

Mr. David Locey
NYDEC Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
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Buffalo, NY 14203-2915

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Subject:
Union Ship Canal Public Open Space, Site #B00164
Cap Verification Work Summary

ENVIRONMENTAL

Dear Mr. Locey:

Date:
August 17, 2016

On behalf of Buffalo Urban Development Corporation (BUDC), Arcadis U.S., Inc. (Arcadis) is pleased to provide New York State Department of Environmental Conservation (NYSDEC) with this Work Summary for the cap verification performed at the Hanna Furnace Sub-parcel 3, Site #B00164, Union Ship Canal Open Space Site (Site) in response to the NYSDEC letter dated June 1, 2016 (Appendix A). This work was performed in accordance with the Work Plan dated August 2, 2016 and conditionally approved by NYSDEC on August 3, 2016 (Work Plan). The objective was to verify the thickness of soil ground cover above a subsurface demarcation fabric.

Contact:
Ben Girard

Phone:
716-667-6645

Email:
ben.girard@arcadis.com

Our ref:
04080012.0000

WORK SUMMARY

Prior to conducting subsurface work, Arcadis completed utility clearance activities consisting of an 811 call, a review of record drawings, and a detailed Site inspection.

Arcadis subcontracted with Nothnagle Drilling Inc. (Nothnagle) to perform the work as detailed in the Work Plan. The work occurred August 4 through August 5, 2016. A total of 44 direct push borings were advanced using a track mounted Geoprobe® rig. The soil boring locations were selected to avoid existing underground utilities and to satisfy NYSDEC's request for two borings per acre with several locations selected near the Site perimeter. As outlined in correspondence with NYSDEC, soil borings were advanced mid slope on two of the landscaped soil mounds.

Soil borings were advanced to a minimum of three feet below ground surface (bgs) and no deeper than four feet bgs. Each Boring was logged and visually characterized for color, texture, moisture content, evidence of demarcation layer, and evidence of contrasting composition with underlying fill. The boring logs are included in Appendix B. Photographs of each boring are included in Appendix C.

All soil borings were backfilled with their respective drill cuttings. Hydrated bentonite was used when additional backfill material was needed.

RESULTS

The soil cap is a fill layer comprised of Silty Sand and Sandy Silt with trace to little gravel and was observed throughout the site at depths ranging from 11 to 32 inches bgs. An orange demarcation fabric was also observed throughout the site below the cap material in 39 of the 44 soil borings.

Soil boring locations and their depth to cap demarcation are identified on Figure 1. Photographs of the boring locations are included in Appendix D.

There was no demarcation fabric observed at CB-5, CB-13, CB-19, CB-22 or CB-23. For these locations, the estimated cap thickness was determined by the contrast in surficial fill and underlying, existing onsite material.

CONCLUSION

Forty-three of the soil borings indicated an estimated cap thickness greater than or equal to 14 inches. Only soil boring CB-23, in which the demarcation fabric was not evident, suggested the soil cap may have been as shallow as 11 inches.

The original cap design was established with a thickness of 24 inches to ensure a minimum cap thickness of 12 inches would exist given that future settling, compaction, and erosion would likely occur over time. The findings in the field demonstrated that an adequate cap thickness exists five years after the cap was installed in 2011. Thus, the results of this field investigation and discussions with NYSDEC confirm that the cap thickness throughout the Site sufficiently provides a safe barrier to the public, as intended.

Mr. David Locey
August 17, 2016

CLOSING

If you have any comments or questions regarding this Work Summary please feel free to contact me.

Sincerely,

Arcadis U.S., Inc.



Ben Girard
Project Manager

Copies:

Pete Cammarata, BUDC
Michael Nasca, Arcadis

Enclosures:

Figures

- Figure 1A Soil Boring Locations (West)
- Figure 1B Soil Boring Locations (East)

Appendices

- Appendix A NYSDEC Soil Cap Verification Letter
- Appendix B Field Soil Boring Logs
- Appendix C Soil Boring Photographs
- Appendix D Soil Boring Location Photographs

This proposal and its contents shall not be duplicated, used or disclosed — in whole or in part — for any purpose other than to evaluate the proposal. This proposal is not intended to be binding or form the terms of a contract. The scope and price of this proposal will be superseded by the contract. If this proposal is accepted and a contract is awarded to Arcadis as a result of — or in connection with — the submission of this proposal, Arcadis and/or the client shall have the right to make appropriate revisions of its terms, including scope and price, for purposes of the contract. Further, client shall have the right to duplicate, use or disclose the data contained in this proposal only to the extent provided in the resulting contract.

FIGURES



Figure 1A: Union Ship Canal Cap Verification (West)
Buffalo, NY

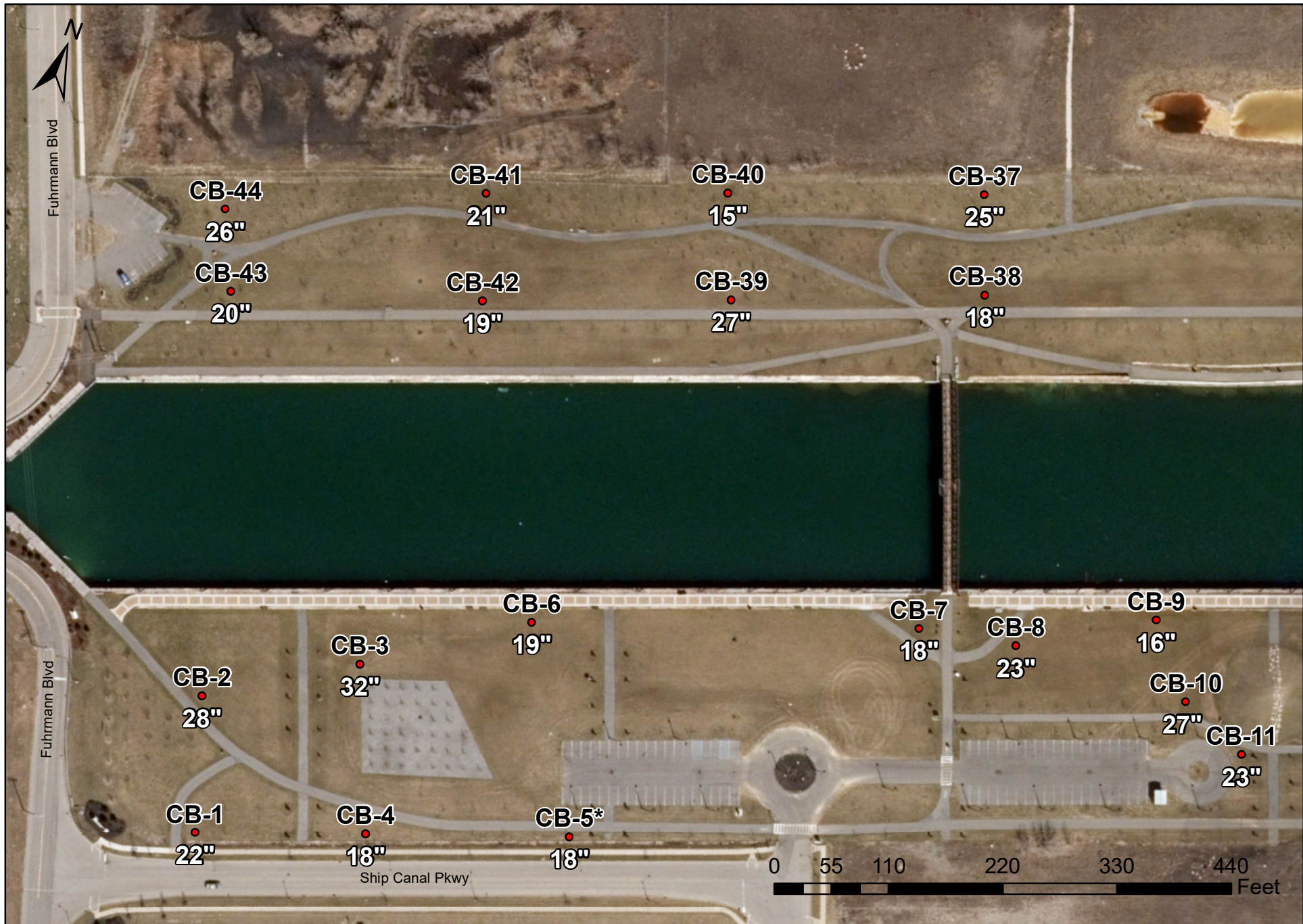
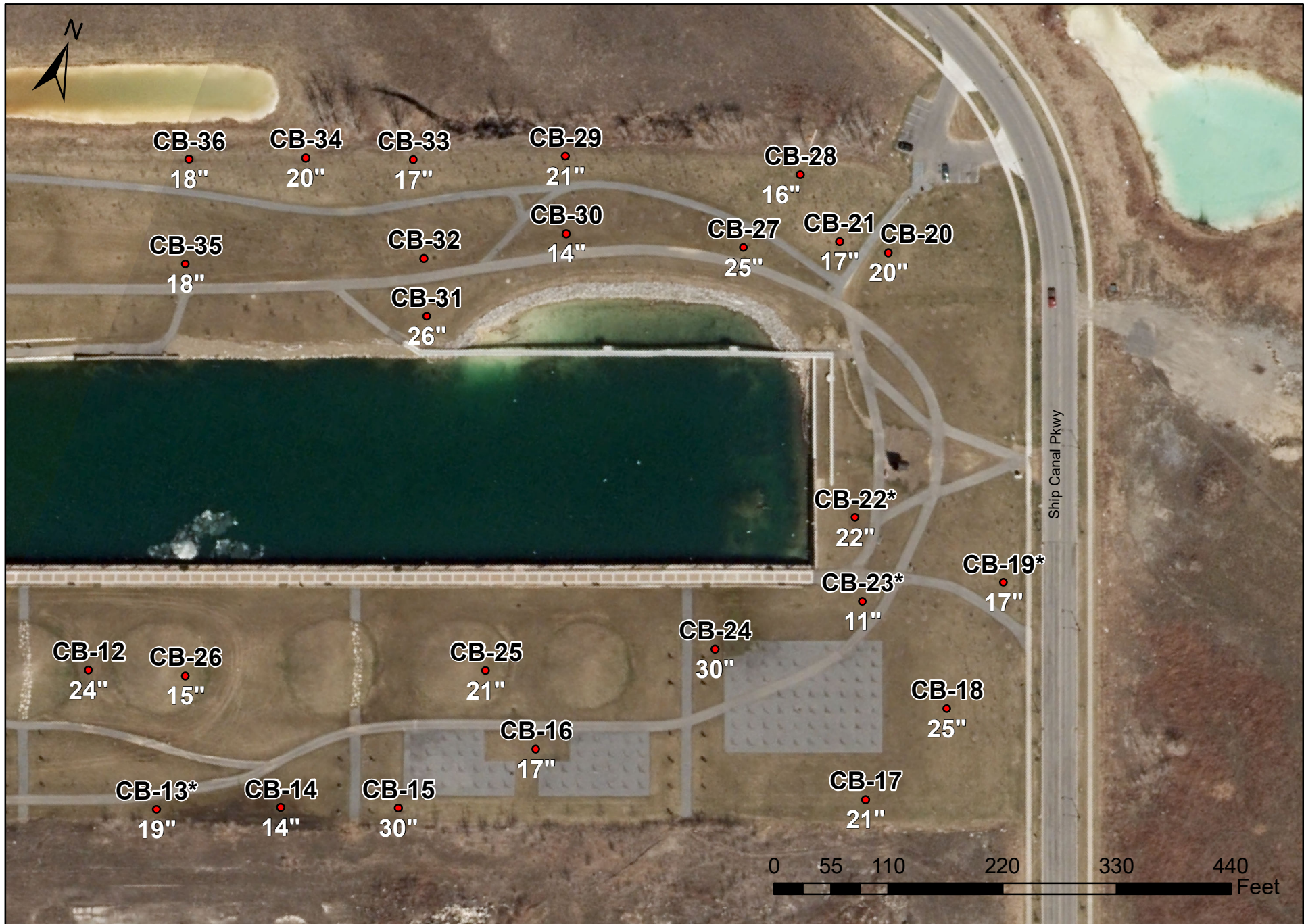


Figure 1B: Union Ship Canal Cap Verification (East)
Buffalo, NY



APPENDIX A

NYSDEC Soil Cap Verification Letter



NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 9
270 Michigan Avenue, Buffalo, NY 14203-2915
P: (716) 851-7220 | F: (716) 851-7226
www.dec.ny.gov

June 1, 2016

Mr. Peter M. Cammarata
Buffalo Urban Development Corporation
95 Perry Street, Suite 403
Buffalo, New York 14203

Dear Mr. Cammarata:

Final Engineering Report
Hanna Furnace Sub-parcel 3, Site #B00164
Union Ship Canal Public Open Space
Buffalo, Erie County

In a November 27, 2012 email, you mentioned that Arcadis had compared their draft Final Engineering Report for the subject site against a checklist provided by DEC, and found that it would not be possible to provide all of the items for a complete FER. A NYS P.E. stamped drawing, identifying the areal extent and thickness of the site's cover system could not be prepared with the data available. The DEC will therefore require the thickness of the cover to be field verified.

