	SS	21	4/4							90
	SS	22	5/6							95
								449.8	Refusal	100

FOREMAN Pattus LOGGED BY Parazak DATE STARTED 5/11/76 DATE COMPLETED 5/12/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 9 CONTRACT G-1031

FOREMAN Pettus LOGGED BY Parazak DATE STARTED 5/12/76 DATE COMPLETED 5/12/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION
								547.0	SURFACE
	SS	1	2/3						Brown sandy silty CLAY
	SS	2	2/3						
76% < #200 Sieve	SS	3	2/1					540.0	Light brown sandy SILT
3% < #200 Sieve	SS	4	3/3					537.0	
7% < #200 Sieve	SS	5	5/7						Light brown silty fine SAND
	SS	6	5/6						Dark brown below 14.5'
	SS	7	9/15						
	SS	8	9/11					525.5	END

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" =

5'

RECORD OF SUBSURFACE EXPLORATION

BORING 10 CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								548.0	— SURFACE —	
	SS	1	2/4						Light brown silty SAND with clay pockets	
	SS	2	3/3					544.0		5
	SS	3	2/3						Dark brown silty CLAY with fine sand	
	SS	4	2/2							10
	SS	5	2/2					536.0	Gray sandy clayey SILT	
	SS	6	2/4					534.0	Gray and brown CLAY	15
87.3% < #200 Sieve	SS	7	1/1					531.0	Gray sandy SILT	
	SS	8	4/5					529.0	Brown silty fine SAND	20
								526.5	— END —	25

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

FOREMAN Pattus LOGGED BY Parazak DATE STARTED 5/12/76 DATE COMPLETED 5/12/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 11 CONTRACT G-1031

FOREMAN Pettus LOGGED BY Parazak DATE STARTED 5/12/76 DATE COMPLETED 5/12/76
 LOCATION Jefferson City Mom. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	PT
96% < #200 Sieve								548.0	SURFACE	
	SS	1	3/4							
	SS	2	4/5							
	SS	3	3/3							
	SS	4	1/3							
	SS	5	2/4					536.5	Light brown sandy clayey SILT	
	SS	6	1/3					534.0	Brown sandy SILT	
	SS	7	3/5					531.5	Brown silty fine SAND	
	SS	8	3/5					527.0	End	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

RECORD OF SUBSURFACE EXPLORATION

BORING 12 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
44% < #200 Sieve								546.0	SURFACE	
	SS	1	1/1						Brown and dark gray silty CLAY with gravel (FILL)	5
	SS	2	3/7						Brown below 5'	
	SS	3	5/7					539.0		10
	SS	4	6/7						Brown silty fine SAND	15
	SS	5	4/4					530.0	END	20

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

FOREMAN Plattus LOGGED BY Schwartz DATE STARTED 5/7/76 DATE COMPLETED 5/7/76

LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None

Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 13 CONTRACT G-1031



FOREMAN PERLIN LOGGED BY SCHEIDT DATE STARTED 11/14/44 DATE COMPLETED 11/14/44 CASING NONE
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qd.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
32% < #200 Sieve								542.0	SURFACE	
	SS	1	2/3						Gray silty sandy CLAY	
	SS	2	3/4					537.5	Brown SILT with fine sand	5
	SS	3	6/8					535.0	Brown silty fine SAND	10
	SS	4	1/2					530.5	END	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

LAYNE-WESTERN COMPANY, INC.

RECORD OF SUBSURFACE EXPLORATION

BORING 14 CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								546.0	SURFACE	
	SS	1	1/2						Gray and brown silty CLAY with fine sand	5
	SS	2	2/3						Gray below 7'	
	SS	3	2/2					537.0	Gray and brown CLAY with fine sand	10
	SS	4	2/2					534.5	Gray SILT with fine sand	15
	SS	5	1/1						With clay from 14' to 14.5'	
	SS	6	1/1							
	SS	7	1/2							
	SS	8	1/1					525.0	END	20
										25

FOREMAN Peters LOGGED BY Schwartz DATE STARTED 5/21/76 DATE COMPLETED 5/21/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING A CONTRACT G-1031

FOREMAN Pettus LOGGED BY Schwartz DATE STARTED 5/17/76 DATE COMPLETED 5/17/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hand Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	EP
								540.0	SURFACE	
									Brown SILT with fine sand	
	A	1						537.5		
									Brown SILT	
								533.0	END	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING B CONTRACT G-1031

FOREMAN Peltus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City, Mo. Airport BORING METHOD Retractable Auger Casing None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								544.0	SURFACE	
	A	1							Dark gray silty CLAY	
	A	2							Gray below 2.5'	5
	A	3								
	A	4						536.5	Dark brown SILT with sand	
								534.0	END	10
										15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING C CONTRACT G-1031

FOREMAN Pettus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hand Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	PT
								543.0	SURFACE	
	A	1							Brown silty CLAY	
								540.5		
	A	2							Brown silty fine SAND	5
								536.0	END	
										10

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

RECORD OF SUBSURFACE EXPLORATION

BORING D CONTRACT G-1031



FOREMAN Pattus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hand Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								546.0	SURFACE	
	A	1							Dark gray silty CLAY	
	A	2							Dark brown below 2.5'	
	A	3						541.0	Brown silty fine SAND	5
								538.5	END	10

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING E CONTRACT G-1031

FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Memorial Airport METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION
								543.0	SURFACE
	A	1							Dark brown silty CLAY
	A	2						537.0	Brown silty fine SAND
								535.5	END

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING F CONTRACT G-1031

FOREMAN WILLIAM LUGGENT, SCHWILTZ DATE STARTED 5/10/10 DATE COMPLETED 5/10/10
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								545.0	SURFACE	
	A	1							Brown silty CLAY	5
	A	2						534.0	Brown silty fine SAND	10
								533.0	END	15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING G CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPT.
								544.0	SURFACE	
	A	1						538.0	Brown silty CLAY	5
	A	2						534.0	Brown sandy SILT	10
									END	15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING Done
Jefferson City, Missouri
 DATE COMPLETED 5/18/76

RECORD OF SUBSURFACE EXPLORATION

BORING H CONTRACT G-1031

FOREMAN Rollins LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								546.0	SURFACE	
	A	1						543.5	Brown sandy SILT	
	A	2								5
	A	3								
	A	4						538.0		10
	A	5							Brown silty fine SAND	15
	A	6						526.0	END	20
										25

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING I CONTRACT G-1031

LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri
 DATE COMPLETED 5/18/76
 DATE STARTED 5/19/76

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEP.
								546.0	SURFACE	
	A	1							Brown sandy SILT	
	A	2						543.5		
	A	3							Brown silty CLAY	
	A	4							With clayey silt layer from 5' to 7.5'	
								536.0	END	10
										15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING J CONTRACT G-1031

FORMAN Pettus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								543.0	SURFACE	
	A	1							Dark gray silty CLAY	
	A	2							Brown silty fine sand layer from 2.5' to 5'	5
	A	3							Brown and sandy below 5'	
	A	4						535.5	Brown sandy clayey SILT	
								533.0		10
										15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING K CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEP.
								544.0	SURFACE	
	A	1							Brown clayey SILT	
	A	2						539.0		
	A	3							Gray silty CLAY	
	A	4						534.0		10
	A	5							Brown silty fine SAND	
								529.0	END	1
										2

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri
 DATE COMPLETED 5/18/76
 BY Layne

RECORD OF SUBSURFACE EXPLORATION

BORING L CONTRACT G-1031

FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING NONE
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								545.0	SURFACE	
	A	1						542.5	Dark brown silty CLAY	
	A	2								
	A	3							Brown SILT	5
	A	4						537.5	Brown silty fine SAND	10
									END	15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING M CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEP.
								544.4	SURFACE	
	A	1								
	A	2							Gray silty CLAY	
	A	3							Sandy below 5'	
	A	4						536.9	Brown silty fine SAND	
								534.4	END	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

LOCATION Jefferson City, Mo. Airport Boring Method Retractable Auger Casing None
Jefferson City, Missouri

DATE COMPLETED 5/18/76

RECORD OF SUBSURFACE EXPLORATION

BORING N CONTRACT G-1031

FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 5/18/76 DATE COMPLETED 5/18/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								541.6	SURFACE	
	A	1								
	A	2								
	A	3							Brown silty CLAY	5
	A	4							Gray 2.5' to 5.0'	10
	A	5						529.1	Brown silty fine SAND	
								526.6	END	15
										20

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING P CONTRACT G-1031

FOREMAN Pattus LOGGED BY Schwartz DATE STARTED 5/19/76 DATE COMPLETED 5/19/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	EP
								543.0	SURFACE	
	A	1							Gray silty CLAY	
	A	2							Brown below 2.5'	
	A	3							Sandy below 5'	
	A	4								
	A	5						533.0	Brown silty fine SAND	
								528.0	END	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 0 CONTRACT G-1031

FOREMAN P. Lottus LOGGED BY Schwartz DATE STARTED 5/19/76 DATE COMPLETED 5/19/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								545.0	SURFACE	
	A	1							Brown silty CLAY	
								542.5		
	A	2							Brown sandy SILT	
								540.0	END	5
										10

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING R CONTRACT G-1031

FOREMAN Pottus LOGGED BY Schwartz DATE STARTED 5/19/76 DATE COMPLETED 5/19/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	EF
								545.0	SURFACE	
	A	1							Brown clayey SILT	
	A	2								
	A	3						540.0		
	A	4							Brown silty CLAY	
	A	5								
	A	6						532.5	Brown silty fine SAND	
								530.0	END	

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING S CONTRACT G-1031

FOR MAN -- Pottus -- LOGGED BY -- Schwartz -- DATE STARTED -- 5/19/76 -- DATE COMPLETED -- 5/19/76
 LOCATION -- Jefferson City Mem. Airport -- BORING METHOD -- Retractable Auger -- CASING -- None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								540.0	SURFACE	
	A	1							Dark brown silty CLAY	
	A	2								
	A	3						535.0	Brown silty fine SAND	5
								530.0	END	10
										15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING T CONTRACT G-1031

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEP.
								542.0	SURFACE	
	A	1								
	A	2								
	A	3								
	A	4								
								532.0	END	10
										15

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS.

SCALE 1" = 5'

LOCATION Jefferson City Mem. Airport BORING METHOD Retractable Auger CASING None
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 15 CONTRACT G-1031

FOREMAN Church LOGGED BY Parazak DATE STARTED 7/15/76 DATE COMPLETED 7/15/76
 LOCATION Jefferson City Mm. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								546.6	SURFACE	
								546.1	TOPSOIL	
	SS	1	3/3						Light brown SILT	5
	SS	2	3/4							
	SS	3	9/7					538.6	Brown silty fine SAND	10
	SS	4	3/3					534.6		
	SS	5	1/1					532.6	Brown sandy SILT	
									END	15

GROUND WATER DEPTH AT COMPLETION Dry AFTER _____ HRS. AFTER _____ HRS.SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 16 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEP.
								546.9		
								546.4	SURFACE	
									TOPSOIL	
	SS	1	3/2						Light brown SILT	
								542.4		
	SS	2	2/3						Light brown and gray silty CLAY	
								539.9		
	SS	3	2/3						Brown sandy SILT	10
	SS	4	2/3							
								534.9		
	SS	5	3/2						Gray and brown silty clayey fine SAND	
								532.9	END	15

GROUND WATER DEPTH AT COMPLETION Dry AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

LOCATION Jefferson City Mm. Airport BORING METHOD Hollow Auger CASING None

Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 17 CONTRACT G-1031

FOREMAN Church LOGGED BY Barazak DATE STARTED 7/16/76 DATE COMPLETED 7/16/76
 LOCATION Jefferson City Mgm. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								544.2		
								543.7	SURFACE	
									TOPSOIL	
	SS	1	4/5						Dark brown silty CLAY	
									Light brown below 4.5'	5
	SS	2	3/4							
								537.2		
	SS	3	4/4						Brown silty fine SAND	10
									Fine to medium below 12.0'	
	SS	4	4/5							
								530.2	END	15
	SS	5	4/4							

GROUND WATER DEPTH AT COMPLETION Dry AFTER _____ HRS. AFTER _____ HRS.

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 22 CONTRACT G-1031

FOREMAN Church LOGGED BY Parazak DATE STARTED 7/15/76 DATE COMPLETED 7/15/76
 LOCATION Jefferson City, Mo. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	'T
								543.2		
								542.7	SURFACE	
									TOPSOIL	
	SS	1	6/7						Brown silty fine SAND	5
	SS	2	2/3						With silty clay seams from 0.5' - 4.0'	10
	SS	3	3/4							
	SS	4	4/5							
	SS	5	3/3							
									END	15

GROUND WATER DEPTH AT COMPLETION Dry AFTER _____ HRS. AFTER _____ HRS.SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 23 CONTRACT G-1031

FOREMAN Church LOGGED BY Parazak DATE STARTED 7/15/76 DATE COMPLETED 7/15/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								543.5	SURFACE	
								543.0	TOPSOIL	
	SS	1	2/3						Gray and brown sandy SILT	
								542.1		5
	SS	2	1/1						Gray and brown silty CLAY	
	SS	3	1/3						Sandy from 4.5' - 7.0'	10
	SS	4	1/2							
	SS	5	1/2					536.6	Gray and brown CLAY	
								532.6	END	15

GROUND WATER DEPTH AT COMPLETION DRY AFTER HRS. AFTER HRS.SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

BORING 24 CONTRACT G-1031

NOTES	TYPE	NO.	N	Qp.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPT
								544.4		
								543.9	TOPSOIL SURFACE	
	SS	1	5/7						Brown and gray silty CLAY	
									Gray and brown below 4.5'	
	SS	2	3/3						Brown silt seam from 7.0' - 8.0'	
	SS	3	2/2							
	SS	4	8/8					533.9	Brown silty fine SAND	10
	SS	5	6/7					530.4	END	15

GROUND WATER DEPTH AT COMPLETION Driv AFTER _____ HRS. AFTER _____ HRS.SCALE 1" = 5'

LOCATION JEFFERSON CITY, MO. ALFORD E. BORING METHOD Hollow Auger Casing None
Jefferson City, Missouri

RECORD OF SUBSURFACE EXPLORATION

BORING 26 CONTRACT G-1031

FOREMAN Church LOGGED BY Parazak DATE STARTED 7/15/76 DATE COMPLETED 7/15/76
 LOCATION Jefferson City Mem. Airport BORING METHOD Hollow Auger CASING None
Jefferson City, Missouri

NOTES	TYPE	NO.	N	Op.	Qu.	MC	D	ELEV.	DESCRIPTION	DEPTH
								545.9		
								545.4	SURFACE	
									TOPSOIL	
	SS	1	7/4						Light brown silty CLAY	
								541.4		5
	SS	2	2/3						Gray and brown sandy SILT	
	SS	3	2/3							
								536.4		10
	SS	4	3/4						Brown silty fine SAND With silty clay pockets below 12.0'	
	SS	5	5/6					531.9	END	15

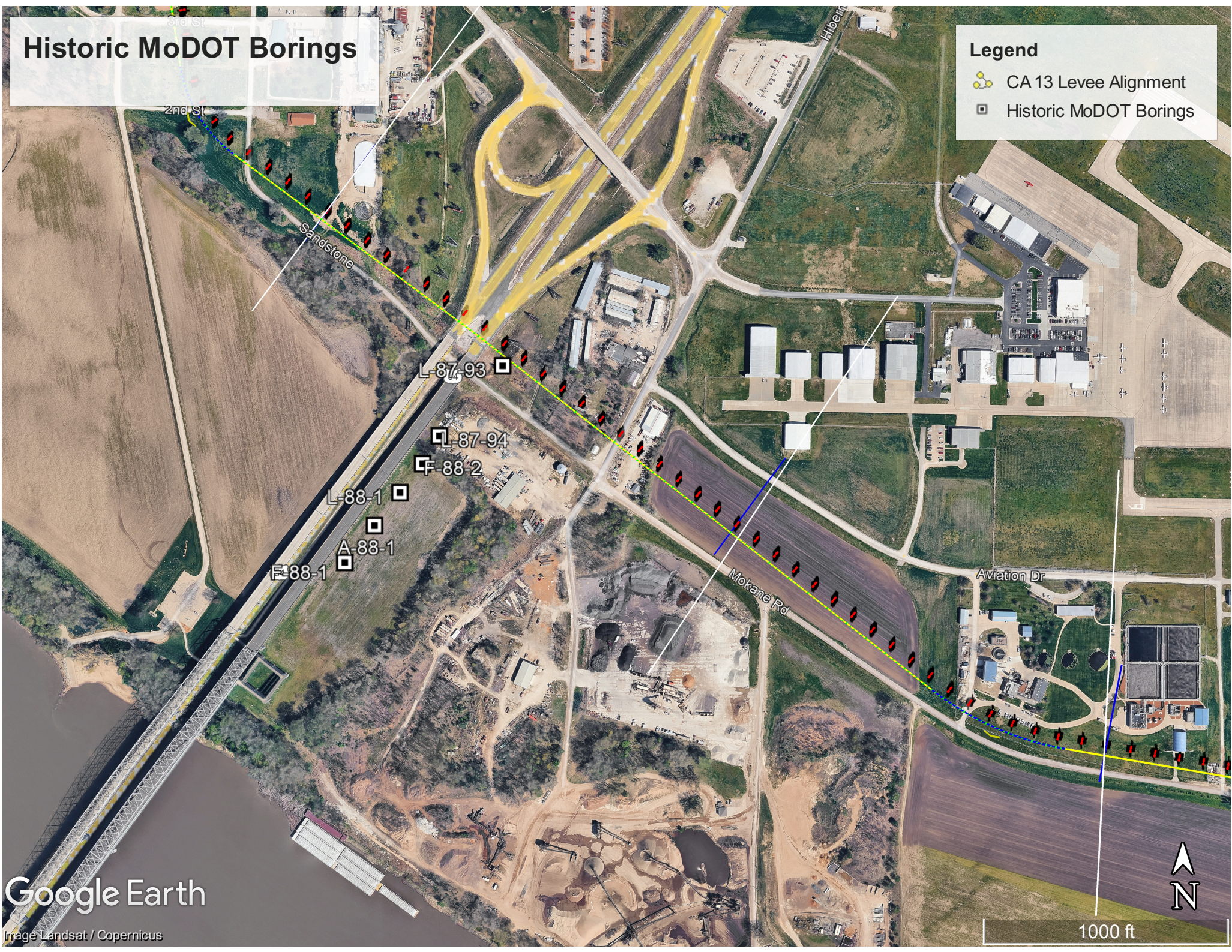
GROUND WATER DEPTH AT COMPLETION Dry AFTER HRS. AFTER HRS.SCALE 1" = 5'

Missouri Highway and Transportation Department Borings

Historic MoDOT Borings

Legend

- CA 13 Levee Alignment
- Historic MoDOT Borings





MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT

James R. Toft
District Engineer

CENTRAL DISTRICT: 1511 Missouri Blvd., P.O. Box 718, Jefferson City, MO 65102 (314) 751-3322 Fax (314) 751-8267

March 28, 1994

Mr. Scott A. Loehr, P.E.
U. S. Army Corps of Engineer
Room 824
601 East 12th Street
Kansas City, MO 64106-2896

Dear Mr. Loehr:

Pursuant to our telephone conversation of March 25, 1994 I am enclosing logs of borings that were taken in 1988, in the Missouri River bottoms, for the bridge columns on Route 54/63.

