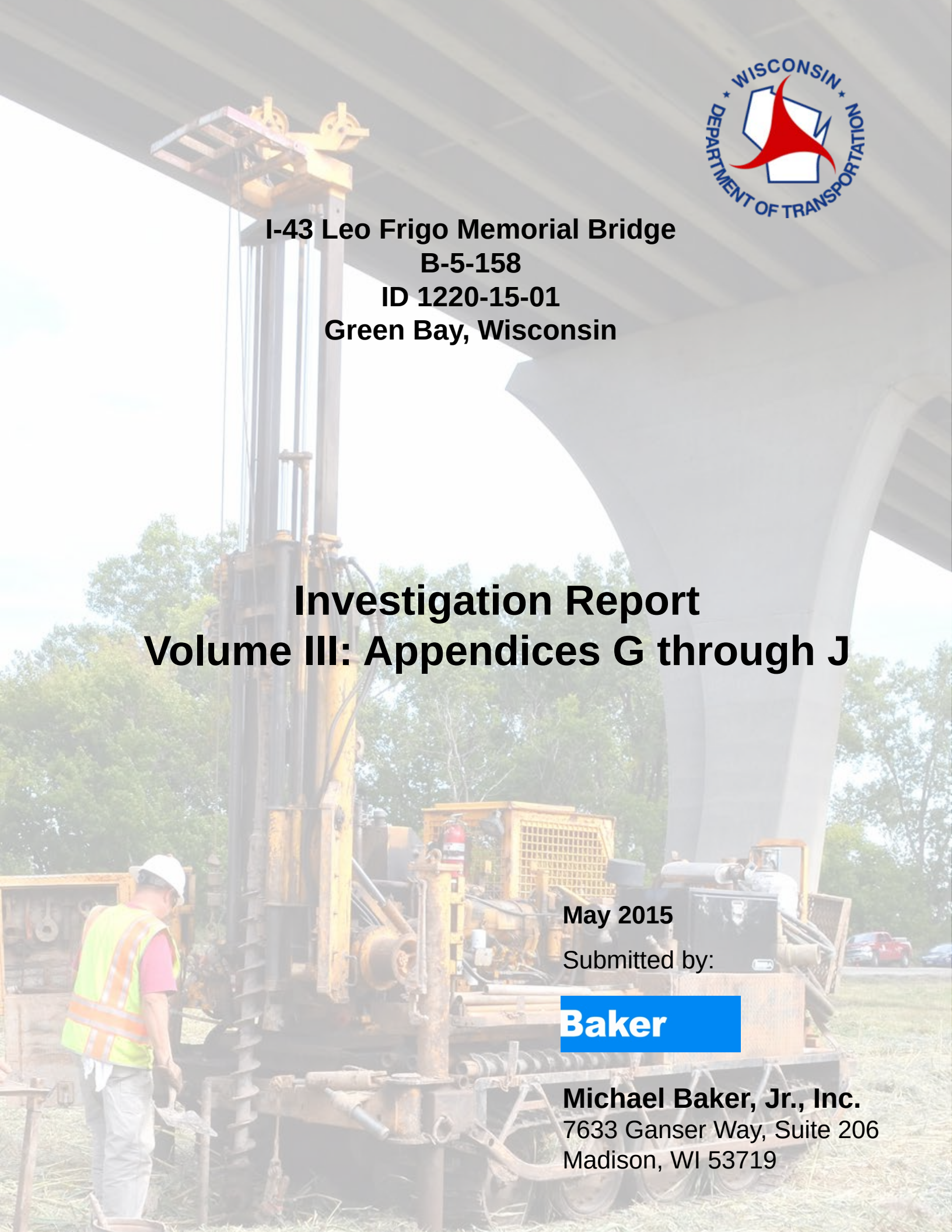


I-43 Leo Frigo Memorial Bridge
B-5-158
ID 1220-15-01
Green Bay, Wisconsin

Investigation Report
Volume III: Appendices G through J

May 2015

Submitted by:

Michael Baker, Jr., Inc.
7633 Ganser Way, Suite 206
Madison, WI 53719

Appendices

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Appendix G
Test Pit Logs

Appendix G – Test Pit Logs

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KEY TO SYMBOLS

PROJECT NAME Leo Frigo Memorial Bridge
CONSULTANT OMNNI Associates
PROJECT No
CONSULTANT PROJECT No T1463A13

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


ASH: Fly Ash, Coal Ash, Foundry Sand


CL: USCS Low Plasticity Clay


CONCRETE: Concrete


FILL: Fill (made ground)


GP: USCS Poorly-graded Gravel


GP-GM: USCS Poorly-graded Gravel with Silt


ML: USCS Silt


OL: USCS Low Plasticity Organic silt or clay


SM: USCS Silty Sand


SP: USCS Poorly-graded Sand

SAMPLER SYMBOLS


Grab Sample

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

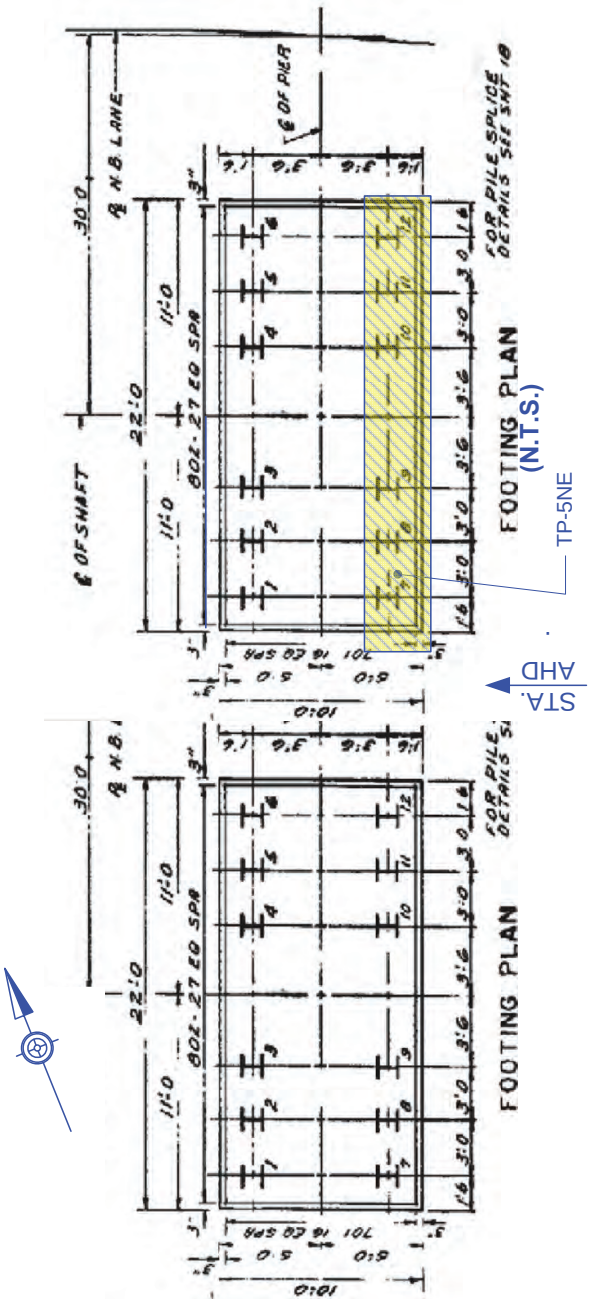
LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
Water Level at Time Drilling, or as Shown
Water Level at End of Drilling, or as Shown
Water Level After 24 Hours, or as Shown

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Pier 05
Test Pit TP-5NE

TEST PIT 5NE at PIER 5



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP05NE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/13/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/13/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**578.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1 2 3 4 5 6 7 8 9 10 11 12		(FIELD: Lean Clay with a little fine Sand, reddish brown, mottled, damp to moist) 12.0 566.9	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic power excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.

End of Boring at 12.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation **3502 Kinsman Blvd.** **Madison, WI 53704**	WISDOT PROJECT ID:		**BORING ID:TP05NE-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/13/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/13/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **578.9 ft**

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Elevation
0	(FIELD: Lean Clay with a little fine Sand, reddish brown, mottled, damp to moist)	CL	
3.0			575.9
3	Pier 5 Foundation		
7.5			571.4
8	(FIELD: Gravel, limestone)	GP-GM	
8.5			570.4
9	(FIELD: Lean Clay with a little fine Sand, reddish brown, mottled, damp to moist)	CL	
12.0			566.9
12	End of Boring at 12.0 ft.		

SAMPLE TYPE NUMBER | RECOVERY (in) (RQD) | Moisture | BLOW COUNTS (N VALUE) | Graphic | Strength Qp (tsf) | Liquid Limit (%) | Plasticity Index (%) | Boulders | Drilling Method

Notes

Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.

Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data.

Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc.

Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

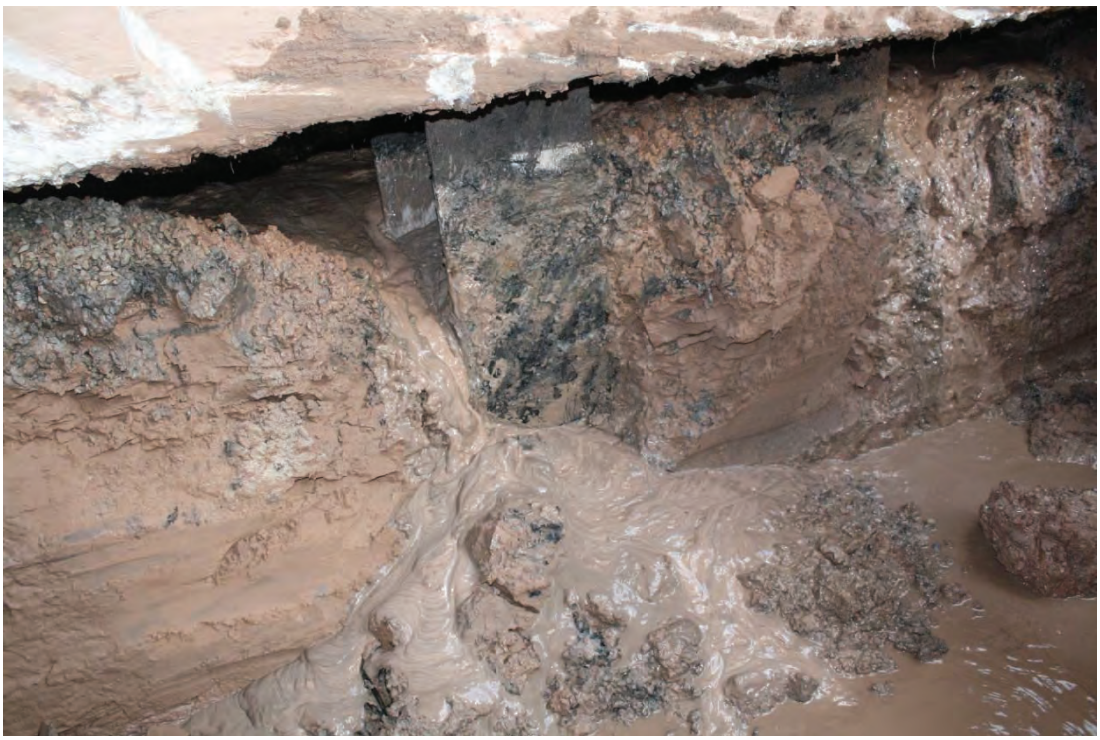
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Test Pit 5NE Photograph 1 – Footing Looking North



Test Pit 5NE Photograph 2 – Footing Looking West



Test Pit 5NE Photograph 3 – Footing and Pier Looking West



Test Pit 5NE Photograph 4 – Pier Looking West

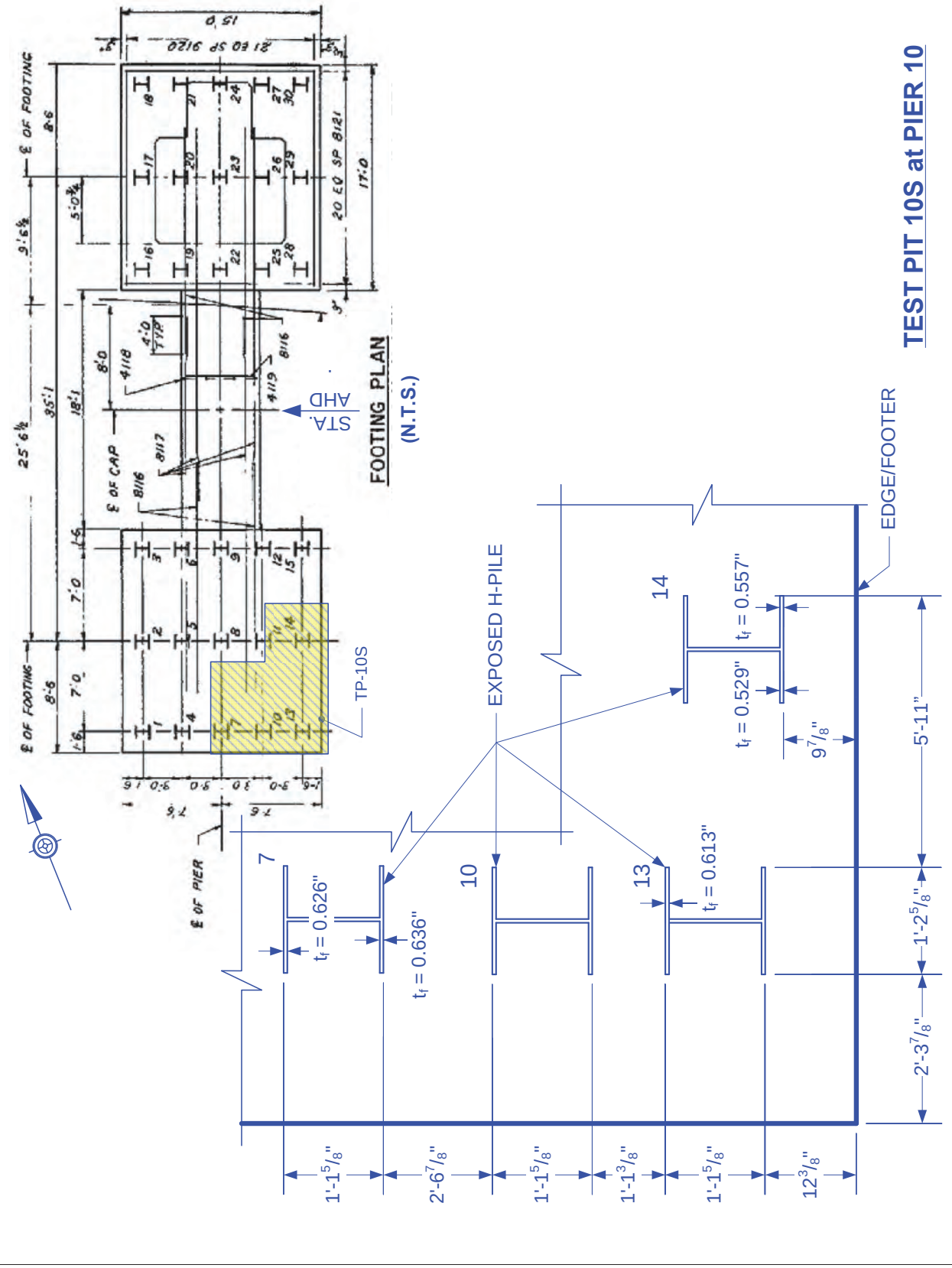


Test Pit 5NE Photograph 5 – Pier Looking West



Test Pit 5NE Photograph 6 – Excavation Looking Southeast

Pier 10
Test Pit TP-10S


TEST PIT 10S at PIER 10
FOOTING PLAN
(N.T.S.)
STA. AHD
℄ OF FOOTING
℄ OF CAP
℄ OF PIER
TP-10S
EXPOSED H-PILE
EDGE/FOOTER
7
10
13
14
t_f = 0.626"
t_f = 0.636"
t_f = 0.613"
t_f = 0.529"
t_f = 0.557"
$9^{7}/_{8}$"
5'-11"
$1'-2^{5}/_{8}$"
$2'-3^{7}/_{8}$"
$1'-1^{5}/_{8}$"
$2'-6^{7}/_{8}$"
$1'-1^{5}/_{8}$"
$1'-1^{3}/_{8}$"
$1'-1^{5}/_{8}$"
$12^{3}/_{8}$"

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP10S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		18		1–12		LEAN CLAY, reddish brown, moist, with sand (FIELD: FILL - Lean Clay w/Sand, Concrete, Stone, Organics, reddish brown, moist)	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				12.3		569.1							
GS 2		19		13		LEAN CLAY, reddish brown, moist - wet (FIELD: Silt, brown, moist to wet)	CL						
				13.7		567.7							

End of Boring at 13.7 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP10S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		LEAN CLAY, reddish brown, moist, with sand (FIELD: FILL - Lean Clay w/Sand, Concrete, Stone, Organics, reddish brown, moist)	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		18		6		6.7 574.7							
				7		Pier 10 Foundation							
				10		11.2 570.2							
				12		POORLY GRADED GRAVEL, gray, moist (FIELD: 1.5" Crushed Clear Stone)	GP						
GS 2		19		13		12.3 569.1 LEAN CLAY, reddish brown, moist - wet (FIELD: Silt, brown, moist to wet)	CL						
						13.7 567.7							

End of Boring at 13.7 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 10S Photograph 1 – Water Seeping Out from Granular Base Below Footer Looking West



Test Pit 10S Photograph 2 – Exposed Footer Looking North



3

Test Pit 10S Photograph 3 – Test Pit Excavation Looking East



Test Pit 10S Photograph 4 – Test Pit Excavation Looking East



Test Pit 10S Photograph 5 – Exposed Footer Looking North



Test Pit 10S Photograph 6 – Test Pit Excavation Looking South



Test Pit 10S Photograph 7 – Pile #13 Looking West



Test Pit 10S Photograph 8 – Pile #14 Looking West



Test Pit 10S Photograph 9 – Exposed Footer Looking Southwest

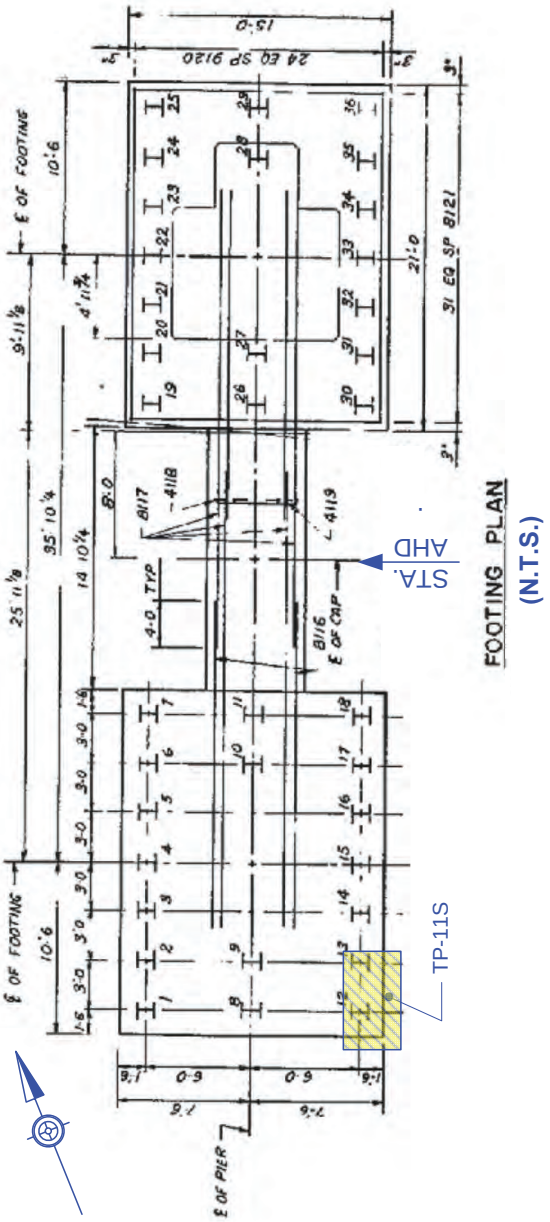


Test Pit 10S Photograph 10 – Pile #13 Looking North



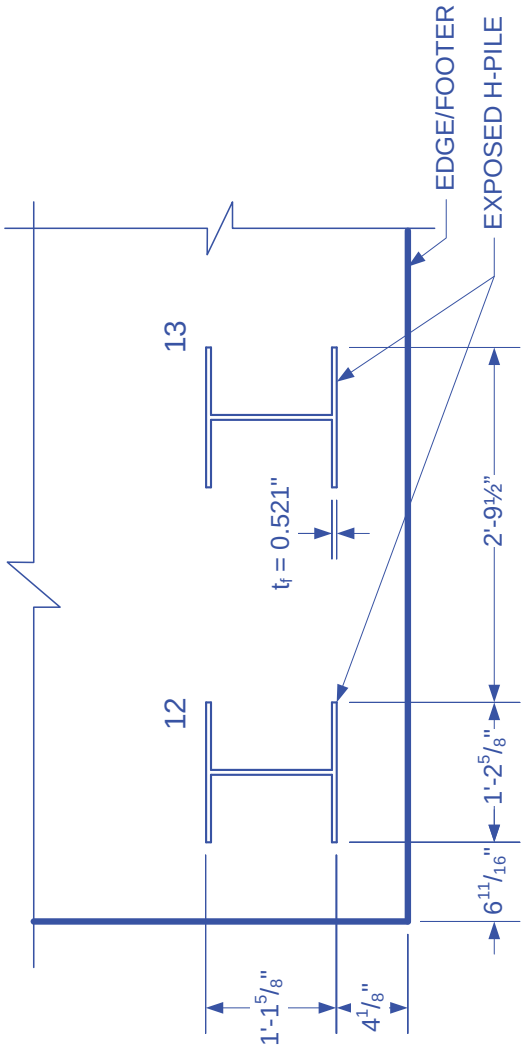
Test Pit 10S Photograph 11 – Pile #10 Looking North

Pier 11
Test Pit TP-11S



FOOTING PLAN
(N.T.S.)

TEST PIT 11S at PIER 11



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP11S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown)	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		20		2									
				3									
				4									
				5									
				6									
				7									
				8									
				9		9.4 / 571.8							
GS 2		22		10		SILT, dark brown, moist - wet (FIELD: Silt w/Clay, dark reddish brown)	ML						
				11									
				12									
				13		13.5 / 567.7							

End of Boring at 13.5 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP11S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		20		1–13		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown)	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
						6.6 / 574.6							
						Pier 11 Foundation							
						12.1 / 569.1							
						POORLY GRADED GRAVEL, gray, moist (FIELD: 3" Breaker)	GP						
						12.8 / 568.4							
						SILT, dark brown, moist - wet (FIELD: Silt w/Clay, dark reddish brown)	ML						
						13.5 / 567.7							

End of Boring at 13.5 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 11S Photograph 1 – Test Pit Excavation Looking West



Test Pit 11S Photograph 2 – Test Pit Excavation Looking Northwest



Test Pit 11S Photograph 3 – Test Pit Excavation Looking South



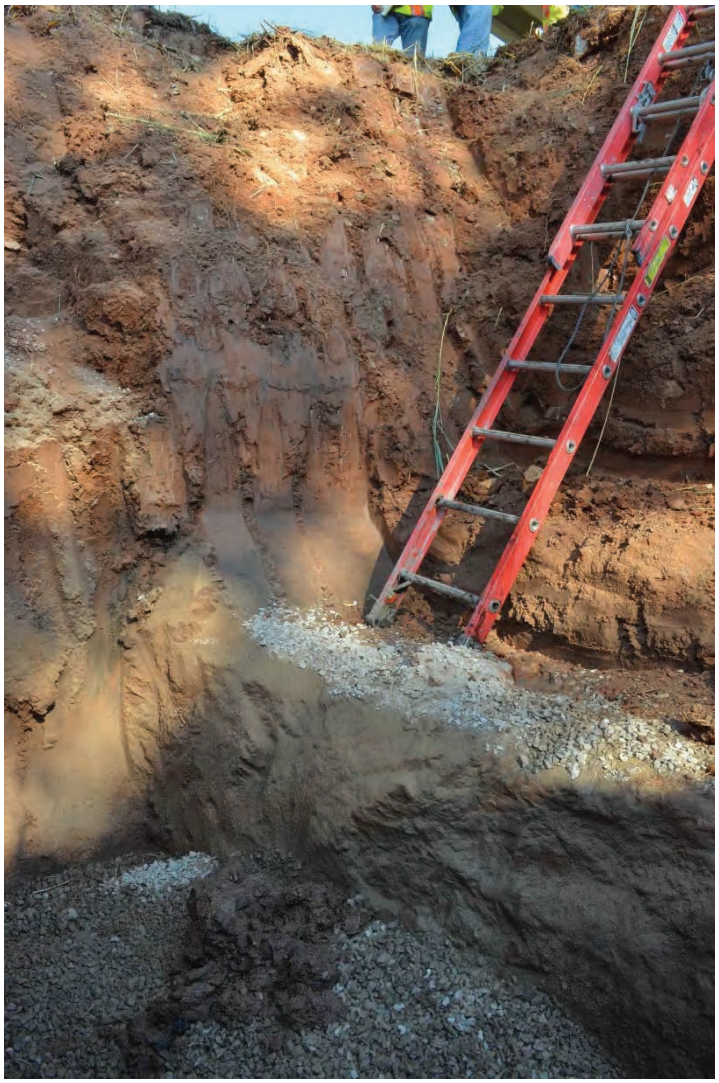
Test Pit 11S Photograph 4 – Pile #12 Looking West



Test Pit 11S Photograph 5 – Pile #13 Looking West



Test Pit 11S Photograph 6 – Pile #12 Looking North



Test Pit 11S Photograph 7 – Test Pit Excavation Looking Northeast

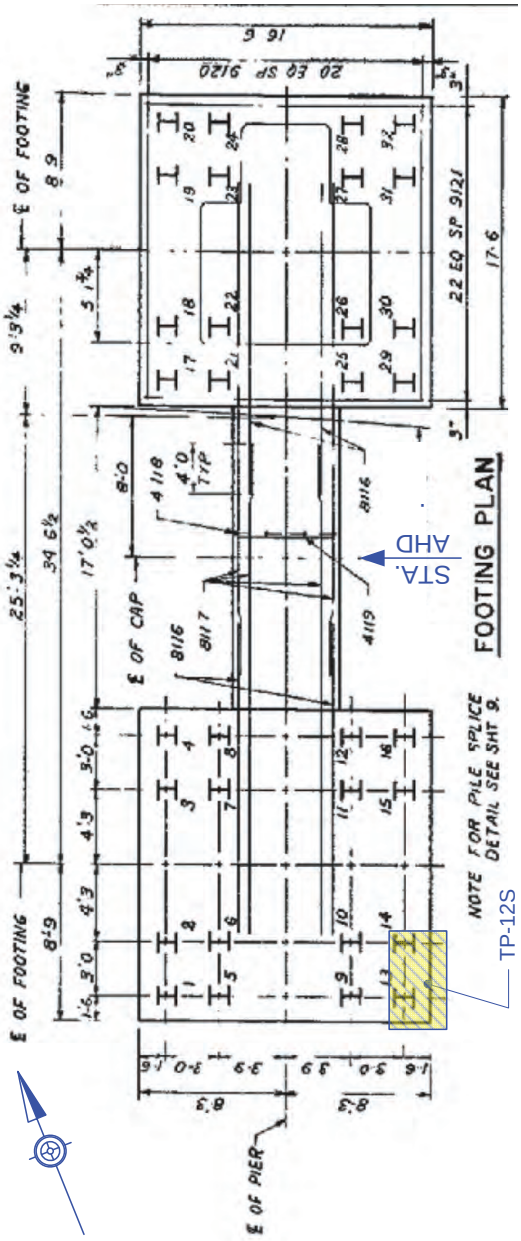


Test Pit 11S Photograph 8 – Test Pit Excavation Looking North

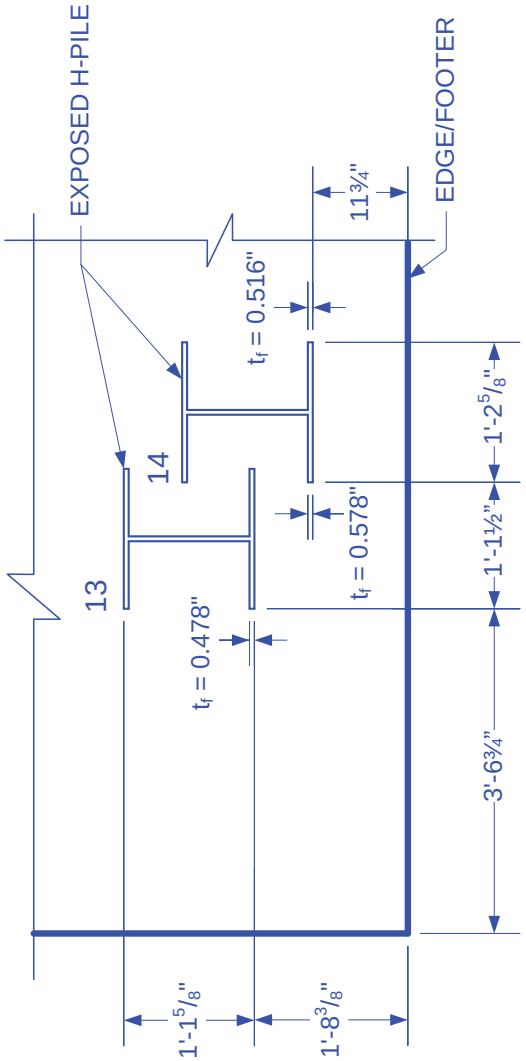
Pier 12

Test Pit TP-12S

TEST PIT 12S at PIER 12



FOOTING PLAN (N.T.S.)



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP12S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		86		1 2 3 4 5 6		SILTY SAND, black, fine to medium grained, moist - wet, with organics (FIELD: Organic Silt, w/Sand, Clay, black, moist to wet) 4.0 577.9 LEAN CLAY, reddish brown, moist (FIELD: Lean Clay, reddish brown, mottled gray, moist) 6.2 575.7 End of Boring at 6.2 ft.	SM CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP12S-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **584.6 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		Pier 12 Foundation							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2									
				3									
				4									
				5									
						5.8 578.8							
GS 2				6		POORLY GRADED GRAVEL, gray, moist (FIELD: 1.5" Crushed Clear Stone)	GP						
				7		7.4 577.2							
				8		LEAN CLAY, reddish brown, moist (FIELD: Lean Clay, reddish brown, mottled gray, moist)	CL						
				9		9.2 575.4							

End of Boring at 9.2 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 12S Photograph 1 – Footer Looking Northwest



Test Pit 12S Photograph 2 – Footer Looking West



Test Pit 12S Photograph 3 – Footer Looking West



Test Pit 12S Photograph 4 – Footer Looking Northwest



Test Pit 12S Photograph 5 – Test Pit Excavation Spoil Looking Southeast



Test Pit 12S Photograph 6 – Test Pit Excavation Spoil Looking Southeast



Test Pit 12S Photograph 7 – Footer/Test Pit Excavation Looking West



Test Pit 12S Photograph 8 – Piles 13 & 14



Test Pit 12S Photograph 9 – Pile 13



Test Pit 12S Photograph 10 – Pile 13

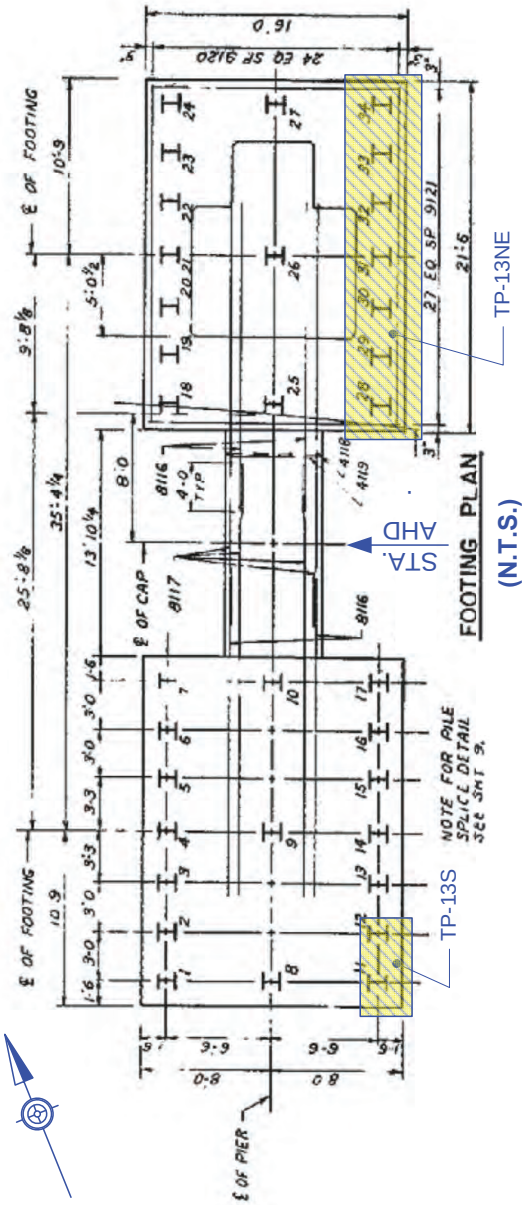


Test Pit 12S Photograph 11 – Pile 13

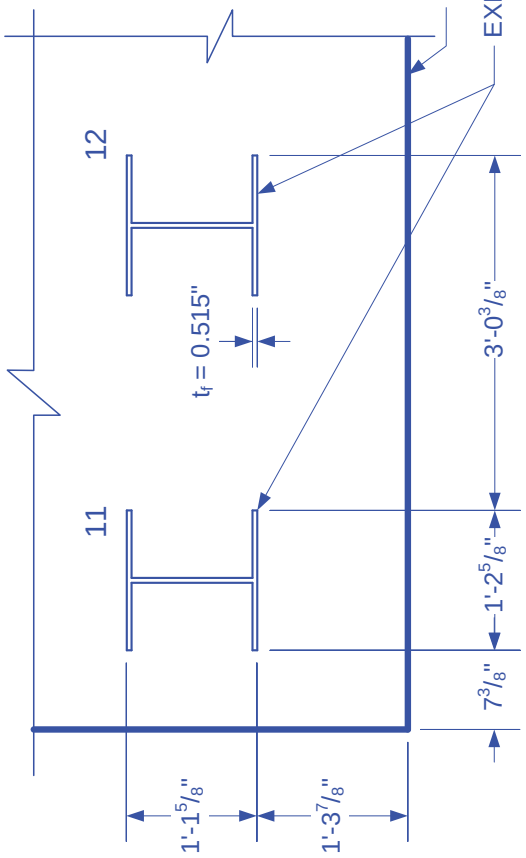


Test Pit 12S Photograph 12 – Piles 13 & 14

Pier 13
Test Pit TP-13NE
Test Pit TP-13S



TEST PITS 13S & 13NE at PIER 13



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP13NE**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/12/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/12/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **584.7 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1–3		SILTY SAND, black, fine to medium grained, moist , some ASH (FIELD: Topsoil/Silt and Ash, moist, dark brown to black)	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				3.0		581.7							
				3–5		SANDY LEAN CLAY, dark brown, wet (FIELD: Clay and Silt, reddish brown to grayish brown, mottled, wet)	CL						Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data.
GS 2				5.3		579.4							
GS 5				6.0		POORLY GRADED SAND WITH SILT, black, fine to medium grained (FIELD: Organic Silt, dark gray to black) 578.7	SP-SM						Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc.
GS 3				7.0		SAND, brown, fine grained, wet (FIELD: Fine to medium Sand, little Silt, wet, gray) 577.7	SP						
				7–11		LEAN CLAY, reddish brown, moist, with sand (FIELD: Clay, some Silt, reddish brown, damp)	CL						Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
GS 4				11.5		573.2							

End of Boring at 11.5 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:				**BORING ID:TP13NE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**			PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**		CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**		DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/12/13**	CREW CHIEF:		DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/12/13**	LOGGED BY:		HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:		HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **584.7 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		Pier 13 Foundation							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2									
				3									
				4									
				5 ▽									
				6		6.1 578.6							
GS 7						SILTY SAND, black, fine grained, wet, with gravel (FIELD: Fine to medium Sand, little Silt, wet, gray)	SM						
GS 6				7		7.0 577.7							
				8		LEAN CLAY, reddish brown, moist, with sand (FIELD: Clay, some Silt, reddish brown, damp)	CL						
				9									
				10									
GS 4				11		11.5 573.2							

End of Boring at 11.5 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 13NE Photograph 1 –Exposed Sand and Footing Looking North West



Test Pit 13NE Photograph 2 – Footing and Pile 13-3Looking West



Test Pit 13NE Photograph 3 – Sand and Footing and Pile 13-3 Looking Northwest



Test Pit 13NE Photograph 4 – Pile 13-3 Looking West



Test Pit 13NE Photograph 5 – Pile 13-3 Looking West



Test Pit 13NE Photograph 6 – Pile 13-3 Looking West



Test Pit 13NE Photograph 7 – Pile 13-3 Looking West



Test Pit 13NE Photograph 8 – Pile Looking West



Test Pit 13NE Photograph 9 – Pile Looking West



Test Pit 13NE Photograph 10 – Pile Looking West



Test Pit 13NE Photograph 11 – Footing Looking Southwest



Test Pit 13NE Photograph 12 – Footing/Excavation Looking North



Test Pit 13NE Photograph 13 – Footing Looking West



Test Pit 13NE Photograph 14 – Looking West at Pile 13-1 to 13-3



Test Pit 13NE Photograph 15 – Looking West at Pile 13-3 to 13-5

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP13S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**584.7 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SANDY SILT, black, wet , some ASH (FIELD: Organic Sandy Silt, w/ Roots, Railroad Ties, some wood chips)	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Railroad ties encountered in upper 4 feet of Test Pit.
				2									
				3									
				4									
GS 1		76		5									
				6		6.1 578.6							
GS 2		10		7		POORLY GRADED GRAVEL WITH SILT AND SAND, dark grayish brown, moist - wet (FIELD: ¾ Crushed Stone) 7.2 577.5	GP						
GS 3		85		8		SILTY SAND, dark grayish brown, fine grained, wet, with organics (FIELD: Silt, gray to dark gray, w/ Organics) 8.6 576.1	SM						

End of Boring at 8.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP13S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**584.7 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1 2 3 4 5 6		Pier 13 Foundation 6.1 578.6							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 2		10		7		POORLY GRADED GRAVEL WITH SILT AND SAND, dark grayish brown, moist - wet (FIELD: ¾" Crushed Stone) 7.2 577.5	GP-GM						
GS 3		85		8		SILTY SAND, dark grayish brown, fine grained, wet, with organics (FIELD: Silt, gray to dark gray, w/ Organics) 8.6 576.1	SM						

End of Boring at 8.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 13S Photograph 1 – Test Pit Excavation Looking Southwest



Test Pit 13S Photograph 2 – Test Pit Excavation Looking Southeast



Test Pit 13S Photograph 3 - Test Pit Excavation Looking South



Test Pit 13S Photograph 4 – Footer Looking North



Test Pit 13S Photograph 5 – Test Pit Excavation Looking Northeast



Test Pit 13S Photograph 6 – Pile #11 Looking West



Test Pit 13S Photograph 7 – Pile #12 Looking West



Test Pit 13S Photograph 8 – Pile #11 Looking North



Test Pit 13S Photograph 9 – Pile #11 Looking Northwest



Test Pit 13S Photograph 10 – Pile #12 Looking Northwest



Test Pit 13S Photograph 11 – Test Pit Excavation Looking West

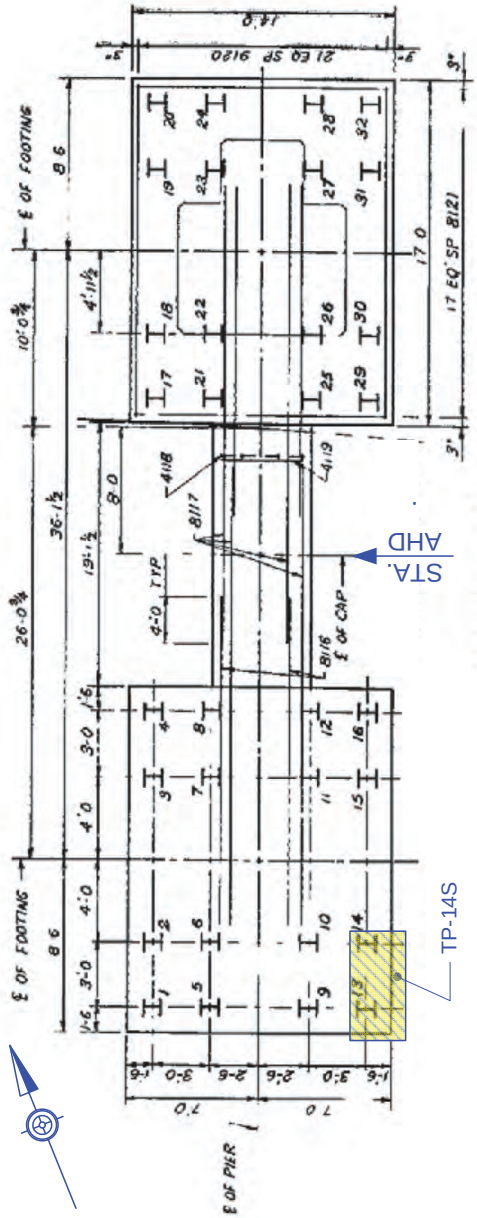


Test Pit 13S Photograph 12 – Test Pit Excavation Looking North



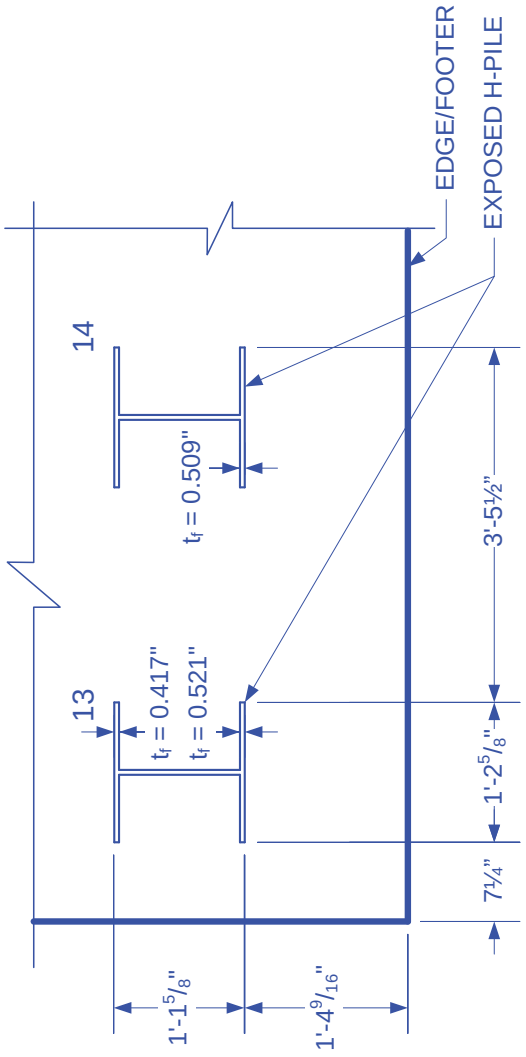
Test Pit 13S Photograph 13 – Test Pit Excavation Looking East

Pier 14
Test Pit TP-14S



FOOTING PLAN
(N.T.S.)

TEST PIT 14S at PIER 14



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP14S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**585.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILTY SAND, brown to very dark gray, fine to medium grained, moist (FIELD: Clay, Sand, Silt, Organics, black to brown to gray, moist to wet)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		30		2			SM						
				3									
				4									
				5		5.5 579.9							
				6		SILTY SAND, black, fine grained, wet, with organics (FIELD: Organic Silt w/ Sand, black, wet)							
GS 2		76		7			SM						
				8		8.0 577.4							

End of Boring at 8.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP14S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**585.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				0		0.5 (FIELD: Clay, Sand, Silt, Organics, black to brown to gray, moist to wet) 584.9	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				1		Pier 14 Foundation							
				2									
				3									
				4		4.7 580.7							
GS 3		9		5		POORLY GRADED GRAVEL WITH SILT AND SAND, grayish brown, moist - wet (FIELD: ¾" Crushed Stone) 5.5 579.9	GP-GM						
				6		SILTY SAND, black, fine grained, wet, with organics (FIELD: Organic Silt w/ Sand, black, wet)							
GS 2		76		7			SM						
				8		8.0 577.4							

End of Boring at 8.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 14S Photograph 1 – Test Pit Excavation Looking West



Test Pit 14S Photograph 2 – Test Pit Excavation Looking Southwest



Test Pit 14S Photograph 3 – Test Pit Excavation Looking East



Test Pit 14S Photograph 4 – Test Pit Excavation Looking Southeast



Test Pit 14S Photograph 5 – Test Pit Excavation Looking Southeast



Test Pit 14S Photograph 6 – Footer Looking West



Test Pit 14S Photograph 7 – Pile #13 Flange Looking North



Test Pit 14S Photograph 8 – Pile #13 Flange Looking North



Test Pit 14S Photograph 9 – Footer Looking Northeast



Test Pit 14S Photograph 10 – Test Pit Excavation Looking East



Test Pit 14S Photograph 11 – Test Pit Excavation Looking South



Test Pit 14S Photograph 12 – Test Pit Excavation Looking South



Test Pit 14S Photograph 13 – Splice at Pile #14



Test Pit 14S Photograph 14 – Splice at Pile #14



Test Pit 14S Photograph 15 – Splice at Pile #13



Test Pit 14S Photograph 16 – Splice at Pile #14



Test Pit 14S Photograph 17 – Pile #13



Test Pit 14S Photograph 18 – Pile #13



Test Pit 14S Photograph 19 – Pile #13



Test Pit 14S Photograph 20 – Pile #14



Test Pit 14S Photograph 21 – Test Pit Excavation Looking East



Test Pit 14S Photograph 22 – Footer Looking West



Test Pit 14S Photograph 23 – Pile #14



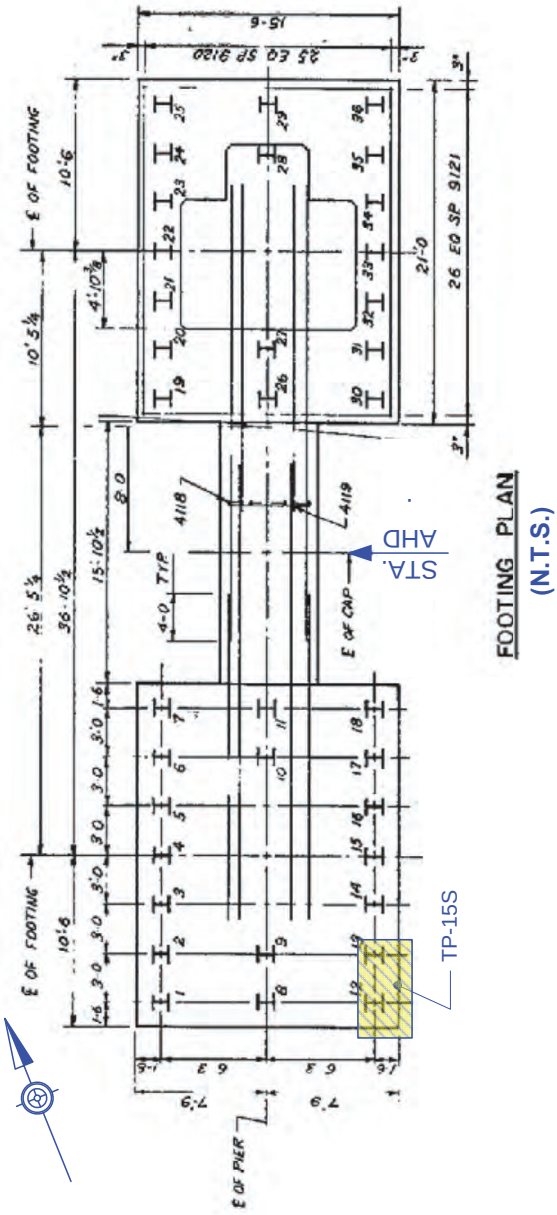
Test Pit 14S Photograph 24 – Test Pit Excavation Looking Northeast



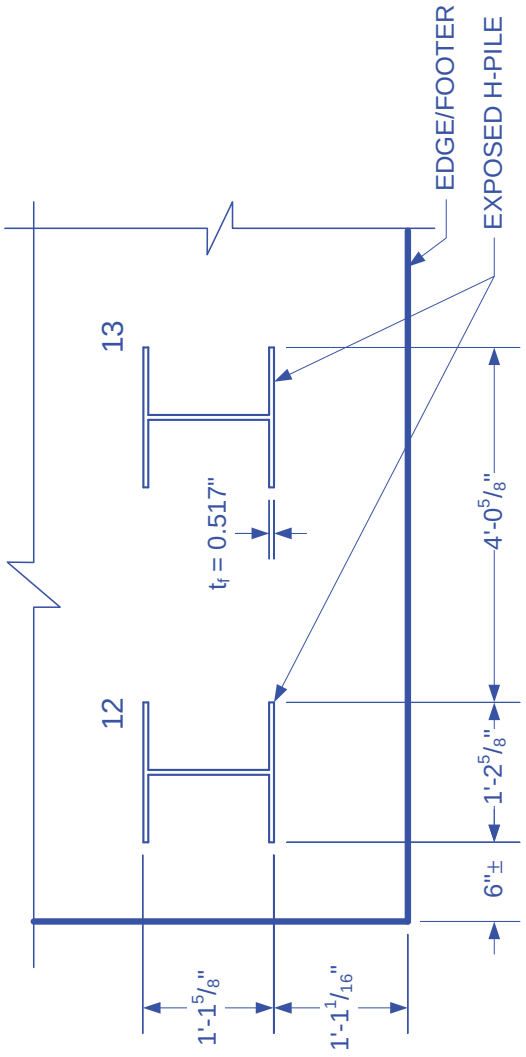
Test Pit 14S Photograph 25 – Test Pit Excavation Looking Northeast

Pier 15
Test Pit TP-15S

TEST PIT 15S at PIER 15



FOOTING PLAN
(N.T.S.)



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP15S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**585.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		ORGANIC SOIL, SILT, black, moist, with sand (FIELD: FILL - Organic Sandy Silt w/ Wood Pulp)	OL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2		2.7 583.2							
				3		"Shredded Wood" (FIELD: Wood Pulp/Saw Dust Mix)							
				4									
				5									
GS 1		355		6		6.7 579.2							
GS 2		10		7		POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: ¾" Crushed Stone, wet)	GP-GM						
						7.7 578.2							
GS 3		31		8		SAND, very dark grayish brown, fine grained, wet (FIELD: Sand w/ Silt, fine grained, gray, wet)	SP						
						8.9 577.0							
				9		LEAN CLAY, reddish brown, moist (FIELD: Lean Clay, reddish brown, moist)	CL						
						9.7 576.2							

End of Boring at 9.7 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP15S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**	
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **585.9 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		ORGANIC SOIL, SILT, black, moist, with sand (FIELD: FILL - Organic Sandy Silt w/ Wood Pulp) 1.2 584.7	OL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2		Pier 15 Foundation							
				3									
				4									
				5									
				6		6.7 579.2							
GS 2		10		7		POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: ¾" Crushed Stone, wet) 7.7 578.2	GP-GM						
GS 3		31		8		SAND, very dark grayish brown, fine grained, wet (FIELD: Sand w/ Silt, fine grained, gray, wet) 8.9 577.0	SP						
				9		LEAN CLAY, reddish brown, moist (FIELD: Lean Clay, reddish brown, moist) 9.7 576.2	CL						

End of Boring at 9.7 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 15S Photograph 1 – Test Pit Excavation Looking Southwest



Test Pit 15S Photograph 2 – Test Pit Excavation Looking South



Test Pit 15S Photograph 3 – Pile #12 Looking Northwest



Test Pit 15S Photograph 4 – Pile #12 Looking North



Test Pit 15S Photograph 5 – Pile #12 Flange



Test Pit 15S Photograph 6 – Test Pit Excavation Looking North



Test Pit 15S Photograph 7 – Test Pit Excavation Looking Northeast



Test Pit 15S Photograph 8 – Test Pit Excavation



Test Pit 15S Photograph 9 – Test Pit Excavation Looking Southeast



Test Pit 15S Photograph 10 – Pile #13 Looking West



Test Pit 15S Photograph 11 – Footer Looking North

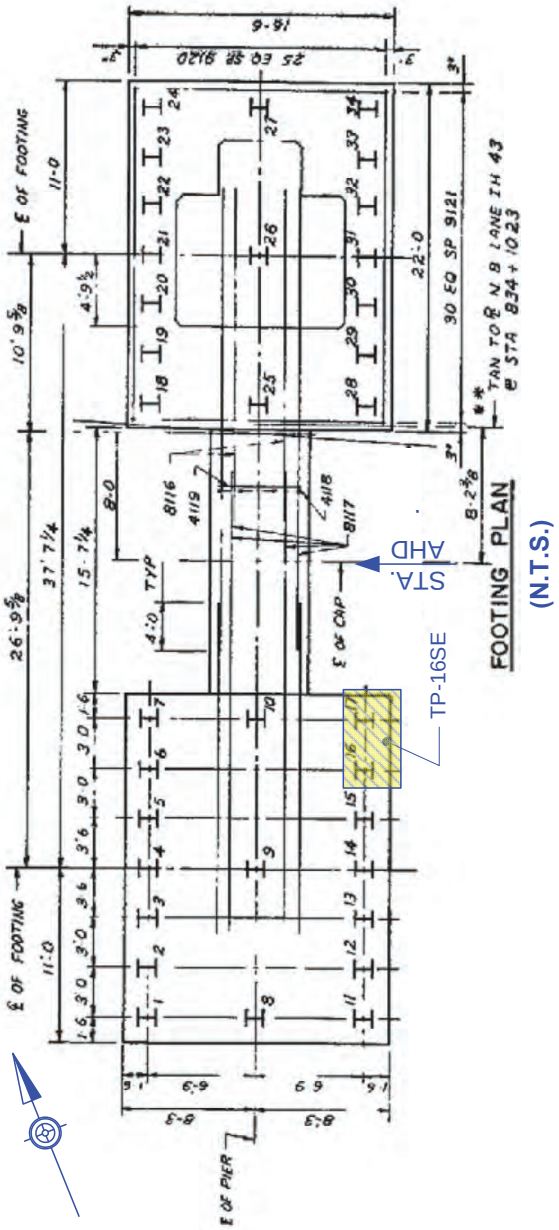


Test Pit 15S Photograph 12 – Test Pit Excavation Looking Northeast

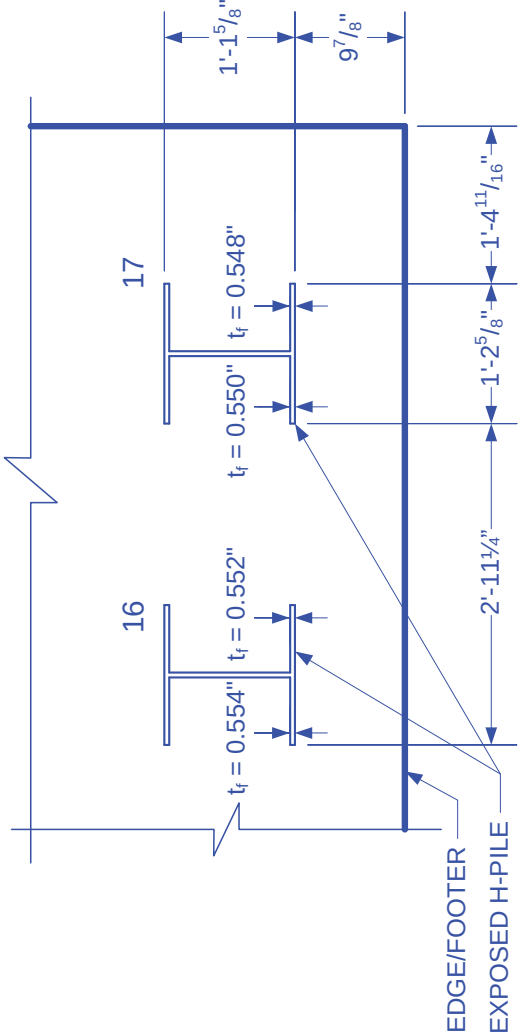


Test Pit 15S Photograph 13 – Test Pit Excavation Looking Northwest

Pier 16
Test Pit TP-16SE



TEST PIT 16SE at PIER 16



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP16SE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**586.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILTY SAND, very dark gray, moist, with organics (FIELD: Organic Lean Clay, black, moist)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		38		2 3 4 5 6 7		7.1 579.3	SM						
GS 2		23		8		SAND, dark grayish brown, fine grained, wet (FIELD: Sand, fine to medium grained, gray, wet) 8.8 577.6	SP						
GS 3		21		9		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, mottled gray, moist) 9.7 576.7	CL						

End of Boring at 9.7 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:				**BORING ID:TP16SE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**			PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**586.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILTY SAND, very dark gray, moist, with organics (FIELD: Organic Lean Clay, black, moist)	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
						1.8 584.6							
				2		Pier 16 Foundation							
				3									
				4									
				5									
				6									
				7									
						7.8 578.6							
GS 4		9		8		POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: Crushed Stone w/ Sand and Silt, gray, wet)	GP-GM						
						8.4 578.0							
GS 2		23				8.8 SAND, dark grayish brown, fine grained, wet (FIELD: Sand, fine to medium grained, gray, wet) 577.6	SP						
GS 3		21		9		9.7 LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, mottled gray, moist) 576.7	CL						
						End of Boring at 9.7 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 16SE Photograph 1 – Test Pit Excavation Looking South



Test Pit 16SE Photograph 2 – Test Pit Excavation Looking East



Test Pit 16SE Photograph 3 – Test Pit Excavation Looking South



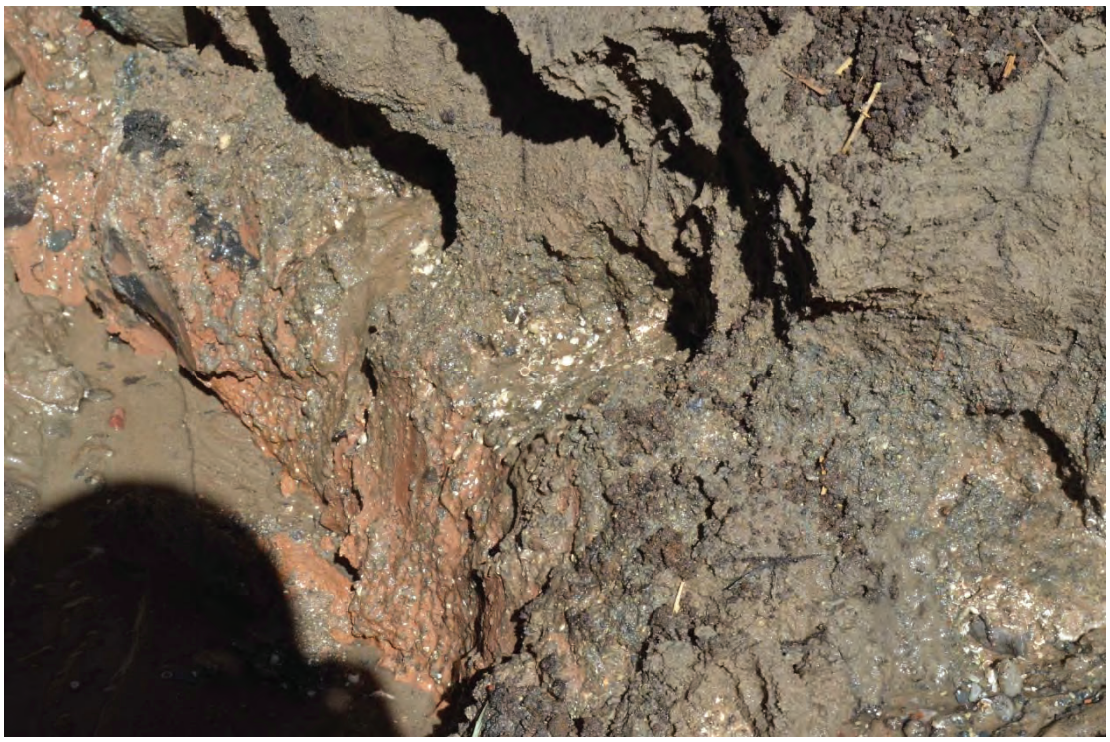
Test Pit 16SE Photograph 4 – Test Pit Excavation Looking South



Test Pit 16SE Photograph 5 – Footer Looking West



Test Pit 16SE Photograph 6 – Test Pit Excavation Looking North



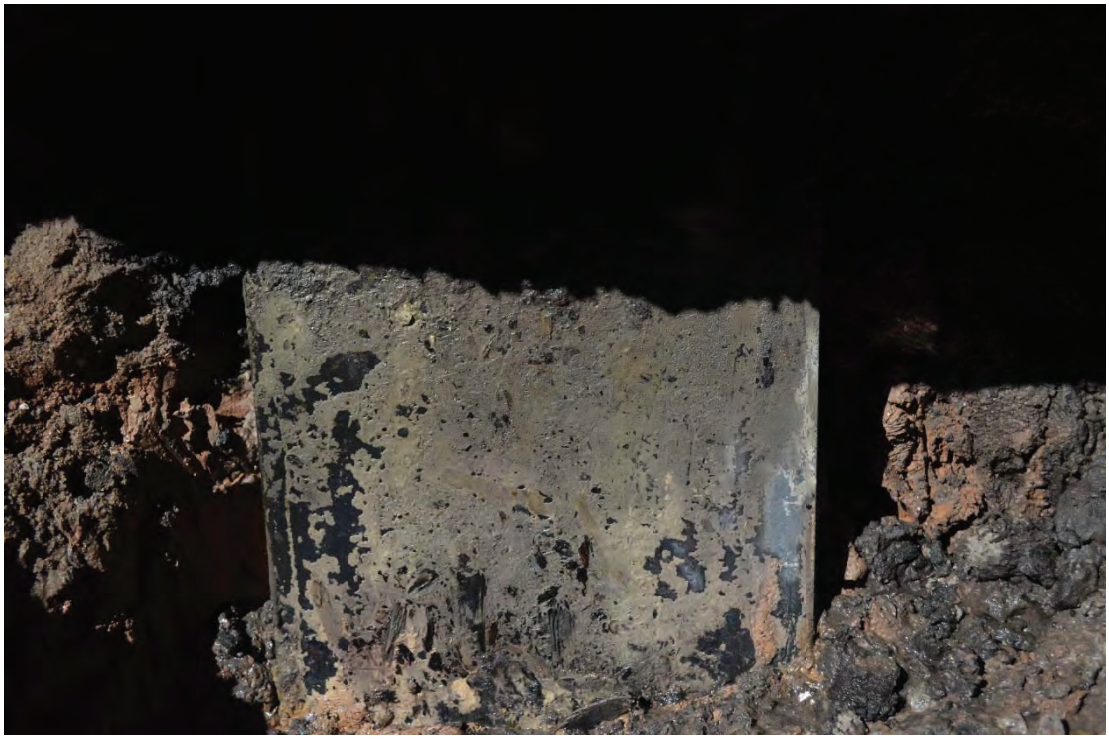
Test Pit 16SE Photograph 7 – Test Pit Excavation Looking North



Test Pit 16SE Photograph 8 – Test Pit Excavation Looking North



Test Pit 16SE Photograph 9 – Footer Looking West



Test Pit 16SE Photograph 10 – Pile #16 Looking West



Test Pit 16SE Photograph 11 – Pile #17 Looking West



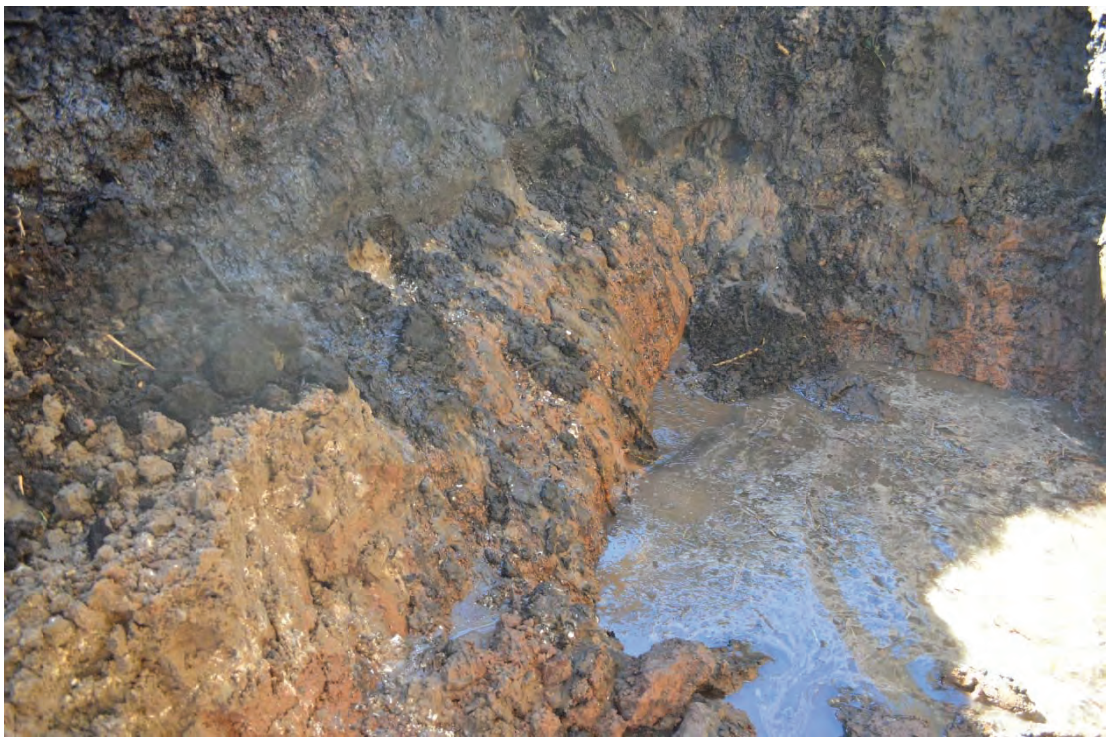
Test Pit 16SE Photograph 12 – Pile #17 Flange



Test Pit 16SE Photograph 13 – Footer Looking West



Test Pit 16SE Photograph 14 – Footer Looking West



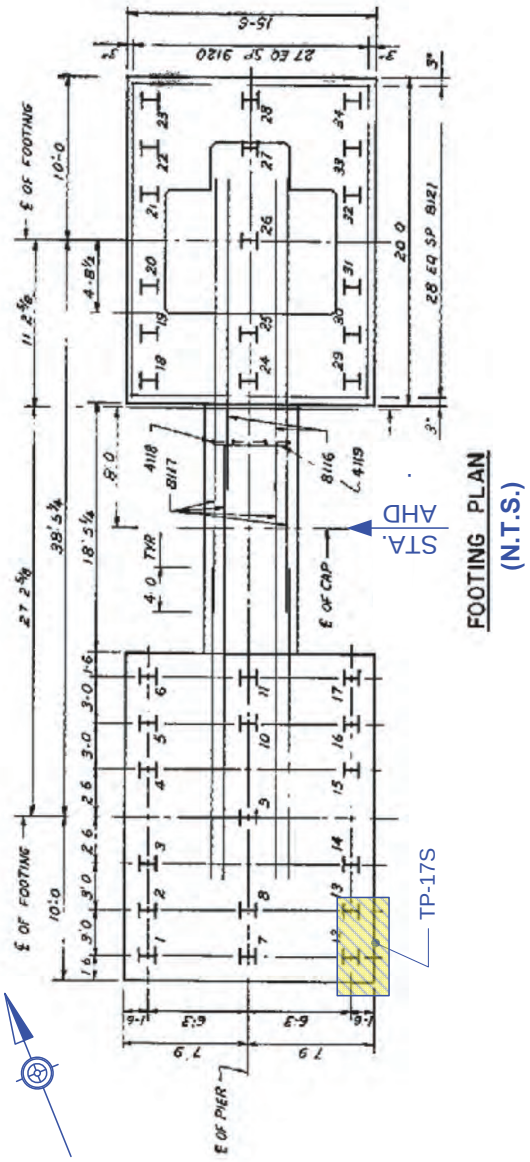
Test Pit 16SE Photograph 15 – Test Pit Excavation Looking North



Test Pit 16SE Photograph 16 – Test Pit Excavation Looking Southeast

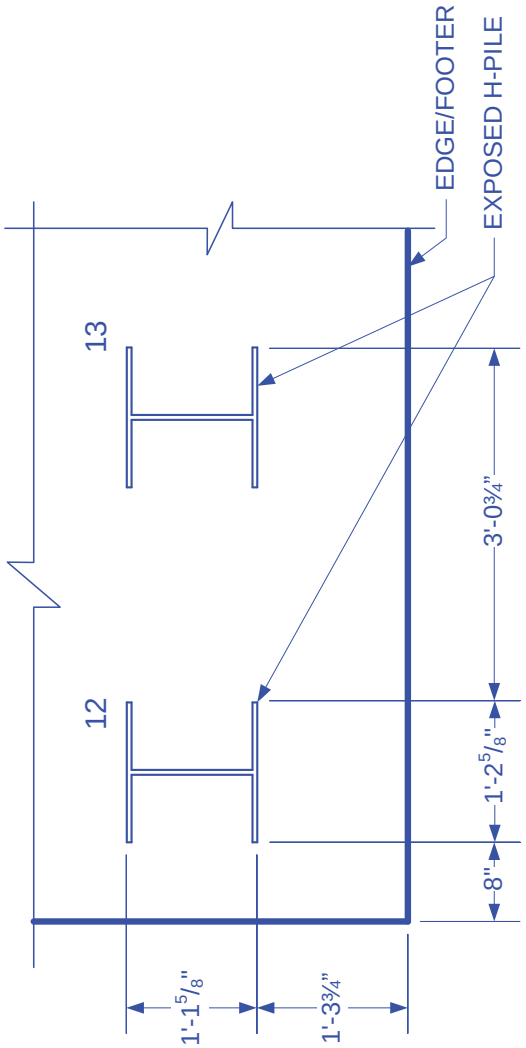
Pier 17

Test Pit TP-17S



FOOTING PLAN
(N.T.S.)

TEST PIT 17S at PIER 17



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP17S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**584.8 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		ORGANIC SOIL, SILT, black, wet (FIELD: Organic Silt w/ Wood Pulp and other Organics, black, moist)	OL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2									
				3									
				4									
				5		5.2 579.6							
GS 3		13				5.5 SAND, very dark gray, moist - wet, with silt, with gravel (FIELD: ¾" Crushed Stone, wet) 579.3	SP-SM						
GS 1		67		6		SILT, black, wet, with sand (FIELD: Organic Silt (Muck), black, wet)	ML						
						7.0 577.8							
GS 2		19		7		SANDY SILT, brown, moist (FIELD: Sandy Silt, brown, moist)	ML						
				8		8.0 576.8							

End of Boring at 8.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP17S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**	
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **584.8 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		Pier 17 Foundation							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2									
				3									
				4									
				5		5.2 579.6							
GS 3		13				5.5 SAND, very dark gray, moist - wet, with silt, with gravel (FIELD: ¾" Crushed Stone, wet) 579.3	SP-SM						
GS 1		67		6		SILT, black, wet, with sand (FIELD: Organic Silt (Muck), black, wet)	ML						
						7.0 577.8							
GS 2		19		7		SANDY SILT, brown, moist (FIELD: Sandy Silt, brown, moist)	ML						
				8		8.0 576.8							

End of Boring at 8.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 17S Photograph 1 – Test Pit Excavation Looking North



Test Pit 17S Photograph 2 – Test Pit Excavation Looking North



Test Pit 17S Photograph 3 – Test Pit Excavation Looking North



Test Pit 17S Photograph 4 – Test Pit Excavation Looking West



Test Pit 17S Photograph 5 – Test Pit Excavation Looking Southwest



Test Pit 17S Photograph 6 – Pile #12 Looking North



Test Pit 17S Photograph 7 – Pile #12 & #13 Looking West



Test Pit 17S Photograph 8 – Test Pit Excavation Looking North

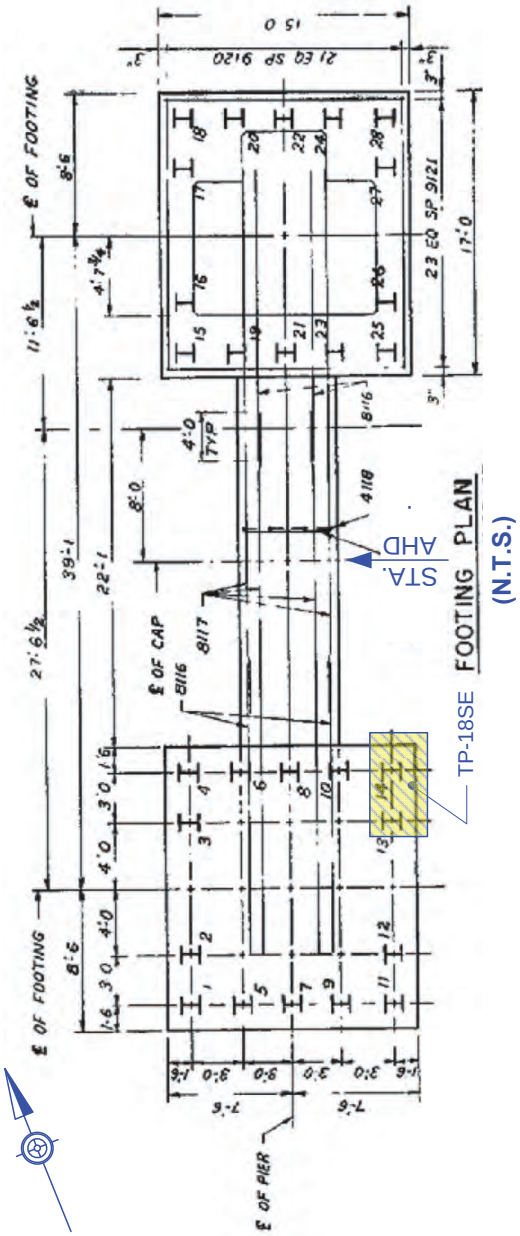


Test Pit 17S Photograph 9 – Test Pit Excavation/Footer Looking North

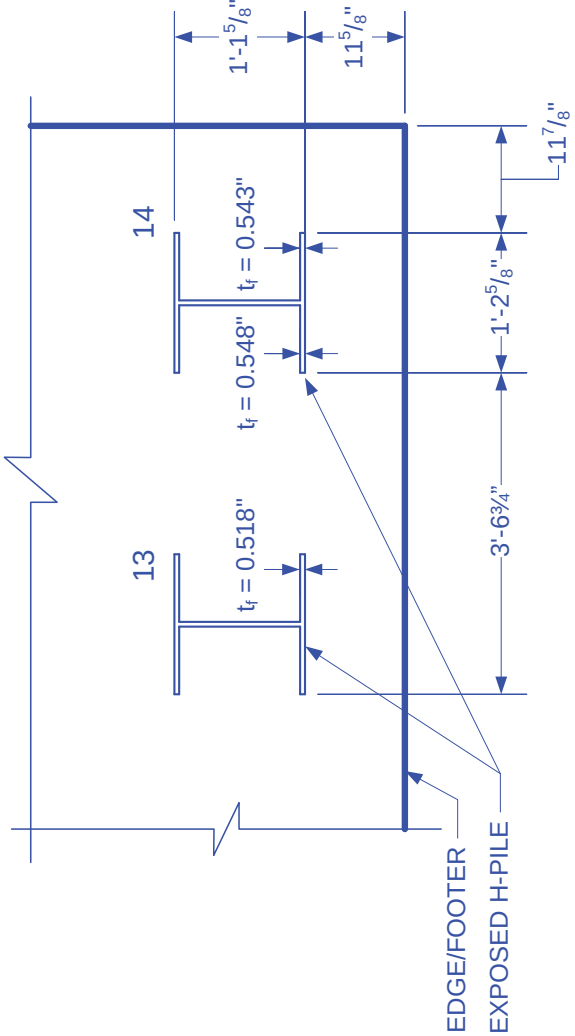


Test Pit 17S Photograph 10 – Test Pit Excavation Looking North

Pier 18
Test Pit TP-18SE



TEST PIT 18SE at PIER 18



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP18SE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**591 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILTY SAND, black, fine grained, moist , trace to some Ash (FIELD: Organic Silt w/ Roots and Sand black, moist, encountered white boulder sized material, possible paper waste)	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. White boulder sized material (TP18SE-GS4) was sampled for chemistry testing only.
GS 1		106		2									
GS 4				3									
				4									
				5									
				6									
				7									
				8									
				9		9.3 581.7							
GS 3		8		10		POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: Gravel w/ Sand, gray, wet)	GP-GM						
GS 2		24				10.3 580.7 10.4 SAND, brown, fine to medium grained, wet, with silt, with gravel (FIELD: Sand w/ Silt and Gravel, fine to medium grained, gray, wet) 580.6	SP-SM						
				11		11.4 579.6 LEAN CLAY, reddish brown, moist, with roots (FIELD: Lean Clay, reddish brown mottled gray, moist)	CL						
						End of Boring at 11.4 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:TP18SE-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/02/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/02/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **591 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1–2		SILTY SAND, black, fine grained, moist , trace to some Ash (FIELD: Organic Silt w/ Roots and Sand black, moist, encountered white boulder sized material, possible paper waste)	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. White boulder sized material (TP18SE-GS4) was sampled for chemistry testing only.
				3		3.0 588.0 Pier 18 Foundation							
				4–9		9.3 581.7 POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: Gravel w/ Sand, gray, wet)	GP-GM						
GS 3		8		10		10.3 580.7 10.4 SAND, brown, fine to medium grained, wet, with silt, with gravel (FIELD: Sand w/ Silt and Gravel, fine to medium grained, gray, wet)	580.6 SP-SM						
GS 2		24		11		11.4 579.6 LEAN CLAY, reddish brown, moist, with roots (FIELD: Lean Clay, reddish brown mottled gray, moist)	CL						
						End of Boring at 11.4 ft.							