In order to meet the requirements of the program, the DEC recommends that the soil cover be verified in the field with shallow soil borings and core samples. A minimum of two boring locations per acre of the vegetated, soil-covered portions of the site would seem sufficient provided the results confirm the soil cover meets the required thickness. The soil cores should be examined and described in terms of established soil classification systems, noting any evidence of the cover's demarcation fabric and contrasts with the original, underlying fill material. Some boring locations should be biased to the perimeter of the site and the tops of the landscaped soil mounds located on the south side of the canal.

Please provide a drawing of the proposed boring locations for DEC review with a tentative work schedule.

Sincerely,



David P. Locey
NYSDEC Project Manager

DPL/tm

ec: C. Staniszewski, NYSDEC



Department of
Environmental
Conservation

APPENDIX B

Field Soil Boring Logs





Boring/Well CB-2 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method NA Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth (feet below land surface)		Core Recovery (inches)
From	To	

USC 5

Sample/Core Description

Core	Depth	Interval	Soil	Sample Core Description
0	4	41	ML	(0-12") Brown Silt + vf Sand, trace gravel, sub angular, dry, loose, roots
			SM	(12"-28") Lt. brown vf Sand, little Silt, little sm to medium pebbles, angular to sub rounded, dry to moist, loose to dense, few fractured rocks. DEMARCATION GRID at 28" bgs.
			-	(28"-38") Fill material - Dk reddish brown Silt + vf Sand mixed with pieces of wood, concrete, slag, ^{waste} dense to mod dense,
			SP	(38"-41") Greyish brown - fine Sand, trace to little gravel to medium pebbles, sub ang to sub rounded, moist to dry, loose.



Boring/Well CB-3 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

LSCS

Sample/Core Description

From	To	Thickness (inches)	Sample Core Description
0	4	41	SM (0-12") Brown vf Sand, some silt, trace to little granules to lg pebbles, angular to sub rounded, dry, loose, roots.
			ML (12"-19") very dark brown silt, some vf sand, trace granules, angular, moist, very dense.
			SM (19"-32") lt. olive brown vf sand & silt, little granules to lg pebbles, angular to rounded, moist, dense to very dense. DEMARCATION GRID at 32" bgs.
			(32"-41") Mixed Fill - very dk. brown silt & vf sand w/ slag, pink rock crushed from 34"-35", slag, coal pieces, moist to dry, loose.



Boring/Well CB-4 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

05C5

Sample/Core Description

Q	4	39	SM	(0-7") Brown vf Sand and Silt, trace coarse sand + granules, angular, dry, loose, roots.
				(7"-9") SAA; Gray
			SM	(9"-18") SAA; Grayish brown, little fractured rock spread throughout. DEMARCATION GRID at 18" bgs.
			-	(18"-39") Fill Material - very dk brown to black vf Sand + Silt mixed with Slog, concrete, red brick, trace granules to lg pebbles, sub ang to sub rounded, moist, med. dense



Boring/Well CB-5 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)

Core
Recovery
(Inches)

USC 5

Sample/Core Description

Core No.	Depth (meters)	Sample Core Description
0	4	30 SM (0-3") Brown vF sand + silt, trace coarse coarse sand, dry, loose, roots.
		SM (3"-11") SAA; grayish brown, trace small pebbles, sub rounded.
		SM (11"-18") Dk brown vF sand + silt, little granules to lg pebbles, angular to sub angular, moist, loose to med. dense.
		— (18"-30") Dk reddish brown brown vF sand, trace silt, mixed with slag, coal, brick (pink and lt. yellow), 27"-30" is lt. yellow crushed brick

* No Demarcation Grid observed



Boring/Well CB-6 Project/No. 04080012-0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Macro Core

Length and Diameter of Coring Device 4' & 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method  Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)

Core
Recovery
(inches)

USCS

Sample/Core Description

Core Number	Core Depth (m)	Core Depth (ft)	Core Description
0	4	34	SW (0-14") Lt. brown fine sand, some granules to lg pebbles, ang to sub ang, dry, loose. DEMARCATION GRID @ 14" bgs
			ML (14"-24") Dk brown to black silt + vf sand, mixed with coal, slag, wood pieces, moist md dense to dense.
			- (24"-34") Brownish Gray + Gray concrete, pink brick, coh + slag. Ash/slag in the shoe, dry, loose.



Boring/Well CB-7 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC 5

Sample/Core Description

Core No.	Depth	Soil Color & Description
0	4	32 SM (0-18") Lt. Grayish brown vf Sand + Silt, little granules to Ls pebbles, ang to sub rounded trace m.c sand, dry, loose DEMARCATION GRID @ 18".
		ML (18"-22") Dk. Reddish brown silt, some vf Sand, trace granules, angular, mixed with slog + birch pieces, stiff ^{most} , very stiff,
		(22"-32") Black coal mixed with dk olive brown silt, trace clay, trace granules to md. pebbles, sub ang, dry, loose to stiff.

* Lost



Boring/Well CB-8 Project/No. 04080012.0000 Page 1 of 1

Site Location Buffalo, NY Drilling Started — Drilling Completed 8-4-16

Ship Canal Commons

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' + 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

VSC5

Sample/Core Description

Core No.	Depth (meters)	Sample Core Description
0	4	45 SM (0-6") Lt. brown vf sand + silt, little granules to lg pebbles, ang to sub rounded, trace muc sand, dry, loose.
		SM (6"-11") SPA; Gray
		SM (11"-21") Brown vf sand + silt, little granules to lg pebbles, ang to sub ang, trace clay, trace f-m sand, moist, very dense.
		SP (21"-23") Lt. brown fine sand, dry, loose and 1.5" dia. stone. DEM DEMARCATION GRID at 23" bgs.
		SM (23"-27") Dk brown to black vf sand + silt mixed with silt + coal, moist ^{dry} , loose.
		CL (27"-33") Dk brown clay, little silt, dry brittle, dry, hard.
		— (33"-45") Black & Dk brown silt, coal, rock, & glass pieces, dry, loose.



Boring/Well CB-9 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started Drilling Completed 8-4-16

Total Depth Drilled 3.5 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used NA Drilling Method ~~NA~~ Geo probe

Drilling Contractor Nothnagle Driller Jeff S. Helper

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC 5

Sample/Core Description

0	3.5	35	SM	(0-10") Lt. brown grades to gray vf sand and silt, trace coarse sand + granules, ang to sub ang, dry, loose, roots.
			ML	(10"-16") Brown silt & vf sand, trace to little sm to lg pebbles, sub ang to sub round moist to dry, med dense to dense. DEMARCAT
				GRID at 16" bgs
			SW	(16"-35") Rust reddish brown fine sand, little sm to lg pebbles, ang, dry, loose, mixed with slag, coal, # ash, & wood pieces, lots of slag 31"-35". Refusal on concrete

Field soil sample sheet.xlsx.xls
Geoprobe Log

x refusal at 42" bgs or 3.5' bgs
concrete



Boring/Well CB-10 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC5

Sample/Core Description

Turn	10	(inches)	Sample Core Description
0	4	45	SM (0-6") Lt. brown vf Sand and Silt, trace granules to lg pebbles, ang to sub angular, dry, loose, roots.
			SM (6"-14") SAA; Gray, little granules.
			SM (14"-27") Brown vf Sand + Silt, little to some granules to lg pebbles, ang to sub ang, moist, dense. DEMARCATION GRID at 27" bgs.
			— (27"-45") Black + Dk gray slag, coal, wood pieces, pink brick, and sand, dry, loose. lots of slag chunks in the shoe.



Site Location	Buffalo, NY	Drilling Started	8/4/16	Drilling Completed	8/4/16
	Ship Canal Commons				
			Type of Sample/		

Drilling Fluid Used	NA	Drilling Method	NA Geoprobe
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Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Recovery
(inches)

USCJ

Sample/Core Description

Core	Feet	Inches	Sample Core Description
0	4	45	SM (0-8") lt. Brown v f Sand & silt, trace granules to med pebbles, ang to sub ang, dry, loose.
			SM (8"-10") SAA; grayish brown
			SM (10"-14") SAA; little to some med - lg pebbles, moist.
			ML (14"-23") Brown silt & v f Sand, little granules to lg pebbles, ang to sub ang, brittle, moist to dry, very dense. DEMARCATION GREP @ 23" bgs.
			ML (23"- 28" 33") Black silt, some v f Sand, trace clay, mixed with coal, ash, & slag, moist, loose to Hard.
			- (33"-36") pink sandstone, crushed.
			- (36"-45") Black coal, slag, fine sand mixed together, moist, very dense.

Feb 12 at 23⁰⁰



Boring/Well	CB-12	Project/No.	04080012.0000	Page	1	of	1
Site Location	Ship Canal Commons		Drilling Started	—	Drilling Completed	8-4-16	
Total Depth Drilled	4	Feet	Hole Diameter	2	inches	Type of Sample/ Coring Device	Macro Core
Length and Diameter of Coring Device	4' + 2"			Sampling Interval	4	feet	
Land-Surface Elev.	—	feet	☐ Surveyed	☐ Estimated	Datum	—	
Drilling Fluid Used	NA			Drilling Method	NA Geoprobe		
Drilling Contractor	Nothnagle		Driller	Jeff S.		Helper	—
Prepared By	Ryan Clare		Hammer Weight	NA		Hammer Drop	NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC 5

Sample/Core Description

Core	Feet	Feet	Feet	Sample No.	Description
0	4	43	SM	(0-6")	lt. brown vf Sand + silt, trace granules to med. pebbles, sub ang to sub rounded, dry, loose, roots.
			SM	(6"-12")	SAA; Brownish Gray, grades to a clayey silt.
			ML	(12"-24")	Mottled Gray + reddish brown silt + clay, brittle, dry, very stiff. DEMARCATION GRD at 24"
			+	(24"-43")	Black + dk Gray vf-f Sand; trace silt, mixed w/ silt, cool, ash, moist, loose to very dense.