We have also included soundings that were taken in 1986 and 1987 on property owned by the Conservation Federation of Missouri, for a possible source of hydraulic sand borrow. This site adjoins our right of way.

All the borings are in the area of the proposed levy construction and I sincerely hope they will be of use to you.

If we can be of further assistance, please advise.

Sincerely,

Edward Martin
District Soils and Geology Technologist
District Five

bp

Copy: File

MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT

Division of Materials and Research

BORING DATA (CORE & SPT)

Job No. JC-5 H054 ²⁵⁸ ~~285~~ Sheet 1 of 6
Callaway County, Route 54 Design No. A-4497
 Over Missouri River Skew Right Angles
 Logged by C. Ousley Operator Fry
 Equipment Failing 1500, Split Spoon Sampler Drillers Hole No. F-88-1
 Hole Stab. by Bentonite Date of Work 1/4/88

BENT	STATION	LOC	SURFACE ELEVATION	LOG OF MATERIALS*
7	32+11.8	<u>Q</u>	544.2	0-13.5' Brown to gray silty clay, soft. 13.5-69.5' Fine to medium sand with layers of silty clay. 69.5-71.0' Boulder, hard, limestone (rock bit). 71.0-90.2' Coarse sand and fine gravel with scattered cobbles. 90.2-95.0' Hard dolomite, cut with rock bit.

TEST DATA

Depth, ft	SPT Blows/6"	Pocket Pen., tsf
5	2-2-2	0.75
10	2-1-2	
15	3-2-4	0.75
20	6-11-9	
25	7-9-9	
30	9-13-13	
35	11-15-17	
40	11-15-16	
45	6-5-7	
50	13-10-10	
55	10-13-14	
60	1-16-17	
65	12-20-20	
70	-----	
75	16-25-22	
80	15-17-18	
85	19-26-38	
90	160 in 3"	

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes

WATER TABLE OBSERVATIONS

Date	Δt	Depth Hole Open	Depth To Water
1/11/88	1 hour	25.0'	9.0'

MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT

Division of Materials and Research

BORING DATA (CORE & SPT)

Job No. JC-5 U054 ²⁵⁸~~285~~ Sheet 2 of 6
Callaway County, Route 54 Design No. A-4497
 Over Missouri River Skew Right Angles
 Logged by C. Ousley Operator L. Fry
 Equipment 1500 Failing Drillers Hole No. A-88-1
 Hole Stab. by Bentonite Date of Work 1-11-88

BENT	STATION	LOC	SURFACE ELEVATION	LOG OF MATERIALS*
9	35+31.80	<u>g</u>	542.6	0-12.0' - Brown silty clay to sandy silt, soft.

TEST DATA

Depth, ft	SPT Blows/6"	Pocket Pen., tsf	
10	2-2-2	5.0	
15	5-6-8	---	
20	5-7-7		
25	6-6-8		
30	5-9-8		
35	8-14-14		
40	9-12-13		
45	10-13-17		
50	6-7-11		
55	10-9-12		
60	12-15-31		
65	21-22-23		
70	17-21-23		
75	22-37-24		
80	21-28-37		

12.0-14.0' - Fine brown sand.
 14.0-60.0' - Coarse and fine light gray sand.
 60.0-90.3' - Fine gravel and coarse sand layers, some cobbles.
 90.3-95.3' - Dolomite solid.
 (Cut with rock bit.)

CORING LOG (INX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes

WATER TABLE OBSERVATIONS

Date	Δt	Depth Hole Open	Depth To Water

Date	Δt	Depth Hole Open	Depth To Water

MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT

Division of Materials and Research

BORING DATA (CORE & SPT)

258

Job No. JC-5 UO54 285

Sheet 4 of 6

Callaway County, Route 54 Design No. A-4497

Over Missouri River Skew Right Angles

Logged by C. Ousley Operator V. Hees

Equipment 1500 Failing. Split Spoon Sampler Drillers Hole No. F-88-2

Hole Stab. by Bentonite Date of Work 1/13/88

BENT	STATION	LOC	SURFACE ELEVATION	LOG OF MATERIALS*
13	39+50.80	<u>Q</u>	543.1	0-9.5' Brown silty clay to a sandy silt.

TEST DATA

Depth, ft	SPT Blows/6"	Pocket Pen., tsf
5	2-3-3	1.25
10	3-3-6	
15	3-4-4	
20	7-9-12	
25	9-11-11	
30	4-6-9	
35	19-24-31	
40	10-12-9	
45	9-11-16	
50	12-14-17	
55	8-10-11	
60	14-24-18	
65	16-22-19	
70	17-23-31	
75	18-25-24	
80	18-18-17	
85	15-18-22	

9.5-19.0' Fine brown silty sand.
19.0-59.0' Fine light gray sand with coarse sand and gravel layers.
59.0-88.3' Coarse sand and fine gravel with some cobbles
88.3-93.2' Dolomite, solid (cut with rock bit).

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes

WATER TABLE OBSERVATIONS

Date	Δt	Depth Hole Open	Depth To Water

MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT

Division of Materials and Research

BORING DATA (CORE & SPT)

258

No. JC-5 U054 ~~258~~

Sheet 5 of 6

Callaway

County, Route 54

Design No. A-4497

Missouri River

Skew Right Angles

d by C. Ousley

Operator V. Hees

ment Failing 1500 & Split Spoon SamplerDrillers Hole No. L-87-94Stab. by Bentonite

Date of Work 12/30/87

POINT	STATION	LOC	SURFACE ELEVATION	LOG OF MATERIALS*
L6	42+39.80	<u>Ø</u>	536.4	Inaccessible, falls in old borrow pit
TEST TO:	42+39.80	64.0'	542.0	0-3.0' Brown silt to a silty clay, soft, with boulders, sand and gravel (fill).
TEST DATA Lt.				
Depth, ft	SPT Blows/6"	Pocket Pen., tsf		
0-1'	2-2-2	1.25		3.0-9.0' Brown silt to silty clay.
1-2'	1-2-1	0.50		9.0-13.0' Gray clay soft.
2-3'	1-2-2			13.0-19.0' Gray silty sandy clay and fine sand.
3-4'	4-7-13			19.0-55.0' Fine gray sand with layers of medium to coarse white sand
4-5'	2-4-8			55.0-89.4' Sand, medium to coarse, coarse to medium gravel, with cobbles at various depth.
5-6'	5-4-8			89.4-94.4' Hard dolomite (rock bit).
6-7'	4-6-4			
7-8'	11-15-19			
8-9'	12-12-15			
9-10'	14-12-14			
10-11'	20-27-38			
11-12'	23-29-28			
12-13'	18-18-21			
13-14'	17-17-26			
14-15'	13-15-15			
15-16'	25-21-24			
16-17'	22-22-16			
				*Water in old borrow pit at elevation 535.7.

CORING LOG (NX Double Tube Barrel)

m	To	Run	Rec	Loss	% RQD	Notes

WATER TABLE OBSERVATIONS

Date	Δt	Depth Hole Open	Depth To Water
			*

MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT

Division of Materials and Research

BORING DATA (CORE & SPT)

Job No. JC-5 U054 258

Sheet 6 of 6

Callaway

County, Route 54

Design No. A-4497

Over Missouri River

Skew Right Angles

Logged by C. Ousley

Operator V. Hees

Equipment 1500 Failing, Split Spoon Sampler & Rockbit Drillers Hole No. L-87-93

Hole Stab. by Bentonite

Date of Work 12/28/87

BENT	STATION	LOC	SURFACE ELEVATION	LOG OF MATERIALS*
19 OFFSET TO: 45+49.80	45+27.80	<u>Ø</u> <u>Ø</u>	546.5 546.1	Falls in middle of road. 0-9.0' Brown and gray mottled silty clay.

TEST DATA

Depth, ft	SPT Blows/6"	Pocket Pen., tsf	
5'	2-3-4	1.25	9.0-19.0' Fine brown sand.
10'	6-8-8	--	19.0-30.0' Coarse gray sand and layers of dark gray clay, soft.
15'	4-3-3	--	30.0-54.0' Coarse to medium gray sand
20'	2-2-3	0.50	54.0-60.0' Coarse sand, fine gravel & cobbles.
25'	5-9-7	--	60.0-92.1' Layers of coarse gravel and sand, some cobbles.
30'	4-5-4	--	92.1-97.3' Dolomite (rock bit).
35'	6-6-7	--	
40'	7-8-9	--	
45'	8-7-6	--	
50'	9-11-13	--	
55'	12-13-13	--	
60'	17-15-14	--	
65'	17-27-27	--	
70'	15-20-25	--	
75'	12-13-12	--	
80'	11-10-9	--	
85'	20-19-17	--	
90'	20-19-21	--	

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes

WATER TABLE OBSERVATIONS

Date	Δt	Depth Hole Open	Depth To Water
12/30/87	3 hrs.	11.5'	4.0'

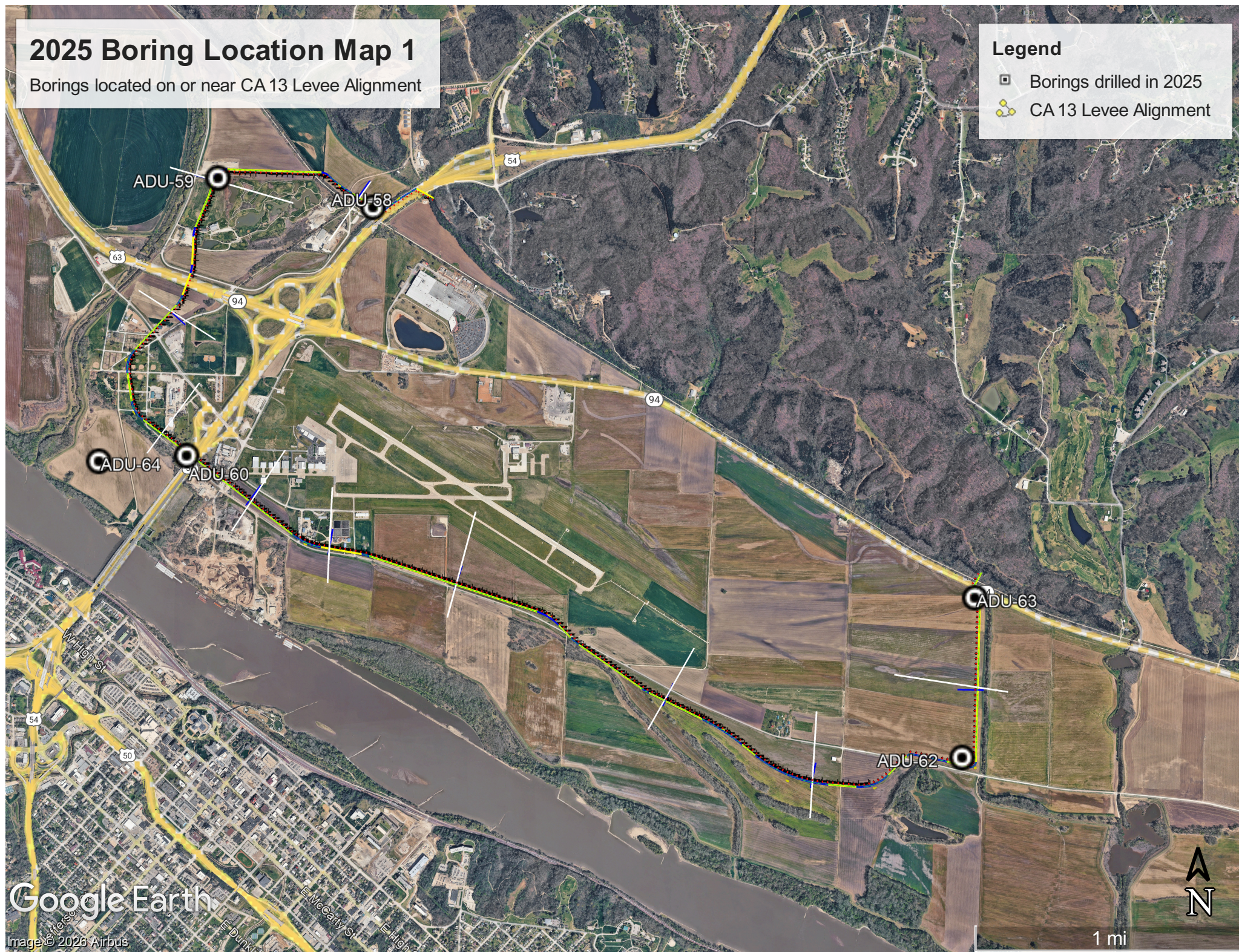
2025 Borings

2025 Boring Location Map 1

Borings located on or near CA 13 Levee Alignment

Legend

- Borings drilled in 2025
- CA 13 Levee Alignment



Google Earth

Image © 2026 Airbus

2025 Boring Location Map 2

Borings located in Church Farms Borrow Area

Legend

▣ Borings drilled in 2025

Ait ADU-66 ▣

Church Farms Borrow Area

Ait ADU-65 ▣

Google Earth

179
Image Landsat / Copernicus



2000 ft

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 5										
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)		VERTICAL NGVD29										
2. HOLE NUMBER ADU-58		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Jul 08 2025		LOCATION METHOD: COMPLETED Jul 10 2025										
4. NAME OF DRILLER Lane Wisdom				12. HAMMER TYPE 140 lb		EFFICIENCY (%)										
5. EQUIPMENT NWK-D-90 TRK				13. SIZE AND TYPE OF BIT												
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 554.0'										
7. THICKNESS OF OVERBURDEN 76.5'				15. ELEVATION GROUND WATER 528.0'												
8. DEPTH DRILLED INTO ROCK 76.5'				16. TOTAL NUMBER CORE BOXES												
9. TOTAL DEPTH OF BORING 76.5'				17. SIGNATURE AND TITLE OF INSPECTOR Shelby Huntebrinker, Field Geologist		APPROVED BY:										
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
					LEAN CLAY (CL) brown, dry, highly fractured, and fragile due to particle distribution and and low MC MEDIUM											
				3.00			S-1			99	46	28	26		116	T-1=.048, T-2= .045, T-3= .01, Time: 5 secs, Press: 400 psi
				551.00	FAT CLAY (CH) dark gray, dry, MEDIUM	83	J-1									
		8					J-2			99	70	45				
5	4			6.00												
				548.00	FAT CLAY (CH) dark brown, dry, soft, very fragile 6.5		S-2				53	28	21		114	T-1=0, T-2= .075, T-3= .062, Time: 6 secs, Press: 450 psi
							J-3									
10				10.00												
		4		544.00	LEAN CLAY (CL) grayish brown, dry, soft, trace roots, trace gravel	93	J-4			83	45	24				
15				15.00												
				539.00	LEAN CLAY (CL) gray brown, moist, very stiff		J-6			94	40	18	23			
		12		15.80	POORLY GRADED SAND (SP) light gray, moist, medium dense, trace clay, fine sand	100										
				538.20												

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 5

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.606729°

Lon: -92.163111°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	9 8				POORLY GRADED SAND (SP) light gray, moist, medium dense, trace clay, fine sand		J-5									
20		8			20 ft: changes to loose	87	J-7			33						
	4 6															
25		10			26 ft: 28hr after drilling	73	J-8									samples got rained on and washed sample out
	6 5				26.5 ft: changes to medium dense											
					28 ft: hit water after drilling											
30		8			30 ft: color change to grey, grading coarser sand	80	J-9			20						samples got rained on and washed sample out
	5 7															
35		11		34.00 520.00	POORLY GRADED SAND (SP) gray, moist, medium dense, fine sand	0										no recovery, no

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 5

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.606729°

Lon: -92.163111°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	5 5				POORLY GRADED SAND (SP) gray, moist, medium dense, fine sand											catcher and sample fell out, 26ft 4ft water hit
40		20			40 ft: changed to dense	0										no recovery, no sample, water in hole making it come out
45	12 14			45.00 509.00	POORLY GRADED SAND (SP) gray, wet, dense, trace gravel, trace roots	67	J-10									
	12 14	19														
50		24				67	J-11			7						adding mud, augers were sand locked
	16 24															
55		9			55 ft: changes to medium dense	67	J-12									

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 4 of 5

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.606729°

Lon: -92.163111°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	5 6				POORLY GRADED SAND (SP) gray, wet, dense, trace gravel, trace roots											
60		16		60.00 494.00	POORLY GRADED SAND (SP) gray, wet, medium dense, fine sand	100	J-13									
65	9 12															
					65 ft: changes to loose		J-14									
		3		65.50 488.50 65.60 488.40	WELL GRADED SAND (SW) gray, wet, loose, coarse sand layer POORLY GRADED SAND (SP) gray, wet, loose, fine sand	40										
70	1 1			70.10 483.90	WELL GRADED SAND (SW) gray, wet, loose, some gravel, coarse sand	40	J-15 J-16									
	3 4	6														
75		14			75 ft: changed to medium dense 75.05 ft: layer of fine sand 75.1 ft: 1 large piece of gravel, smooth	33	J-17									

(continued on next page)