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 18SE Photograph 1 – Test Pit Excavation Looking Southwest



Test Pit 18SE Photograph 2 – Test Pit Excavation Looking South



Test Pit 18SE Photograph 3 – Test Pit Excavation Looking South



Test Pit 18SE Photograph 4 – Concrete Removed from Test Pit Excavation



Test Pit 18SE Photograph 5 – Concrete Removed from Test Pit Excavation



Test Pit 18SE Photograph 6 – Test Pit Excavation Looking South



Test Pit 18SE Photograph 7 – Sand Exposed Below Bottom of Footer Looking South



Test Pit 18SE Photograph 8 – Test Pit Excavation Looking South



Test Pit 18SE Photograph 9 – Footer Corner Looking West



Test Pit 18SE Photograph 10 – Test Pit Excavation Looking West



Test Pit 18SE Photograph 11 – Test Pit Excavation Looking West



Test Pit 18SE Photograph 12 – Test Pit Excavation



Test Pit 18SE Photograph 13 – Pile #14



Test Pit 18SE Photograph 14 – Pile #13



Test Pit 18SE Photograph 15 – Pile #13 & #14



Test Pit 18SE Photograph 16 – Pile #14



Test Pit 18SE Photograph 17 – Pile #14



Test Pit 18SE Photograph 18 – Test Pit Excavation Looking West



Test Pit 18SE Photograph 19 – Footer Looking West

Pier 19

Test Pit TP-19NE

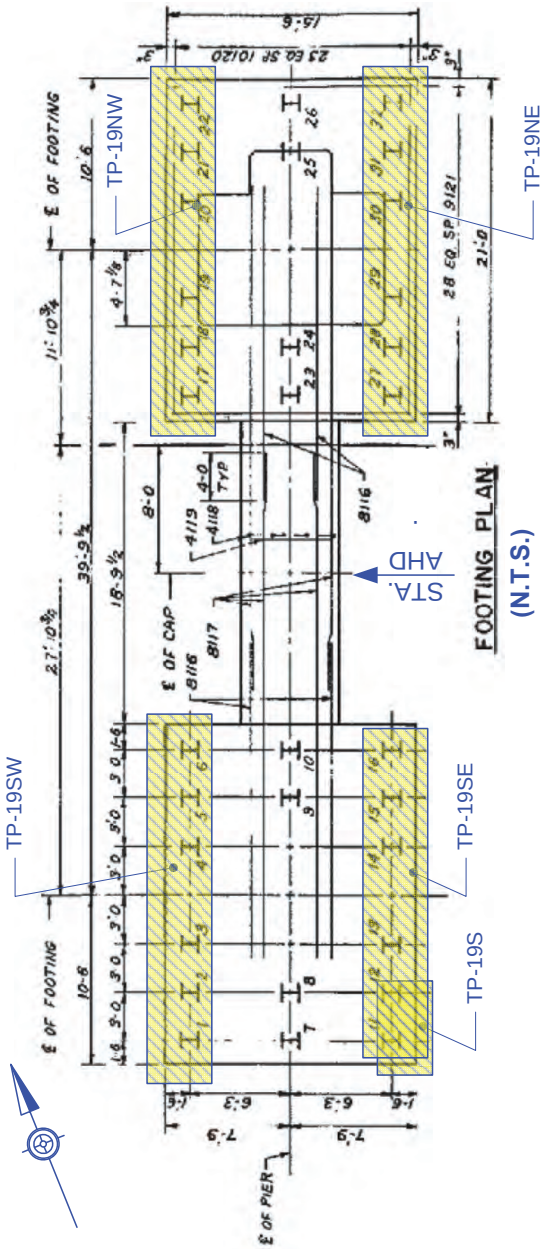
Test Pit TP-19NW

Test Pit TP-19S

Test Pit TP-19SE

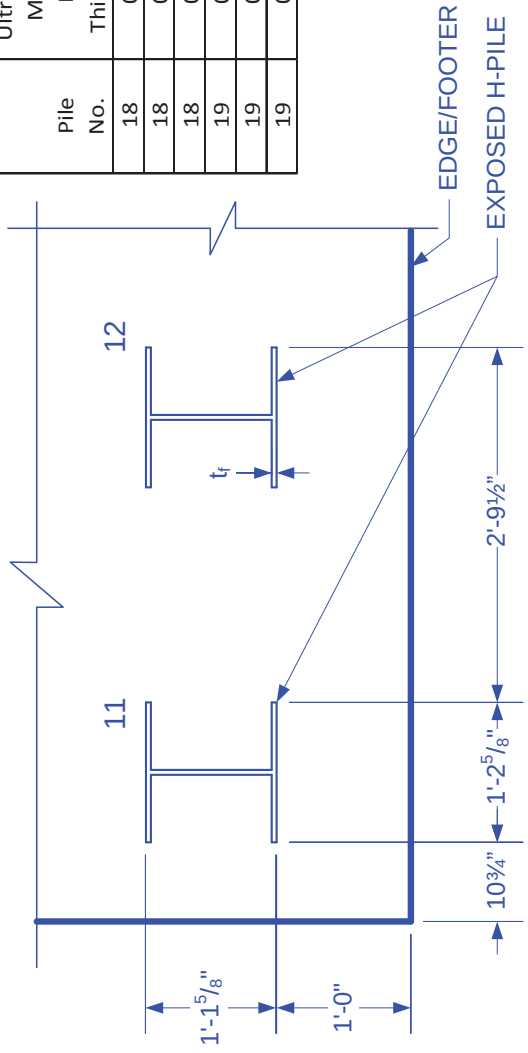
Test Pit TP-19SW

TEST PITS 19S, 19SE, 19SW, 19NE & 19NW at PIER 19



Pile No.	Ultrasonically Measured Flange Thickness, t_f
18	0.525"
18	0.471"
18	0.555"
19	0.552"
19	0.502"
19	0.529"

Pile No.	Measured Flange Thickness, t_f
11	0.523"
12	0.513"
13	0.549"
14	0.324"
15	0.544"
16	0.528"
17	0.542"
18	0.528"
19	0.476"
20	0.516"
21	0.499"
22	0.468"



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP19NE**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/12/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/12/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **586.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Clay and Silt, gray to brown, mottled, with roots, moist)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		2.0 / 584.4							
				3		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Flyash and gray fine sand, moist, black)							
				4									
				5		5.8 / 580.6							
				6		"Shredded Wood" (FIELD: Shredded Wood, wet, mixed with Flyash)							
				7		7.9 / 578.5							
GS 3				8		SILTY SAND, black, fine to medium grained, moist to wet, with organics (FIELD: Sandy Silt, black to dark gray, moist to wet)	SM						
				9		9.2 / 577.2							
GS 4				10		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown and gray, mottled with decomposed roots, moist)	CL						
				11									
				12		12.3 / 574.1							

End of Boring at 12.3 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation **3502 Kinsman Blvd.** **Madison, WI 53704**	WISDOT PROJECT ID:				**BORING ID:TP19NE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**			PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**		CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**		DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/12/13**	CREW CHIEF:		DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/12/13**	LOGGED BY:		HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:		HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **586.4 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1		(FIELD: Sandy Silt with Roots, dark brown)	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		2.0 584.4 Pier 19 Foundation							
				3									
				4									
				5									
				6									
				7									
				8		7.9 578.5 8.3 (FIELD: Gravel, limestone, gray, wet) 578.1	GP-GM						
GS 3				9		SILTY SAND, black, fine to medium grained, moist to wet, with organics (FIELD: Sandy Silt, black to dark gray, moist to wet) 9.2 577.2	SM						
GS 4				10		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown and gray, mottled with decomposed roots, moist)	CL						
				11									
				12		12.3 574.1							

End of Boring at 12.3 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 19NE Photograph 1 – Test Pit Excavation Looking North



Test Pit 19NE Photograph 2 – Pile Looking West



Test Pit 19NE Photograph 3 – Pile Looking West



Test Pit 19NE Photograph 4 – Test Pit Excavation Looking East



Test Pit 19NE Photograph 5 – Footer Looking Northwest



Test Pit 19NE Photograph 6 – Test Pit Excavation Looking Southeast



Test Pit 19NE Photograph 7 – Test Pit Excavation Looking East



Test Pit 19NE Photograph 8 – Pile Looking West

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP19NW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/13/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/13/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**587.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Silt, little fine sand, brown, some roots, trace gravel, damp to moist)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths. Water provided from sand lenses
				2									
				3									
				3.8									
				4		583.4							
				5		(FIELD: Lean Clay with Sand, trace gravel)	CL						
				6									
				7		7.3 579.9							
				7.6		(FIELD: Sand, gray, wet, poorly graded, medium grained) 579.6	SP						
				8		SILTY SAND, black, fine grained, moist to wet (FIELD: Silt, organics, dark brown to black, moist to wet)	SM						
				9		9.7 577.5							
				10		10.2 SILT, brown, fine grained, moist (FIELD: Medium Sand, poorly graded, gray, wet) 577.0	ML						
GS 2				11		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, damp)	CL						
				12									
				13		13.0 574.2							

End of Boring at 13.0 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		BORING ID: TP19NW-CAP
	WISDOT STRUCTURE ID: B-5-158		PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: OMNNI Associates	CONSULTANT PROJECT NO: T1463A13	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: 10/13/13	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: 10/13/13	LOGGED BY:	HOLE SIZE: in	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 587.2 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Silt, little to fine sand, brown, some roots, trace gravel, damp to moist)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths. Water provided from sand lenses
				2									
				2.8		584.4							
				3		Pier 19 Foundation							
				4									
				5									
				6									
				7									
				8									
				8.8		578.4							
GS 1				9		POORLY GRADED GRAVEL WITH SILT AND SAND, dark yellowish brown, moist - wet (FIELD: Limestone Gravel Subbase / Organic Silt)	GP						
				9.6		577.6							
				10		SILT, brown, fine grained, moist (FIELD: Medium Sand, poorly graded, gray, wet)	ML						
GS 2				10.2		577.0							
				11		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, damp)	CL						
				12									
				13									
				13.0		574.2							

End of Boring at 13.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 19NW Photograph 1 – Pile #18 Looking East



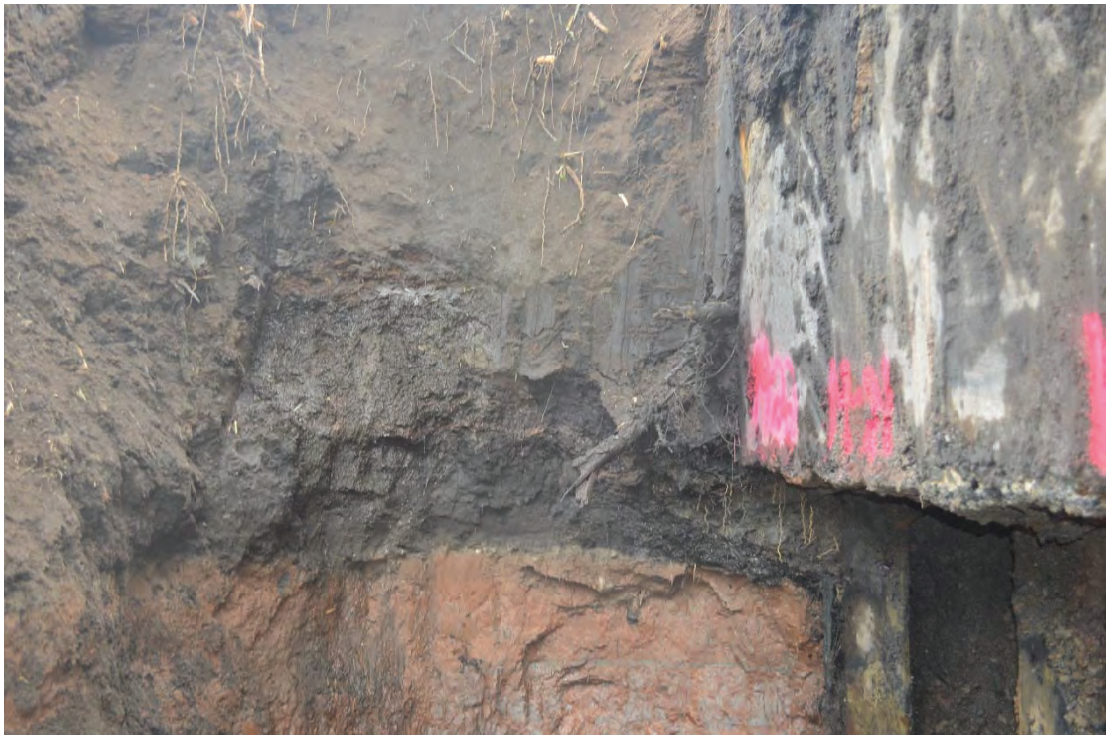
Test Pit 19NW Photograph 2 – Pile # 22 Looking East



Test Pit 19NW Photograph 3 – Pile # 21 Looking East



Test Pit 19NW Photograph 4 – Pile #19 Looking East



Test Pit 19NW Photograph 5 – Test Pit Excavation Looking North



Test Pit 19NW Photograph 6 – Test Pit Excavation Looking West



Test Pit 19NW Photograph 7 – Piles Looking Southeast



Test Pit 19NW Photograph 8 – Pile# 17 – Test Pit Excavation Looking East

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP19S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**585.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILTY SAND, black, fine grained, moist to wet (FIELD: Silt, black, Organic)	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		65		5		5.7 / 580.2							
GS 2		261		6		"Shredded Wood" (FIELD: Wood, Red) 6.7 / 579.2							
				7		SILTY SAND, black to dark gray, moist to wet (FIELD: Silty Sand, black to dark gray) 8.0 / 577.9	SM						
GS 4		27		8		SAND, brown, fine grained, moist (FIELD: Sand, brown to gray) 8.6 / 577.3	SP						
GS 5		19		9		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay w/ Roots, mottling) 9.6 / 576.3	CL						

End of Boring at 9.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP19S-CAP**	
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**	
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **9/28/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **9/28/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **585.9 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILTY SAND, black, fine grained, moist to wet (FIELD: Silt, black, Organic) 1.5 584.4	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2		Pier 19 Foundation							
				3									
				4									
				5									
				6									
				7		7.5 578.4							
GS 3		11		8		POORLY GRADED GRAVEL WITH SILT AND SAND, dark yellowish brown, moist - wet (FIELD: ¾" Crushed Stone) 8.6 577.3	GP-GM						
GS 5		19		9		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay w/ Roots, mottling) 9.6 576.3	CL						

End of Boring at 9.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 19S Photograph 1 – Test Pit Excavation Looking Northeast



Test Pit 19S Photograph 2 – Pile #11 Looking West



Test Pit 19S Photograph 3 – Pile #12 Looking West



Test Pit 19S Photograph 4 – Pile Flange



Test Pit 19S Photograph 5 – Test Pit Excavation Looking East



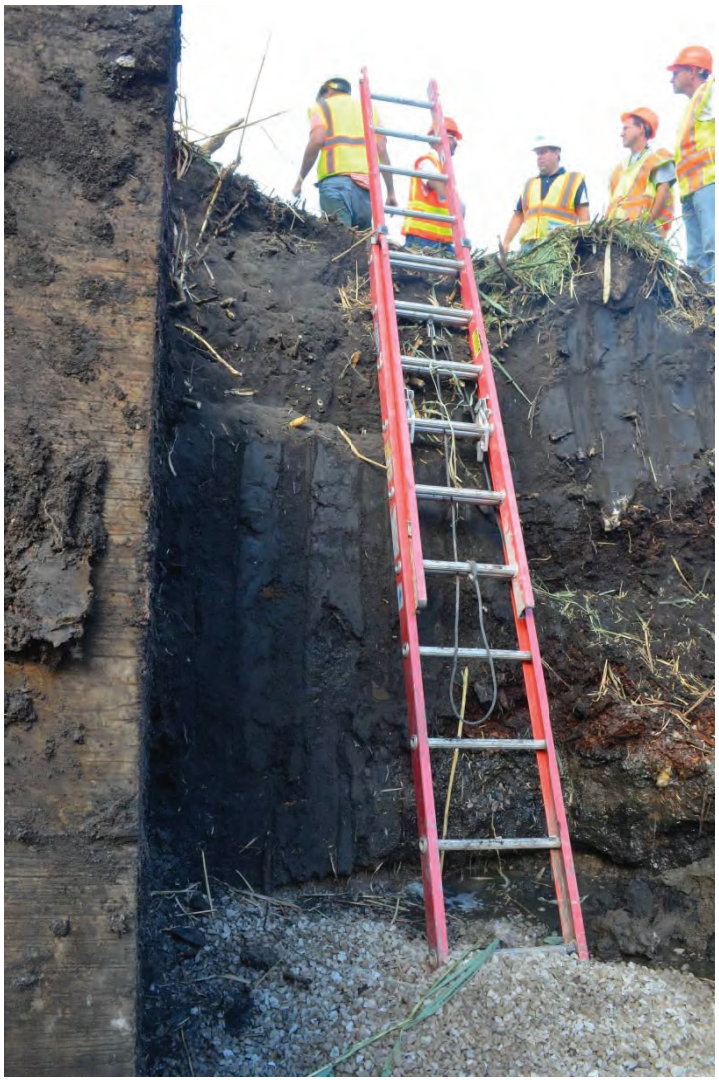
Test Pit 19S Photograph 6 – Test Pit Excavation Looking Northeast



Test Pit 19S Photograph 7 – Test Pit Excavation Looking Southeast



Test Pit 19S Photograph 8 – Test Pit Excavation Looking Southeast



Test Pit 19S Photograph 9 – Test Pit Excavation Looking North



Test Pit 19S Photograph 10—Test Pit Excavation Looking North

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP19SE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**586.5 ft**

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
0	(FIELD: FILL - Silt, Flyash, gravel, wood frags, and roots, damp, brown)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
2.1	584.4							
	"Shredded Wood" (FIELD: Shredded Wood, wet)							
5.6	580.9							
	(FIELD: Flyash)							
8.6	577.9							
9.1	SAND, brown, fine grained, moist (FIELD: Silty Sand, gray, wet) 577.4	SP						
	LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, little Silt and Sand, reddish brown)	CL						
13.2	573.3							

End of Boring at 13.2 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5.6ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation **3502 Kinsman Blvd.** **Madison, WI 53704**	WISDOT PROJECT ID:		**BORING ID:TP19SE-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **586.5 ft**

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
0	(FIELD: FILL - Silt, Flyash, gravel, wood frags, and roots, damp, brown to dark brown)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
2.1	584.4							
	Pier 19 Foundation							
7.9	578.6							
8.4	(FIELD: Gravel, Limestone, wet) 578.1	GP-GM						
9.2	SILTY SAND, black to dark gray, moist to wet (FIELD: Silt, Gravel, Wood Frags, black) 577.3	SM						
	LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, little Silt and Sand, reddish brown)	CL						
13.2	573.3							
	End of Boring at 13.2 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 19SE Photograph 1 – Ground Surface Looking West



Test Pit 19SE Photograph 2 – Test Pit Excavation Looking South



Test Pit 19SE Photograph 3 – Test Pit Excavation Looking North



Test Pit 19SE Photograph 4 – Piles #12 and #13 Looking West



Test Pit 19SE Photograph 5 – Pile #11 Looking West



Test Pit 19SE Photograph 6 – Piles #11 and #12 Looking West



Test Pit 19SE Photograph 7 – Pile #11 Looking West



Test Pit 19SE Photograph 8 –Pile # 13 Looking West



Test Pit 19SE Photograph 9 –Pile #12 Looking West



Test Pit 19SE Photograph 10 –Pile #12 Looking West

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:**	**TP19SW**
	WISDOT STRUCTURE ID:	**B-5-158**	PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION:	**584.4 ft**

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO
0	(FIELD: FILL - Silt and Clay, brown, damp)	
4.3	580.1	
	(FIELD: Flyash and Shredded Wood, wet)	
7.2	577.2	
7.7	SAND, brown, fine grained, moist (FIELD: Sand, gray, wet) 576.7	SP
	LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay with Sand, reddish brown, moist)	CL
11.6	572.8	

End of Boring at 11.6 ft.

Notes:

Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.

Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc.

Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 4.3ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP19SW-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**586.4 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments		USCS / AASHTO	Notes
1		(FIELD: FILL - Sandy Silt and Roots, brown)			Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
2		2.0	584.4		
3		Pier 19 Foundation			
4					
5					
6					
7					
8		7.9	578.5		
		(FIELD: Gravel, limestone, wet)		GP-GM	
		8.6	577.8		
9		9.0 SILTY SAND, black to dark gray, moist to wet	577.4	SM	
		9.4 SAND, brown, fine grained, moist (FIELD: Sand, fine grained, wet, gray)	577.0	SP	
10		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, with Sand, reddish brown, moist)		CL	
11					
12					
13		13.6	572.8		

End of Boring at 13.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 8ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 19SW Photograph 1 – Pile #6 Looking East



Test Pit 19SW Photograph 2 – Test Pit Excavation Looking South



Test Pit 19SW Photograph 3 – Footer Looking East



Test Pit 19SW Photograph 4 – Pile #4 Looking East



Test Pit 19SW Photograph 5 – Pile #5 Looking East



Test Pit 19SW Photograph 6 – Pile #5 Looking East

Pier 20

Test Pit TP-20NW

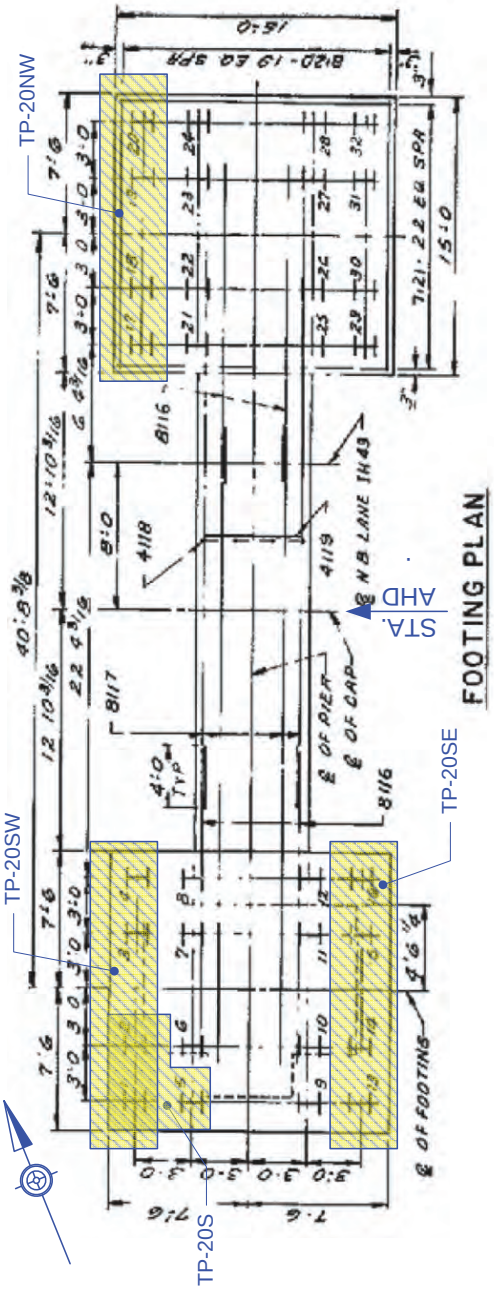
Test Pit TP-20S

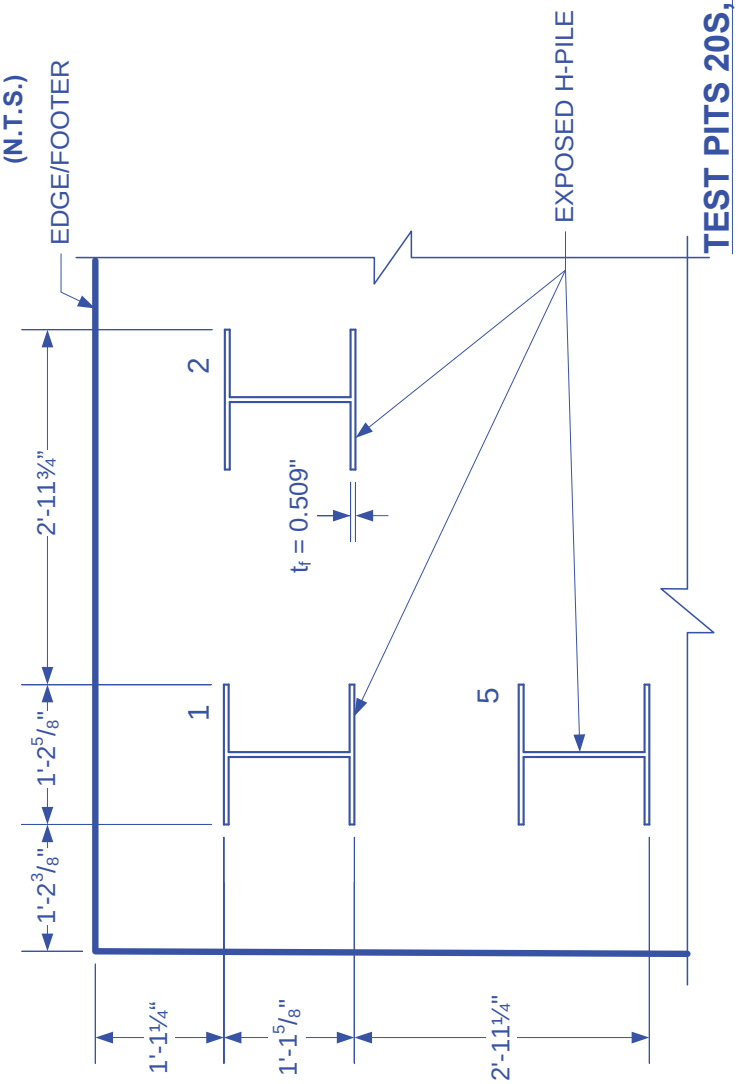
Test Pit TP-20SE

Test Pit TP-20SW

TEST PITS 20S, 20SE, 20SW & 20NW at PIER 20

Pile No.	Measured Flange Thickness, t_f
2	0.500
13	0.412
14	0.533
15	0.412
1	0.415
1	0.422
1	0.422
1	0.422
20	0.522





WI Dept. of Transportation **3502 Kinsman Blvd.** **Madison, WI 53704**	WISDOT PROJECT ID:		**BORING ID: TP20NW**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **583.6 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
0–2.7		(FIELD: FILL - Silt with Roots)	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
2.7 (580.9)–4.2 (579.4)		(FIELD: Paper Sludge, gray, wet)							
4.2 (579.4)–6.0 (577.6)		ORGANIC SOIL, SILT, black, wet, with sand (FIELD: black Silt)	OL						
6.0 (577.6)–7.2 (576.4)		SAND, brown, fine grained, moist (FIELD: Sand, fine grained, poorly sorted, shells at base, gray, wet, producing water)	SP						
7.2 (576.4)–11.3 (572.4)		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown to gray, mottled, moist with decomposed roots)	CL						

End of Boring at 11.3 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 2.7ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		BORING ID: TP20NW-CAP
	WISDOT STRUCTURE ID: B-5-158		PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: OMNNI Associates	CONSULTANT PROJECT NO: T1463A13	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: 10/18/13	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: 10/18/13	LOGGED BY:	HOLE SIZE: in	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 584.6 ft

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
0		Pier 20 Foundation							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
4.5		580.1							
		(FIELD: Gravel, limestone, gray, wet providing perched water)	GP-GM						
7.5		577.1							
		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown to gray, mottled, moist with decomposed roots)	CL						
12.3		572.4							
		End of Boring at 12.3 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

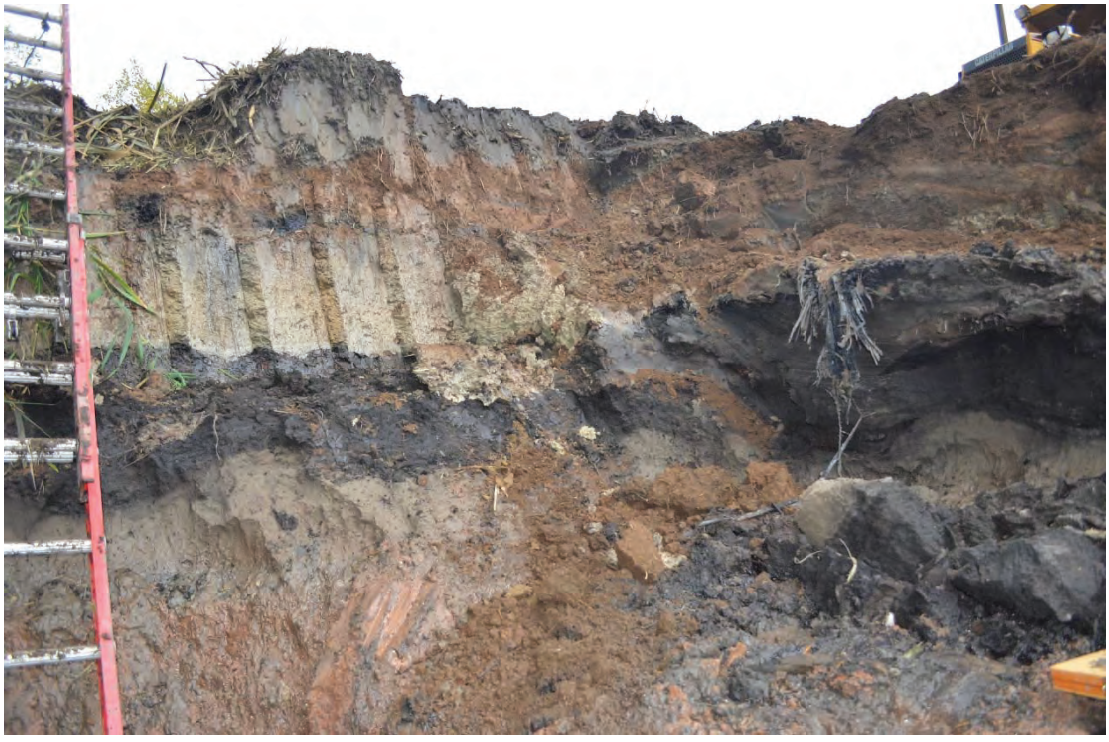
▽	WATER ENCOUNTERED DURING DRILLING: 4.5ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

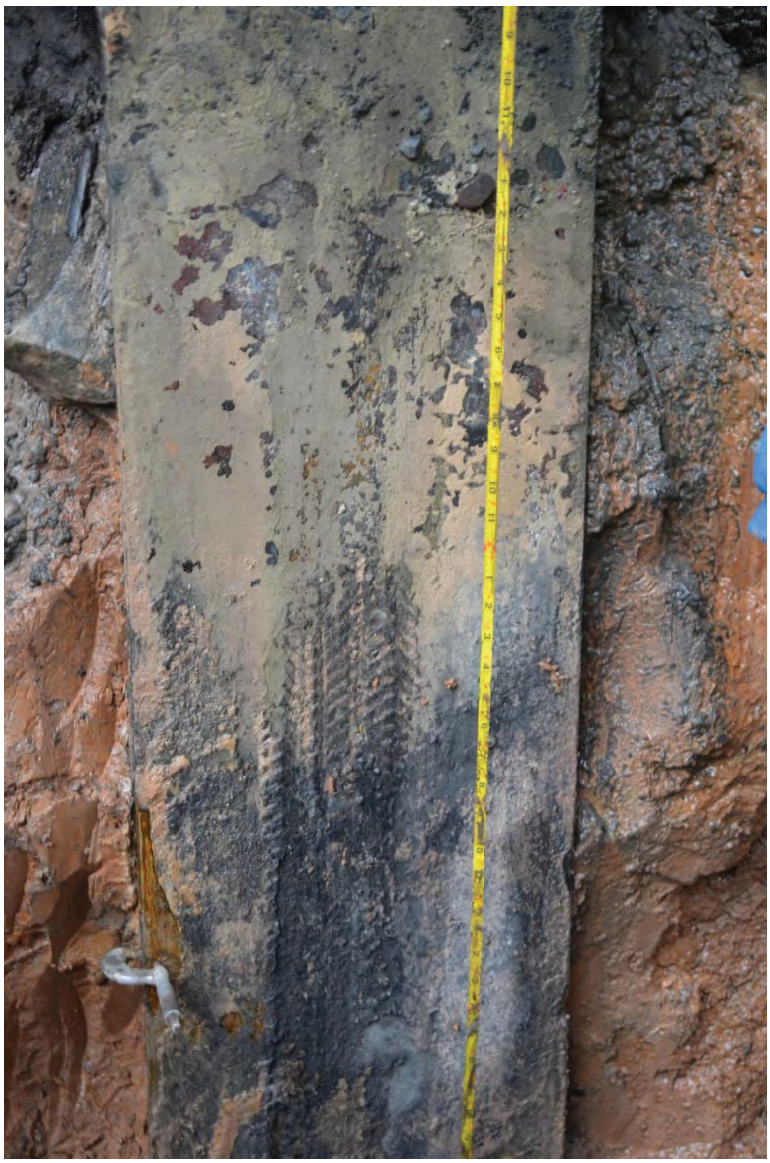
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Test Pit 20NW Photograph 1 – Footer Looking Northeast



Test Pit 20NW Photograph 2 – Test Pit Excavation Looking Southwest



Test Pit 20NW Photograph 3 – Pile #17 Looking East



Test Pit 20NW Photograph 4 – Pile # 17 Looking East

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP20S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**584.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILT, brown, moist, with organics (FIELD: Brown Silt, w/ Organics)	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
						1.6 582.6							
GS 1		51		2		SILTY SAND, dark yellowish brown, fine to medium grained, moist, with silt (FIELD: Brown Sandy Silt w/ Roots)	SM						
						2.7 581.5							
				3		"Paper Sludge" (FIELD: Light yellowish brown Silt, Pulp)							
GS 2		233		4									
				5									
						5.3 578.9							
GS 5		77		6		SILT, black, wet, with sand (FIELD: Black organic, Silt)	ML						
						6.0 578.2							

End of Boring at 6.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP20S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**	
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **584.6 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		Pier 20 Foundation							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2									
				3									
				4		4.2 580.4							
GS 3		8		5		POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: ¾" Crushed Stone)	GP-GM						
GS 4		31				5.5 579.1							
GS 5		77		6		SILT, black, wet, with sand (FIELD: Black organic, Silt)	ML						
						6.4 578.2							

End of Boring at 6.4 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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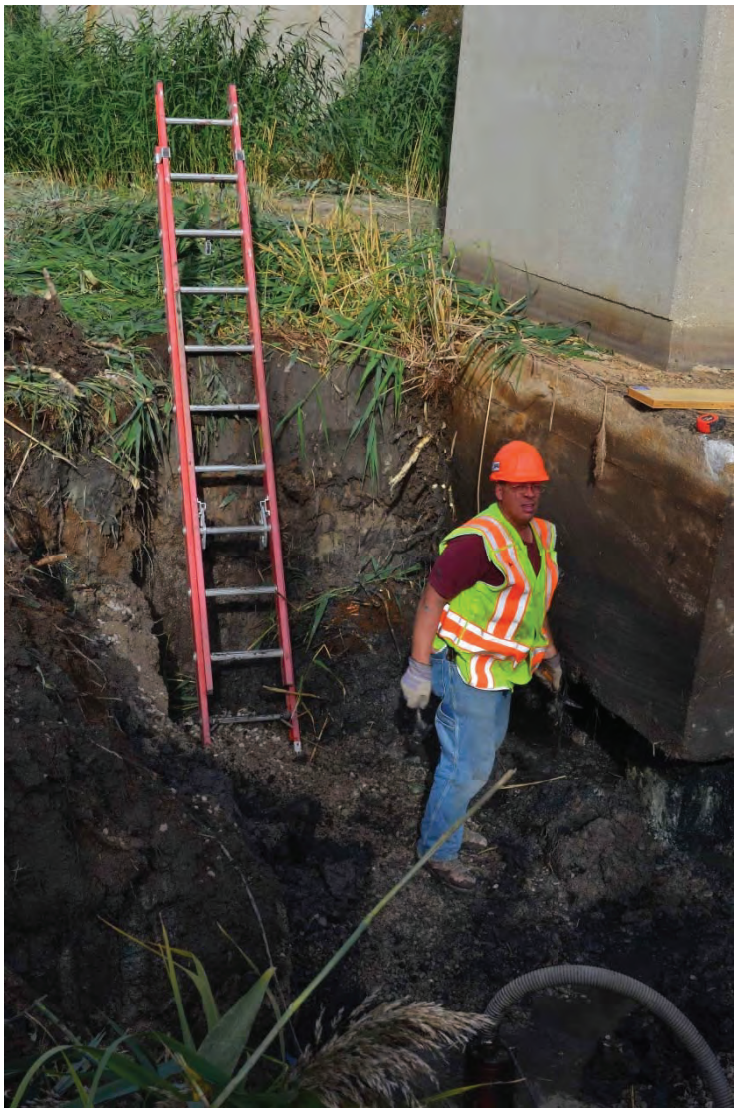
Test Pit 20S Photograph 1 – Test Pit Excavation Looking West



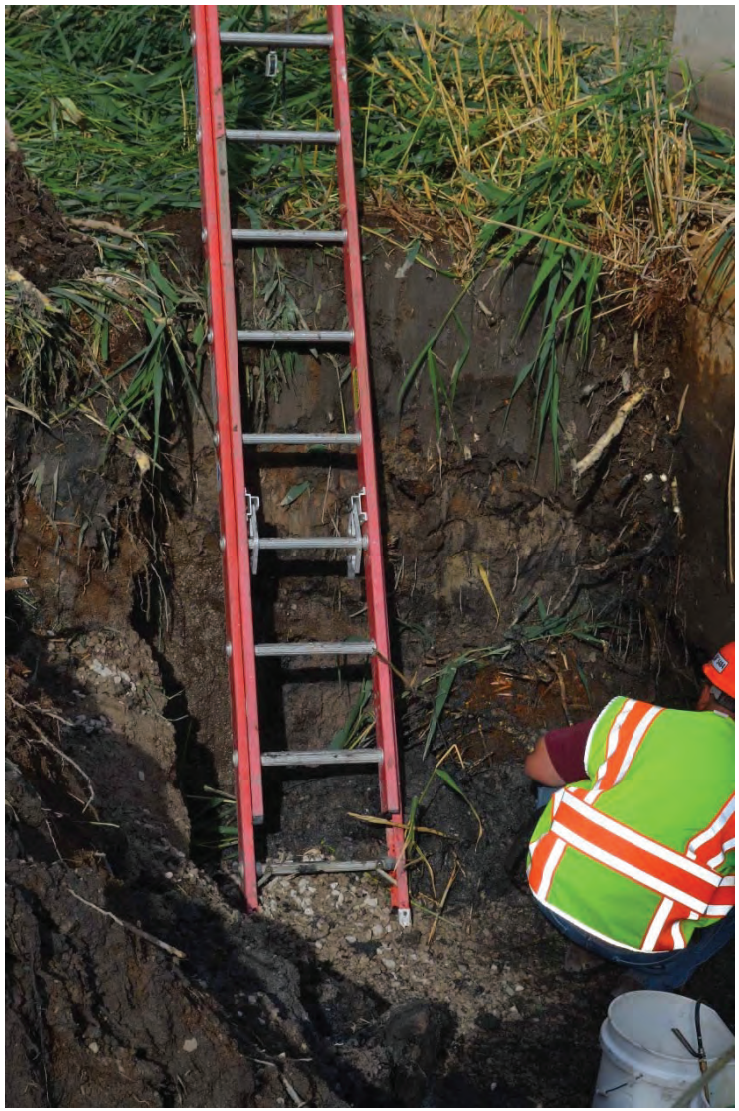
Test Pit 20S Photograph 2 – Test Pit Excavation Looking Northwest



Test Pit 20S Photograph 3 – Footer Looking Northeast



Test Pit 20S Photograph 4 – Footer Looking Northeast



Test Pit 20S Photograph 5 – Test Pit Excavation Looking Northeast



Test Pit 20S Photograph 6 – Footer Looking Northeast



Test Pit 20S Photograph 7 – Pile #1 Looking East



Test Pit 20S Photograph 8 – Pile #1 Looking East



Test Pit 20S Photograph 9 – Pile #1 Looking East



Test Pit 20S Photograph 10 – Pile #1 Looking North



Test Pit 20S Photograph 11 – Pile #1 Looking North



Test Pit 20S Photograph 12 – Pile #5 Looking North



Test Pit 20S Photograph 13 – Footer Looking Northeast

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP20SE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**583.1 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
1		(FIELD: FILL - Silt, Sand, Root, brown, moist, heavy roots)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
2		2.0 — 581.1							
3		"Paper Sludge" (FIELD: Paper Sludge, gray, wet)							
4		3.5 — 579.6							
5		ORGANIC SOIL, SILT, black, wet, with sand (FIELD: Organic Silt, with plant fibers, black, wet)	OL						
6		5.5 — 577.6							
7		SAND, brown, fine grained, moist (FIELD: Sand)	SP						
8		6.0 — 577.1							
9		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, little Silt, trace cobbles, reddish brown to gray, mottled)	CL						
		9.7 — 573.4							

End of Boring at 9.7 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 2ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:TP20SE-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **584.6 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
0		Pier 20 Foundation							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
4.2		580.4							
		(FIELD: Gravel, limestone, gray, wet, perched water present)	GP-GM						
5.8		578.8							
		ORGANIC SOIL, SILT, black, wet, with sand (FIELD: black Organic Silt, plant fibers)	OL						
7.0		577.6							
7.5		SAND, brown, fine grained, moist (FIELD: Sand, fine grained, gray, wet) 577.1	SP						
		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay little Silt, trace cobbles, reddish brown to gray, mottled)	CL						
11.2		573.4							

End of Boring at 11.2 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3.5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 20SE Photograph 1 – Test Pit Excavation Looking North



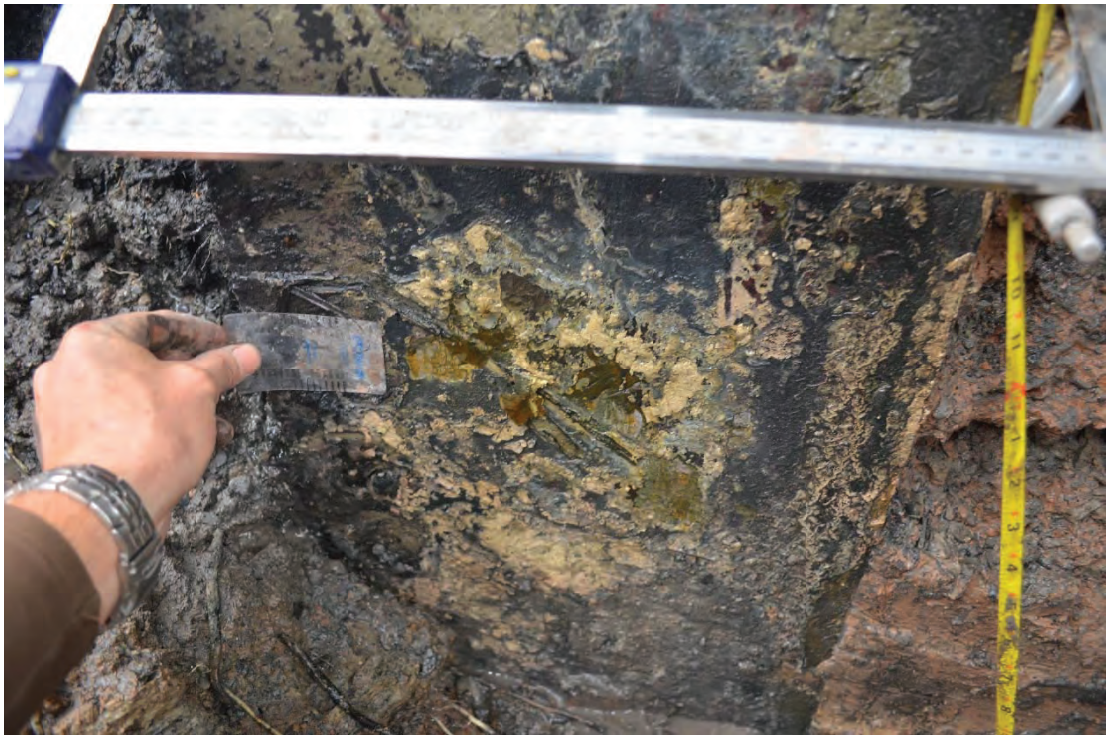
Test Pit 20SE Photograph 2 – Test Pit Excavation Looking Northeast



Test Pit 20SE Photograph 3 – Test Pit Excavation Looking South



Test Pit 20SE Photograph 4 – Footer Looking West



Test Pit 20SE Photograph 5 – Pile #13 Looking West

WI Dept. of Transportation **3502 Kinsman Blvd.** **Madison, WI 53704**	WISDOT PROJECT ID:			**BORING ID:**	**TP20SW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**584.6 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Silt with Sand and Roots, brown, damp)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2									
				3		3.0 581.6							
				4		"Paper Sludge" (FIELD: Paper Sludge, gray, wet)							
				5		5.0 579.6							
				6		ORGANIC SOIL, SILT, black, wet, with sand (FIELD: Silt, black, wet)	OL						
				7		6.6 578.0							
						SAND, brown, fine grained, moist (FIELD: Sand, gray, fine grained, poorly sorted, wet)	SP						
				8		7.4 577.2							
				9		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown and gray mottled, moist, with decomposed roots, trace cobbles, plastic)	CL						
				10									
				11		11.5 573.1							

End of Boring at 11.5 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP20SW-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **584.6 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Notes
1–4		Pier 20 Foundation		Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
4.2		580.4		
5		(FIELD: Gravel, limestone, gray, wet, producing perched water)	GP-GM	
6.0		578.6		
6.5		ORGANIC SOIL, SILT, black, wet, with sand (FIELD: Silt. black, wet) 578.1	OL	
7.4		SAND, brown, fine grained, moist (FIELD: Sand, gray, fine grained, poorly sorted, wet, producing water) 577.2	SP	
8–11		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown and gray mottled, moist with decomposed roots, trace cobbles, plastic)	CL	
11.5		573.1		

End of Boring at 11.5 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 20SW Photograph 1 – Footer Looking East



Test Pit 20SW Photograph 2 – Pile #3 Looking East

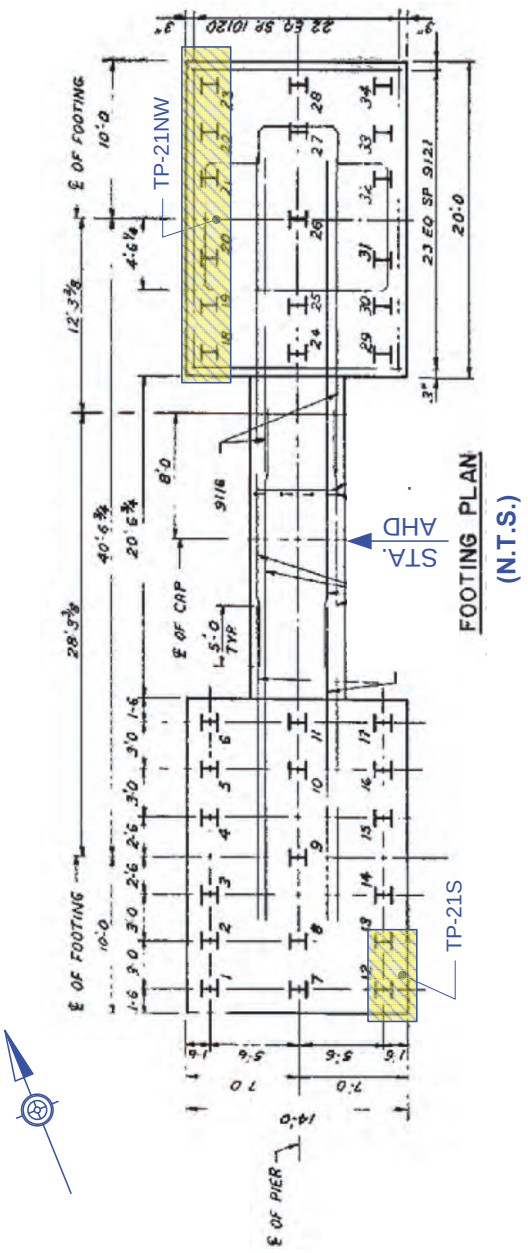


Test Pit 20SW Photograph 3 –Pile #1 Looking East

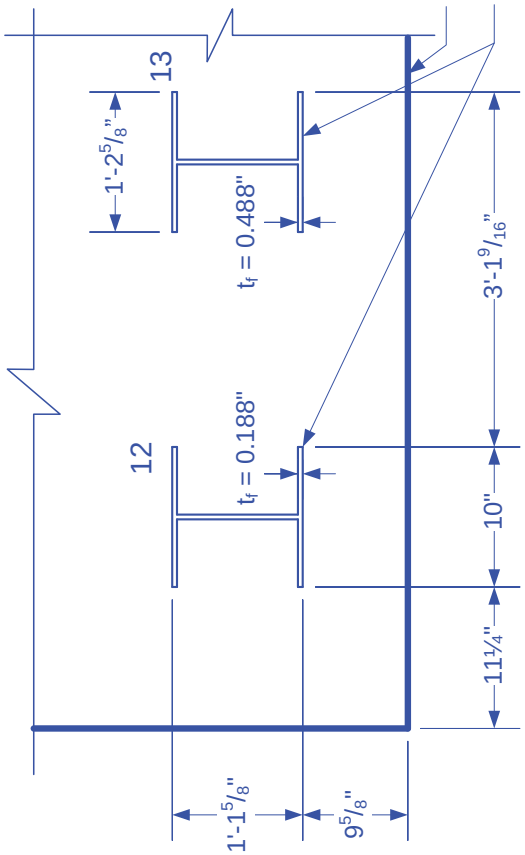
Pier 21

Test Pit TP-21NW

Test Pit TP-21S



FOOTING PLAN (N.T.S.)



TEST PITS 21S & 21NW at PIER 21

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP21NW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/13/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/13/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**593.4 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				0		0.5 (FIELD: FILL - Silt and Roots) 592.9	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				1		(FIELD: FILL - Well Graded Gravel with Sand, light brown, damp to dry)	GP						
				2		2.0 591.4 "Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash and Fine Sand, black, damp to moist, trace roots)							
				3									
				4									
				5									
				6									
				7									
				8									
				9									
				10									
				11									
				12									
				13									
				14	▽	14.0 579.4							

End of Boring at 14.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 14ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		BORING ID: TP21NW-CAP
	WISDOT STRUCTURE ID: B-5-158		PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: OMNNI Associates	CONSULTANT PROJECT NO: T1463A13	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: 10/13/13	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: 10/13/13	LOGGED BY:	HOLE SIZE: in	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 593.4 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				0		0.5 (FIELD: Silt and Roots, some Clay, reddish brown, dry) 592.9	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				1		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash and Fine Sand, black, damp to moist, trace roots)							
				2									
				3		3.5 589.9							
				4		Pier 21 Foundation							
				5									
				6									
				7									
				8		8.8 584.6							
				9		POORLY GRADED GRAVEL WITH SILT AND SAND, light brown, moist - wet (FIELD: Well-Graded Gravel with Sand, light brown, rust stained) 583.9	GP						
GS 1				10		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash and Fine Sand, black, damp to moist, trace roots)							
				11									
				12									
				13									
				14		14.0 579.4							

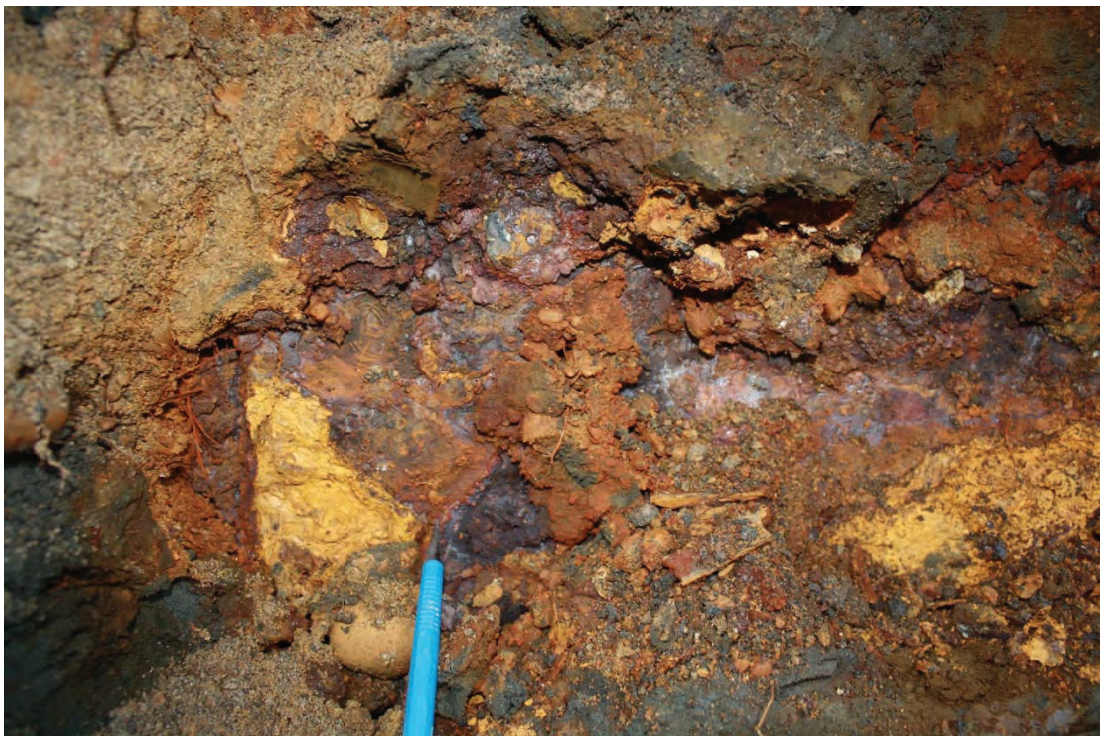
End of Boring at 14.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 14ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 21NW Photograph 1 – Pile Looking East



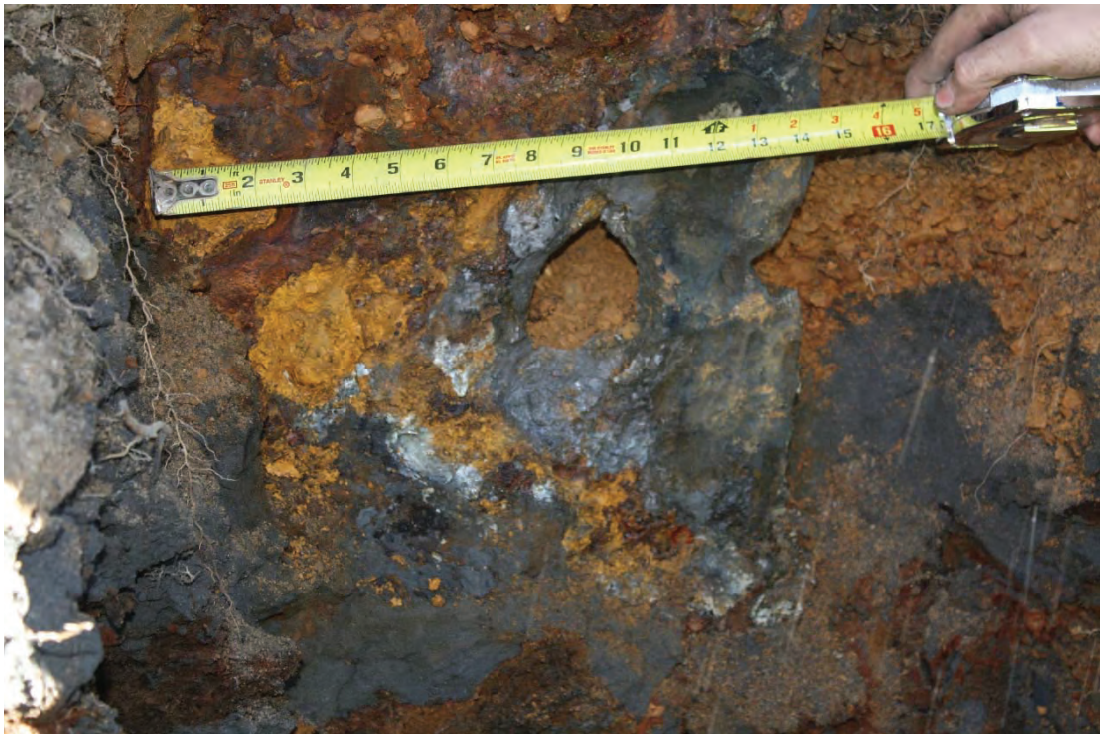
Test Pit 21NW Photograph 2 – Pile Looking East



Test Pit 21NW Photograph 3 – Pile Looking East



Test Pit 21NW Photograph 4 – Pile Looking East



Test Pit 21NW Photograph 5 – Pile Looking East



Test Pit 21NW Photograph 6 – Ground Surface Looking East



Test Pit 21NW Photograph 7 – Footer Looking South



Test Pit 21NW Photograph 8 – Pile Looking East

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP21S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**593.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		ORGANIC SOIL, SILT, black, moist (FIELD: Organic Silt (Topsoil) w/ Concrete Rubble)	OL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2		2.7 590.5							
GS 1		18		3		SANDY SILT, brown, moist (FIELD: Brown Silt w/ Sand, moist)	ML						
				4									
				5									
				6									
				7		7.4 585.8							
GS 2		34		8		SANDY SILT, dark gray, moist (FIELD: Brown/Gray Silt w/ Stone)	ML						
				9		8.6 584.6							
GS 3		77		10		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Foundry Sand/Fly Ash)							
GS 4		72		11									
				12		12.1 581.1							

End of Boring at 12.1 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP21S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**593.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SANDY SILT, brown, moist (FIELD: Brown Silt w/ Sand, moist)	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2									
				3		3.3 / 589.9							
				4		Pier 21 Foundation							
				5									
				6									
				7									
				8		8.6 / 584.6							
GS 3		77		9		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Foundry Sand/Fly Ash)							
GS 4		72		10									
				11									
				12		12.1 / 581.1							

End of Boring at 12.1 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 21S Photograph 1 – Test Pit Excavation Looking West



Test Pit 21S Photograph 2 – Test Pit Excavation Looking Northwest



Test Pit 21S Photograph 3 – Footer Looking Northwest



Test Pit 21S Photograph 4 – Pile #13 Looking West



Test Pit 21S Photograph 5 – Pile #12 Looking West



Test Pit 21S Photograph 6 – Pile #12 Looking West



Test Pit 21S Photograph 7 – Pile #12 Looking West



Test Pit 21S Photograph 8 – Pile #12 Looking West



Test Pit 21S Photograph 9 – Pile #12 Looking North



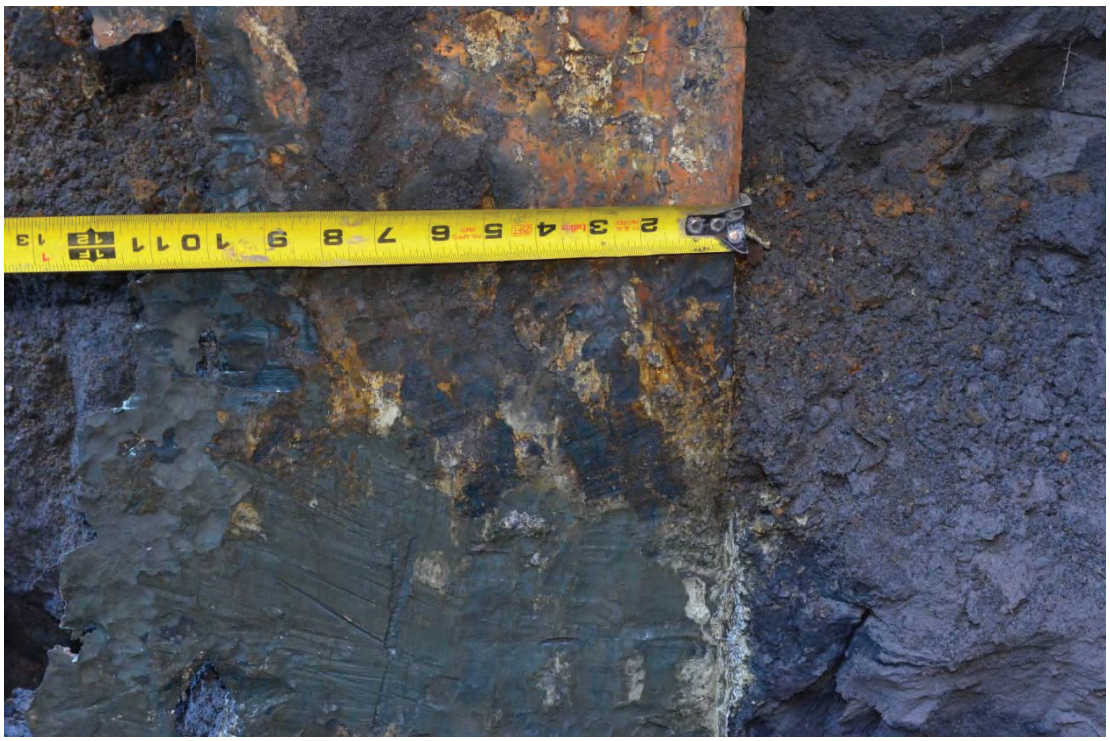
Test Pit 21S Photograph 10 – Pile #12 & #13 Looking Northwest



Test Pit 21S Photograph 11 – Pile #12 Looking North



Test Pit 21S Photograph 12 – Pile #13 Looking North



Test Pit 21S Photograph 13 – Pile #12 Looking West



Test Pit 21S Photograph 14 – Pile #13 Looking West



Test Pit 21S Photograph 15 – Pile #12 Looking West



Test Pit 21S Photograph 16 – Pile #12 Looking North



Test Pit 21S Photograph 17 – Test Pit Excavation Looking North



Test Pit 21S Photograph 18 – Pile #13 Looking West



Test Pit 21S Photograph 19 – Test Pit Excavation Looking Northwest



Test Pit 21S Photograph 20 – Test Pit Excavation Looking Northwest



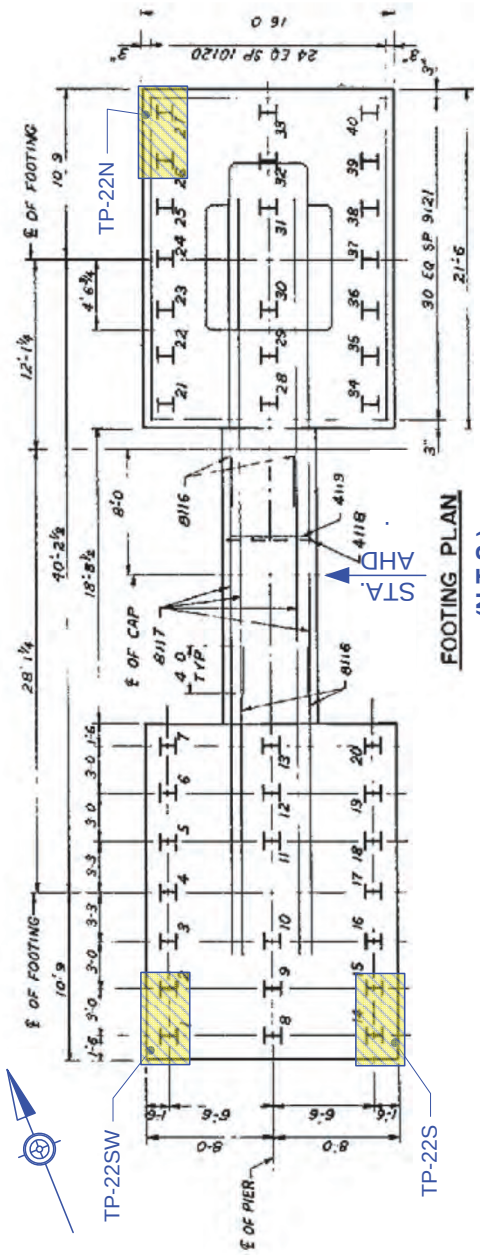
Test Pit 21S Photograph 21 – Footer / Piles Looking Northwest

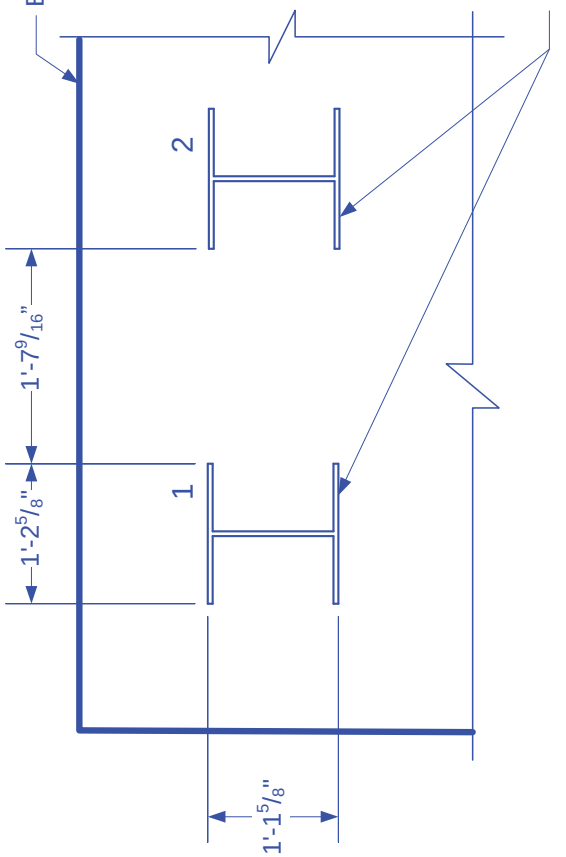
Pier 22

Test Pit TP-22N

Test Pit TP-22S

Test Pit TP-22SW





TEST PITS 22S, 22SW & 22N at PIER 22

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP22N**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/01/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/01/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**594.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1–15		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Ash)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		86											
GS 2		131		15									
				16		16.5 / 577.7							
GS 3		39		17		SILTY SAND, dark gray to black, fine grained, moist (FIELD: Silty Sand, fine to medium grained, gray) 17.5 / 576.7	SM						
GS 4		20		18		LEAN CLAY, reddish brown, moist, with sand (FIELD: Fat Clay, reddish brown, moist) 18.5 / 575.7	CL						
						End of Boring at 18.5 ft.							

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP22N-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/01/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/01/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **594.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Ash)								Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				1.5		592.7							
				2		Pier 22 Foundation							
				3									
				4									
				5									
				6									
				7									
				7.5		586.7							
				8		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Ash)							Additional samples of soil/pile material were collected off of pile. Additional samples held by OMNNI.
				9									
				10									
				11									
GS 1		86		12									
				13									
				14									
GS 2		131		15									
				16									
				16.5		577.7							
GS 3		39		17		SILTY SAND, dark gray to black, fine grained, moist (FIELD: Silty Sand, fine to medium grained, gray)	SM						
				17.5		576.7							
GS 4		20		18		LEAN CLAY, reddish brown, moist, with sand (FIELD: Fat Clay, reddish brown, moist)	CL						
				18.5		575.7							
						End of Boring at 18.5 ft.							

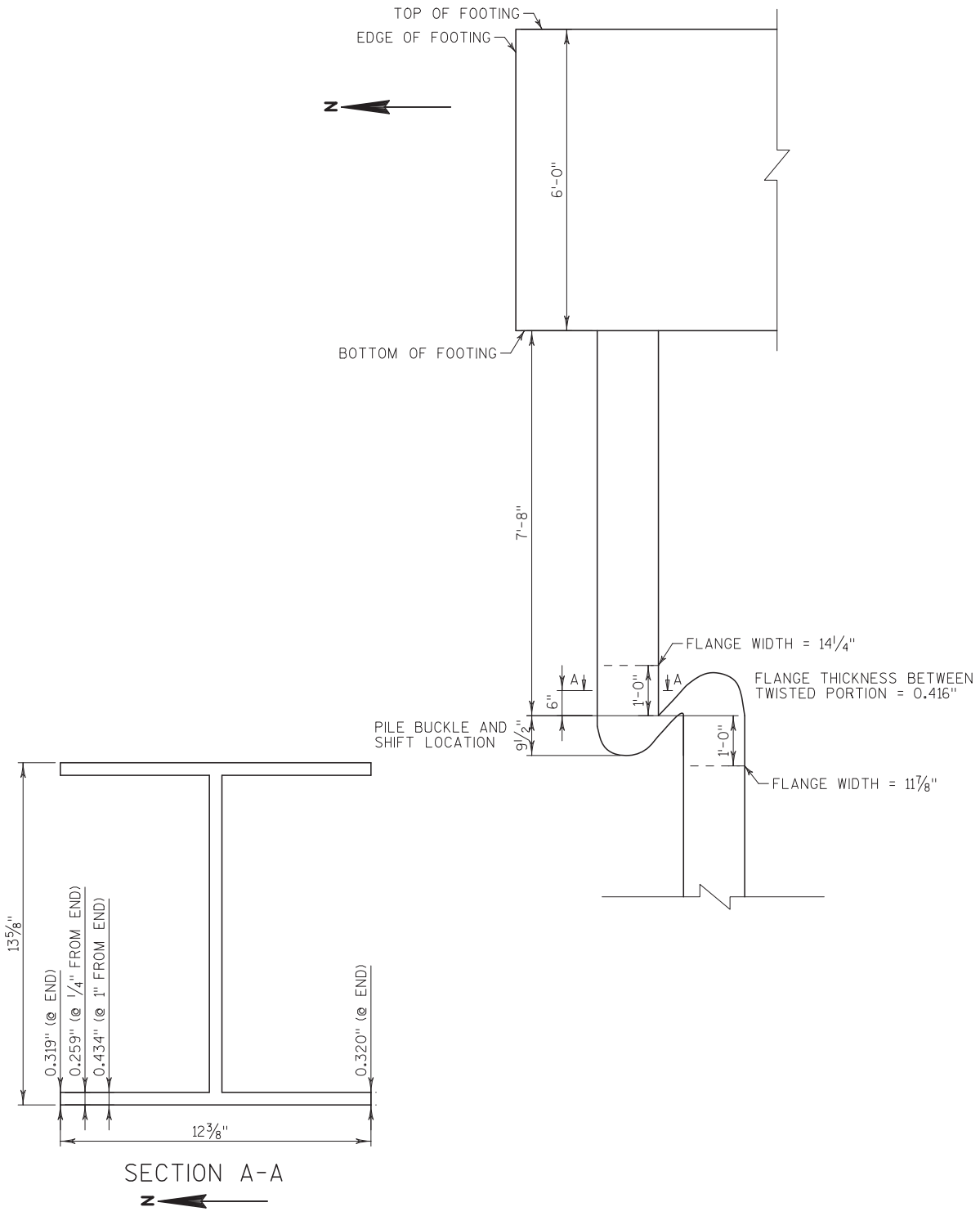
F:\MATERIAL\GEOTECH\GINT\PROJECTS\T1463A13_WISDOTFIELD.GPJ Leo Frigo Memorial Bridge 11/5/13

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

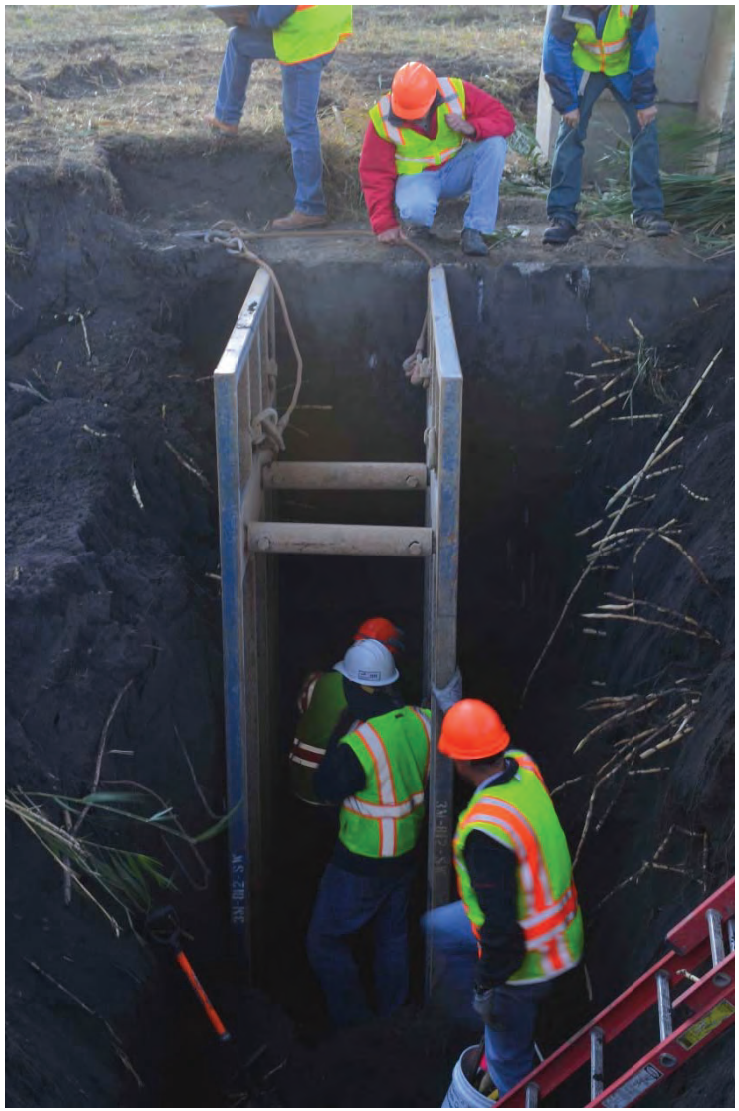
NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

PIER 22 - NW CORNER
FIELD SKETCH





Test Pit 22N Photograph 1 – Test Pit Excavation Looking Northeast



Test Pit 22N Photograph 2 – Looking East



Test Pit 22N Photograph 3 – Pile 27 Looking East



Test Pit 22N Photograph 4 – Pile 27 Looking East



Test Pit 22N Photograph 5 – Pile 27 Looking East



Test Pit 22N Photograph 6 – Pile 27 Looking East



Test Pit 22N Photograph 7 – Pile 27 Close-up



Test Pit 22N Photograph 8 – Pile 27



Test Pit 22N Photograph 9 – Pile 27



Test Pit 22N Photograph 10 – Pile 27



Test Pit 22N Photograph 11 – Pile 27 Looking Down



Test Pit 22N Photograph 12 – Pile 27 Looking Up



Test Pit 22N Photograph 13 – Pile 27 Looking Up



Test Pit 22N Photograph 14 – Pile 27 Looking Down

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP22S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**595.1 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		66		1–10		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Sample 4 (TP22S-4) take from Pit Run Sand & Gravel from East Bank of Test Pit.
GS 2		88		11		11.0 / 584.1 End of Boring at 11.0 ft.							