Feb 12 at 2411



Boring/Well CB-13 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Recovery
(inches)

VSC5

Sample/Core Description

Core	Depth	Interval	Sample	Description
0	4	39	SM	(0-7") Lt. brown vf Sand & Silt, trace granules to lg pebbles, ang to sub ang, dry, loose.
			SM	(7"-13") SPA; Gray, trace to little granules.
				(13"-19") Brown silt & vf Sand, trace to little granules to med. pebbles, sub ang, med, very dense.
			ML	(19"-39") Dk grayish brown fine Sand, trace to little granules to lg pebbles, ang to sub rounded. Grades to rust red "chert" like stone or slag material.

Fill
Stalls

* No fabric observed



From	To	Recovery (inches)	USCS	Sample/Core Description
0	4	39	SM	(0-6") lt. brown vf sand + silt, trace granules to small pebbles, ang to sub rounded, dry, loose, roots.
			SM	(6"-15") SAA; little lg pebbles, angular
			SM	(15"-19") Brown vf sand + silt; some lg pebbles, angular (fractured rock), dry, md. dense.
			-	(19"-39") Dk Reddish Gray fine sand mixed with slag, brick, & coal, silt & coal in the stone, dry to moist, loose to very stiff (silt).



Boring/Well	CB-15		Project/No.	04080012.0000		Page	1	of	1
Site Location	Ship Canal Commons			Drilling Started	—	Drilling Completed	8-4-16		
Total Depth Drilled	4	Feet	Hole Diameter	2	inches	Type of Sample/ Coring Device	Macro Core		
Length and Diameter of Coring Device	4' + 2"					Sampling Interval	4	feet	
Land-Surface Elev.	—	feet	☐ Surveyed	☐ Estimated	Datum	—			
Drilling Fluid Used	NA				Drilling Method	NA Geoprobe			
Drilling Contractor	Nothnagle			Driller	Jeff S.		Helper	—	
Prepared By	Ryan Clare			Hammer Weight	NA		Hammer Drop	NA ins.	

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC5

Sample/Core Description

Core No.	Depth (meters)	Sample Core Description
0	4	38 SM (0-11") Lt. brown vf Sand & silt, little f-m sand, trace granules to med. pebbles, ang to sub angular, dry, loose.
		SM (11"-19") SAA; Gray (19"-25") Brown Silt + vf Sand; trace to little granules to lg pebbles, ang to sub rounded, dry brittle, dense hard.
		SM (25"-30") Lt. brown vf. f sand, trace silt , trace little granules to med. pebbles, ang to sub ang, trace silt, dry, med. dense. DEMARCATION GRID at 30" bgs.
		- (30"-38") Fill material - some ash/slag on top of a pink sand & gravel material dry, loose.

30" de fabrica

[illegible]



Page 1 of 1

8-4-16

Macro Core

Sampling Interval 9 feet

Datum

Drilling Method

Jeff S.

Helper

Hammer
Weight

NA

Hammer
Drop

NA ins.

Core
Recovery
(inches)

From	To	Recovery (inches)	Uses	Sample/Core Description
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Core No.	Depth (feet)	Depth (inches)	Sample Description
0	4	41	SM (0-6") Lt. brown vf sand & silt, trace granules to small pebbles, ang to sub rounded, dry, loose, roots.
			SM (6"-10") SAA; Gray
			SM (10"-21") Brown vf sand & silt, trace granules to lg pebbles, ang to sub ang, moist, dense to very dense. DEMARCATION GRID at 21" bgs
			- (21"-28") Dk brown & black fine sand, mixed w/ coal, slag, & wood pieces, dry, loose.
			SP (28"-32") very lt. gray fm sand and slag like gravel - med - lg pebbles, dry, loose.
			(32"-41") Black coal powder



Boring/Well	CB-18	Project/No.	04080012.0000	Page	1	of	1	
Site Location	Ship Canal Commons		Drilling Started	—		Drilling Completed	8-4-16	
Total Depth Drilled	4	Feet	Hole Diameter	2	inches	Type of Sample/ Coring Device	Macro Core	
Length and Diameter of Coring Device	4' + 2"			Sampling Interval		4	feet	
Land-Surface Elev.	—	feet	☐ Surveyed	☐ Estimated	Datum			—
Drilling Fluid Used	NA			Drilling Method		NA Geoprobe		
Drilling Contractor	Nothnagle		Driller	Jeff S.		Helper		—
Prepared By	Ryan Clare		Hammer Weight	NA		Hammer Drop	NA ins.	

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USE 5

Sample/Core Description

From	To	(inches)	Sampler Core Description	
0	4	48	SM	(0-5") lt. brown vf sand & silt, trace granules to sm pebbles, ang to sub ang, dry, loose.
			SM	(5"-10") SAA; gray
			ML	(10"-25") Grayish brown silt & vf sand, trace to little granules to lg pebbles, ang to sub rounded, moist, very stiff to hard. DEMARCATION
				GRID at 25" bgs
			-	(25"-48") Black grading to dk reddish brown slag & coal powder (5 fine sand size grains), dry, loose.

Field soil sample sheet.xlsx.xls
Geoprobe Log

febrile at 25" 695

[illegible]



Boring/Well	CB-20		Project/No.	04080012.0000		Page	1 of 1	
Site Location	Ship Canal Commons			Drilling Started	—		Drilling Completed	8-4-16
Total Depth Drilled	4 Feet		Hole Diameter	2 inches		Type of Sample/ Coring Device	Macro Core	
Length and Diameter of Coring Device	4' x 2"					Sampling Interval	4 feet	
Land-Surface Elev.	— feet		☐ Surveyed	☐ Estimated		Datum	—	
Drilling Fluid Used	NA					Drilling Method	NA Geoprobe	
Drilling Contractor	Nothnagle			Driller	Jeff S.		Helper	—
Prepared By	Ryan Clare			Hammer Weight	NA		Hammer Drop	NA ins.

Sample/Core Depth
(feet below land surface)

[illegible]

20" fabric



From	To	Recovery (inches)	USE	Sample/Core Description
0	4	38	SM	(0-4") Lt. brown w/ Sand + silt, trace granules to sm pebbles, ang to sub ang, dry, loose
			SM	(4"-8") SAA; Gray, little granules to sm pebbles
			SM	(8"-17") Lt. brown w/ Sand, & silt, trace to little granules to lg pebbles, ang to sub round, dry, loose.
				DEMARCATION GRIT at 17" bgs
			SW	(17"-38") Black grading to dk reddish brown fine sand, little granules to lg pebbles, ang to sub ang, mixed w/ s/s powder & coal.



Boring/Well CB-22 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery[illegible]

Core	Depth	Interval	Sample	Description
0	4	40	SM	(0-15") lt. brown vf sand & silt, trace gravel to sm pebbles, ang to sub round, dry, loose.
			SM	(15"-22") SAA; silt & vf sand, brittle.
			-	(22"-34") white/gray slag/ash mix, brnd gravel to lg pebble grain size, fine sand to lg pebble grain sizes, dry, loose.
			GM	(34"-40") Gray & black fine sand, some med to lg pebbles, sub round to round, slag/cast powder, dry, loose.

Field soil sample sheet.xlsx.xls
Geoprobe Log

* No fabric observed.



Boring/Well CB-23 Project/No. 04080012 - 0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started 8-4-16 Drilling Completed 8-4-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4 + 2" Sampling Interval 4 feet

Land-Surface Elev. - feet ☐ Surveyed ☐ Estimated Datum -

Drilling Fluid Used NA Drilling Method Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper -

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

Usc 5

Sample/Core Description

0	4	37	SM	(0-11") lt. brown w/ sand & silt, trace gravel, ang to sub ang, dry, loose.
			-	(11"-37") reddish brown dk reddish brown to black coal/slag powder (vf-f sand sized); some chunks of coal & slag throughout, Red brick at 32"-34".
				* Fill started at 11" bgs

Field soil sample sheet.xlsx.xls
Geoprobe Log

K No fabric observed

[illegible]



Boring/Well CB-25 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8/4/16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Macro Core

Length and Diameter of Coring Device 4' + 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth (feet below land surface)	Core
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[illegible]

Field soil sample sheet.xlsx.xls
Geoprobe Log

location on ore mound mid-slope



Boring/Well CB-27 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal commons Drilling Started — Drilling Completed 8/5/16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC 5

Sample/Core Description

Core No.	Depth (ft)	Depth (inches)	Sample Description
0	4	42	SM (0-5") Lt. brown @ v f sand + silt, trace granules to md. pebbles; sub ang to sub rounded dry, loose.
			ML (5"-12") Dk brown silt + v f sand, little to some sm-lg pebbles; ang to sub ang; dry, very stiff.
			ML (12"-25") SM SAA; Brown, little granules to Ls pebbles. DEMARCATION CRD at 25" bgs
			(25"-42") Dk reddish brown to brk fine sand mixed w/ coal + slag; dry, loose. Blue slag in the shoe.



Boring/Well C8-28 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship canal commons Drilling Started — Drilling Completed 8-5-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~DP~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

0585

Sample/Core Description

Station	Depth (feet)	Soil Description
0	4	40 SM (0-16") Lt. brown vf sand & silt grading to silt & vf sand, trace granules to med. pebbles, sub ang to sub rounded, dry, loose grading to very stiff. DEMARCATION GRID at 16" bgs.
		(16"-19") black crushed slag
		CL (19"-22") dk olive brown clay, trace silt, moist, Hard.
		(22"-37") dk reddish brown & black crushed slag and coal, trace wood debris, dry, loose.
		CL (37"-45") olive brown clay, little silt, moist, very stiff to hard

[illegible]

[illegible]



Boring/Well CB-32 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-5-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4 + 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~EA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)

From	To	Recovery (Inches)	USCS	Sample/Core Description
0	4	33	SM	(0-8") lt. brown vf sand & silt. trace granules to md. pebbles, sub ang to sub round, dry, loose.
			SM	(8"-13") SAA; lt. gray
			ML	(13"-14") brown silt & vf sand, little silt to md. pebbles, ang to sub ang, dry, very stiff.
				DEMARCATION GRID at 14" bgr.
			-	(14"-33") dk reddish brown crushed slag mixed w/ some coal & md. pebbles, dry, loose.

 ARCADIS
Sample/Core Log

Boring/Well CB-33 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-5-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. — feet ☐ Surveyed ☐ Estimated Datum —

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)

Core
Recovery
(inches)

USE 5

Sample/Core Description

Core	Fe	Mon	Sample	Sample Description
0	4	34	SM	(0-4") lt. brown vf sand + silt, trace granules to lg pebbles, ang to sub rounded, dry, loose, roots.
			SM	(4"-12") SNA; Gray
			ML	(12"-17") Brown silt + vf sand, little granules to med. pebbles, ang to sub ang, dry, stiff to very stiff. DEMARCATION GRID at 17" bgs.
			-	(17"-25") dk reddish brown crushed slag w/ some coal, little crushed lime stone, dry, loose
			GP	(25"-31") lt. Gray crushed lime stone.
			-	(31"-39") chunks of black + blue slag.