Boring Designation

ADU-59

DRILLING LOG				DIVISION Northwestern		INSTALLATION		Sheet 1 of 6								
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)				VERTICAL NGVD29								
2. HOLE NUMBER ADU-59		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Jul 12 2025		LOCATION COORDINATES Lat: 38.608092° Lon: -92.173165°										
4. NAME OF DRILLER Lane Wisdom				12. HAMMER TYPE 140 lb				LOCATION METHOD: COMPLETED Jul 15 2025								
5. EQUIPMENT NWK-D-90 TRK				13. SIZE AND TYPE OF BIT												
6. DIRECTION OF BORING		DEG FROM VERTICAL		BEARING		14. ELEVATION SURFACE 550.0'										
7. THICKNESS OF OVERBURDEN 100.0'				15. ELEVATION GROUND WATER												
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES												
9. TOTAL DEPTH OF BORING 100.0'				17. SIGNATURE AND TITLE OF INSPECTOR Shelby Huntbrinker, Field Geologist				APPROVED BY:								
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
					FAT CLAY (CH) brown, moist, trace organics, trace roots, highly fractured, rained night before, grading silty after 2.0											
					2 - 3.9 ft: <i>torvane</i> : T-1=023, T-2=.015, T-3=0, (T-3 was too loose)		S-1				54	30	32		79	
							J-1									
5	3	6		5.00 545.00	FAT CLAY (CH) dark gray, moist, stiff, trace silt, trace roots, organic odor, trace grass, trace sand (SP)	100	J-2				62	38				
	2															
	4			7.00 543.00	POORLY GRADED SAND (SP) light brown, moist, trace organics, trace clay 7 - 8 ft: <i>torvane</i> too loose, .4 fell out of bottom, horizon fracture 8-8.6, sample broke apart completely		J-3			22	23	2				
10	3	12		10.00 540.00	LEAN CLAY (CL) dark gray, moist, trace roots, trace sand (SP)		J-4			77	47	27				
	5			10.60 539.40	POORLY GRADED SAND (SP) tan, moist, medium dense, fine grained sand	100										
	7															
15	4	20		15.00 535.00	POORLY GRADED SAND (SP) brown, wet, medium dense, trace clay, fine sand	67	J-6			10						
	9															

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.608092°

Lon: -92.173165°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	11				POORLY GRADED SAND (SP) brown, wet, medium dense, trace clay, fine sand											
20	6	13		20.20 529.80	20 - 20.2 ft: trace gravel layer											
	6				POORLY GRADED SAND WITH SILT (SP-SM) light gray, wet, medium dense	73	J-7			11						
	7				21.4 - 21.5 ft: FAT CLAY layer, dark gray, wet											
25	4	18		25.00 525.00	POORLY GRADED SAND (SP) grayish tan, moist, medium dense, iron oxide staining, trace fat clay nodules, fine sand	100										
	5															
	13															
30	5	14		30.00 520.00	SANDY SILTY CLAY (SP-SM) grayish brown, wet, medium dense, trace clay, fine sand	53										
	5															
	9															
35	2	15			35 - 36.5 ft: trace gravel size .025"											
	3					100	J-10									

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.608092°

Lon: -92.173165°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	12				SANDY SILTY CLAY (SP-SM) grayish brown, wet, medium dense, trace clay, fine sand											
40	6	5/-1"			40 ft: switched to mud rotary	100										
	5															
	5															
45	8	28		45.00	POORLY GRADED SAND (SP) gray, wet, dense, trace gravel, fine-coarse sand, .02 sized gravel	47	J-12			1						
	13			45.40	WELL GRADED SAND (SW) gray, wet, dense, medium sized sand											
	15			504.60	WELL GRADED SAND (SW) gray, wet, dense, trace gravel, coarse sand, trace gravel is .05 sized											
				504.40												
50	4	16		50.00	POORLY GRADED SAND (SP) gray, wet, medium dense, fine sand	60										
	7			50.45	WELL GRADED SAND (SW) gray, wet, medium dense, coarse sand											
	9			499.55												
55	3	9		55.00	POORLY GRADED SAND (SP) gray, wet, medium dense, trace gravel, fine-coarse sand	73	J-17			1						
				495.00	WELL GRADED SAND (SW) gray, wet, medium dense, medium sand											
	4			55.60	POORLY GRADED GRAVEL (GP) gray, wet, medium dense											
				494.40	POORLY GRADED GRAVEL (GP) gray, wet, medium dense											
				55.75												
				494.25												

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 4 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.608092°

Lon: -92.173165°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	5			55.95 494.05	POORLY GRADED GRAVEL (GP) gray, wet, medium dense											
60	9	35			60 ft: sample fell out, plastic catcher was stretched open, mud scale was 10ppg, did not exceed 11ppg 60 - 65 ft: changes to loose	33										
65				65.00 485.00	POORLY GRADED GRAVEL (GP) brown, wet, dense, trace coarse gravel, trace large gravel sized .1" 65 ft: mud scale= 9.5ppg											
70	9	21		70.00 480.00	WELL GRADED GRAVEL (GW) brown, wet, medium dense, coarse gravel											
	9			70.30 479.70	POORLY GRADED GRAVEL (GP) brown, wet, medium dense, fine gravel	53										
	12			70.50 479.50	POORLY GRADED SAND (SP) brown, wet, medium dense, medium sand											
75	9	22		75.20 474.80	75 - 75.2 ft: changes to dense with some medium gravel WELL GRADED GRAVEL (GW) brown, wet, dense, coarse gravel											
	10			75.40 474.60	WELL GRADED SAND (SW) brown, wet, dense, little coarse gravel, medium sand	47										

(continued on next page)

ADU-59

USACE FORM 1836 Boring Designation ADU-59 Sheet 5 of 6

ADU-59

USACE FORM 1836 Boring Designation ADU-59 Sheet 6 of 6

ADU-60

[illegible]

Sheet 1 of 9

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 9

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.649720°

Lon: -92.275439°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	0				LEAN CLAY (CL) gray brown, moist, very soft											
20	0	4		20.00	FAT CLAY (CH) gray, moist, soft	100										
	0			534.00												
	4			21.10												
				532.90	POORLY GRADED SAND (SP) gray, wet, loose, fine sand											
25	0	0		25.50	25 ft: changes to <i>VERY LOOSE</i>											
	0			528.50	LEAN CLAY (CL) gray, wet, very soft, trace poorly sorted sand	100	J-10			69	39	1	36			
	0															
30	2			30.80	POORLY GRADED SAND (SP) gray, wet, medium dense, fine sand											
	8			523.20												
	10															
35	3	7		35.00	POORLY GRADED SAND (SP) dark gray, wet, loose, little gravel, coarse sand, trace clay	60	J-13			19	NP	NP				
	2			519.00												

switched to mud rotary

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 9

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.649720°

Lon: -92.275439°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
5					POORLY GRADED SAND (SP) dark gray, wet, loose, little gravel, coarse sand, trace clay 36.4 - 36.5 ft: <i>FAT CLAY</i> layer 0.1'											
40	7	18		40.00 514.00	WELL GRADED SAND (SW) gray, wet, medium dense, trace medium to coarse gravel, medium sand	47	J-14			6						
45	7	23		45.00 509.00	WELL GRADED SAND (SW) gray, wet, medium dense, medium grain sand, some medium gravel	47										
50	10	28			50 - 51 ft: <i>black fine layers of clay, changes to DENSE</i>	67										
55	9	12		55.00 499.00	POORLY GRADED GRAVEL WITH SAND (GP) gray, wet, medium dense, little coarse gravel, fine to coarse	40	J-17			3	NP	NP				

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 4 of 9

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.649720°

Lon: -92.275439°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
5					POORLY GRADED GRAVEL WITH SAND (GP) gray, wet, medium dense, little coarse gravel, fine to coarse											
60	8	25			60 ft: changes to DENSE	53										
13																
12																
17																
14																
15		14/-5 4"				-26										
65																
70	12	30				53										
15																
15																
75	7			75.00												
				479.00	WELL GRADED SAND (SW) gray, wet, dense, few medium gravel, coarse sand		J-21			4						
8		17			75 ft: changes to MEDIUM DENSE, and to few coarse gravel	40										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 5 of 9

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.649720°

Lon: -92.275439°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
	9				WELL GRADED SAND (SW) gray, wet, dense, few medium gravel, coarse sand											
80	11				80 ft: changes to DENSE											
	12	22			80.6 - 80.7 ft: large rock size 0.1'	47										
	10															
85	12															
	12	23				47										
	11															
90	15				90 ft: changes to poorly sorted sand		J-24		4							
	14	31				67										
	17															
95	0															
	1	51				7										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 6 of 9

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.649720°

Lon: -92.275439°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
50				96.40	WELL GRADED SAND (SW) gray, wet, dense, few											backfilled w/ Portland cement 92 lb, 14 bags
				457.60	medium gravel, coarse sand											
				96.50	White, trace coarse gravel, trace coarse sand,											
				457.50	LIMESTONE											
					Borehole finished at 96.5 ft. Backfilled with cement grout.											
100																
105																
110																
115																

(continued on next page)

DRILLING LOG (Cont Sheet)					INSTALLATION					Sheet 7 of 9						
PROJECT L-142 Levee Jefferson City Jefferson City, MO					COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)					VERTICAL NGVD29						
					LOCATION COORDINATES Lat: 38.649720° Lon: -92.275439°					LOCATION METHOD:						
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
120																434
125																429
130																424
135																419

(continued on next page)

DRILLING LOG (Cont Sheet)					INSTALLATION					Sheet 8 of 9						
PROJECT L-142 Levee Jefferson City Jefferson City, MO					COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)					VERTICAL NGVD29						
					LOCATION COORDINATES Lat: 38.649720° Lon: -92.275439°					LOCATION METHOD:						
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY						Unit Weight (pcf)	REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
140																414
145																409
150																404
155																399

(continued on next page)

DRILLING LOG (Cont Sheet)					INSTALLATION					Sheet 9 of 9						
PROJECT L-142 Levee Jefferson City Jefferson City, MO					COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)					VERTICAL NGVD29						
					LOCATION COORDINATES Lat: 38.649720° Lon: -92.275439°					LOCATION METHOD:						
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							Unit Weight (pcf)	REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
160																
165																
170																
175		18				1										

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 6										
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)		VERTICAL NGVD29										
2. HOLE NUMBER ADU-62		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Aug 18 2025		LOCATION METHOD: COMPLETED Aug 21 2025										
4. NAME OF DRILLER C. Morton				12. HAMMER TYPE 140 lb		EFFICIENCY (%)										
5. EQUIPMENT NWK-D-90 TRK				13. SIZE AND TYPE OF BIT 3.75" HSA												
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE 547.0'										
7. THICKNESS OF OVERBURDEN 97.4'				15. ELEVATION GROUND WATER												
8. DEPTH DRILLED INTO ROCK 0.3'				16. TOTAL NUMBER CORE BOXES												
9. TOTAL DEPTH OF BORING 97.7'				17. SIGNATURE AND TITLE OF INSPECTOR Sierra Orndoff, Field Geologist		APPROVED BY:										
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
2		5			LEAN CLAY (CL) dark gray, dry, medium stiff, roots	80										
3																
2																
5					3 - 3.5 ft: highly fractured											
					4 - 4.1 ft: highly fractured											
					4.4 - 4.9 ft: highly fractured											
2		6		5.20	POORLY GRADED SAND (SP) gray, dry, loose, fine sand											
3				541.80	SILT WITH SAND (ML) brown, dry, medium stiff	100	Jar-5									
3				541.50	SILTY SAND (SM) brown, dry, loose, fine sand		Jar-6									
				5.90												
				541.10												
3		9				100	Jar-7			36	NP	NP			decided no to do 2nd shelly because of it being loose sand	
5																
4																
10																
10		13		10.40	SANDY LEAN CLAY (CL) gray, dry, stiff	100										
4				536.60												
9				10.80	POORLY GRADED SAND (SP) tan, dry, medium dense											
				536.20												
15		7		15.00	POORLY GRADED GRAVEL WITH SAND (GP) tan, wet, loose, SANDY GRAVEL, rained											
				532.00												
3				15.70	POORLY GRADED SAND (SP) tan, wet, loose, fine sand, rained	100										
				531.30												

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.576614°

Lon: -92.121612°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	4				POORLY GRADED SAND (SP) tan, wet, loose, fine sand, rained										
20	4	15													
	8					93	Jan-13			1	NP	NP			
	7														
25	2	4		25.30	24.9 ft: casing in ground w/ 1.3' stick up										
	2			521.70	POORLY GRADED SAND (SP) tan, dry, very loose, medium sand	73									
	2			521.80											
	2			521.20	POORLY GRADED SAND (SP) tan, wet, very loose										
															switched to mud rotary
30	7	34		30.70		73									
	15			516.30	POORLY GRADED SAND (SP) gray, wet, dense, medium sand										
	19														
35	6	22		35.70		60									
	7			511.30	POORLY GRADED GRAVEL (GP) gray, wet, medium dense, fine gravel										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 3 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.576614°

Lon: -92.121612°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	15				POORLY GRADED GRAVEL (GP) gray, wet, medium dense, fine gravel										
40	4	17		40.00 507.00	WELL GRADED SAND (SW) gray, wet, medium dense, coarse sand	53	Jan-21			3	NP	NP			
45	31	74		45.00 502.00	POORLY GRADED SAND (SP) gray, wet, very dense, fine sand	73									
	42			45.80 501.20	WELL GRADED SAND (SW) gray, wet, very dense, coarse sand										
50	17	26				53									
	16														
	10														
55	9	16		55.40 491.60	POORLY GRADED GRAVEL (GP) gray, medium dense, fine gravel	67									
	8														

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 4 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.576614°

Lon: -92.121612°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	8				POORLY GRADED GRAVEL (GP) gray, medium dense, fine gravel										
60	16	33		60.00											
	17			487.00	POORLY GRADED SAND (SP) gray, wet, dense	80									
	16														
	18	24			62.3 ft: hard drilling 62.4 - 62.4 ft: changes to MED DENSE										
	13					67									
	11														
65	14	26													
	14					67									
	12														
70	15	29													
	15					80									
	14														
75	13	45		75.00											
	21			472.00	WELL GRADED SAND WITH GRAVEL (SW) grayish brown, wet, dense, medium sand, 1 piece of 0.1" gravel	73	Jar-33			5	NP	NP			

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 5 of 6

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.576614°

Lon: -92.121612°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	24		32		WELL GRADED SAND WITH GRAVEL (SW) grayish brown, wet, dense, medium sand, 1 piece of 0.1' gravel										
80	13			80.20											
	15			466.80	WELL GRADED SAND (SW) gray, wet, dense, coarse sand										
	17			80.40	WELL GRADED SAND (SW) gray, wet, dense, coarse sand	73									
				466.60											
85	2		18	85.00	WELL GRADED GRAVEL WITH SAND (GP) grayish brown, wet, medium dense, fine gravel										
	4			462.00		60	Jan-37			3					
	14														
90	14		18												
	8					53									
	10														
95	12		34		95 - 95 ft: changes to DENSE										
	13					73									

(continued on next page)

DRILLING LOG (Cont Sheet)					INSTALLATION				Sheet 6 of 6						
PROJECT L-142 Levee Jefferson City Jefferson City, MO					COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)				VERTICAL NGVD29						
					LOCATION COORDINATES Lat: 38.576614° Lon: -92.121612°			LOCATION METHOD:							
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	21				WELL GRADED GRAVEL WITH SAND (GP) grayish brown, wet, medium dense, fine gravel 96.1 - 96.1 ft: possible bedrock (while limestone)										hard drilling, rig bouncing SPT refusal
	50	50/3"		97.40 449.60			100								
				97.70 449.30	Borehole finished at 97.7 ft. Backfilled with cement grout.										
100															447
105															442
110															437
115															432

DRILLING LOG		DIVISION Northwestern		INSTALLATION		Sheet 1 of 2									
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)		VERTICAL NGVD29									
2. HOLE NUMBER ADU-63		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Dec 09 2025		LOCATION METHOD: COMPLETED Dec 10 2025									
4. NAME OF DRILLER C. Broksieck				12. HAMMER TYPE		EFFICIENCY (%)									
5. EQUIPMENT NWK-D-90 ATV				13. SIZE AND TYPE OF BIT 3.75" HSA											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE '									
7. THICKNESS OF OVERBURDEN 35.0'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK 2.5'				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 37.5'				17. SIGNATURE AND TITLE OF INSPECTOR T. Fox, Field Geologist		APPROVED BY:									
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
2	2	4		3.20	SANDY LEAN CLAY (CL) brown, dry to moist, MEDIUM, fine grain sand	100	J-1								Shelby-1 : torvane: 0.15, 0.2, .03, time: 7 sec, pressure-500 psi
2															
2															
5	0	5													
3															
2															
5															
10	1	4													
2															
2															
15	0	3		15.00	SANDY LEAN CLAY (CL) gray, moist to wet, soft, fine grain sand	100	J-6								Shelby-2: torvane: 0.3, 0.2, 0.2, time: 6 sec, Pressure: 450 psi
2															
1															
20	0	5		20.90	FAT CLAY (CH) gray, wet, soft	100	J-7								
3															
2															
25	1	0			25 ft: changes to very soft	100	J-9								
0															
0															
30	1			30.00	SANDY LEAN CLAY (CL) gray, moist to wet, very soft, fine to coarse grain, mostly medium										

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 2

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.585735°

Lon: -92.120759°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	0	1			SANDY LEAN CLAY (CL) gray, moist to wet, very soft, fine to coarse grain, mostly medium	100	J-10								
	1														
35	27	63		35.00	LIMESTONE, moderately weathered, light gray, moderately hard, effervescent with HCL, gravel	100	J-11								
	32														
	31														
	50	50/5"		37.40	Borehole finished at 37.5 ft. Backfilled with cement grout.	100	J-12								
40															
45															
50															
55															
60															
65															