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP22S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**	
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **595.1 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		66		1–2		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
						2.5 — 592.6							
				3–8		Pier 22 Foundation							
						8.5 — 586.6							
GS 3		107		9		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)							Additional samples of soil/pile material were collected off of pile. Additional samples held by OMNNI.
GS M1		25		10–12									
GS 5				13		13.7 — 581.4							Sample 5 (TP22S-5) taken off of pile surface. Only chemistry testing performed.

End of Boring at 13.7 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 22S Photograph 1 – Test Pit Excavation Looking Northeast



Test Pit 22S Photograph 2 – Test Pit Excavation Looking East



Test Pit 22S Photograph 3 – Test Pit Excavation Looking West



Test Pit 22S Photograph 4 – Test Pit Excavation Looking West



Test Pit 22S Photograph 5 – Footer Looking West



Test Pit 22S Photograph 6 – Test Pit Excavation Looking South



Test Pit 22S Photograph 7 – Test Pit Excavation Looking South



Test Pit 22S Photograph 8– Test Pit Excavation Looking South



1Test Pit 22S Photograph 9– Pile #14 Looking West



Test Pit 22S Photograph 10– Pile #14 (left) and Pile #15 (right) Looking West



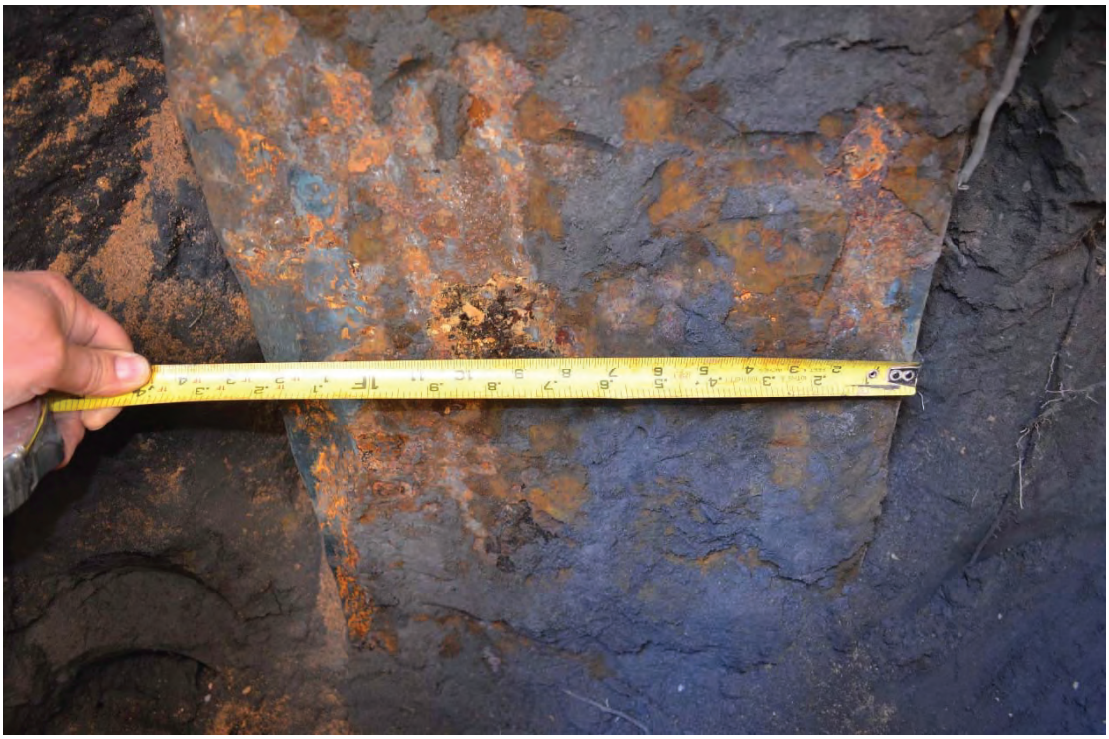
Test Pit 22S Photograph 11 – Pile #14 Looking North



Test Pit 22S Photograph 12 – Pile #14



Test Pit 22S Photograph 13 – Pile #14



Test Pit 22S Photograph 14 Pile #14



Test Pit 22S Photograph 15 – Pile #14



Test Pit 22S Photograph 16 – Pile Flange



Test Pit 22S Photograph 17 –Pile #14 (left) and Pile #15 (right) Looking West



Test Pit 22S Photograph 18 – Pile #14 Looking West



Test Pit 22S Photograph 19 – Test Pit Excavation Spoil



Test Pit 22S Photograph 20 –Pile #14 (left) and Pile #15 (right)



Test Pit 22S Photograph 21 – Pile #14 Looking West

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP22SW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/01/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/01/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**594.6 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1–16		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Ash)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 1		55											
				17		17.0 577.6							
GS 2		20				SAND, dark yellowish brown, fine grained, moist (FIELD: Sand, fine to medium grained, gray, moist)	SP						
				18		18.0 576.6							
GS 3		19				LEAN CLAY, brown with black, moist, with sand (FIELD: Lean Clay, reddish brown mottled gray, moist)	CL						
				19		19.0 575.6							

End of Boring at 19.0 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP22SW-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**	
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/01/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/01/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: **594.6 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Ash)								Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2		2.0 592.6 Pier 22 Foundation							
				3									
				4									
				5									
				6									
				7									
				8		8.0 586.6 "Fly Ash / Coal Ash / Foundry Sand" (FIELD: Ash)							
				9									
				10									
				11									
				12									
				13									
				14									
				15									
				16									
				17		17.0 577.6							
GS 2		20		18		SAND, dark yellowish brown, fine grained, moist (FIELD: Sand, fine to medium grained, gray, moist) 18.0 576.6	SP						
GS 3		19		19		LEAN CLAY, brown with black, moist, with sand (FIELD: Lean Clay, reddish brown mottled gray, moist) 19.0 575.6	CL						Additional samples of soil/pile material were collected off of pile. Additional samples held by OMNNI.
						End of Boring at 19.0 ft.							

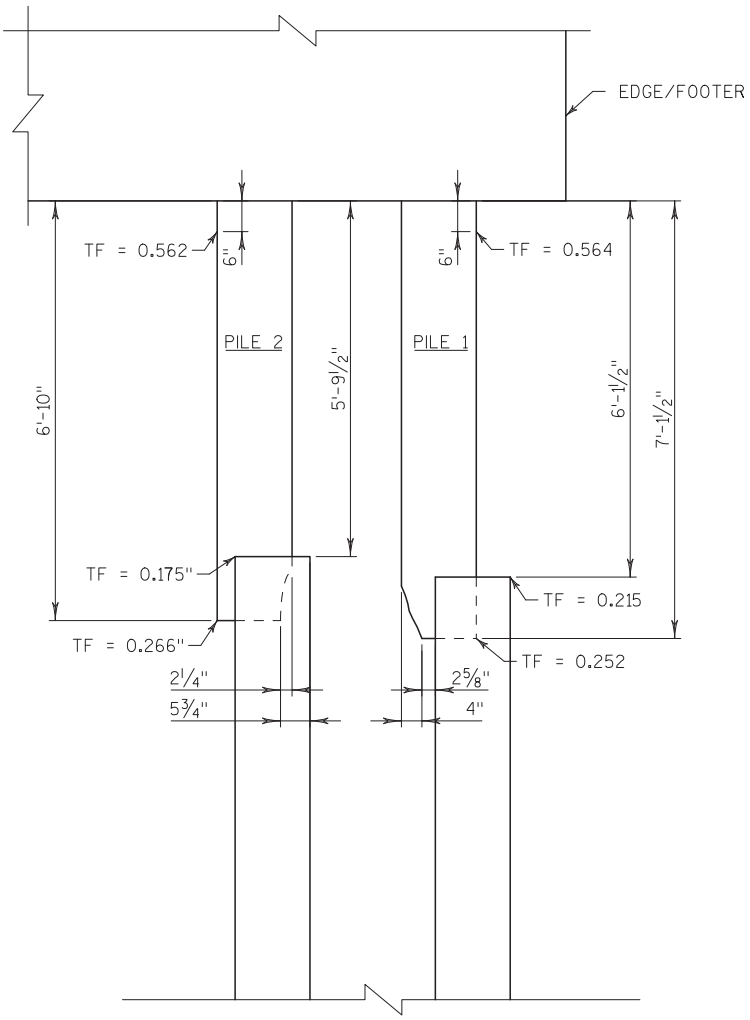
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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

PIER 22 - SW CORNER
FIELD SKETCH



TF = FLANGE THICKNESS



Test Pit 22SW Photograph 1 – Test Pit Excavation Looking East



Test Pit 22SW Photograph 2 – Pile #1 Looking East



Test Pit 22SW Photograph 3 – Pile #1 Looking Down to East



Test Pit 22SW Photograph 4 – Pile #1 Looking Up to East



Test Pit 22SW Photograph 5 – Pile #1 Looking East



Test Pit 22SW Photograph 6 – Pile #1 Looking Down to East



Test Pit 22SW Photograph 7 – Pile #2 Looking Northeast



Test Pit 22SW Photograph 8 – Pile #2 Looking Northeast



Test Pit 22SW Photograph 9 – Pile #2 Looking Northeast



Test Pit 22SW Photograph 10 – Pile #2 Looking Down to Northeast



Test Pit 22SW Photograph 11 – Pile #1 Looking Southeast



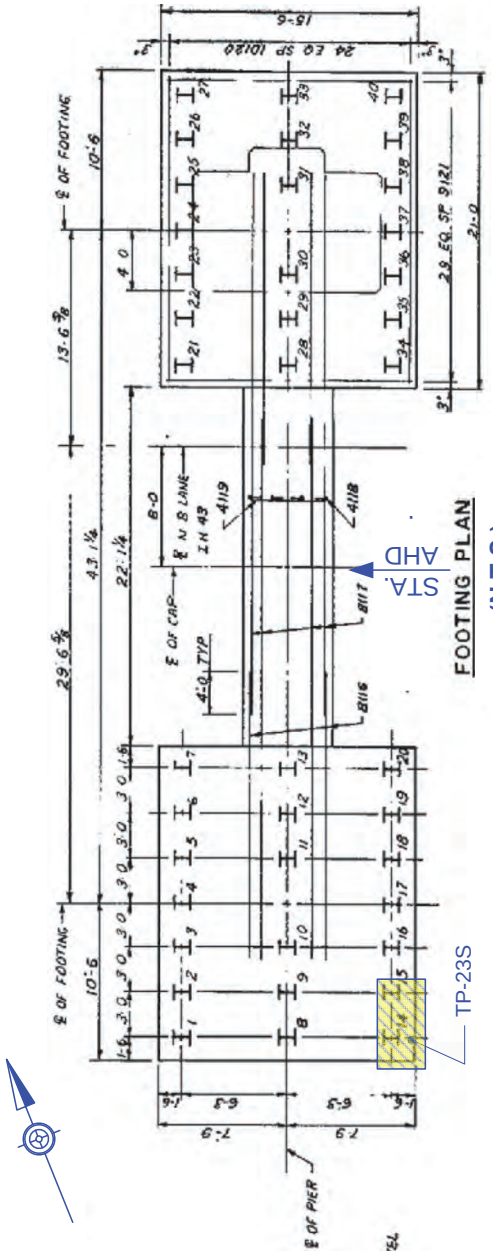
Test Pit 22SW Photograph 12 – Pile #2 Looking Down to Northeast



Test Pit 22SW Photograph 13 – Pile #1 Looking to Down to Southeast

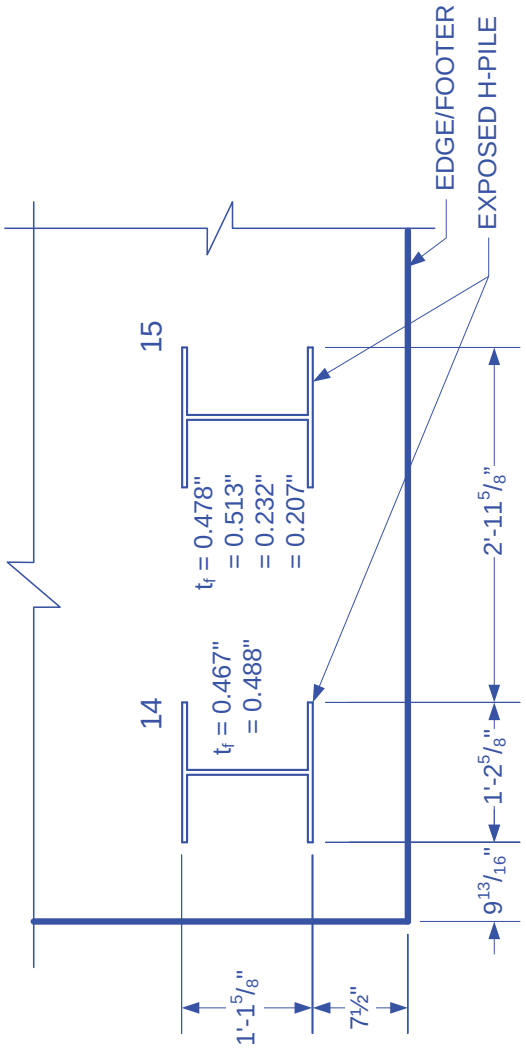
Pier 23

Test Pit TP-23S



FOOTING PLAN (N.T.S.)

TEST PIT 23S at PIER 23



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP23S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**589.3 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		10		1–2		SAND, dark brown, fine grained, moist, with silt (FIELD: Sand w/ Silt, brown, moist) 2.3 587.0	SP-SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 2		70		3–8		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash) 8.1 581.2							
GS 3		93		8–9		8.6 "Shredded Wood" (FIELD: Wood) 580.7 ORGANIC SOIL, SILT, black, moist (FIELD: Black Organic Silt, moist) 10.3 579.0	OL						Flyash encountered extends downward below Pier 23 foundation.
GS 4		22		10–11		SILTY SAND, yellowish brown, fine grained, moist 11.8 577.5	SM						

End of Boring at 11.8 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP23S-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**589.3 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SAND, dark brown, fine grained, moist, with silt (FIELD: Sand w/ Silt, brown, moist)	SP-SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				1.9		587.4							
				2		Pier 23 Foundation							
				3									
				4									
				5									
				6									
				7									
				8		8.0 581.3							
GS 6		34				"Shredded Wood" (FIELD: Wood)							Sample 6 (TP23S-6) a lean clay sample taken below pile cap. Only geotechnical testing performed.
				8.6		580.7							
GS 5		113		9		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)							Additional samples of soil/pile material were collected off of pile. Additional samples held by OMNNI.
				10									
				11									
				11.8		577.5							

End of Boring at 11.8 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 23S Photograph 1 – Test Pit Excavation Looking South



Test Pit 23S Photograph 2 – Test Pit Excavation Looking Southeast



Test Pit 23S Photograph 3 – Bottom of Footer Looking West



Test Pit 23S Photograph 4 – Close Up of Bottom of Footer Looking West



Test Pit 23S Photograph 5 – Test Pit Excavation Looking West



Test Pit 23S Photograph 6 – Footer Looking West



Test Pit 23S Photograph 7 – Test Pit Excavation Looking Southwest



Test Pit 23S Photograph 8 – Piles #14 & #15 Looking North



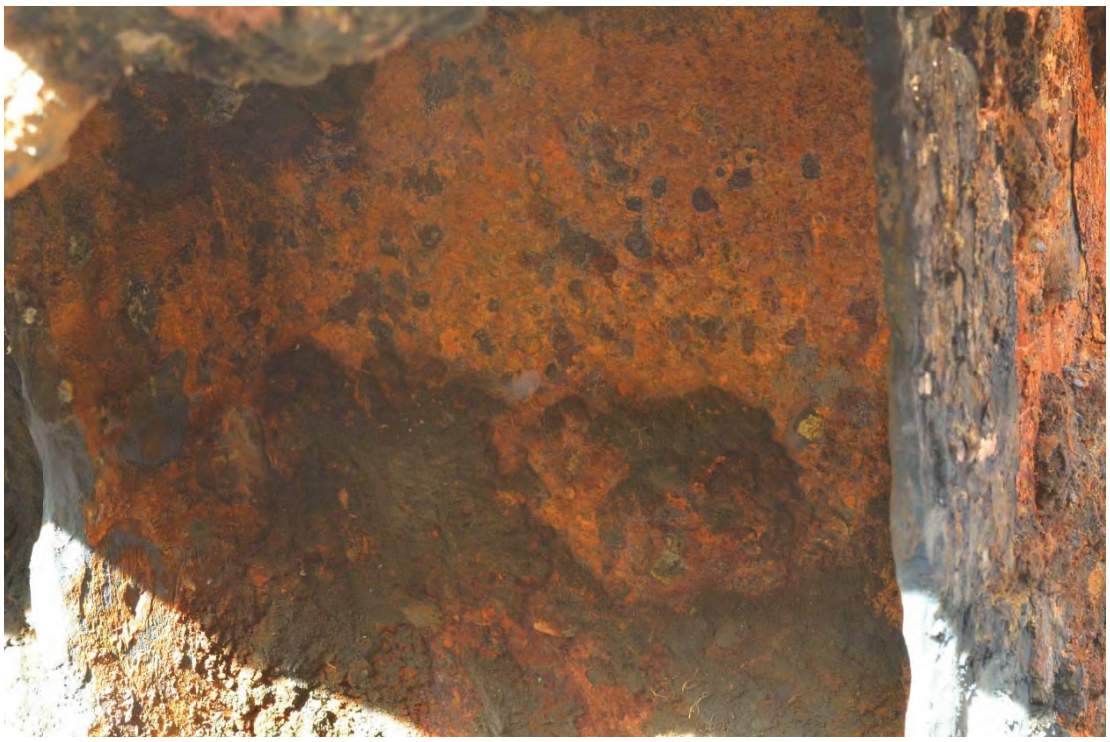
Test Pit 23S Photograph 9 – Pile #15 Looking North



Test Pit 23S Photograph 10 – Pile #14 Looking West



Test Pit 23S Photograph 11 – Pile #15 Looking West



Test Pit 23S Photograph 12 – Pile #14 Web Looking North



Test Pit 23S Photograph 16 – Pile #14 Looking North



Test Pit 23S Photograph 17 – Pile #15 Looking North



Test Pit 23S Photograph 18 – Pile #14 & #15 Looking Northwest



Test Pit 23S Photograph 19 – Pile #14 Looking North

Pier 24

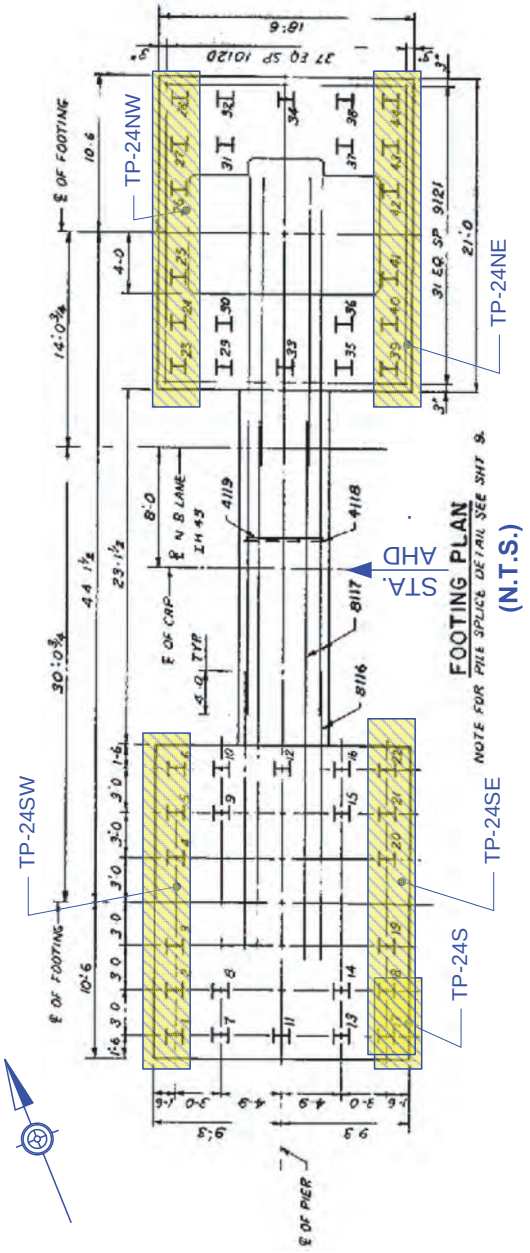
Test Pit TP-24NE

Test Pit TP-24NW

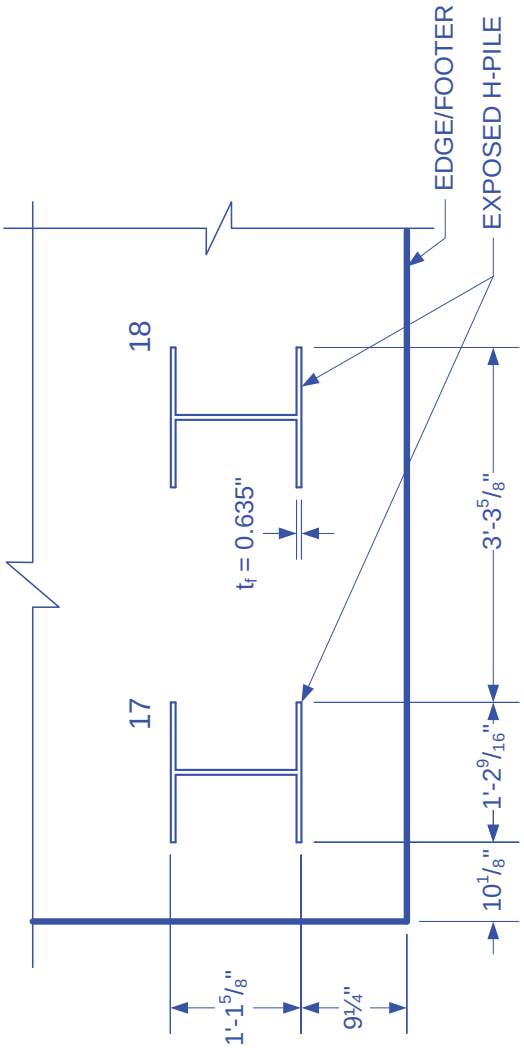
Test Pit TP-24S

Test Pit TP-24SE

Test Pit TP-24SW



Pile No.	Measured Flange Thickness t_f
2	0.500
16	0.635
32	0.641
40	0.642
41	0.615
42	0.622
43	0.641
44	0.653



TEST PITS 24S, 24SE, 24SW, 24NE & 24NW at PIER 24

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP24NE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**587.4 ft**

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
1–4	(FIELD: FILL - Sand, dark yellowish brown, with silt and trace gravel, some roots, damp)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
4.5 / 582.9	"Shredded Wood" (FIELD: Shredded Wood, brown, wet)							
8 ▽ / 8.5 / 578.9	SANDY SILT, black, wet (FIELD:Silt, black, wet)	ML						
10.0 / 577.4	SAND, brown, fine grained, moist (FIELD: Silty Sand, fine grained, wet, some shells present, producing water)	SP						
11.7 / 575.7	LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, grades from gray to orangish brown to reddish brown, mottled)	CL						
14.6 / 572.8	End of Boring at 14.6 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:TP24NE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **587.4 ft**	

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
1	(FIELD: FILL - Sand, dark yellowish brown, with silt and trace gravel, some roots, damp)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
1.7 / 585.7	Pier 24 Foundation							
8.0 / 579.4								
8.3 / 579.2	(FIELD: Gravel, limestone, wet, gray, perched water)	GP-GM						
	SANDY SILT, black, wet (FIELD:Silt, trace vegetation)	ML						
9.8 / 577.6								
10.4 / 577.0	SAND, brown, fine grained, moist (FIELD: Silty Sand, gray, fine grained, wet, perched water)	SP						
	LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, grades from gray to orangish brown to reddish brown, mottled)	CL						
14.6 / 572.8								

End of Boring at 14.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 24NE Photograph 1 – Footer Looking West



Test Pit 24NE Photograph 2 – Pile # 40 Looking West



Test Pit 24NE Photograph 3 – Pile #40 Looking West



Test Pit 24NE Photograph 4 – Pile #40 Looking West



Test Pit 24NE Photograph 5 – Pile #44 Looking West

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP24NW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/11/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/11/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**585.7 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1		SILTY SAND, yellowish brown, fine grained (FIELD: FILL - Sand, light brown)	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data.
				1.5 / 584.2									
				2		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)							
				3									
				4									
				4.2 / 581.5									
GS 2				5		"Shredded Wood" (FIELD: FILL - Shredded Wood Frag, with Organic Silt)							
				6.0 / 579.7									
				6		SANDY SILT, black, wet	ML						Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc.
				7									
				8.0 / 577.7									
GS 3				8		LEAN CLAY, dark grayish brown, with sand (FIELD: Silty Clay, gray)	CL						Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				9									
				10.0 / 575.7									
GS 4				10		SILT, yellowish brown (FIELD: Silty Clay, tan to light brown grades to reddish brown)	ML						
				11									
				12.0 / 573.7									
GS 5				12		LEAN CLAY, dark brown, with sand (FIELD: Silty Clay, tan to light brown grades to reddish brown)	CL						
				13									
				14.0 / 571.7									
				14		End of Boring at 14.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		BORING ID: TP24NW-CAP
	WISDOT STRUCTURE ID: B-5-158		PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: OMNNI Associates	CONSULTANT PROJECT NO: T1463A13	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: 10/11/13	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: 10/11/13	LOGGED BY:	HOLE SIZE: in	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 586.9 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1		SILTY SAND, yellowish brown, fine grained 1.2 585.7	SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		Pier 24 Foundation							
				3									
				4									
				5									
				6									
				7		7.2 579.7							
				8		SANDY SILT, black, wet	ML						
				9		9.7 577.2							
GS 3				10		LEAN CLAY, dark grayish brown, with sand (FIELD: Silty Clay, gray)	CL						
				11		11.2 575.7							
GS 5				12		LEAN CLAY, dark brown, with sand (FIELD: Silty Clay, light brown)	CL						
				13									
				14									
				15		15.2 571.7							

End of Boring at 15.2 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 24NW Photograph 1 – Resistivity Testing Near Top of Footer Elevation Looking South



Test Pit 24NW Photograph 2 – Test Pit Excavation Looking North



Test Pit 24NW Photograph 3 – Bottom of Footer Looking Southeast



Test Pit 24NW Photograph 4 – Resistivity Testing Near Bottom of Footer Elevation Looking Northeast



Test Pit 24NW Photograph 5 – Footer and Underlying Clay Looking East



Test Pit 24NW Photograph 6 – Water-Filled Void at Exposed Pile Looking East



Test Pit 24NW Photograph 7 – Pile Looking East



Test Pit 24NW Photograph 8 – Test Pit Excavation Looking Northwest



Test Pit 24NW Photograph 9 – Void at Exposed Pile Looking East



Test Pit 24NW Photograph 10 – Footer Looking East

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP24S**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**586.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		15		1–4		SAND, dark yellowish brown, fine grained, moist, with silt (FIELD: Sand w/ Silt, light brown, moist)	SP-SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				4.2									
GS 2		77		5		SILTY SAND, black, fine to medium grained, moist, with gravel , some Ash (FIELD: Organic Silt w/ Roots and Gravel, moist, black)	SM						
				5.5									
GS 3		224		6–7		"Shredded Wood" (FIELD: Wood, Mulch, moist to wet)							
				7.6									
GS 5		39		8–9		SANDY SILT, black, wet (FIELD: Organic Clay w/ Sand, black, wet)	ML						
				9.3									
GS 6		19		10		SAND, dark grayish brown, fine grained, wet (FIELD: Clay w/ Gravel, Sand, and Silt, gray, wet)	SP-SM						
				10.3									

End of Boring at 10.3 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP24S-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **586.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SAND, dark yellowish brown, fine grained, moist, with silt (FIELD: Sand w/ Silt, light brown, moist) 1.2 585.7	SP-SM						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				2		Pier 24 Foundation							
				3									
				4									
				5									
				6									
				7		7.7 579.2							
GS 4		8		8		POORLY GRADED GRAVEL WITH SILT AND SAND, dark gray, moist - wet (FIELD: Crushed Stone w/ Sand and Silt, wet) 8.5 578.4	GP-GM						
				9		SANDY SILT, black, wet (FIELD: Organic Clay w/ Sand, black, wet) 9.3 577.6	ML						
GS 6		19		10		SAND, dark grayish brown, fine grained, wet (FIELD: Clay w/ Gravel, Sand, and Silt, gray, wet) 10.3 576.6	SP-SM						

End of Boring at 10.3 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 24S Photograph 1 – Test Pit Excavation Looking North



Test Pit 24S Photograph 2 – Test Pit Excavation Looking North



Test Pit 24S Photograph 3 – Test Pit Excavation Looking North



Test Pit 24S Photograph 4 – Test Pit Excavation Spoil



Test Pit 24S Photograph 5 – Test Pit Excavation Spoil Looking West



Test Pit 24S Photograph 6 – Footer and Test Pit Excavation Looking Northeast



Test Pit 24S Photograph 7 – Pile #17 Looking West



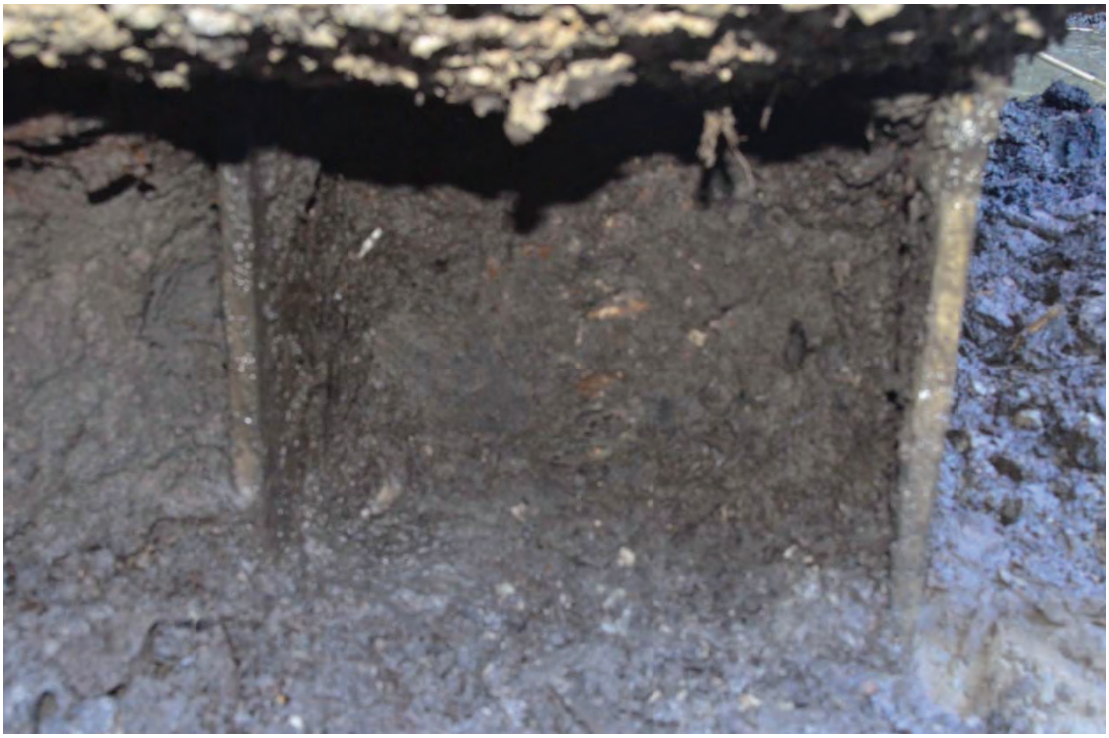
Test Pit 24S Photograph 8 –Pile #18 Looking West



Test Pit 24S Photograph 9 –Pile #17 (left) and Pile #18 (right) Looking West



Test Pit 24S Photograph 10 – Footer and Pile #17 Looking North



Test Pit 24S Photograph 11 – Pile #17 Looking North



Test Pit 24S Photograph 12 – Footer Looking North



Test Pit 24S Photograph 13 – Test Pit Excavation Looking Northeast



Test Pit 24S Photograph 14 – Pile Flange



Test Pit 24S Photograph 15 – Test Pit Excavation and Footer Looking Northwest



Test Pit 24S Photograph 16 – Footer and Pile #17 (left) and Pile #18 (right) Looking Northwest

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP24SE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**587 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
1		(FIELD: FILL - Sandy Silt, brown, damp)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
5		5.1 — 581.9							
6		"Shredded Wood" (FIELD: Shredded Wood)							
7		▽							
9		9.1 — 577.9							
10		SANDY SILT, black, wet (FIELD: Silt, black, wet)	ML						
		10.3 — 576.7							
11		SAND, brown, fine grained, moist (FIELD: Sand, gray, wet, trace gravel)	SP						
		11.7 — 575.3							
12		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, moist)	CL						
13		13.5 — 573.5							

End of Boring at 13.5 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.5ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:TP24SE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **587 ft**	

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
1		(FIELD: FILL - Sandy Silt, brown, damp)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
1.3		585.7							
2		Pier 24 Foundation							
3									
4									
5									
6									
7									
7.5		579.5							
7.9		(FIELD: Gravel, gray, wet) 579.1	GP-GM						
8		SANDY SILT, black, wet (FIELD: Silt, black, wet)	ML						
8.9		578.1							
9		SAND, brown, fine grained, moist (FIELD: Sand, gray, wet)	SP						
9.5		577.5							
10		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, moist)	CL						
11									
12									
13									
13.5		573.5							

End of Boring at 13.5 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 7.5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 24SE Photograph 1 – Footer and Pile #19, #20, #21 & #22 Looking West



Test Pit 24SE Photograph 2 –Void Exposed Around Pile #20 Looking Southwest



Test Pit 24SE Photograph 3 – Footer and Pile #20, #21 & #22 Looking West



Test Pit 24SE Photograph 4 – Pile #20 Looking West

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP24SW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**587.2 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Notes
1–5		(FIELD: Silt and fine Sand, some Gravel in upper 18 inches, brown, damp)		Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
5.4 / 581.8		"Shredded Wood" (FIELD: Shredded Wood with some Flyash)		
9.4 / 577.8		SAND, brown, fine grained, wet (FIELD: Silty Sand, gray, fine grained, wet)	SP	
10.5 / 576.7		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, grades from reddish brown to gray to orangish brown to reddish brown mottled)	CL	
13.7 / 573.5		End of Boring at 13.7 ft.		

SAMPLE TYPE NUMBER | RECOVERY (in) (RQD) | Moisture | BLOW COUNTS (N VALUE) | Strength Qp (tsf) | Liquid Limit (%) | Plasticity Index (%) | Boulders | Drilling Method

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 9.4ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP24SW-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/18/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/18/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**587.2 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
1		(FIELD: FILL - Silt and fine Sand, brown, damp) 1.5 / 585.7							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
2		Pier 24 Foundation							
3									
4									
5									
6									
7									
8		7.8 / 579.4 8.1 (FIELD: Gravel) / 579.1	GP-GM						
9		SANDY SILT, black, wet (FIELD: Sandy Silt w/ Organics, black, wet) 9.5 / 577.7	ML						
10		SAND, brown, fine grained, wet (FIELD: Silty Sand, gray, fine grained, wet) 10.5 / 576.7	SP						
11		LEAN CLAY, reddish brown, moist, with sand (FIELD: Lean Clay, grades from reddish brown to gray to orangish brown to reddish brown mottled)							
12			CL						
13		13.7 / 573.5							

End of Boring at 13.7 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 9.4ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 24SW Photograph 1 – Pile #1 and #2 Looking Southeast



Test Pit 24SW Photograph 2 – Test Pit Excavation Looking Southeast



Test Pit 24SW Photograph 3 – Pile #2, #3, #4, #5 & #6 Looking Northeast



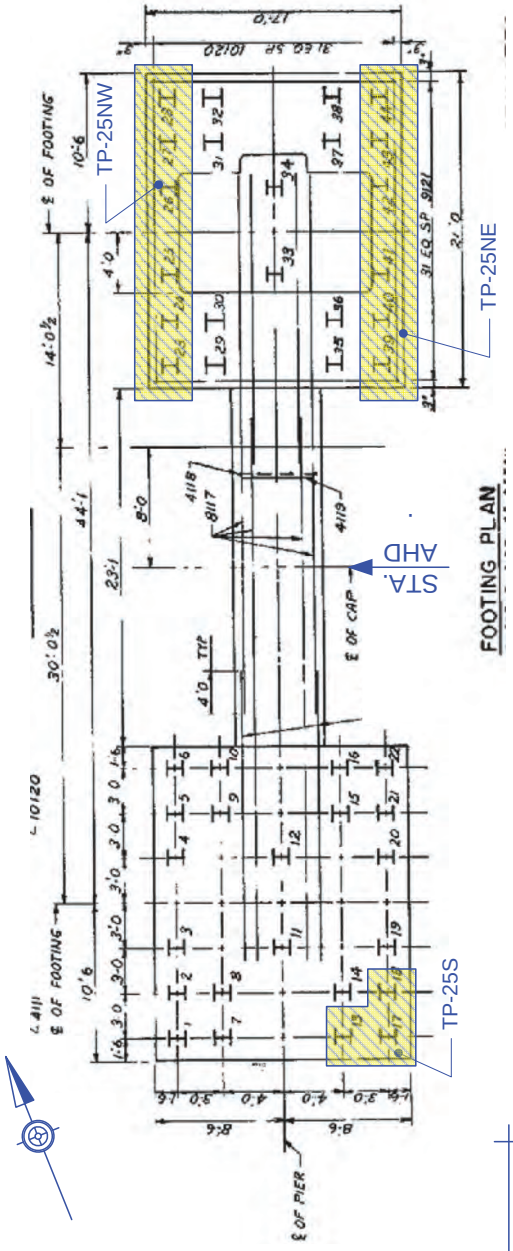
Test Pit 24SW Photograph 4 – Pile #2 Looking East

Pier 25

Test Pit TP-25NE

Test Pit TP-25NW

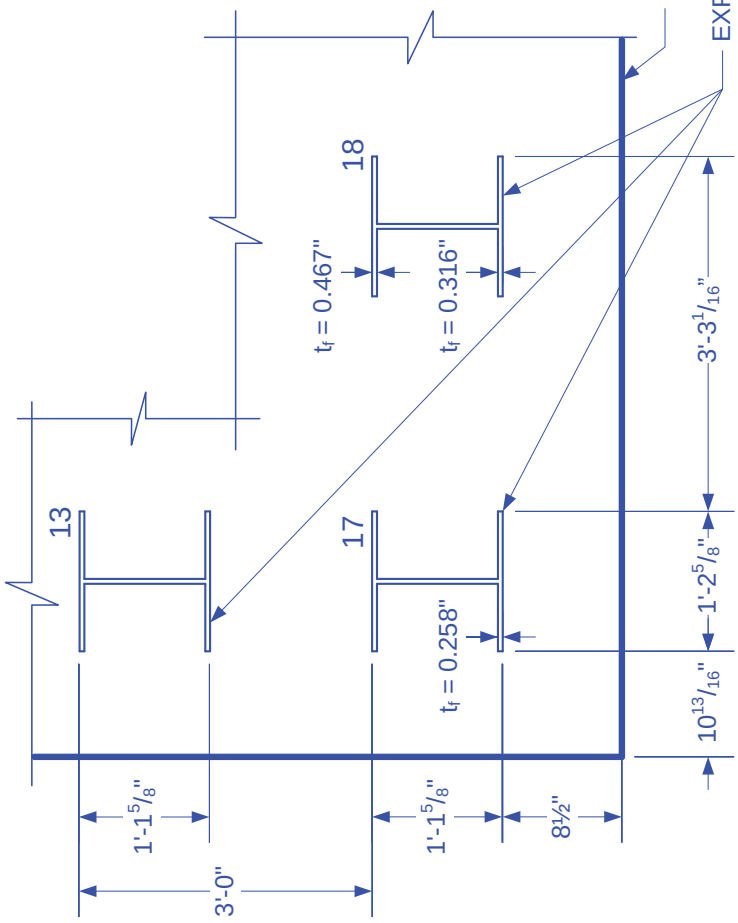
Test Pit TP-25S



FOOTING PLAN
(N.T.S.)

Pile No.	Ultrasonically Measured Flange Thickness, t_f
24	0.242"
24	0.215"
24	0.231"
24	0.502"

TEST PITS 25S, 25NE & 25NW at PIER 25



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP25NE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/12/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/12/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**592.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1–16		"Fly Ash / Coal Ash / Foundry Sand"							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
GS 2													
GS 3													
				14.4		577.8							
GS 4				15		SAND, black, fine grained, with silt	SP-SM						
				15.4		576.8							
GS 5				16.0		SAND, light brown, fine grained	SP						
						576.2							

End of Boring at 16.0 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:TP25NE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**	PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/12/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/12/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **592.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		"Fly Ash / Coal Ash / Foundry Sand"							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		2.4 589.8							
				3		Pier 25 Foundation							
				4									
				5									
				6									
GS 2				7									
				8		8.6 583.6							
				9		"Fly Ash / Coal Ash / Foundry Sand"							
				10									
				11									
				12									
GS 3				13									
				14		14.4 577.8							
GS 4				15		SAND, black, fine grained, with silt	SP-SM						
GS 5						15.4 576.8 SAND, light brown, fine grained							
				16		16.0 576.2	SP						

End of Boring at 16.0 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 25NE Photograph 1 – Footer Looking West



Test Pit 25NE Photograph 2 Pile Looking Northwest



Test Pit 25NE Photograph 3 – Pile Looking West



Test Pit 25NE Photograph 4 – Bottom of Footer Looking West



Test Pit 25NE Photograph 5– Pile Looking West



Test Pit 25NE Photograph 6 – Pile Looking Northwest



Test Pit 25NE Photograph 7 – Pile Looking West



Test Pit 25NE Photograph 8 – Pile Looking West



Test Pit 25NE Photograph 9 – Pile and Fill Looking West



Test Pit 25NE Photograph 10 – Pile Looking West



Test Pit 25NE Photograph 11 – Pile Looking West



Test Pit 25NE Photograph 12 – Pile Looking West



Test Pit 25NE Photograph 13 – Pile Looking Southwest



Test Pit 25NE Photograph 14 – Pile Looking Southwest



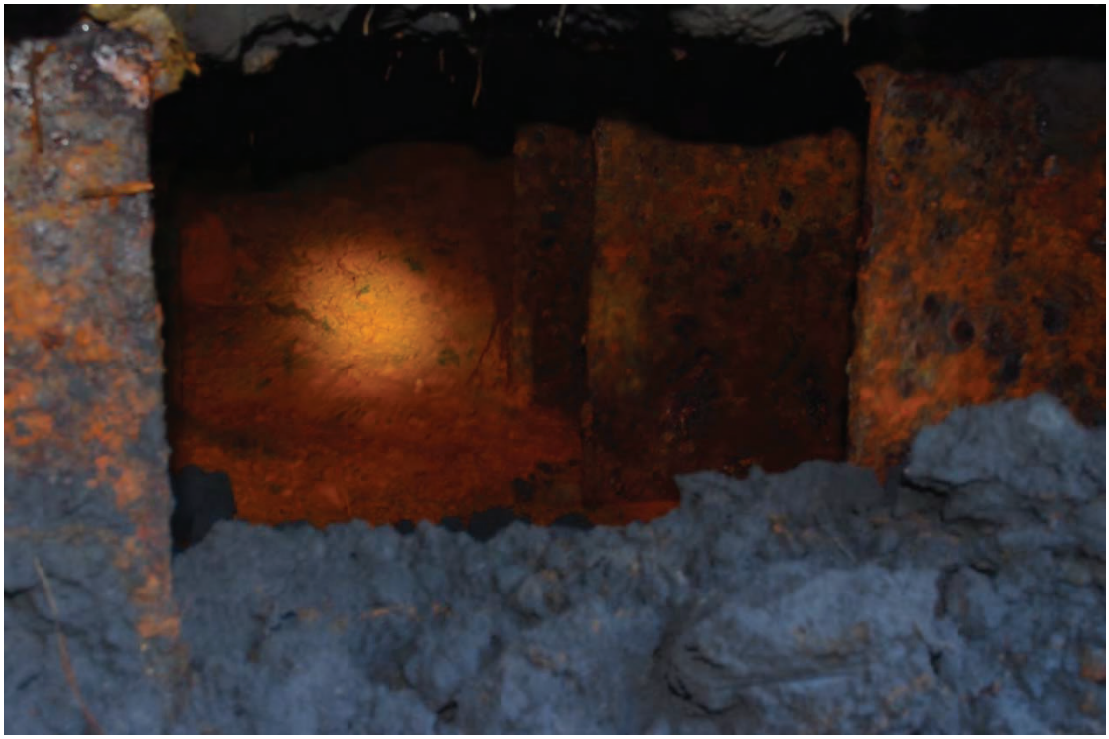
Test Pit 25NE Photograph 15 – Pile Looking West



Test Pit 25NE Photograph 16 – Pile Looking West



Test Pit 25NE Photograph 17 – Pile Looking West



Test Pit 25NE Photograph 18 – Pile Looking West



Test Pit 25NE Photograph 19 – Footer and Piles Looking North



Test Pit 25NE Photograph 20 – Pile Looking West

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP25NW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/13/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/13/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**592 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				0		0.5 (FIELD: Sand, Silt, Fly Ash, light brown, some roots and organic material) 591.5							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				1		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash, black, damp)							
				2		2.2 589.8							
				3		Pier 25 Foundation							
				4									
				5									
				6									
				7									
				8		8.2 583.8							
GS 1				9		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash, black, damp, roots)							
				10									
				11									
				12		12.5 579.5							

End of Boring at 12.5 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 12.5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 25NW Photograph 1 – Pile Looking East



Test Pit 25NW Photograph 2 – Pile Looking East



Test Pit 25NW Photograph 3 – Pile Looking East



Test Pit 25NW Photograph 4 – Pile Looking East



Test Pit 25NW Photograph 5– Pile Looking East



Test Pit 25NW Photograph 6 – Test Pit Excavation Below Footer Looking East



Test Pit 25NW Photograph 7 – Test Pit Excavation Looking Northeast

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:**	**TP25S**
	WISDOT STRUCTURE ID:	**B-5-158**	PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION:	**592.2 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1		90		1–10		"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
GS 2		120											
						10.4 581.8							

End of Boring at 10.4 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP25S-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **9/29/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **9/29/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **592.2 ft**

Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	Notes
0	"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)	Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
2.4 (589.8)	Pier 25 Foundation	
8.6 (583.6)	"Fly Ash / Coal Ash / Foundry Sand" (FIELD: Fly Ash)	Additional samples of soil/pile material were collected off of pile. Additional samples held by OMNNI.
10.4 (581.8)	End of Boring at 10.4 ft.	

SAMPLE TYPE NUMBER | RECOVERY (in) (RQD) | Moisture | BLOW COUNTS (N VALUE) | Graphic | USCS / AASHTO | Strength Qp (tsf) | Liquid Limit (%) | Plasticity Index (%) | Boulders | Drilling Method

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 25S Photograph 1 – Footer Looking North



Test Pit 25S Photograph 2 – Pile #17 & #18 Looking West



Test Pit 25S Photograph 3 – Pile #18 Looking West



Test Pit 25S Photograph 4 – Pile #17 Looking North



Test Pit 25S Photograph 5 – Pile #17 Looking North



Test Pit 25S Photograph 6 – Pile #17 Looking North



Test Pit 25S Photograph 7 – Pile #17 Looking Northwest



Test Pit 25S Photograph 8 – Pile #17 Looking North



Test Pit 25S Photograph 9 – Pile #18 Looking West



Test Pit 25S Photograph 10 – Pile #17 Looking West



Test Pit 25S Photograph 11 – Footer Looking West



Test Pit 25S Photograph 12 – Footer Looking West

Pier 32

Test Pit TP-32NE

Test Pit tp-32SW

TEST PITS 32NE & 32SW at PIER 32

Pile No.	Ultrasonically Measured Flange Thickness, t_f
3	0.340"
3	0.3□0"
3	0.421"

WI Dept. of Transportation **3502 Kinsman Blvd.** **Madison, WI 53704**	WISDOT PROJECT ID:		**BORING ID:**	**TP32NE**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/14/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/14/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **583.5 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Topsoil and Roots) 1.0 582.5							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		(FIELD: FILL - Sand, Gravel, Clay, some roots, damp)							
				3		3.0 580.5							
GS 1				4		SANDY SILT, dark grayish brown, moist (FIELD: Organic Silt, dark brown to gray, little sand, little organic fibers, moist) 4.5 579.0	ML						
				5		5.0 (FIELD: Medium Sand, poorly sorted, gray, moist) 578.5	SP						
				6		(FIELD: Lean Clay, mottled reddish brown with trace to little orangish brown fine sand, damp to moist)	CL						
				7									
				8									
				9		9.0 574.5							
				10		LEAN CLAY, dark reddish brown, moist, with sand (FIELD: Lean Clay, dark reddish brown, damp)							
				11									
GS 5				12									
				13			CL						
				14									
GS 3				15									
				16									
				17									
				18		18.0 565.5							
GS 6				19		SILTY SAND, brown, fine grained, wet (FIELD: Silt and Fine Sand, brown, wet) 19.0 564.5	SM						

End of Boring at 19.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 18ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:TP32NE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**	PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/14/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/14/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **583.5 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Topsoil and Roots) 1.0 582.5								Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2									
				3		(FIELD: FILL - Sand, Gravel, Clay, some roots) 3.9 579.6							
				4		Pier 32 Foundation							
				5									
				6									
				7									
				8									
				9		9.6 573.9							
				10		(FIELD: Limestone gravel, wet, thickness varies) 10.4 573.1	GP-GM						
				11		LEAN CLAY, dark reddish brown, moist, with sand (FIELD: Lean Clay, dark reddish brown, damp)							
GS 5				12									
				13									
				14			CL						
GS 3				15									
				16									
				17									
				18		18.0 565.5							
GS 6				19		SILTY SAND, brown, fine grained, wet (FIELD: Silt and Fine Sand, brown, wet) 19.0 564.5	SM						
						End of Boring at 19.0 ft.							

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 9.6ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

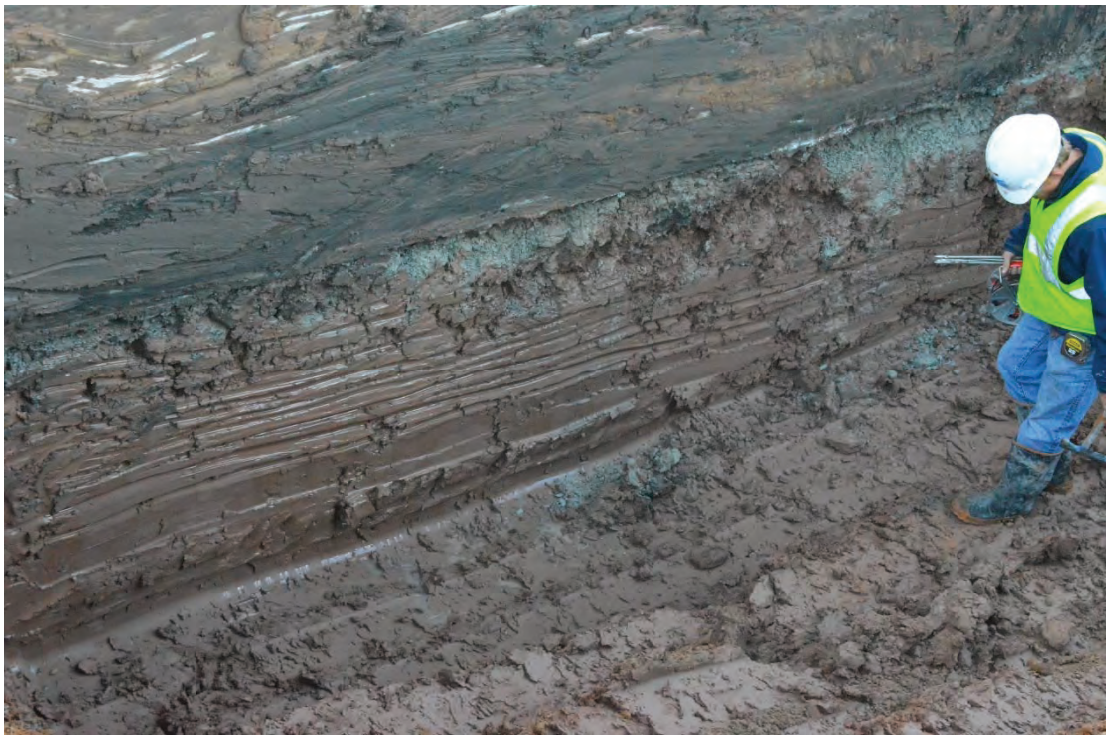
NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded



Test Pit 32NE Photograph 1 – Test Pit Excavation Looking Northeast



Test Pit 32NE Photograph 2 – Footer Looking Northwest



Test Pit 32NE Photograph 3 – Bottom of Footer Looking Northwest



Test Pit 32NE Photograph 4 – Footer and Exposed Piles Looking Northwest



Test Pit 32NE Photograph 5– Footer and Exposed Piles Looking West



Test Pit 32NE Photograph 6 –Pile Looking West



Test Pit 32NE Photograph 7 – Pile Looking West



Test Pit 32NE Photograph 8 – Footer and Piles Looking Northwest



Test Pit 32NE Photograph 9 – Footer and Piles Looking Northwest

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP32SW**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/15/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/15/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.1 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				0		(FIELD: FILL - Clay/Roots) 0.7 580.4	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				1		TOPSOIL (FIELD: Old Topsoil) 1.2 579.9							
				2		(FIELD: Silt, light brown)	ML						
				3		3.2 577.9							
						(FIELD: Silty Clay, reddish brown) 3.7 577.4	CL						
				4		(FIELD: Silty Sand, orangish brown, moist) 4.4 576.7	SM						
				5		(FIELD: Clayey Silt, reddish brown, damp)	ML						
				6									
				7		7.6 573.5							
				8		LEAN CLAY, dark reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, damp)	CL						
				9									
				10									
				11									
				12		12.5 568.6							

End of Boring at 12.5 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID: TP32SW-CAP**	
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/15/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/15/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION:	1/4 SECTION:	1/4 1/4 SECTION:	SURFACE ELEVATION:	**582.6 ft**

Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Notes
0		(FIELD: FILL - Silt, Sandy, some roots, light brown)	ML	Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
3.0		579.6		
		Pier 32 Foundation		
8.7		573.9		
9		(FIELD: Limestone Gravel, wet)	GP-GM	
9.5		573.1		
10		LEAN CLAY, dark reddish brown, moist, with sand (FIELD: Lean Clay, reddish brown, damp)	CL	
14.0		568.6		
		End of Boring at 14.0 ft.		

SAMPLE TYPE NUMBER | RECOVERY (in) (RQD) | Moisture | BLOW COUNTS (N VALUE) | Strength Qp (tsf) | Liquid Limit (%) | Plasticity Index (%) | Boulders | Drilling Method

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 32SW Photograph 1 – Test Pit Excavation Looking Southwest



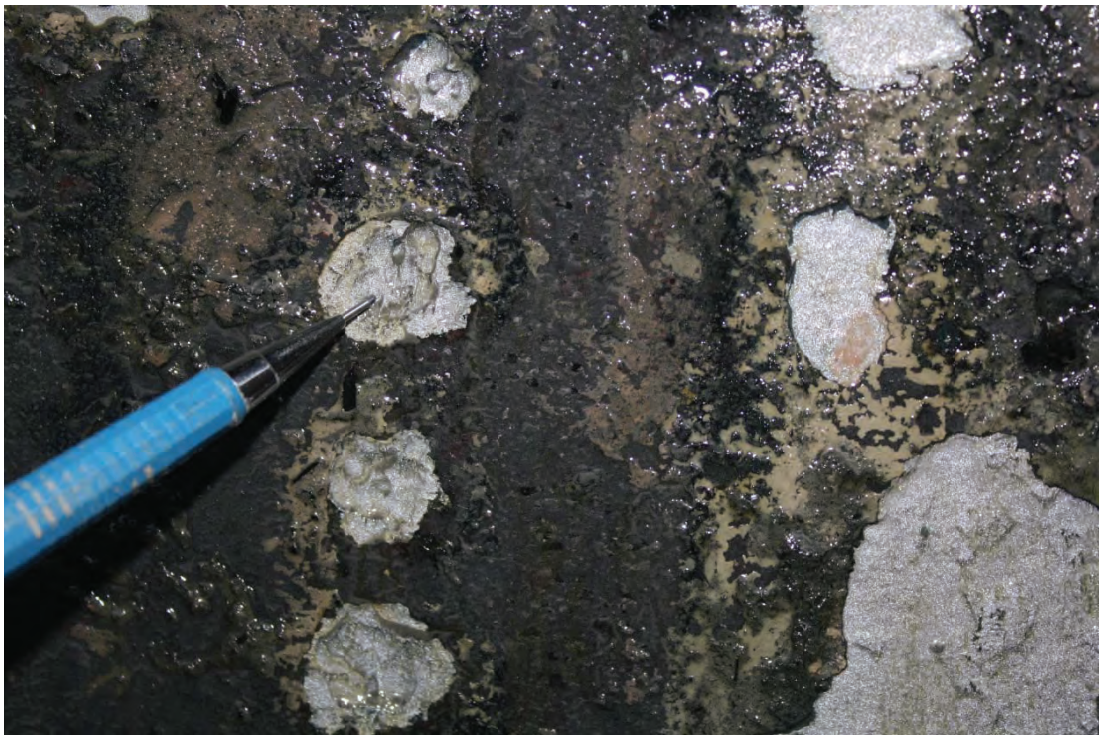
Test Pit 32SW Photograph 2 – Footer and Test Pit Excavation Looking East



Test Pit 32SW Photograph 3 – Footer and Piles Looking Northeast



Test Pit 32SW Photograph 4 – Pile Looking East



Test Pit 32SW Photograph 5 – Pile Looking East



Test Pit 32SW Photograph 6 – Pile Looking East



Test Pit 32SW Photograph 7 – Pile Looking East

Pier 39
Test Pit TP-39NW
Test Pit TP-39SE

TEST PITS 39SE & 39NW at PIER 39

Pile No.	Itrasonic Measured Flange Thickness
13	0.41
15	0.41

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID: TP39NW**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/15/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/15/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **581.1 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: Gravel, dry to damp, brown) 1.0 580.1	GP						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
						1.3 (FIELD: Old Topsoil, dark brown) 579.8	ML						
				2		(FIELD: Silty Sand, orangish brown, mottled, some clay, damp)							
				3									
				4			SM						
				5									
				6		6.3 574.8							
GS 4				7		LEAN CLAY, brown, wet, with sand (FIELD: Clay, with Sand and Silt lenses, orangish brown grading to reddish brown, wet)							
				8									
				9									
				10			CL						
GS 3				11									
				12		12.8 568.3							
				13		SILTY SAND, brown, fine grained, wet (FIELD: Silt, little fine Sand and Clay, reddish brown, wet)							
				14			SM						
				15		15.6 565.5							

End of Boring at 15.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		BORING ID: TP39NW-CAP
	WISDOT STRUCTURE ID: B-5-158		PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: OMNNI Associates	CONSULTANT PROJECT NO: T1463A13	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: 10/15/13	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: 10/15/13	LOGGED BY:	HOLE SIZE: in	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 584.3 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1–4		SANDY LEAN CLAY, reddish brown to dark brown (FIELD: FILL - Gravel, Silt, and Sand, dry to damp, brown)	CL						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator.
				4.5		579.8							
GS 2				5–10		Pier 39 Foundation							Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc.
GS 4				10.3		574.0							Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				11–12		(FIELD: Limestone, Gravel, Organics, trace black slime, wet)	GP-GM						
				12.3		572.0							
GS 3				13–15		LEAN CLAY, brown, wet, with sand (FIELD: Lean Clay, reddish brown, wet)	CL						
				15.3		569.0							
GS 5				16–18		SILTY SAND, brown, fine grained, wet (FIELD: Silt, little fine Sand and Clay, reddish brown, wet)	SM						
				18.8		565.5							

End of Boring at 18.8 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 5.8ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 39NW Photograph 1 – Resistivity Test Conducted Near Top of Footer Elevation Looking East



Test Pit 39NW Photograph 2 – Resistivity Test Conducted Near Bottom of Footer Elevation Looking South



Test Pit 39NW Photograph 3 – Bottom of Footer Looking South



Test Pit 39NW Photograph 4– Pile Looking East



Test Pit 39NW Photograph 5 – Test Pit Excavation Looking Northeast



Test Pit 39NW Photograph 6 – Footer Looking East



Test Pit 39NW Photograph 7 – Pile Looking East



Test Pit 39NW Photograph 8 – Pile Looking East



Test Pit 39NW Photograph 9 – Pile Looking East



Test Pit 39NW Photograph 10 – Pile Looking East



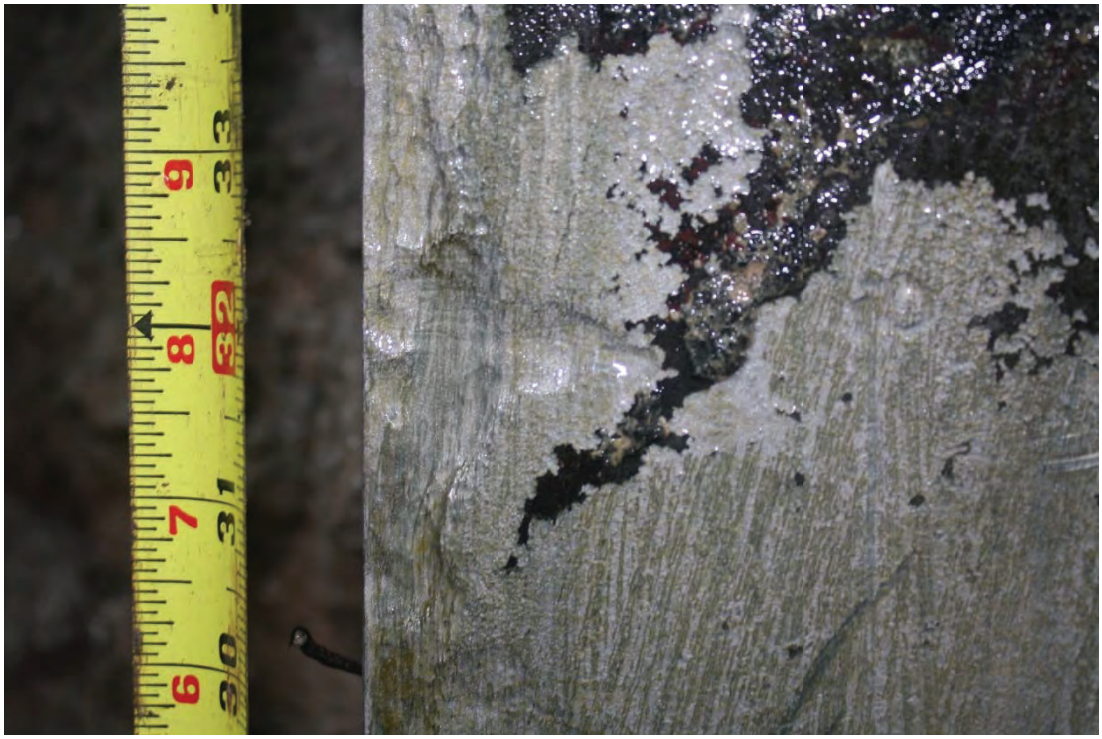
Test Pit 39NW Photograph 11 – Test Pit Excavation Looking Southwest



Test Pit 39NW Photograph 12 – Pile Looking East



Test Pit 39NW Photograph 13 – Pile Looking East



Test Pit 39NW Photograph 14 – Pile Looking East



Test Pit 39NW Photograph 15 – Pile Looking East



Test Pit 39NW Photograph 16 – Pile Looking East



Test Pit 39NW Photograph 17 – Pile Looking East



Test Pit 39NW Photograph 18 – Pile Looking East



Test Pit 39NW Photograph 19 – Pile Looking East



Test Pit 39NW Photograph 20 – Pile Looking Southeast



Test Pit 39NW Photograph 21 – Footer Looking East

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP39SE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/15/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/15/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**581.6 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: Gravel, Silt, Sand and Roots, some Cobbles, brown, dry to damp)							Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		2.5 579.1							
				3		(FIELD: Silt, orangish brown, mottled, with fine Sand) 3.1 578.5	ML						
				4		(FIELD: Clay and Silt, gray, mottled) 4.1 577.5	CL						
				5		(FIELD: Sand, gray mottled orange) 5.5 576.1	SP						
				6		(FIELD: Clay, with fine Sand and Silt, reddish brown) 7.0 574.6	CL						
				7		7.5 (FIELD: Silty Sand, reddish brown, wet) 574.1	SM						
GS 2				8		LEAN CLAY, reddish brown to brown, moist, with sand (FIELD: Lean Clay, reddish brown, plastic, damp, moist at top becomes drier at base)							
				9									
				10									
				11			CL						
				12									
				13									
				14		14.6 567.0							

End of Boring at 14.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:		**BORING ID:TP39SE-CAP**
	WISDOT STRUCTURE ID: **B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING: / EASTING:
DATE STARTED: **10/15/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:
DATE COMPLETED: **10/15/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM: / VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **584.6 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1–4		SANDY SILT, dark yellowish brown, moist (FIELD: FILL - Sand, Silt, Gravel, Cobbles, and Roots brown, dry to damp)	ML						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				4.8		579.8							
				5–9		Pier 39 Foundation							
GS 3				10	▽								
				10.6		574.0							
				11		(FIELD: Gravel, Limestone, wet, some organic staining)	GP-GM						
				11.9		572.7							
				12–14		LEAN CLAY, reddish brown to brown, moist, with sand (FIELD: Lean Clay, reddish brown, plastic, damp becoming drier near base, some mottling orangish brown and gray)	CL						
GS 4				15–17									
				17.6		567.0							

End of Boring at 17.6 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10.6ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 39SE Photograph 1 – Test Pit Excavation Looking Southwest



Test Pit 39SE Photograph 2 – Piles Looking West



Test Pit 39SE Photograph 3 – Test Pit Excavation Looking West



Test Pit 39SE Photograph 4– Pile Looking West



Test Pit 39SE Photograph 5 – Pile Looking West



Test Pit 39SE Photograph 6 – Pile Looking West



Test Pit 39SE Photograph 7 – Pile Looking West



Test Pit 39SE Photograph 8 – Pile Looking West



Test Pit 39SE Photograph 9 – Pile Looking South



Test Pit 39SE Photograph 10 – Pile Looking Southwest



Test Pit 39SE Photograph 11 – Exposed Piles Looking West



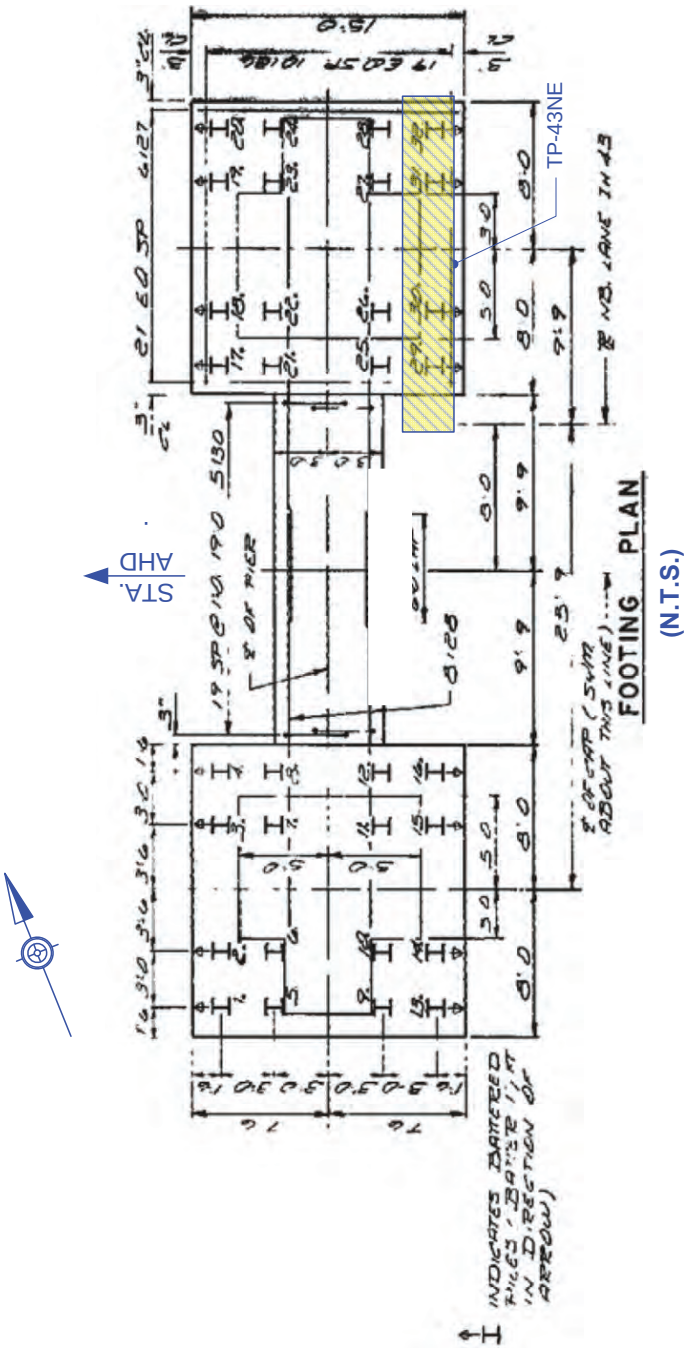
Test Pit 39SE Photograph 12 – Pile Looking West



Test Pit 39SE Photograph 13 – Pile Looking West

Pier 43
Test Pit TP-43NE

TEST PIT 43NE at PIER 43



WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:**	**TP43NE**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO:	**1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: **10/14/13**	CREW CHIEF:	DRILL RIG:		COORDINATE SYSTEM:	
DATE COMPLETED: **10/14/13**	LOGGED BY:	HOLE SIZE: **in**		HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION:	**NA**
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	**584.9 ft**

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		(FIELD: FILL - Sand)	SP						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				2		2.3 582.7							
						2.6 (FIELD: Lean Clay, mottled gray, orangish brown, damp) 582.3	CL						
				3		3.1 (FIELD: Organic Silt, Wood Fibers, Silt, black, moist) 581.8	OL						
GS 1				4		SILTY SAND, dark grayish brown, fine grained, moist (FIELD: Sand, medium grained, poorly sorted, gray, wet, trace shells, water bearing at 3.5')	SM						
				5		5.6 579.3							
				6		(FIELD: Clay, gray and black, laminated/mottled with Organics and Wood fragments)	CL						
				7									
				8		8.5 576.4							
				9		LEAN CLAY, dark grayish brown, moist (FIELD: Lean Clay)	CL						
				10									
				11									
				12									
GS 5				13									
				14									
GS 4				15		15.5 569.4							

End of Boring at 15.5 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 3.5ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID:			**BORING ID:TP43NE-CAP**
	WISDOT STRUCTURE ID:	**B-5-158**		PAGE NO: **1 of 1**
WISDOT PROJECT NAME: **Leo Frigo Memorial Bridge**	CONSULTANT: **OMNNI Associates**	CONSULTANT PROJECT NO: **T1463A13**	LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: **WISDOT**	DRILLING CONTRACTOR PROJECT NO:	NORTHING:	EASTING:
DATE STARTED: **10/14/13**	CREW CHIEF:	DRILL RIG:	COORDINATE SYSTEM:	
DATE COMPLETED: **10/14/13**	LOGGED BY:	HOLE SIZE: **in**	HORIZONTAL DATUM:	VERTICAL DATUM:
COUNTY: **Brown**	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: **NA**	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: **584.9 ft**	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
GS 1				1–5		SILTY SAND, fine grained, moist (FIELD: FILL - Sand and Gravel)	SP						Log represents subsurface conditions encountered in test pit performed by hydraulic powered excavator. Elevations are approximate. Top of cap elevations were estimated from the adjacent cap or from historic construction data. Test Pit Log information and strata based on field logs provided by Michael Baker Jr., Inc. Laboratory sample depths and associated laboratory classification based on laboratory material testing, Baker field classification, and approximate sample depths.
				6.0 / 578.9		Pier 43 Foundation							
GS 2				6–10									
				10.5 / 574.4		(FIELD: Limestone Gravel, gray, wet, decomposed organics)	GP-GM						
				11.5 / 573.4		LEAN CLAY, dark gray, moist, with sand (FIELD: Lean Clay, gray with black laminated organic layers, wet)	CL						
GS 3				12–13									
GS 5				13.0 / 571.9		LEAN CLAY, dark grayish brown, moist (FIELD: Lean Clay, gray, wet, plastic)	CL						
GS 4				14–15									
				15.5 / 569.4		End of Boring at 15.5 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 3.5ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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Test Pit 43NE Photograph 1 – Test Pit Excavation Looking Northeast



Test Pit 43NE Photograph 2 – Footer Looking Northwest



Test Pit 43NE Photograph 3 – Footer and Exposed Pile Looking West



Test Pit 43NE Photograph 4 – Bottom of Footer and Exposed Pile Looking West

Appendix H
Test Boring Logs

KEY TO SYMBOLS

PROJECT NAME I-43 Leo Frigo Memorial Bridge **CONSULTANT** _____

PROJECT No _____ **CONSULTANT PROJECT No** _____

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- ASPHALT: Asphalt
- BLDRCBBL: Boulders and cobbles
- CL: USCS Low Plasticity Clay
- CL-ML: USCS Low Plasticity Silty Clay
- CLS: USCS Low Plasticity Sandy Clay
- CONCRETE: Concrete
- FLY ASH
- GM: USCS Silty Gravel
- GP: USCS Poorly-graded Gravel
- ML: USCS Silt
- MLG: USCS Gravelly Silt
- MLS: USCS Sandy Silt
- OL: USCS Low Plasticity Organic silt or clay
- PT: USCS Peat
- SM: USCS Silty Sand
- SP: USCS Poorly-graded Sand

SAMPLER SYMBOLS

- Rock Core
- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

- Water Level at Time Drilling, or as Shown
- Water Level at End of Drilling, or as Shown
- Water Level After 24 Hours, or as Shown

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KEY TO SYMBOLS

PROJECT NAME I-43 Leo Frigo Memorial Bridge **CONSULTANT** _____

PROJECT No _____ **CONSULTANT PROJECT No** _____

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- SP-SC: USCS Poorly-graded Sand with Clay
- SW: USCS Well-graded Sand
- TOPSOIL: Topsoil
- USGS 642: Dolomite
- USGS 657: Peat
- WOOD DEBRIS: USCS Peat

SAMPLER SYMBOLS

- Rock Core
- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL	- LIQUID LIMIT (%)
PI	- PLASTIC INDEX (%)
W	- MOISTURE CONTENT (%)
DD	- DRY DENSITY (PCF)
NP	- NON PLASTIC
-200	- PERCENT PASSING NO. 200 SIEVE
PP	- POCKET PENETROMETER (TSF)
TV	- TORVANE
PID	- PHOTOIONIZATION DETECTOR
UC	- UNCONFINED COMPRESSION
ppm	- PARTS PER MILLION

- Water Level at Time Drilling, or as Shown
- Water Level at End of Drilling, or as Shown
- Water Level After 24 Hours, or as Shown

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: AE** PAGE NO: 1 of 2
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572361.239 / EASTING: 105437.289
DATE STARTED: 10/22/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 3	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/22/13	LOGGED BY: P. Skolos	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY: D. Reid	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 614.5 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		SILT, brn., fine sandy, some f-c gravel.							
SPT 1	12	D	6-9-9-9 (18)	2			ML						
				3									
				4		4.0 610.5							
SPT 2	12	D	5-10-11-11 (21)	5		Fine SILTY SAND, some silt, some cs. gravel, brn.						HSA	
				6			SM						
SPT 3	12	D	7-8-7-7 (15)	7									
				8		8.0 606.5							
SPT 4	24	D	3-5-5-5 (10)	9		Fine SAND, tr. f-c gravel, tr silt, brn.	SP	1.25					
				10		10.0 604.5							
SPT 5	12	D	2-8-10-17 (18)	11		Fine SILTY SAND, tr. - little cs. gravel, brn							
				12									
SPT 6	18	M	4-9-12-14 (21)	13			SM						
				14									
SPT 7	24	M	4-9-12-17 (21)	15									
				16		16.5 598.0							
SPT 8	24	M	17-14-20-17 (34)	17		SANDY SILT, little f-cs gravel, brn.	ML						
				18		18.5 596.0							
SPT 9	24	M	10-17-16-18 (33)	19		Fine SILTY SAND, tr. f-c gravel, brn							
				20									
SPT 10	24	M	9-14-17-20 (31)	21									
				22									
SPT 11	24	M	7-14-14-20 (28)	23									
				24									
SPT 12	24	M	10-18-19-18 (37)	25									
				26									
SPT 13	24	M	13-15-19-23 (34)	27			SM						
				28									
SPT 14	24	M	7-10-15-20 (25)	29									
				30									
SPT 15	24	M	10-15-18-23 (33)	31									
				32									
SPT 16	18	M	6-10-16-14 (26)	33									
				34									
SPT 17	18	M	7-11-15-17 (26)	35									

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158	BORING ID: AE PAGE NO: 2 of 2

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 18	24	M	11-16-24-20 (40)	37		Fine SILTY SAND, tr. f-c gravel, brn	SM						
				38		38.0 576.5							
SPT 19	24	D	5-10-16-26 (26)	39		SILT, tr. f sand, brn.		2.5					
SPT 20	24	D	20-30-37-50 (67)	40 41			ML	3.5					
SPT 21	18	D	10-15-16-17 (31)	42 43				4.5					
				44		44.0 570.5							
SPT 22	24	M	12-13-19-23 (32)	45		SILTY LEAN CLAY, brn, mottled.	CL-ML	4.5					
				46		46.5 568.0							
SPT 23	24	M	10-15-17-21 (32)	47		Interbedded dk brn SILT and dk brn CLAY seams.	CL-ML	4.5					
				48		48.0 566.5							

End of Boring at 48.0 ft.