Site Location Ship Canal Commons Drilling Started — Drilling Completed 8-5-16

Length and Diameter of Coring Device 4' + 2" Sampling Interval 4 feet

Drilling Fluid Used	NA	Drilling Method	Geoprobe
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Prepared By	Ryan Clare	Hammer Weight	NA	Hammer Drop	NA	ins.
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Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC 5

Sample/Core Description

Core Number	Core Depth (ft)	Core Interval (ft)	Core Description
0	4	47	SM (0-6") lt. brown vf sand + silt, trace granules + med. pebbles, ang to sub ang, dry, loose, roots.
			SM (6"-9") SAA; Gray
			ML (9"-12") Grayish brown silt + vf sand, trace granules to lg pebbles, ang to sub ang, dry, very stiff.
			SW (12"-20") reddish brown f-c sand, little granules to lg pebbles, ang to sub ang, trace silt, dry, loose. DEMARCATION GRID at 20" bgs.
			- (20"-33") Black + gray crushed slag + coal, trace sm-med pebbles, dry, loose.
			- (33"-47") dk reddish brown sand/coal product w/ some wood organics, dry, loose.



Page 1 of 1

8-5 16

Macro core

Sampling Interval 4 feet

Datum

 Geoprobe

Helper

NA ins.

U5c5

From	To	Recovery (inches)	USCS	Sample/Core Description
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Core Number	Depth (ft)	Soil Type	Soil Description
0	4	34	SM (0-5") Lt. brown v.f. Sand + silt, trace granules to med. pebbles, ang. to sub ang., dry, loose.
			(5"-18") Greyish brown grading to brown v.f. f
		SM	Sand + silt, little med. sand, little granules to lg pebbles, ang. to sub ang., dry, loose.
			DEMARCATION GRID at 18" bgs
		-	(18"-34") Dk reddish brown crushed slag + some coal, dry, loose.



From	To	Recovery (inches)	USCS	Sample/Core Description
0	3.5	37	SM	(0-7") lt. brown vf Sand + silt, trace granules to sm pebbles, ang to sub ang, dry, loose, roots,
			SM	(7"-12") SSA; Gray, 1" dia. calcareous limestone at 12".
			ML	(12"-25") Brown silt + vf Sand, trace granules to md. pebbles, ang to sub rounded, dry, md, stiff. DEMARCATION GRID at 25" bgs
			—	(25"-26") dk red s/sy sand/sst. dry & loose.
			CL	(26"-34") olive gray clay w/ rust mottling, trace silt, brittle, dry to moist, very stiff.
			—	(34"-37") Reddish Gray s/sy/sst powder. trace fractured rock.

[illegible]



Boring/Well CB-39 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Commons Drilling Started Drilling Completed 8-5-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Meso Core

Length and Diameter of Coring Device 4' 2 2" Sampling Interval 4 feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used NA Drilling Method ~~NA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)Core
Recovery
(inches)

USC5

Sample/Core Description

Core No.	Depth (meters)	Sample Core Description
0	4	46
SM	(0-10")	lt. brown vf sand & silt trace granules to md. pebbles, ang to sub ang, dry, loose, roots.
SM	(10"-12")	SAA; Gray
SW	(12"-27")	Reddish brown v f-f sand, little granules to lg pebbles, ang to sub ang, little silt, dry to moist, dense. 1" dia blue slag piece at 21" bgs
DEMARCATION GRID at 27" bgs		
-	(27"-28")	Red crushed slag/sand
-	(28"-33")	White/gray fine sand & granules, sub ang, dry, loose.
-	(33"-46")	Reddish brown crushed slag/sand material, same dry, loose.



From	To	Unit	Sample/Core Description
0	4	39	SM (0-2") lt. brown v. sand & silt trace
			gravel to med pebbles, angular, dry, loose, loose
		SM	(5"-10") SAA; Gray 1.5" dia. stone at 5"-10".
		SM	(10"-12") SAA; Brown
		ML	(12"-20") dk olive gray silt; some very fine
			sand, trace to light gravel to lg pebble, ang.
			to subangular, moist, med. dense to dense.
			DEMARCATION GRID at 20" bgs.
			(20"-39") SM dk brown silt/cl, crushed
			& powdered, mixed with fractured limestone
			& other sm to lg pebbles, dry, loose

 ARCADIS
Sample/Core Log

Boring/Well CB-44 Project/No. 04080012.0000 Page 1 of 1

Site Location Ship Canal Command Drilling Started — Drilling Completed 8-5-16

Total Depth Drilled 4 Feet Hole Diameter 2 inches Type of Sample/
Coring Device Macro Core

Length and Diameter of Coring Device 4' x 2" Sampling Interval 4 feet

Land-Surface Elev. ✓ feet ☐ Surveyed ☐ Estimated Datum ✓

Drilling Fluid Used NA Drilling Method ~~SA~~ Geoprobe

Drilling Contractor Nothnagle Driller Jeff S. Helper —

Prepared By Ryan Clare Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth
(feet below land surface)

From	To	Recovery (inches)	Sample/Core Description
0	4	40	USCS
			SM (0-7) lt. brown vf sand + silt, trace granules to ls pebbles, ang, dry, loose, trace roots.
			SM (7"-10") SAA; gray
			(10"-14") SAA; little granules to ls pebbles, angular
			ML (14"-26") very dk brown silt, little vf sand, trace granules to small pebbles, trace sub ang to sub rounded, trace clay, moist, hard.
			DEMARCATION GRID at 26" bgs
			- (26"-31") Grayish brown like sand mixed w/ chunks of coal 1/2" to 1" dia., dry, loose.
			- (31"-40") Mixed granular white powdery material. dry, loose.

APPENDIX C

Soil Boring Photographs





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610DT-

Cap Verification
Union Ship Canal
2016-8-4
CB-1

610DT-

Cap Verification
Union Ship Canal
2016-8-4
CB-2

Cap Verification
Union Ship Canal
2016-8-4
CB-3

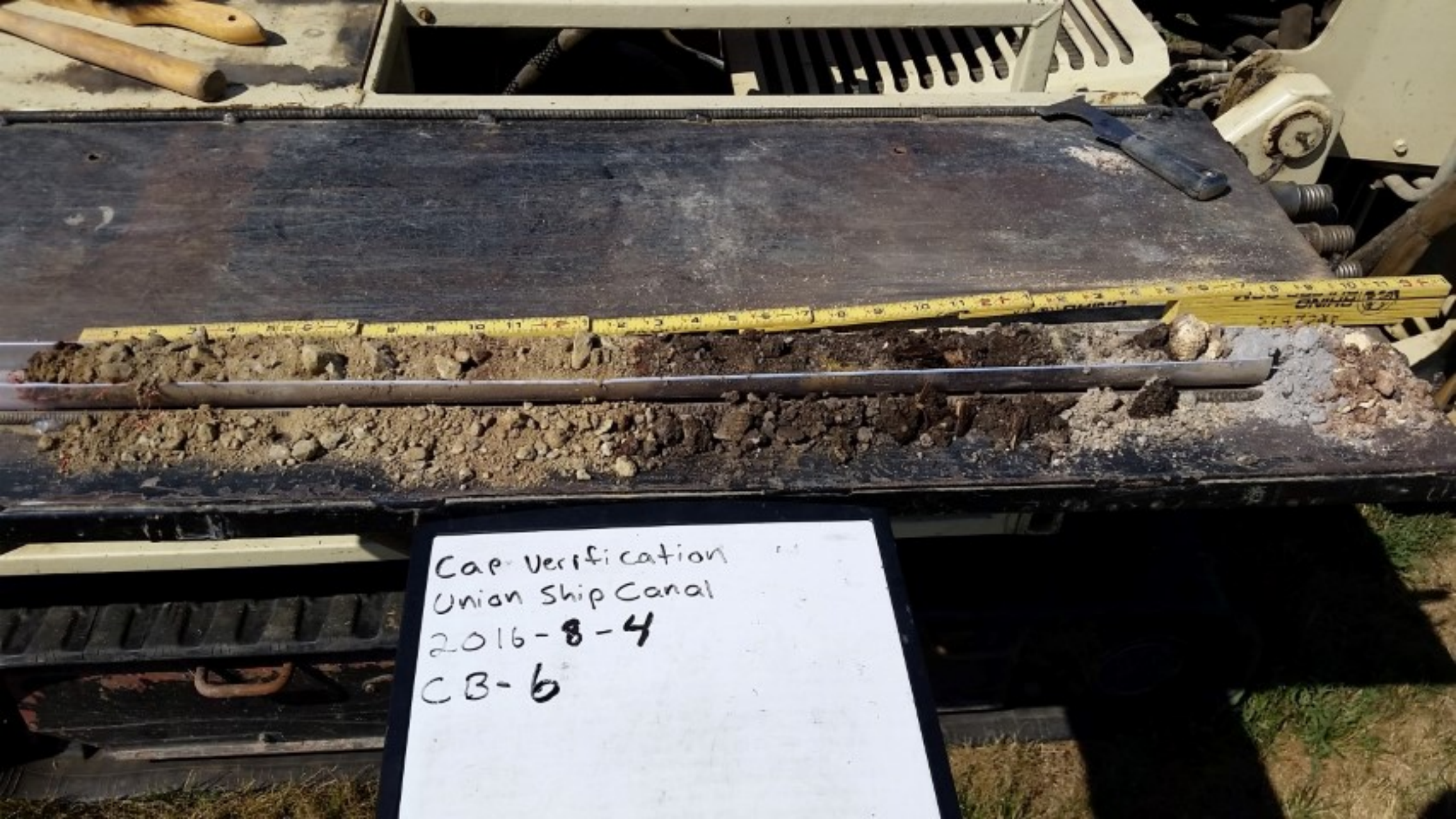
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2016-8-4
CB-4



Cap Verification
Union Ship Canal
2016-8-4
CB-5

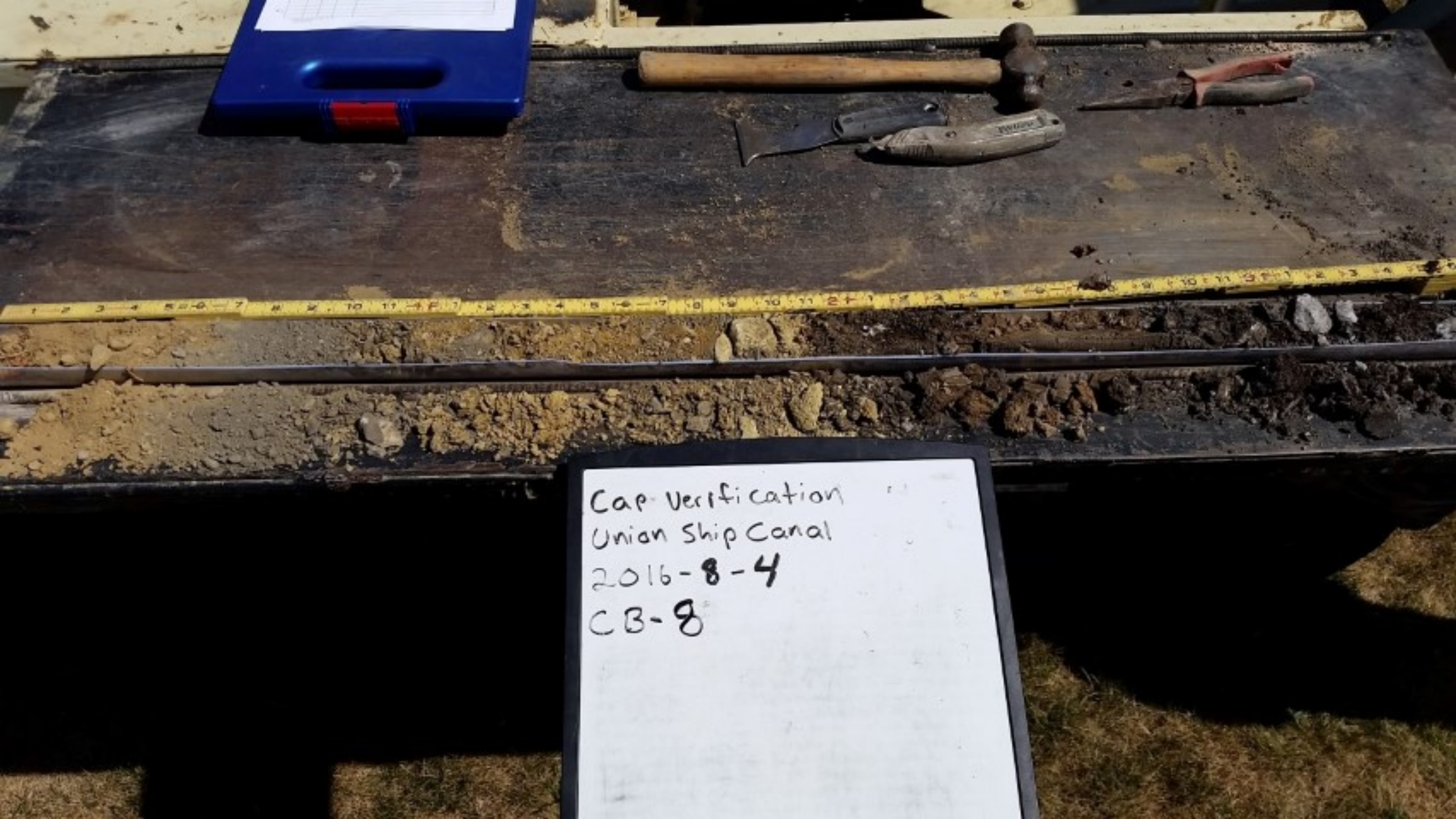
A photograph showing a soil sample in a metal tray. A yellow ruler is placed above the sample for scale. The soil is dark brown and appears to be a mix of fine particles and small stones. A label is attached to the front of the tray, providing context for the sample.