DRILLING LOG				DIVISION Northwestern		INSTALLATION		Sheet 1 of 2								
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)				VERTICAL NGVD29								
2. HOLE NUMBER AD-64				3. DRILLING AGENCY USACE-NWK		11. DATE BORING Aug 27 2025		12. HAMMER TYPE EFFICIENCY (%)								
4. NAME OF DRILLER Cole Morton				13. SIZE AND TYPE OF BIT 3.75" HSA				14. ELEVATION SURFACE 542.0'								
5. EQUIPMENT NWO-Geoprobe 3230DT				15. ELEVATION GROUND WATER				16. TOTAL NUMBER CORE BOXES								
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		17. SIGNATURE AND TITLE OF INSPECTOR Shelby Huntetbrinker, Field Geologist										
7. THICKNESS OF OVERBURDEN 26.4'				18. DEPTH DRILLED INTO ROCK 26.4'				APPROVED BY:								
8. DEPTH DRILLED INTO ROCK 26.4'				19. TOTAL DEPTH OF BORING 26.4'												
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS	
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class		
5	0	2		5.00	LEAN CLAY WITH SAND (CL) dark brown, moist	80	Bulk - 1/2			77	37	13				
				537.00	LEAN CLAY (CL) brown, moist, soft		J-1									
				6.00	SILT (ML) brown, moist, very loose		J-2									
				536.00												
10	0	6		10.00	FAT CLAY (CH) brown, moist, medium stiff	100	J-3									
				532.00												
				10.70	SILT (ML) brown, moist, loose		J-4		53	23	-1					
				531.30												
15	3	7		15.00	POORLY GRADED SAND (SP) brown, wet, loose, fine sand	87	J-5									
				527.00												

(continued on next page)

DRILLING LOG (Cont Sheet)

INSTALLATION

Sheet 2 of 2

PROJECT

L-142 Levee Jefferson City
Jefferson City, MO

COORDINATE SYSTEM

NAD27 + NGVD29 height (ftUS)

VERTICAL

NGVD29

LOCATION COORDINATES

Lat: 38.592304°

Lon: -92.177777°

LOCATION METHOD:

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class	
	3				POORLY GRADED SAND (SP) brown, wet, loose, fine sand										
20	0	18		20.00	POORLY GRADED SAND (SP) dark brown, wet, medium dense, trace gravel, fine sand	100	J-6			4					
	8			522.00											
	10														
25	3	13/5"		25.00	WELL GRADED SAND (SW) gray, wet, medium dense, medium sand, trace fine black gravel	100	J-7								backfill: 7 bags sodium bentonite, tamped with rig and finished by hand
	5			517.00											
	13			26.40											
				515.60	Borehole finished at 26.4 ft. Backfilled with bentonite grout.										
30															
35															

DRILLING LOG		DIVISION Northwestern		INSTALLATION				Sheet 1 of 1							
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)				VERTICAL NGVD29							
2. HOLE NUMBER AD-65		3. DRILLING AGENCY USACE-NWK		11. DATE BORING STARTED Dec 08 2025		LOCATION COORDINATES Lat: 36.650067° Lon: -92.276360°		LOCATION METHOD:							
4. NAME OF DRILLER C. Broksieck				12. HAMMER TYPE				COMPLETED Dec 08 2025 EFFICIENCY (%)							
5. EQUIPMENT NWK-D-90 ATV				13. SIZE AND TYPE OF BIT 3.75" HSA											
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE									
7. THICKNESS OF OVERBURDEN 21.5'				15. ELEVATION GROUND WATER											
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES											
9. TOTAL DEPTH OF BORING 21.5'				17. SIGNATURE AND TITLE OF INSPECTOR T.Fox, Field Geologist				APPROVED BY:							
DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY						REMARKS	
	2	4			SILTY CLAY (CL-ML) dark brown, moist, trace roots, MEDIUM	67	Jar-1								
	1														
	3														
5	2	3				67	Jar-2								
	1														
	2														
10	2	11		10.00	POORLY GRADED SAND (SP) gray, wet, medium dense, fine to medium grain, mostly medium, slowly dilatent 10 ft: slowly dilatant, fine to medium grain, mostly medium	67	Jar-3								
	5														
	6														
15	6	17				100	Jar-4								
	9														
	8														
20	4	14		20.00	WELL GRADED SAND (SW) gray, wet, medium dense, coarse grain	100	Jar-5								
	8														
	6														
				21.50	Borehole finished at 21.5 ft. Backfilled with cement grout.										
25															
30															

DRILLING LOG		DIVISION Northwestern		INSTALLATION				Sheet 1 of 1			
1. PROJECT L-142 Levee Jefferson City Jefferson City, MO				10. COORDINATE SYSTEM NAD27 + NGVD29 height (ftUS)				VERTICAL NGVD29			
2. HOLE NUMBER AD-66		3. DRILLING AGENCY USACE-NWK		11. DATE BORING Dec 08 2025		STARTED Dec 08 2025		LOCATION METHOD: COMPLETED Dec 08 2025			
4. NAME OF DRILLER L Wisdom				12. HAMMER TYPE				EFFICIENCY (%)			
5. EQUIPMENT NWK-D-90 ATV				13. SIZE AND TYPE OF BIT 3.75" HSA							
6. DIRECTION OF BORING Vertical		DEG FROM VERTICAL 0		BEARING		14. ELEVATION SURFACE '					
7. THICKNESS OF OVERBURDEN 21.5'				15. ELEVATION GROUND WATER							
8. DEPTH DRILLED INTO ROCK				16. TOTAL NUMBER CORE BOXES							
9. TOTAL DEPTH OF BORING 21.5'				17. SIGNATURE AND TITLE OF INSPECTOR Tyler Fox, Field Geologist				APPROVED BY:			

DEPTH	BLOWS/ 0.5ft	N	LEGEND	LAYER DEPTH ELEV.	CLASSIFICATION OF MATERIALS (Description)	% REC	SAMP NO.	LABORATORY							REMARKS		
								Gravel	Sand	Fines	LL	PI	MC	ASTM Class			
2	3	7			SILTY CLAY (CL-ML) dark brown, moist, trace roots, MEDIUM	100	Jar-1										
3	4																
4																	
5	3	14		5.70	SILTY SAND (SM) tan, dry, medium dense, fine to medium grain sand, mostly fine	100	Jar-2										
6	6						Jar-3										
8																	
10	3	11				100	Jar-4										
4	4																
7	7																
15	2	9/-5"		15.50	POORLY GRADED SAND (SP) tan, moist, medium dense, fine to coarse grain, mostly medium	250	Jar-5										
6	6						Jar-6										
9	9																
20	3	5		21.50	20 ft: changed to wet	100	Jar-7										
3	3																
2	2				Borehole finished at 21.5 ft. Backfilled with auger cuttings.												

JEFFERSON CITY, L-142; JEFFERSON CITY, MISSOURI
IDIQ CONTRACT NO W912DQ-25-DA-001; PR No. W58XUW52457884
December 15, 2025

Boring No.	Sample Depth (feet)	Sample Type	Sample ID	Field Soil Class.	Atterberg Limits			Wash %	Gradation	Soil Class.	Moisture Content, %	Shelby Tube Density, PCF	Visual Soil Descrip.	Triaxial Testing		Consol. w/ Time	Standard Proctor
					LL	PL	PI							Triax UU	Triax CU Bar		
ADU-58	1.0-2.9	Shelby	S-1	CL	46	18	28	99.1	--	CL, Brown	26.2	116.3	--	--	--	NOTE*	--
	3.0-4.2	SPT	J-2	CL	70	25	45	98.7	--	CH, Dark Gray	--	--	--	--	--	--	--
	6.0-7.9	Shelby	S-2	CH	53	23	30	98.6	--	CH, Dark Brown	21.0	114.1	--	--	NOTE*	--	--
	10.0-11.0	SPT	J-4	CH	45	21	24	82.6	--	CL, Grayish Brown	--	--	--	--	--	--	--
	15.0-15.8	SPT	J-6	CL	40	22	18	93.8	--	CL, Gray Brown	23.4	--	--	--	--	--	--
	15.8-16.5	SPT	J-5	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	20.0-21.3	SPT	J-7	SAND	NP	NP	NP	32.6	NOTE*	SP-SM, light gray	--	--	--	--	--	--	--
	25.0-26.1	SPT	J-8	SAND	--	--	--	--	NOTE*	--	--	--	SP - SM, Light Gray	--	--	--	--
	30.0-31.2	SPT	J-9	SAND	NP	NP	NP	19.5	--	SP with CL, Gray	--	--	--	--	--	--	--
	45.0-46.0	SPT	J-10**	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	50.0-51.0	SPT	J-11	SAND	NP	NP	NP	7.2	--	SP trace CL, Gray	--	--	--	--	--	--	--
	60.0-61.5	SPT	J-13	SAND	NP	NP	NP	--	NOTE*	--	--	--	SP - SM, Gray	--	--	--	--
	65.0-65.6	SPT	J-14	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	70.1-70.6	SPT	J-16	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	75.0-75.6	SPT	J-17**	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--

TESTED BY: Varies
APPROVED BY: FME

NOTE*: SEE ATTACHED DATA SHEETS.

NOTE**: This sample was on the assignment sheet dated 9/24, but sample was not received



JEFFERSON CITY, L-142; JEFFERSON CITY, MISSOURI
IDIQ CONTRACT NO W912DQ-25-DA-001; PR No. W58XUW52457884
December 15, 2025

Boring No.	Sample Depth (feet)	Sample Type	Sample ID	Field Soil Class.	Atterberg Limits			Wash %	Gradation	Soil Class.	Moisture Content, %	Shelby Tube Density, PCF	Visual Soil Descrip.	Triaxial Testing		Consol. w/ Time	Standard Proctor
					LL	PL	PI							Triax UU	Triax CU Bar		
ADU-59	2.0-3.9	Shelby	S-1	CH	54	24	30	99.6	--	CH, Brown	--	NOTE*	--	NOTE*	--	NOTE*	--
	5.0-6.5	SPT	J-2	CH	62	24	38	89.0	--	CH trace SP & organics, Dark gray	--	--	--	--	--	--	--
	7.0-8.0	SPT	J-3	SAND	23	21	2	22.1	--	SP trace CI & organics, Light brown	--	--	--	--	--	--	--
	10.0-10.6	SPT	J-4	CH	47	20	27	76.7	--	CL trace SP, Dark gray	--	--	--	--	--	--	--
	10.6-11.5	SPT	J-5	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	15.0-16.0	SPT	J-6	SAND	NP	NP	NP	9.5	--	SP trace CL, Brown	--	--	--	--	--	--	--
	20.0-21.5	SPT	J-7	SAND	--	--	--	--	NOTE*	--	--	--	SP - SM, gray	--	--	--	--
	25.0-26.5	SPT	J-8	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	30.0-30.8	SPT	J-9	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	35.0-36.5	SPT	J-10	SAND	NP	NP	NP	NOTE*	NOTE*	SP-SM, Grayish brown	--	--	--	--	--	--	--
	40.0-40.9	SPT	J-11	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	45.0-45.4	SPT	J-12	SAND	NP	NP	NP	1.2	--	SP, Gray	--	--	--	--	--	--	--
	50.0-50.4	SPT	J-15	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	55.0-55.6	SPT	J-17	SAND	NP	NP	NP	0.9	--	SP, Gray	--	--	--	--	--	--	--
	65.0-65.5	SPT	J-21	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	70.0-70.3	SPT	J-22	Gravel	--	--	--	--	NOTE**	--	--	--	GP w/ SP, Gray	--	--	--	--
	75.4-75.7	SPT	J-27	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	80.2-80.55	SPT	J-29	Gravel	--	--	--	--	NOTE**	--	--	--	GP trace SP, Gray	--	--	--	--
	85.4-85.8	SPT	J-31	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	90.5-91.0	SPT	J-34	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	95.0-95.35	SPT	J-35	SND/GRVL	--	--	--	--	NOTE*	--	--	--	SP, Gray	--	--	--	--

TESTED BY: Varies
APPROVED BY: FME

NOTE*: SEE ATTACHED DATA SHEETS.

NOTE**: SEE ATTACHED, Not Enough Material for Hydrometer, Sieve analysis performed instead



JEFFERSON CITY, L-142; JEFFERSON CITY, MISSOURI
IDIQ CONTRACT NO W912DQ-25-DA-001; PR No. W58XUW52457884
December 15, 2025

Boring No.	Sample Depth (feet)	Sample Type	Sample ID	Field Soil Class.	Atterberg Limits			Wash %	Gradation	Soil Class.	Moisture Content, %	Shelby Tube Density, PCF	Visual Soil Descrip.	Triaxial Testing		Consol. w/ Time	Standard Proctor
					LL	PL	PI							Triax UU	Triax CU Bar		
ADU-60	0-1.2	SPT	J-1	CL	--	--	--	--	--	--	--	--	--	--	--	--	--
	1.2-1.5	SPT	J-2	CL	--	--	--	--	--	--	--	--	--	--	--	--	--
	3.0-4.5	SHELBY	S-1	CL	58	26	32	98.1	--	CH, Brown	NOTE*	NOTE*	--	--	--	NOTE*	--
	5.0-6.0	SPT	J-3	ML-CL	--	--	--	--	--	--	--	--	--	--	--	--	--
	8.0-10.0	SHELBY	S-2	CH	55	25	30	82.9	--	CH, Brown	NOTE*	NOTE*	--	--	NOTE*	--	--
	10.0-11.5	SPT	J-5	CH	--	--	--	--	--	--	--	--	--	--	--	--	--
	15.0-16.0	SPT	J-6	CH	45	24	21	91.8	--	CL, Gray Brown	34.8	--	--	--	--	--	--
	20.0-21.1	SPT	J-7	CH	--	--	--	--	--	--	--	--	--	--	--	--	--
	25.5-26.5	SPT	J-10	CH	39	38	1	68.8	--	CL trace SP, Gray	35.8	--	--	--	--	--	--
	30.8-31.5	SPT	J-12	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	35.0-35.4	SPT	J-13	SAND	NP	NP	NP	18.9	--	SP trace CL, Dark gray	--	--	--	--	--	--	--
	40.0-40.7	SPT	J-14	SAND	--	--	--	--	NOTE*	--	--	--	--	--	--	--	--
	45.0-45.7	SPT	J-15	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	55.0-55.6	SPT	J-17	SAND	NP	NP	NP	2.8	--	GP w/ SP, Gray	--	--	--	--	--	--	--
	65.0-65.9	SPT	J-19	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	75.0-75.6	SPT	J-21	SAND	--	--	--	--	NOTE*	--	--	--	SW w/ GRAVEL, gray	--	--	--	--
	85.0-85.7	SPT	J-23	SAND	--	--	--	--	--	--	--	--	--	--	--	--	--
	90.0-91.0	SPT	J-24	SAND	NP	NP	NP	3.8	--	SP w/ GP, Gray	--	--	--	--	--	--	--

TESTED BY: Varies
APPROVED BY: FME

NOTE*: SEE ATTACHED DATA SHEETS.



JEFFERSON CITY, L-142; JEFFERSON CITY, MISSOURI
IDIQ CONTRACT NO W912DQ-25-DA-001; PR No. W58XUW52457884
December 15, 2025

[illegible]**Terracon**

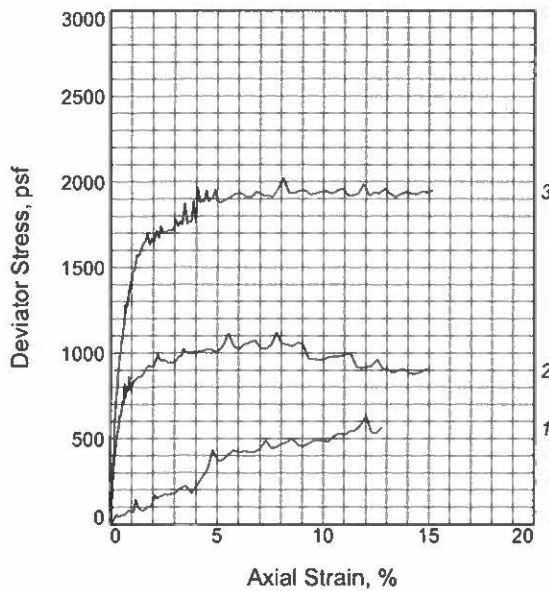
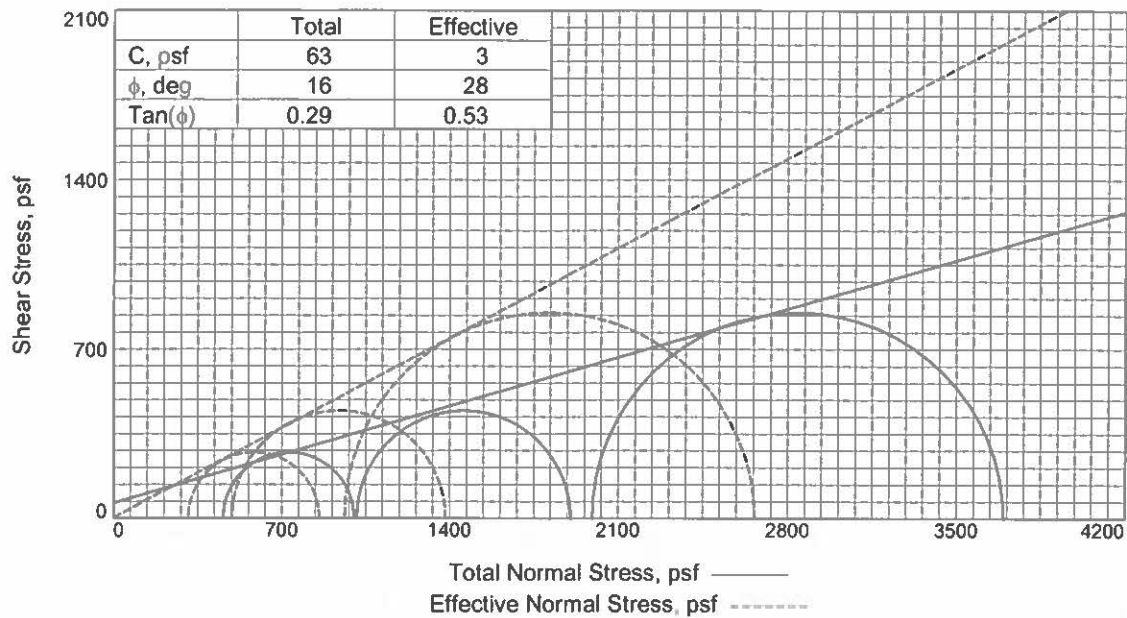
JEFFERSON CITY, L-142; JEFFERSON CITY, MISSOURI
IDIQ CONTRACT NO W912DQ-25-DA-001; PR No. W58XUW52457884
December 15, 2025

[illegible]

TESTED BY:	Varies
APPROVED BY:	FME

NOTE*: SEE ATTACHED DATA SHEETS.