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 1** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572339.853 / EASTING: 105297.726
DATE STARTED: 10/03/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/03/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: Pier 1 SW corner / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 579.575 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	16	W	1-1-3-4 (4)	1		Sand to silty Clay, tr. gravel, brn plastic, tr. organics	CL-ML						
				2		2.0 577.6							
SPT 2	11	M	1-4-5-8 (9)	3		silty Clay, hard, brn, plastic		4.5+					
SPT 3	17	M	3-6-9-11 (15)	4				4.5+					
SPT 4	14	M	3-8-12-16 (20)	5				4.5					
SPT 5	20	M	3-5-8-13 (13)	6			CL-ML	4.5+					
SPT 6	13	M	4-6-7-10 (13)	7				2.5					
SPT 7	24	M	3-5-6-10 (11)	8		change to stiff		2.5					
				9		14.0 565.6							
SPT 8	16	W	2-3-4-5 (7)	10		soft, silty Clay, gray plastic		0.50					
SPT 9	24	W	2-3-4-5 (7)	11			CL-ML	0.75					
SPT 10	20		1-3-3-3 (6)	12				0					
				13		20.0 559.6							
				14		End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 14ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 2** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572473.65 / EASTING: 105195.905
DATE STARTED: 10/03/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/03/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: er 2 North Pier North Side	OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION: 580.3 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	17	M	0-0-3-3 (3)	1		0.5 fill, Sand and wet Clay, brn, plastic 579.8	SP-SC					HSA	4 1/4" HS
				2		fill, silty Clay, brn, stiff, plastic	CL-ML	0.25					
SPT 2	19	M	3-5-7-7 (12)	3		2.0 578.3		2.75					
				4		Silt to silty Clay, brn plastic to not plastic, hard	CL-ML	4.0					
SPT 3	18	M	1-5-10-20 (15)	5		4.0 576.3							
				6		silty Clay, v. stiff, brn, plastic		3.25					
SPT 4	21	M	6-10-13-15 (23)	7			CL-ML	4.5					
				8		2" silty Sand layer at 7', peat 7.5'-8.5'							
SPT 5	20	M	3-12-19-23 (31)	9		8.5 571.8							
				10		hard, silty Clay, brn, plastic		4.5+					
SPT 6	19	M	6-10-16-22 (26)	11				4.5+					
				12			CL-ML						
SPT 7	24	M	4-10-12-16 (22)	13				4.5+					
				14									
SPT 8	24	M	3-7-8-10 (15)	15				3.0					
				16	▽	16.0 v. stiff 564.3							
SPT 9	24	W	2-2-2-3 (4)	17		soft silty Clay, brn plastic		0.25					
				18			CL-ML						
SPT 10	24	W	1-2-3-3 (5)	19				0					
				20		20.0 560.3							
						2" well installed							
						End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 16ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 3** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572533.276 / EASTING: 105091.245
DATE STARTED: 10/04/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/04/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: er 4 NE corner North Pier / OFFSET:	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 578.595 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	14	M	3-6-8-10 (14)	1		1" Topsoil silty Clay, hard, tr. organics, brn to red brn, plastic, possible till	CL-ML	4.5				HSA	3 1/4" HS
SPT 2	19	M	3-4-5-6 (9)	3		3.0 575.6 Clay, green, tr. sand, stiff	CL	1.0					
SPT 3	20	M	1-3-6-9 (9)	5		4.5 574.1 hard silty Clay, brn to red brn, plastic		4.5					
SPT 4	20	M	4-7-12-16 (19)	7				4.5					
SPT 5	20	M	3-6-11-14 (17)	9				3.5					
SPT 6	19	M	2-7-19-20 (26)	11			CL-ML	4.5					
SPT 7	20	M	5-10-10-21 (20)	13				4.5+					
SPT 8	21	M	6-13-18-18 (31)	15				4.5+					
SPT 9	24	M	6-8-10-10 (18)	17		change to medium to stiff at 17'		4.5+					
SPT 10	24	M W	2-4-4-4 (8)	19 ▽		19.0 559.6 very soft silty Clay, gray brown, plastic	CL-ML	1.5					
				20		20.0 558.6 End of Boring at 20.0 ft.		0					

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 19ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 4** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572513.57 / EASTING: 104982.2
DATE STARTED: 10/03/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/03/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: r 4 SW corner South Pier / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 578.88 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	18	M	1-2-4-5 (6)	1		Topsoil, silty Clay, with organics, little sand, black plastic		2.5				HSA	4 1/4" HS
SPT 2	18	M	3-6-7-12 (13)	2		2.0 576.9 hard silty Clay, little sand, brn, plastic		4.5+					
SPT 3	17	M	4-8-11-16 (19)	5				4.5+					
SPT 4	18	M	3-7-8-12 (15)	7				4.5+					
SPT 5	18	M	3-5-8-11 (13)	9				4.5+					
SPT 6	17	M	2-5-12-14 (17)	11			CL-ML	4.5+					
SPT 7	20	M	5-8-12-13 (20)	13				4.5+					
SPT 8	20	M	3-8-13-16 (21)	15		with 1/2" wet spots, sample 8 (wet)		4.5+					
SPT 9	24	M	6-11-13-18 (24)	17		no wet spots		4.5+					
SPT 10	24	M	4-9-14-15 (23)	19				4.5+					
				20		20.0 558.9 2" well set End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 5** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572565.226 / EASTING: 104867.728
DATE STARTED: 10/03/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/03/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: Pier 5 SE corner S. Pier / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 578.918 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	19	M	7-10-10-8 (20)	1		fill sandy Silt, brown, hard, not plastic		4.5+				HSA	4 1/4" HS
SPT 2	18	M	5-8-10-14 (18)	2		2.0 576.9		4.5+					
SPT 3	19	M	6-9-10-15 (19)	3		silty Clay, hard, gray to reddish brn, plastic	CL-ML	4.5+					
SPT 4	21	M	4-14-31-52 (45)	4				3.0					
SPT 5	17	M	8-47-60 (107)	5									
				6									
				7		7.0 571.9							
SPT 6	24	M	15-46-56-48 (102)	8		Silt, brn, hard, not plastic	ML						
				9									
				10									
				11		little sand							
				12		12.5 566.4							
SPT 7	20	M	8-16-18-23 (34)	13		silty Clay, brn, hard, plastic, hard		4.5+					
SPT 8	21		4-9-14-16 (23)	14									
				15				4.5+					
				16			CL-ML						
SPT 9	22		6-11-14-20 (25)	17				4.5+					
				18									
SPT 10			50-11-20-19 (31)	19									
				20		20.0 558.9							

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 6** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572672.675 / EASTING: 104791.724
DATE STARTED: 10/04/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/04/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: Pier 6 N. Pier East side	OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION: 583.4 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	14	M	7-8-9-11 (17)	1		silty Clay, hard, little sand, brn plastic tr. organics		4.5				HSA	4 1/4" HS
				2				3.0					
SPT 2	13	M	4-6-6-6 (12)	3				3.5					
				4									
SPT 3	13	M	3-4-8-14 (12)	5		change to v. stiff with silt seams, no organics		3.25					
				6			CL-ML						
SPT 4	14	M	6-10-14-15 (24)	7		change to hard		4.5					
				8									
SPT 5	18	M	4-7-10-15 (17)	9				4.5+					
				10									
SPT 6	19	M	3-8-14-26 (22)	11				4.5+					
				12		12.0 / 571.4							
SPT 7	19	M	5-18-46-52 (64)	13		Silt, hard, brn, not plastic		4.5+					
				14									
SPT 8	20	M	16-55-60 (115)	15			ML						
				16									
SPT 9	22	M	29-32-34-29 (66)	17		17.0 / 566.4		4.5					
				18		hard, silty Clay, brn plastic							
SPT 10	20	M	7-14-13-19 (27)	19			CL-ML	4.5					
				20		20.0 / 563.4							
						2" well set							
						End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 7** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572671.437 / EASTING: 104647
DATE STARTED: 10/10/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 3	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/10/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: S. Pier E. Side	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 581.737 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	18	M	2-3-2-3 (5)	1	Silt, lt. sand, tr. clay, dark brn	ML	2.0				HSA	2 1/4" HS
				1.5	580.2		1.5					
SPT 2	24	M	0-1-2-1 (3)	2	Silt and Wood fiber, black, loose	ML	1.0					
SPT 3	24	W	0-0-0-3 (0)	4 ▽								
				5			0.5					
				5.5	576.2		1.0					
SPT 4	24	M	2-4-5-7 (9)	6	Clay, silty, brn, v-stiff	CL-ML	3.0					
SPT 5	24	M	4-7-8-11 (15)	8	gray-brown with silt seams		2.5					
				10			3.0					
				10.0	571.7		3.5					
SPT 6	24	M	12-18-18-16 (36)	11	Silt, brn, dense	ML	4.5+					
SPT 7	24	M	12-16-20-24 (36)	12	lt. very fine sand		4.5+					
SPT 8	24	M	10-17-20-18 (37)	15			4.5+					
				16								
				16.0	v-fine, sandy 565.7							
SPT 9	24	M W	10-11-13-15 (24)	17	Clay, lt. silt, brn, v-stiff	CL	2.5					
				18			3.0					
				18.5	563.2							
SPT 10	24	M	5-7-24-34 (31)	19	Silt, v-fine, sandy, gray, dense		3.0					
				20			4.5+					
				20.0	561.7							

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 4ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 8**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 572795.49	EASTING: 104542.54
DATE STARTED: 10/10/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 3		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/10/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION	OFFSET: N. Pier W. Side	TOWNSHIP:	RANGE: SECTION: 1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION: 583.5 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	18	M	2-1-2-2 (3)	1		Silt, f-cs gravel (Fill) 1.0 582.5	ML	0.75				HSA	4 1/4" HS
SPT 2	24	M W	1-2-2-3 (4)	2 3 4 5 6		lean Clay, little sitl, reddish-brn some f-m gravel at ~4', little f-sand	CL	1.0 1.5 0.5 0.25					
SPT 3	12	W	0-1-1-0 (2)			6.5 577.0							
SPT 4	24	M	1-2-2-4 (4)	7		organic Silt/Peat, tr. f-sand, blk 7.5 576.0	OL	0.0					
SPT 5	24	M	1-2-5-6 (7)	8 9 10		lean Clay, sand, silt, little f-cs sand and gravel	CL	2.0					
SPT 6	24	M	3-17-25-24 (42)	11		11.0 572.5		4.0					
SPT 7	24	M	20-22-30-26 (52)	12 13 14		Silt, tr. f-sand, lt. brn	ML	3.0 4.5+					
SPT 8	18	M	5-12-15-18 (27)	15		14.5 569.0 lean Clay, some silt, brn 15.5 568.0	CL	3.5					
SPT 9	24	M	9-14-17-18 (31)	16 17 18		Silt, some clay, tr. f-cs sand 16.5 567.0 lean Clay, some silt, tr. f-sand, with 0.5" f. sand lenses ~6" apart	ML CL	4.5 3.0 4.25					
SPT 10	18	M	5-8-10-14 (18)	19 20		20.0 as above but with 3" silt lense at 19.5' 563.5		3.5 4.5+					

End of Boring at 20.0 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 9**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 572777.19	EASTING: 104417.21
DATE STARTED: 10/03/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/03/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION: Pier 9 S. Pier	OFFSET	TOWNSHIP:	RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION:	580.89 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	8	M	8-7-7-8 (14)	1		0.2 Topsoil 2" 580.7 silty Clay, tr. gravel, redish brown plastic, fill hard, tr. sand	ML	4.5+				HSA	4 1/4" HS
SPT 2	10	M	6-6-7-8 (13)	2			CL-ML						
SPT 3	18	M	3-6-6-7 (12)	5		5.0 575.9 v. stiff silty Clay, red brown with gray mottling plastic		3.0					
SPT 4	16	M	5-7-10-13 (17)	6			CL-ML	2.0					
SPT 5	18	M	3-6-10-12 (16)	7		7.0 573.9 change to gray to brown, hard		4.5+					
SPT 6	24	M	4-7-10-10 (17)	9				4.5+					
SPT 7	21	M	3-8-11-12 (19)	11			CL-ML	4.5+					
SPT 8	20	M	2-4-5-7 (9)	13		14.0 566.9 very stiff		4.5					
SPT 9	24	M	3-5-5-8 (10)	15				2.0-3.0					
SPT 10		M	5-5-8-9 (13)	17			CL-ML	1.5 3.0					
				19				1.75-4.5					
				20		20.0 560.9 End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 10** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 572892 / EASTING: 104306.98
DATE STARTED: 10/02/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/02/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: Pier 10 N. Pier / OFFSET: 10' West of N. Pier	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 580.97 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	10-13-9-8 (22)	1	fill silty Clay with gravel, little sand, brn						HSA	4 1/4" HS
SPT 2	6	M	7-7-8-8 (15)	2 3 4		CL-ML						
SPT 3	15	M	4-7-10-13 (17)	5	5.0 576.0		3.5					
				6	very stiff Clay, brn, plastic 6.0 575.0	CL						
SPT 4	18	M	4-7-10-14 (17)	7 8	very stiff to hard silty Clay, grayish brn, plastic		4.5					
SPT 5	18	M	2-8-15-19 (23)	9 10			4.5+					
SPT 6	21	M	6-18-23-30 (41)	11 12			4.5+					
SPT 7	16	M	3-8-16-20 (24)	13 14			4.5+					
SPT 8	20	M	5-11-14-19 (25)	15 16		CL-ML	4.5+					
SPT 9	21	M	4-8-11-14 (19)	17 18								
SPT 10	19	M	6-10-14-16 (24)	19 20 21 22 23			4.5+					
SPT 11	24	M	6-8-8-9 (16)	24 25 26 27	24.5 556.5		0.75					
					medium Clay to silty clay, gray brn, plastic							
SPT 12	24	W	0-0-2-2 (2)	28 29 30 31 32	change to wet and soft	CL	0					
SPT 13	24	W	2-2-3-4 (5)	33 34 35	35.0 546.0		0.25					
					2" well set							
					End of Boring at 35.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 28ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 12**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 572938.53	EASTING: 104069.17
DATE STARTED: 10/02/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/02/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WGS 1984	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION: Pier 12 S. Pier	OFFSET: 10' South of Pier	TOWNSHIP:	RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION:	583.41 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	8	M	1-2-2-4 (4)	1		soft Clay, tr. sand, tr. gravel, organic, blk, m. plastic						HSA	4 1/4" HS
SPT 2	2	M	2-1-2-1 (3)	2				0					
SPT 3	2	M	0-0-1-2 (1)	3			CL	0					
SPT 4	8	M	0-1-2-5 (3)	4				2.25					
SPT 5	24	M	3-8-11-14 (19)	5				4.5					
SPT 6	18	M	3-4-14-32 (18)	6									
SPT 7	18	W	25-36-7-24 (43)	7		7.5 / 575.9							
SPT 8	18	W	7-24-41-50 (65)	8		v. stiff, m. plastic, silty Clay, brn with gray mottleing							
SPT 9	18	W	10-25-35-57 (60)	9		1" silt layer at 9'	CL-ML						
				10									
				11		11.5 / 571.9							
				12		dense Sand, some silt, brn	SP						
				13		12.5 / 570.9							
				14		Silt, v. dense, tr. sand, tr. clay, brn, not plastic	ML						
				15		15.5 / 567.9							
				16		Sand, brn, wet, little silt, dense	SP						
				17		18.0 / 565.4							
				18		End of Boring at 18.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 12ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 14** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: USH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573053.62 / EASTING: 103864.26
DATE STARTED: 10/02/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 3	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/02/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION: 10' East of South Pier / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 585.14 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	5-21-16-33 (37)	1		1.0 584.1 Concrete Rubble and fly ash?						HSA	2 1/4" HSA
SPT 2	6	M	10-17-5-3 (22)	2 3 4		f-c Gravel and fly ash? 4.0 581.1	GP						
SPT 3	12	M	2-2-2-1 (4)	5 6		Silt, some clay, Lt. sand and gravel	ML						
SPT 4	12	M-W	1-1-2-2 (3)	7		7.5 577.6		1.00					
SPT 5	24	M-W	1-1-2-4 (3)	8 9		Silt, Lt. f-sand, blk 9.0 576.1	ML	0.50					
SPT 6	24	W M	1-1-6-6 (7)	10 11 12		Silt, f-sandy, brn, native soil 11.0 574.1 Silt, tr. sand, gray 12.0 573.1	ML	0.50 1.00 2.00					
SPT 7	24	M	3-4-8-9 (12)	13 14		Clay, silty, brn, with brn silt layers	CL-ML	3.25 3.50					
SPT 8	24	M	3-9-12-31 (21)	15 16		16.0 569.1		4.5+					

End of Boring at 16.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 16** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573137.47 / EASTING: 103611.51
DATE STARTED: 9/28/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 9/28/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: 15' LT	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 586.13 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		Concrete rubble 1.0 585.1						HSA	2 1/4" HSA
SPT 1	6	M	0-0-2-1 (2)	2		Silt, blk with concrete rubble	ML						
SPT 2	12	M-W	1-1-1-2 (2)	3		3.5 582.6							
SPT 3	12	M-W	1-1-1-1 (2)	4		Wood, little silty							
SPT 4	12	M-W	0-0-2-3 (2)	5		7.5 578.6							
SPT 5	24	M	2-3-5-9 (8)	6		f-Sand, brn 9.0 577.1	SP						
SPT 6	24	M	5-8-11-14 (19)	7		Clay, brn	CL	2.75 2.5 4.0 4.5					
				8									
				9									
				10									
				11									
				12									
				13		13.0 573.1							

End of Boring at 13.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 18**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 573237.75	EASTING: 103382.79
DATE STARTED: 9/28/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 9/28/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION / OFFSET: 15' LT	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: 587.89 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	24	M	1-1-2-3 (3)	1		Silt, black, some f-m sand, trace organics		0.25				HSA	2 1/4" HSA
SPT 2	24	M	1-1-1-1 (2)	2 3 4			ML	0					
SPT 3	24	M W	0-0-0-0 (0)	5				0					
SPT 4	24	W	0-1-0-1 (1)	6 7 8		6.5 / 581.4 Fly Ash, black 8.5 / 579.4							
SPT 5	24	M-W	0-0-1-1 (1)	9 10		Sedimentary peat 10.5 / 577.4							
SPT 6	24	W	3-4-5-7 (9)	11 12		f-Sand, brn, tr. m-gravel 12.5 / 575.4	SP						
SPT 7	24	M	3-7-15-10 (22)	13 14		Clay, brn, tr. f-gravel 15.0 / 572.9	CL	3.0 4.0					
SPT 8	24	M	2-5-11-12 (16)	15 16		Clay, brn, silty 18.0 / 569.9	CL-ML	4.5					
SPT 9	24	M	7-11-13-16 (24)	17 18				4.5 4.0					

End of Boring at 18.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 19A**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING:	EASTING:
DATE STARTED: 9/28/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7		COORDINATE SYSTEM:	
DATE COMPLETED: 9/28/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION	OFFSET: 15' LT	TOWNSHIP:	RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION:	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
		M		1		Silt, dk brn, some organics	ML					HSA	2 1/4" HSA
		M		2									
				3									
				4									
				5		5.0							
		W		6		black Silt and wood pulp	ML						
				7		7.5							
				8		Silt, black some v. fine sand	ML						
		M		9		9.5							
				10		10.0 Clay, brn	CL						

End of Boring at 10.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 19B** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573376.8 / EASTING: 103285.27
DATE STARTED: 9/28/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 9/28/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: 23' RT	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 586.17 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	1-2-1-2 (3)	1		Silt, brn, little f-m sand	ML	0.75				HSA	2 1/4" HSA
SPT 2	12	M	1-2-1-2 (3)	2									
SPT 3	18	M-W	1-1-2-3 (3)	3				1.0					
SPT 4	18	M-W	1-1-1-2 (2)	4		2.5 583.7							
SPT 5	12	M-W	0-0-2-2 (2)	5		Silt, dk brn, tr. organics	ML						
SPT 6	24	M	3-6-8-12 (14)	6		4.5 581.7							
SPT 7	24	M	3-4-7-7 (11)	7		Wood, brn, some silt		0.25					
SPT 8	24	M	3-3-5-8 (8)	8		5.5 580.7		0.25					
				9		Silt, brn, f-m sandy	ML						
				10		8.0 578.2							
				11		Silt, dk brn, little organics	ML	0.25					
				12		10.0 576.2							
				13		Clay, brn, tr. f-gravel	CL	3.25					
				14				3.5					
				15									
				16				3.5					
								2.75					
						15.0 571.2							
						Clay, brn, some silt	CL	2.5					
						16.0 570.2							

End of Boring at 16.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158	**BORING ID: Pier 20**	PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573423.19 / EASTING: 103148.58
DATE STARTED: 9/27/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 9/27/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: 10' RT	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.37 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	1-0-1-1 (1)	1	Silt, brn, little f-sand, tr. clay, tr. gravel, tr. wood fibers	ML					HSA	4 1/4" HSA
SPT 2	6	M-W	0-0-0-1 (0)	2 3 4	4.0 579.4							
SPT 3	6	M-W	0-0-0-2 (0)	5	wood pulp, blk, strong chemical odor 5.0 578.4		0					
				6	Silt, brn 6.0 577.4	ML						
SPT 4	18	W M	2-3-2-4 (5)	7	f-m Sand, brn, little m-c gravel 7.0 576.4	SP	2.0 2.25					
SPT 5	18	M	3-5-6-8 (11)	8 9 10	Clay, brn, tr. f-gravel	CL	2.5 2.75					
SPT 6	24	M	3-6-8-13 (14)	11	11.0 572.4		3.5					
				12	Clay, brn, with gray silt seams 12.0 571.4	CL	4.0					
SPT 7	24	M	4-20-40-55 (60)	13 14	Silt, brn	ML	4.5					
SPT 8	24	M	9-14-20-18 (34)	15 16	16.0 567.4							

End of Boring at 16.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 22A** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573497.995 / EASTING: 102834.829
DATE STARTED: 9/29/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 9/29/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: 6' East	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 594.341 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	6	M	1-0-1-0 (1)	1	Silt, blk, little organics 1.0 593.3	ML					HSA	2 1/4" HSA
SPT 2	6	M	1-0-1-1 (1)	2	Silt, blk							
SPT 3	6	M	1-0-1-0 (1)	3								
SPT 4	12	M	1-1-1-1 (2)	4								
SPT 5	18	M	0-1-2-2 (3)	5								
SPT 6	24	D W	1-0-1-1 (1)	6								
SPT 7	24	W	0-0-0-1 (0)	7								
SPT 8	24	W	0-0-0-1 (0)	8	little f-sand	ML						
SPT 9	24	W	1-5-5-4 (10)	9								
SPT 10	24	M	2-4-5-7 (9)	10								
SPT 11	24	M	3-8-15-16 (23)	11								
				12								
				13	tr. organics							
				14								
				15	15.0 579.3							
				16	Wood pulp 16.0 578.3							
				17	Silt, blk, f-sandy 17.0 577.3	ML	1.5					
				18	f-Sand, brn 18.0 576.3	SP						
				19	Clay, brn	CL	2.75 4.0					
				20								
				21	21.0 573.3		4.5+					
				22	Silt, brn, some clay 22.0 572.3	ML						

End of Boring at 22.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 11ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 22B** PAGE NO: 1 of 4
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573490.89 / EASTING: 102828.401
DATE STARTED: 9/30/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/03/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY: D. Reid	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: SE corner S. Pier	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 595.35 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		Fly ash, fill						HSA	2 1/4" HSA 4" Casing, 0'-19'
				2									
				3									
				4									
				5								MR	3 7/8" RB, DM
				6									
				7									
				8									
				9									
				10									
				11									
				12									
				13									
				14									
				15									
				16									
				17									
				18									
				19		19.0 / 576.4							
SPT 1	18	M	2-6-9 (15)	20		Clay, brn, little silt	CL	3.0 3.5					
				21									
				22									
				23		23.0 / 572.4							
SPT 2	18	M	6-8-9 (17)	24		Silt, some clay	ML	4.5+ 4.5+					
				25									
				26									
				27		27.0 / 568.4							
SPT 3	18	M	4-5-7 (12)	28		Clay, brn	CL	3.75 4.25					
				29									
				30									
				31									
				32									
				33		33.0 / 562.4							
SPT	18	M-W	0-2-2	34		Clay, brn, tr. f-gravel	CL	1.0					
				35									

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 40ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158	BORING ID: Pier 22B PAGE NO: 2 of 4

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
4			(4)	37		Clay, brn, tr. f-gravel		1.5					
				38									
				39									
				40 ▽									
SPT 5	18	W	1-2-3 (5)	41				0.25 0.25					
				42									
				43									
				44									
SPT 6	18	W	1-2-3 (5)	45 46				0.5 0.5					
				47									
				48									
				49									
SPT 7	18	W	0-1-2 (3)	50 51				0.25 0.25					
				52									
				53									
				54									
SPT 8	18	W	0-2-1 (3)	55 56			CL	1.0 1.0					
				57									
				58									
				59									
SPT 9	18	M-W	0-2-2 (4)	60 61				1.0 1.0					
				62									
				63									
				64									
SPT 10	18	M-W	0-3-2 (5)	65 66				1.0 1.0					
				67									
				68									
				69									
SPT 11	18	M-W	0-3-3 (6)	70 71				1.25 1.25					
				72									
				73									
				74									
SPT 12	18	M-W	1-60-12 (72)	75 76		75.5 519.9 Silt, brn, with f-c gravel							
				77			ML						
				78									
				79		79.0 516.4 Clay, brn, tr. silt							
SPT 13	18	M-W	0-2-2 (4)	80 81			CL	1.0 1.0					
				82									

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WI Dept. of Transportation
3502 Kinsman Blvd.
Madison, WI 53704

WISDOT PROJECT ID: 1220-15-01
WISDOT STRUCTURE ID: B-5-158

BORING ID: Pier 22B

PAGE NO: 3 of 4

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				83		Clay, brn, tr. silt							
SPT 14	6	W	2-3-4 (7)	85				0.5					
				88			CL						
SPT 15	0	W	3-4-4 (8)	90		No recovery							
				93		93.0 502.4							
						Clay, gray, silty							
SPT 16	12	W	2-2-3 (5)	95		tr. coarse gravel		0.5					
				98			CL-ML						
SPT 17	18	W	1-3-5 (8)	100		little f-c gravel		0.5 0.5					
				103		103.0 492.4							
SPT 18	12	M	5-7-11-17 (18)	104		Silt, gray with f-c gravel, some f-m sand		2.0					
SPT 19	24	M	10-15-16-22 (31)	107			ML						
SPT 20	24	M	26-21-19-24 (40)	108		(glacial till)							
SPT 21	24	M	17-35-31-42 (66)	110		110.5 484.9							
SPT 22	11	M	27-60	111		v. f-Sand, brn	SP						
				113		113.0 482.4							
SPT 23	17	M	23-34-60 (94)	113		113.5 Silt, gray, f-sandy 481.9		4.5+					
				114		v. f-Sand, brn							
SPT 24	12	M	36-60	115			SP						
				117		117.0 478.4							
SPT 25	16	M	33-52-60 (112)	117		117.5 Silt, gray, tr. sand 477.9	ML						
				118		Silt, gray, some clay	ML	2.5 2.5					
SPT 26	22	M	13-18-27-60 (45)	119		119.0 476.4							
				120		Clay, silty 120.0 475.4	CL-ML	4.5					
				121		Silt, gray, v. f-sandy, tr. c-gravel 121.0 474.4	ML						
SPT 27	24	M	8-18-25-26 (43)	122		Silt, gray, some clay, little m-c gravel w/ f-sand seams	ML	4.25 4.5					
				123		123.0 472.4							
SPT 28	24	M	8-14-20-30 (34)	124		Clay, silty, gray, tr. sand, f-gravel	CL-ML	4.0 4.5 4.5+					
SPT 29	24	M	8-15-27-27 (42)	126		126.0 469.4		4.5					
				126		126.5 Silt, gray 468.9	ML						
				127		127.0 Clay, silty, gray, tr. f-sand and gravel 468.4	CL-ML						
SPT 30	3		60	127		127.5 Limestone 467.9							
				128									
				129									

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158	BORING ID: Pier 22B PAGE NO: 4 of 4

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
CORE Run 1	54 (90)			130 131 132		Core run #1, 127.5'-132, 98% recovery, 90% RQD, Dolomite (probable Galena FM), fine-grained, medium-bedded, brownish gray with abundant very thin shaley partings throughout. Slightly fossiliferous (brachiopods) in isolated beds. 132.0 463.4 Lost all fluid return at 130'						COR	NQ UCS = 35,330 psi UCS = 10,110 psi
CORE Run 2	60 (83)			133 134 135 136 137		Core run #2, 132'-137' Dolomite, as above, more jointed. 137.0 458.4							UCS = 11,320 psi UCS = 22,998 psi
CORE Run 3	60 (84)			138 139 140 141 142		Core run #3, 137'-142', Core time 25 min. Dolomite, as above. 142.0 453.4 Inclinometer installed at 142'--grouted in place. Fluid capacity for inclinometer 100 gallons--cement grout. End of Boring at 142.0 ft.							UCS = 16,290 psi UCS = 16,500 psi UCS = 18,300 psi

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 23**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 573635.2	EASTING: 102623.13
DATE STARTED: 9/29/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 9/29/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION	OFFSET: 10' West	TOWNSHIP:	RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION: 589.08 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	24	M	1-1-1-1 (2)	1	Silt, blk, tr. organics 1.0 588.1	ML					HSA	4 1/4" HSA
SPT 2	24	M	1-2-3-2 (5)	2								
SPT 3	24	M	1-1-1-2 (2)	3								
SPT 4	12	M	1-2-2-3 (4)	4								
SPT 5	12	M	2-3-3-2 (6)	5								
SPT 6	6	W	2-1-1-3 (2)	6	Silt, blk (Fly ash?) 6.5 582.6	ML						
SPT 7	18	M	1-2-3-5 (5)	7								
SPT 8	24	M	3-4-1-8 (5)	8								
SPT 9	24	M	8-7-9-20 (16)	9								
SPT 10	24	M	9-13-8-20 (21)	10								
				11	Wood 11.0 578.1							
				12	f-Sand, brn 12.5 576.6	SP	2.25					
				13	Clay, brn, tr. f-gravel		2.0					
				14								
				15		CL	2.5					
				16								
				17			2.0					
				18	18.0 571.1		2.5					
				19	Silt, brn Monitoring well installed at 18' with 2' above grade	ML	2.5					
				20	20.0 569.1		3.0					

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 25** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 573769.754 / EASTING: 102198.731
DATE STARTED: 9/29/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 9/29/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET: 11' West	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 592.164 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	24	M	2-3-4-4 (7)	1	0.5 Silt, dk brn, tr. organics 591.7 Silt, blk, Fly Ash	ML					HSA	4 1/4" HSA
SPT 2	24	M	3-3-3-3 (6)	2–4								
SPT 3	24	M	2-1-2-2 (3)	5–6								
SPT 4	24	M	3-2-2-2 (4)	7–8		ML						
SPT 5	12	M	0-0-1-0 (1)	9–10								
SPT 6	24	W	0-1-0-1 (1)	11	tr. organics 12.0 580.2							
SPT 7	12	M-W	0-1-1-3 (2)	12–13	Wood fibers, some silt 13.5 578.7							
SPT 8	24	W	0-1-7-6 (8)	14–15	Silt, dk gray, some clay 15.5 576.7	ML	1.0 1.25					
SPT 9	24	W	3-6-8-4 (14)	16–18	f-Sand, brn 18.5 573.7	SP						
SPT 10	24	W M	3-5-6-4 (11)	19	Silt, some f-c gravel 19.5 572.7	ML	3.0					
				20	20.0 Clay, brn, some silt 572.2 Monitoring well installed at 20' with 10' screen End of Boring at 20.0 ft.	CL						

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:			**BORING ID: Pier 26**	PAGE NO: 1 of 2
WISDOT PROJECT NAME: I 43 Bridge Over Fox River, B-5-158	CONSULTANT: TRC Environmental Corporation	CONSULTANT PROJECT NO: 209601.0000		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: Subsurface Exploration Services	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 573870.16	EASTING: 101865.66
DATE STARTED: 10/17/13	CREW CHIEF: Randy Tremel	DRILL RIG: CME 850		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/17/13	LOGGED BY: TRC ENV - T. Koch	HOLE SIZE: 3 in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: NA	
STATION	OFFSET	TOWNSHIP:	RANGE: SECTION: 1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION: 578.8 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
ST 1	18			1 2		**SILTY SAND (SM)**, fine grained, trace gravel, non-plastic, very dark brown (10YR 2/4), no odor, moist, wood fiber debris. (FILL)	SM						
						2.5 576.3							
ST 2	30			3 4 5		**ALTERNATING LAYERS OF SILTY CLAY (CL-ML) AND SILTY SAND (SM)**, very fine grained sand, gray to very dark gray (10YR 4/1), slight petroleum odor, wet. (FILL)	CL-ML						
						5.5 573.3							
ST 3	20			6 7		**SILTY SAND (SM)**, very fine grained, trace clay, very dark gray (10YR 3/1), no odor, wet. (LACUSTRINE.)							
ST 4	30			8 9									
ST 5	30			10 11 12		Same as above.							Fines = 23% Soil Resistivity = 700
ST 6	30			13 14		Same as above, little clay.	SM						
ST 7	30			15 16 17									
ST 8	30			18 19		Same as above, occasional shell fragments							
						20.0 558.8							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:	BORING ID: Pier 26 PAGE NO: 2 of 2

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
ST 9	30			21 22		**SILTY SAND (SM)**, trace to little clay, very dark gray (10YR 3/1), occasional shell fragments. (LACUSTRINE.)	SM						Fines = 33% Soil Resistivity = 700
						22.5 556.3							
ST 10	30			23 24 25		**SILT WITH SAND (ML)**, very dark brown (10YR 2/2), occasional shells. (LACUSTRINE.)							
ST 11	30			26 27			ML	0.75					
ST 12	30			28 29 30				0.75	24	2			Fines = 77% Soil Resistivity = 800
						30.0 548.8							

End of Boring at 30.0 ft.

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:			**BORING ID: Pier 27**	PAGE NO: 1 of 2
WISDOT PROJECT NAME: I 43 Bridge Over Fox River, B-5-158	CONSULTANT: TRC Environmental Corporation	CONSULTANT PROJECT NO: 209601.0000		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: Subsurface Exploration Services	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 573960.75	EASTING: 102038.24
DATE STARTED: 10/16/13	CREW CHIEF: Randy Tremel	DRILL RIG: Diedrich D-25/Osterberg Sampler		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/16/13	LOGGED BY: TRC ENV - T. Koch	HOLE SIZE: 3 in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: 573.46 ft	
STATION	OFFSET	TOWNSHIP:	RANGE: SECTION: 1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION: 579.46 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		**BARGE.**							
				1.5			578.0						
NR 0				2		**WATER.**							
				3									
				4									
				5									
				6			573.5						
				6.0		**SILT (ML)**, very dark grayish brown (10YR 3/2).	ML						
				6.9			572.6						
ST 1	28			7		**SILTY SAND (SM)**, very fine grained, very dark grayish brown (10YR 3/2), occasional roots, bark.							Osterberg Sampler used to collect samples to 23.5 feet below top of barge surface, shellby tubes were used to 36.0 feet (E.O.B.)
				8									
ST 2	24			9		Same as above, trace gravel, with more wood chips, piece of coal present.							
				10									
				11									
ST 3	22			12		Same as above, no recovery from 12.7 to 13.5 feet.	SM						Fines = 21% Soil Resistivity = 1,400
				13									
ST 4				14		Same as above, denser, more wood debris.							
				15									Set 4" Casing
				16									
				16.9			562.6						
ST 5				17		**SILTY CLAY (CL-ML)**, very dark grayish brown (10YR 3/2).	CL-ML						
				17.1			562.4						
				18		**POORLY GRADED SAND WITH SILT (SP-SM)**, very fine grained, gray (10YR 5/1), trace wood chips.	SP-SM						
ST				19				0.75					

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐	
WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐	

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:	BORING ID: Pier 27 PAGE NO: 2 of 2

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
6				20		20.6 558.9 **SILT WITH SAND (ML)**, gray (10YR 5/1), wet, soft. (LACUSTRINE.)	SP-SM						Fines = 8% Soil Resistivity = 3,700
ST 7	30			21									
				22									
				23									
				24		Same as above, soft.							
ST 8	30			25				0.50	46	19			Fines = 80% Soil Resistivity = 1,100
				26		Same as above, medium.							
ST 9	30			27				0.75					
				28			ML						
				29		Same as above, soft.							
ST 10	30			30				0.50					
				31		Same as above, medium.							
ST 11	23			32				0.75					
				33									
				34									
ST 12	30			35				0.75					
				36		36.0 543.5 End of Boring at 36.0 ft.							

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:			**BORING ID: Pier 28** PAGE NO: 1 of 3	
WISDOT PROJECT NAME: I 43 Bridge Over Fox River, B-5-158	CONSULTANT: TRC Environmental Corporation	CONSULTANT PROJECT NO: 209601.0000		LATITUDE:	LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: Subsurface Exploration Services	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 574158.93	EASTING: 101382.84
DATE STARTED: 10/18/13	CREW CHIEF: Randy Tremel	DRILL RIG: Diedrich D-25/Osterberg Sampler		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/18/13	LOGGED BY: TRC ENV - T. Koch	HOLE SIZE: 3 in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:		STREAMBED ELEVATION: 557.26 ft	
STATION	OFFSET	TOWNSHIP:	RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:	SURFACE ELEVATION: 579.76 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		**BARGE.**							
						1.5 578.3							
				2		**WATER.**							
				3									
				4									
				5									
				6									
				7									
				8									
				9									
◯	NR 0			10									
				11									
				12									
				13									
				14									
				15									
				16									
				17									
				18									
				19									

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:	BORING ID: Pier 28 PAGE NO: 2 of 3

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				21		**WATER.**							
				22		22.5 557.3							
ST 1	30			23		**SANDY SILT (ML)**, occasional shell fragments, black (10YR 2/1). Increase in density at 1.0 feet.		0.25					Osterberg Sampler used to collect samples to 30 feet below top of barge surface, shellby tubes were used to 52.5 feet (E.O.B.)
ST 2	30			25		Same as above, soft, occasional shells.		0.25					
ST 3	30			27		Same as above.	ML	0.25					Fines = 67% Soil Resistivity = 800
ST 4	30			30				0.25					
ST 5	30			33									Hit rock at 34 feet at Pier 28-1 location, moved boring to Pier 28-2 location and drilled to 34 feet to restart sampling.
				35		35.0 544.8 **LEAN CLAY (CL)**, dark gray (10YR 4/1), no visable shells.							
ST 6	18			36				0.50					
ST 7	30			38		Same as above, occasional shells.		0.50	46	22			Fines = 86% Soil Resistivity = 800
ST 8	30			40			CL	0.50					
ST 9	22			43				0.50					
				45		Same as above, a few small pieces of wood fibers and/or roots.							

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:	BORING ID: Pier 28 PAGE NO: 3 of 3

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
ST 10	30			47		**LEAN CLAY (CL)**, dark gray (10YR 4/1), no visable shells.		0.50					
				48		Same as above, grades to gray (10YR 5/2), no roots or fibers, medium.	CL						
ST 11	30			49				0.75					
				50		50.0 529.8							
ST 12	30			51		**FAT CLAY (CH)**, gray (10YR 5/2), soft.	CH	0.5	58	28			Fines = 100% Soil Resistivity = 600
				52		52.5 527.3							

End of Boring at 52.5 ft.

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:		**BORING ID: Pier 29** PAGE NO: 1 of 2
WISDOT PROJECT NAME: I 43 Bridge Over Fox River, B-5-158	CONSULTANT: TRC Environmental Corporation	CONSULTANT PROJECT NO: 209601.0000	LATITUDE: / LONGITUDE:
ROADWAY NAME:	DRILLING CONTRACTOR: Subsurface Exploration Services	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 574231.51 / EASTING: 101239.42
DATE STARTED: 10/19/13	CREW CHIEF: Randy Tremel	DRILL RIG: Diedrich D-25/Osterberg Sampler	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/19/13	LOGGED BY: TRC ENV - T. Koch	HOLE SIZE: 3 in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE:	STREAMBED ELEVATION: 574.76 ft
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 579.76 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		**BARGE.**							
				1.5		578.3							
NR 0				2		**WATER.**							
				3									
				4									
				5		574.8							
ST 1	30			5		**SILTY SAND (SM)**, fine grained, very dark grayish brown (10YR 4/2), wet, occasional shells..							Osterberg Sampler used to collect samples to 27.5 feet below top of barge surface, shellby tubes were used to 35.0 feet (E.O.B.)
				6									
				7									
ST 2	30			8			SM						
				9									
				10		569.8							
ST 3	30			10		**SANDY SILT (ML)**, trace to little clay, very dark grayish brown (10YR 3/2), occasional shells, wet, soft.							Fines = 26% Soil Resistivity = 40
				11									
				12									
ST 4	30			13				0.25					
				14									
				15		Same as above, increase in shell content.	ML						
ST 5	30			16									
				17									
				18									
ST 6	30			19									

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WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: NMR		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID:	BORING ID: Pier 29 PAGE NO: 2 of 2

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
ST 7	30			21		**SANDY SILT (ML)**, trace to little clay, very dark grayish brown (10YR 3/2), occasional shells, wet, soft.	ML	0.5					
				22		22.0 557.8 **SANDY SILT (ML)**, dark grayish brown (10YR 4/2), wet, medium.							
ST 8	30			23				0.75	37	1			Fines = 69% Soil Resistivity = 900
				24									
ST 9	18			25				0.75					
				26									
				27		Same as above, occasional shells, medium.							
ST 10	15			28			ML	1.0					
				29									
				30		Same as above, poor recovery due to clam shell.							
ST 11	6			31				0,5					Fines = 66%
				32									
				33		Same as above, little sand, occasional shells, medium.							
ST 12	18			34				0.5					Soil Resistivity = 400
				35		35.0 544.8 End of Boring at 35.0 ft.							

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 30**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 574319.362	EASTING: 100991.772
DATE STARTED: 10/07/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/07/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION	OFFSET	TOWNSHIP:	RANGE: SECTION: 1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION:	582.54 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	24	M	8-10-10-8 (20)	1	f-c Gravel and silt, brn, f-m sandy	GP					HSA	4 1/4" HS
SPT 2	24	M	4-3-3-3 (6)	2			1.5					
SPT 3	12	M	2-2-2-1 (4)	3			1.0					
SPT 4	24	W M	1-0-0-6 (0)	4			1.5					
SPT 5	24	M	2-6-8-8 (14)	5			1.0					
SPT 6	24	M	3-6-7-6 (13)	6			0					
SPT 7	24	M	2-4-5-8 (9)	7	2.5 580.0		2.75					
SPT 8	24	M	2-4-5-6 (9)	8	Silt, black-brn, mottled, f-sandy	ML	4.5					
SPT 9	24	M	3-5-6-6 (11)	9			3.75					
SPT 10	24	M	2-3-6-6 (9)	10			4.0					
				11			2.75					
				12								
				13								
				14								
				15	7.5 575.0		0					
				16	Clay, brn, tr. silt, tr. f-gravel		2.75					
				17								
				18								
				19								
				20	20.0 562.5	CL	2.75					
							2.5					
							2.0					
							2.25					

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 31** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 574427.388 / EASTING: 100797.293
DATE STARTED: 10/08/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/08/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 584.188 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	18	M	2-3-4-4 (7)	1	0.5 Topsoil 583.7 Silt, tr. sand, lt. brn, loose	ML	1.00 1.5				HSA	4 1/4" HS
SPT 2	18	M	3-3-4-4 (7)	3	3.0 581.2 Clay, silty, brn, stiff	CL-ML	2.25					
SPT 3	24	M M-W	1-2-3-4 (5)	5	4.0 580.2 Silt, drk brn, loose 5.0 579.2	ML	1.5					
SPT 4	18	M-W M	4-5-7-9 (12)	7	Silt, lt. brn, lt. clay, m-loose, drk brn tr. sand 6'-7' 7.0 577.2	ML	0.5					
SPT 5	24	M	2-4-5-6 (9)	9	Clay, silty, brn, v-stiff lt. silt	CL-ML	2.75 2.75					
SPT 6	24	M	3-4-5-9 (9)	11	trace f-gravel, hard		2.5 4.00					
SPT 7	24	M W	5-7-8-6 (15)	13	13.0 571.2 14.0 Wood, wet 570.2		4.5 4.5					
SPT 8	24	M	0-3-4-8 (7)	15	Clay, lt. silt, brn, hard, tr. organics 16.0 568.2	CL	3.25					
SPT 9	24	W	8-13-15-15 (28)	17	v-fine sand, silty, brn, firm 18.0 566.2	SM						
SPT 10	24	M	16-11-15-16 (26)	19	brn Clay and gray silt layers, hard 20.0 564.2	CL	4.5+					

Monitoring well installed at 20' with 10' of screen and 2' above grade

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 32**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 574461.093	EASTING: 100608.301
DATE STARTED: 10/09/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/09/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	584.347 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	20	M	2-5-6-8 (11)	1	2" Topsoil, clay and Silt, lt. brwn, not plastic, fill						HSA	3 1/4" HS
SPT 2	16	M	5-8-8-12 (16)	2		ML						
SPT 3	22	M	3-6-6-6 (12)	5	5.0 579.3 Silty Sand, with organic seams, brn							
SPT 4	16	M	2-1-2-2 (3)	7	7.0 577.3 Silty Clay, with sand, brn plastic, with organic seams	SM	0.25					
SPT 5	14	M	0-0-1-2 (1)	9		CL-ML						
SPT 6	19	W	0-3-12-18 (15)	10 ▽	11.0 573.3 Sand with silt, brn, firm							
SPT 7	24	W M	9-11-13-14 (24)	12	12.5 571.8 Silty Clay, little sand, brn plastic	SP	3.0-3.5					
SPT 8	24	M	2-6-8-12 (14)	15	no sand		3.0					
SPT 9	24	M	4-6-7-11 (13)	17		CL-ML	2.25					
SPT 10	24	M	2-5-5-6 (10)	19			1.25-1.5					
				20	20.0 564.3 End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 33** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 574594.988 / EASTING: 100411.577
DATE STARTED: 10/08/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/08/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 582.073 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	18	M	4-5-6-7 (11)	1	Silt, tr. sand, lt. brn, firm, some clay	ML	2.5				HSA	4 1/4" HS
SPT 2	18	M	2-4-4-3 (8)	4	4.0 578.1		2.5 2.0					
SPT 3	24	M-W W	1-3-4-4 (7)	5 ▽	Silt, lt. clay, tr. sand 5.0 577.1	ML	1.5					
				6	fine Sand, silty, brn, wet 6.0 576.1	SM						
SPT 4	18	M	4-8-9-11 (17)	7	Clay, lt. silt, tr. sand seams, brn, hard, v-stiff	CL	4.5 2.5					
SPT 5	24	M	2-3-5-15 (8)	9	9.0 573.1 Clay, silty, gray-brn, stiff 10.0 572.1	CL-ML	2.5 1.5					
SPT 6	24	W	7-14-16-20 (30)	11	v-fine Sand, silty, brn, firm, dense	SM						
SPT 7	24	W	21-25-22-26 (47)	13	14.0 568.1							
SPT 8	24	M	7-8-11-14 (19)	15	brn Clay and gray Silt, layers	CL-ML	4.5+					
SPT 9	24	M	1-2-5-9 (7)	17	18.0 564.1		2.5 3.25					
SPT 10	24	M	4-7-10-11 (17)	19	Silt, some clay, gray, firm 20.0 562.1	ML	4.5+					

Monitoring well installed at 20' with 10' of screen and 2' above grade, sand packed from 20'-4'

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 34**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 574623.41	EASTING: 100237.43
DATE STARTED: 10/09/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/09/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	585.95 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	14	M	4-14-4-8 (18)	1	2" Topsoil, tr. gravel, Silt with sand, some clay, slightly plastic, fill, lt. brn	ML					HSA	2 1/4" HS
SPT 2	18	M	4-5-5-6 (10)	4	4.0 no clay 582.0							
SPT 3	18	M	4-6-7-8 (13)	5	Silt and Silty Clay, with organic pocket, lt. brn to red brn to black, fill	ML						
SPT 4	17	M	3-2-2-2 (4)	7	6.0 580.0 Silty clay with sand, gray plastic		0.75					
SPT 5	11	W	0-0-0-2 (0)	8 ▽		CL-ML	0-0.5					
SPT 6	14	M	2-5-4-6 (9)	11			0.25 1.0					
SPT 7	22	M	3-4-14-21 (18)	12	12.0 574.0 Silty clay with sand and silty seams, aproximately 3" thick, brn plastic	CL-ML	1.75					
SPT 8	20	M	9-17-22-22 (39)	14	14.0 572.0 Silty with fine sand, not plastic, brn	ML						
SPT 9	23	M	7-12-14-23 (26)	18	18.5 567.5							
SPT 10	20	W M	6-9-9-12 (18)	19	Silty clay, brn to red brn, plastic	CL-ML	3-4.5					
				20	20.0 566.0 End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 35** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 574693.899 / EASTING: 100080.034
DATE STARTED: 10/08/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/08/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 586.5 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	18	M	5-8-10-15 (18)	1	Silt, lt. brn, firm, dry						HSA	4 1/4" HS
SPT 2	12	M	3-2-2-3 (4)	2–3	mixed with topsoil, loose	ML						
				4	4.0 / 582.5							
SPT 3	24	M	3-5-6-7 (11)	5–6	Silt, some clay, brn, firm	ML	2.5					
SPT 4	24	M M-W	3-5-6-8 (11)	7	7.0 / 579.5		2.5 1.0					
SPT 5	24	M-W	2-5-3-4 (8)	8–9	Silt, tr. fine sand, lt. brn, firm	ML	1.5					
				9.5	9.5 / 577.0		2.5					
SPT 6	24	M	2-5-5-8 (10)	10–11	Clay, lt. silt, brn, v-stiff		2.5					
SPT 7	24	W M	4-3-4-5 (7)	12–13	small 6" wet sand seam	CL	2.75 2.75					
SPT 8	24	M M-W	2-4-17-18 (21)	14–15	15.0 / 571.5		2.5 2.0					
SPT 9	24	M-W M	13-18-19-21 (37)	16–17	Silt, v-fine sand, gray, firm	ML	1.5 1.75					
SPT 10	24		9-14-14-15 (28)	18–19	20.0 / 566.5		2.0					
				20	Monitoring well installed at 20' with a 10' screen sand packed from 20'-6', Bentonite seal 6'-4', 2' left above grade End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 12.5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 36** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 574797.58 / EASTING: 99936.86
DATE STARTED: 10/09/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/09/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.64 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M	3-6-5-4 (11)	1		1" Topsoil, Silty Clay, tr. gravel, with organics, fill plastic, with sand	CL-ML	2.0				HSA	3 1/4" HS
SPT 2	13	M	3-3-5-7 (8)	2		2.0 581.6 Silty Clay, gravel, red-brown plastic		2.25					
SPT 3	19	M	3-5-9-11 (14)	3				3-4.5					
SPT 4	17	M	4-5-7-8 (12)	4				2.5					
SPT 5	20	M	3-5-7-12 (12)	5				3.0					
SPT 6	21	M	3-8-11-15 (19)	6		change to gray at 9'	CL-ML	4.5+					
SPT 7	19	M	4-10-13-17 (23)	7				4.5+					
SPT 8	22	M	4-9-14-23 (23)	8				4.5+					
SPT 9	22	M	6-9-11-16 (20)	9				4.5+					
SPT 10	20	M	8-12-19-23 (31)	10				4.5+					
				11									
				12									
				13									
				14									
				15									
				16									
				17									
				18									
				19									
				20		20.0 563.6 End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 37**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 574854.98	EASTING: 99806.88
DATE STARTED: 10/09/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/09/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION	OFFSET	TOWNSHIP:	RANGE: SECTION: 1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION: 583.687 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	1-3-4-4 (7)	1		Silt, trace sand and gravel, brn, loose	ML	3.0				HSA	4 1/4" HS
SPT 2	12	M	2-4-14-16 (18)	3		3.0 580.7		1.5					
				4		Cobbles and Rip Rap 4.0 579.7							
SPT 3	18	M	3-4-5-9 (9)	5		Silt, tr. clay, gray, loose	ML	1.5					
SPT 4	24	M-W	3-4-5-7 (9)	7		some clay, gray-brn		3.0 3.0					
				8	▽	8.0 575.7		1.5					
SPT 5	24	W	2-2-3-10 (5)	9		Clay, silty, gray with wet sand seams	CL-ML	0.5					
				10		10.0 573.7							
SPT 6	24	W	5-16-16-18 (32)	11		fine Sand, silty, brn with silt layers, dense	SM	4.5+					
				12		12.5 571.2							
SPT 7	24	M	3-6-8-9 (14)	13		Clay, silty, brn, v-stiff	CL-ML	1.5 3.0					
SPT 8	24	M	3-7-9-10 (16)	15				3.75 3.5					
SPT 9	24	M	4-6-11-13 (17)	17				3.75 3.5					
SPT 10	24	M	3-6-6-10 (12)	19		few gray silt seams		3.0 2.5					
				20		20.0 563.7							

Monitoring well installed at 20' with a 10' screen, sand packed from 20'-6', Bentonite seal from 6'-4', 2' left above grade
End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 8ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 38**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 574879.3	EASTING: 99649.75
DATE STARTED: 10/09/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/09/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	585.667 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M	6-8-12-9 (20)	1	Fill silty, sand, tr. gravel, lt. brn, not plastic						HSA	3 1/4" HS
SPT 2	0		8-9-5-4 (14)	2								
				3		SM						
SPT 3	0		3-3-3-4 (6)	4	split-spoon pounded stone							
				5								
				6	6.0 / 579.7							
SPT 4	10	M	3-6-9-11 (15)	7	Sandy Clay, red brn, plastic							
SPT 5	20	M	2-6-10-12 (16)	8			3.25					
				9	tr. gravel with sand seams							
				10								
SPT 6	22	M	2-4-5-7 (9)	11			1-1.75					
				12	12.0 / 573.7							
SPT 7	21	M	3-4-5-8 (9)	13	Silty Clay, tr. sand, brn to gray, plastic		2.5 1.25					
SPT 8	19	M	3-7-9-12 (16)	14			4.5+					
				15								
				16		CL-ML						
SPT 9	18	M	3-9-10-11 (19)	17			4.5+					
				18								
SPT 10	19	M	5-5-7-12 (12)	19								
				20	20.0 / 565.7							

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 39** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 574953.79 / EASTING: 99577.62
DATE STARTED: 10/09/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/09/13	LOGGED BY: J. Ruda	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.601 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	4-6-8-10 (14)	1	Silt, tr. sand and gravel, brn, firm	ML	3.0				HSA	4 1/4" HS
SPT 2	12	M	6-15-14-10 (29)	2.5 / 581.1	Silt and f-c Gravel, cobbles, brn							
SPT 3	24	M	4-5-6-7 (11)	4.5 / 579.1	Silt, f-m sandy, gray, firm, brn	ML	2.5					
SPT 4	24	M M-W	2-10-9-8 (19)	8.0 / 575.6			3.0 3.5 2.5					
SPT 5	12	M-W	2-4-7-6 (11)	10.0 / 573.6	Silt, f-m sandy, some clay, brn	ML	1.0					
SPT 6	6	W	3-4-6-7 (10)	12.5 / 571.1	Clay, silty, lt. sand, brn, soft, few cobbles	CL	0.5					
SPT 7	24	W M	4-11-16-17 (27)	15.0 / 568.6	Silt, f-sandy, gray-brn, firm	ML	4.5 4.5+					
SPT 8	24	M	7-14-15-21 (29)		Silt, some clay, gray-brn, dense		4.5+					
SPT 9	24	M	7-15-27-30 (42)			ML	4.5+					
SPT 10	24	M	6-11-15-18 (26)	20.0 / 563.6			4.5+					

Monitoring well installed at 20' with a 10' screen, sand packed from 20'-6', Bentonite seal from 6'-4', 2' left above grade
End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158			**BORING ID: Pier 40**	PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 575006.861	EASTING: 99463.368
DATE STARTED: 10/10/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 7		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/10/13	LOGGED BY: J. Ruda	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION	OFFSET: N. Pier E. Side	TOWNSHIP:	RANGE:	SECTION:	1/4 SECTION:	1/4 1/4 SECTION:	SURFACE ELEVATION: 583.522 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	12	M	4-14-10-12 (24)	1		Silt and f-c Gravel, few cobbles						HSA	2 1/4" HS
SPT 2	24	M	10-14-11-9 (25)	3		3.0 580.5 Silt, lt. clay, brn, loose		2.5 3.0					
SPT 3	24	M	4-5-4-5 (9)	5			ML	2.5 1.5					
SPT 4	24	M-W	2-4-4-4 (8)	7		7.0 576.5 Clay, silty, gray-brn, stiff		1.5					
SPT 5	24	M-W	3-5-5-5 (10)	9			CL	2.25 1.75					
SPT 6	24	W M	3-4-4-8 (8)	11		11.0 572.5 Clay, lt. sitl, brn, v-stiff		1.25 2.75					
SPT 7	24	W M	5-10-6-8 (16)	13		wet sand layer 13'-13.5'	CL	3.5					
SPT 8	24	M	3-7-10-12 (17)	15		silty 16.0 567.5		3.5					
SPT 9	24	M	5-7-12-14 (19)	17		brn Clay and gray Silt layers		4.5+					
SPT 10	24	M	6-8-16-14 (24)	19		20.0 563.5	CL-ML	4.5+					
				20		End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 10ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 41**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 575059.14	EASTING: 99322.555
DATE STARTED: 10/10/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/10/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION	OFFSET	TOWNSHIP:	RANGE:	SECTION:	1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION: 584.1 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	14	M	6-10-6-11 (16)	1		fill Silty Clay, tr. gravel, brn, plastic		4.0				HSA	4 1/4" HS
SPT 2	19	M	5-4-5-5 (9)	2				2.0					
SPT 3	6	M	3-4-4-3 (8)	3			CL-ML						
SPT 4	10	M	1-1-3-3 (4)	4				0					
SPT 5	7	M	0-1-1-2 (2)	5				0					
SPT 6	12	M	0-2-2-3 (4)	6				0.25					
SPT 7	18	M	0-3-3-5 (6)	7				1-1.5					
SPT 8	24	M	9-21-25-29 (46)	8									
SPT 9	22	M	13-19-13-16 (32)	9				3.5					
SPT 10	19	M	4-9-14-16 (23)	10				3.0-4.5					
				11									
				12									
				13									
				14									
				15									
				16									
				17									
				18									
				19									
				20									

9.0 575.1 — Silt to silty clay, brn, plastic when with clay — ML

12.0 572.1 — Silty Clay, red-brn, plastic, tr. gravel with sand lenses — CL-ML

14.0 570.1 — Sandy Silt, brn, not plastic

16.0 568.1 — Silty Clay, brn, hard plastic to silt — CL-ML

20.0 564.1

2" well set at 18', top of screen at 8', sand to 7' seal to 5', .010" screen, 10' riser

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE	CAVE - IN DEPTH AT COMPLETION: NMR		WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR		WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 42** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575066.39 / EASTING: 99220.53
DATE STARTED: 10/09/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/09/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 584.495 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M	4-8-9-11 (17)	1	fill Silty Sand, tr. gravel, brn, not plastic	SM					HSA	3 1/4" HS
SPT 2	15	M	7-10-16-18 (26)	2 3 4	4.0 580.5							
SPT 3	15	M	6-5-5-6 (10)	5 6	fill Silty Clay with sand, brn, plastic 6.5 578.0	CL-ML	2.0					
SPT 4	12	M	2-2-2-2 (4)	7 8	Silty Clay, little sand, tr. organics, gray plastic		0					
SPT 5	12	M	1-1-2-2 (3)	9 10		CL-ML	0					
SPT 6	1	M	0-0-9-2 (9)	11 12			0					
SPT 7	14	M W	2-1-2-2 (3)	13 ▽ 14	14.0 tr. gravel 570.5		0					
SPT 8	20	W M	5-5-4-6 (9)	15 16	Silty Clay, little sand, with sand seams, brn		1.5					
SPT 9	20	M	6-9-12-10 (21)	17 18		CL-ML	1.5 2.5-4.5					
SPT 10	24	M	3-10-14-20 (24)	19 20	brn and gray 20.0 564.5		4.5+					

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 43**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 575159.285	EASTING: 99102.881
DATE STARTED: 10/07/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/07/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: 584.174 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M	2-3-3-4 (6)	1		3" Topsoil, fill fine Sand, tr. gravel, tr. organics, brn to black						HSA	4 1/4" HS
SPT 2	13	M	3-3-2-2 (5)	2 3 4		with silty clay layers	SP	0					
SPT 3	16	M W	0-1-0-2 (1)	5 6		Sandy Clay with silt, tr. gravel, tr. organics, gray-brn, fill, plastic		0					
SPT 4	13	W	0-2-1-4 (3)	7		4.0 580.2 7.0 577.2							
SPT 5	3	W	2-1-0-0 (1)	8 9 10		Sand, brn, little silt 10.0 574.2	SP						
SPT 6	9	W	0-0-1-1 (1)	11		Clay, little silt, gray, plastic		0					
SPT 7	24	W	0-0-0-0 (0)	12 13				0					
SPT 8	24	W	0-0-1-1 (1)	14 15		with organic lenses	CL	0					
SPT 9	24	W	0-0-0-0 (0)	16 17				0					
SPT 10	12	W	0-0-2-12 (2)	18 19 20		2" silty sand seam at bottom of spoon 20.0 564.2		0					

2" well set at 20', set at 19', sand 19'-8', chips 8'-4', 10', .010" screen, 10' riser

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED DURING DRILLING: 5ft.		CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
WATER LEVEL AT COMPLETION: NMR		CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 44** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575162.963 / EASTING: 99002.939
DATE STARTED: 10/07/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/07/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.143 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M	1-3-2-4 (5)	1	2" topsoil, Silty Clay, with sand seams, brn to black						HSA	3 1/4" HS
SPT 2	15	M	2-2-6-11 (8)	4	wet at 4'	CL-ML	0.5					
SPT 3	8	M W	11-12-11-11 (23)	5	Gravel with sand, gray, angular, possible fill 4.0 / 579.1 6.0 / 577.1	GP						
SPT 4	14	W M	4-2-2-2 (4)	7	Silty Clay, with organics and peat seams and silt seams, gray to black		0					
SPT 5	22	M	0-0-0-3 (0)	9		CL-ML	0.5					
SPT 6	24	M	0-0-1-1 (1)	11	12.0 / 571.1		0					
SPT 7	24	M W	0-0-0-0 (0)	13	Silty Clay, gray, plastic		0					
SPT 8	24	W	0-0-0-1 (0)	15	with shells 16.0 / 567.1	CL-ML	0					
SPT 9	24	W	2-4-7-8 (11)	17	Sand, brn, well graded 17.5 / 565.6	SW						
SPT 10	12	M	5-6-10-19 (16)	19	Silty Clay, with silt seams, brn, plastic 20.0 / 563.1	CL-ML	4.5+					

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 5ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID: Pier 45**	
	WISDOT STRUCTURE ID: B-5-158			PAGE NO: 1 of 1	
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 575206.245	EASTING: 98888.378
DATE STARTED: 10/07/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/07/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION: NA	
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION: 583.113 ft	

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	10	M	2-3-3-3 (6)	1		medium Silty Clay, tr. gravel, with sand, black, fill	CL-ML					HSA	4 1/4" HS
				2		2.0 581.1							
SPT 2	10	M W	4-9-13-5 (22)	3		Silty Clay, brn, stiff, plastic, fill	CL-ML	2.5					
				4		3.0 580.1 Gravel with sand, brn, wet, fill	GP						
SPT 3	18	W M	1-0-1-2 (1)	5		4.0 579.1 Sandy Silt, brn to black, soft, slightly plastic		0-.5					
				6		6.0 577.1							
SPT 4	19	M	0-0-3-6 (3)	7		Silty Clay, brn, very stiff plastic		2.5					
SPT 5	19	M	0-3-5-6 (8)	8				2.5-3.5					
				9		change to gray at 9' with sand							
SPT 6	20	M W	1-2-3-3 (5)	10				0.25					
				11		tr. gravel							
SPT 7	22	W M	1-2-6-12 (8)	12			CL-ML	2.5-3.5					
				13									
SPT 8	22	M	3-10-9-10 (19)	14				2.0-2.5					
				15		with 2" sand seams at 15'							
SPT 9	24	M	3-11-15-19 (26)	16				4.5+					
				17		hard							
SPT 10	20	M	4-7-13-17 (20)	18		2" well set at 18', sand 18' to 8', chips 8' to 3', 10' .010" screen, 10' riser		3.5-4.5					
				19									
				20		20.0 563.1							

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 46** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575304.148 / EASTING: 98795.707
DATE STARTED: 10/08/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/08/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 584.103 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	9	M	2-4-4-4 (8)	1	4" topsoil, fill Silty Sand, tr. gravel, brn						HSA	3 1/4" HS
SPT 2	7	M W	3-3-7-4 (10)	2–3		SM						
				4.0	580.1							
SPT 3	5	W	0-0-0-5 (0)	4–5	Silty Clay with sand lenses, brn, plastic	CL-ML	0.5					
				6.0	578.1							
SPT 4	20	M	1-1-3-4 (4)	6–7	Silty Sand, wet, brn, wet plastic	SM						
				7.0	577.1							
				7–8	Silty Clay, with sand, green, plastic	CL-ML	2.5					
				8.0	576.1							
SPT 5	22	W M	0-2-4-6 (6)	8–9	Silt, brn	ML						
				9.0	575.1							
SPT 6	24	M	1-3-4-5 (7)	9–10	sandy, silty Clay, gray		2.25					
				10–11			1.0					
SPT 7	15	W M	2-3-5-7 (8)	11–12		CL						
				12–13	with wet silt seams, brn		3.25					
SPT 8	21	M	5-11-7-9 (18)	13–14								
				14–15			3.0					
				15–16	with 3" wet sand seam at 15'							
				16.0	568.1							
SPT 9	22	M	3-10-15-22 (25)	16–17	Silty Clay, brn, plastic		4.5+					
				17–18		CL-ML						
SPT 10	22	M	9-14-21-20 (35)	18–19			4.5+					
				19–20								
				20.0	564.1							

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158	**BORING ID: Pier 47**	PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575311.813 / EASTING: 98674.563
DATE STARTED: 10/07/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/07/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 582.713 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	20	W	2-2-2-2 (4)	1	Sandy Silt, black, not plastic						HSA	4 1/4" HS
SPT 2	8	W	1-4-7-3 (11)	2 3 4	tr. gravel 4.0 578.7							
SPT 3	20	W M	0-0-3-5 (3)	5 6	Silty Clay with sand, greenish gray to tan/gray, plastic		0.5-1.0					
SPT 4	22	M	2-4-4-4 (8)	7 8	brown	CL-ML	1.5-3.5					
SPT 5	20	M	1-2-4-8 (6)	9 10			1.5-2.5					
SPT 6	20	M W	7-5-5-5 (10)	11 12	10" silty sand seam at 10', brn, wet 12.0 570.7		0.5					
SPT 7	23	W M	3-5-7-11 (12)	13 14	Silty Clay, brn, plastic, v-stiff		3.0					
SPT 8	20	M	2-5-7-9 (12)	15 16		CL-ML	2.0-3.0					
SPT 9	18	M	3-6-10-15 (16)	17 18			2.5-3.5					
SPT 10	20	M	10-12-19-22 (31)	19 20	2" well set at 18', sand to 8', chips to 3', 10' .010" screen, 10' riser 20.0 562.7		4.5+					

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 48** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575411.016 / EASTING: 98585.119
DATE STARTED: 10/08/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/08/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.452 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M	1-2-2-3 (4)	1	0.5 Topsoil 583.0 fill, Silty Clay, with sand, tr. gravel, and plastic, brn						HSA	3 1/4" HS
SPT 2	12	M W	2-2-3-5 (5)	3		CL-ML	1	25	2	5		
				4	4.0 579.5 Peat, black, f.								
SPT 3	19	W M	0-1-2-2 (3)	5	5.0 578.5 Silty Clay, gray, plastic		0					
SPT 4	24	M	1-3-4-4 (7)	7			0.75 1.5-2.0					
SPT 5	17	M W	0-2-4-5 (6)	9	tr. to with sand		1.5					
SPT 6	18	M	1-2-5-5 (7)	11			0					
SPT 7	22	W M-W	0-3-6-7 (9)	13	3" sand seam at 13'	CL-ML	0.5 3.5					
SPT 8	22	M	2-6-5-7 (11)	15	red-brn		2.5 1.0					
SPT 9	21	M	2-7-14-17 (21)	17			1.5-2.0 4.5					
SPT 10	16	M-W	15-13-14-19 (27)	19	with 1" sand seams with 6" silty sand seam		4.5+					
				20	20.0 563.5 End of Boring at 20.0 ft.							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 49** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575421.736 / EASTING: 98434.017
DATE STARTED: 10/07/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/07/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.092 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	17	M	7-7-3-4 (10)	1		0.5 fill Sand with gravel tan 582.6	SP					HSA	4 1/4" HS
				2		organic Silt, black, plastic, fill 2.0 581.1	OL						
SPT 2	6	M	2-3-3-3 (6)	3		Silt, brn, not plastic, fill	ML						
				4		4.0 579.1							
SPT 3	12	M	2-2-4-3 (6)	5		Silty Clay with sand, brn, plastic, fill	CL-ML	0					
				6	▽								
SPT 4	24	W M	0-3-4-6 (7)	7		7.0 576.1		2.5					
SPT 5	20	M	1-2-5-5 (7)	8		Silty Clay, brn, plastic, v. stiff							
				9		stiff to soft	CL-ML	0.5-2.0					
SPT 6	4	M W	1-3-5-4 (8)	10									
				11									
				12		12.0 v. soft 571.1		0					
SPT 7	20	W M	6-13-14-16 (27)	13		Silty Sand, brn	SM						
				14									
SPT 8	24	M	7-10-10-15 (20)	15		15.0 568.1							
				16		16.0 Silty Clay, brn, plastic, v. stiff 567.1	CL-ML	3.75					
SPT 9	20	M W	11-20-26-32 (46)	17		Silty Sand, brn, not plastic	SM						
				18									
SPT 10	20	W	2-11-28-36 (39)	19		2" well set at 19', screen 19'-4', sand to 6.5', chip 6'-2', 10' .010"							
				20		20.0 screen, 10' riser 563.1							

End of Boring at 20.0 ft.