Cap Verification
Union Ship Canal
2016-8-4
CB-6

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CB-9

Cap Verification
Union Ship Canal
2016-8-4
CB-10

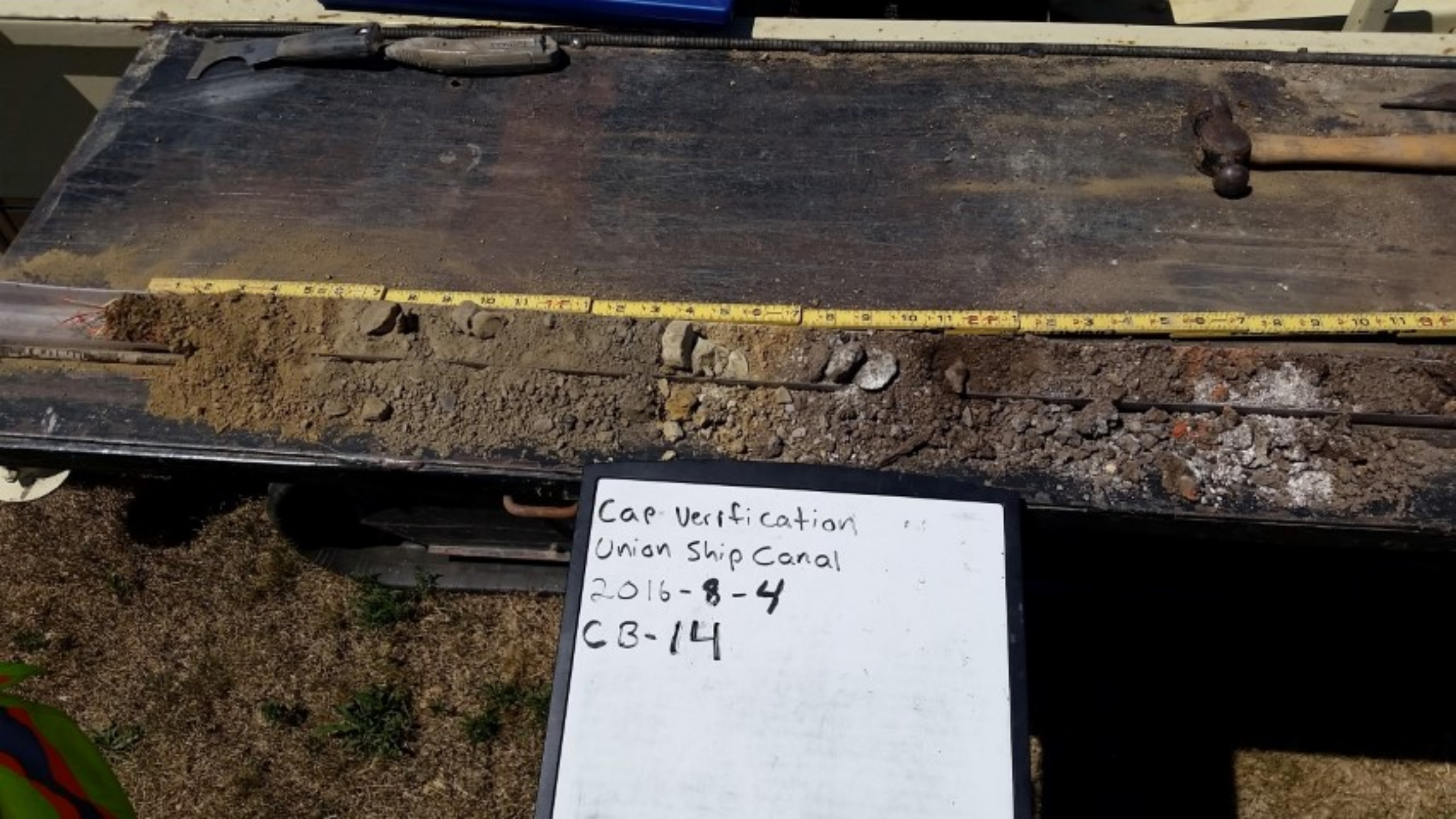
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Union Ship Canal
2016-8-4
CB-11



Cap Verification
Union Ship Canal
2016-8-4
CB-12



Cap Verification
Union Ship Canal
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Cap Verification
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2016-8-4
CB-14



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Union Ship Canal
2016-8-4
CB-15



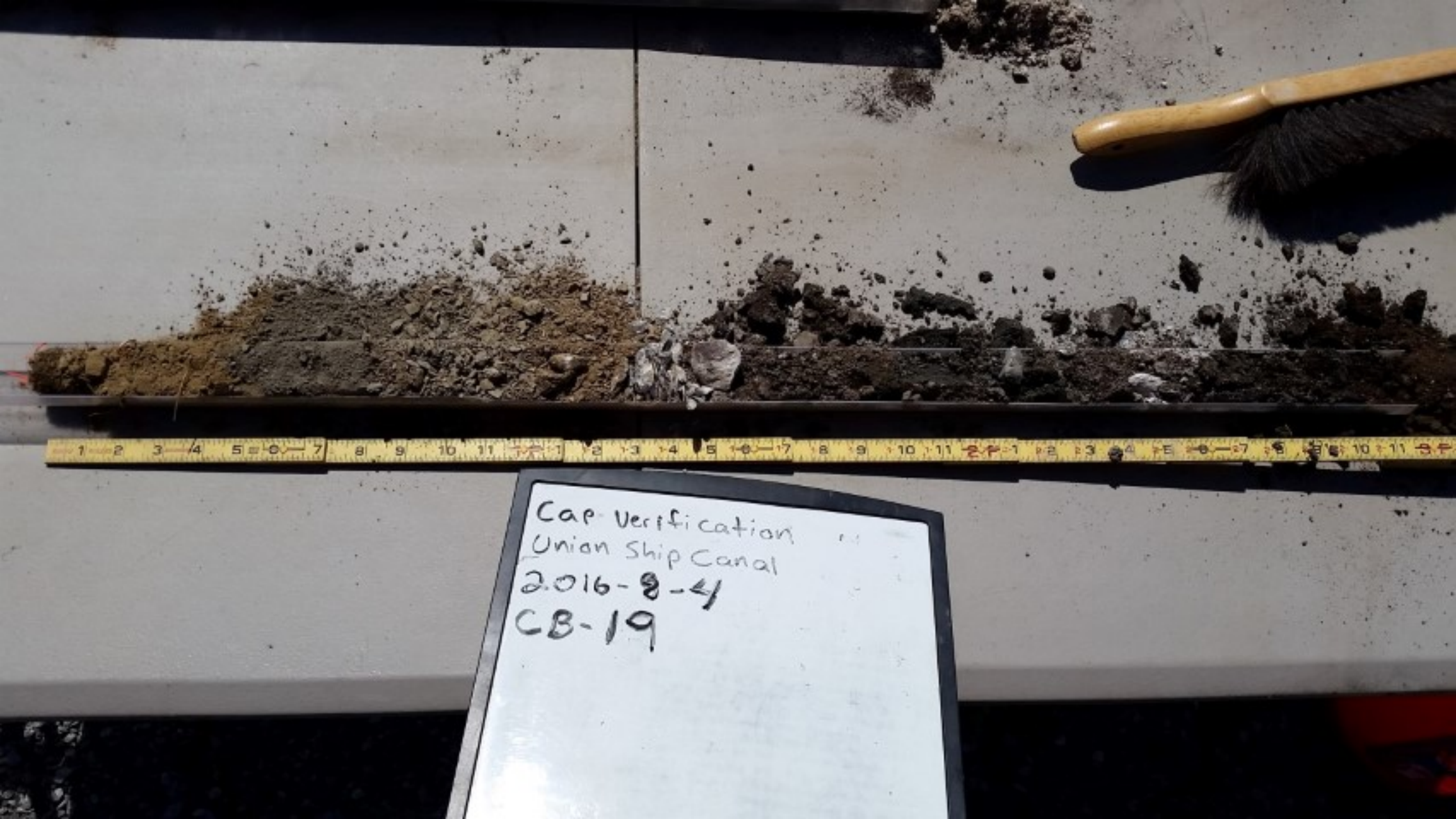
Cap Verification
Union Ship Canal
2016-8-4
CB-18



Cap Verification
Union Ship Canal
2016-8-4
CB-17



Cap Verification
Union Ship Canal
2016-8-4
CB-18

A photograph showing a soil sample in a metal tray. A yellow ruler is placed horizontally below the tray, indicating the sample's length is approximately 19 inches. A wooden-handled brush with dark bristles is positioned in the upper right corner. A white label with handwritten text is in the foreground.