Sample No.		1	2	3
Initial	Water Content, %	35.9	32.7	36.6
	Dry Density, pcf	79.7	81.8	79.2
	Saturation, %	86.8	83.2	87.6
	Void Ratio	1.1158	1.0618	1.1279
	Diameter, in.	1.36	1.37	1.38
	Height, in.	2.82	2.82	2.81
At Test	Water Content, %	42.0	38.4	39.2
	Dry Density, pcf	79.0	82.8	81.9
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.1339	1.0356	1.0580
	Diameter, in.	1.37	1.36	1.37
	Height, in.	2.83	2.81	2.78
Strain rate, %/min.		0.02	0.02	0.02
Back Pressure, psi		60.41	60.08	60.24
Cell Pressure, psi		63.57	67.11	74.07
Fail. Stress, psf		546	892	1703
Excess Pore Pr., psf		145	521	1030
Ult. Stress, psf				
Excess Pore Pr., psf				
$\bar{\sigma}_1$ Failure, psf		856	1383	2664
$\bar{\sigma}_3$ Failure, psf		310	491	961

Type of Test:

CU with Pore Pressures

Sample Type: Shelby Tube

Description: FAT CLAY (CH), Dark Brown

LL= 53

PL= 23

PI= 30

Assumed Specific Gravity= 2.7

Remarks:

Figure

Client:

Project: Jefferson City, L-142

Source of Sample: ADU-60

Depth: 8.0-10.0 feet

Sample Number: S-2

Proj. No.: 02251486

Date Sampled:

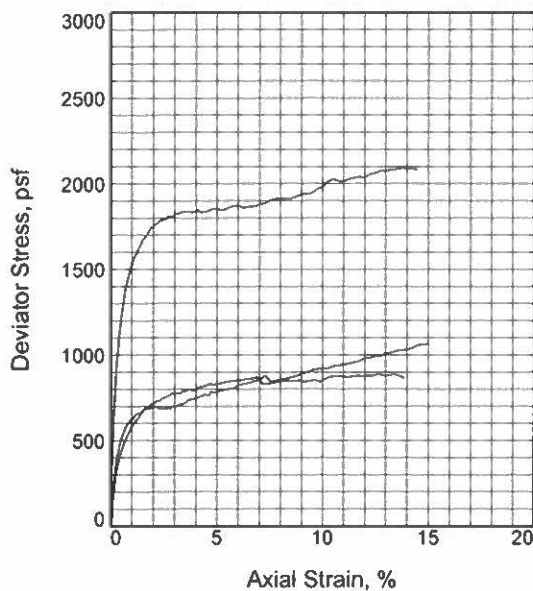
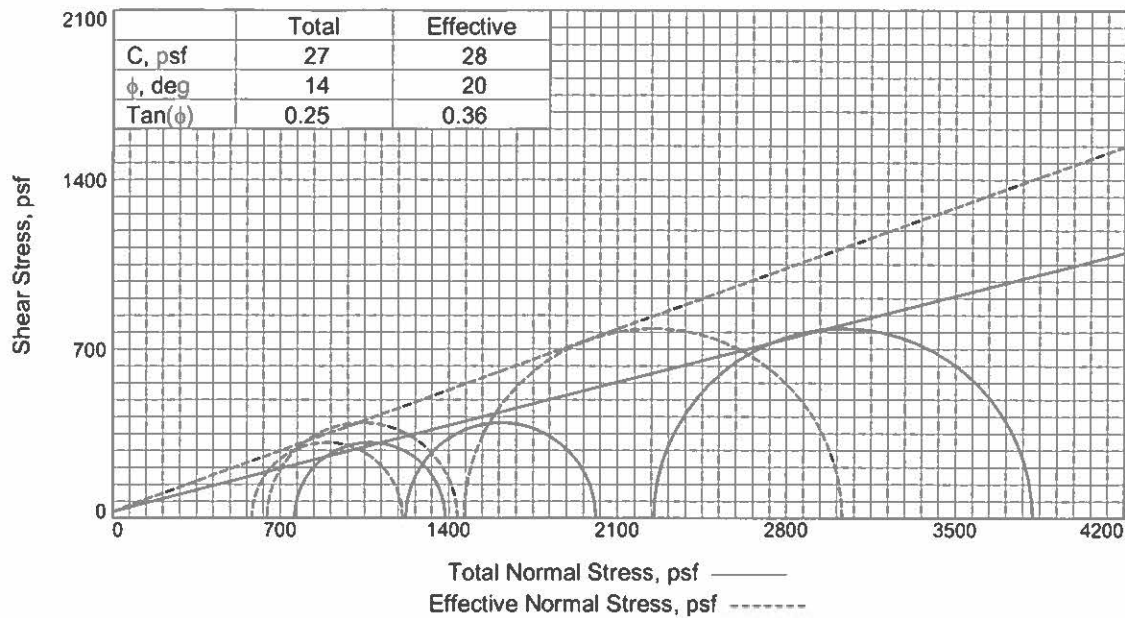
TRIAXIAL SHEAR TEST REPORT

Terracon Consultants, Inc.

Lenexa, KS

Tested By: SR

Checked By: FME, KCB



Sample No.		1	2	3
Initial	Water Content, %	21.0	27.4	25.3
	Dry Density, pcf	94.3	82.3	81.3
	Saturation, %	72.0	70.7	63.7
	Void Ratio	0.7876	1.0470	1.0728
	Diameter, in.	1.36	1.30	1.38
	Height, in.	2.81	2.80	2.81
At Test	Water Content, %	29.2	38.7	39.7
	Dry Density, pcf	94.3	82.4	81.3
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7876	1.0448	1.0728
	Diameter, in.	1.36	1.30	1.38
	Height, in.	2.81	2.80	2.81
Strain rate, %/min.		0.02	0.02	0.02
Back Pressure, psi		58.30	58.57	58.40
Cell Pressure, psi		63.57	67.05	74.03
Fail. Stress, psf		626	791	1569
Excess Pore Pr., psf		177	577	788
Ult. Stress, psf				
Excess Pore Pr., psf				
$\bar{\sigma}_1$ Failure, psf		1208	1435	3032
$\bar{\sigma}_3$ Failure, psf		581	644	1463

Type of Test:

CU with Pore Pressures

Sample Type: Shelby Tube

Description: FAT CLAY (CH), brown

LL= 53 PL= 23 PI= 30

Assumed Specific Gravity= 2.7

Remarks: All samples trimmed to near 1.4" diameter

Sample #1 was drier than Samples #2 & 3.

Client:

Project: Jefferson City, L-142

Source of Sample: ADU-58

Depth: 6.0-7.9 feet

Sample Number: S-2

Proj. No.: 02251486

Date Sampled:

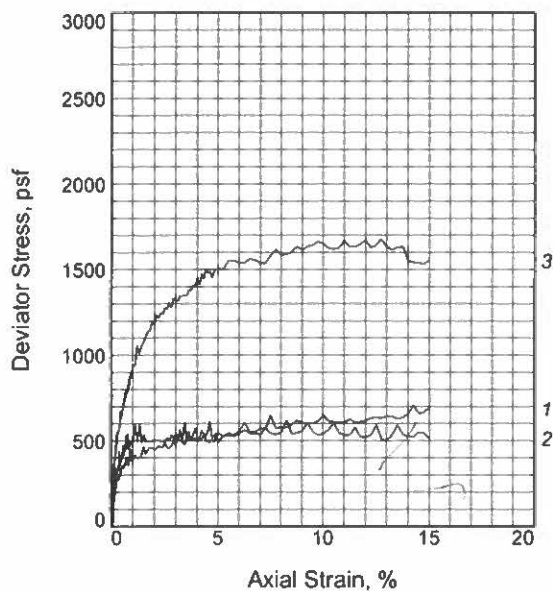
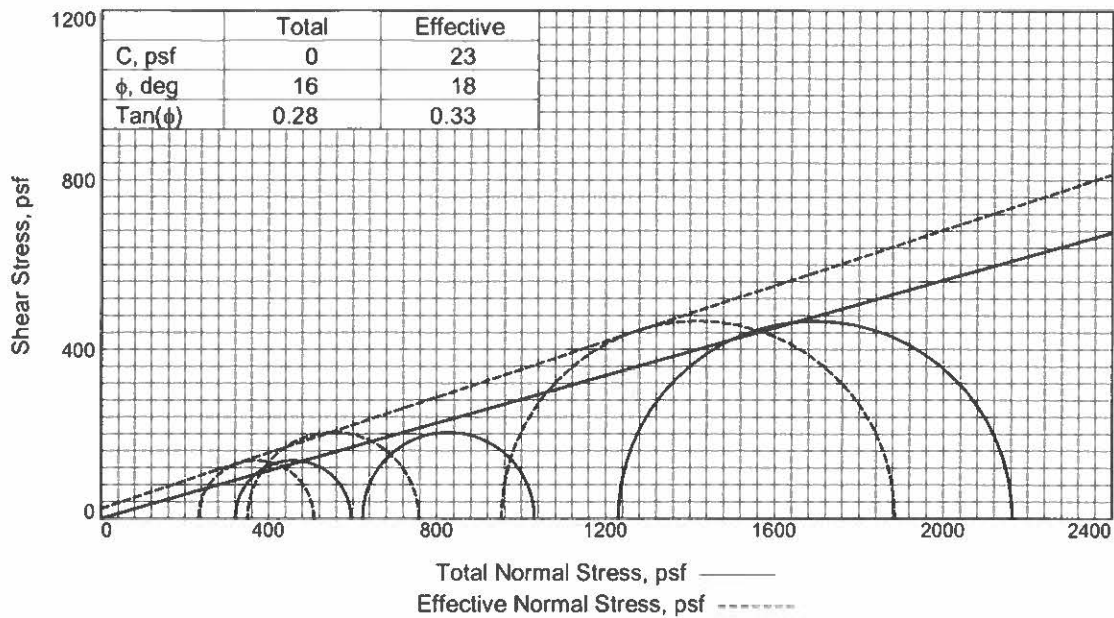
TRIAXIAL SHEAR TEST REPORT

Terracon Consultants, Inc.

Lenexa, KS

Figure _____

Tested By: SR



Sample No.		1	2	3
Initial	Water Content, %	33.5	37.6	35.0
	Dry Density, pcf	82.2	76.5	76.3
	Saturation, %	86.1	84.3	78.1
	Void Ratio	1.0496	1.2042	1.2100
	Diameter, in.	1.37	1.36	1.38
	Height, in.	2.83	2.81	2.81
At Test	Water Content, %	38.9	44.6	44.8
	Dry Density, pcf	82.2	76.5	76.3
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.0496	1.2042	1.2100
	Diameter, in.	1.37	1.36	1.38
	Height, in.	2.83	2.81	2.81
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		60.00	60.00	60.00
Cell Pressure, psi		62.23	64.33	68.54
Fail. Stress, psf		274	407	934
Excess Pore Pr., psf		88	273	278
Ult. Stress, psf				
Excess Pore Pr., psf				
σ_1 Failure, psf		507	758	1886
σ_3 Failure, psf		233	350	952

Type of Test:

CU with Pore Pressures

Sample Type: Shelby Tube

Description: FAT CLAY (CH), brown

LL= 78 PL= 29 PI= 49

Assumed Specific Gravity= 2.7

Remarks: All samples trimmed to near 1.4" diameter

Client:

Project: Jefferson City, L-142

Source of Sample: ADU-62

Depth: 3.0-4.9 feet

Sample Number: W-1

Proj. No.: 02251486

Date Sampled:

TRIAxIAL SHEAR TEST REPORT

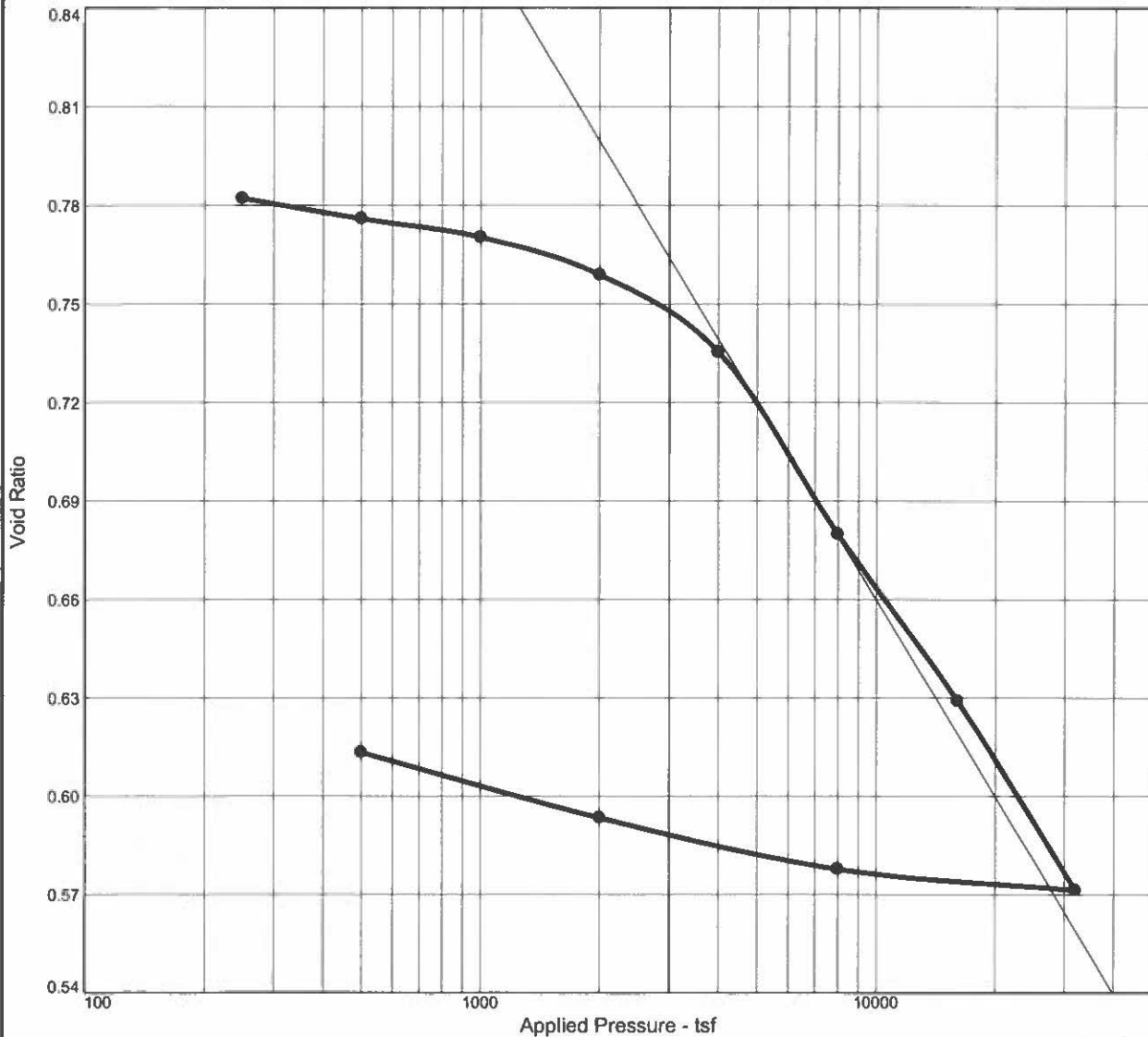
Terracon Consultants, Inc.

Lenexa, KS

Figure _____

Tested By: SR _____

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_0
Sat.	Moist.											
90.3 %	26.2 %	92.1	46	28	2.7	232	3754.2	0.20				0.782

MATERIAL DESCRIPTION

LEAN CLAY (CL), brown

USCS

CL

AASHTO

N/A

Project No. 02251486

Client:

Project: Jefferson City, L-142

Source of Sample: ADU-58

Depth: 1.0-2.9 feet

Sample Number: S-1

Terracon Consultants, Inc.

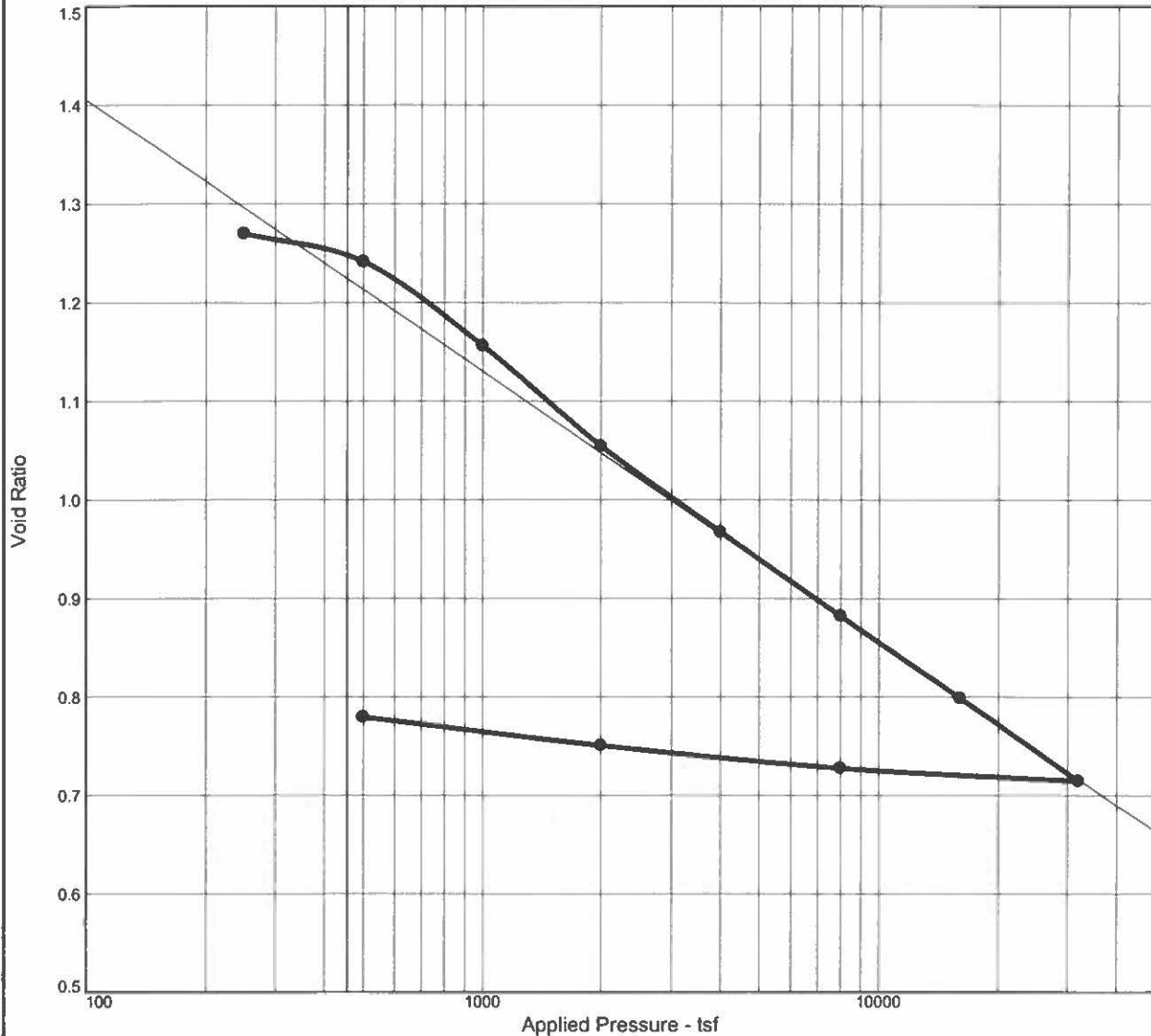
Lenexa, KS

Remarks:

Figure

Tested By: SR

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Swell Press. (tsf)	Swell %	e ₀
Sat.	Moist.											
82.4 %	38.8 %	73.3	54	30	2.7	304	345.5	0.28				1.270

MATERIAL DESCRIPTION

CLAY, brown

USCS

AASHTO

Project No. 02251486

Client:

Project: Jefferson City, L-142

Source of Sample: ADU-59

Depth: 2.0-3.9 feet

Sample Number: S-1

Terracon Consultants, Inc.