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WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 6ft.	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158		**BORING ID: Pier 50** PAGE NO: 1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:	LATITUDE: / LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:	NORTHING: 575525.449 / EASTING: 98373.899
DATE STARTED: 10/08/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV	COORDINATE SYSTEM: WCCS
DATE COMPLETED: 10/08/13	LOGGED BY: A. Woerpel	HOLE SIZE: in	HORIZONTAL DATUM: WCCS Brown / VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic	STREAMBED ELEVATION: NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:		SURFACE ELEVATION: 583.25 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	15	M W	2-9-8-8 (17)	1		4" topsoil, Sand with silt with gravel, tan, moist to wet, fill	SP					HSA	3 1/4" HS
SPT 2	1	W M	6-5-2-1 (7)	2 3 4		2.0 581.3 Silty Clay, with sand, brn to black, fill 4.0 579.3	CL-ML						
SPT 3	20	M	0-2-2-4 (4)	5 6 7		Silty Clay, with sand, gray to yellow-gray, tr. organics 7.5 575.8	CL-ML	0.5 1.5 2.75					
SPT 4	24	M	2-5-6-8 (11)	8		Silty Clay, little sand, red-brn		3.5					
SPT 5	18	M	3-4-7-7 (11)	9 10		tr. gravel, gray		0.5					
SPT 6	0		3-4-5-6 (9)	11 12									
SPT 7	24	M	2-5-7-9 (12)	13 14		no gravel, brn	CL-ML	2.0					
SPT 8	24	M	2-5-7-9 (12)	15 16		tr. gravel		1.5 3.0					
SPT 9	18	M	7-16-19-23 (35)	17 18				4.5+					
SPT 10	20	M	7-6-12-19 (18)	19 20		20.0 563.3		4.5+					

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 1ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

P:\GINT\WISDOT GINT PROJECTS\GINT_06\B-5-158\B-5-158.GPJ Leo Frigo Memorial Bridge 11/4/13

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**Pier 51**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 1
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: GESTRA	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 575537.43	EASTING: 98250.669
DATE STARTED: 10/08/13	CREW CHIEF: A. Woerpel	DRILL RIG: D-50 ATV		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/08/13	LOGGED BY: A. Woerpel	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY:	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION / OFFSET	TOWNSHIP: / RANGE: / SECTION: / 1/4 SECTION: / 1/4 1/4 SECTION:			SURFACE ELEVATION:	583.106 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 1	20	M	2-1-2-2 (3)	1		Topsoil, fill, sandy silt, clay, black		0.25				HSA	4 1/4" HS
				1.5		581.6							
SPT 2	10	M W	0-1-3-2 (4)	3		fill, Sand with gravel, with silty clay layers, black	SP						
				4.0		579.1							
SPT 3	9	W M	1-2-2-3 (4)	5		Silty Clay, light brn, plastic		0.5					
SPT 4	21	M	4-4-4-6 (8)	7		little sand, tr. gravel, gray		0.5					
SPT 5	23	M	2-3-4-6 (7)	9		gray to brn	CL-ML	1.25 2.0					
SPT 6	16	M	1-4-6-7 (10)	11				2.0					
SPT 7	24	M	2-6-6-11 (12)	13		no sand, no gravel		2.5 2.0					
SPT 8	24	M	4-6-7-10 (13)	15		brown		1.5-2.0					
				16.0		567.1							
SPT 9	6	M W	45-33-30-26 (63)	17		Rock at 16' then Sand with silt, brn, very dense	SP						
SPT 10	23	W	10-17-20-23 (37)	19		2" well set at 18', sand 18'-7', Chips to 7'-1', 10' .010" screen, 10' riser							
				20		20.0 563.1							

End of Boring at 20.0 ft.

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 3ft.	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01			**BORING ID:**	**AW**
	WISDOT STRUCTURE ID: B-5-158			PAGE NO:	1 of 2
WISDOT PROJECT NAME: Leo Frigo Memorial Bridge	CONSULTANT: Michael Baker, Inc.	CONSULTANT PROJECT NO:		LATITUDE:	LONGITUDE:
ROADWAY NAME: IH 43 over Fox River	DRILLING CONTRACTOR: WISDOT	DRILLING CONTRACTOR PROJECT NO:		NORTHING: 575586.505	EASTING: 98116.246
DATE STARTED: 10/17/13	CREW CHIEF: J. Ruda	DRILL RIG: Unit 3		COORDINATE SYSTEM: WCCS	
DATE COMPLETED: 10/21/13	LOGGED BY: P. Skolos	HOLE SIZE: in		HORIZONTAL DATUM: WCCS Brown	VERTICAL DATUM: MSL
COUNTY: Brown	LOG QC BY: D. Reid	HAMMER TYPE: Automatic		STREAMBED ELEVATION:	NA
STATION	OFFSET	TOWNSHIP:	RANGE: SECTION: 1/4 SECTION: 1/4 1/4 SECTION:	SURFACE ELEVATION:	614.8 ft

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
				1		0.3 Asphalt 614.5 0.7 Concrete 614.1 1.7 Bas course aggregate 613.1							
SPT 1	18	D	3-6-7-9 (13)	2		Fine SAND, tr. silt, brn.							
SPT 2	24	D	3-7-9-11 (16)	5								HSA	
SPT 3	24	D	10-12-5-6 (17)	7									
SPT 4	24	D	5-6-7-7 (13)	9									
SPT 5	24	D	4-5-5-8 (10)	10		tr. cs. gravel							
SPT 6	24	D	3-8-11-16 (19)	13									
SPT 7	24	M	6-11-16-19 (27)	15									
SPT 8	24	M	11-11-14-16 (25)	16		silty							
SPT 9	24	M	6-12-13-18 (25)	19			SP						
SPT 10	24	M	6-14-15-28 (29)	20									
SPT 11	24	M	8-17-21-23 (38)	23									
SPT 12	24	M	11-18-24-32 (42)	25									
SPT 13	24	M	20-21-22-23 (43)	27									
SPT 14	24	M	8-11-11-18 (22)	29									
SPT 15	24	M	11-14-15-18 (29)	30									
SPT 16	24	M	9-11-19-32 (30)	33									
SPT 17	24	M	19-19-19-19 (38)	35		Fine SAND, tr. silt, tr. f-c gravel, brn							

WATER LEVEL & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NMR	▨	CAVE - IN DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NMR	■	CAVE - IN DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.
2) NE = Not Encountered; NMR = No Measurement Recorded

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WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT ID: 1220-15-01 WISDOT STRUCTURE ID: B-5-158	BORING ID: AW PAGE NO: 2 of 2

SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	Moisture	BLOW COUNTS (N VALUE)	Depth (ft)	Graphic	Soil / Rock Description and Geological Origin for Each Major Unit / Comments	USCS / AASHTO	Strength Qp (tsf)	Liquid Limit (%)	Plasticity Index (%)	Boulders	Drilling Method	Notes
SPT 18	24	W	7-9-10-7 (19)	37		Fine SAND, tr. silt, brn.	SP						
						37.5 577.3							
SPT 19	24	M	1-3-3-4 (6)	38 39 40		CLAY, some silt, brn.	CL	1.0					
						41.0 573.8							
SPT 20	24	M-W	1-2-2-3 (4)	41 42		SILT, some clay, w/ fine sand seams, brn.	CL-ML	1.0					
						42.0 572.8							
SPT 21	24	M-W	0-0-0-0 (0)	43 44		SILT, some clay, some f. sand, gray	CL-ML	0.0					
						45.0 569.8							
SPT 22	24	M-W	0-0-0-2 (0)	45 46		CLAY, some silt, brn.	CL	0.0					
SPT 23	24	M	2-3-5-5 (8)	47 48		48.0 566.8		0.75					

End of Boring at 48.0 ft.

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Appendix I
Impulse Echo Test Results

Geotechnical
Environmental
Water Resources
Ecological

December 11, 2013
Revised December 16, 2013
GEI Project No. 1330980

By email to Jeremy.Thomas@aecom.com
CC: Paul.Tarvin@aecom.com

Mr. Jeremy Thomas
AECOM Technical Services, Inc.
558 North Main Street,
Oshkosh, WI 54901

RE: Nondestructive Testing of Foundations, Interstate 43 Leo Frigo Memorial Bridge, Green Bay, Wisconsin

Dear Mr. Thomas:

Following our visit to the above-referenced project, we are pleased to submit this letter report on the results of the testing that was performed on September 29, 2013.

Introduction

Michael Baker Corporation (MBC), acting as Principal Investigator for Wisconsin Department of Transportation, was assessing the foundation piles of Pier 22 of the Leo Frigo Memorial Bridge in an effort to determine the cause of the settlement of that pier that occurred on September 25, 2013. MBC asked AECOM Technical Services, Inc. (AECOM) to determine if nondestructive testing (NDT) could assist in the investigation. AECOM contacted GEI Consultants, Inc. (GEI) to discuss possible test methods. GEI determined that, due to the site circumstances, the only test that could be practically applied was low-strain integrity testing, per ASTM D5882, *Standard Test Method for Low-strain Integrity Testing of Piles*.

GEI expressed concern that given the large ratio of surface area to cross-sectional area of H-Piles, soil damping was likely to attenuate any stress waves generated in the piles before any useful information could be obtained. In addition, the superstructure of the bridge was still in place, and would likely produce secondary reflections that would complicate the analysis of the test result.

MBC decided to authorize a trial NDT program on two steel H-piles that had been exposed in a test pit excavation, to assess the value of NDT data in this situation.

Test Method Description

ASTM D5882 covers two similar methods for performing low-strain integrity tests. Both methods involve generating a low-strain stress wave in the foundation by impacting the top of the pile with a small hammer. The basic test technique is the Pulse-Echo Method (PEM) in which the time history of the pile's response to the impact is analyzed. The second method is the Impulse Response

www.geiconsultants.com

GEI Consultants, Inc.
115 Lake Street, Unit 202, Libertyville, IL 60048
847.984.3401 fax: 847.984.3532

Spectrum method in which the frequency spectrum of the pile response is analyzed. GEI used the Impulse Response method to evaluate these piles. The Impulse Response was developed specifically for piles with variable cross-section, or in complex soil strata, as in this case.

For the PEM method, the top of the pile is instrumented with an accelerometer connected to a digital data acquisition system in a portable PC tablet computer, and the pile is struck axially with a hand-held hammer. This generates an elastic compression wave which propagates down the shaft. Some or all of the wave energy is reflected back to the top of the shaft by any significant changes in soil or material quality or shaft dimensions. The reflected wave is detected by the accelerometer, and recorded by the data acquisition system. The data is plotted as a simple time history, and the time between the moment of impact and the return of the reflected wave, or "echo", is measured. If the velocity (Vc) of the compression wave through the material is assumed (typically 16,000-17,000 ft/sec for steel piles), then the shaft length or depth to the anomaly that reflected the wave energy can be calculated. Conversely, where shaft length is known, the wave velocity, Vc, can be calculated.

For the Impulse Response analysis method, the raw time-based velocity data are filtered and processed via a Fast Fourier Transform (FFT) to convert them into frequency spectra. The converted data are then plotted as a graph of velocity against frequency, known as the velocity response curve or spectrum. The velocity response spectrum will typically exhibit a series of regularly spaced peaks, the spacing of which is a function of shaft length, or depth to the anomaly from which wave energy has been reflected. On shafts with variable cross-section, or in stratified soils, the velocity response spectrum can help clarify time-based signals which are otherwise inconclusive due to multiple reflections.

Please also note that the equipment used for this work is manufactured in Europe, and produces data in SI units. For convenience, the length and velocity measurements have been converted to US units where appropriate in the discussion of results. The dynamic stiffness measurements have been left in SI units because the data are only used on a comparative basis, so conversion to US units is impractical.

Test Results

Due to the local ground-water table, the depth of the test pit was limited to about 10 feet, which exposed about two feet of the H-Piles beneath the concrete pile cap [See Figure 1 attached].

The test was performed on two piles, designated Nos. 14 and 15. The transducers were applied to heavy-gauge right-angle steel brackets welded to the piles [See Figure 2 attached].

A series of resonant peaks was apparent in the response curves for Pile 14, copies of which are attached to this report. No useful data could be acquired on Pile 15.

The Impulse Response analysis software used for this project has a series of preset values for the stress wave propagation velocity in concrete, with a maximum value of 4,500 m/s or 14,764 ft/s. Using this value, the resonant peaks in the response for Pile 14 show reflections from apparent depths of about 4.4 metres, or 14.4 feet [See Figure 3 attached], and 26.3 metres, or 86.3 feet [see Figure 4 attached]. However, the stress-wave velocity for steel piles is typically in the range 16,000 to 17,000 ft/s, so assuming a mid-range value of 16,500 ft/s, the depths of the apparent reflectors are about 16 and 96 feet, respectively.

Regardless of the stress wave propagation velocity, the amplitude of the responses was much greater than expected for a steel H-Pile embedded in soil, and therefore we consider them more likely to be

artifacts caused by multiple reflections from the superstructure to which the pile was still attached.

Conclusions

Consistent and repeatable data could only be obtained from one of the two piles selected. The amplitude of the responses measured in the test results from Pile 14 was such that they were not considered likely to be from the pile, and were thought much more likely to be artifacts generated by multiple reflections from the superstructure above the piles.

We were unable to test any other piles with the Impulse Response method on this project, and therefore have no other data to compare with and assess the validity of the recorded measurements. These test results, as stand-alone data, must therefore be considered inconclusive.

We thank you for this opportunity to provide our services to AECOM for this project. If you have any questions concerning the contents of this report, please call the undersigned.

Respectfully,

GEI CONSULTANTS, INC.

Bernard H. Hertlein, M.ASCE, M.GI, FACI.
Senior Consultant

Robert W. Acker, P.E (IL)
Vice President

BHH:nls

Attachments: Figures 1 through 4



Figure 1: General View of Test Pit Excavation



Figure 2: Welded Angle Brackets for Test Application – Pile 14

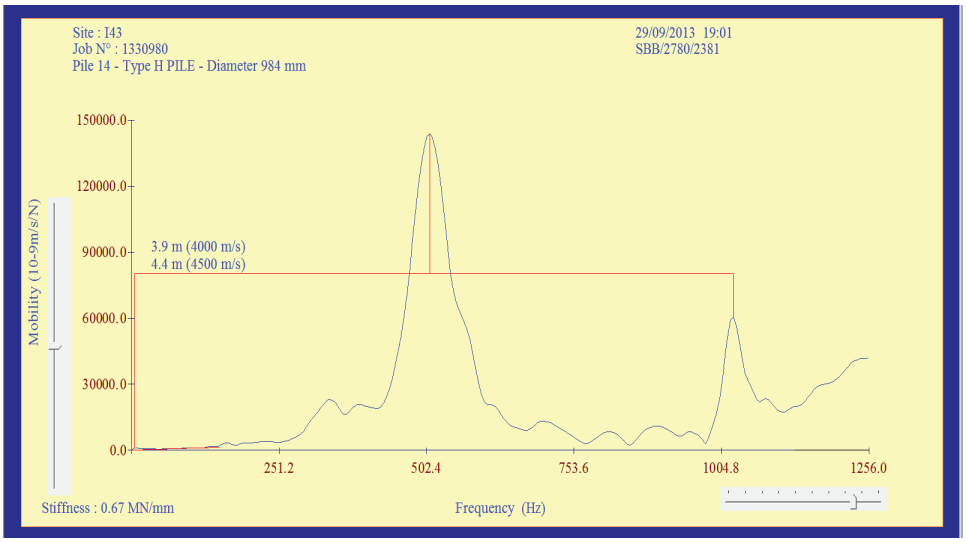


Figure 3: Response from Approximately 16 Feet?

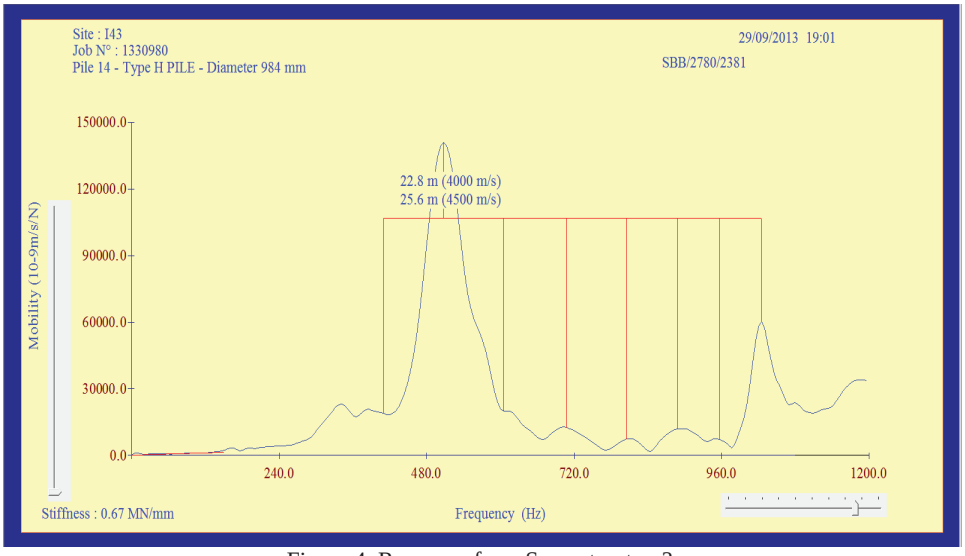


Figure 4: Response from Superstructure?

Appendix J
Laboratory Test Results for Land Piers Completed by OMNNI and Pace

Appendix J – Laboratory Test Results for Land Piers Completed by OMNNI and Pace

Summary of Contents

Soil Classification and Soil Resistivity Test Results by OMNNI Associates (OMNNI) J2

Moisture Content Determination - Test Method Qualification Memorandum by Pace J213

Chemical Analyses by Pace Analytical Services, Inc. (Pace) J218

Standard Operating Procedure (SOP) for Pace J586

Soil Classification and Soil Resistivity Test Results
by
OMNNI Associates (OMNNI)

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP5NE-1
Date of Sample: 10/12/2013
Sample Location: Pier #5: Test Pit TP5NE, 4.6' below T/Pier Footing @ B/ Pier Footing
General Description: Sandy silt, reddish brown
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SANDY SILT, reddish brown (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	100
#100 (.15 mm)	98
#200 (.075 mm)	59.3
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 1100

Soil pH (AASHTO T289) 8.2

Specific Gravity of Soil (AASHTO T100) 2.688

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

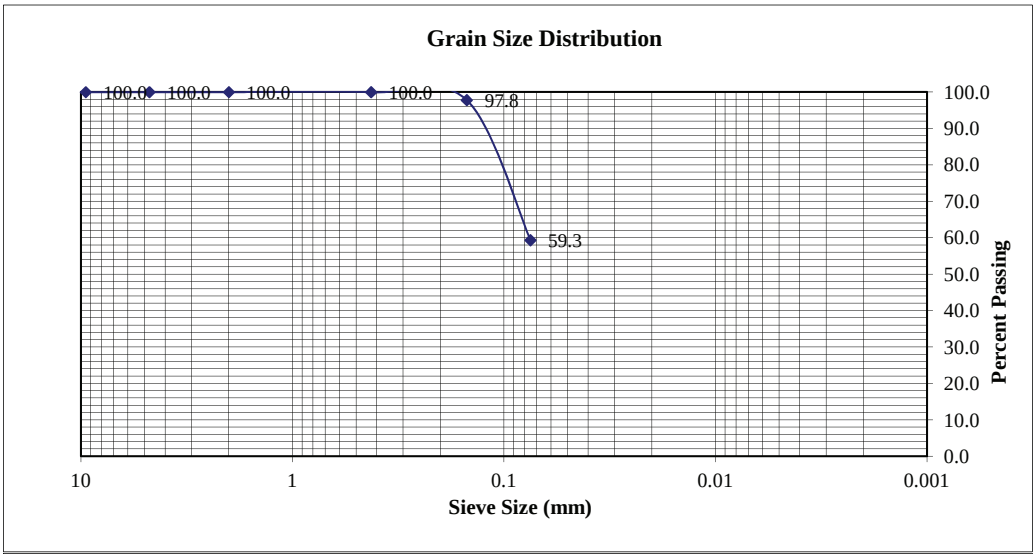
Reviewed By: *Paul R. Eggen*

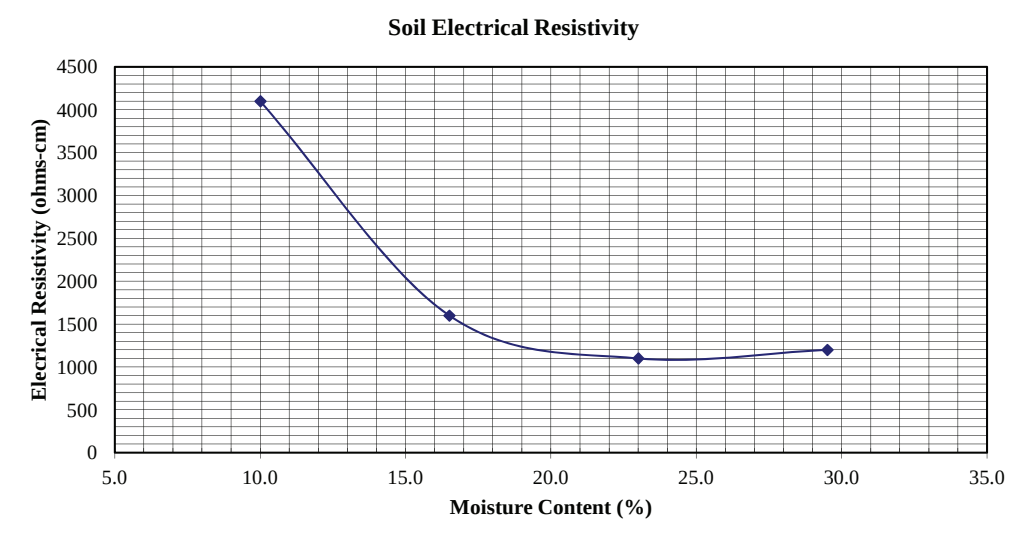
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP5NE-1
Date of Sample: 10/12/13
Sample Location: Pier #5: Test Pit TP5NE, 4.6' below T/Pier Footing @ B/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP10S-1
Date of Sample: 10/2/2013
Sample Location: Test Pit: TP10s-1; Pier #10 - 0' below T/Pier Footing
General Description: Lean clay w/ organics, reddish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, reddish brown (CL)

USDA Soil Classification: Silt Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	99
1" (25 mm)	97
3/4" (19 mm)	96
1/2" (12.5 mm)	94
3/8" (9.5 mm)	93
#4 (4.75 mm)	91
#10 (2.0 mm)	89
#40 (.425 mm)	86
#100 (.15 mm)	78
#200 (.075 mm)	70.4
.002 mm	22.0
D_{10}	<.002

Natural Moisture Content

Moisture Content, %	18.1

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	29.1
Plastic Limit, PL (%)	15.5
Platicity Index (%)	13.6

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 470

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.637

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

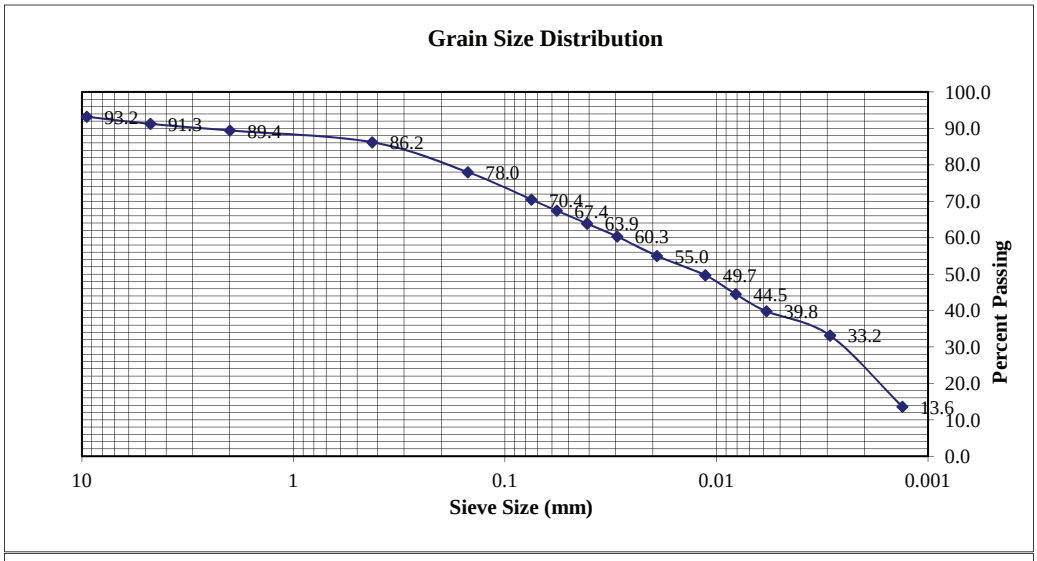
Reviewed By: *Paul R. Eggen*

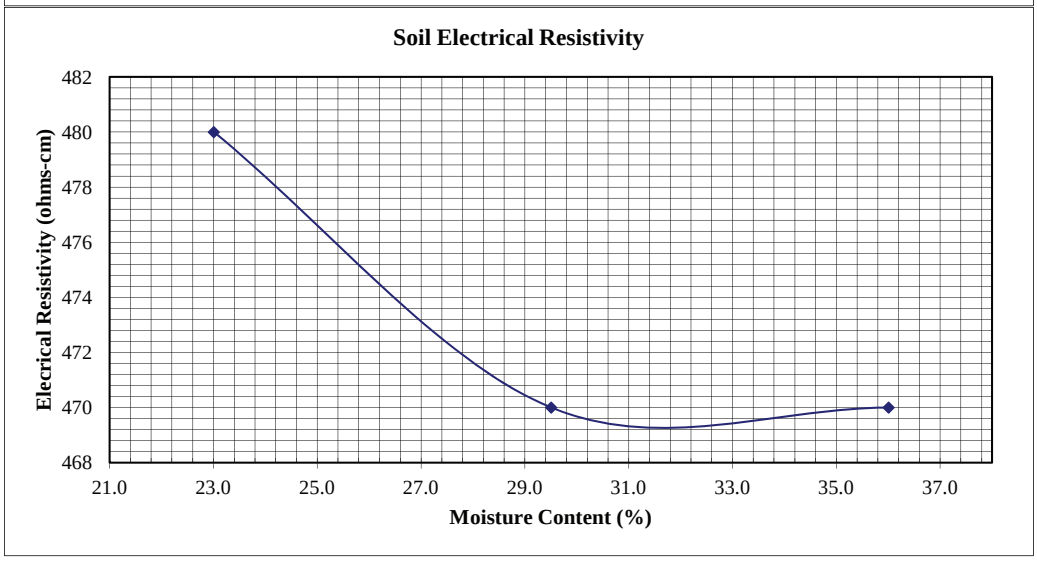
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920 735 6900
FAX 920-830-6100

PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP10S-1
Date of Sample: 10/2/2013
Sample Location: Test Pit: TP10s-1; Pier #10 - 0' below T/Pier Footing





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FAX 920-830-6100

REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP10S-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP10S; Pier # 10, 5.7' below T/Pier Footing
General Description: Silty clay, reddish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY, reddish brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	100
#100 (.15 mm)	99
#200 (.075 mm)	96.5
.002 mm	28.7
D_{10}	<.001

Natural Moisture Content
Moisture Content, % 18.9

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 28.8
Plastic Limit, PL (%) 15.8
Platicity Index (%) 13.0

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 600

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.738

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

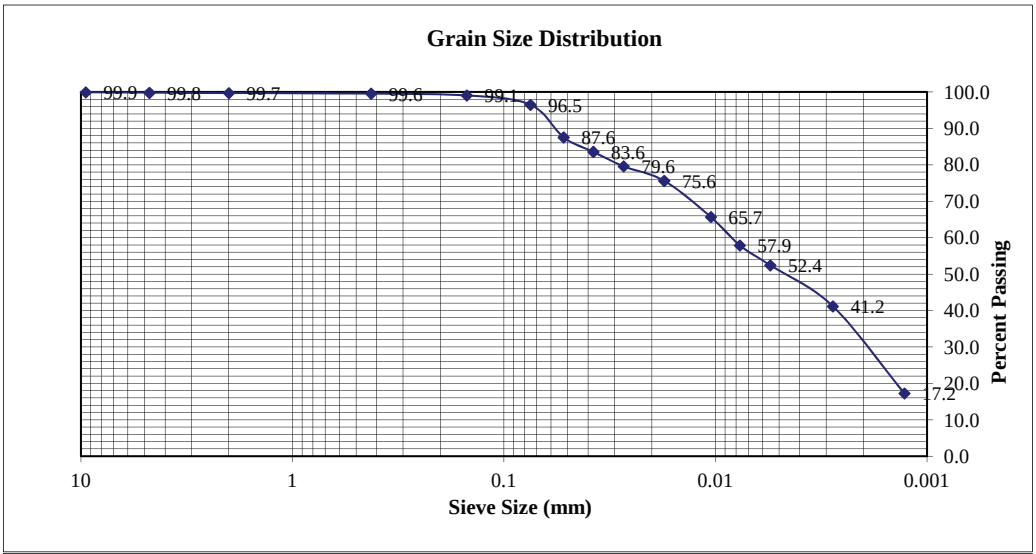
Reviewed By: *Paul R. Eggen*

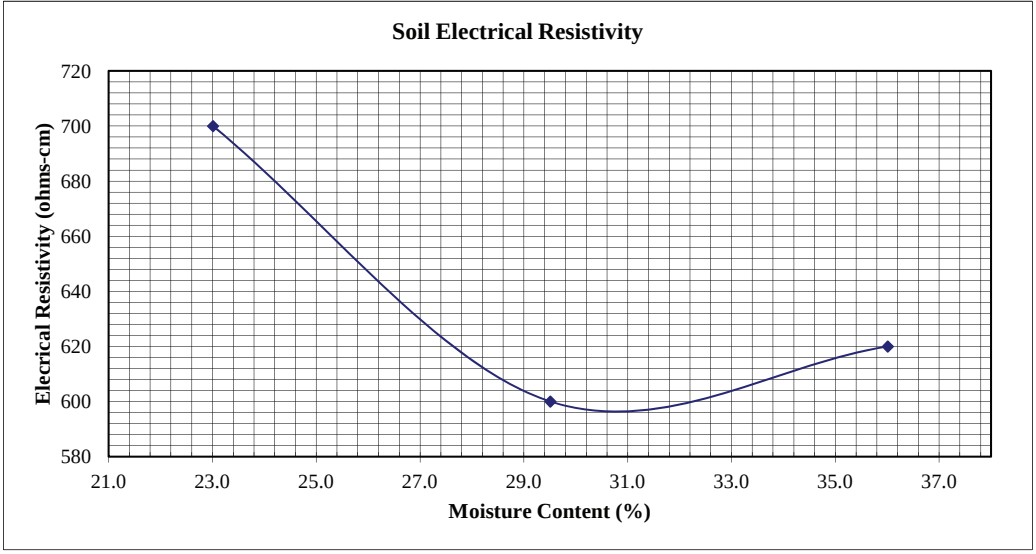
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP10S-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP10S; Pier # 10, 5.7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP11S-1
Date of Sample: 9/28/2013
Sample Location: Test Pit: Pier # 11- SE Corner of pier, 6.6' above to 2.7' below T/Pier Footing
General Description: Lean clay, strong brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, strong brown (CL)

USDA Soil Classification: Clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	98
1/2" (12.5 mm)	96
3/8" (9.5 mm)	96
#4 (4.75 mm)	94
#10 (2.0 mm)	93
#40 (.425 mm)	89
#100 (.15 mm)	80
#200 (.075 mm)	72.5
.002 mm	26.4
D_{10}	<.001

Natural Moisture Content
Moisture Content, % 20.4

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 33.7
Plastic Limit, PL (%) 15.7
Platicity Index (%) 18.0

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 220

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.589

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

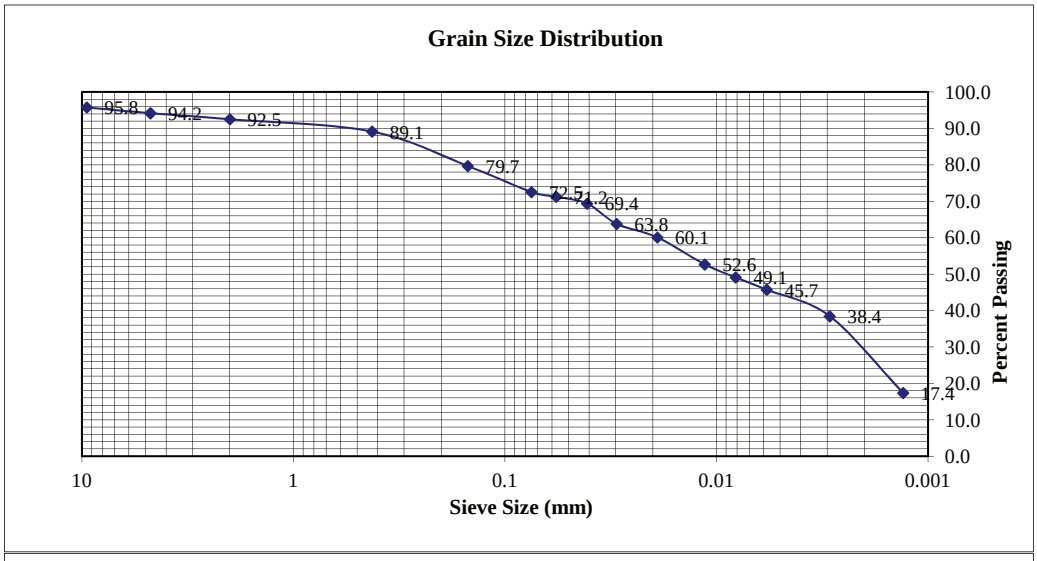
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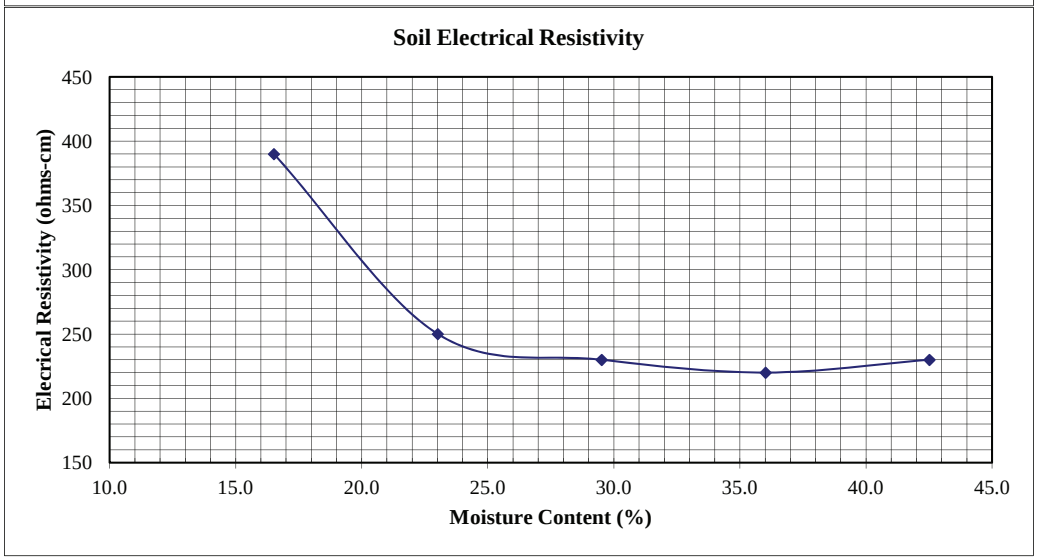
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP11S-1
Date of Sample: 09/28/13
Sample Location: Test Pit: Pier # 11- SE Corner of pier, 6.6' above to 2.7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP11S-2
Date of Sample: 10/2/2013
Sample Location: Test Pit: Pier # 11- 2.7' to 6.9' below T/Pier Footing
General Description: Sandy Silt, dark brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILT, dark brown (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	98
#4 (4.75 mm)	98
#10 (2.0 mm)	98
#40 (.425 mm)	97
#100 (.15 mm)	94
#200 (.075 mm)	87.5
.002 mm	17.8
D_{10}	<.001

Natural Moisture Content
Moisture Content, % 21.8

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 19.7
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 8.3

Specific Gravity of Soil (AASHTO T100) 2.695

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

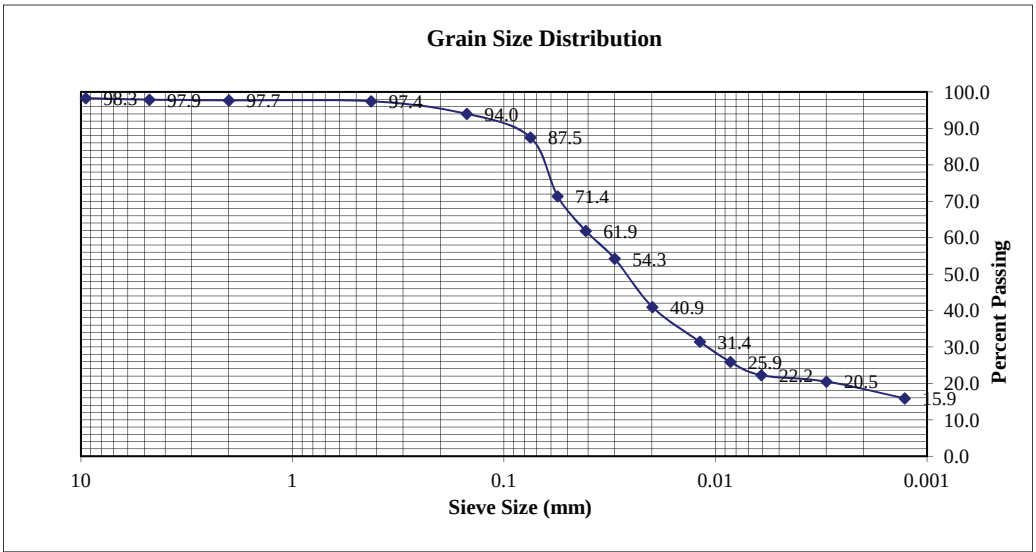
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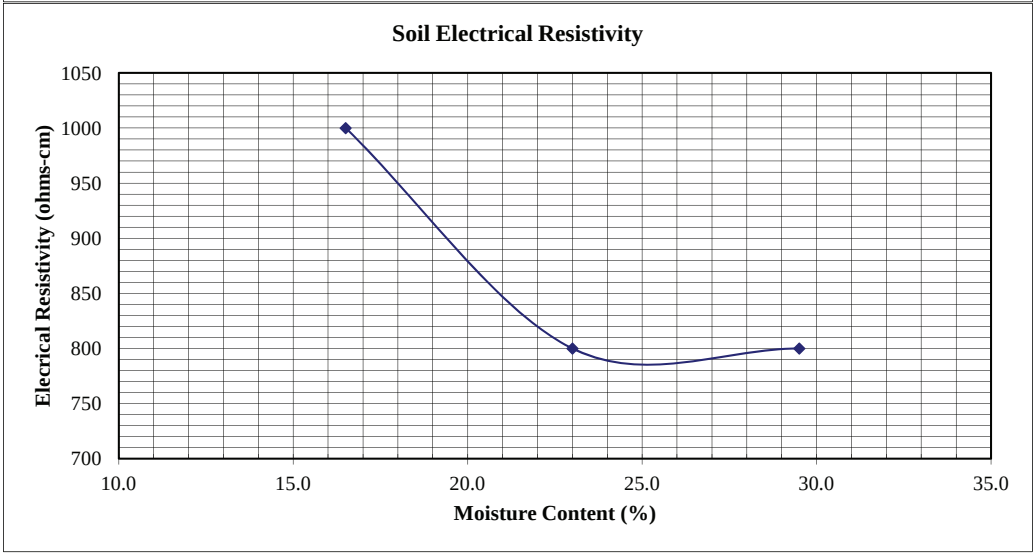
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP11S-2
Date of Sample: 10/02/13
Sample Location: Test Pit: Pier # 11- 2.7' to 6.9' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP12S-1
Date of Sample: 10/2/2013
Sample Location: Test Pit TP12S; Pier # 12 - 5.6' below T/Pier Footing
General Description: Organic silt w/ sand & clay, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND w/ORGANIC FINES, fine to medium grained ,black (SM)

USDA Soil Classification: Sandy Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	97
3/4" (19 mm)	97
1/2" (12.5 mm)	96
3/8" (9.5 mm)	95
#4 (4.75 mm)	93
#10 (2.0 mm)	92
#40 (.425 mm)	81
#100 (.15 mm)	55
#200 (.075 mm)	41.3
.002 mm	12.7
D_{10}	<.002

Natural Moisture Content

Moisture Content, % 85.6

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) 68.3
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) Non-Plastic
Liquid Limit (not dried), LL (%) 100.3

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 160

Soil pH (AASHTO T289) 9.0

Specific Gravity of Soil (AASHTO T100) 2.289

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

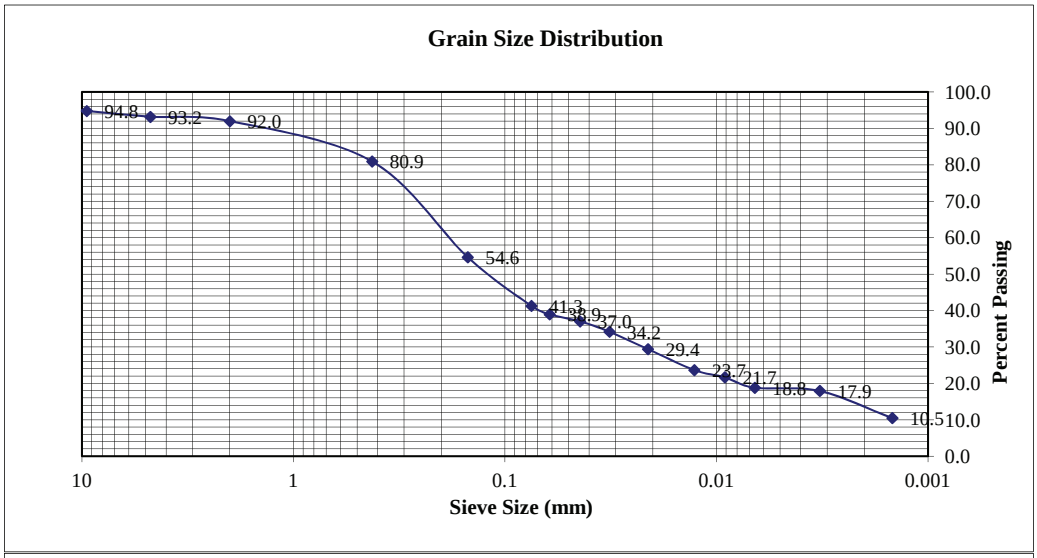
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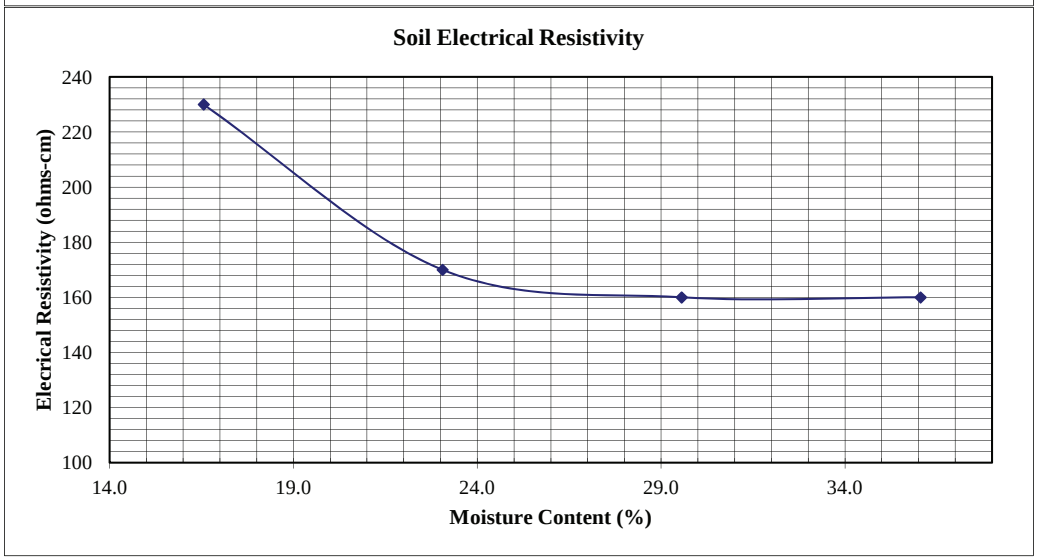
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP12S-1
Date of Sample: 10/2/2013
Sample Location: Test Pit TP12S; Pier # 12 - 5.6' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/7/2013

Sample Number: TP12S-2
Date of Sample: 10/2/2013
Sample Source: Existing Material - 1 1/2" clear crushed stone
Sample Location: Test Pit TP12S; Pier #12 - 6.5' Below T/Pier Footing
Tests Performed: Grain Size Analysis

TEST RESULTS;

Unified Soils Classification (ASTM:D2487) "GRAVEL, gray (GP)"

Grain Size Analysis (ASTM:C136)

SIEVE SIZE	% PASSING
2"	100
1 1/2"	96.6
1"	59.5
3/4"	28.2
1/2"	7.7
3/8"	5.4
#4	3.5
#10	3.0
#40	2.6
#100	2.1
#200	1.9
D_{10}	11

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-1
Date of Sample: 10/12/2013
Sample Location: Pier 13: Test Pit TP13NE, 0' below T/Pier Footing
General Description: Silty Sand, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine to medium grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	98
3/4" (19 mm)	98
1/2" (12.5 mm)	95
3/8" (9.5 mm)	94
#4 (4.75 mm)	91
#10 (2.0 mm)	88
#40 (.425 mm)	74
#100 (.15 mm)	45
#200 (.075 mm)	34.7
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 300

Soil pH (AASHTO T289) 7.7

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

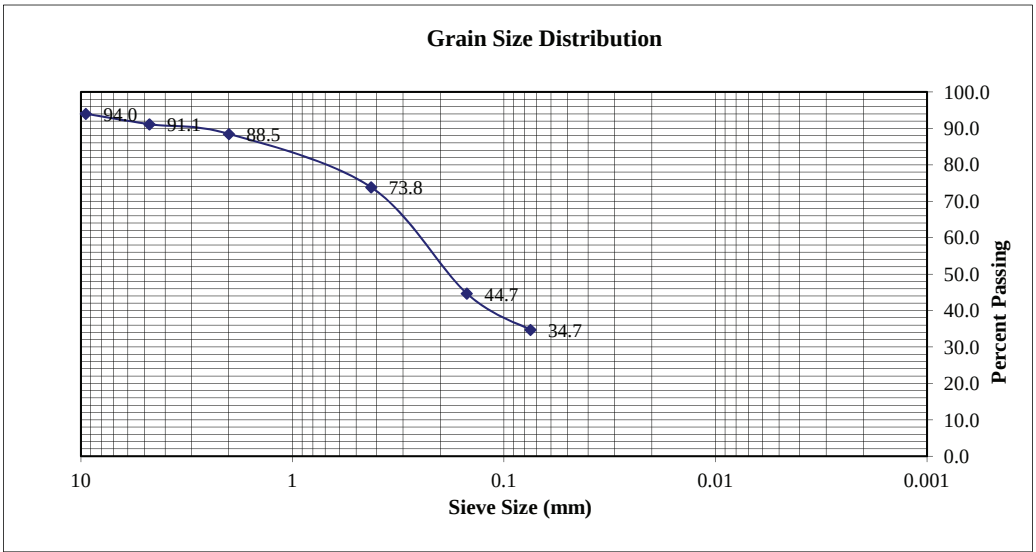
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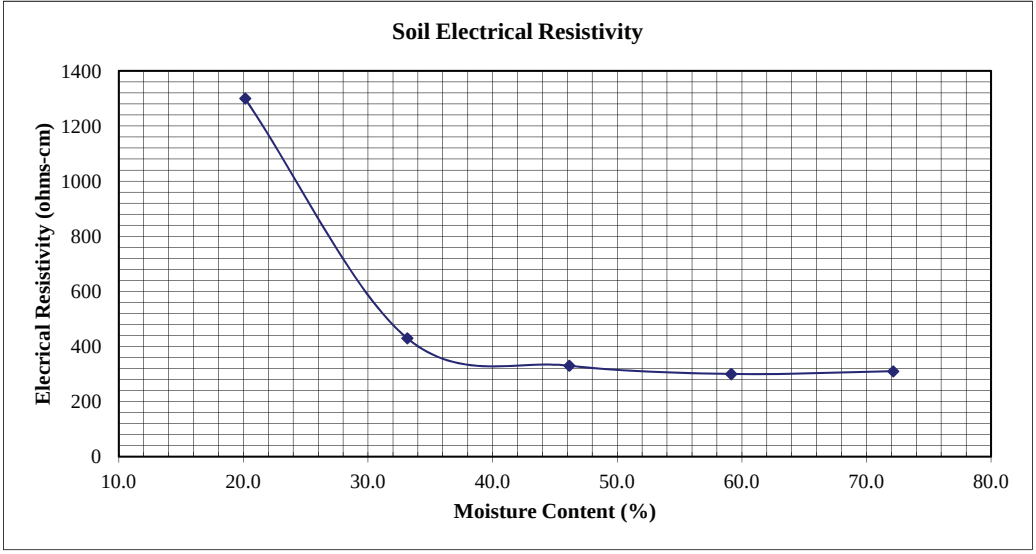
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP13NE-1
Date of Sample: 10/12/13
Sample Location: Pier 13: Test Pit TP13NE, 0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP13NE-2
Date of Sample: 10/12/2013
Sample Location: Pier #13; Test Pit TP13NE, 5.0' below T/ Pier Fotting @ B/ Pier Footing
General Description: Lean Clay, dark brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY LEAN CLAY, dark brown (CL)

USDA Soil Classification: Clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	99
1" (25 mm)	98
3/4" (19 mm)	98
1/2" (12.5 mm)	97
3/8" (9.5 mm)	97
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	91
#100 (.15 mm)	76
#200 (.075 mm)	69.2
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1200

Soil pH (AASHTO T289) 7.9

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: _____
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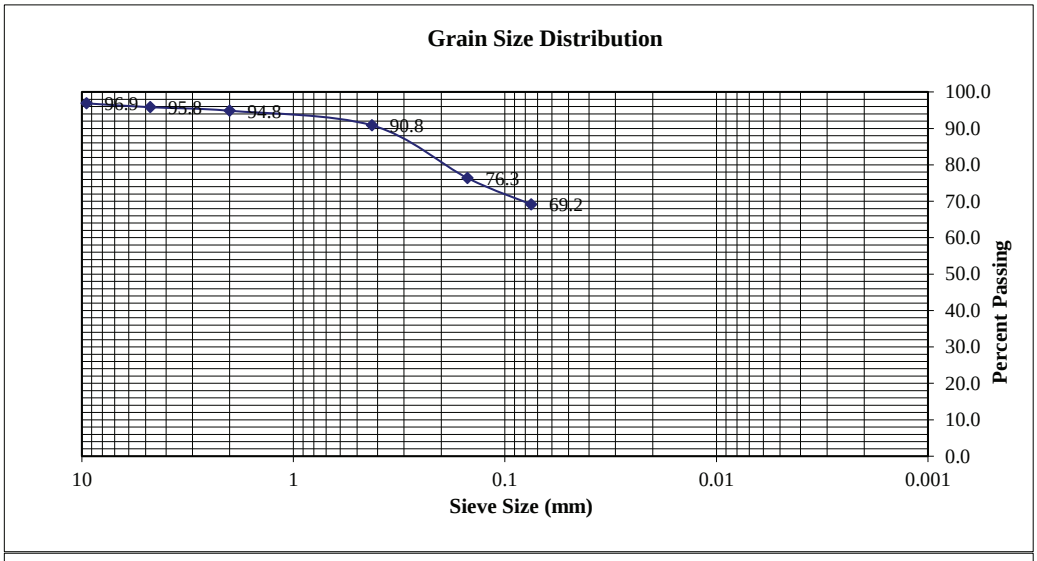
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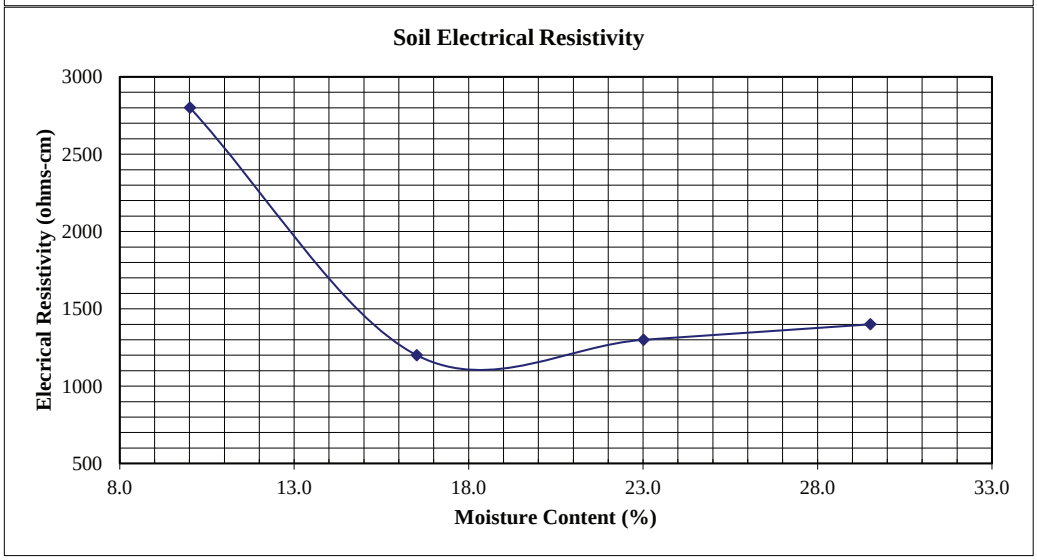
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP13NE-2
Date of Sample: 10/12/13
Sample Location: Pier #13; Test Pit TP13NE, 5.0' below T/ Pier Fotting @ B/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP13NE-3
Date of Sample: 10/12/2013
Sample Location: Pier # 13; Test Pit TP13NE, 8.5' below T/Pier Footing
General Description: Sand, grayish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND, fine grained ,grayish brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	96
#100 (.15 mm)	2
#200 (.075 mm)	0.9
.002 mm	<0.9
D_{10}	0.170

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1600

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

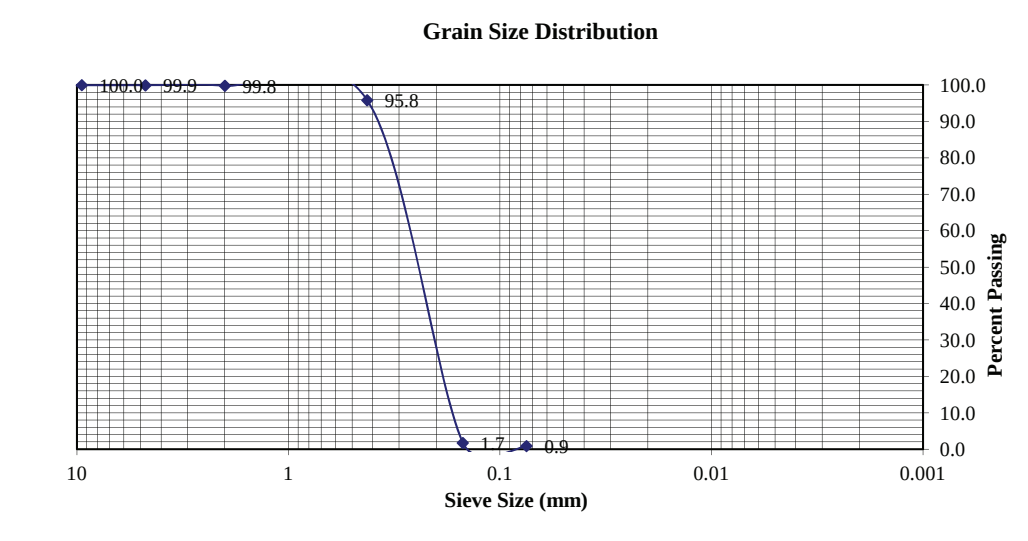
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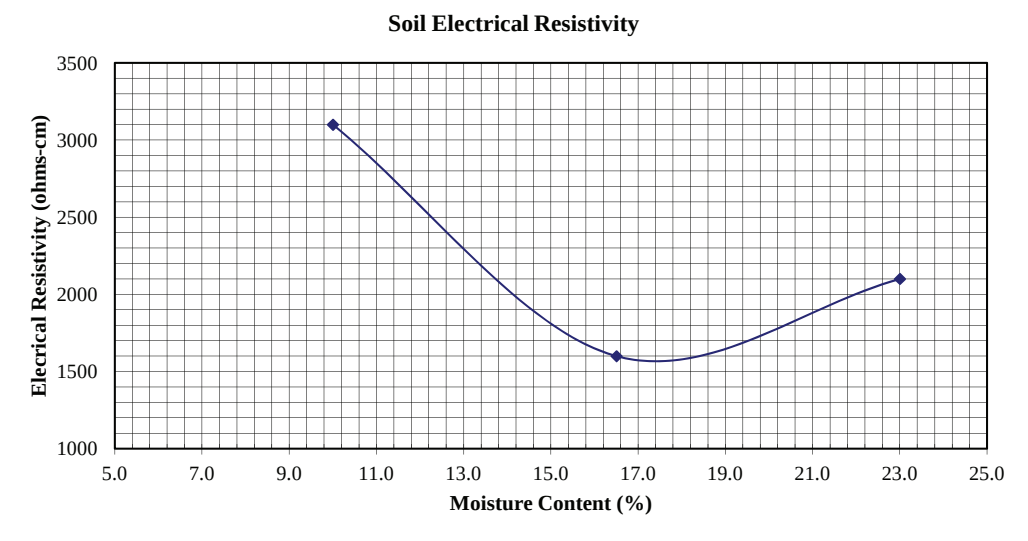
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP13NE-3
Date of Sample: 10/12/13
Sample Location: Pier # 13; Test Pit TP13NE, 8.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP13NE-4
Date of Sample: 10/12/2013
Sample Location: Pier # 13: Test Pit TP13NE, 9.8' below T/Pier Footing
General Description: Clay, reddish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, reddish brown (CL)
USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	99
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	98
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	96
#100 (.15 mm)	89
#200 (.075 mm)	83.5
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1300

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

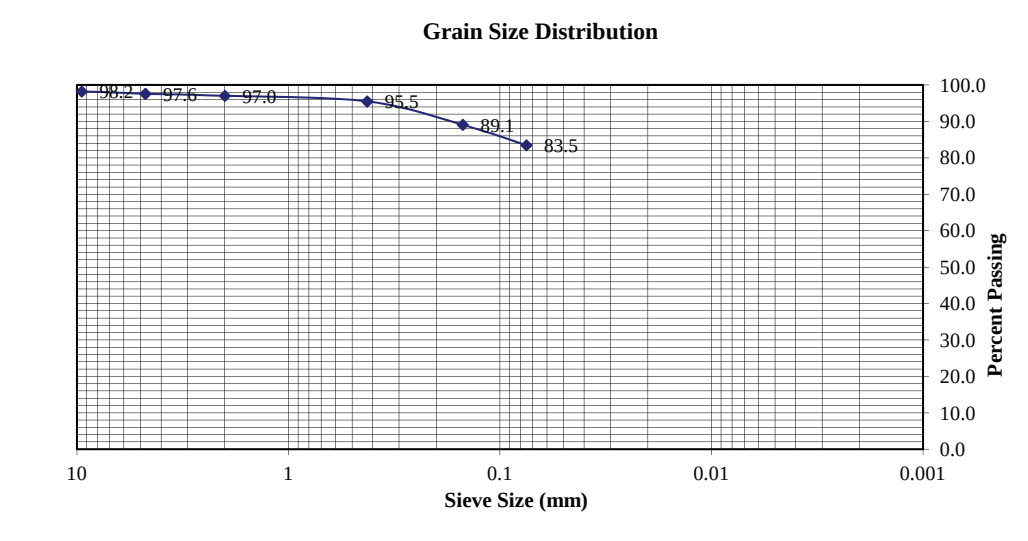
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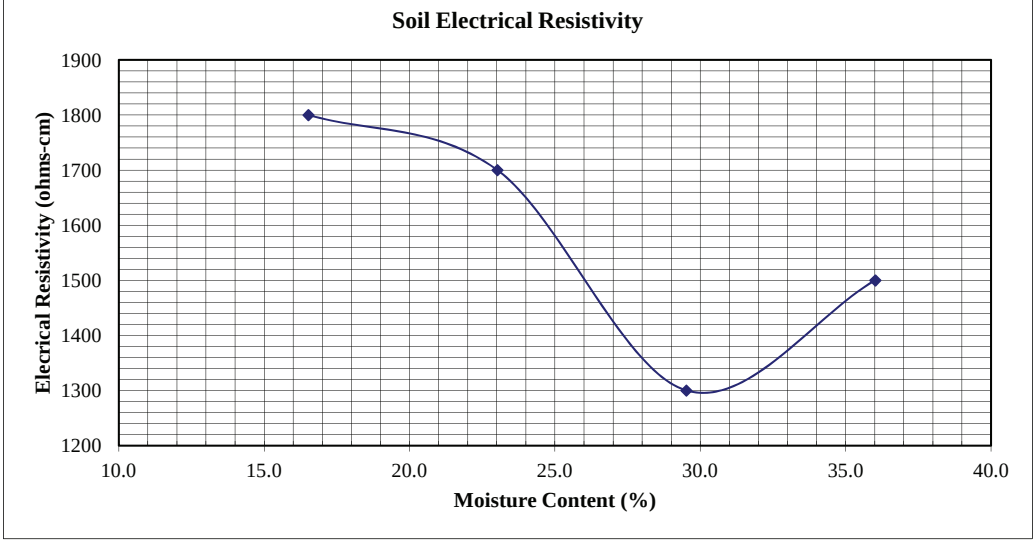
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP13NE-4
Date of Sample: 10/12/13
Sample Location: Pier # 13: Test Pit TP13NE, 9.8' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-5
Date of Sample: 10/12/2013
Sample Location: Pier # 13: Test PitTP13NE; ~1' thick layer @ 7' below T/Pier Footing
General Description: Silty Sand, black
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SAND w/ SILT, fine to medium grained ,black (SP-SM)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	99
#40 (.425 mm)	62
#100 (.15 mm)	16
#200 (.075 mm)	8.3
.002 mm	<8
D_{10}	0.090

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 300

Soil pH (AASHTO T289) 7.4

Specific Gravity of Soil (AASHTO T100) 2.175

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: _____
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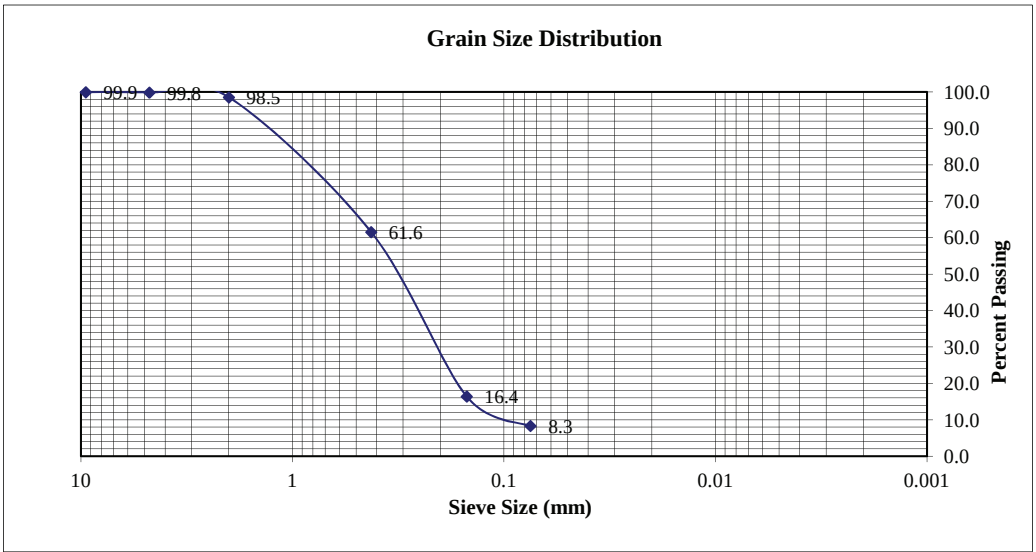
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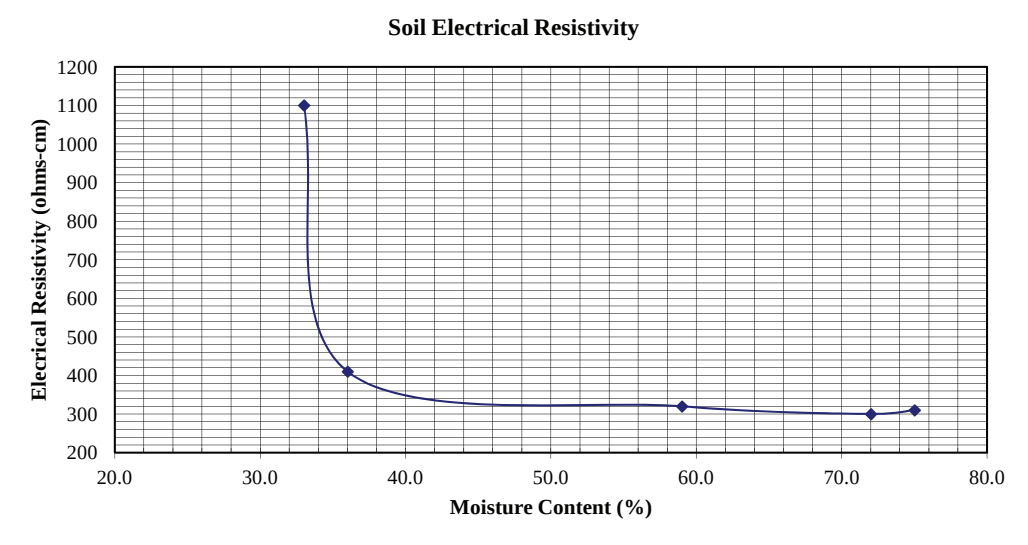
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-5
Date of Sample: 10/12/13
Sample Location: Pier # 13: Test PitTP13NE; ~1' thick layer @ 7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-6
Date of Sample: 10/12/2013
Sample Location: Pier 13; Test Pit TP13NE, under pier footing next to Pile 13-3
General Description: Sandy Silt, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND w/ GRAVEL, fine grained ,black (SM)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	92
3/8" (9.5 mm)	87
#4 (4.75 mm)	80
#10 (2.0 mm)	75
#40 (.425 mm)	65
#100 (.15 mm)	47
#200 (.075 mm)	39.6
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 410

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.367

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

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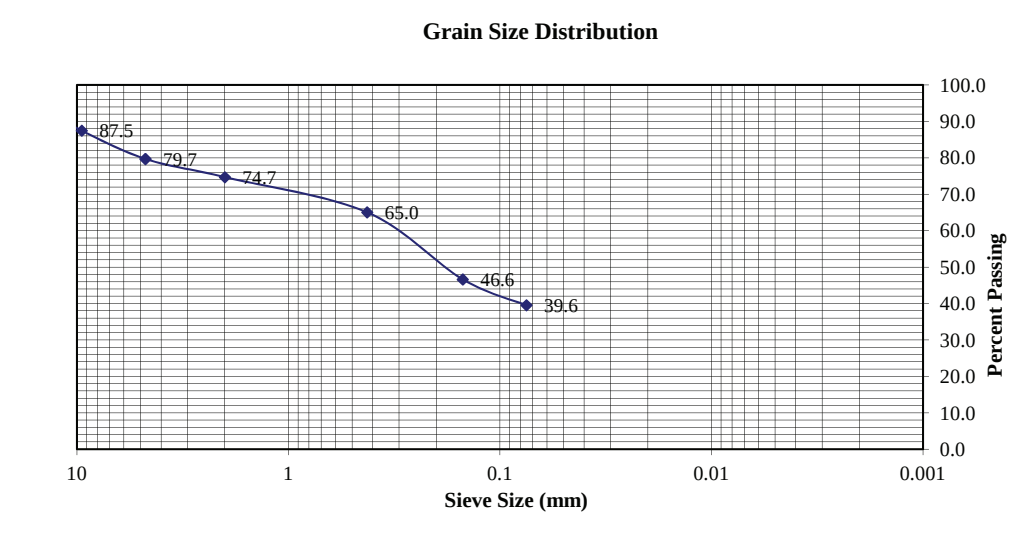
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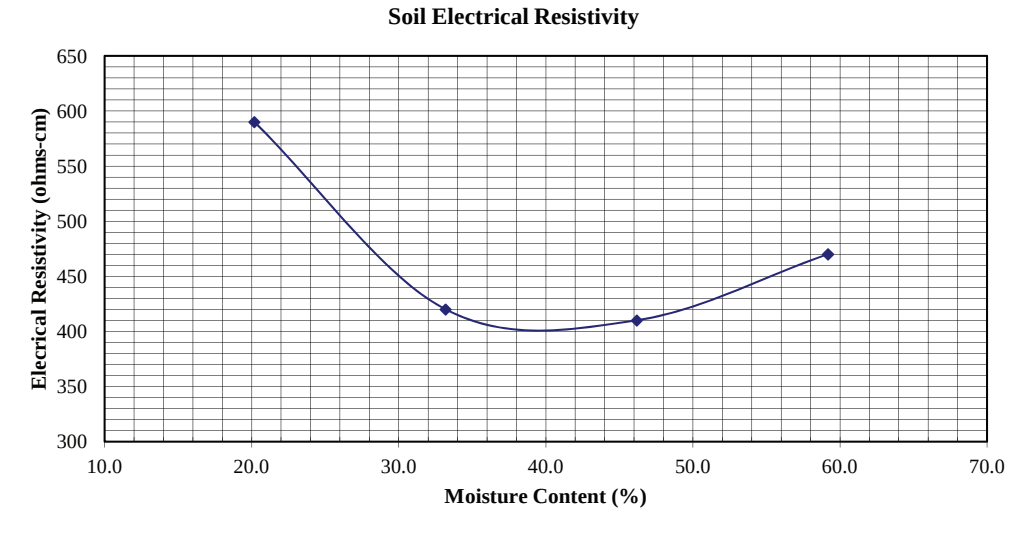
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-6
Date of Sample: 10/12/13
Sample Location: Pier 13; Test Pit TP13NE, under pier footing next to Pile 13-3





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-7
Date of Sample: 10/12/2013
Sample Location: Pier 13; Test Pit: TP13NE, under pier footing next to Pile 13-5
General Description: Silty sand, very fdark gray
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND w/ GRAVEL, fine grained ,very dark gray (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	97
1" (25 mm)	96
3/4" (19 mm)	95
1/2" (12.5 mm)	91
3/8" (9.5 mm)	88
#4 (4.75 mm)	82
#10 (2.0 mm)	79
#40 (.425 mm)	71
#100 (.15 mm)	45
#200 (.075 mm)	37.9
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 530

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.405

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13S-1
Date of Sample: 9/28/2013
Sample Location: Pier #13; Test Pit TP13S, 5.5' below T/Pier Footing
General Description: Organic silty sand, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, black (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	92
#40 (.425 mm)	84
#100 (.15 mm)	64
#200 (.075 mm)	53.5
.002 mm	20.1
D_{10}	<.001

Natural Moisture Content

Moisture Content, %	76.2

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	Non-plastic
Plastic Limit, PL (%)	Non-plastic
Platicity Index (%)	-
Liquid Limit (not dried), LL (%)	Non-plastic

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 410

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.377

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

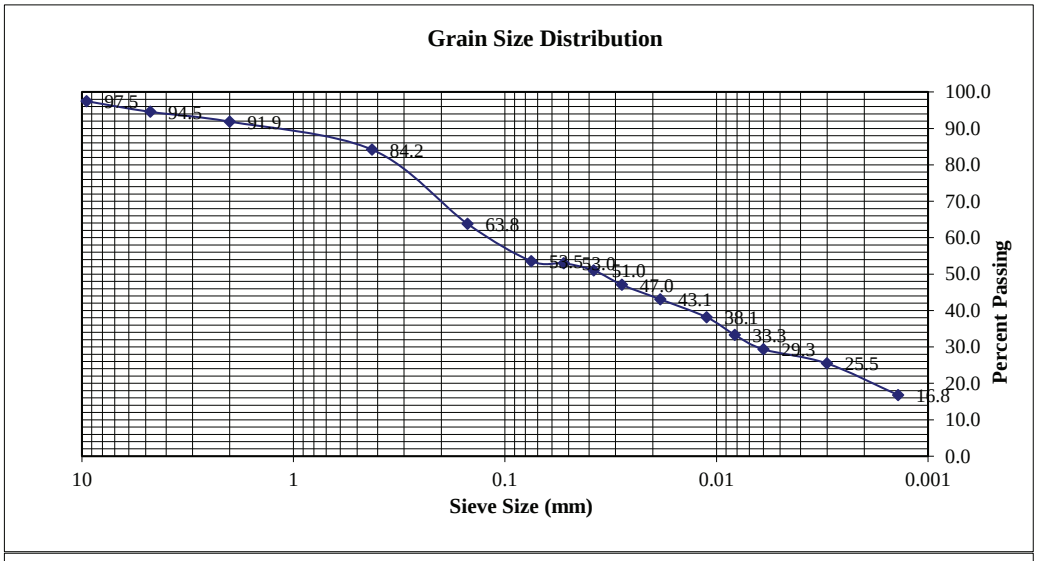
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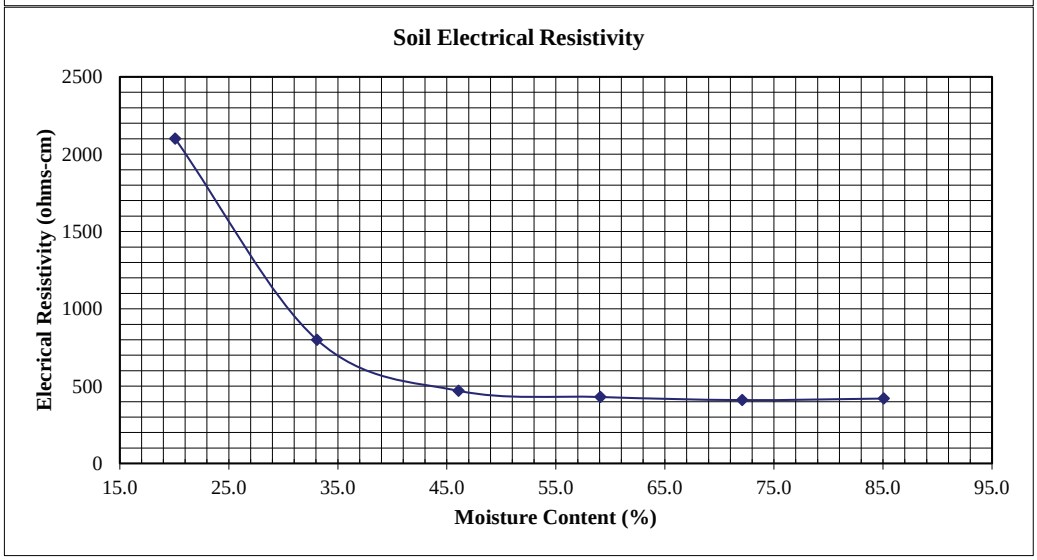
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/12/2013

Sample Number: TP13S-1
Date of Sample: 09/28/13
Sample Location: Pier #13; Test Pit TP13S, 5.5' below T/Pier Footing