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Union Ship Canal
2016-8-4
CB-19



Cap Verification
Union Ship Canal
2016-8-4
CB-20



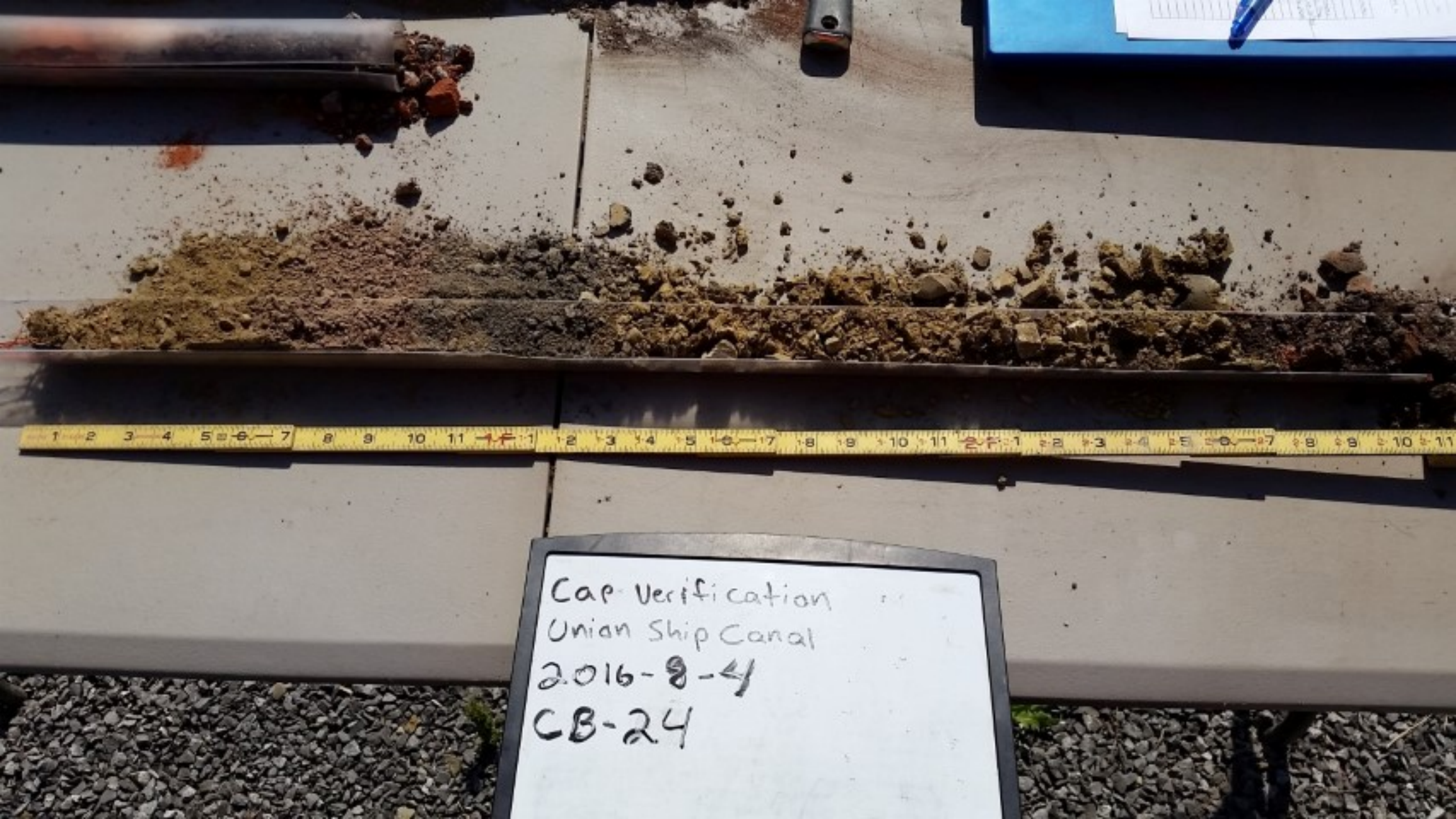
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CB-21



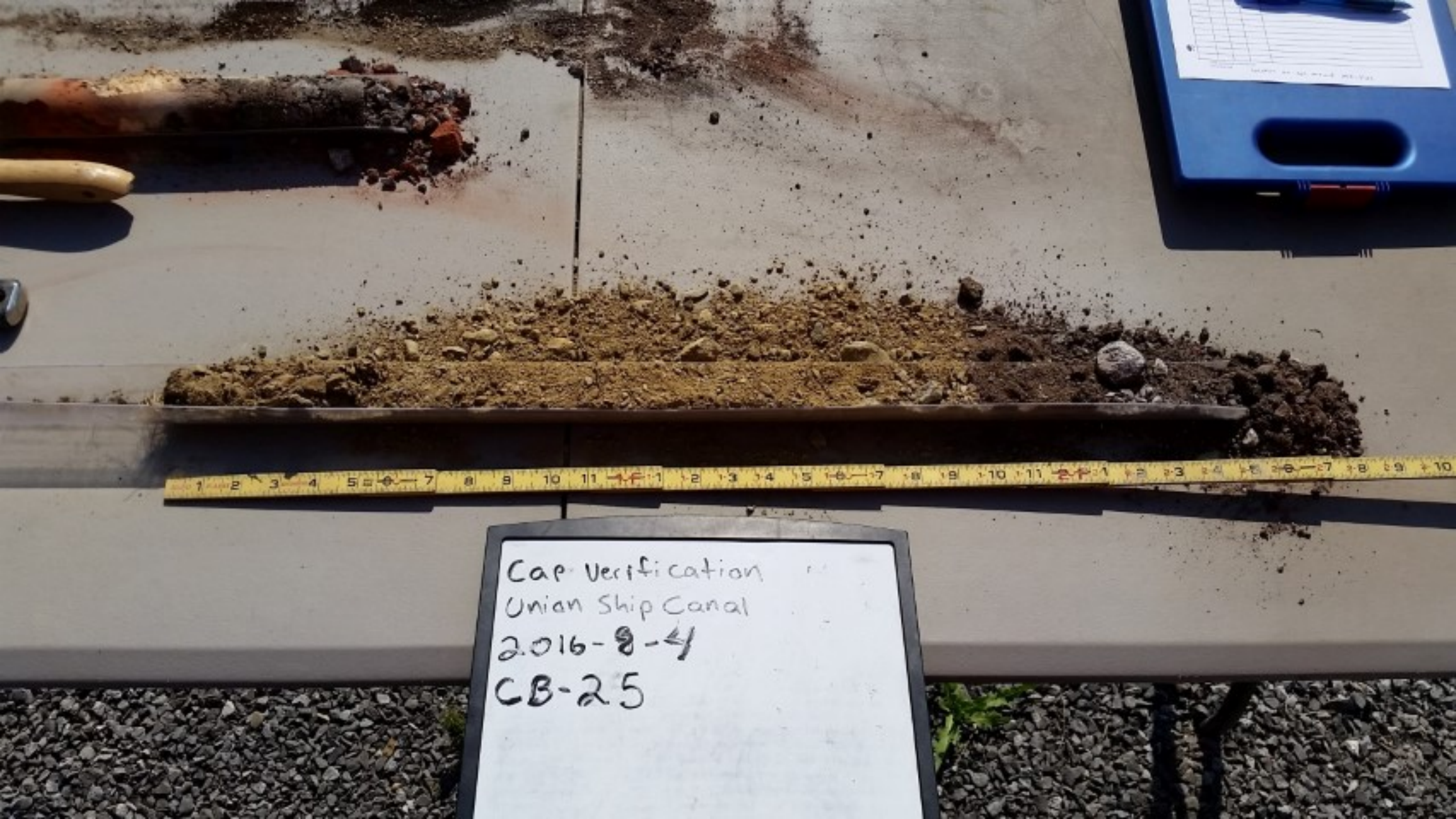
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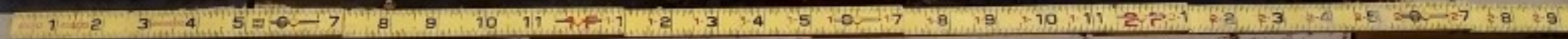
Cap Verification
Union Ship Canal
2016-8-4
CB-23

A photograph showing a soil sample in a metal tray. A yellow ruler is placed horizontally below the tray, indicating the sample's length is approximately 11 inches. The soil is a mix of fine brown powder and larger clumps of reddish-brown material. In the background, a blue clipboard with a pen and some papers is visible. A white label with black text is in the foreground.

Cap Verification
Union Ship Canal
2016-8-4
CB-24

A photograph showing a soil sample in a metal tray. A yellow ruler is placed below the tray for scale. The soil is dark brown and contains small rocks. A blue clipboard with a white sheet of paper is visible in the top right corner. A label with handwritten text is in the foreground.

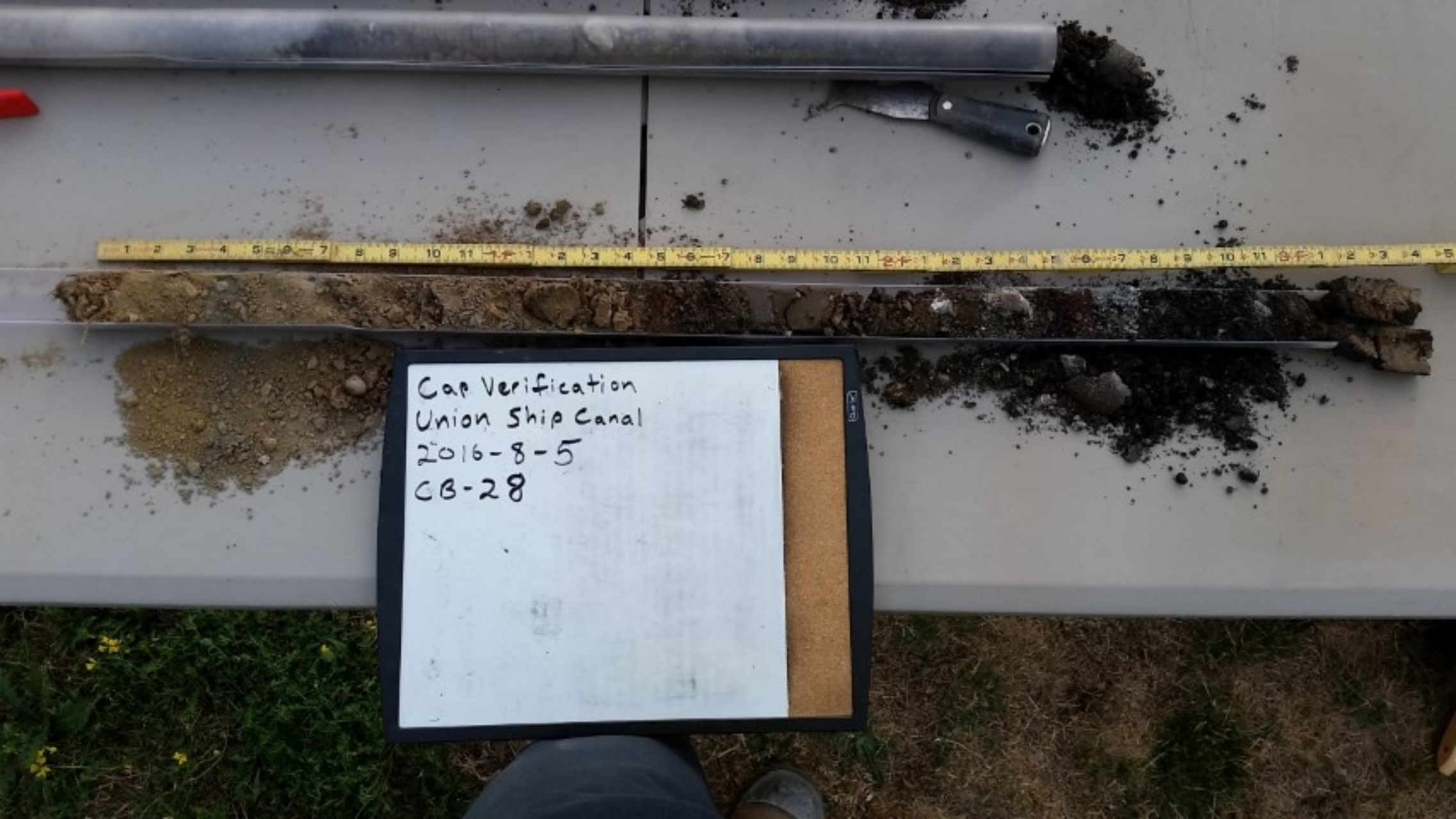
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2016-8-4
CB-25