Lenexa, KS

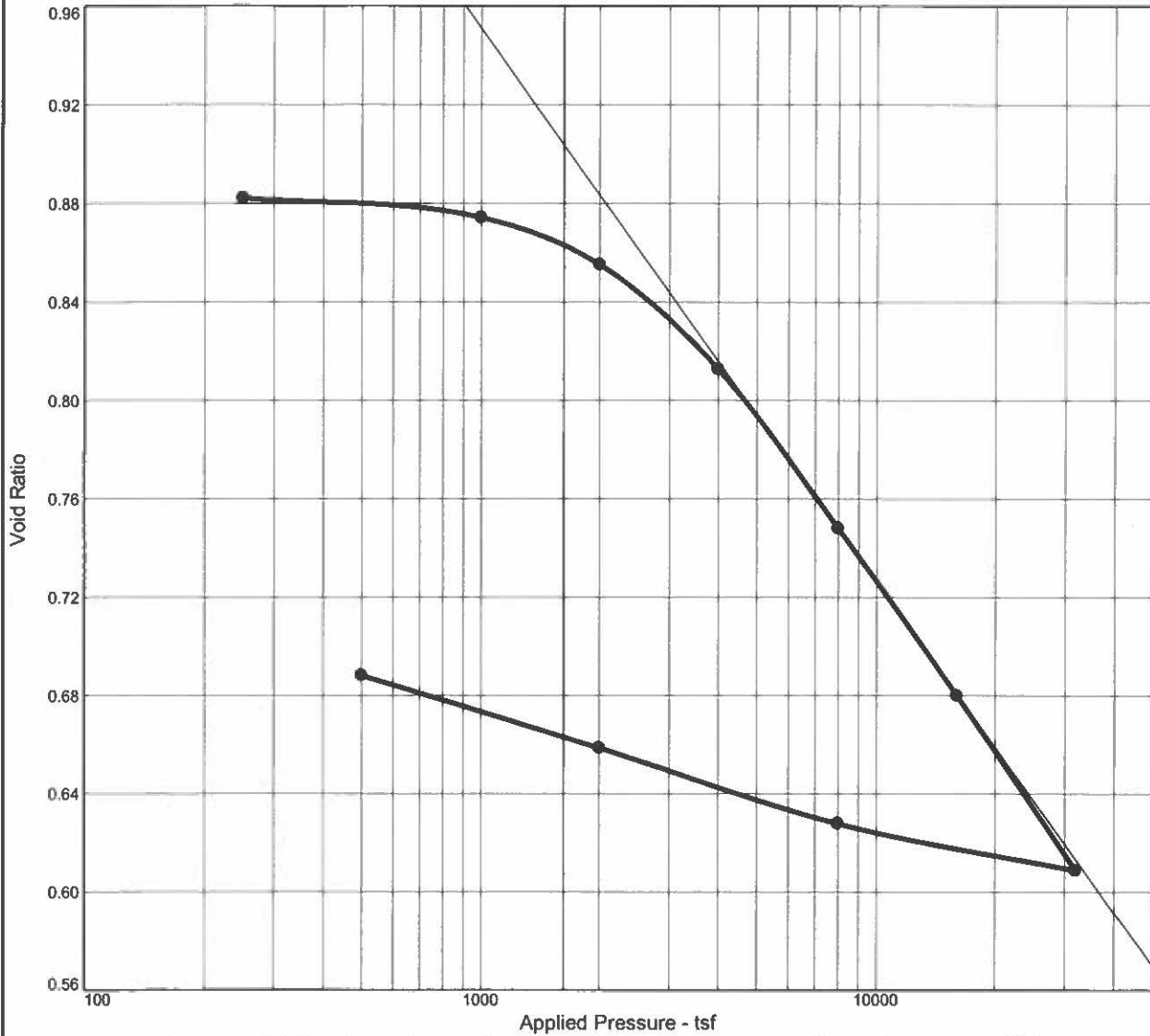
Remarks:

None

Figure

Tested By: SR

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
Sat.	Moist.											
79.9 %	26.2 %	89.6	58	32	2.7	452	2679.2	0.22				0.885

MATERIAL DESCRIPTION

FAT CLAY (CH), brown

USCS

CH

AASHTO

N/A

Project No. 02251486

Client:

Project: Jefferson City, L-142

Source of Sample: ADU-60

Depth: 3.0-4.5 feet

Sample Number: S-1

Terracon Consultants, Inc.

Lenexa, KS

Remarks:

None

Figure

Tested By: SR

SIEVE ANALYSIS OF AGGREGATE

Report Number: 02251486.0001Q
Service Date: 12/09/25
Report Date: 12/09/25
Task: Jefferson City, L-142



15620 W 113th St
Lenexa, KS 66219-5102
913-492-7777

Client

US Army Corps of Engineers (USACE)
Attn: James Mehnert
601 E. 12th St.
Kansas City, MO 64106

Project

Jefferson City, L-142
601 E. 12th St.
Kansas City, MO 64106

Project No. 02251486

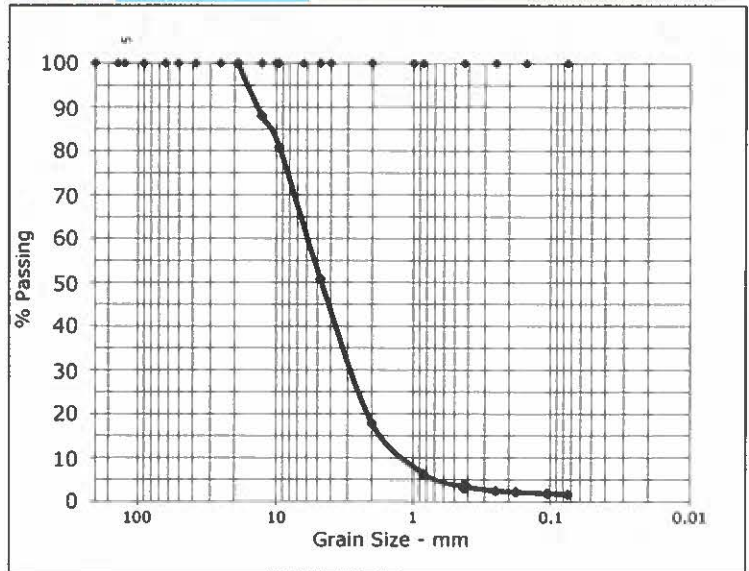
Sieve	% Passing	Spec Min	Spec Max	X=Fail
3/4"	100			
1/2"	88			
3/8"	81			
#4	51			
#10	18			
#20	6			
#40	3			
#60	2			
#80	2			
#140	2			
#200	1.7			

Sample Test Data

Date Sampled: 12/09/25
Sample Source: ADU-59; J-22
Sample Location: 70.0-70.35
Aggregate Type: Coarse and Fine
Aggregate Description: GP w/ SP, Gray
Sieve Specification: N/A
(If Other): N/A

Laboratory Test Data

Test Date: 12/09/25
Tested By: Bunker, Meredith
Test Method: ASTM C136
Sieving Method: Cumulative-No Split
Moisture Content (%): N/A
Elutriation (g): N/A
Fineness Modulus (F.M.): 0.68
Remarks:



Services:

Terracon Rep:

Reported To:

Contractor:

Report Distribution

(1) US Army Corps of Engineers (USACE)

Chris Coyle
Laboratory Manager

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

SIEVE ANALYSIS OF AGGREGATE

Report Number: 02251486.0001R
Service Date: 12/08/25
Report Date: 12/09/25
Task: Jefferson City, L-142



15620 W 113th St
Lenexa, KS 66219-5102
913-492-7777

Client

US Army Corps of Engineers (USACE)
Attn: James Mehnert
601 E. 12th St.
Kansas City, MO 64106

Project

Jefferson City, L-142
601 E. 12th St.
Kansas City, MO 64106

Project No. 02251486

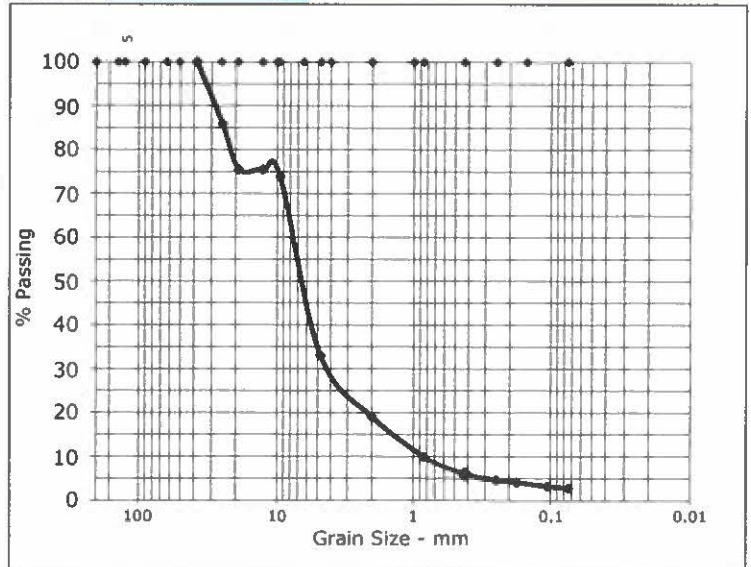
Sieve	% Passing	Spec Min	Spec Max	X=Fail
1.5"	100			
1"	86			
3/4"	76			
1/2"	76			
3/8"	74			
#4	33			
#10	19			
#20	10			
#40	6			
#60	5			
#80	4			
#140	3			
#200	2.8			

Sample Test Data

Date Sampled: 12/08/25
Sample Source: ADU-59; J-29
Sample Location: 80.2-80.55
Aggregate Type: Coarse and Fine
Aggregate Description: GP trace SP, gray
Sieve Specification: N/A
(If Other): N/A

Laboratory Test Data

Test Date: 12/09/25
Tested By: Bunker, Meredith
Test Method: ASTM C136
Sieving Method: Cumulative-No Split
Moisture Content (%): N/A
Elutriation (g): N/A
Fineness Modulus (F.M.): 1.18
Remarks:



Services:

Terracon Rep:

Reported To:

Contractor:

Report Distribution

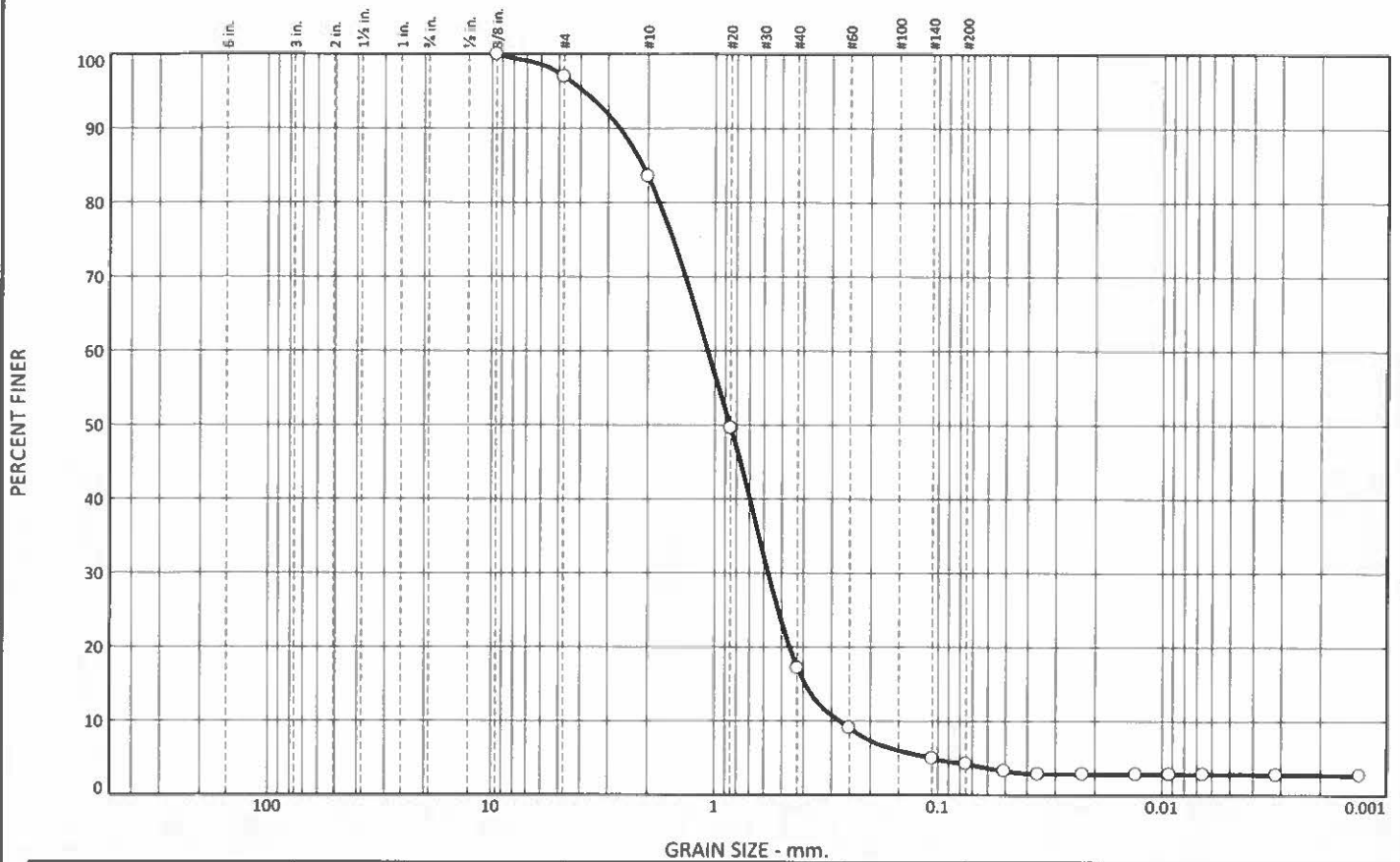
(1) US Army Corps of Engineers (USACE)

Chris Coyle
Laboratory Manager

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Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
☐	0.0		0.0	3.0	13.4	66.5	12.9	1.5		2.7
☒	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
☐			2.1097	1.0764	0.8576	0.5744	0.3929	0.2759	1.11	3.90

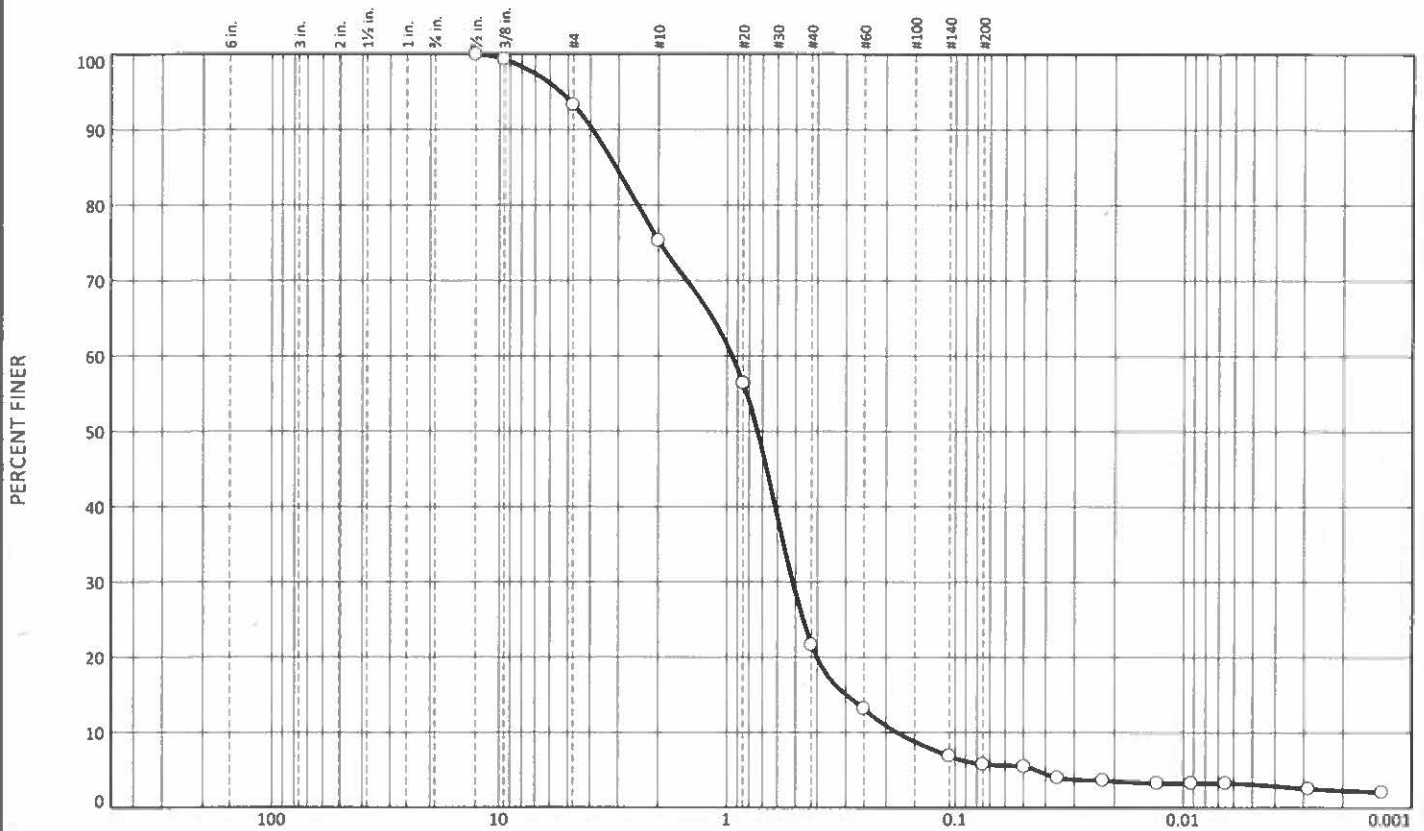
Material Description							Test Date	USCS	NM
☐ POORLY GRADED SAND, gray							10--22-25	SP	