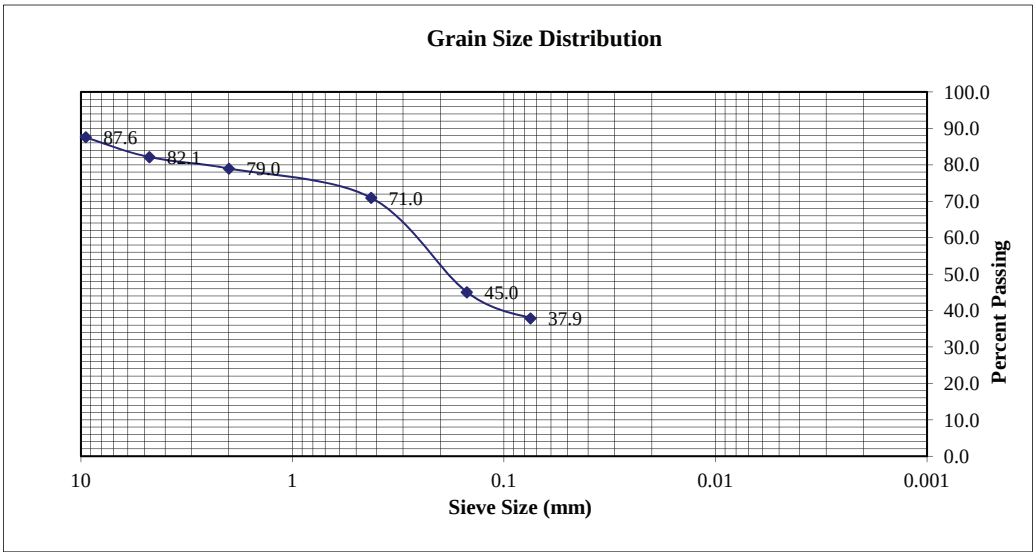
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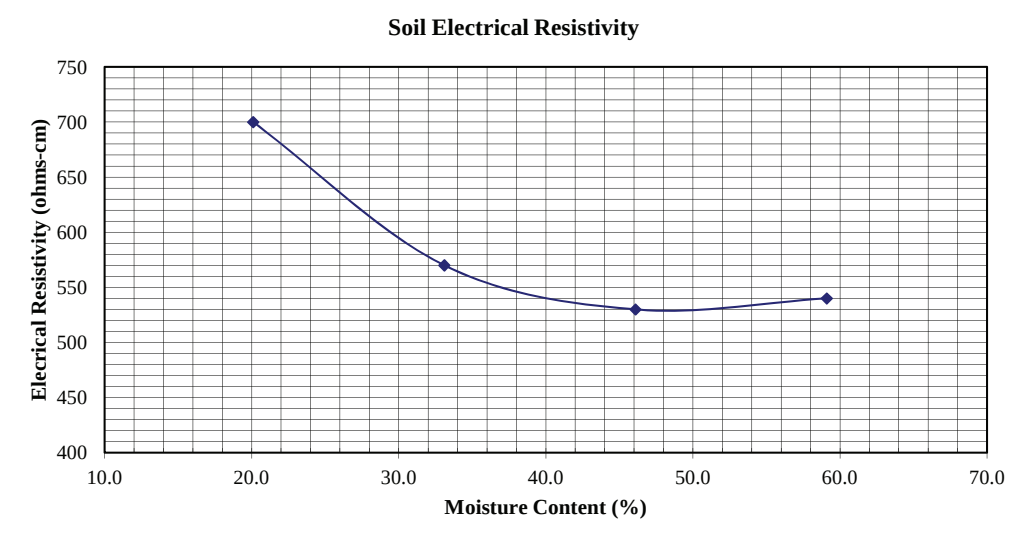
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13NE-7
Date of Sample: 10/12/13
Sample Location: Pier 13; Test Pit: TP13NE, under pier footing next to Pile 13-5





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP13S-2
Date of Sample: 9/28/2013
Sample Location: Pier #13; Test Pit TP13S, SE Corner of pier, 6.1' - 7.2' below T/Pier Footing
General Description: 3/4" Crushed Stone, dark grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, dark gray (GP)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	80
3/8" (9.5 mm)	67
#4 (4.75 mm)	43
#10 (2.0 mm)	27
#40 (.425 mm)	16
#100 (.15 mm)	12
#200 (.075 mm)	9.6
.002 mm	<9.6
D_{10}	0.080

Natural Moisture Content
Moisture Content, % 9.5

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

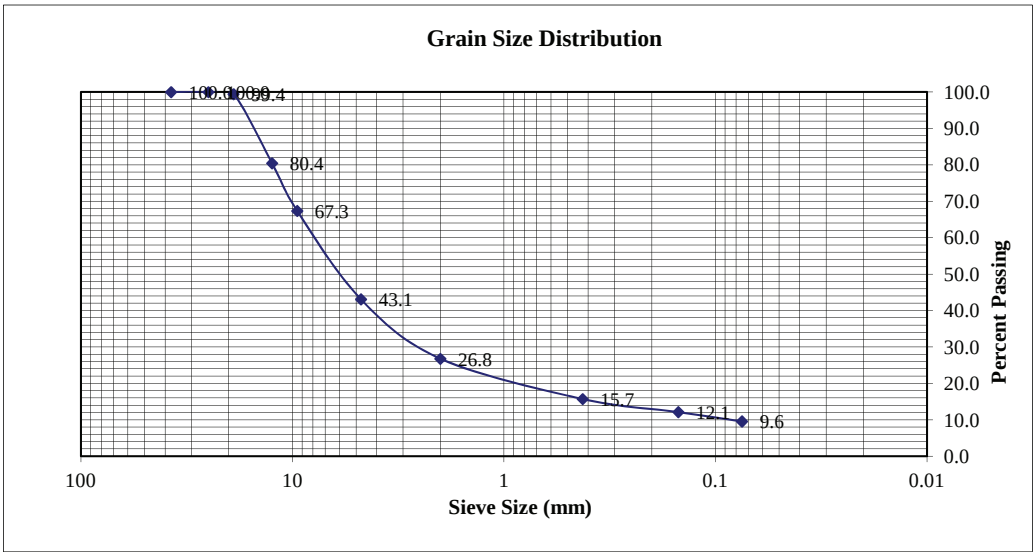
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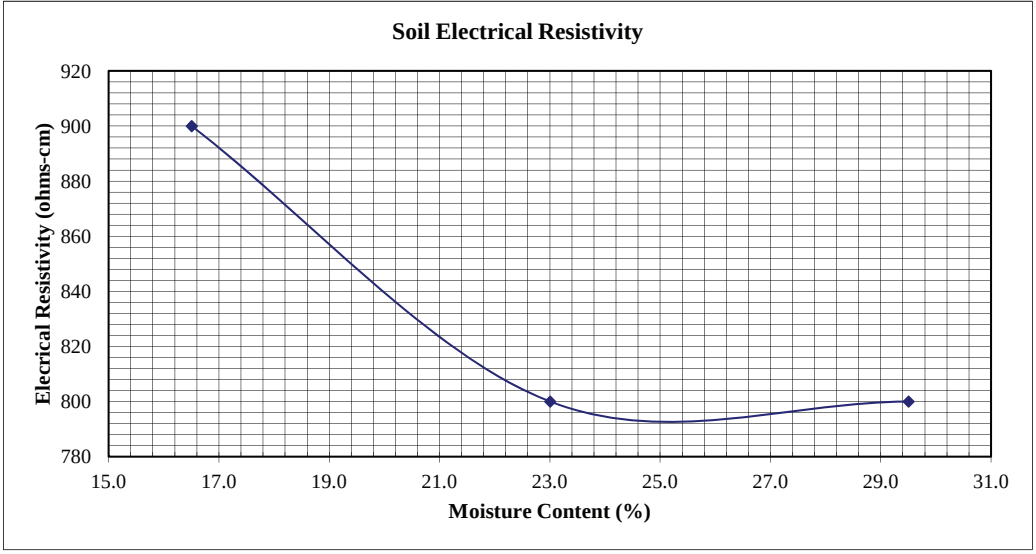
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP13S-2
Date of Sample: 09/28/13
Sample Location: Pier #13; Test Pit TP13S, SE Corner of pier, 6.1' - 7.2' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP13S-3
Date of Sample: 9/28/2013
Sample Location: Test Pit TP13S: Pier #13 - 7.7' below T/Pier Footing
General Description: Silt w/ sand, dark grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND w/ORGANIC FINES, fine grained ,dark grayish brown (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	97
#10 (2.0 mm)	95
#40 (.425 mm)	86
#100 (.15 mm)	59
#200 (.075 mm)	46.4
.002 mm	<10.0
D_{10}	<.003

Natural Moisture Content

Moisture Content, % 84.7

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) 84.3
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -
Liquid Limit (not dried), LL (%) 117.1

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 430

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.071

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

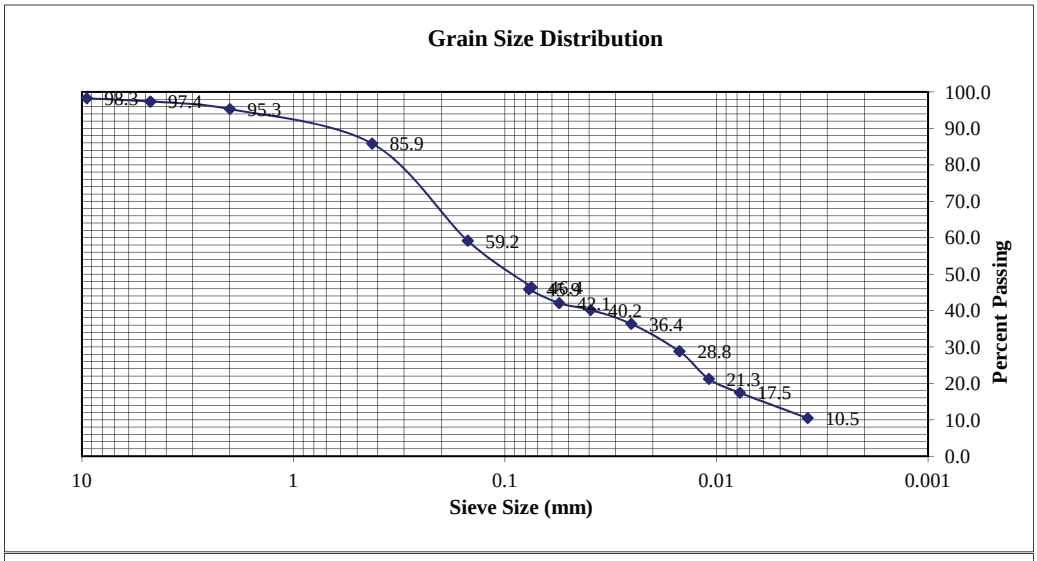
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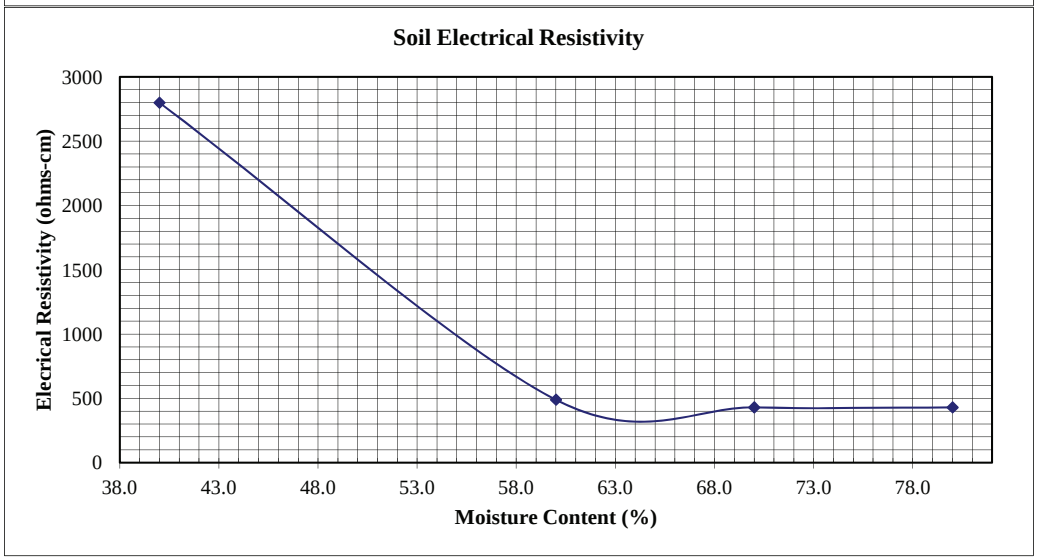
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP13S-3
Date of Sample: 9/28/2013
Sample Location: Test Pit TP13S: Pier #13 - 7.7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/15/2013

Sample Number: TP14S-1
Date of Sample: 10/2/2013
Sample Location: Test Pit TP14; Pier # 14, 1' to 4' below T/Pier Footing
General Description: Clay, sand, silt & organics, brown to very dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine to medium grained ,brown to very dark gray (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	96
1" (25 mm)	96
3/4" (19 mm)	94
1/2" (12.5 mm)	92
3/8" (9.5 mm)	90
#4 (4.75 mm)	87
#10 (2.0 mm)	83
#40 (.425 mm)	72
#100 (.15 mm)	38
#200 (.075 mm)	31.4
.002 mm	6.2
D_{10}	.003

Natural Moisture Content
Moisture Content, % 29.6

Atterberg Limits (ASTM: D4318)
Liquid Limit, LL (%) 26.8
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.584

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

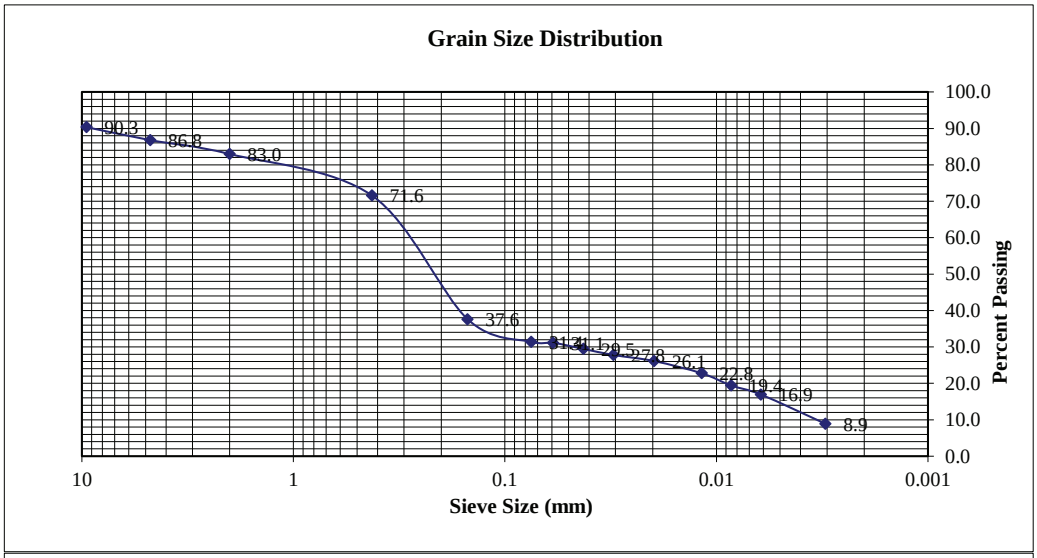
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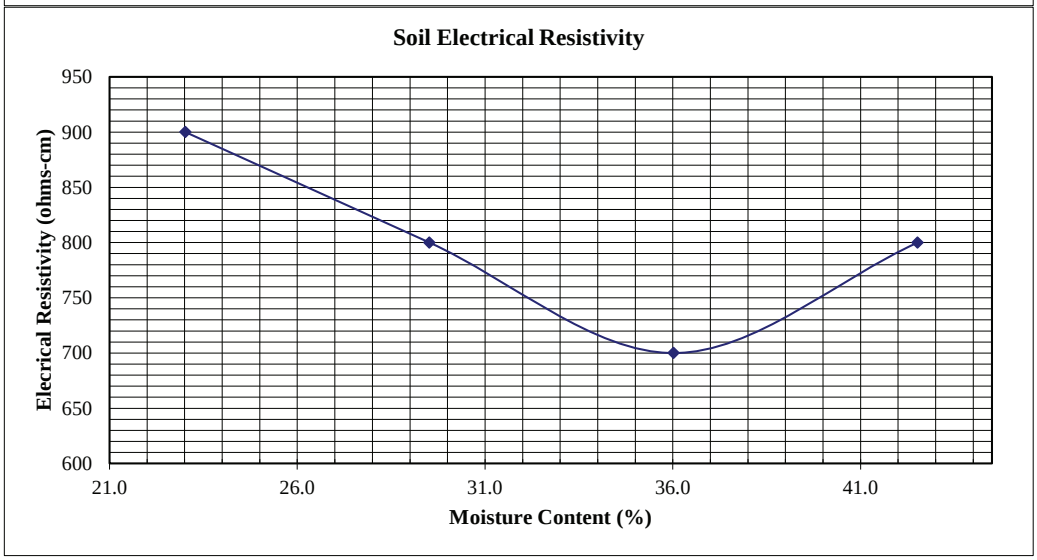
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP14S-1
Date of Sample: 10/2/2013
Sample Location: Test Pit TP14; Pier # 14, 1' to 4' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP14S-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP14s; Pier # 14, 1' to 4' below T/Pier Footing
General Description: Organic silty sand, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND w/ORGANIC FINES, fine grained ,black (SM)

USDA Soil Classification: Sandy Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	94
#10 (2.0 mm)	91
#40 (.425 mm)	82
#100 (.15 mm)	45
#200 (.075 mm)	39.7
.002 mm	14.2
D_{10}	<.002

Natural Moisture Content
Moisture Content, % 76.4

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 34.1
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) Non-Plastic
Liquid Limit (not dried), LL (%) 102.2

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 7.6

Specific Gravity of Soil (AASHTO T100) 2.407

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

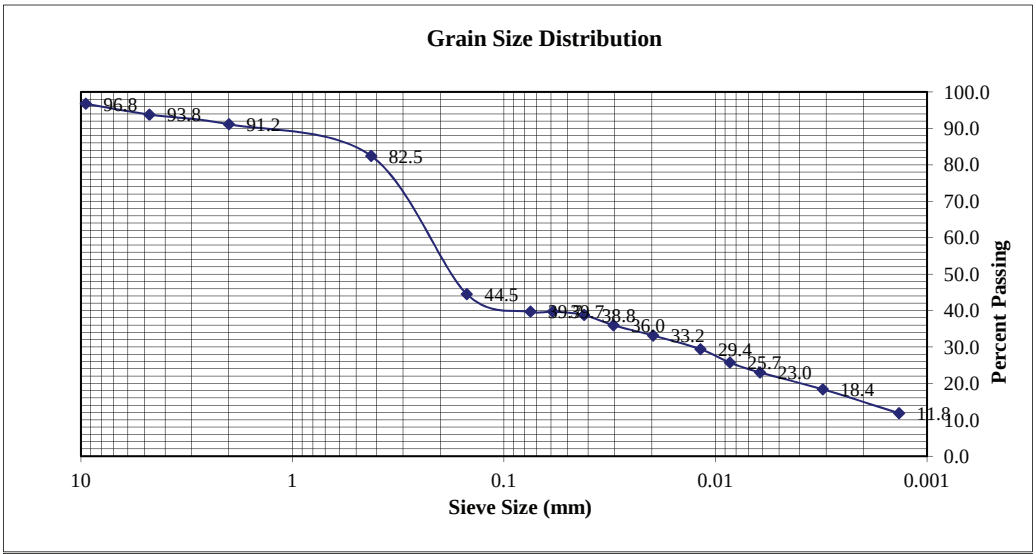
Reviewed By: *Paul R. Eggen*

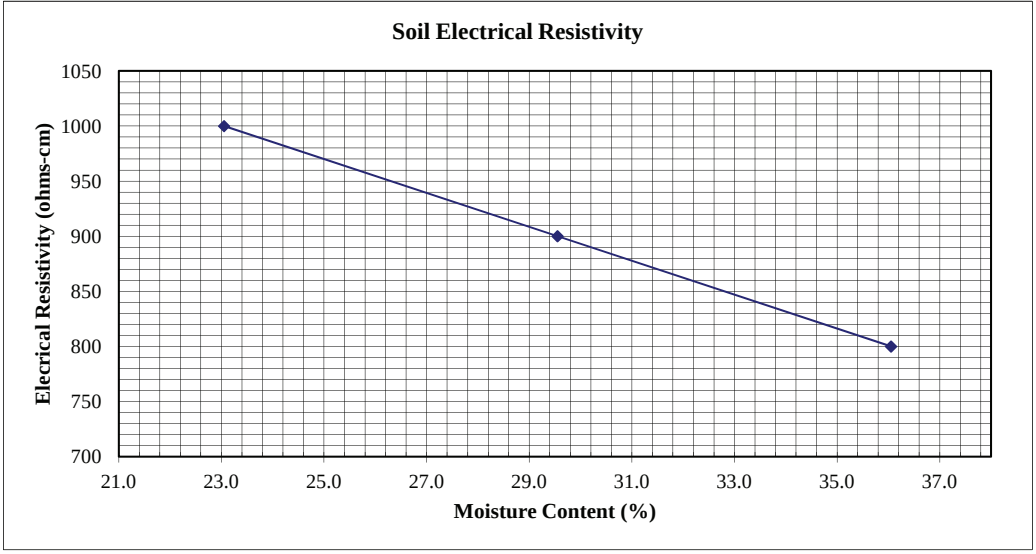
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP14S-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP14s; Pier # 14, 1' to 4' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP14S-3
Date of Sample: 10/2/2013
Sample Location: Pier #14; Test Pit TP14S, 5' to 7.5' below T/Pier Footing
General Description: 3/4" Crushed stone, grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, grayish brown (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	88
3/8" (9.5 mm)	75
#4 (4.75 mm)	50
#10 (2.0 mm)	32
#40 (.425 mm)	16
#100 (.15 mm)	11
#200 (.075 mm)	8.7
.002 mm	<8.7
D_{10}	0.110

Natural Moisture Content
Moisture Content, % 9.2

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1500

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

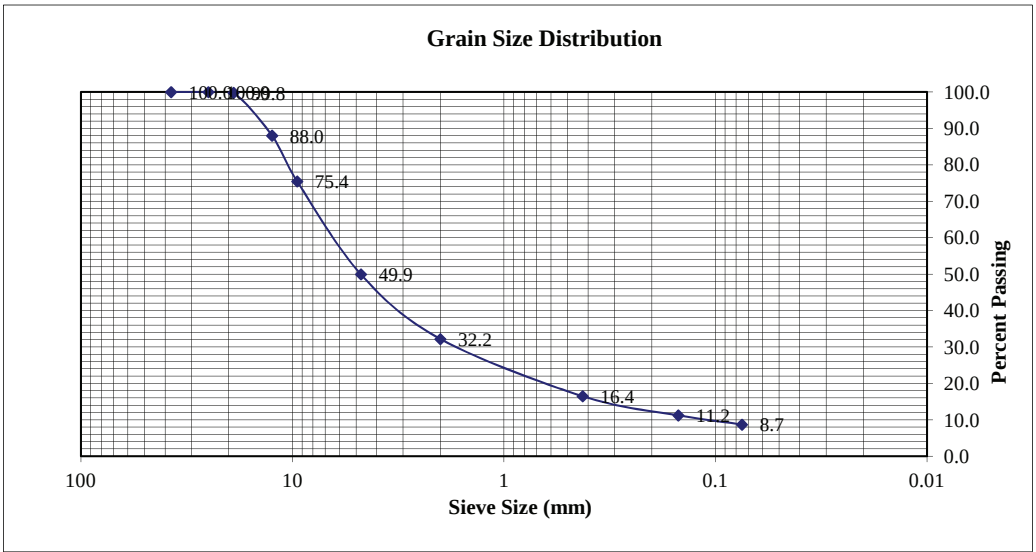
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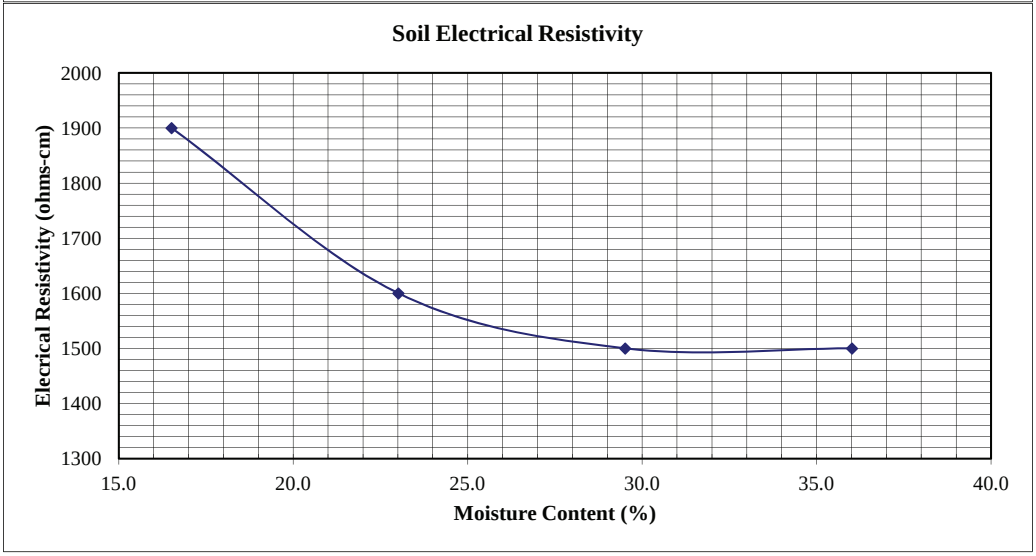
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP14S-3
Date of Sample: 10/02/13
Sample Location: Pier #14; Test Pit TP14S, 5' to 7.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP15S-1
Date of Sample: 9/28/2013
Sample Location: Pier #15; Test Pit 15S, 4' to 5.5' below T/Pier Footing
General Description: Shredded wood debris
Tests Performed: Natural Moisture Content
TEST RESULTS;
Unified Soils Classification (ASTM:D2487): N/A
USDA Soil Classification: N/A

Natural Moisture Content

Moisture Content, %	354.5

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP15S-2
Date of Sample: 9/28/2013
Sample Location: Pier 15; Test Pit TP15S, SE Corner of pier, 5.5 - 6.5' below T/Pier Footing
General Description: 3/4" Crushed Stone, dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, dark gray (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	87
3/8" (9.5 mm)	73
#4 (4.75 mm)	47
#10 (2.0 mm)	30
#40 (.425 mm)	16
#100 (.15 mm)	11
#200 (.075 mm)	8.2
.002 mm	<8.2
D_{10}	0.150

Natural Moisture Content
Moisture Content, % 10.4

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1300

Soil pH (AASHTO T289) 8.2

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

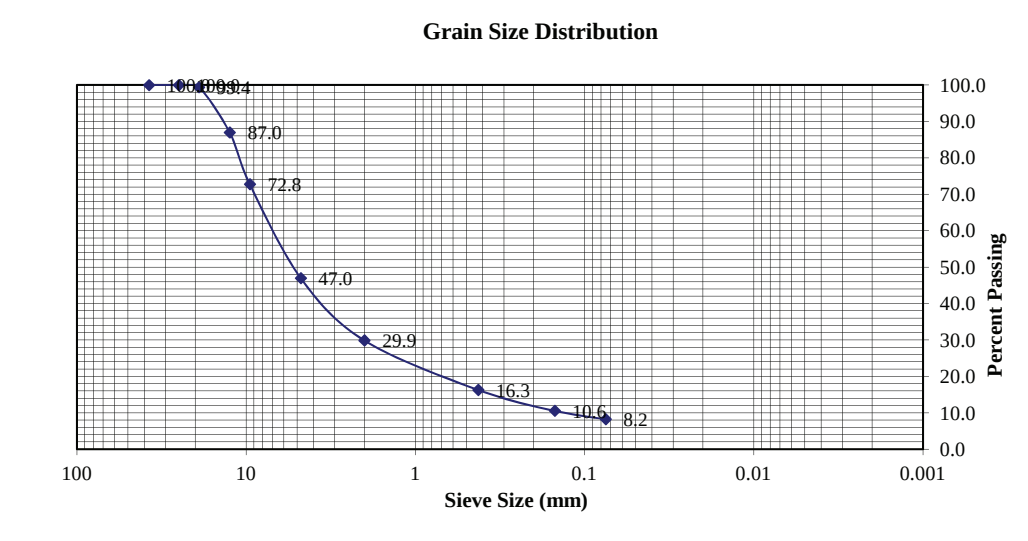
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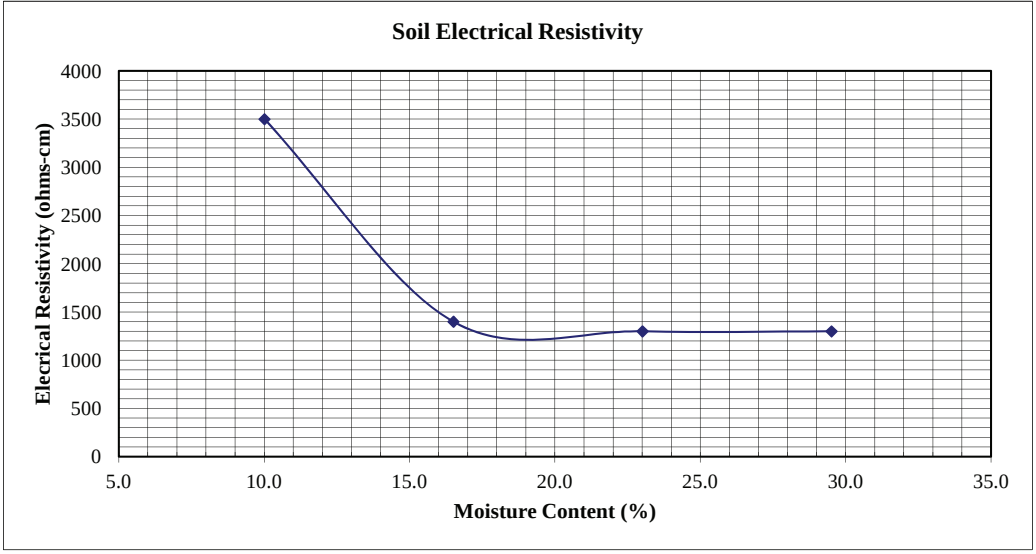
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP15S-2
Date of Sample: 09/28/13
Sample Location: Pier 15; Test Pit TP15S, SE Corner of pier, 5.5 - 6.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP15S-3
Date of Sample: 9/28/2013
Sample Location: Pier 15; Test Pit T15S, 6.5' to 7.7' below T/Pier Footing
General Description: Silty sand w/ organics, very dark grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND, fine grained ,very dark grayish brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	95
#100 (.15 mm)	12
#200 (.075 mm)	4.5
.002 mm	<4.5
D_{10}	0.130

Natural Moisture Content
Moisture Content, % 30.9

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1100

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Paul Eggen of OMNNI Associates.

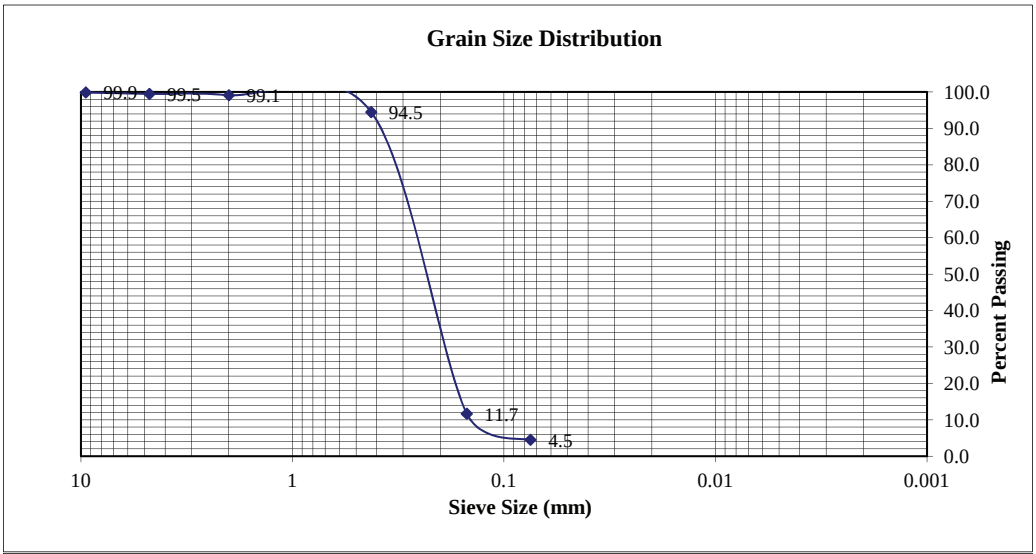
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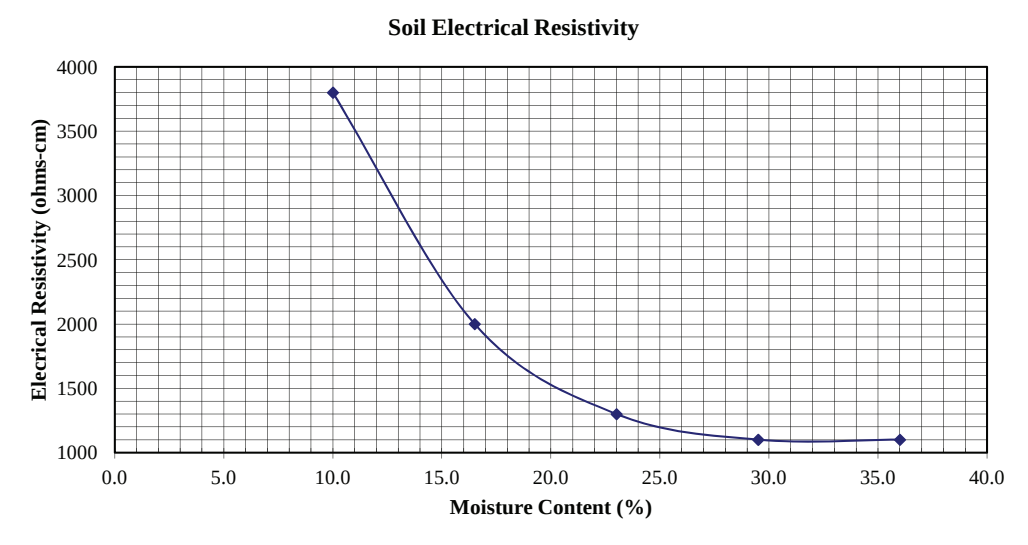
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP15S-3
Date of Sample: 09/28/13
Sample Location: Pier 15; Test Pit T15S, 6.5' to 7.7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP16SE-1
Date of Sample: 10/2/2013
Sample Location: Test Pit TP16S; Pier # 16, 3.4' below T/Pier Footing
General Description: Organic lean clay, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND w/ORGANIC FINES, fine grained ,very dark gray (SM)

USDA Soil Classification: Sandy Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	98
1/2" (12.5 mm)	97
3/8" (9.5 mm)	96
#4 (4.75 mm)	93
#10 (2.0 mm)	91
#40 (.425 mm)	81
#100 (.15 mm)	39
#200 (.075 mm)	36.0
.002 mm	12.7
D_{10}	<.002

Natural Moisture Content
Moisture Content, % 37.9

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 29.6
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) Non-Plastic
Liquid Limit (not dried), LL (%) 55.5

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.426

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

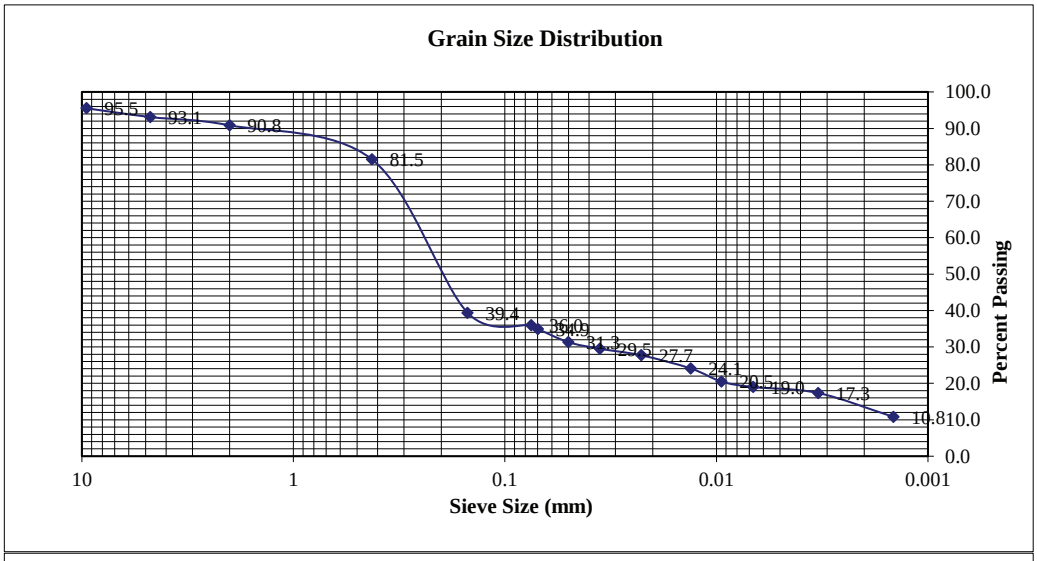
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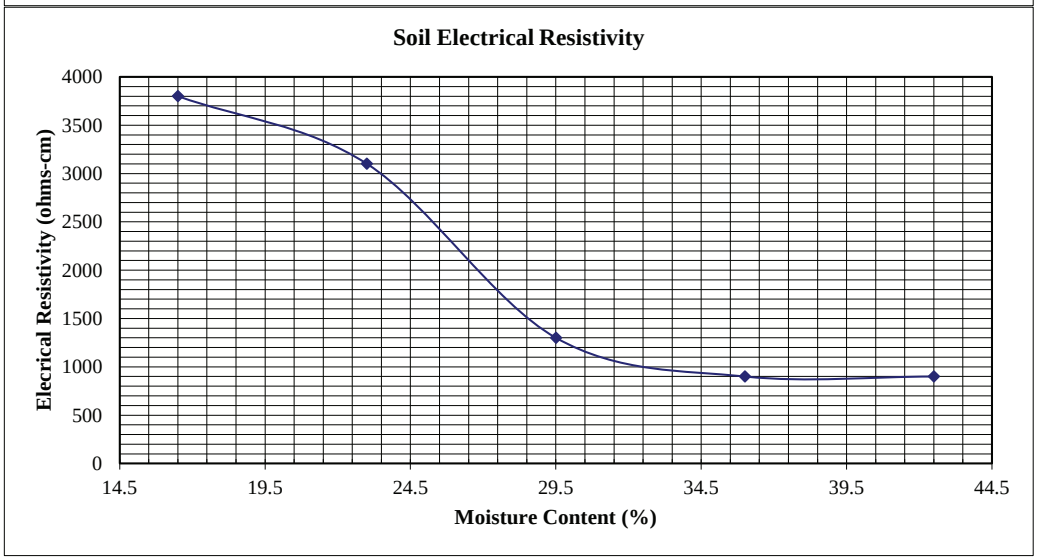
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/14/2013

Sample Number: TP16SE-1
Date of Sample: 10/2/2013
Sample Location: Test Pit TP16S; Pier # 16, 3.4' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP16SE-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP16S; Pier # 16, 6.7' to 7.0' below T/Pier Footing
General Description: Sand, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND, fine grained ,dark grayish brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	98
#100 (.15 mm)	11
#200 (.075 mm)	4.5
.002 mm	<4.5
D_{10}	0.130

Natural Moisture Content
Moisture Content, % 23.4

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 7.8

REMARKS: The above sample was obtained by Paul Eggen of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

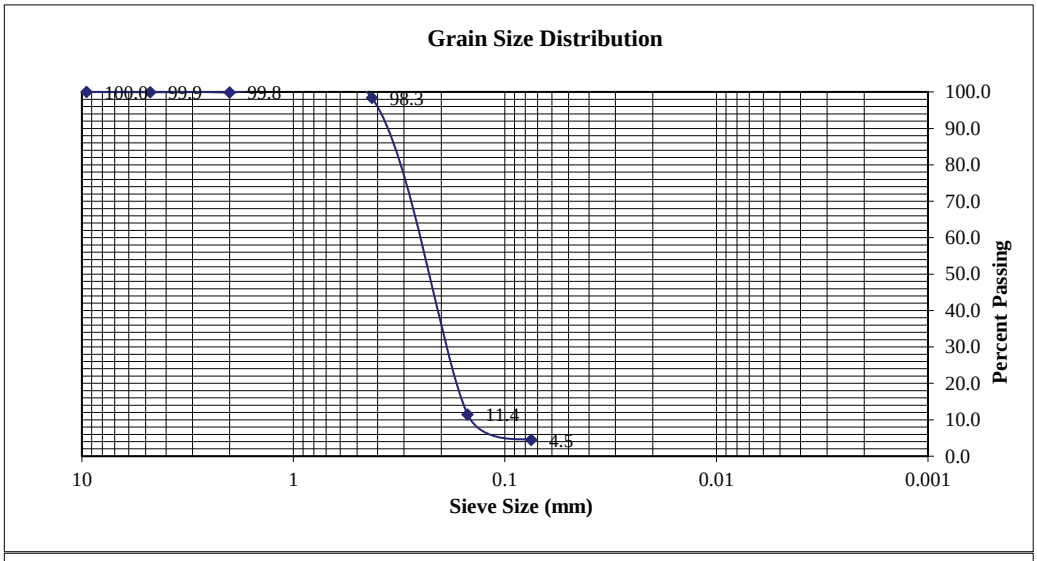
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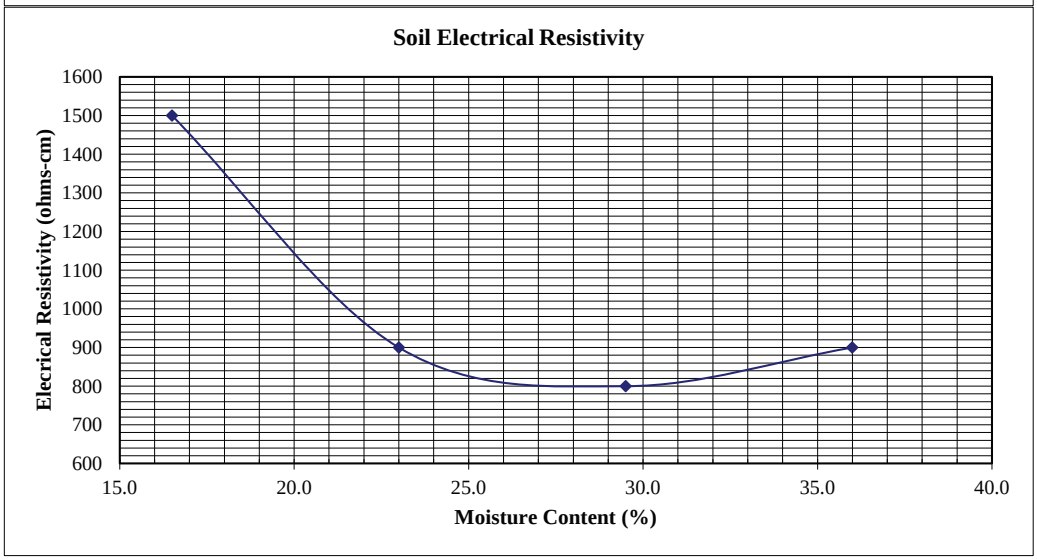
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/14/2013

Sample Number: TP16SE-2
Date of Sample: 10/02/13
Sample Location: Test Pit TP16S; Pier # 16, 6.7' to 7.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP16SE-3
Date of Sample: 10/2/2013
Sample Location: Pier # 16; Test Pit TP16SE, 7.0' to 7.9' below T/Pier Footing
General Description: Lean Clay, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, reddish brown (CL)

USDA Soil Classification: Clay

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	98
#40 (.425 mm)	96
#100 (.15 mm)	80
#200 (.075 mm)	76.9
.002 mm	40.5
D_{10}	N/A

Natural Moisture Content
Moisture Content, % 21.1

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 30.2
Plastic Limit, PL (%) 14.2
Platicity Index (%) 16.0

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.741

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

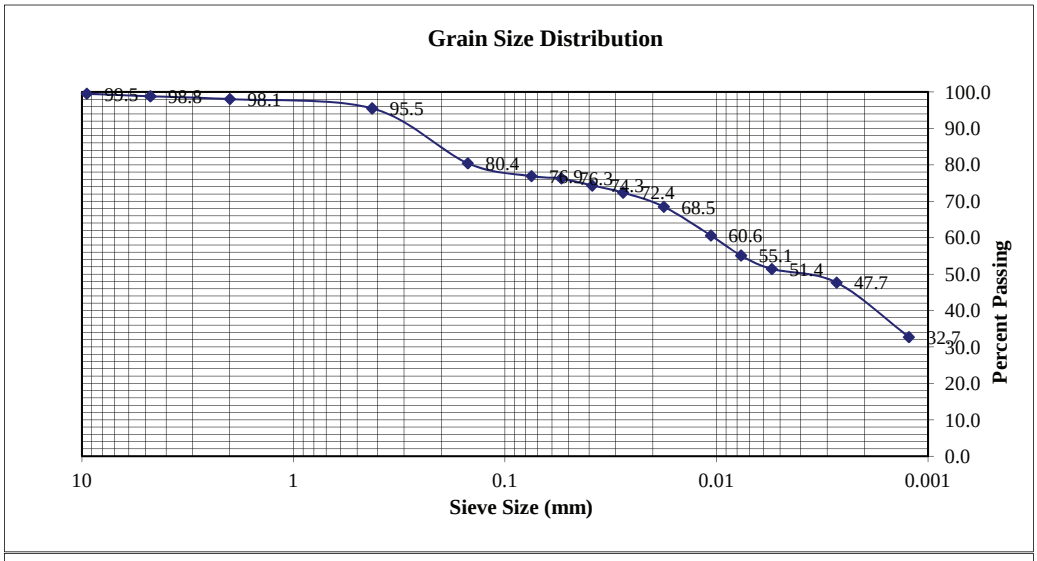
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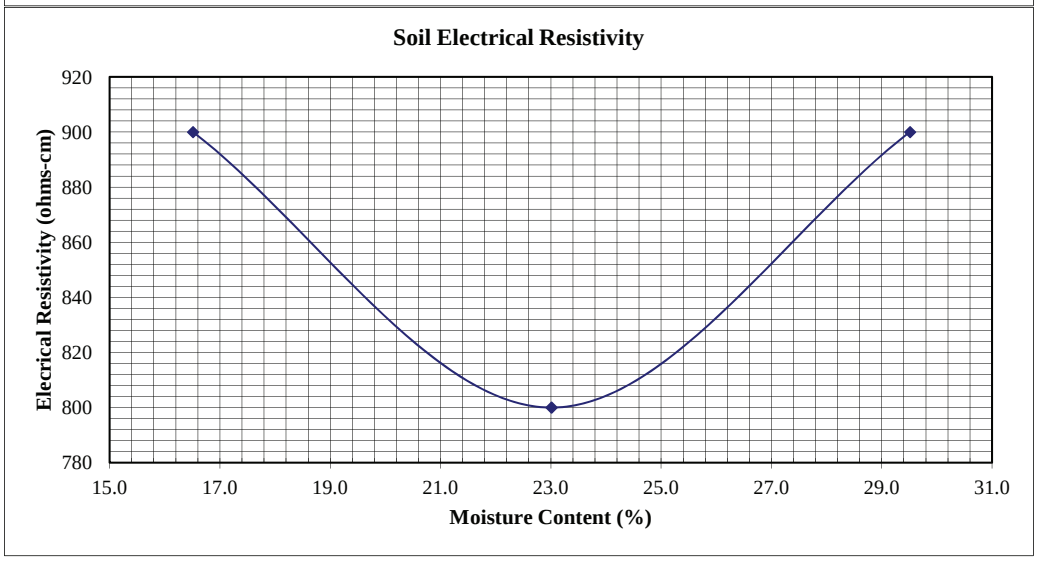
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP16SE-3
Date of Sample: 10/02/13
Sample Location: Pier # 16; Test Pit TP16SE, 7.0' to 7.9' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP16SE-4
Date of Sample: 10/2/2013
Sample Location: Pier 16; Test Pit TP16SE, 6.0' to 6.7' below T/Pier Footing
General Description: Crushed Stone, very dary gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, very dark gray (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	90
3/8" (9.5 mm)	78
#4 (4.75 mm)	52
#10 (2.0 mm)	33
#40 (.425 mm)	18
#100 (.15 mm)	13
#200 (.075 mm)	9.2
.002 mm	<9.2
D_{10}	0.090

Natural Moisture Content
Moisture Content, % 9.1

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 8.3

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

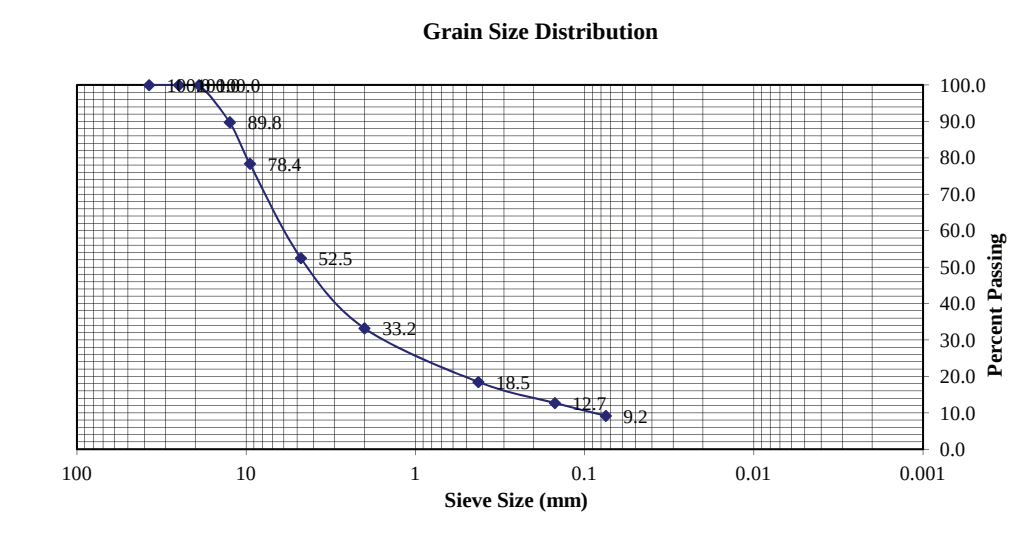
Reviewed By: *Paul R. Eggen*

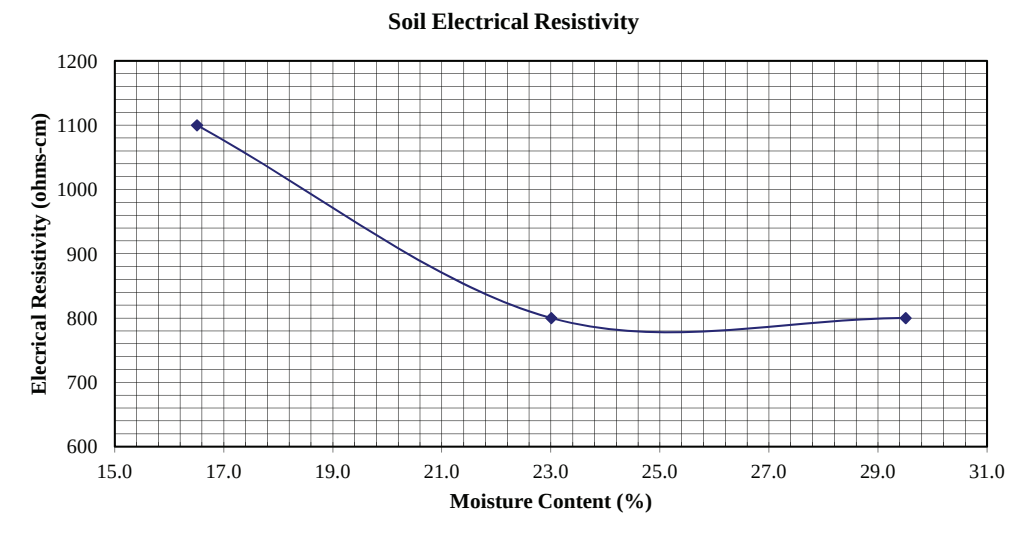
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP16SE-4
Date of Sample: 10/02/13
Sample Location: Pier 16; Test Pit TP16SE, 6.0' to 6.7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP17S-1
Date of Sample: 9/28/2013
Sample Location: Test Pit TP17S: Pier #17 - 5.5' to 7.0' below T/Pier Footing
General Description: Organic silt, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILT w/ SAND, black (ML)

USDA Soil Classification: Silt Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	97
#100 (.15 mm)	87
#200 (.075 mm)	73.1
.002 mm	20.4
D_{10}	<.002

Natural Moisture Content
Moisture Content, % 67.1

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 34.5
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) Non-Plastic
Liquid Limit (not dried), LL (%) 44.5

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 440

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.615

REMARKS: The above sample was obtained by Paul Eggen of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

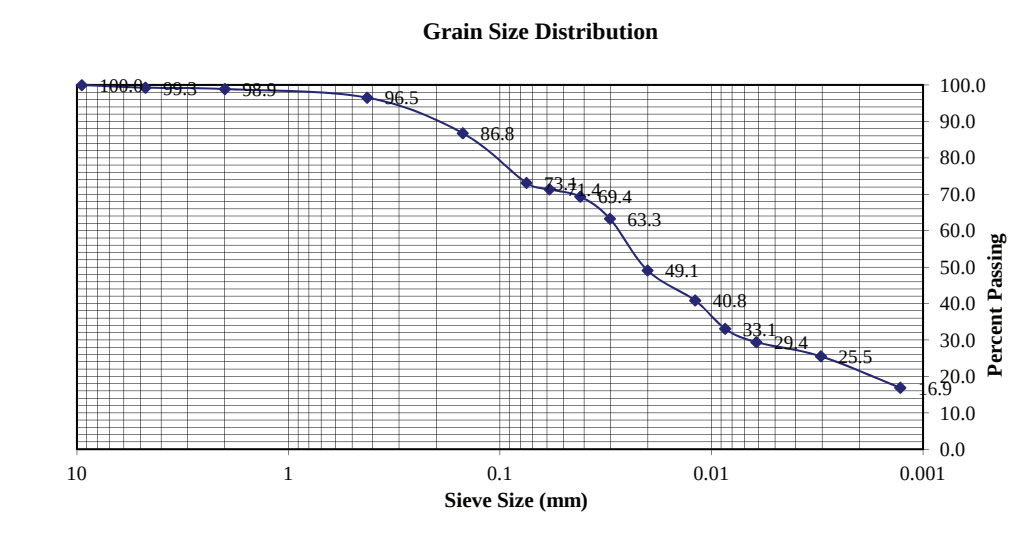
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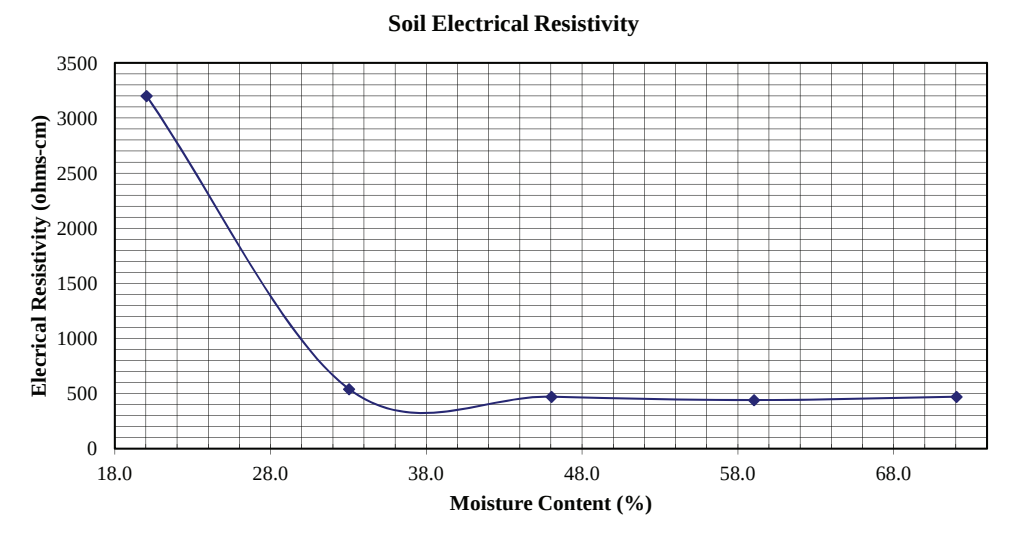
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP17S-1
Date of Sample: 9/28/2013
Sample Location: Test Pit TP17S: Pier #17 - 5.5' to 7.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP17S-2
Date of Sample: 9/28/2013
Sample Location: Test Pit TP17S: Pier #17 - SE Corner of pier, 7.0 - 8.0 below T/Pier Footing
General Description: Sandy Silt, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SANDY SILT, brown (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	98
#4 (4.75 mm)	96
#10 (2.0 mm)	94
#40 (.425 mm)	89
#100 (.15 mm)	68
#200 (.075 mm)	60.1
.002 mm	12.2
D_{10}	<.001

Natural Moisture Content

Moisture Content, % 18.5

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) 16.4
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.711

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

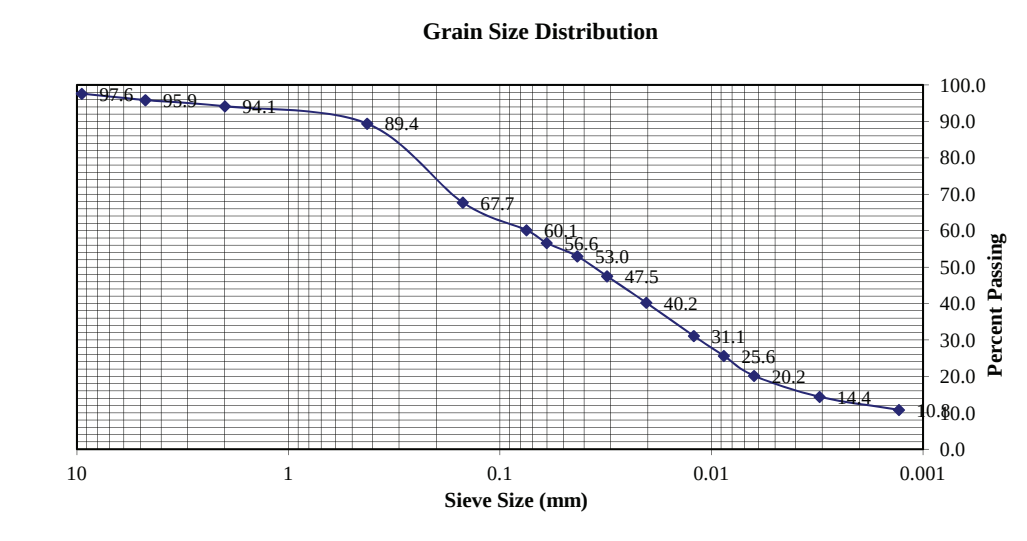
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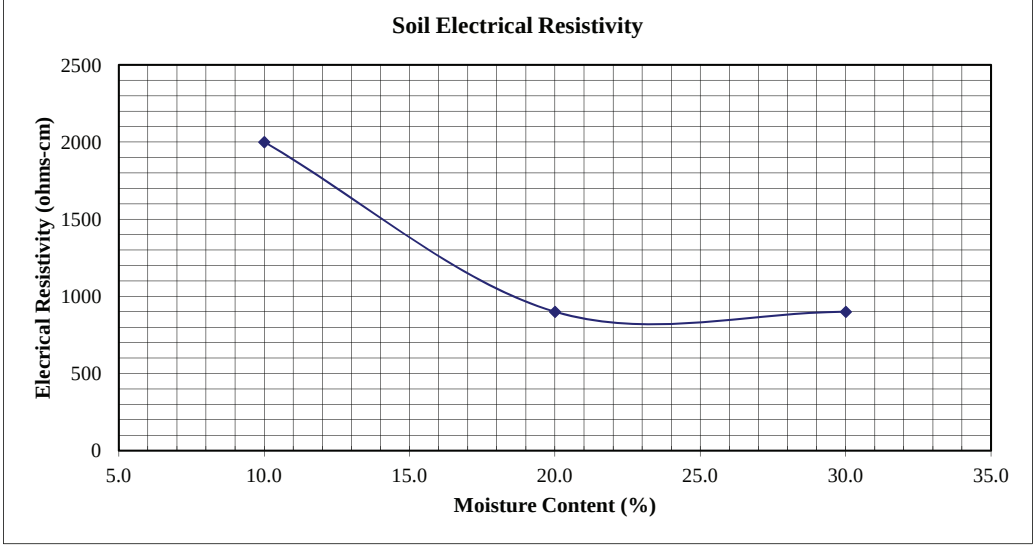
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP17S-2
Date of Sample: 9/28/2013
Sample Location: Test Pit TP17S: Pier #17 - SE Corner of pier, 7.0 - 8.0 below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP17S-3
Date of Sample: 9/28/2013
Sample Location: Test Pit TP17S: Pier # 17 - SE Corner of pier, 5.1 - 5.5' below T/Pier Footing
General Description: 3/4" Crushed Stone, dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): "SAND w/ SILT AND GRAVEL, coarse to medium grained ,very dark gray (SP-SM)"

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	93
3/8" (9.5 mm)	83
#4 (4.75 mm)	57
#10 (2.0 mm)	36
#40 (.425 mm)	20
#100 (.15 mm)	15
#200 (.075 mm)	11.3
.002 mm	3.7
D_{10}	0.045

Natural Moisture Content

Moisture Content, % 13.0

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) 18.6
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.831

REMARKS: The above sample was obtained by Paul Eggen of OMNNI Associates.

Reviewed By: _____
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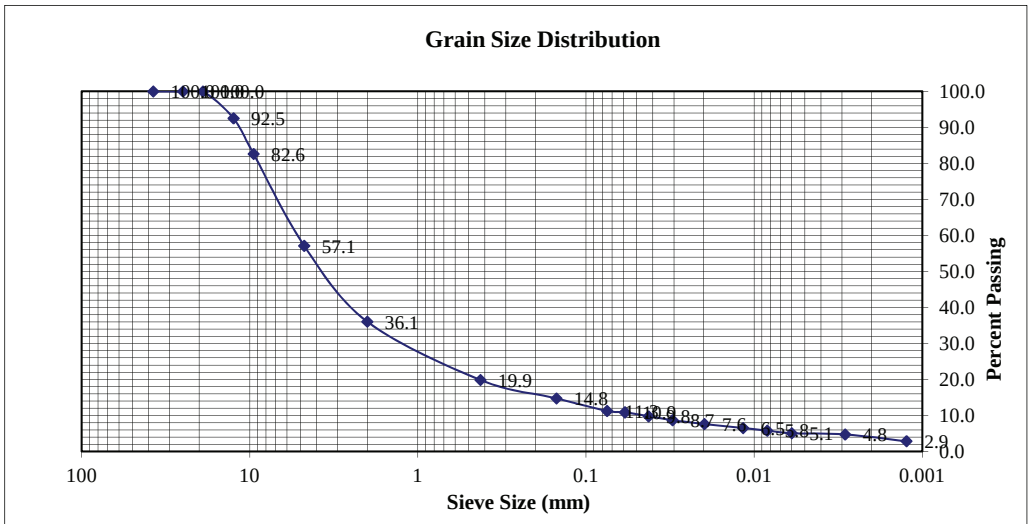
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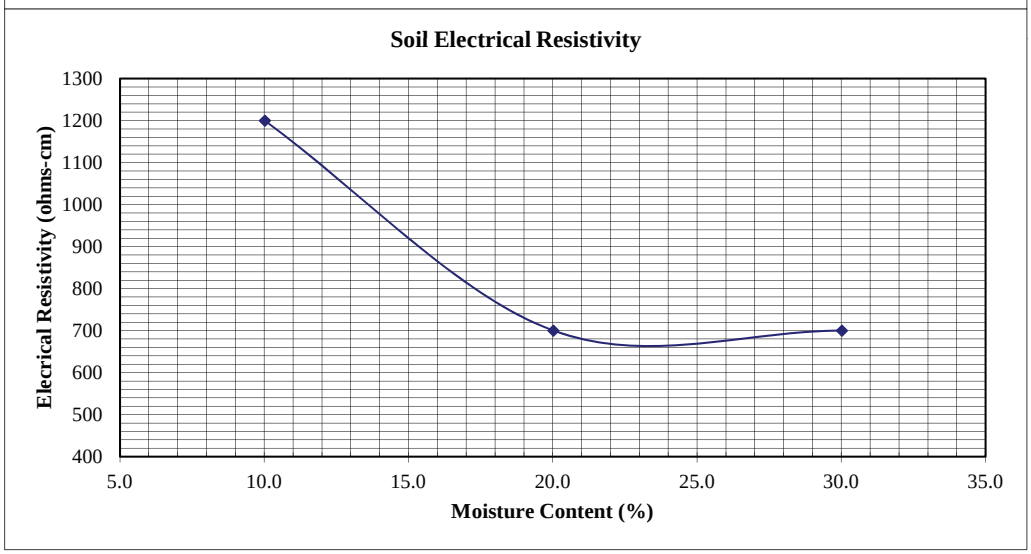
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP17S-3
Date of Sample: 9/28/2013
Sample Location: Test Pit TP17S: Pier # 17 - SE Corner of pier, 5.1 - 5.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP18SE-1
Date of Sample: 10/2/2013
Sample Location: Pier # 18; Test Pit TP18SE 2' to 3' below T/Pier Footing
General Description: Organic sand w/ roots, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	87
3/8" (9.5 mm)	98
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	90
#100 (.15 mm)	61
#200 (.075 mm)	47.4
.002 mm	11.6
D_{10}	N/A

Natural Moisture Content
Moisture Content, % 105.8

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1400

Soil pH (AASHTO T289) 8.9

Specific Gravity of Soil (AASHTO T100) 2.306

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

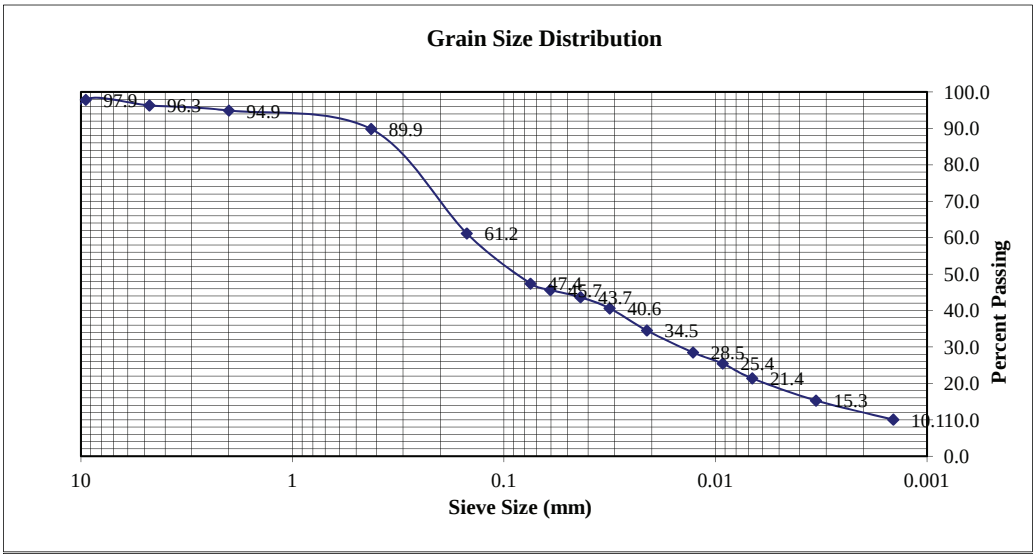
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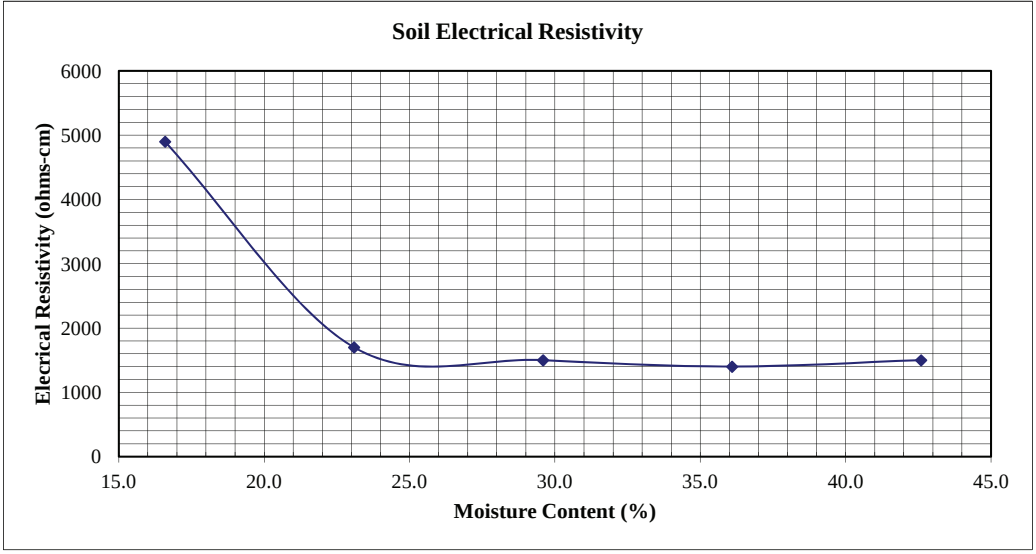
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP18SE-1
Date of Sample: 10/02/13
Sample Location: Pier # 18; Test Pit TP18SE 2' to 3' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP18SE-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP18SE; Pier # 18, 7.3' to 7.5' below T/Pier Footing
General Description: Sand w/ silt & gravel, fine to medium grained, gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ SILT AND GRAVEL, fine to medium grained ,brown (SP-SM)
USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	94
1" (25 mm)	93
3/4" (19 mm)	90
1/2" (12.5 mm)	87
3/8" (9.5 mm)	84
#4 (4.75 mm)	76
#10 (2.0 mm)	68
#40 (.425 mm)	57
#100 (.15 mm)	15
#200 (.075 mm)	5.0
.002 mm	<5
D_{10}	0.110

Natural Moisture Content
Moisture Content, % 24.0

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

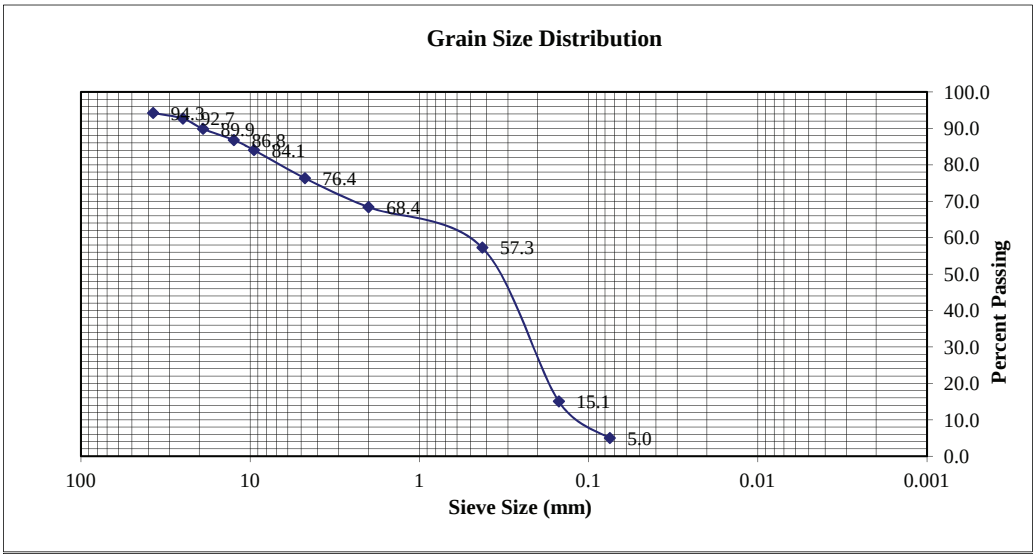
Reviewed By: *Paul R. Eggen*

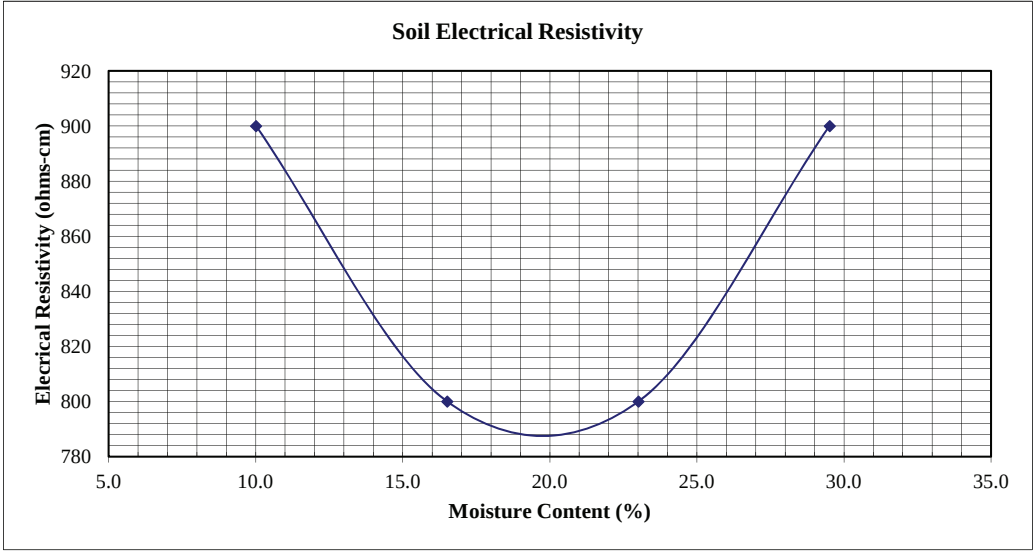
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP18SE-2
Date of Sample: 10/2/2013
Sample Location: Test Pit TP18SE; Pier # 18, 7.3' to 7.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP18SE-3
Date of Sample: 10/2/2013
Sample Location: Pier 18;Test Pit TP18SE, 6.3' to 7.3' below T/Pier Footing
General Description: Crushed stone, dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, dark gray (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	95
3/8" (9.5 mm)	86
#4 (4.75 mm)	57
#10 (2.0 mm)	31
#40 (.425 mm)	16
#100 (.15 mm)	12
#200 (.075 mm)	9.1
.002 mm	<9.1
D_{10}	0.090