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Union Ship Canal
2016-8-4
CB-26



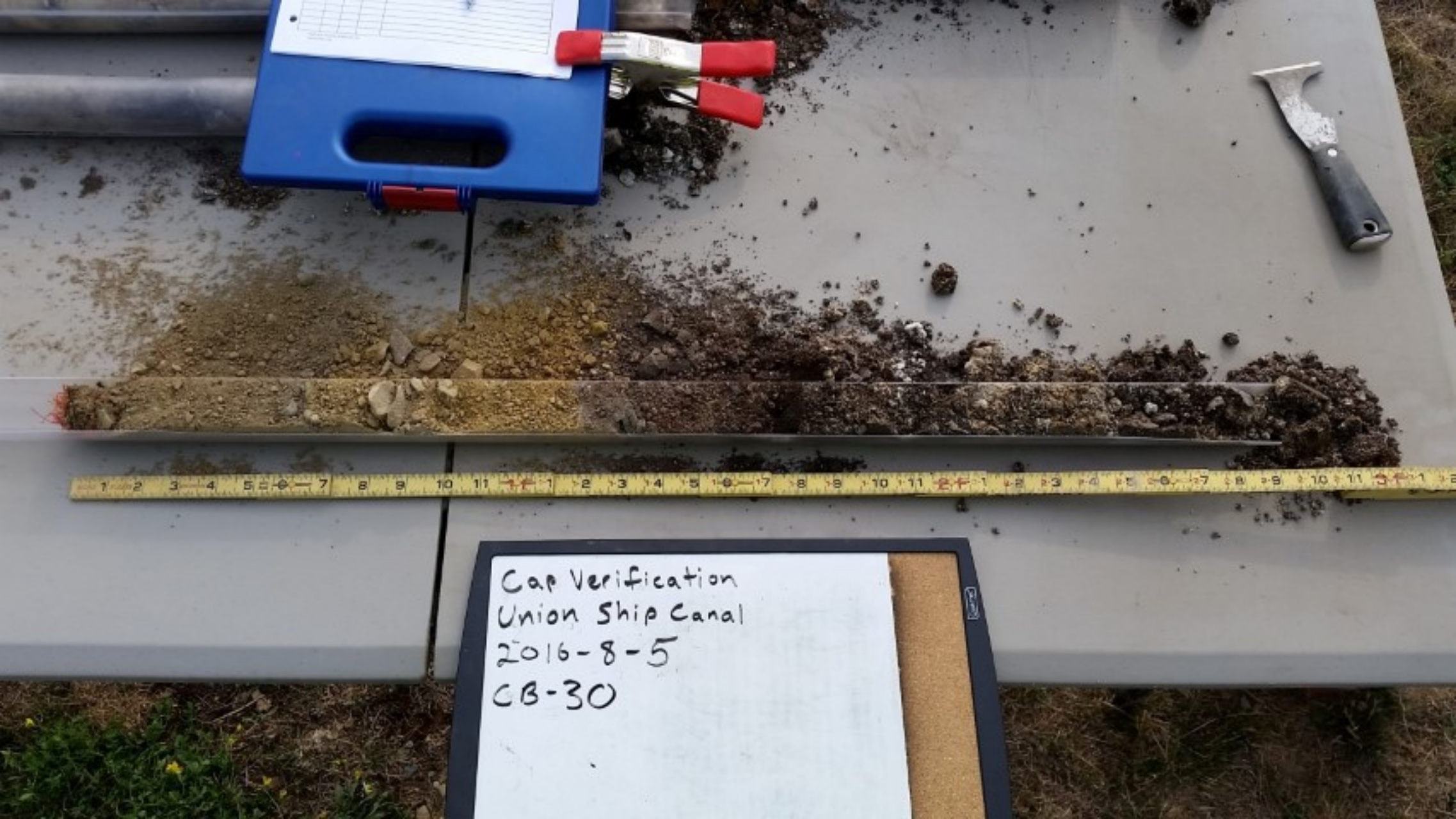
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CB-27



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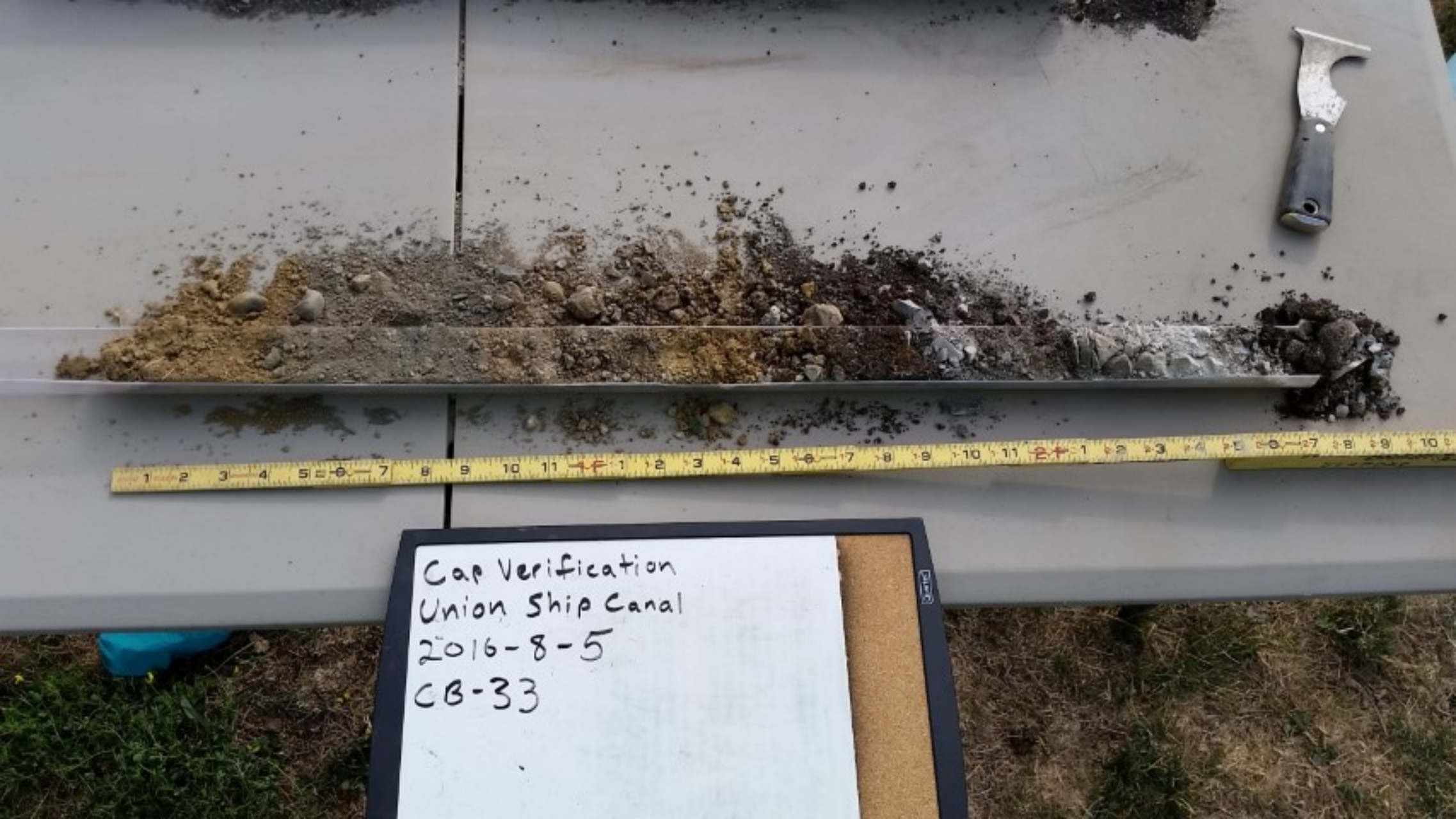
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Union Ship Canal
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CB-31.



Cap Verification
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CB-32



Cap Verification
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2016-8-5
CB-33



Cap Verification
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CB-34/



Cap Verification
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CB-35



Cap Verification
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CB-36



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2016-8-5
CB-37



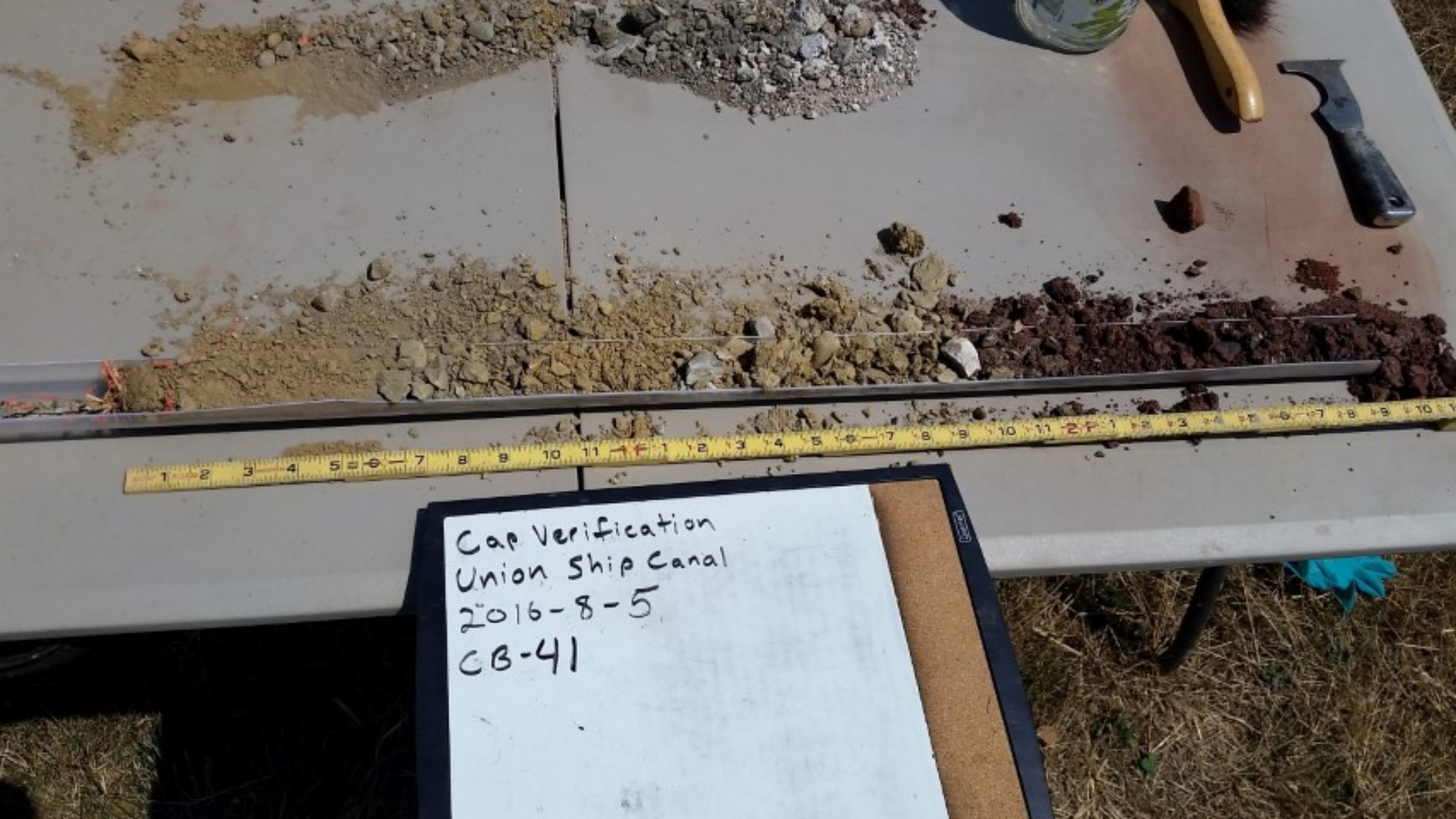
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2016-8-5
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Cap Verification
Union Ship Canal
2016-8-5
CB-39