Project No. 02251486 Client: Project: Jefferson City, L-142 ☐ Source of Sample: 02251486 Depth: 95-95.3 Sample Number: ADU-59; J-35	Remarks: ☐ ADU-59; J-35; 95-95.3
Terracon Consultants, Inc. Lenexa, KS	

Figure

Tested By: JDM

ASTM D422

[illegible]

Material Description	Test Date	USCS	NM
POORLY GRADED SAND, gray	11-22-25		

Project: Jefferson City, L-142

Depth: 40-40.7

Sample Number: ADU-60; J-14

○ADU-60; J-14; 40-40.7

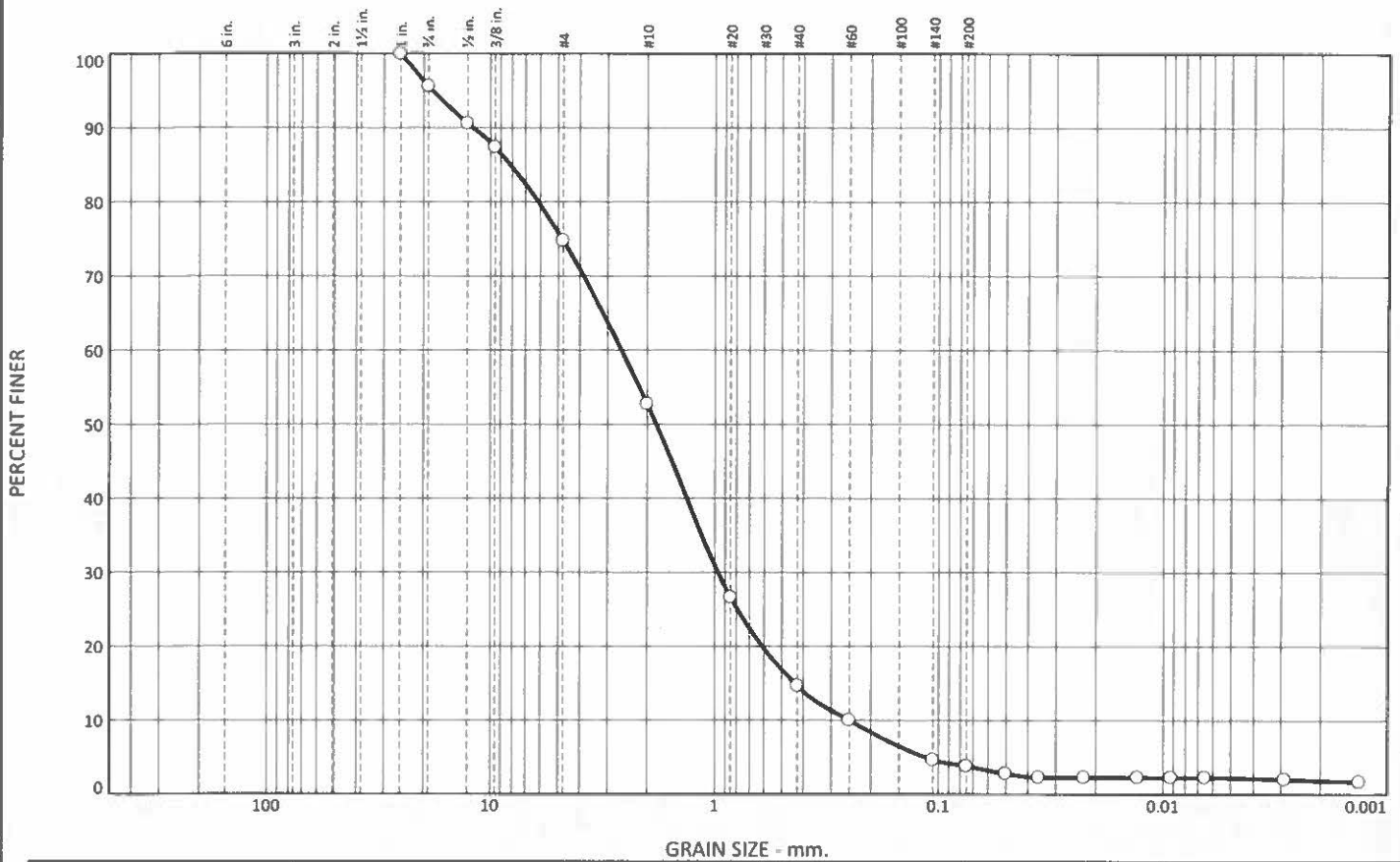
Terracon Consultants, Inc.

Lenexa, KS

Figure

Tested By: JDM

ASTM D422

[illegible]

Material Description	Test Date	USCS	NM
○ WELL-GRADED SAND (SW) W/ GRAVEL, gray	10-22-25	SW	

Project No.	02251486	Client:
--------------------	----------	----------------

Project: Jefferson City, L-142

○ **Source of Sample:** 02251486

Depth: 75-75.6

Sample Number: ADU-60; J-21

Remarks:

○ADU-60; J-21; 75-75.6

Terracon Consultants, Inc.

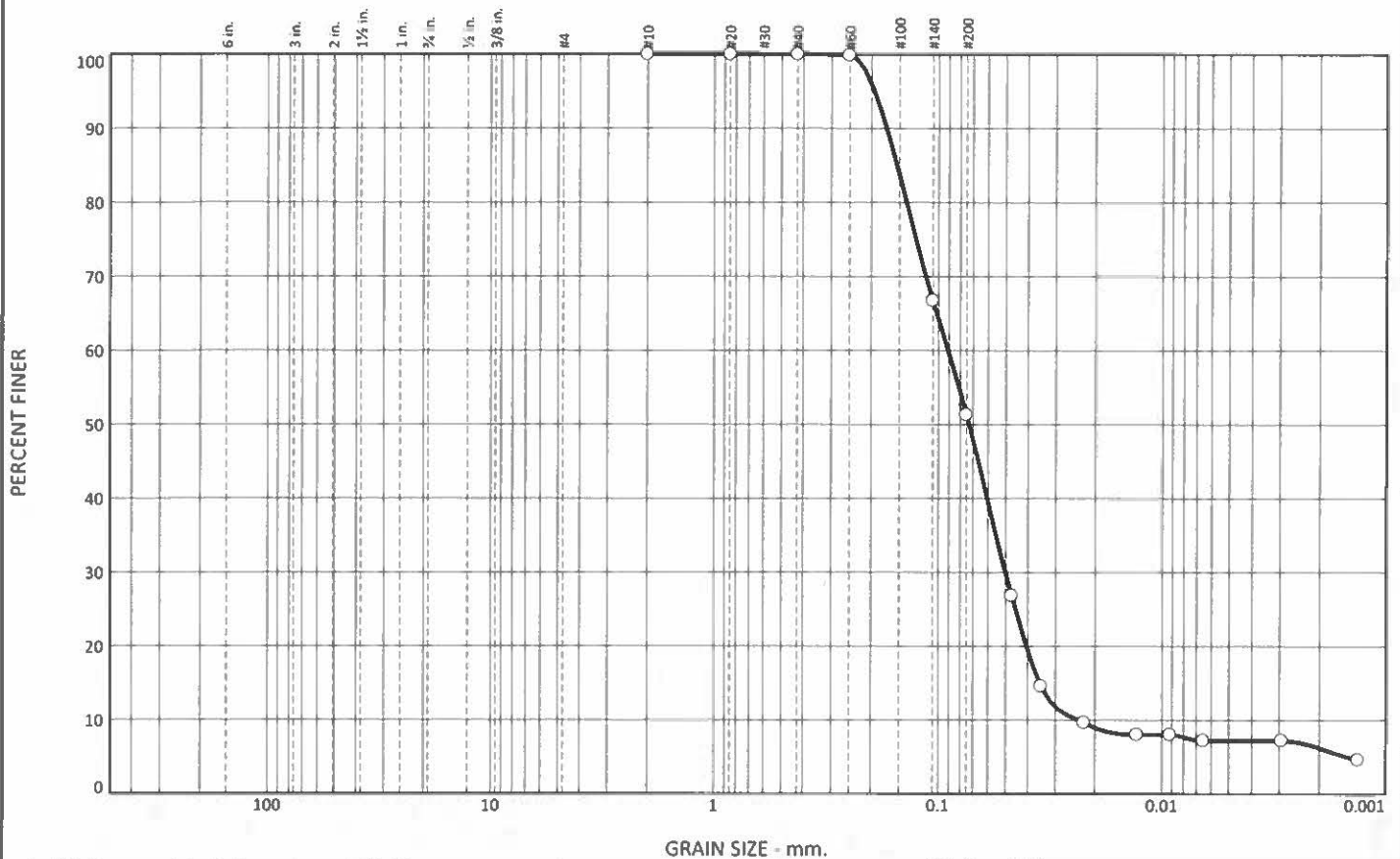
Lenexa, KS

Figure

Tested By: JDM

Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	0.0	0.0	0.0	48.7	45.1		6.2
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.1540	0.0906	0.0731	0.0502	0.0354	0.0236	1.17	3.83

Material Description	Test Date	USCS	NM
○ SILT W/ SAND, brown	10-22-25		

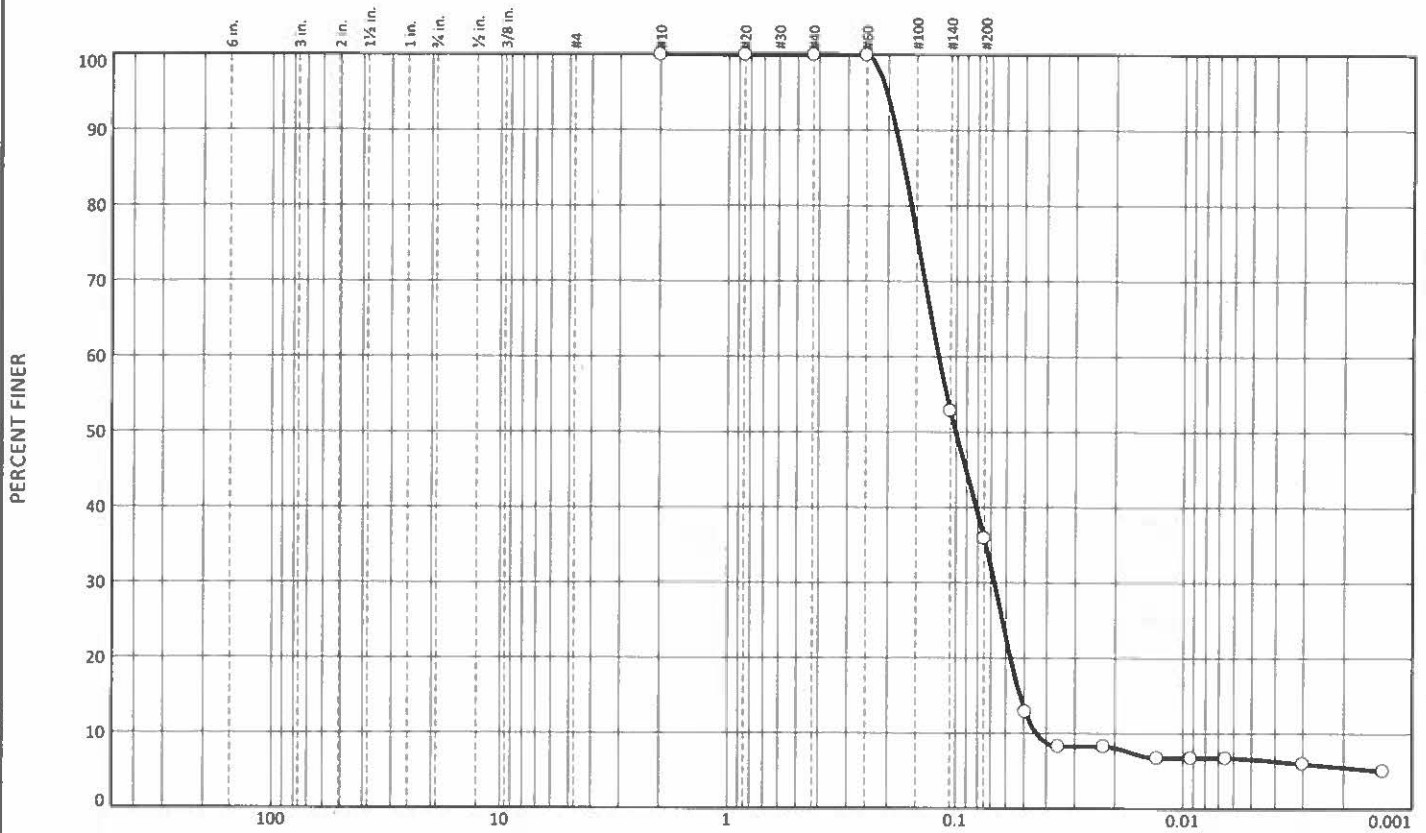
Project No. 02251486 Client: Project: Jefferson City, L-142 ○ Source of Sample: 02251486 Depth: 5.5-5.9 Sample Number: ADU-62; J-5	Remarks: ○ ADU-62; J-5; 5.5-5.9
Terracon Consultants, Inc. Lenexa, KS	

Figure

Tested By: JDM

Particle Size Distribution Report

ASTM D422



GRAIN SIZE - mm.

	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	0.0	0.0	0.0	64.1	30.4		5.5
⊗	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	NP	NP	0.1703	0.1196	0.1002	0.0677	0.0521	0.0443	0.86	2.70

Material Description

Test Date

USCS

NM

☐ SILTY SAND, brown

10-22-25

SM

Project No. 02251486 Client:

Project: Jefferson City, L-142

☐ Source of Sample: 02251486 Depth: 8-9.5 Sample Number: ADU-62; J-7

Remarks:

☐ ADU-62; J-7; 8-9.5

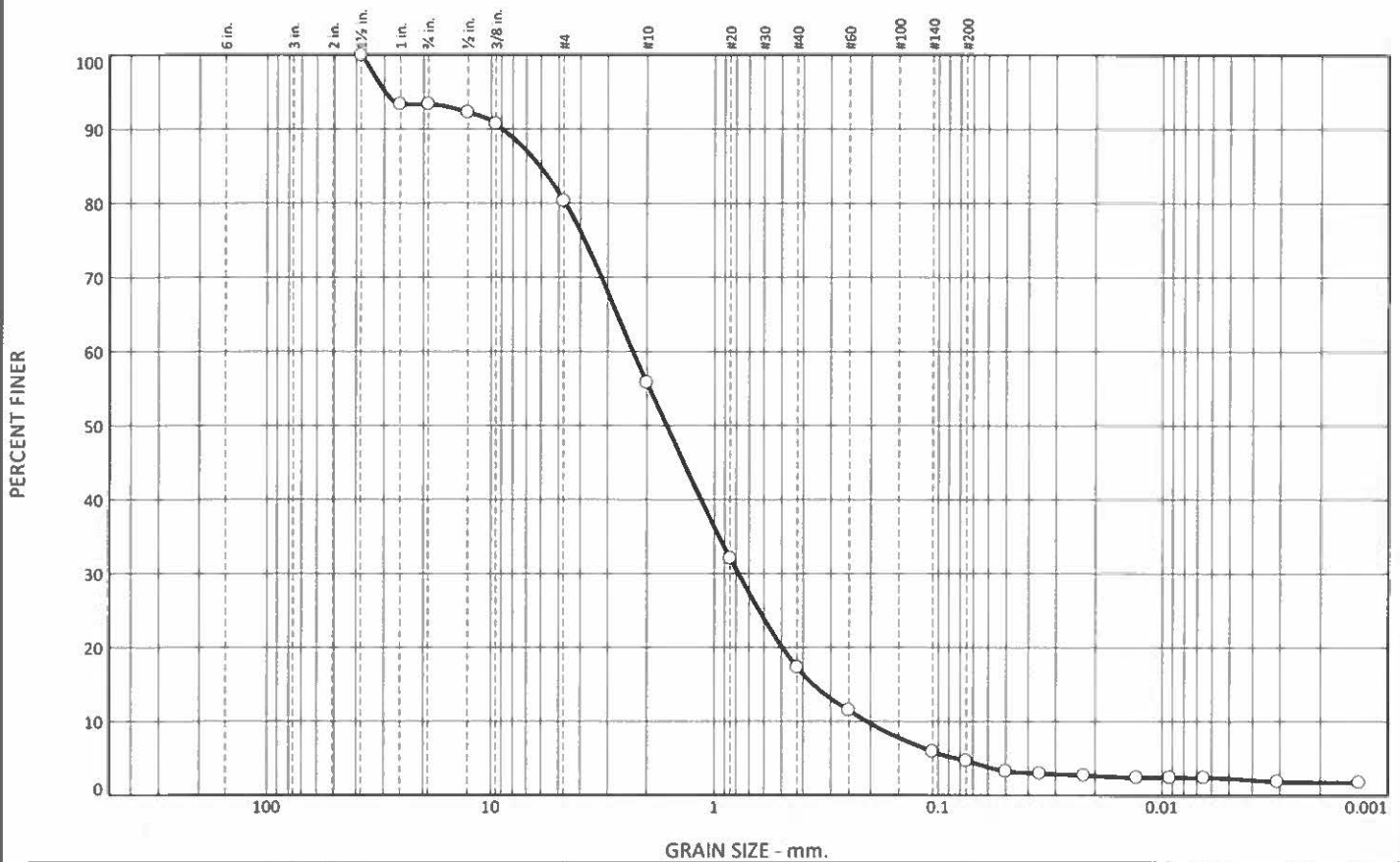
Terracon Consultants, Inc.