Natural Moisture Content
Moisture Content, % 8.4

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1700

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

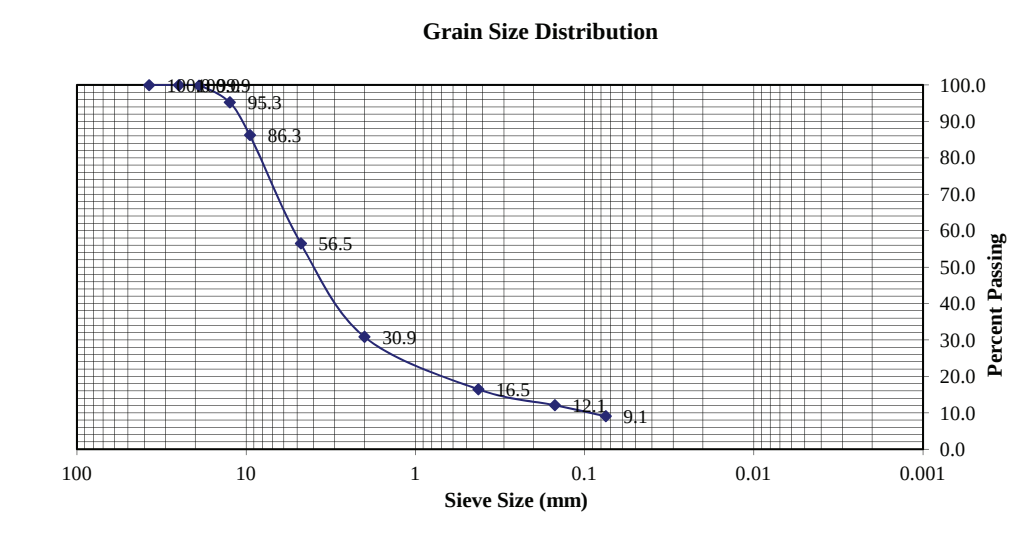
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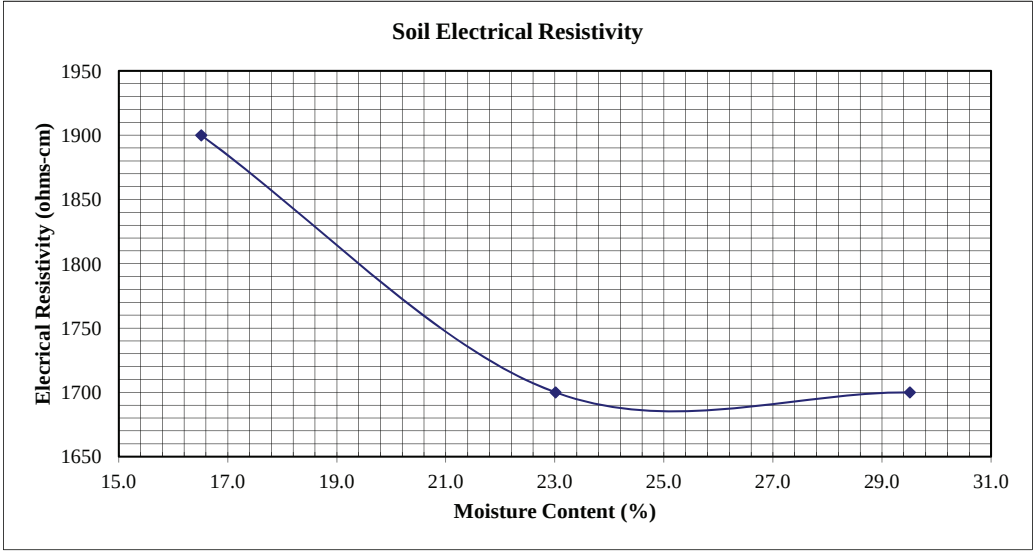
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP18SE-3
Date of Sample: 10/02/13
Sample Location: Pier 18;Test Pit TP18SE, 6.3' to 7.3' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP19NE-1
Date of Sample: 10/12/2013
Sample Location: Pier #19; Test Pit TP19NE, Top of Pier Footing
General Description: Sandy Silt with Organics, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	93
#40 (.425 mm)	84
#100 (.15 mm)	51
#200 (.075 mm)	34.5
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.328

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

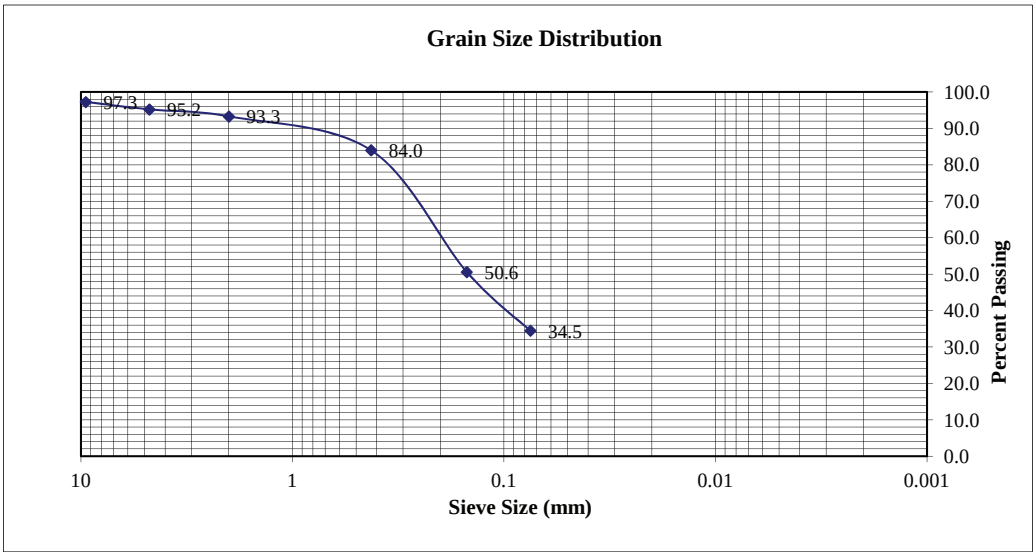
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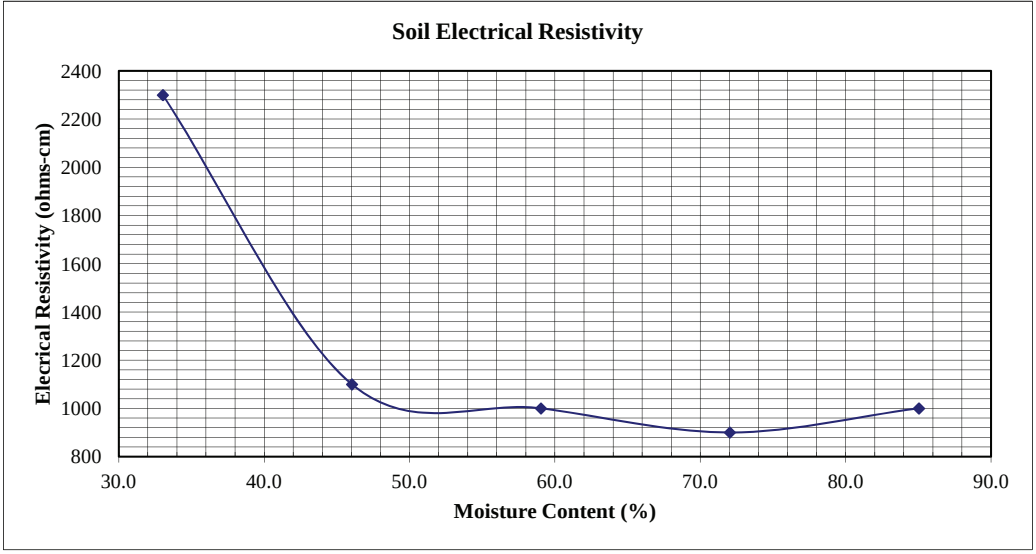
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP19NE-1
Date of Sample: 10/12/13
Sample Location: Pier #19; Test Pit TP19NE, Top of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP19NE-2
Date of Sample: 10/12/2013
Sample Location: Pier 19; Test Pit: TP19NE, 5' below T/ Pier Footing
General Description: Sandy silt w/ organics, black
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine to medium grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	85
#100 (.15 mm)	59
#200 (.075 mm)	43.7
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 570

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.378

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

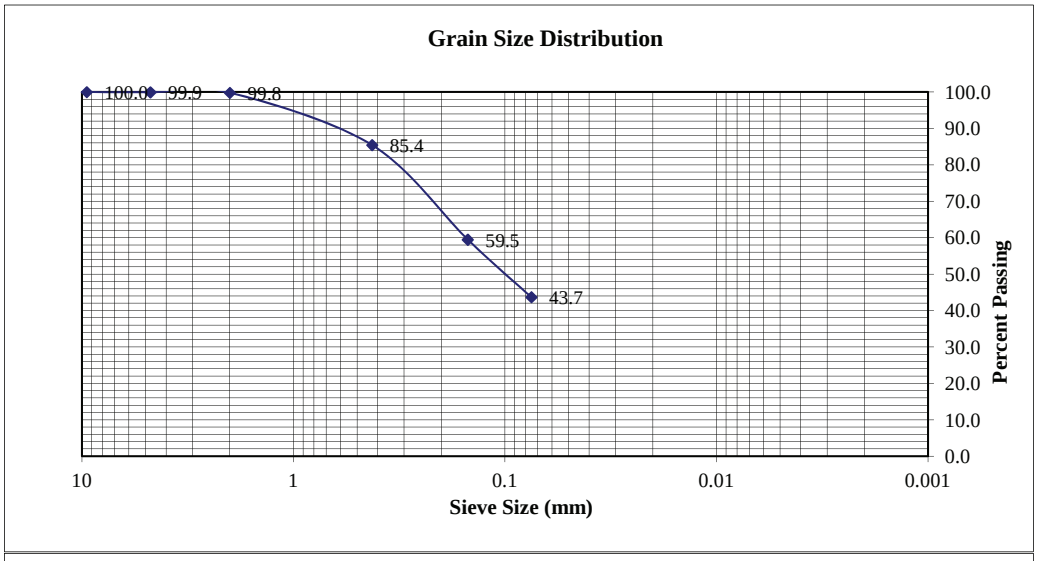
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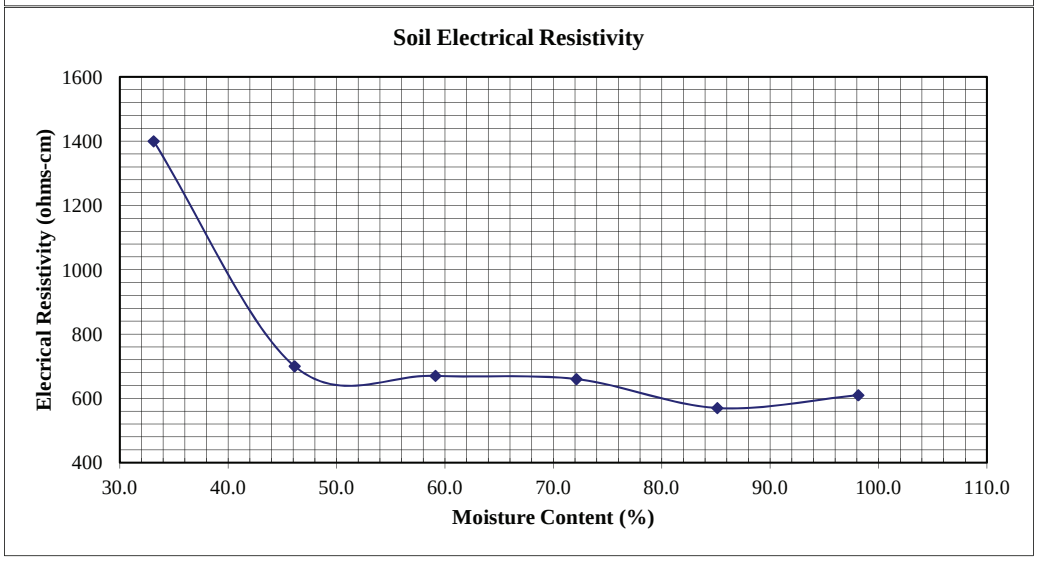
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP19NE-2
Date of Sample: 10/12/13
Sample Location: Pier 19; Test Pit: TP19NE, 5' below T/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/12/2013

Sample Number: TP19NE-3
Date of Sample: 10/12/13
Sample Location: Pier 19: Test Pit TP19NE. 5.8' below T/Pier Footing @ B/ Pier Footing
General Description: Silty Sand with Organics, black
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND w/ORGANIC FINES, fine to medium grained ,black (SM)

USDA Soil Classification: Loamy Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	95
#10 (2.0 mm)	94
#40 (.425 mm)	51
#100 (.15 mm)	22
#200 (.075 mm)	13.2
.002 mm	-
D_{10}	<.07

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	75.2
Plastic Limit, PL (%)	Non-Plastic
Platicity Index (%)	-
Liquid Limit (not dried), LL (%)	117.6

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 460

Soil pH (AASHTO T289) 7.9

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

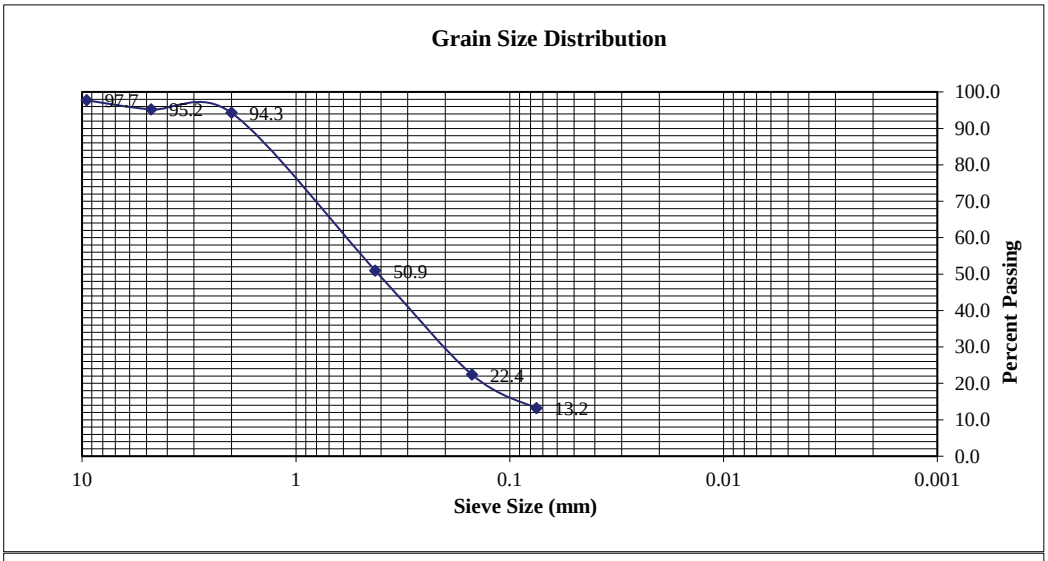
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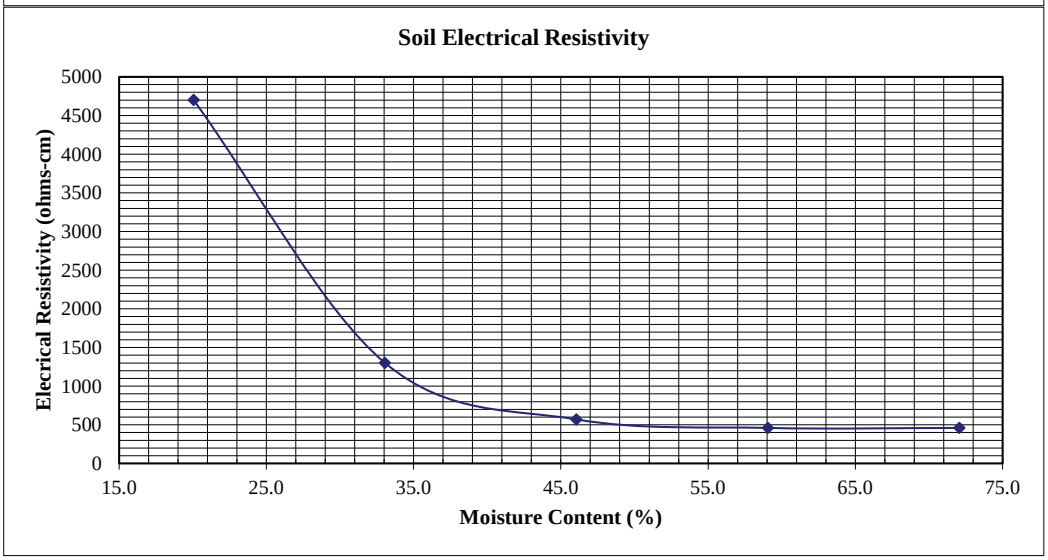
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/12/2013

Sample Number: TP19NE-3
Date of Sample: 10/12/2013
Sample Location: Pier 19: Test Pit TP19NE. 5.8' below T/Pier Footing @ B/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP19NE-4
Date of Sample: 10/12/2013
Sample Location: Pier 19: Test Pit TP19NE. 8' below T/Pier Footing
General Description: Clay, strong brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, strong brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	98
#40 (.425 mm)	96
#100 (.15 mm)	87
#200 (.075 mm)	78.3
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1200

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

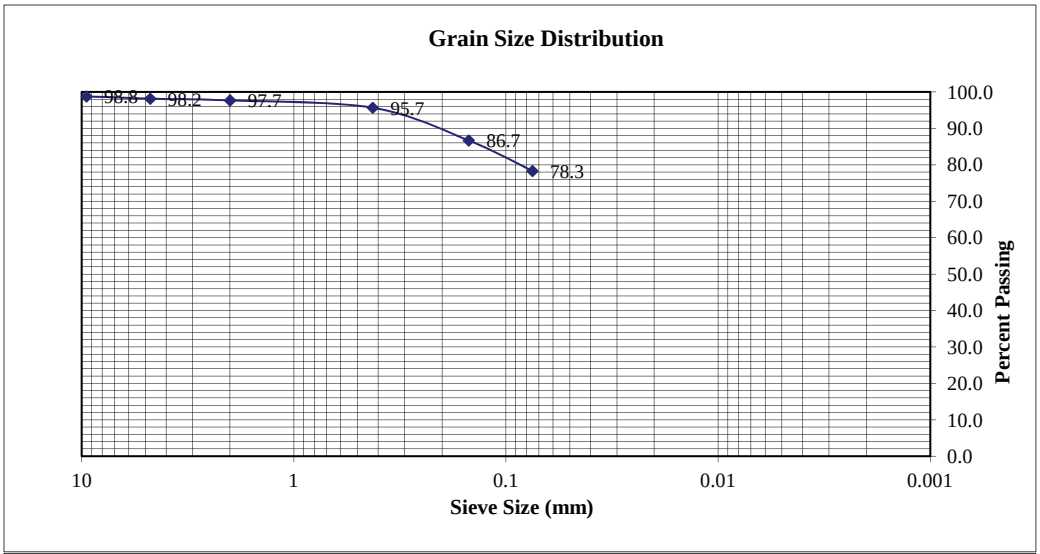
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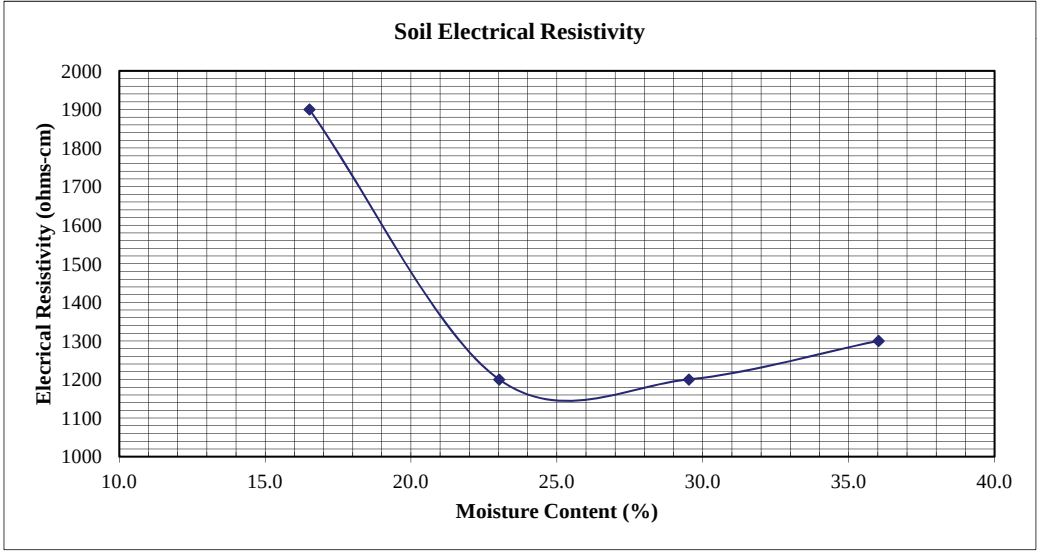
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP19NE-4
Date of Sample: 10/12/13
Sample Location: Pier 19: Test Pit TP19NE. 8' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP19NW-1
Date of Sample: 10/13/2013
Sample Location: Pier #19; Test Pit TP19NW, 7.5' below T/Pier Footing, next to pile
General Description: sandy silt w/ organics, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	97
3/8" (9.5 mm)	96
#4 (4.75 mm)	93
#10 (2.0 mm)	90
#40 (.425 mm)	82
#100 (.15 mm)	53
#200 (.075 mm)	38.9
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 7.6

Specific Gravity of Soil (AASHTO T100) 2.292

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

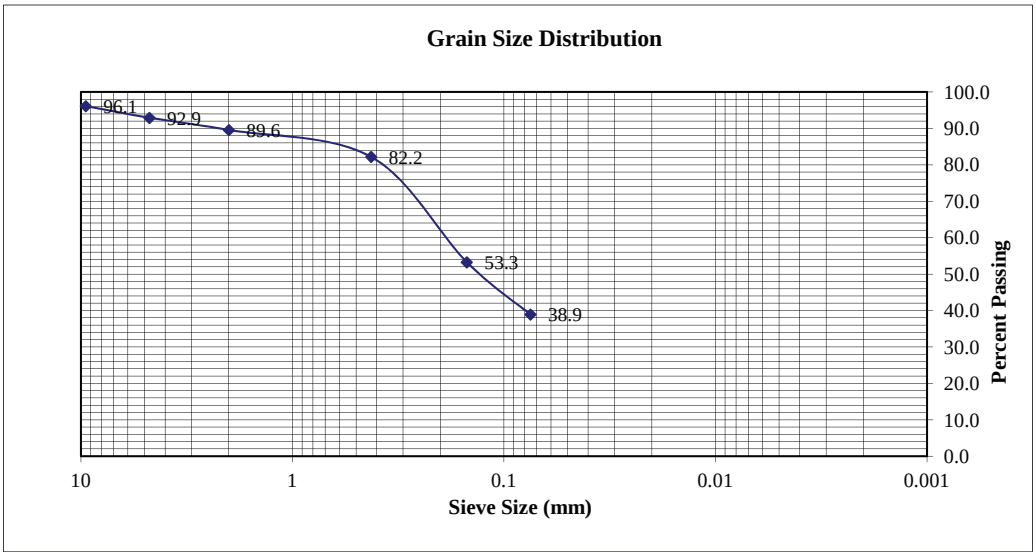
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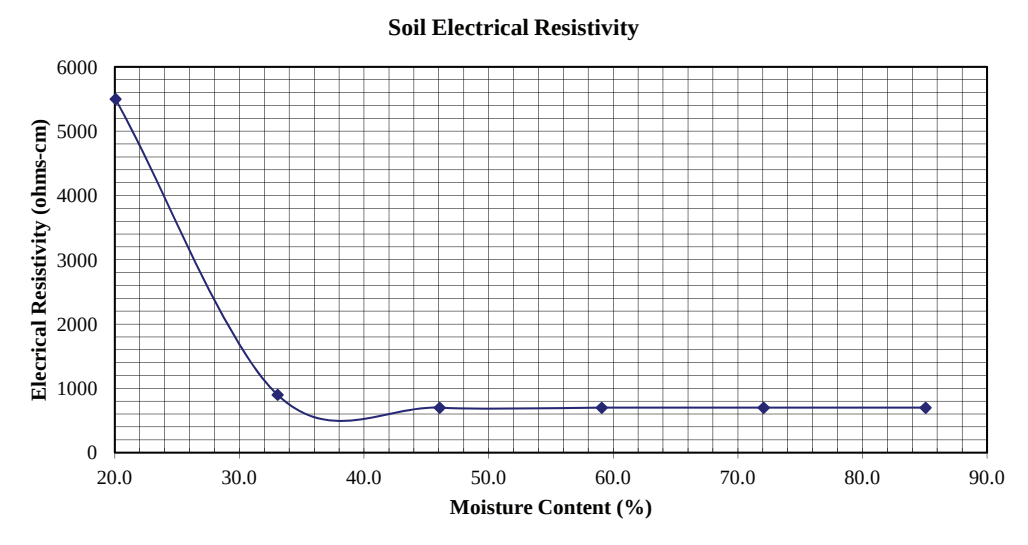
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP19NW-1
Date of Sample: 10/13/13
Sample Location: Pier #19; Test Pit TP19NW, 7.5' below T/Pier Footing, next to pile





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP19NW-2
Date of Sample: 10/13/2013
Sample Location: Pier #19; Test Pit TP19NW, 8' below T/Pier Footing, next to pile
General Description: Silt, brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILT w/ SAND, brown (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	94
#100 (.15 mm)	81
#200 (.075 mm)	73.2
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1100

Soil pH (AASHTO T289) 7.7

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

Reviewed By: _____
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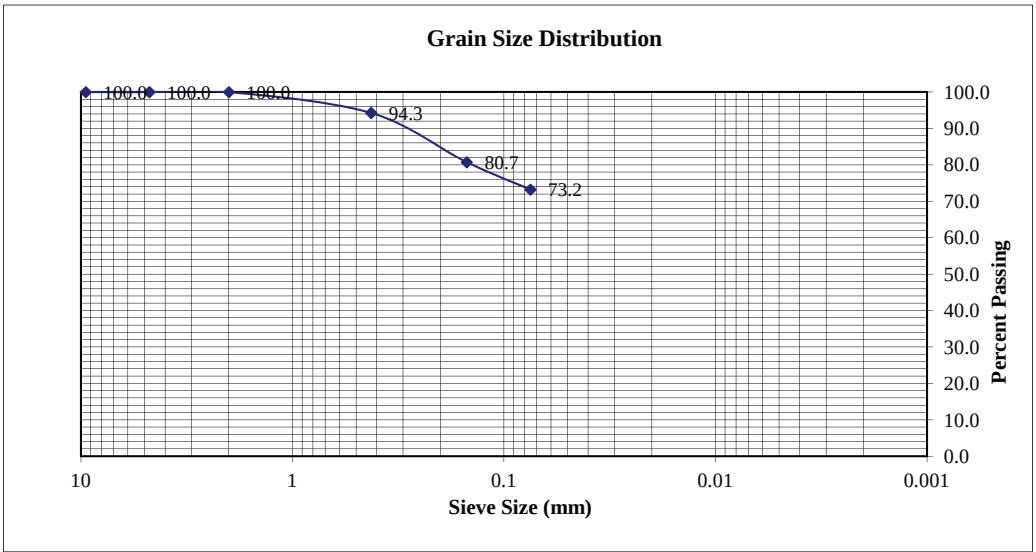
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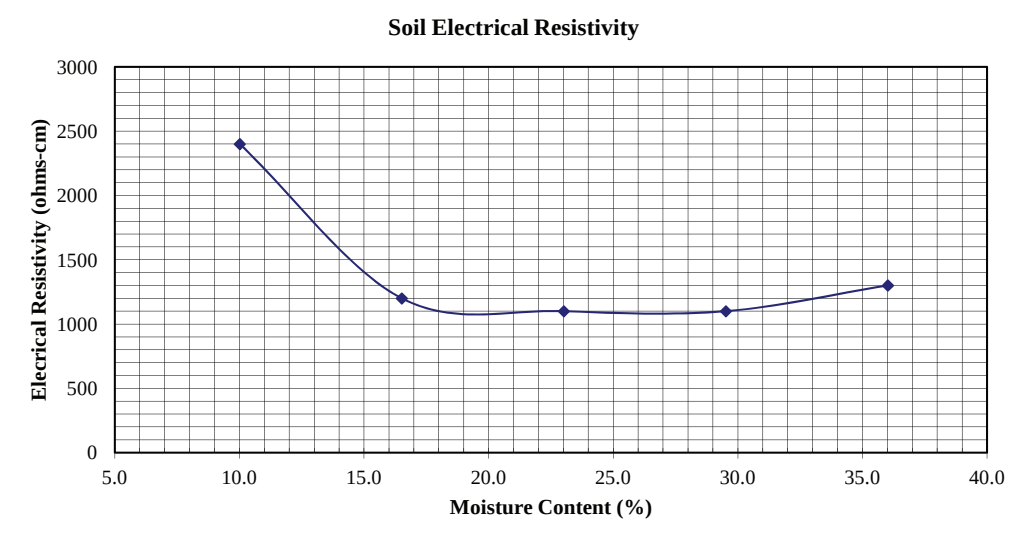
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP19NW-2
Date of Sample: 10/13/13
Sample Location: Pier #19; Test Pit TP19NW, 8' below T/Pier Footing, next to pile





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP19S-1
Date of Sample: 9/28/2013
Sample Location: Test Pit TP19S: Pier #19 - SE Corner of pier, 1.5' above' to 4.2' below T/Pier Footing
General Description: Sandy Organic Silt w/ gravel, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	92
1" (25 mm)	92
3/4" (19 mm)	92
1/2" (12.5 mm)	91
3/8" (9.5 mm)	91
#4 (4.75 mm)	89
#10 (2.0 mm)	87
#40 (.425 mm)	81
#100 (.15 mm)	55
#200 (.075 mm)	44.9
.002 mm	15.0
D_{10}	<.001

Natural Moisture Content
Moisture Content, % 65.2

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.311

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

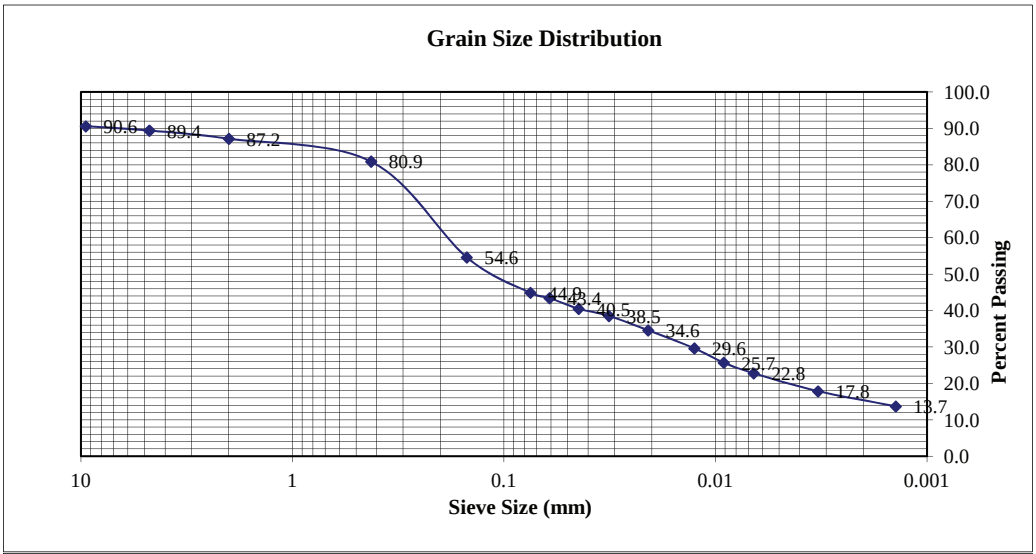
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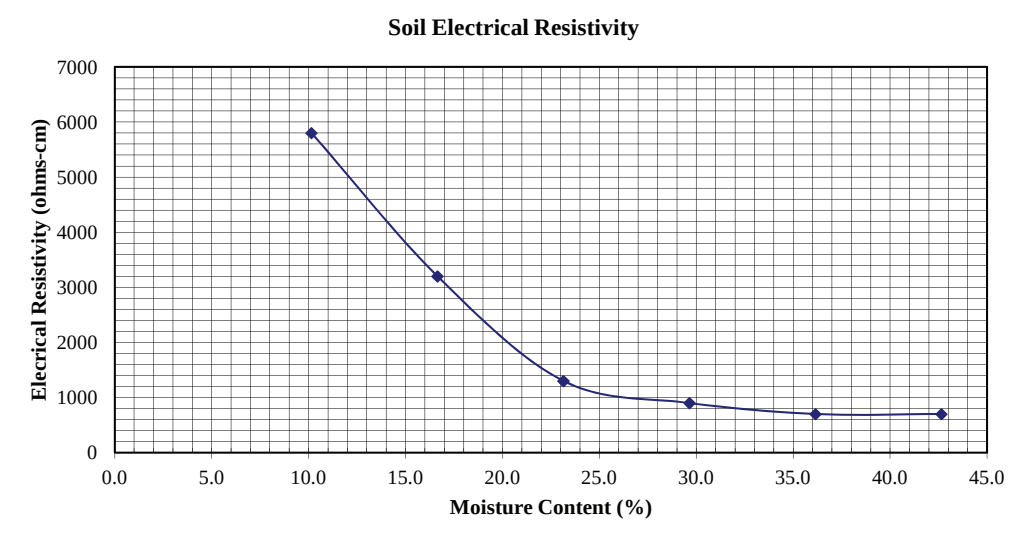
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP19S-1
Date of Sample: 09/28/13
Sample Location: Test Pit TP19S: Pier #19 - SE Corner of pier, 1.5' above' to 4.2' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP19S-2
Date of Sample: 9/28/2013
Sample Location: Pier #19; Test Pit 19S, 4.2' to 5.2' below T/Pier Footing
General Description: Shredded wood debris
Tests Performed: Natural Moisture Content
TEST RESULTS;
Unified Soils Classification (ASTM:D2487): N/A
USDA Soil Classification: N/A

Natural Moisture Content
Moisture Content, % 261.4

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP19S-3
Date of Sample: 9/28/2013
Sample Location: Pier 19; Test Pit TP19S, SE Corner of pier, 3' to 4' below T/Pier Footing
General Description: 2" Crushed stone, dark yellowish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, dark yellowish brown (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	94
1" (25 mm)	93
3/4" (19 mm)	93
1/2" (12.5 mm)	81
3/8" (9.5 mm)	71
#4 (4.75 mm)	46
#10 (2.0 mm)	29
#40 (.425 mm)	17
#100 (.15 mm)	11
#200 (.075 mm)	8.1
.002 mm	<8.1
D_{10}	0.150

Natural Moisture Content
Moisture Content, % 10.7

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

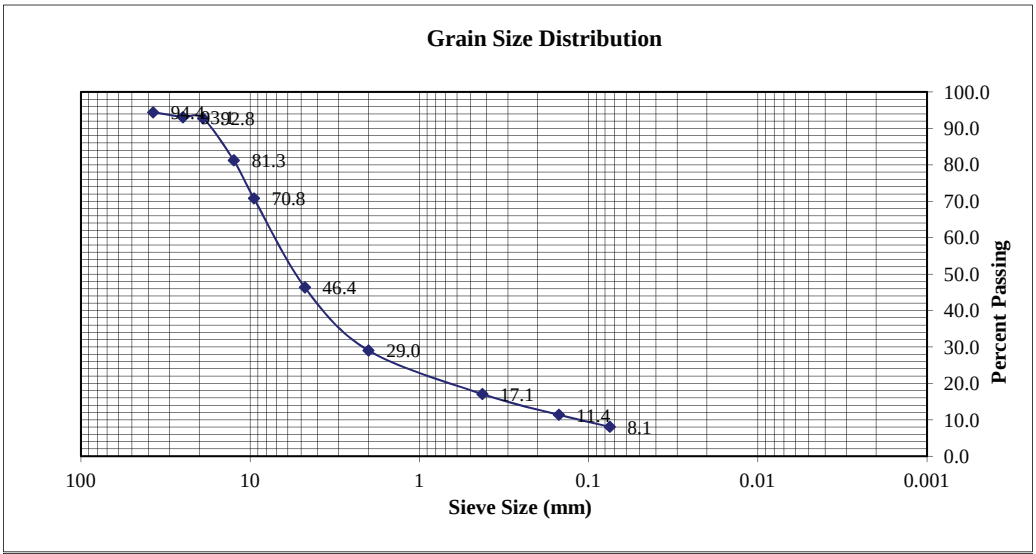
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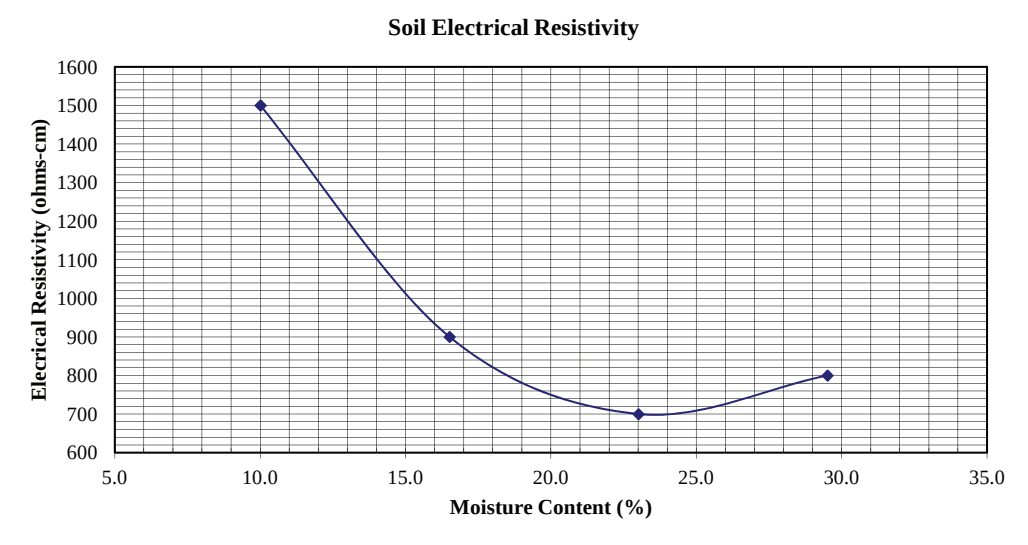
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP19S-3
Date of Sample: 09/28/13
Sample Location: Pier 19; Test Pit TP19S, SE Corner of pier, 3' to 4' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP19S-4
Date of Sample: 9/28/2013
Sample Location: Pier 19; Test Pit TP19S, SE Corner of pier, 6.5' - 7.1' below T/Pier Footing
General Description: Sand w/ silt and gravel, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND, fine grained ,brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	97
#10 (2.0 mm)	96
#40 (.425 mm)	87
#100 (.15 mm)	18
#200 (.075 mm)	3.4
.002 mm	<3.4
D_{10}	0.110

Natural Moisture Content
Moisture Content, % 27.3

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1500

Soil pH (AASHTO T289) 7.6

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

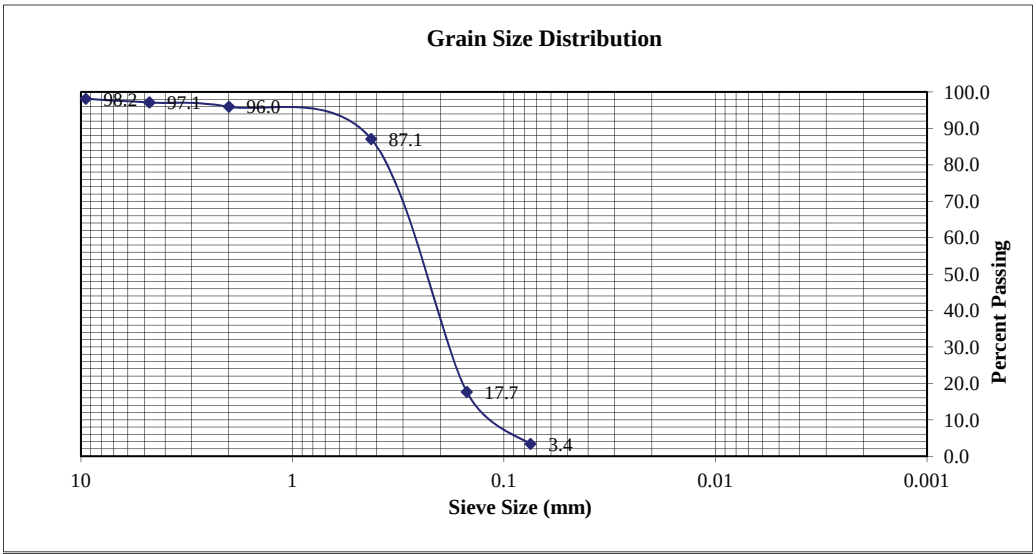
Reviewed By: *Paul R. Eggen*

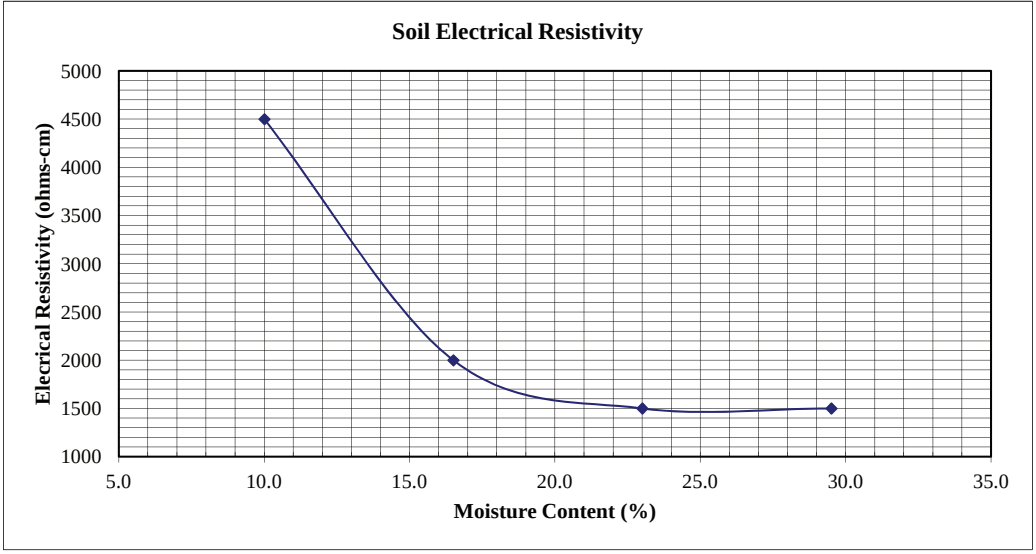
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP19S-4
Date of Sample: 9/28/13
Sample Location: Pier 19; Test Pit TP19S, SE Corner of pier, 6.5' - 7.1' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/15/2013

Sample Number: TP19S-5
Date of Sample: 9/28/2013
Sample Location: Test Pit TP19S: Pier #19 - SE Corner of pier, 7.1' below T/Pier Footing
General Description: Lean clay w/ sand, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, reddish brown (CL)

USDA Soil Classification: Clay

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	96
#10 (2.0 mm)	94
#40 (.425 mm)	92
#100 (.15 mm)	81
#200 (.075 mm)	75.9
.002 mm	42.9
D_{10}	N/A

Natural Moisture Content
Moisture Content, % 19.0

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 30.8
Plastic Limit, PL (%) 14.1
Platicity Index (%) 16.8

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 8.4

Specific Gravity of Soil (AASHTO T100) 2.697

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

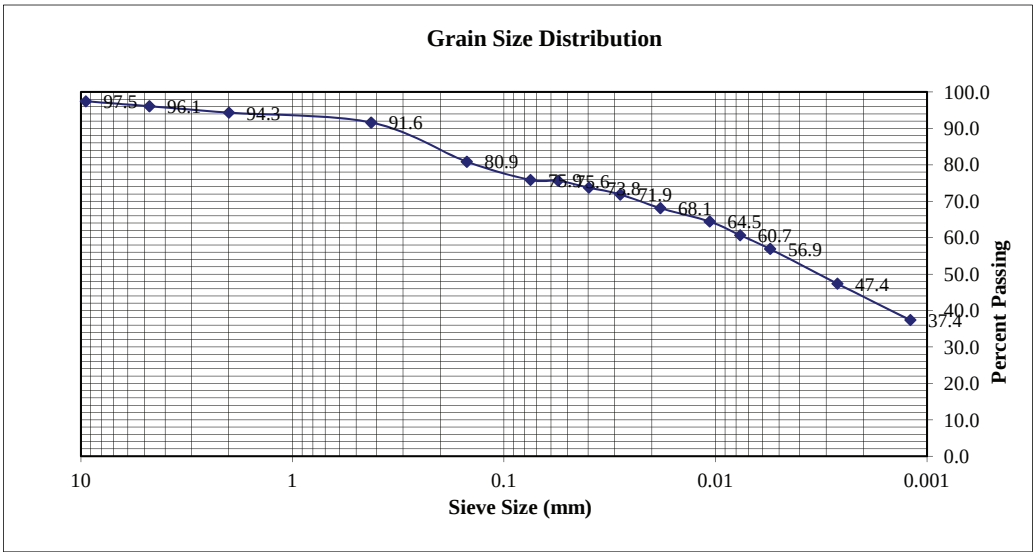
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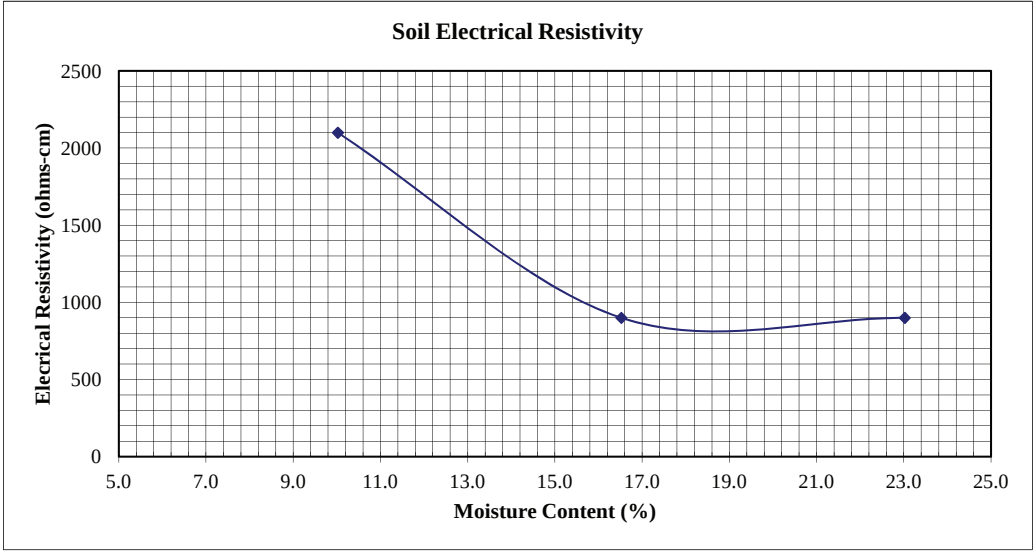
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP19S-5
Date of Sample: 9/28/2013
Sample Location: Test Pit TP19S: Pier #19 - SE Corner of pier, 7.1' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP20S-1
Date of Sample: 9/30/2013
Sample Location: Pier # 20; Test Pit TP20S, 2' to 3' below T/Pier Footing
General Description: Silty sand w/ organics, dark yellowish brown & black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine to medium grained ,dark yellowish brown w/ black mottling (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	95
#10 (2.0 mm)	89
#40 (.425 mm)	78
#100 (.15 mm)	56
#200 (.075 mm)	46.4
.002 mm	16.0
D_{10}	<.001

Natural Moisture Content

Moisture Content, % 51.0

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) 43.6
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 410

Soil pH (AASHTO T289) 7.4

Specific Gravity of Soil (AASHTO T100) 2.288

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

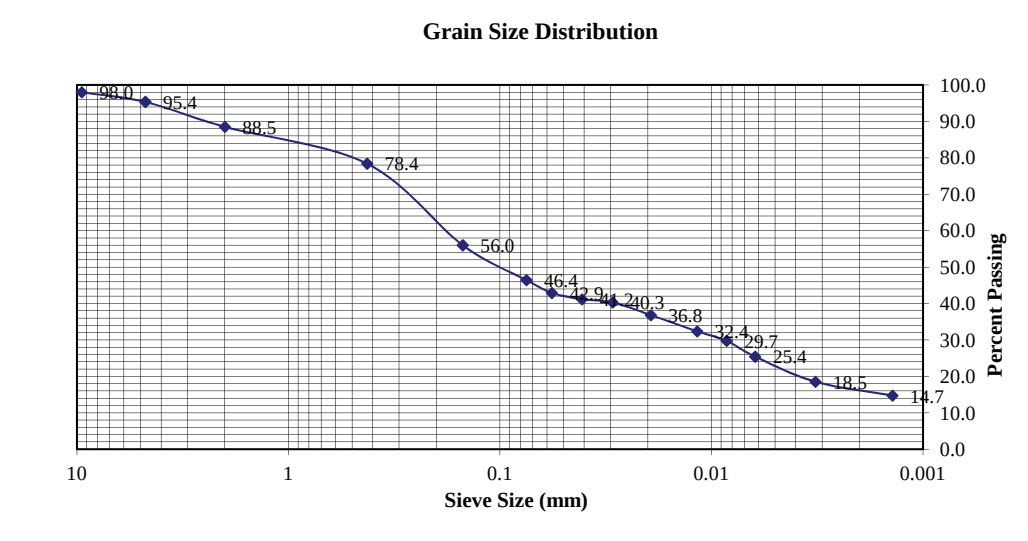
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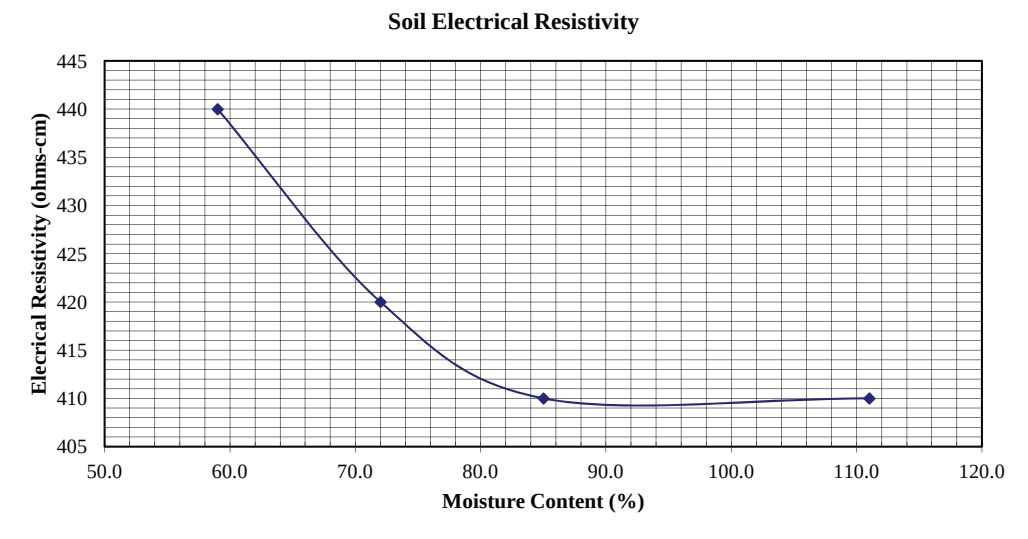
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP20S-1
Date of Sample: 09/30/13
Sample Location: Pier # 20; Test Pit TP20S, 2' to 3' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP20S-2
Date of Sample: 9/30/2013
Sample Location: Pier 20; Test Pit 20S, 3.0' to 5.7' below T/Pier Footing
General Description: Sludge, light brownish gray
Tests Performed: Natural Moisture Content
TEST RESULTS;
Unified Soils Classification (ASTM:D2487): N/A
USDA Soil Classification: N/A

Natural Moisture Content

Moisture Content, %	261.4

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP20S-3
Date of Sample: 9/30/2013
Sample Location: Pier 20, Test Pit TP20, 0.0' to 1.3' below bottom of Pier Footing
General Description: Crushed stone, grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, brown (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	98
1" (25 mm)	95
3/4" (19 mm)	93
1/2" (12.5 mm)	84
3/8" (9.5 mm)	73
#4 (4.75 mm)	50
#10 (2.0 mm)	36
#40 (.425 mm)	20
#100 (.15 mm)	12
#200 (.075 mm)	8.7
.002 mm	<8.7
D_{10}	0.100

Natural Moisture Content
Moisture Content, % 8.4

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

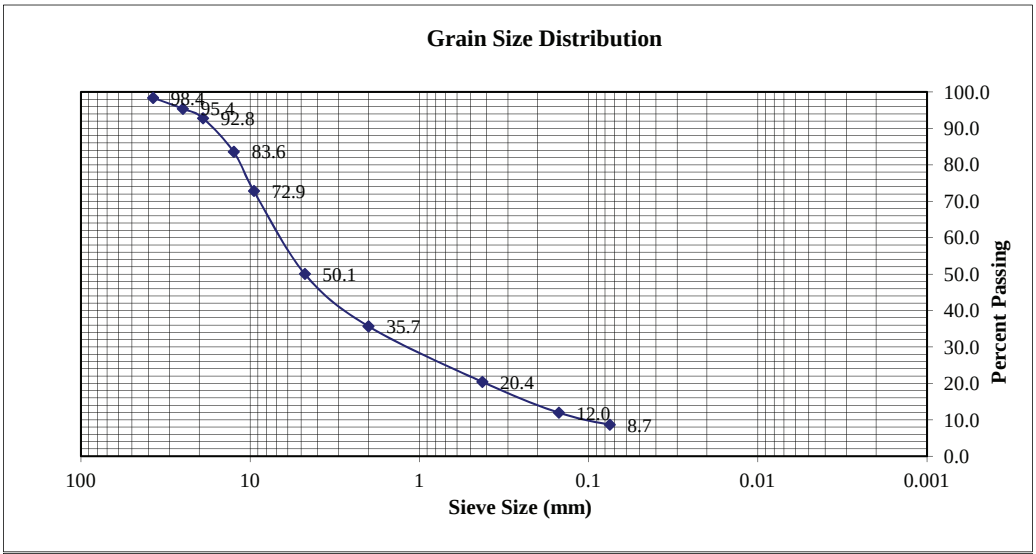
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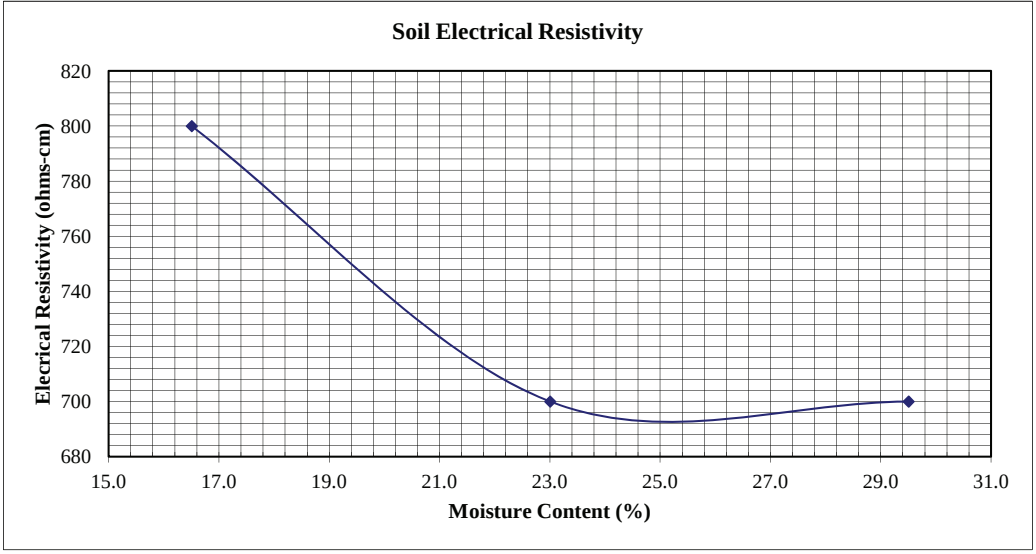
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP20S-3
Date of Sample: 9/30/13
Sample Location: Pier 20, Test Pit TP20, 0.0' to 1.3' below bottom of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP20S-4
Date of Sample: 9/30/2013
Sample Location: Test Pit TP20; Pier #20; 0.0' to 1.3' below bottom of Pier Footing
General Description: Crushed stone, dark grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, some organics, yellow brown mottled black (GP-GM)"
USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	98
1" (25 mm)	89
3/4" (19 mm)	86
1/2" (12.5 mm)	70
3/8" (9.5 mm)	56
#4 (4.75 mm)	34
#10 (2.0 mm)	24
#40 (.425 mm)	14
#100 (.15 mm)	8
#200 (.075 mm)	5.8
.002 mm	<5.8
D_{10}	0.200

Natural Moisture Content
Moisture Content, % 21.1

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 340

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: _____
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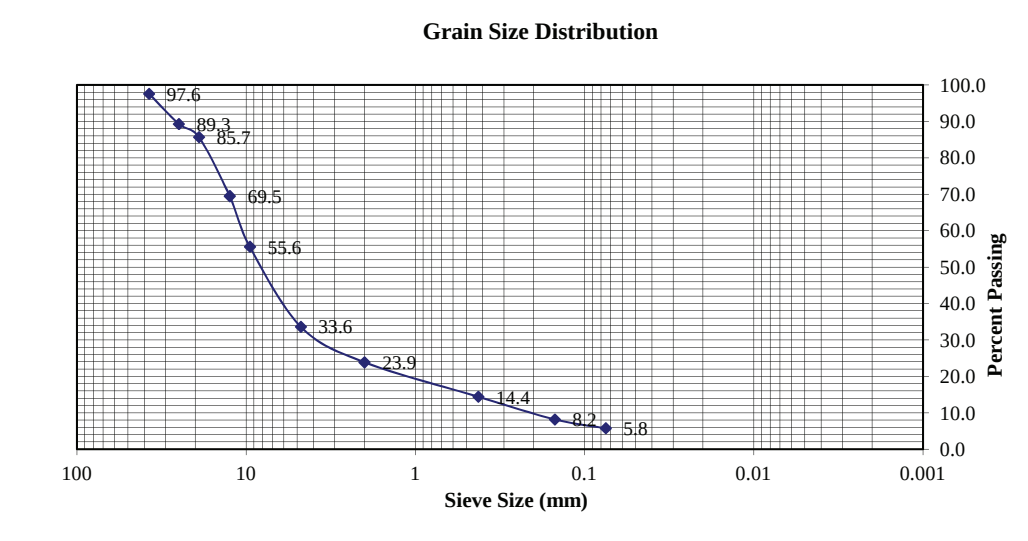
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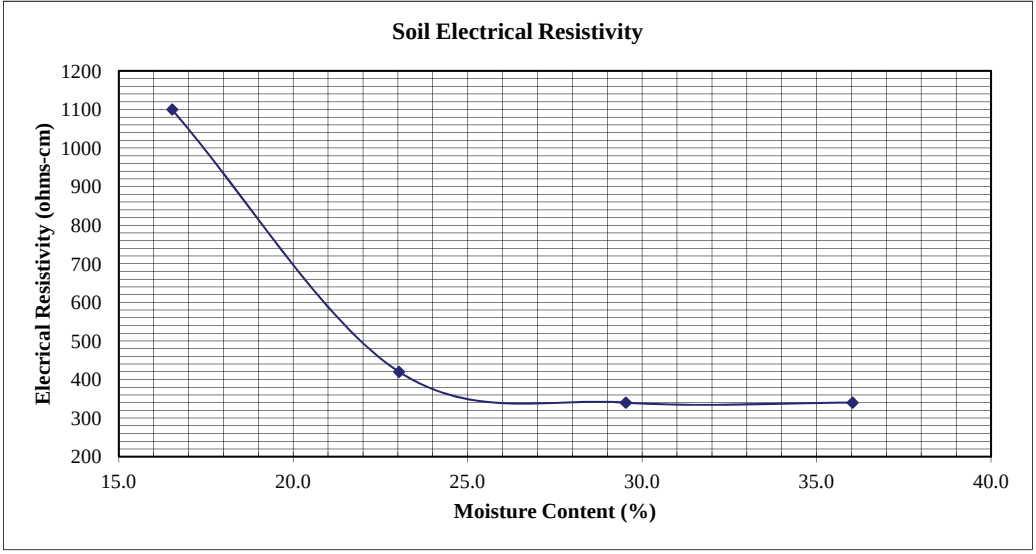
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP20S-4
Date of Sample: 09/30/13
Sample Location: Test Pit TP20; Pier #20; 0.0' to 1.3' below bottom of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP20S-5
Date of Sample: 9/30/2013
Sample Location: Pier #20; Test Pit TP20, 6.0' to 7.0' below T/Pier Footing
General Description: Organic silt,black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILT w/ SAND, black (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	94
#100 (.15 mm)	80
#200 (.075 mm)	73.6
.002 mm	17.2
D_{10}	<.002

Natural Moisture Content

Moisture Content, %	77.2

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	44.9
Plastic Limit, PL (%)	27.4
Platicity Index (%)	17.5
Liquid Limit (not dried), LL (%)	53.3

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 410

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.553

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

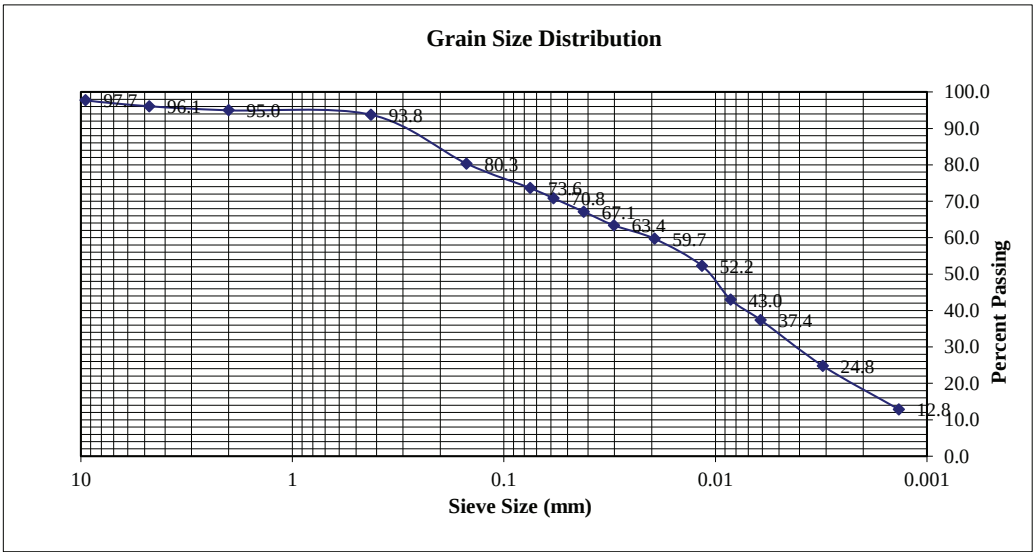
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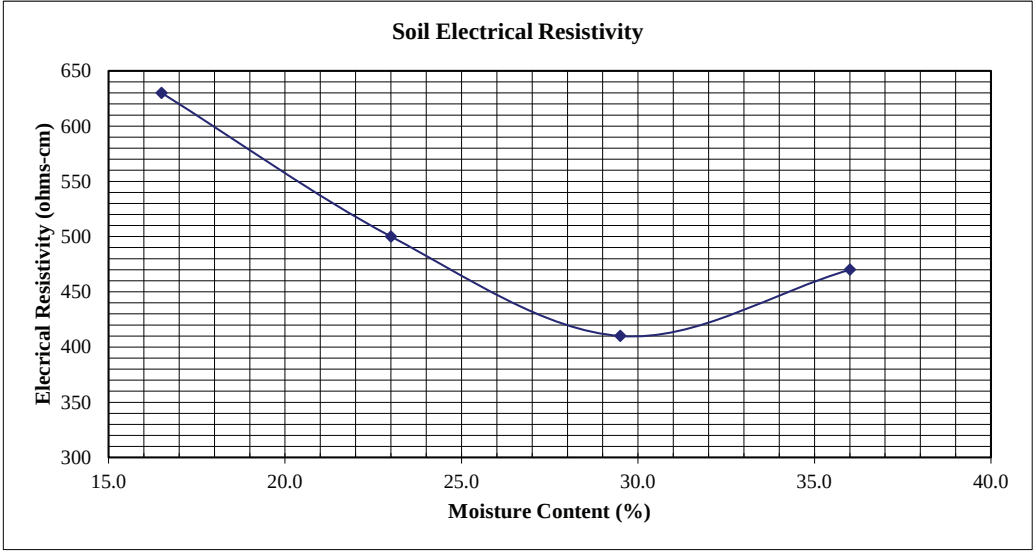
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/13/2013

Sample Number: TP20S-5
Date of Sample: 09/30/13
Sample Location: Pier #20; Test Pit TP20, 6.0' to 7.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP21NW-1
Date of Sample: 10/13/2013
Sample Location: Pier 21 Test Pit; TP21NW-1 7' b/top of cap, next to pile
General Description: Silty sand, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	98
3/4" (19 mm)	98
1/2" (12.5 mm)	97
3/8" (9.5 mm)	97
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	89
#100 (.15 mm)	68
#200 (.075 mm)	49.2
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 370

Soil pH (AASHTO T289) 8.4

Specific Gravity of Soil (AASHTO T100) 2.228

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

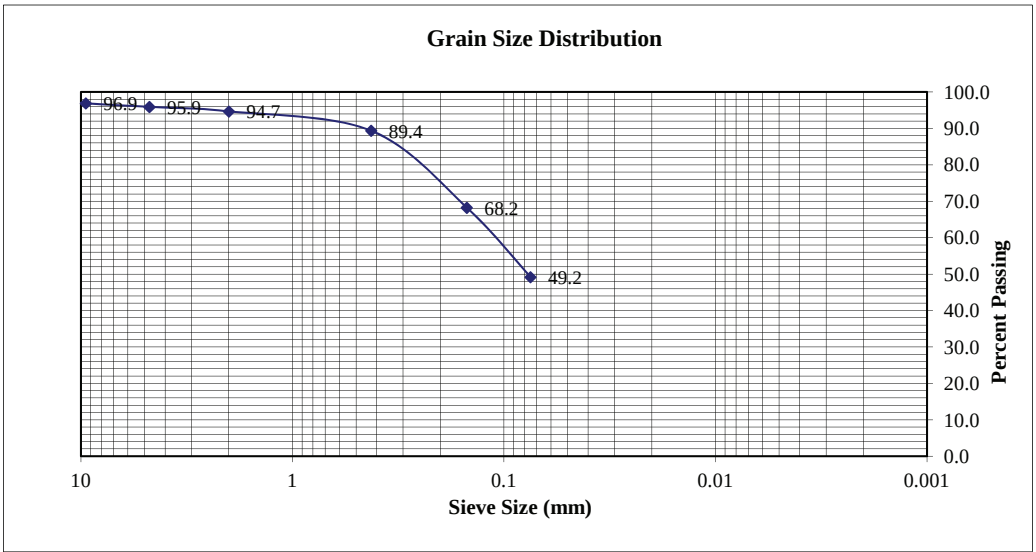
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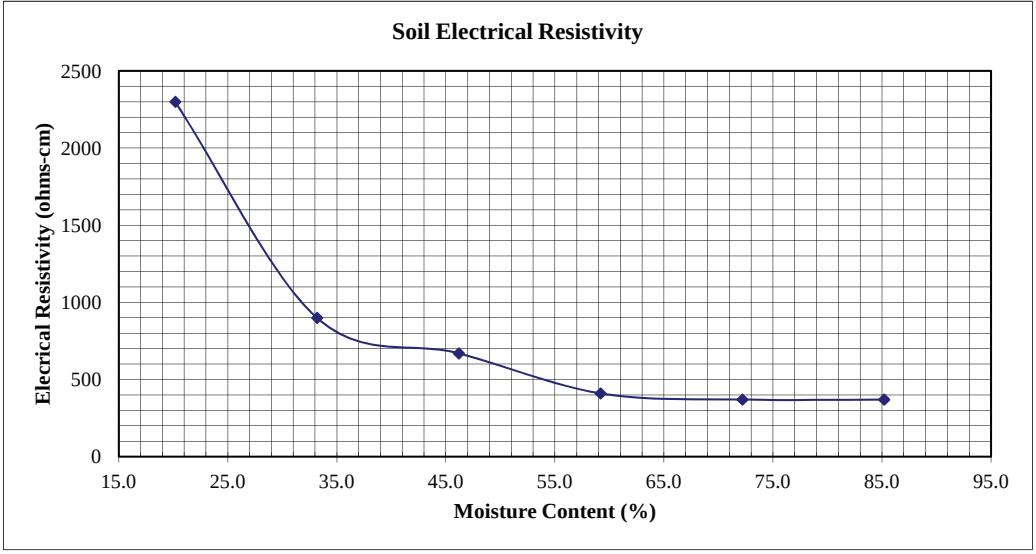
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP21NW-1
Date of Sample: 10/13/13
Sample Location: Pier 21 Test Pit; TP21NW-1 7' b/top of cap, next to pile





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP21S-1
Date of Sample: 9/30/2013
Sample Location: Test Pit TP21; Pier # 21, 1' to 2' below T/Pier Footing
General Description: Sandy silt,brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, brown (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	98
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	88
#100 (.15 mm)	79
#200 (.075 mm)	65.8
.002 mm	25.9
D_{10}	<.001

Natural Moisture Content
Moisture Content, % 18.4

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 27.8
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.4

Specific Gravity of Soil (AASHTO T100) 2.657

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

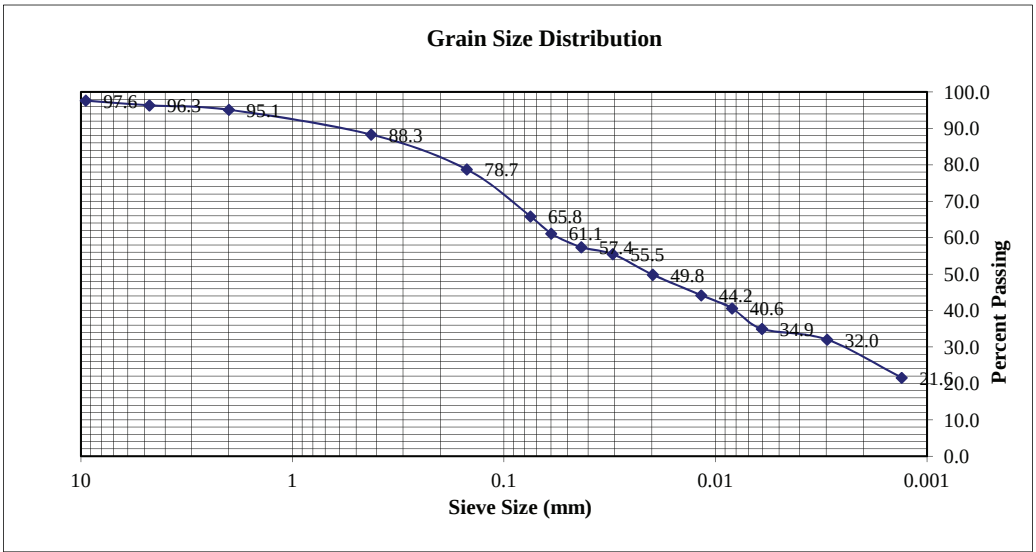
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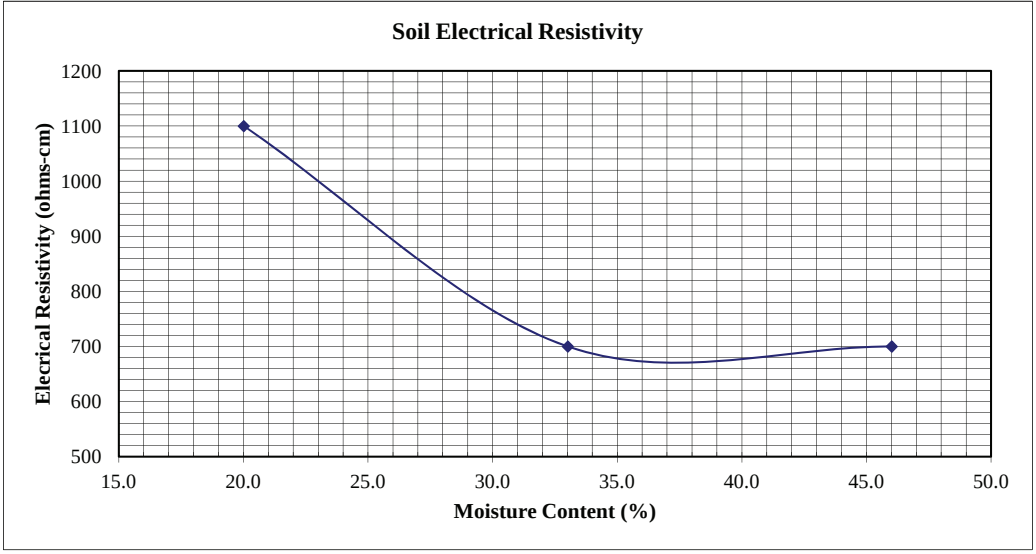
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/1/2013

Sample Number: TP21S-1
Date of Sample: 09/30/13
Sample Location: Test Pit TP21; Pier # 21, 1' to 2' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP21S-2
Date of Sample: 9/30/2013
Sample Location: Pier # 21; Test Pit TP21S, 4.2' to 5.4' below T/Pier Footing
General Description: Silty sand, brown/gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, dark gray (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	93
#100 (.15 mm)	76
#200 (.075 mm)	57.0
.002 mm	18.0
D_{10}	<.002

Natural Moisture Content
Moisture Content, % 34.0

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 25.1
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 410

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.647

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

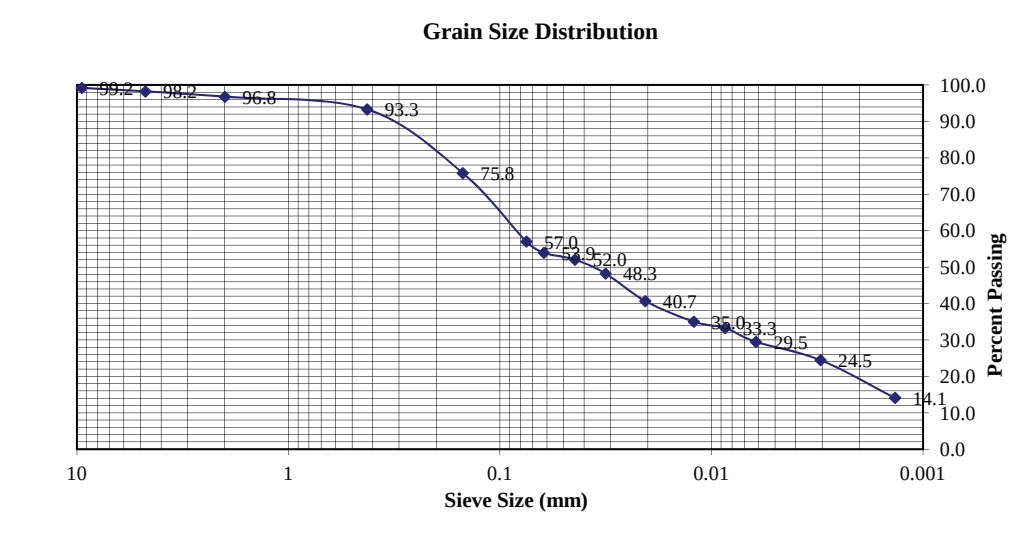
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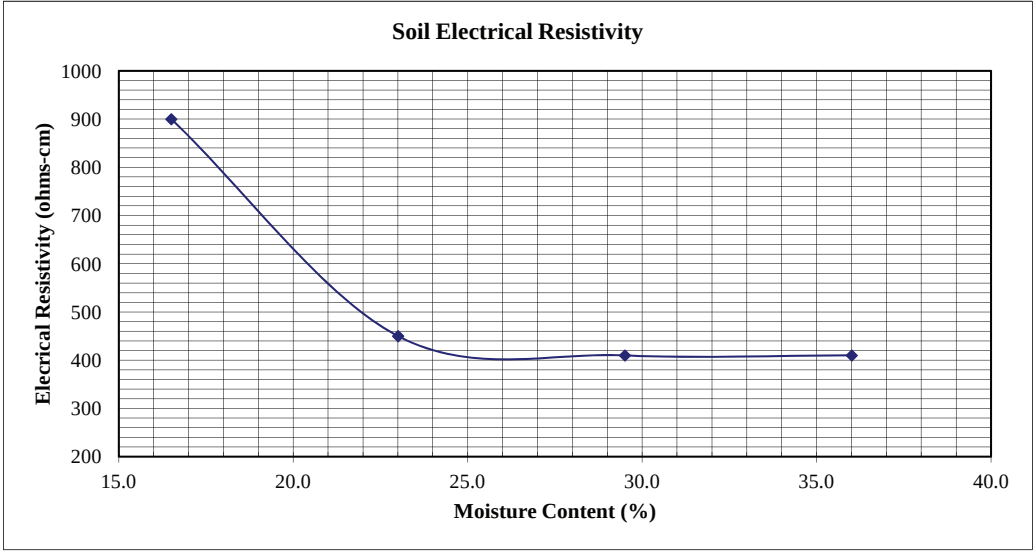
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP21S-2
Date of Sample: 09/30/13
Sample Location: Pier # 21; Test Pit TP21S, 4.2' to 5.4' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP21S-3
Date of Sample: 9/30/2013
Sample Location: Pier # 21, Test Pit TP21S, 5.4 to 7.0' below T/Pier Footing
General Description: Ash,very dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,very dark gray (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	97
#40 (.425 mm)	91
#100 (.15 mm)	60
#200 (.075 mm)	48.7
.002 mm	10.3
D_{10}	0.002