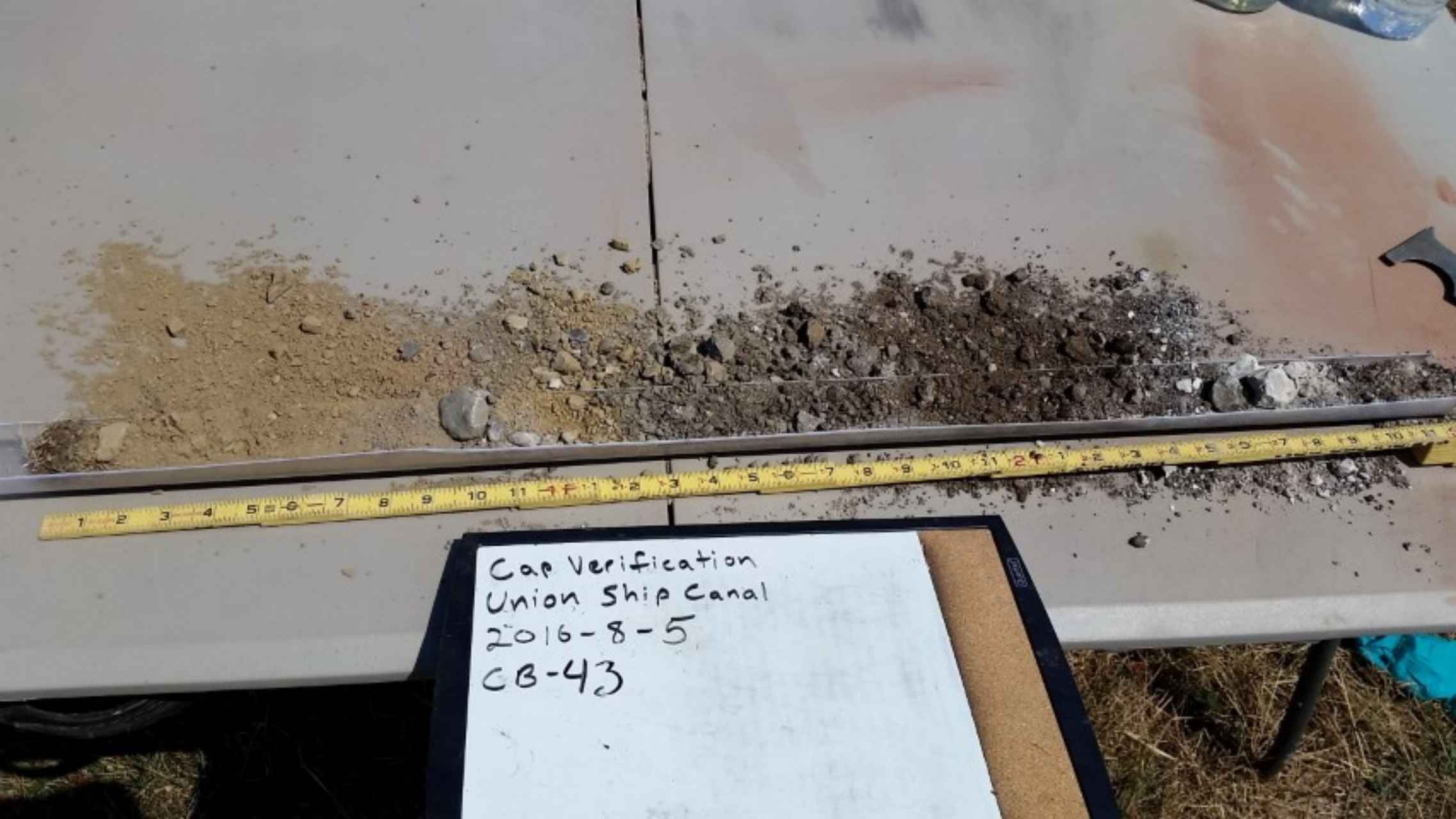
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2016-8-5
CB-40



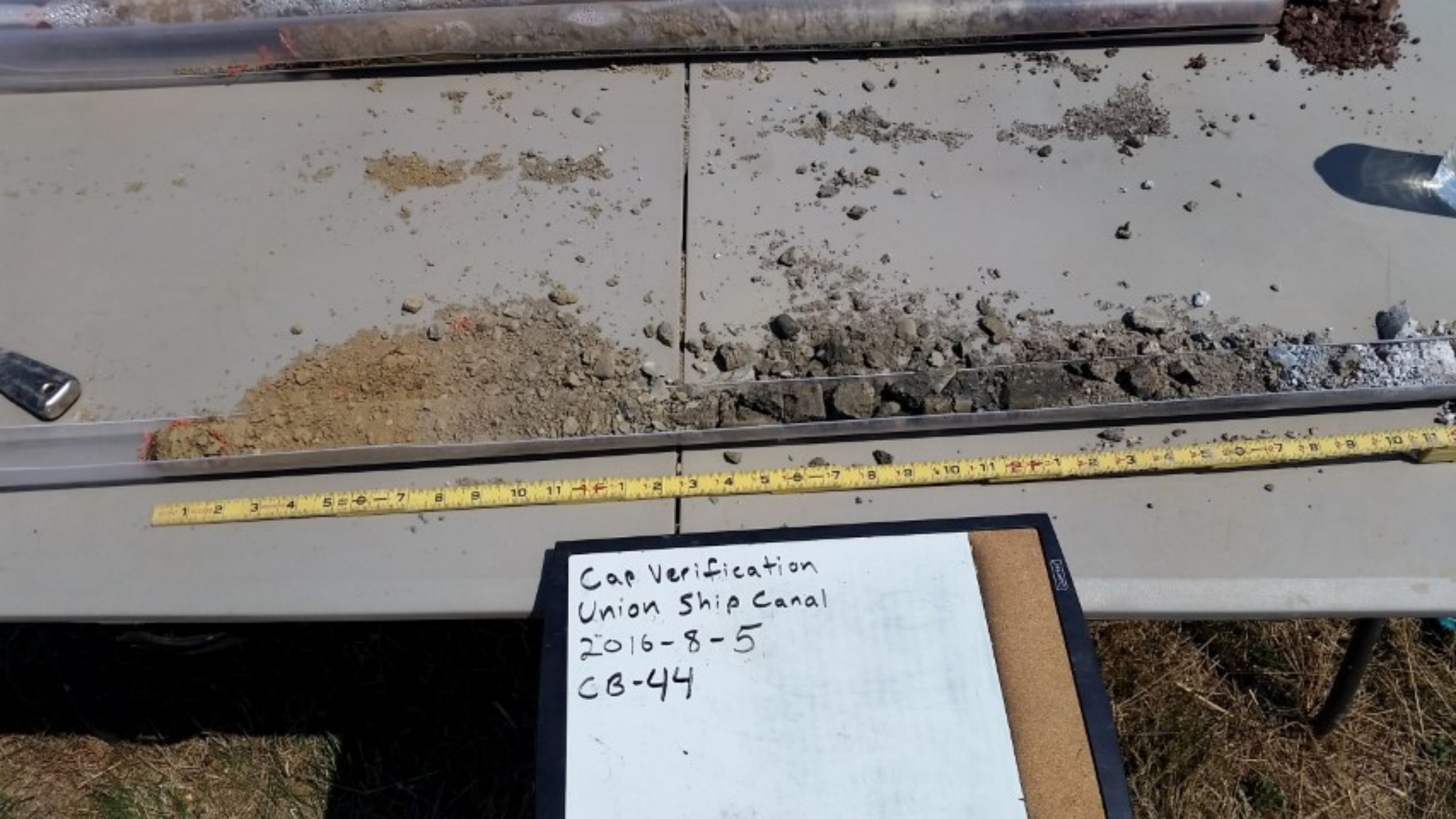
Cap Verification
Union Ship Canal
2016-8-5
CB-41

A photograph showing a soil sample spread out on a white table. A yellow ruler is placed horizontally below the soil. The soil is dark and granular, with some lighter-colored sand on the left. A label with handwritten text is in the bottom left corner. A blue glove is visible on the right side of the table.

Cap Verification
Union Ship Canal
2016-8-5
CB-42

A photograph showing a sediment sample spread along a metal ruler on a light-colored table. The sediment is dark and granular, with some larger rocks. A yellow measuring tape is placed below the ruler. In the foreground, a white card with handwritten text is visible.

Cap Verification
Union Ship Canal
2016-8-5
CB-43

A photograph showing a cross-section of a canal bed. A yellow folding ruler is placed horizontally across the middle of the frame, with markings from 1 to 11 inches visible. Above the ruler, the canal bed is composed of light-colored sand and silt, with some darker, clumpy material on the right. A vertical line, possibly a seam or a measurement point, is visible in the center of the bed. Below the ruler, a black clipboard holds a white piece of paper with handwritten text. The background shows a grassy area and a metal structure, possibly part of a bridge or a gate.

Cap Verification
Union Ship Canal
2016-8-5
CB-44

APPENDIX D

Soil Boring Location Photographs





Cap Verification
Union Ship Canal
2016-8-4
CB-2



Cap Verification
Union Ship Canal
2016-8-4
CB-3



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Cap Verification
Union Ship Canal
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CB-7



Cap Verification
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Union Ship Canal
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CB-9



Cap Verification
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CB-9

Cap Verification
Union Ship Canal
2016-8-4
CB-10





Cap Verification
Union Ship Canal
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CB-11



Cap Verification
Union Ship Canal
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CB-12







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CB-13



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Cap Verification
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CB-14



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2016-8-4
CB-15



Cap Verification
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CB-15



Cap Verification
Union Ship Canal
2016-8-4
CB-16



Cap Verification
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CB-17

Cap Verification
Union Ship Canal
2016-8-4
CB-18

Cap Verification
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2016-8-4
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CB-19



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CB-20



CB-21



CB-22



CB-22



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Nature



Be Safe, W

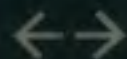
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CB-24



CB-24



CB-25



CB-25



CB-26



CB-26



CB-26



CB-27



CB-27



CB-27



CB-28



CB-29



CB-29



CB-30



CB-31



CB-32



CB-32



CB-33



CB-33



CB-33



CB-34



CB-34



CB-35



CB-36 (near lake)



CB-36 (near lake)



CB-37



CB-37



CB-38



CB-38



CB-38



CB-38



CB-39



CB-40



CB-40



CB-40



CB-40



CB-41



CB-41



CB-42



CB-42

CB-42



CB-42



CB-42



CB-42



100

Shawnee Road
Burlington
and green fields

100

CB-43



CB-43



CB-44



CB-44



CB-44



CB-44



CB-44



CB-44

CAUTION
See back panel for caution before use

HOLEPLUG

3/4
**COARSE GRADE
WYOMING SODIUM BENTONITE**

**SIZED & GRADED
NATURAL SODIUM BENTONITE**

DESIGNED FOR:
• FILLING & ABANDONMENT OF HOLES
• STOP PERMEABLE FAMILAR SEAL
• STOPPING SEISMIC SHOT HOLES
• EFFECTIVE SEAL OF DRILL HOLES
• WALLS OF NATURAL BENTONITE



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