Lenexa, KS

Figure

Tested By: JDM

ASTM D422

[illegible]

Material Description	Test Date	USCS	NM
WELL-GRADED SAND W/ GRAVEL, grayish brown	10-22-25	SW	

Project No.	02251486	Client:
--------------------	-----------------	----------------

Project: Jefferson City, L-142

○ **Source of Sample:** 02251486

Depth: 75-76.1

Sample Number: ADU-62; J-33

Remarks:

○ADU-62; J-33; 75-76.1

Terracon Consultants, Inc.

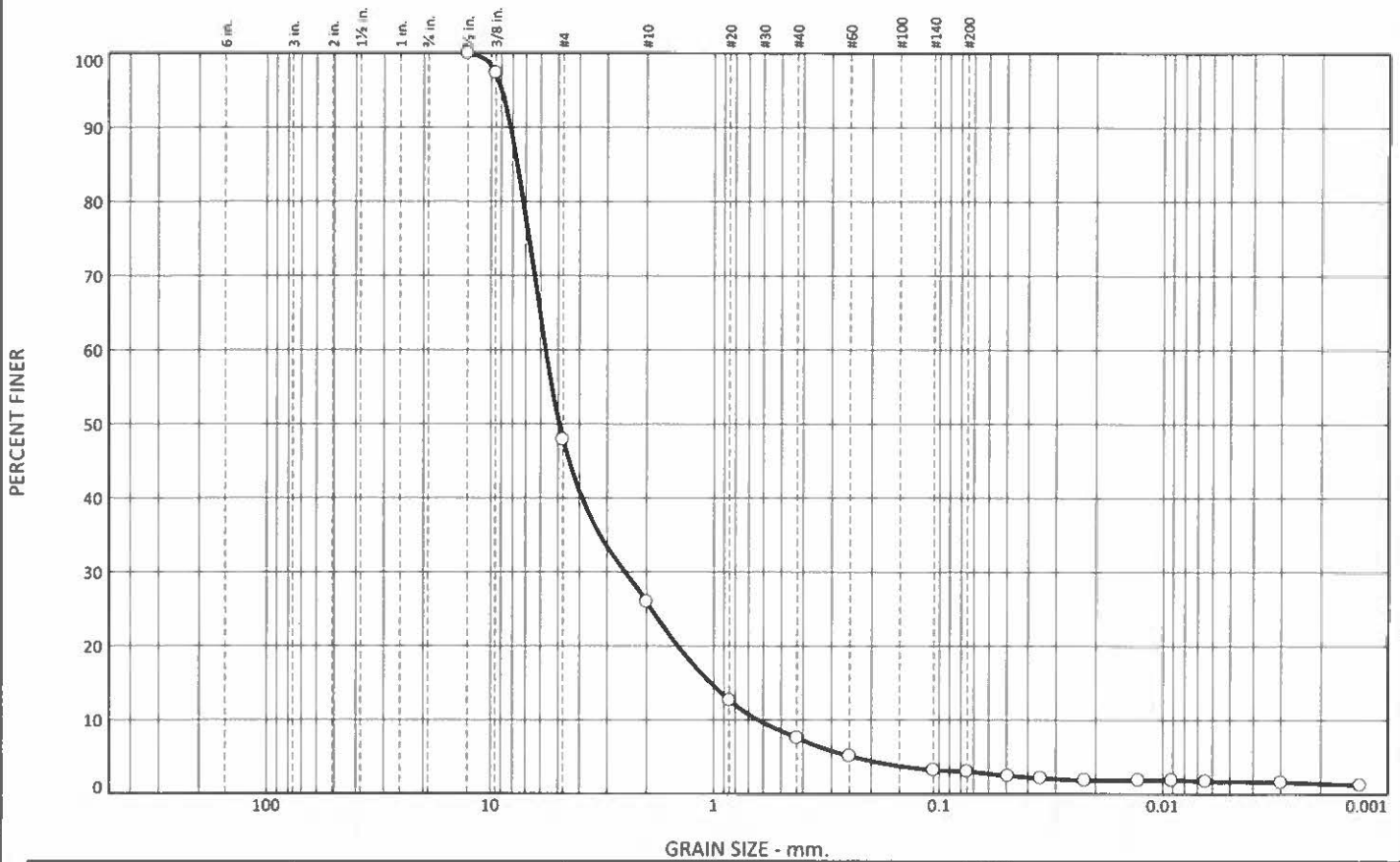
Lenexa, KS

Figure

Tested By: JDM

Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
☐	0.0		0.0	52.1	21.9	18.4	4.6	1.6		1.4
☒	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
☐			7.6333	5.6913	4.9419	2.4948	1.0313	0.6351	1.72	8.96

Material Description	Test Date	USCS	NM
☐ WELL-GRADED GRAVEL W/SAND, grayish brown	10-22-25	GW	

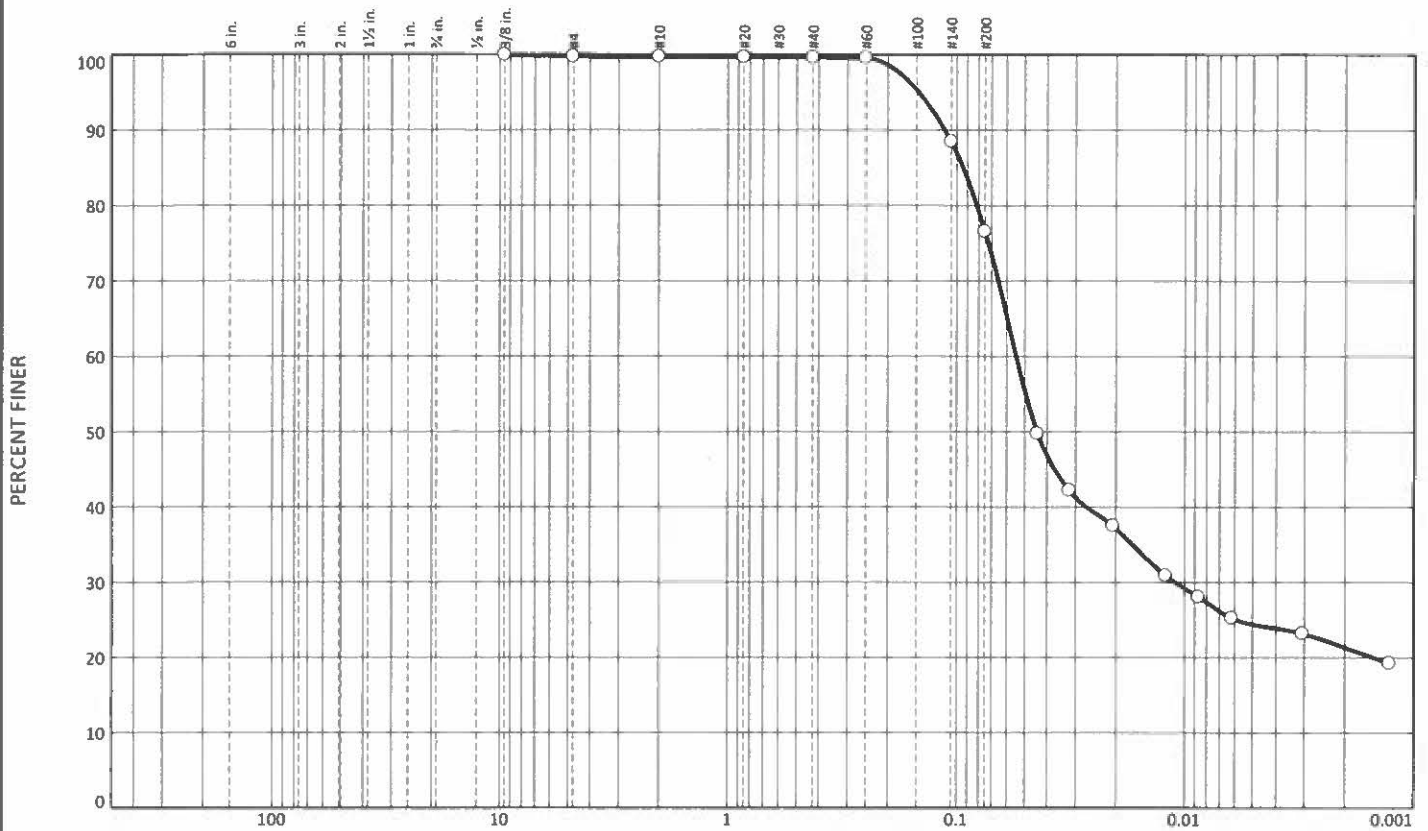
Project No. 02251486 Client: Project: Jefferson City, L-142 ☐ Source of Sample: 02251486 Depth: 85-85.9 Sample Number: ADU-62; J-37	Remarks: ☐ ADU-62; J-37; 85-85.9
Terracon Consultants, Inc. Lenexa, KS	

Figure

Tested By: JDM

Particle Size Distribution Report

ASTM D422



GRAIN SIZE - mm.

	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
☐	0.0		0.0	0.2	0.1	0.1	23.0	55.3	21.3	
☒	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
☐	37	19	0.0937	0.0545	0.0442	0.0110				

Material Description

Test Date

USCS

NM

☐ LEAN CLAY W/SAND, dark brown

10-22-25

CL

Project No. 02251486

Client:

Project: Jefferson City, L-142

Remarks:

☐ AD-64; Bulk-1; 0.0-5.0

☐ Source of Sample: 02251486

Depth: 0.0-5.0

Sample Number: AD-64; Bulk-1

Terracon Consultants, Inc.

Lenexa, KS

Figure

Tested By: JDM

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Report Number: 02251486.0004A
Service Date: 12/09/25
Report Date: 12/09/25
Task: Jefferson City, L-142



15620 W 113th St
Lenexa, KS 66219-5102
913-492-7777

Client

US Army Corps of Engineers (USACE)
Attn: James Mehnert
601 E. 12th St.
Kansas City, MO 64106

Project

Jefferson City, L-142
601 E. 12th St.
Kansas City, MO 64106

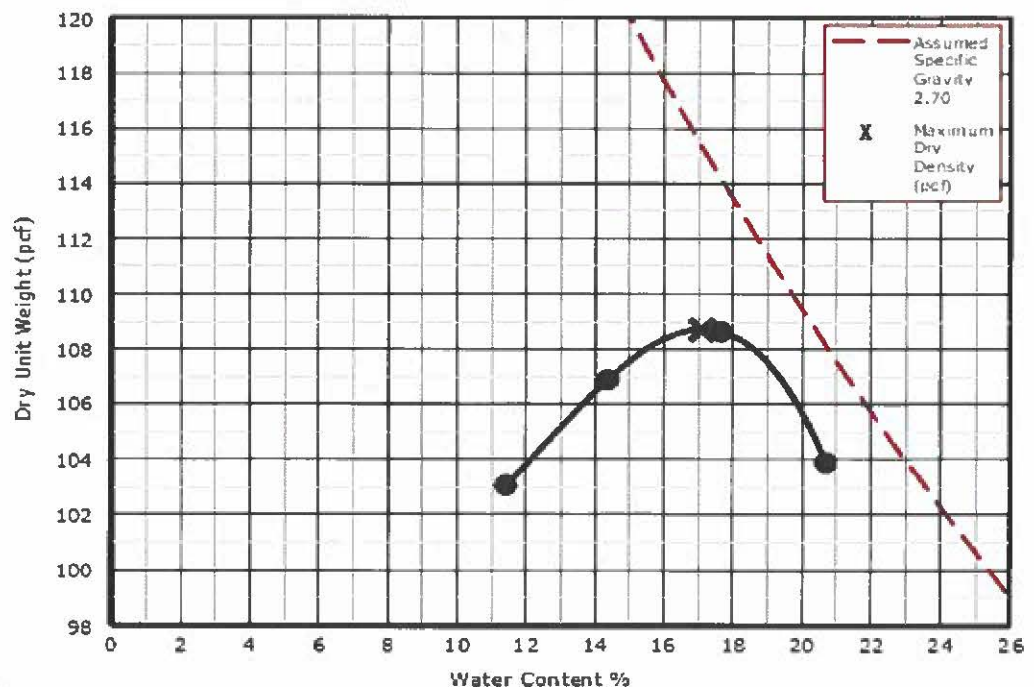
Project No. 02251486

Sample Information

Source of Material	ADU-64, Bulk-1	Test Designation / Method	D698 / Method A
Sample Date		Sample Preparation	Dry
Sampled By		Rammer Type	Mechanical - Circular Face
As Received Water Content (%)	25.9	Assumed Specific Gravity	2.7
Sample Location	0-5 ft		
Sample Description	LEAN CLAY (CL) W/ SILT, dark brown		

Laboratory Test Results

Maximum Dry Density (pcf)	108.7	Liquid Limit	37
Optimum Water Content (%)	17.1	Plastic Limit	24
Fines (%)	76.6	Plasticity Index	13
USCS	CL	Separating Sieve Size	#4



Services:

Terracon Rep:

Reported To:

Contractor:

Report Distribution

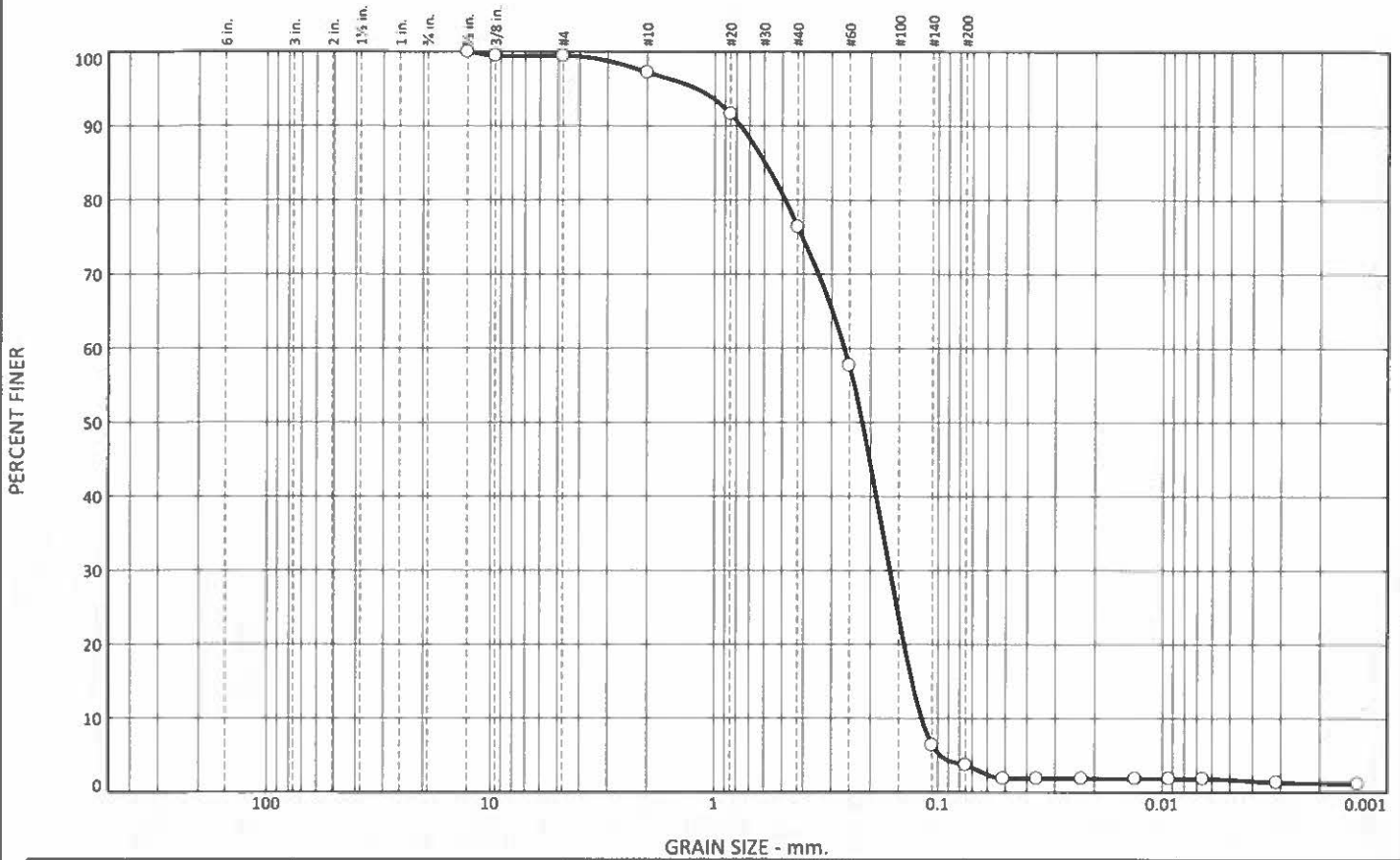
(1) US Army Corps of Engineers (USACE)

Chris Coyle
Laboratory Manager

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Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
☐	0.0		0.0	0.6	2.2	20.8	72.7	2.5		1.2
☒	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
☐			0.5950	0.2629	0.2179	0.1642	0.1308	0.1183	0.87	2.22

Material Description	Test Date	USCS	NM
☐ DARK GRAY, Poorly Graded Sand	10-22-25	SP	

Project No. 02251486 Client: Project: Jefferson City, L-142 ☐ Source of Sample: 02251486 Depth: 20-21.5 Sample Number: ADU-64; J-6	Remarks: ☐ ADU-64; J-6; 20-21.5
Terracon Consultants, Inc. Lenexa, KS	

Figure

Tested By: JDM