Natural Moisture Content
Moisture Content, % 76.6

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 250

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.181

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

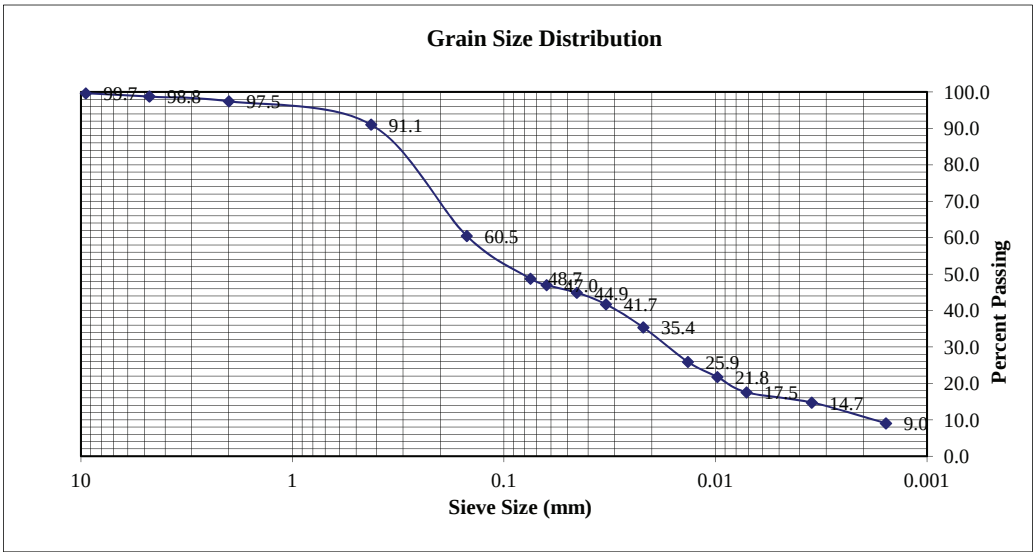
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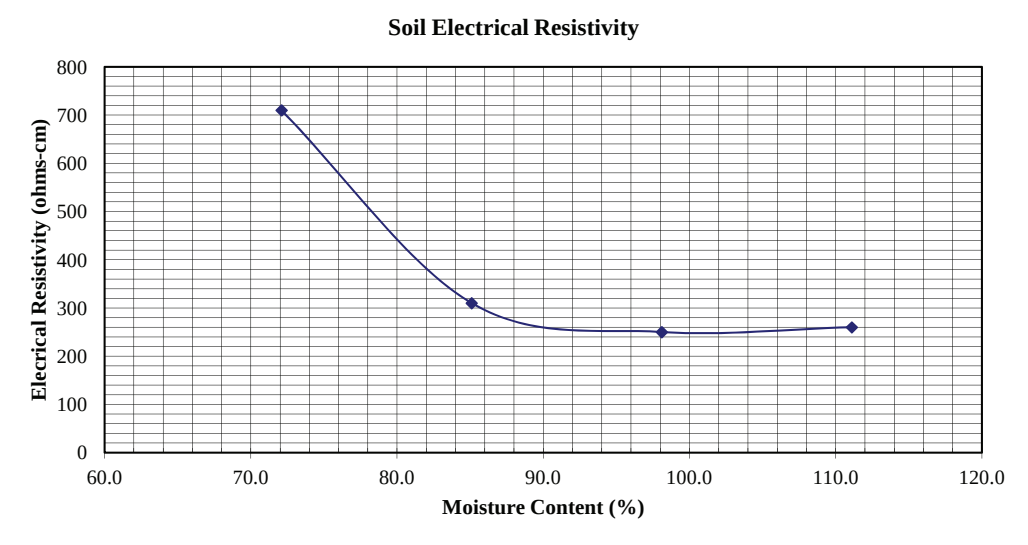
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP21S-3
Date of Sample: 9/30/13
Sample Location: Pier # 21, Test Pit TP21S, 5.4 to 7.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP21S-4
Date of Sample: 9/30/2013
Sample Location: Pier # 21; Test Pit TP21S, 7.6' below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, very dark gray (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	99
#10 (2.0 mm)	98
#40 (.425 mm)	95
#100 (.15 mm)	80
#200 (.075 mm)	65.8
.002 mm	12.0
D_{10}	<.002

Natural Moisture Content
Moisture Content, % 71.6

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 380

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.245

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

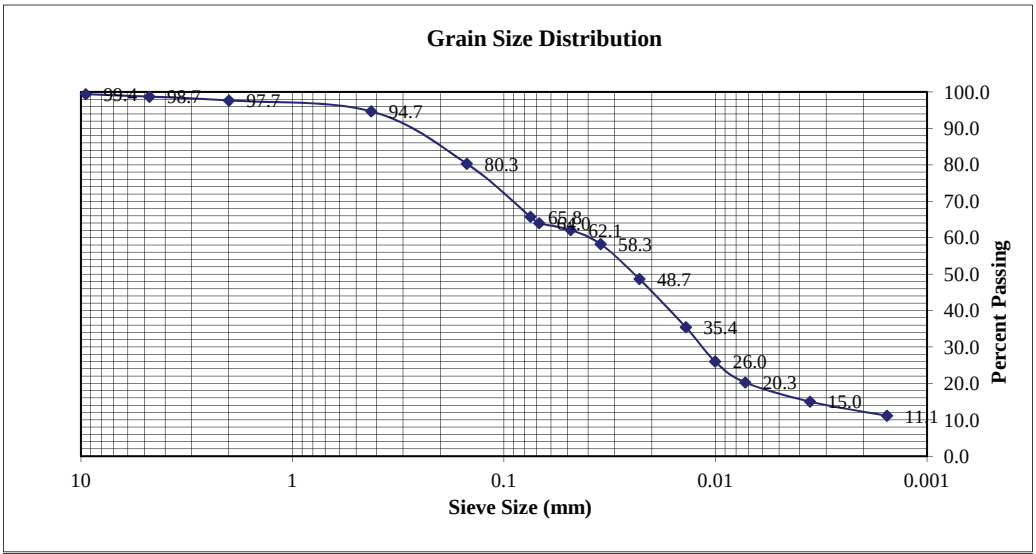
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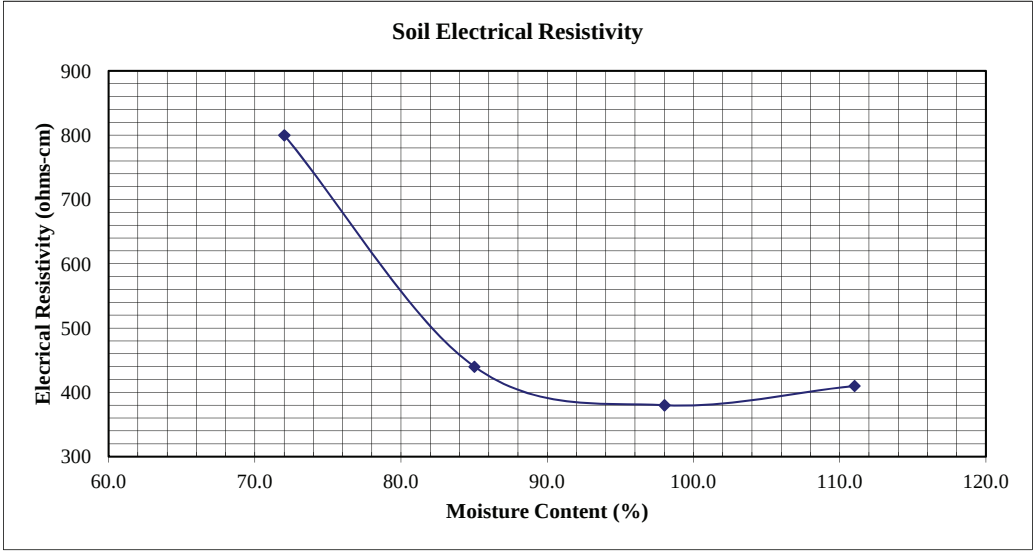
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP21S-4
Date of Sample: 09/30/13
Sample Location: Pier # 21; Test Pit TP21S, 7.6' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22N-1
Date of Sample: 10/1/2013
Sample Location: Pier # 22; Test Pit TP22N, 11' below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	93
#100 (.15 mm)	57
#200 (.075 mm)	45.4
.002 mm	<4.9
D_{10}	0.007

Natural Moisture Content
Moisture Content, % 85.8

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 370

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.243

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

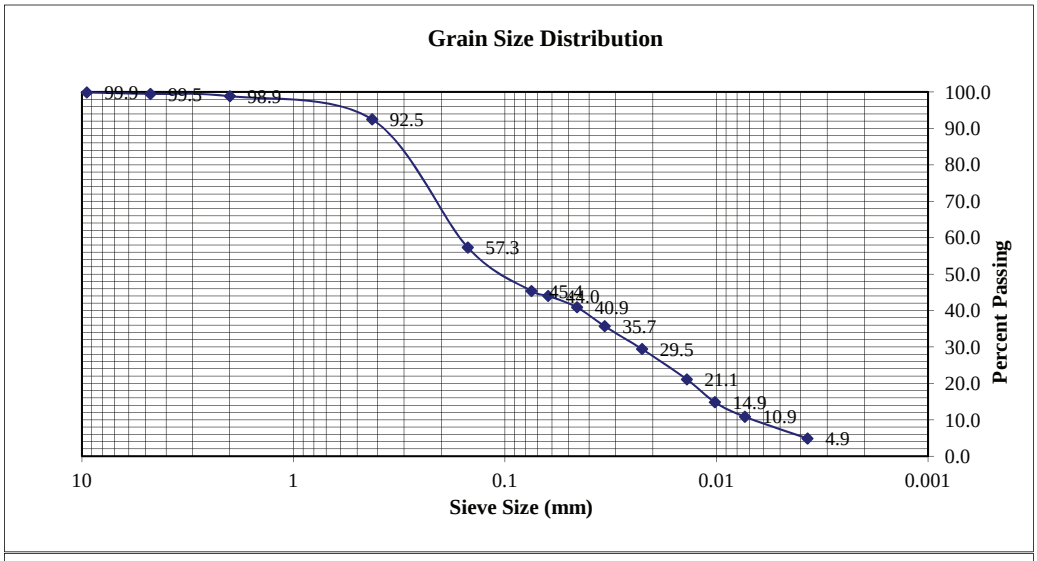
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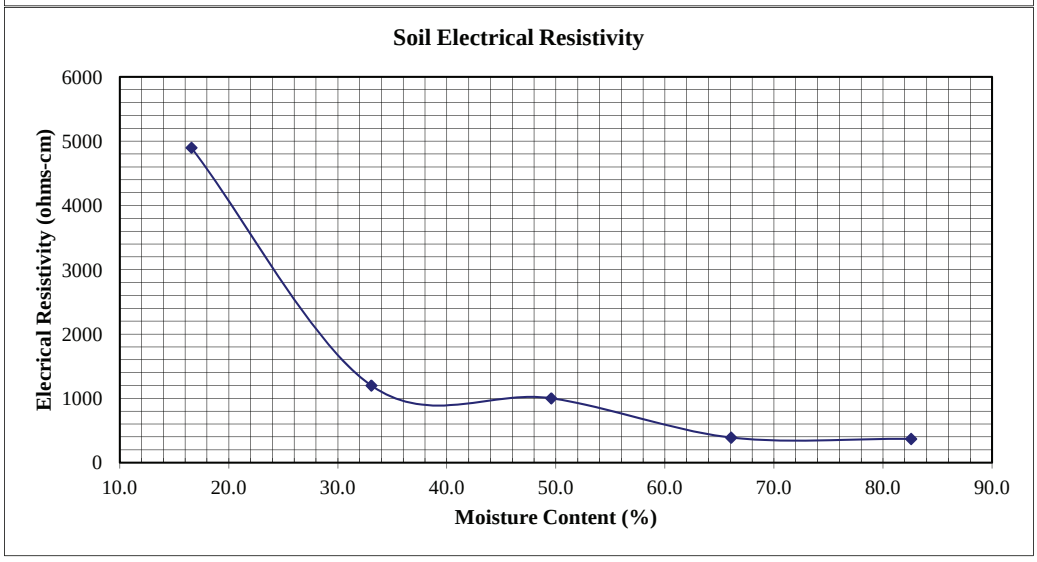
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP22N-1
Date of Sample: 10/01/13
Sample Location: Pier # 22; Test Pit TP22N, 11' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22N-2
Date of Sample: 10/1/2013
Sample Location: Pier # 22; Test Pit TP22N, 14' below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	93
#100 (.15 mm)	66
#200 (.075 mm)	49.6
.002 mm	<9.4
D_{10}	0.008

Natural Moisture Content
Moisture Content, % 131.3

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 340

Soil pH (AASHTO T289) 7.6

Specific Gravity of Soil (AASHTO T100) 2.219

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

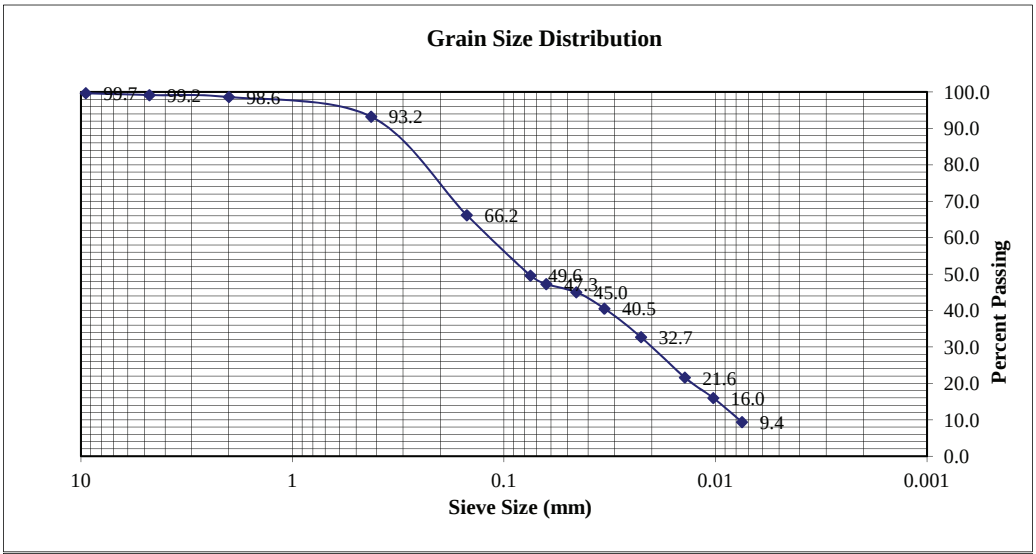
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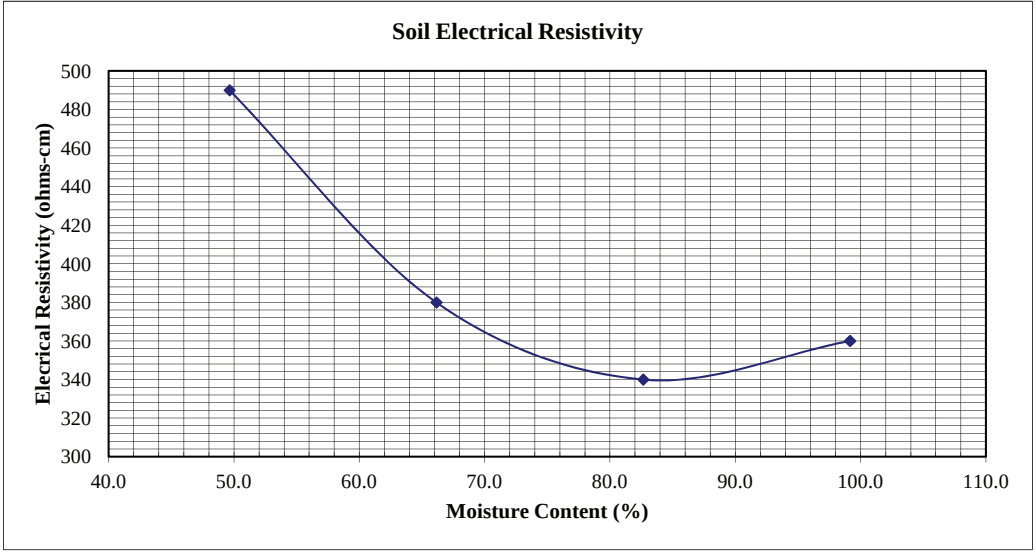
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP22N-2
Date of Sample: 10/01/13
Sample Location: Pier # 22; Test Pit TP22N, 14' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22N-3
Date of Sample: 10/1/2013
Sample Location: Test Pit TP22N; Pier # 22, 15' to 16' below T/Pier Footing
General Description: Organic silty sand, dark gray - black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,dark gray to black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	95
#100 (.15 mm)	43
#200 (.075 mm)	33.8
.002 mm	11.5
D_{10}	0.001

Natural Moisture Content
Moisture Content, % 38.7

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 670

Soil pH (AASHTO T289) 7.7

Specific Gravity of Soil (AASHTO T100) 2.508

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

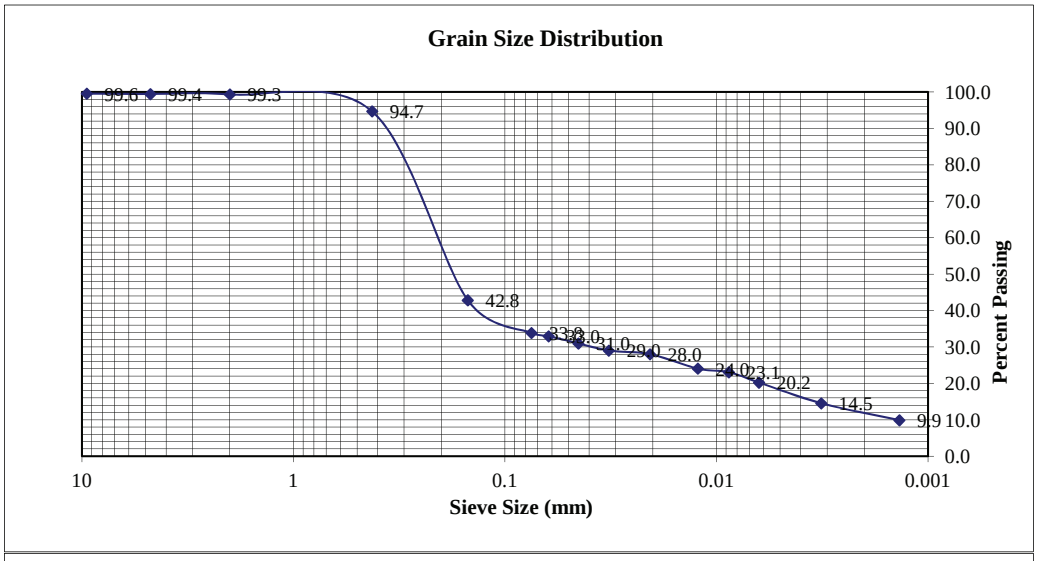
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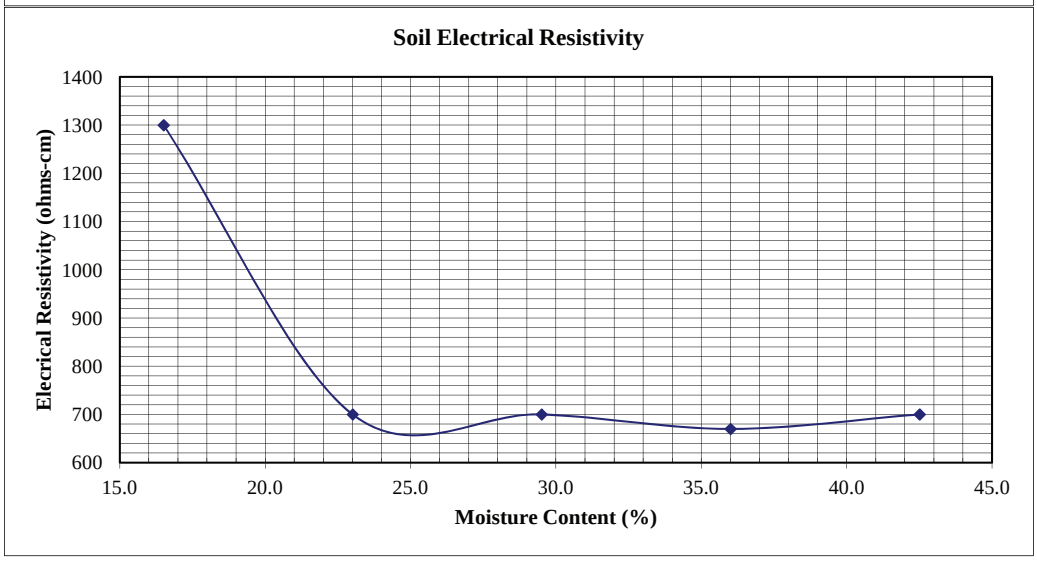
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP22N-3
Date of Sample: 10/1/13
Sample Location: Test Pit TP22N; Pier # 22, 15' to 16' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22N-4
Date of Sample: 10/1/2013
Sample Location: Test Pit TP22N; Pier # 22, 16' below T/Pier Footing
General Description: Lean Clay, reddish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, reddish brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	95
#100 (.15 mm)	86
#200 (.075 mm)	79.5
.002 mm	34.1
D_{10}	<.001

Natural Moisture Content
Moisture Content, % 20.2

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 35.2
Plastic Limit, PL (%) 15.7
Platicity Index (%) 19.5

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.664

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

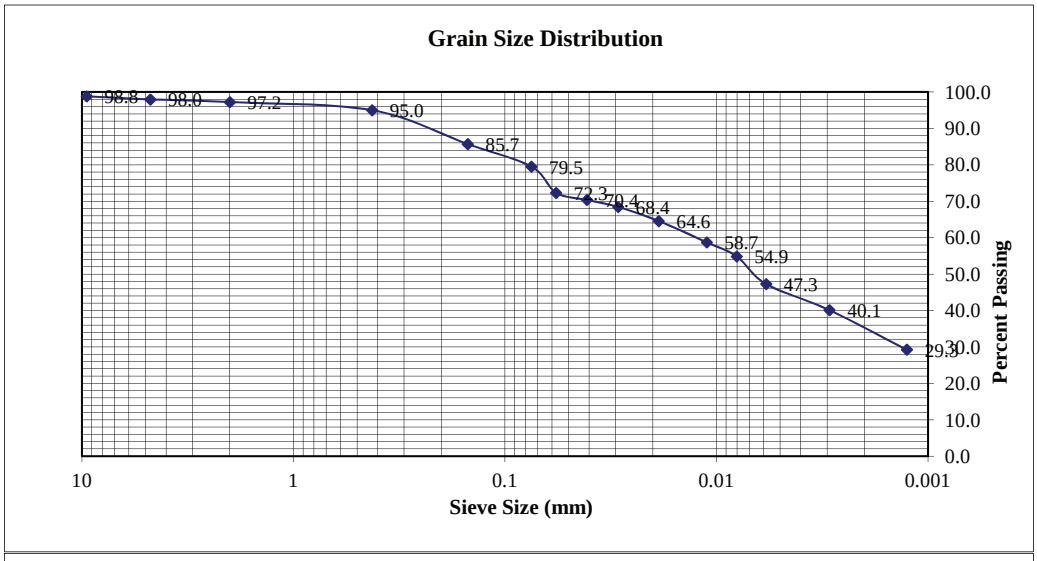
Reviewed By: *Paul R. Eggen*

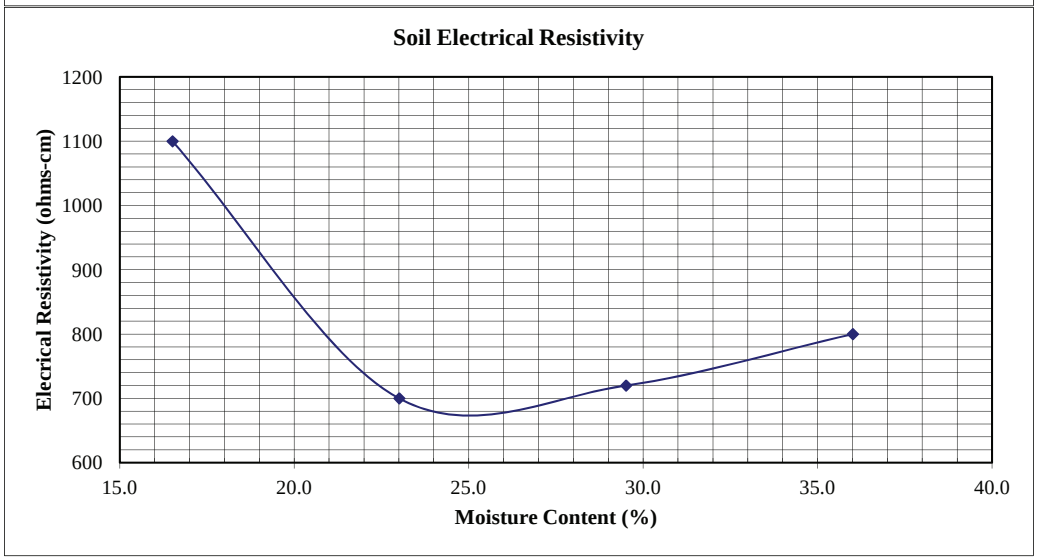
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP22N-4
Date of Sample: 10/01/13
Sample Location: Test Pit TP22N; Pier # 22, 16' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22S-1
Date of Sample: 9/29/2013
Sample Location: Pier #22; Test Pit TP22S, 0' to 2' above T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	96
1/2" (12.5 mm)	95
3/8" (9.5 mm)	93
#4 (4.75 mm)	90
#10 (2.0 mm)	86
#40 (.425 mm)	78
#100 (.15 mm)	54
#200 (.075 mm)	42.4
.002 mm	3.4
D_{10}	N/A

Natural Moisture Content
Moisture Content, % 65.8

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 300

Soil pH (AASHTO T289) 7.7

Specific Gravity of Soil (AASHTO T100) 2.243

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

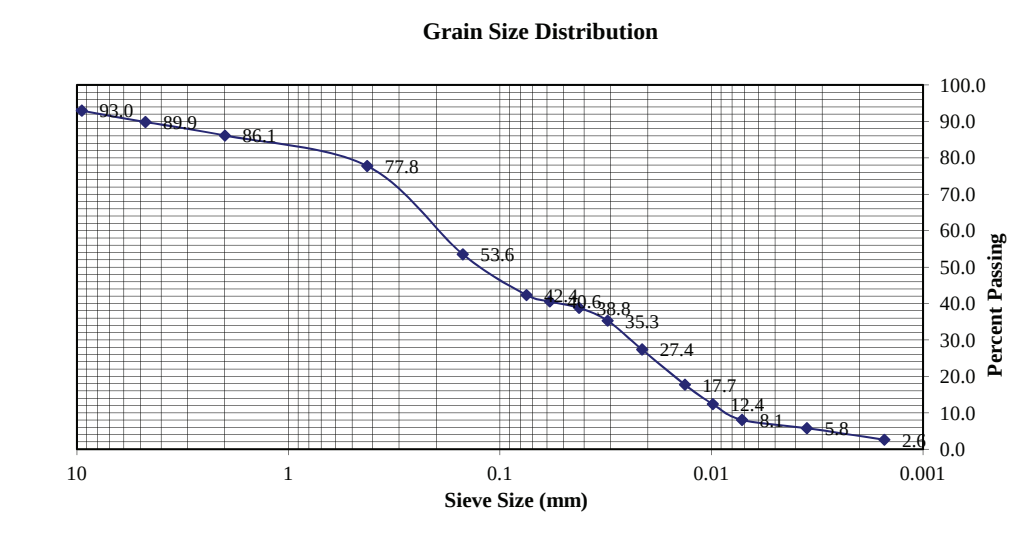
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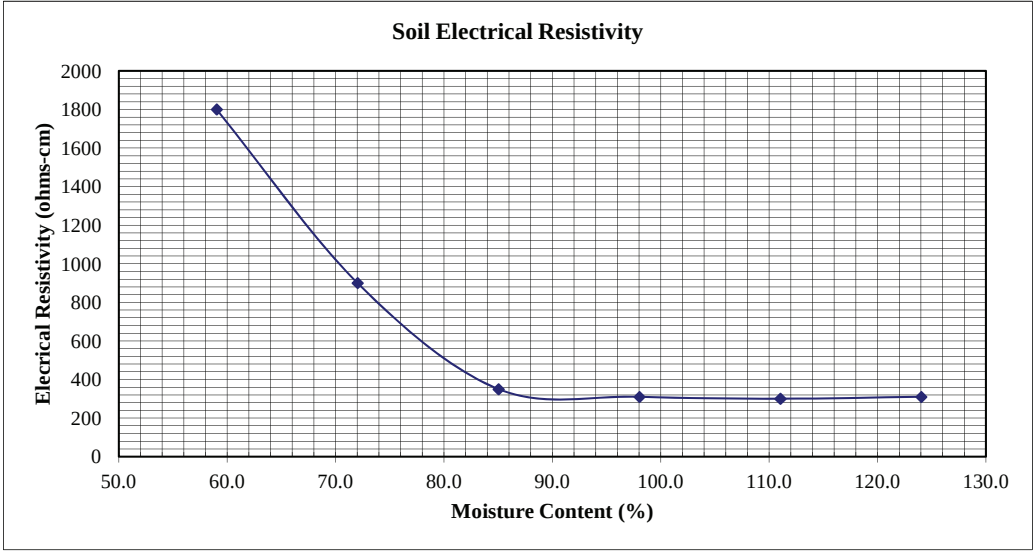
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22S-1
Date of Sample: 9/29/13
Sample Location: Pier #22; Test Pit TP22S, 0' to 2' above T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22S-2
Date of Sample: 9/29/2013
Sample Location: Test Pit TP22S-2; Pier #22, 6' to 7' below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	98
1/2" (12.5 mm)	97
3/8" (9.5 mm)	97
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	87
#100 (.15 mm)	55
#200 (.075 mm)	39.5
.002 mm	<3.8
D_{10}	.011

Natural Moisture Content
Moisture Content, % 88.0

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 290

Soil pH (AASHTO T289) 8.2

Specific Gravity of Soil (AASHTO T100) 2.318

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

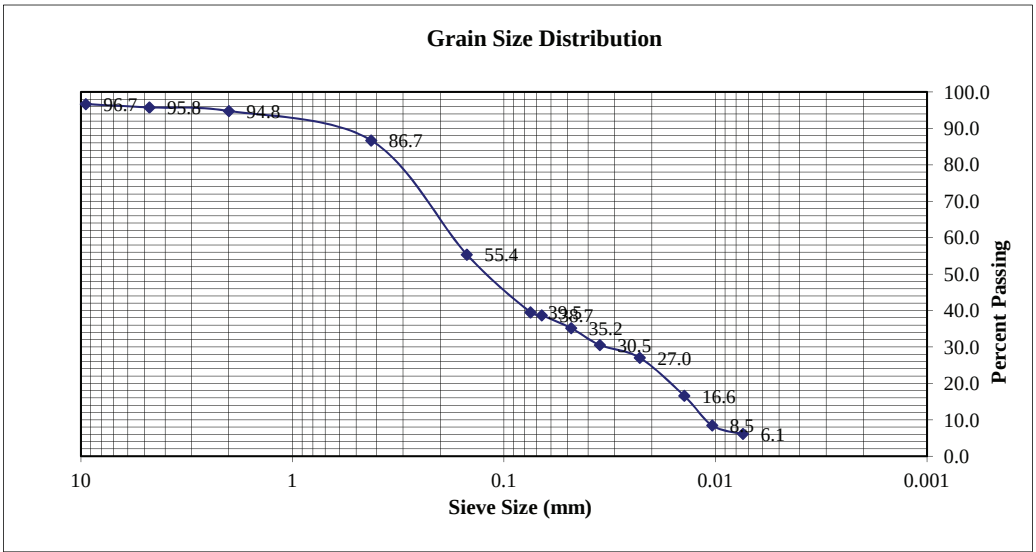
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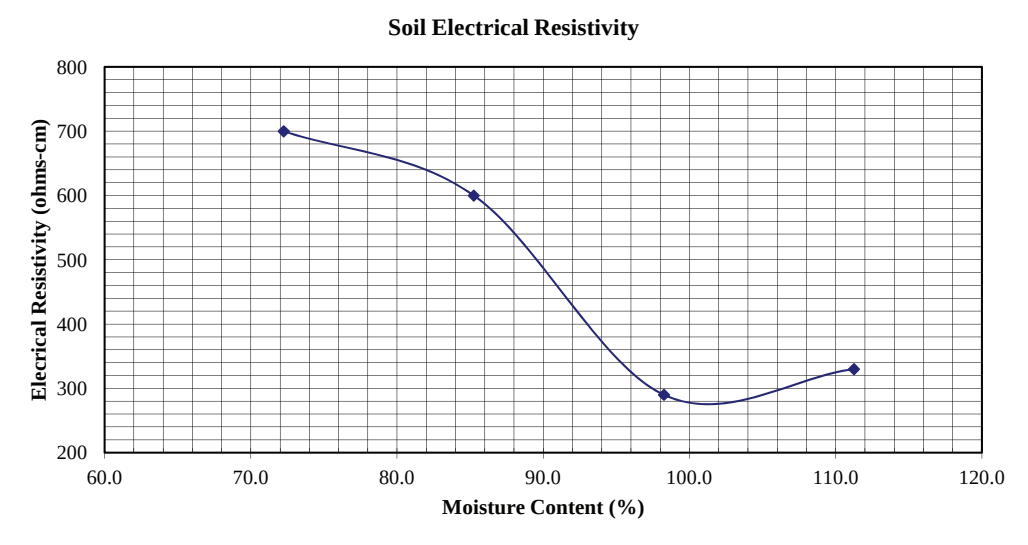
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22S-2
Date of Sample: 9/29/2013
Sample Location: Test Pit TP22S-2; Pier #22, 6' to 7' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22S-3
Date of Sample: 9/29/2013
Sample Location: Pier 22; Test Pit TP22S, 0' to 0.5' below Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	95
#40 (.425 mm)	89
#100 (.15 mm)	65
#200 (.075 mm)	49.7
.002 mm	<7.5
D_{10}	0.005

Natural Moisture Content
Moisture Content, % 107.3

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 260

Soil pH (AASHTO T289) 8.9

Specific Gravity of Soil (AASHTO T100) 2.361

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

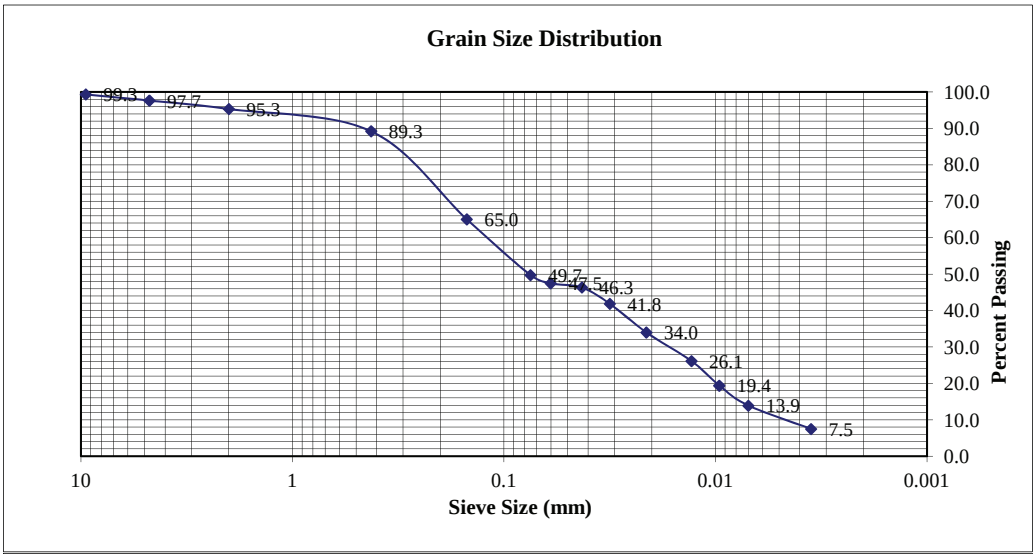
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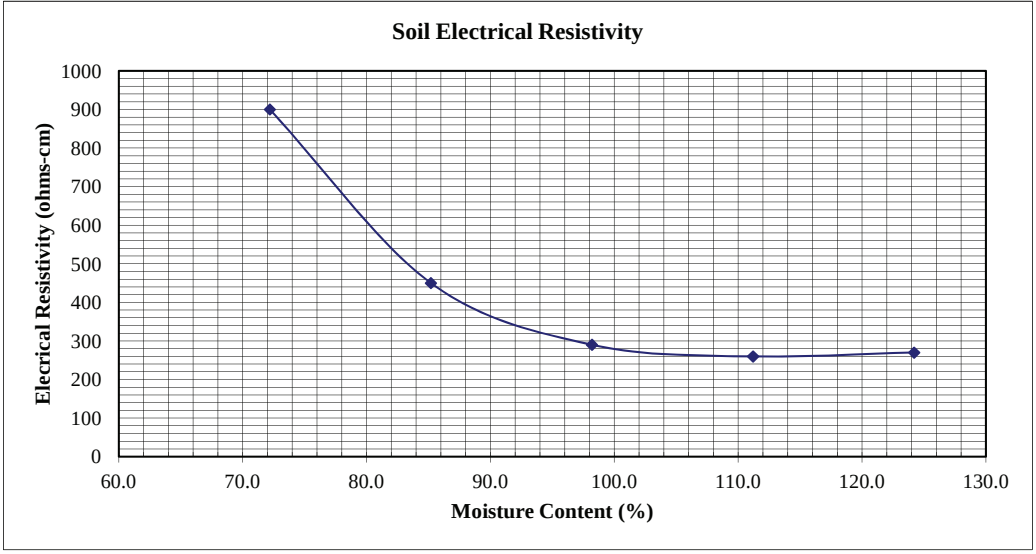
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP22S-3
Date of Sample: 9/29/13
Sample Location: Pier 22; Test Pit TP22S, 0' to 0.5' below Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP22S-4
Date of Sample: 9/29/2013
Sample Location: Test Pit TP22S: Pier #22, 0' below T/Pier Footing
General Description: Pit run sand & gravel dark yellowish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ GRAVEL, coarse to fine grained ,dark yellowish brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	92
1" (25 mm)	86
3/4" (19 mm)	83
1/2" (12.5 mm)	75
3/8" (9.5 mm)	71
#4 (4.75 mm)	58
#10 (2.0 mm)	33
#40 (.425 mm)	12
#100 (.15 mm)	3
#200 (.075 mm)	2.2
.002 mm	<2.2
D_{10}	0.350

Natural Moisture Content
Moisture Content, % 2.0

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 5700

Soil pH (AASHTO T289) 9.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

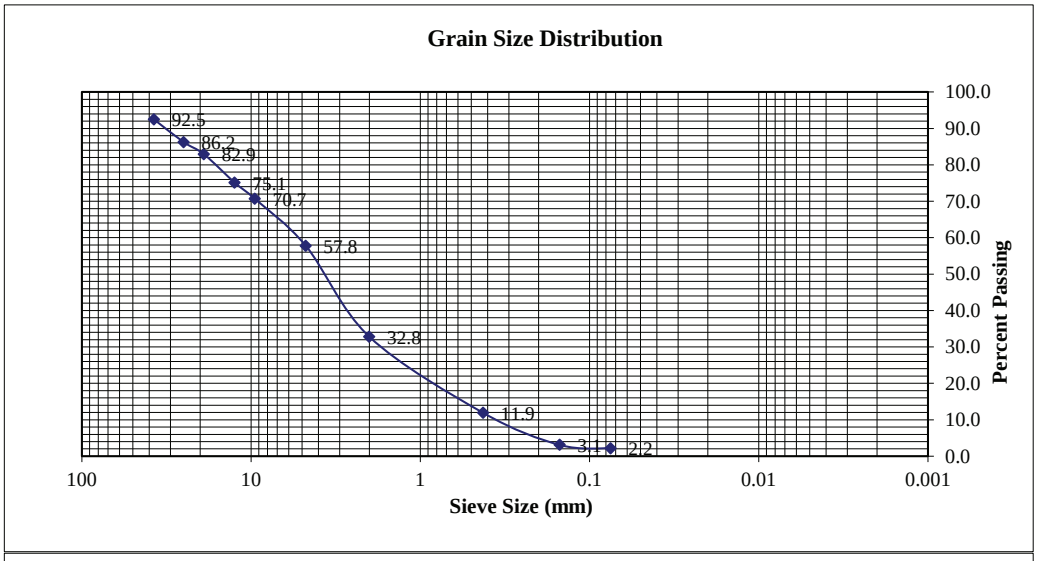
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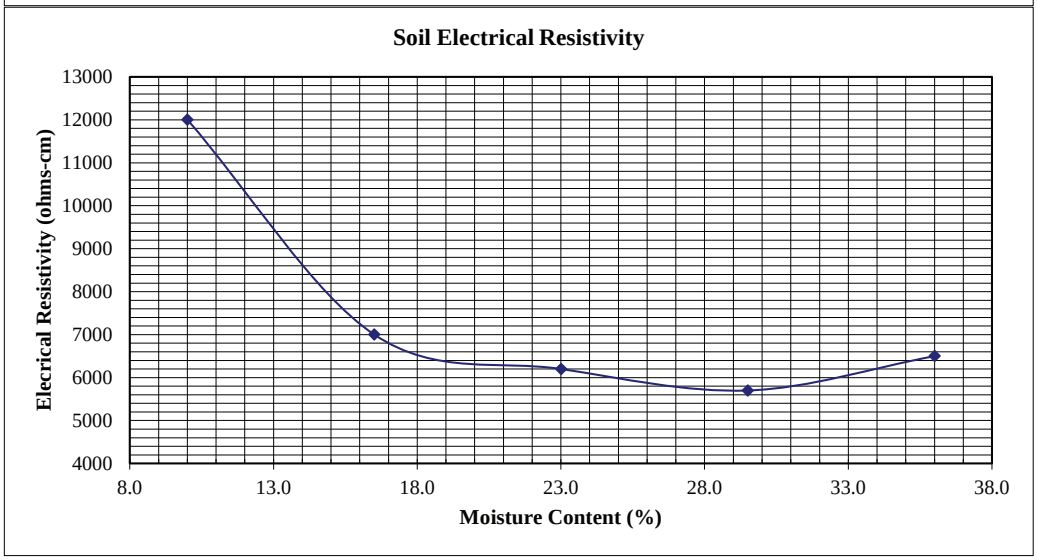
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP22S-4
Date of Sample: 09/29/13
Sample Location: Test Pit TP22S: Pier #22, 0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22SW-1
Date of Sample: 10/1/2013
Sample Location: Pier # 22; Test Pit TP22SW, 6' below T/Pier Footing
General Description: Ash, very dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	98
#4 (4.75 mm)	95
#10 (2.0 mm)	92
#40 (.425 mm)	87
#100 (.15 mm)	60
#200 (.075 mm)	47.3
.002 mm	<7.9
D_{10}	0.008

Natural Moisture Content
Moisture Content, % 55.4

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-plastic
Plastic Limit, PL (%) Non-plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 230

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.263

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

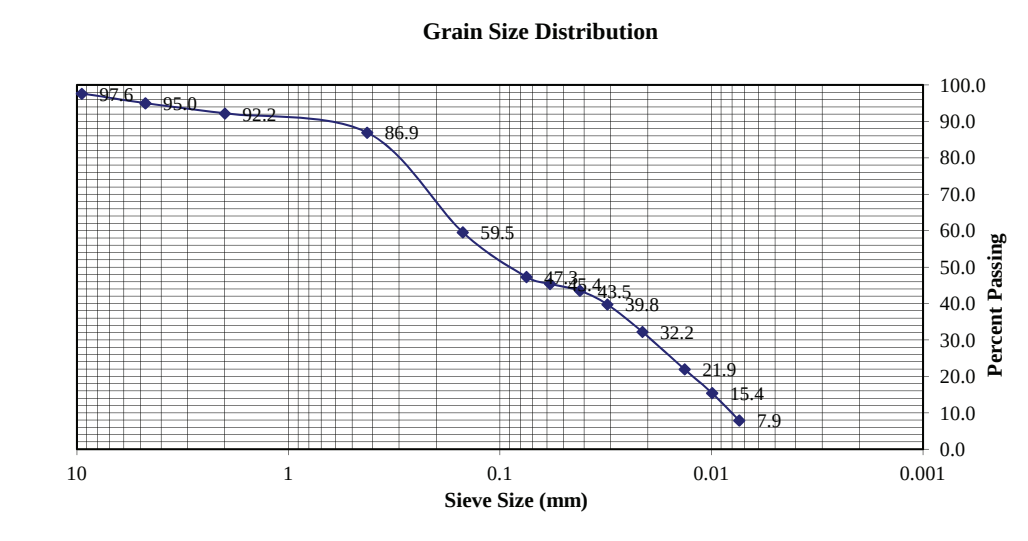
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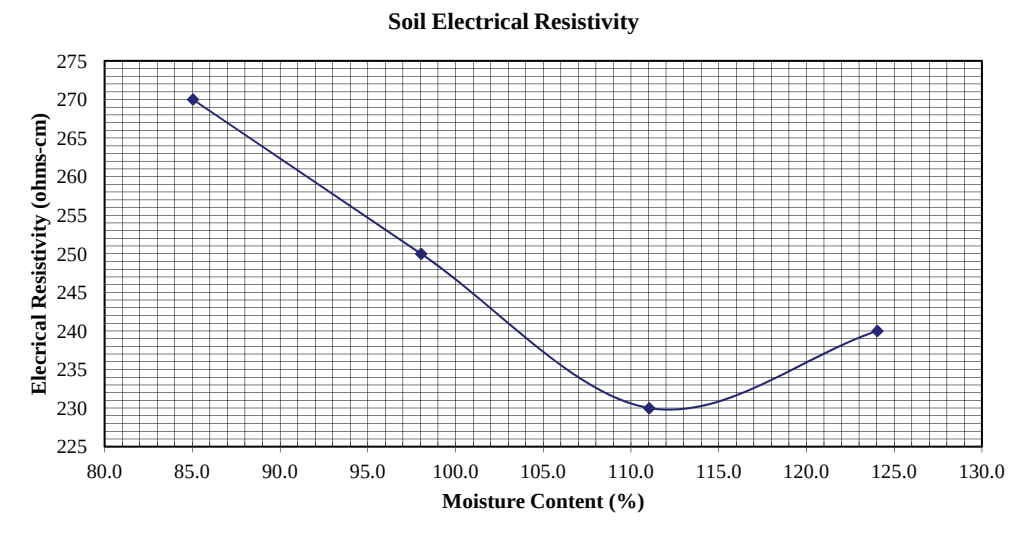
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22SW-1
Date of Sample: 10/01/13
Sample Location: Pier # 22; Test Pit TP22SW, 6' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP22SW-2
Date of Sample: 10/1/2013
Sample Location: Pier 22; Test Pit TP22SW, 15' below T/Pier Footing
General Description: Sand, fine grained, gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND, fine grained ,dark yellowish brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	99
#40 (.425 mm)	97
#100 (.15 mm)	14
#200 (.075 mm)	3.2
.002 mm	<3.2
D_{10}	0.120

Natural Moisture Content
Moisture Content, % 20.4

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 7.9

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

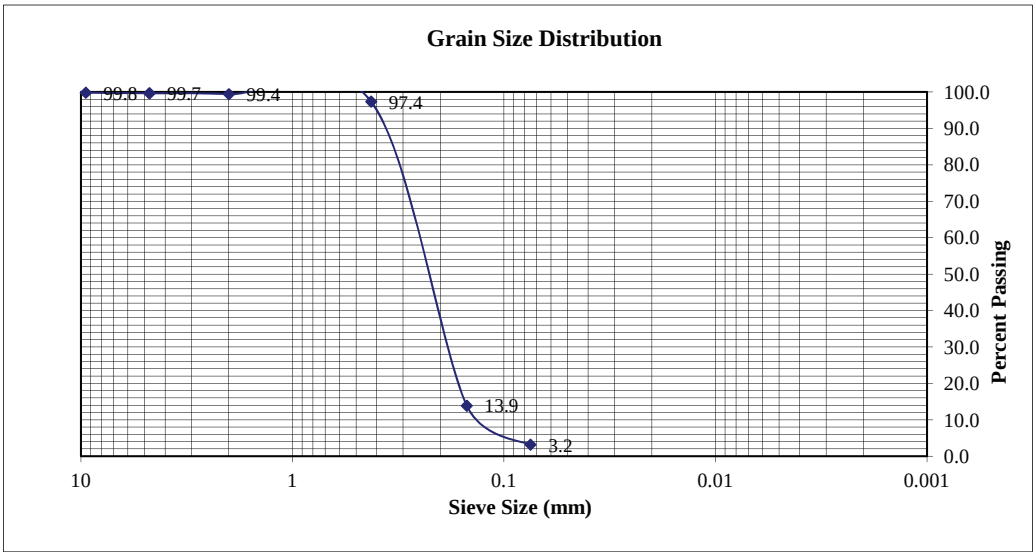
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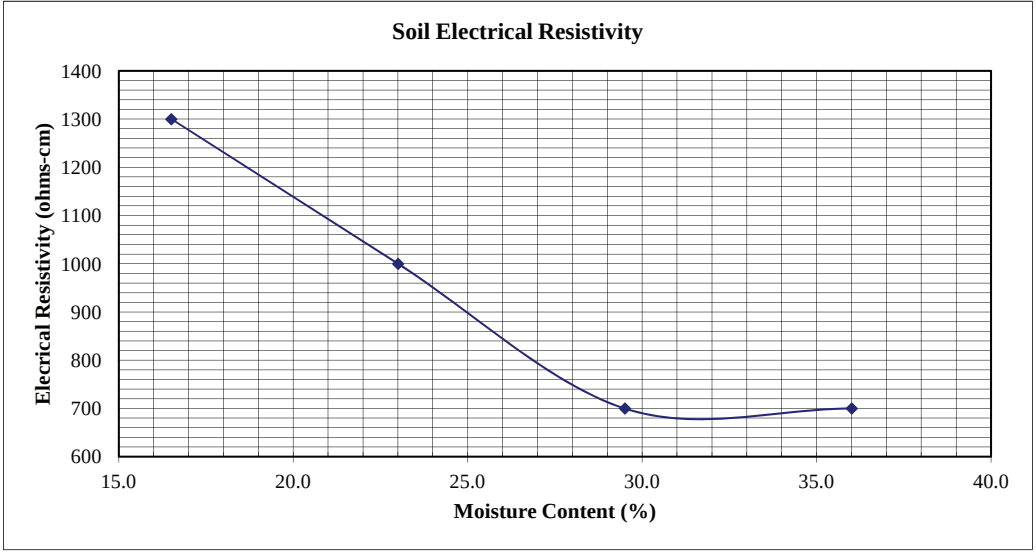
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP22SW-2
Date of Sample: 10/01/13
Sample Location: Pier 22; Test Pit TP22SW, 15' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP22SW-3
Date of Sample: 10/1/2013
Sample Location: Pier # 22; Test Pit TP22SW, 16' below T/Pier Footing
General Description: Lean clay w/ sand, reddish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, brown w/ black mottling (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	98
#40 (.425 mm)	96
#100 (.15 mm)	86
#200 (.075 mm)	80.6
.002 mm	35.8
D_{10}	<.002

Natural Moisture Content

Moisture Content, %	18.6

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	36.0
Plastic Limit, PL (%)	14.2
Platicity Index (%)	21.9

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.660

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

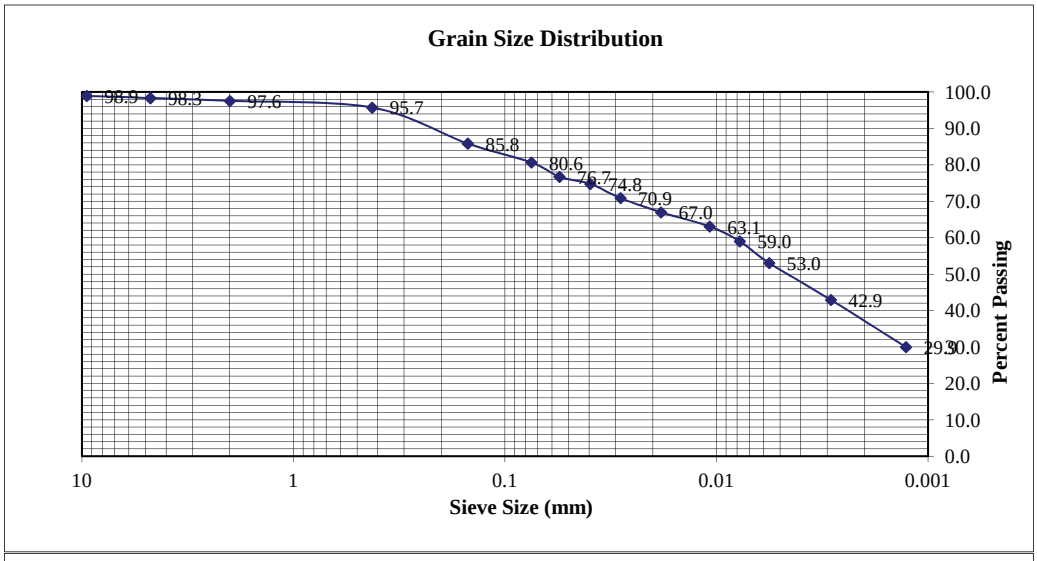
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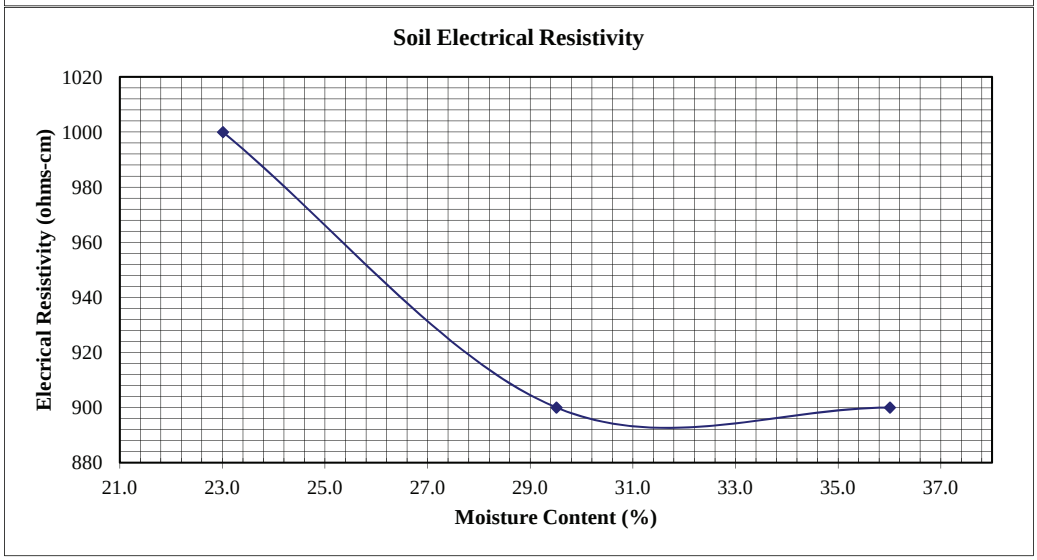
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP22SW-3
Date of Sample: 10/1/13
Sample Location: Pier # 22; Test Pit TP22SW, 16' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP23S-1
Date of Sample: 9/30/2013
Sample Location: Pier 23; Test Pit TP23S, 23" above to 4" below T/Pier Footing
General Description: Silty sand, some gravel, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ SILT, fine grained ,dark brown (SP-SM)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	97
1" (25 mm)	97
3/4" (19 mm)	97
1/2" (12.5 mm)	96
3/8" (9.5 mm)	96
#4 (4.75 mm)	96
#10 (2.0 mm)	95
#40 (.425 mm)	93
#100 (.15 mm)	25
#200 (.075 mm)	7.4
.002 mm	<7.4
D_{10}	0.090

Natural Moisture Content
Moisture Content, % 9.6

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 4100

Soil pH (AASHTO T289) 8.9

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

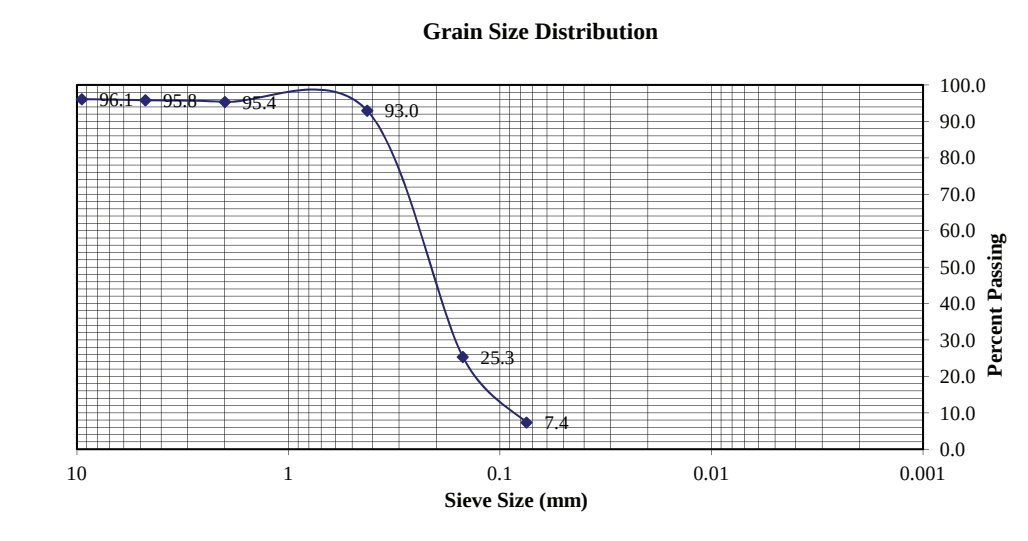
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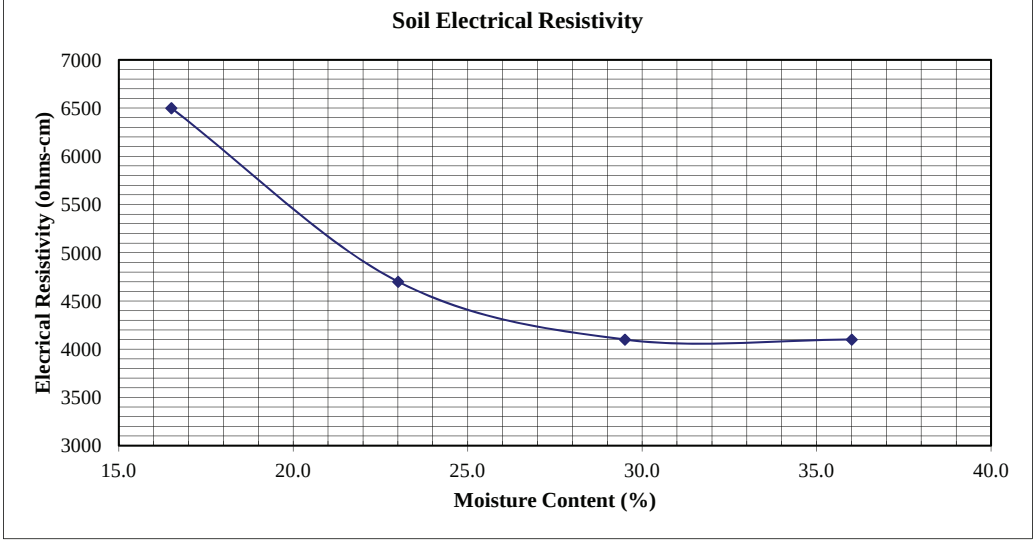
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP23S-1
Date of Sample: 09/30/13
Sample Location: Pier 23; Test Pit TP23S, 23" above to 4" below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP23S-2
Date of Sample: 1/0/1900
Sample Location: Test Pit TP23S; Pier 23, 1' Below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ GRAVEL, fine to medium grained ,black (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	92
3/4" (19 mm)	92
1/2" (12.5 mm)	89
3/8" (9.5 mm)	87
#4 (4.75 mm)	84
#10 (2.0 mm)	81
#40 (.425 mm)	61
#100 (.15 mm)	27
#200 (.075 mm)	3.8
.002 mm	<3.8
D_{10}	0.090

Natural Moisture Content
Moisture Content, % 70.4

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 270

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

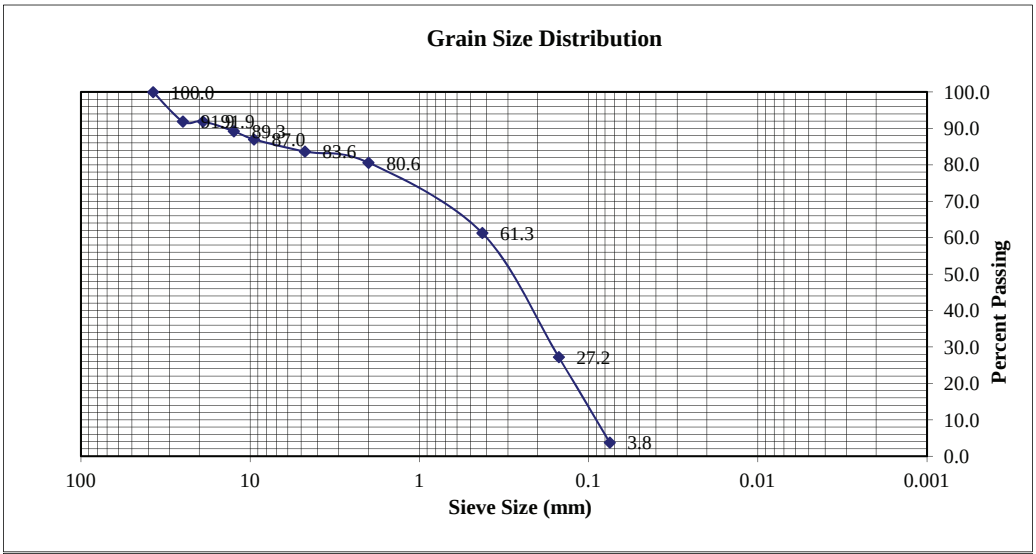
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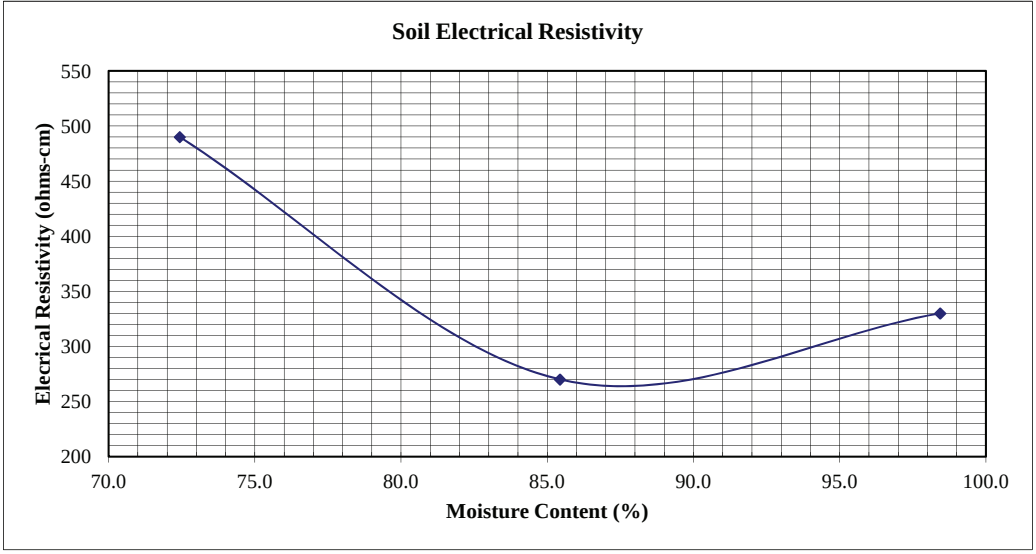
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP23S-2
Date of Sample: 1/0/1900
Sample Location: Test Pit TP23S; Pier 23, 1' Below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP23S-3
Date of Sample: 9/30/2013
Sample Location: Pier 23; Test Pit TP23S, 6.2' below T/Pier Footing
General Description: Shredded wood debris
Tests Performed: Natural Moisture Content

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): N/A

USDA Soil Classification: N/A

Natural Moisture Content
Moisture Content, % 93.3

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP23S-4
Date of Sample: 9/30/2013
Sample Location: Test Pit TP23S; Pier 23, 8.4' to 9.8' Below T/Pier Footing
General Description: Fine graned silty sand, brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,yellowish brown (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	97
3/8" (9.5 mm)	95
#4 (4.75 mm)	93
#10 (2.0 mm)	92
#40 (.425 mm)	89
#100 (.15 mm)	29
#200 (.075 mm)	24.9
.002 mm	10.2
D_{10}	0.002

Natural Moisture Content
Moisture Content, % 22.0

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.3

Specific Gravity of Soil (AASHTO T100) 2.616

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

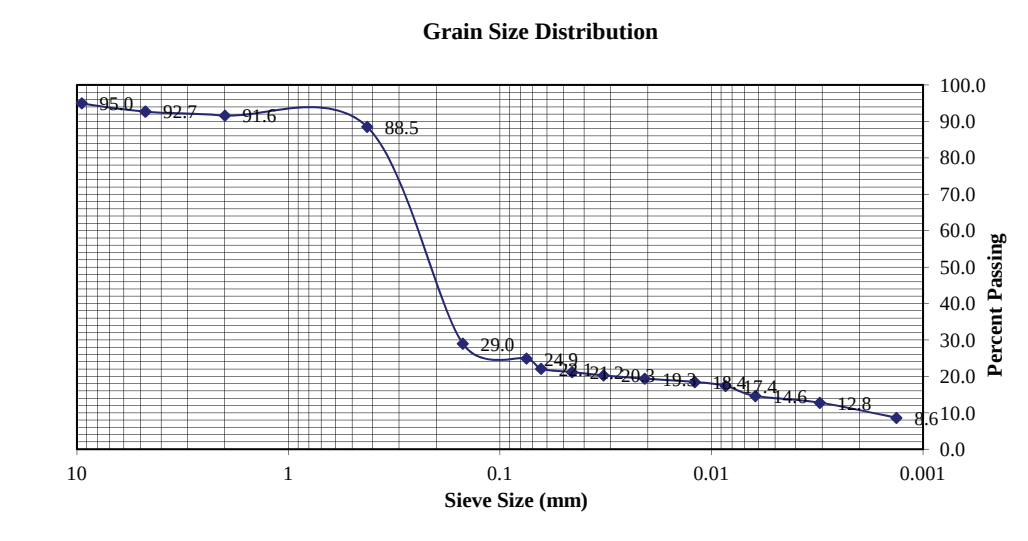
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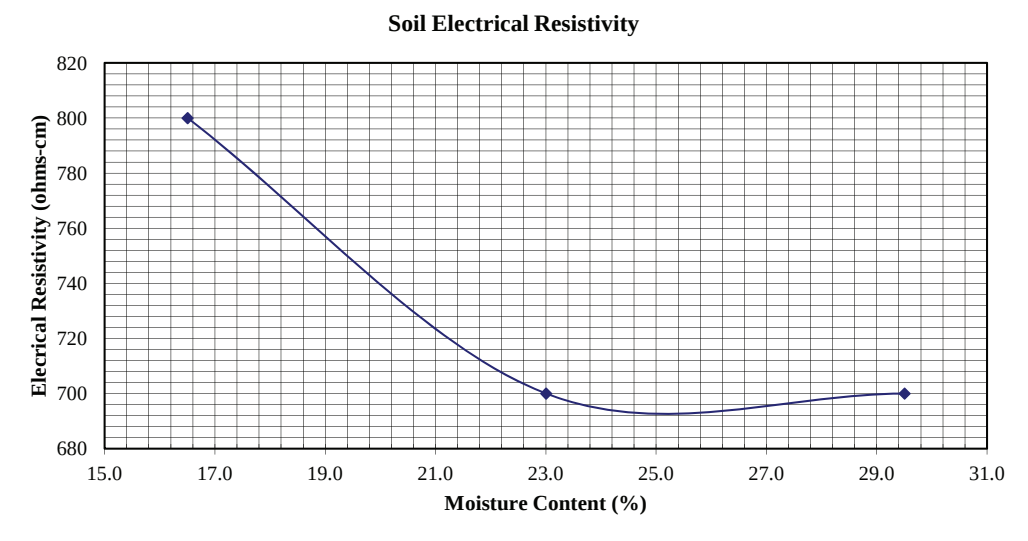
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP23S-4
Date of Sample: 09/30/13
Sample Location: Test Pit TP23S; Pier 23, 8.4' to 9.8' Below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP23S-5
Date of Sample: 9/30/2013
Sample Location: Pier 23; Test Pit TP23S, 11" below cap @ North & under cap at Pile #2
General Description: Foundry sand, dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ SILT, fine to medium grained ,dark gray (SP-SM)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	99
#10 (2.0 mm)	97
#40 (.425 mm)	69
#100 (.15 mm)	27
#200 (.075 mm)	10.1
.002 mm	<10
D_{10}	0.070

Natural Moisture Content
Moisture Content, % 113.0

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 100

Soil pH (AASHTO T289) 7.1

Specific Gravity of Soil (AASHTO T100) 2.108

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

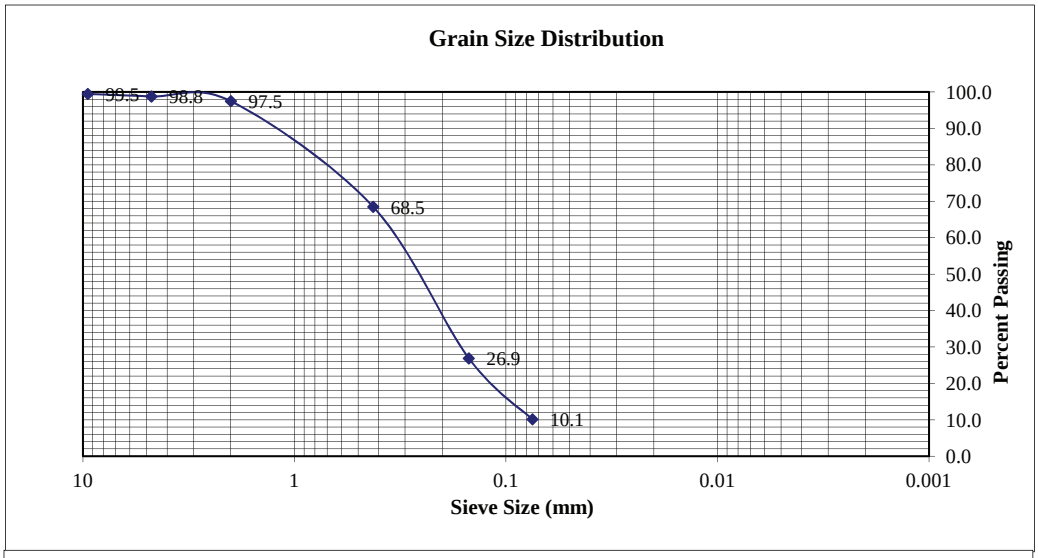
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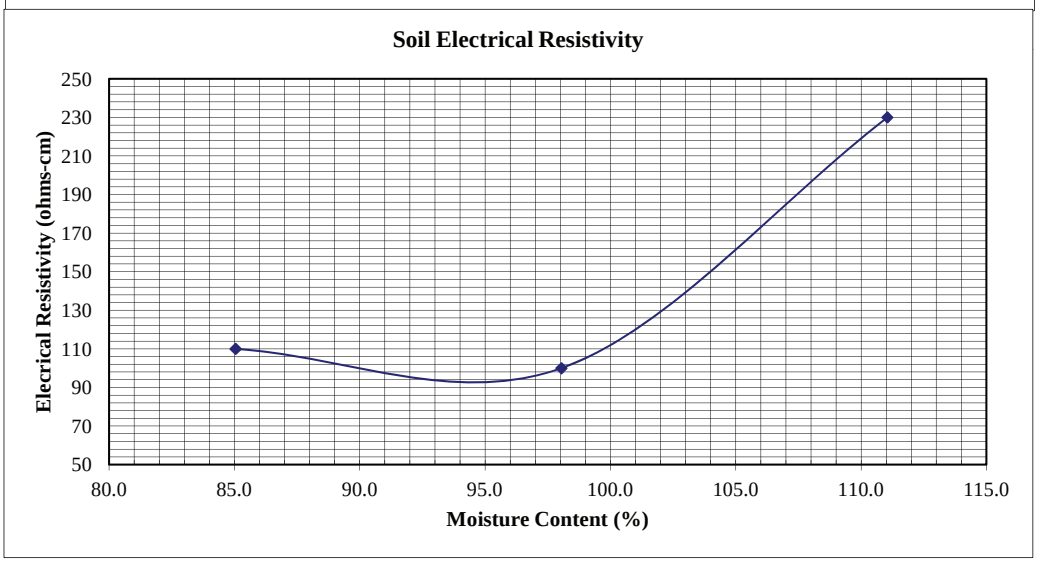
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP23S-5
Date of Sample: 09/30/13
Sample Location: Pier 23; Test Pit TP23S, 11" below cap @ North & under cap at Pile #2





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP23S-6
Date of Sample: 9/30/2013
Sample Location: Pier 23; Test Pit TP23S, 11" below cap @ North & under cap at Pile #2
General Description: Fat clay, reddish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, reddish brown (CL)

USDA Soil Classification: Sily clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	97
#10 (2.0 mm)	94
#40 (.425 mm)	90
#100 (.15 mm)	81
#200 (.075 mm)	75.3
.002 mm	-
D_{10}	-

Natural Moisture Content
Moisture Content, % 34.1

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 41.2
Plastic Limit, PL (%) 28.9
Platicity Index (%) 12.2

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 450

Soil pH (AASHTO T289) 8.5

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

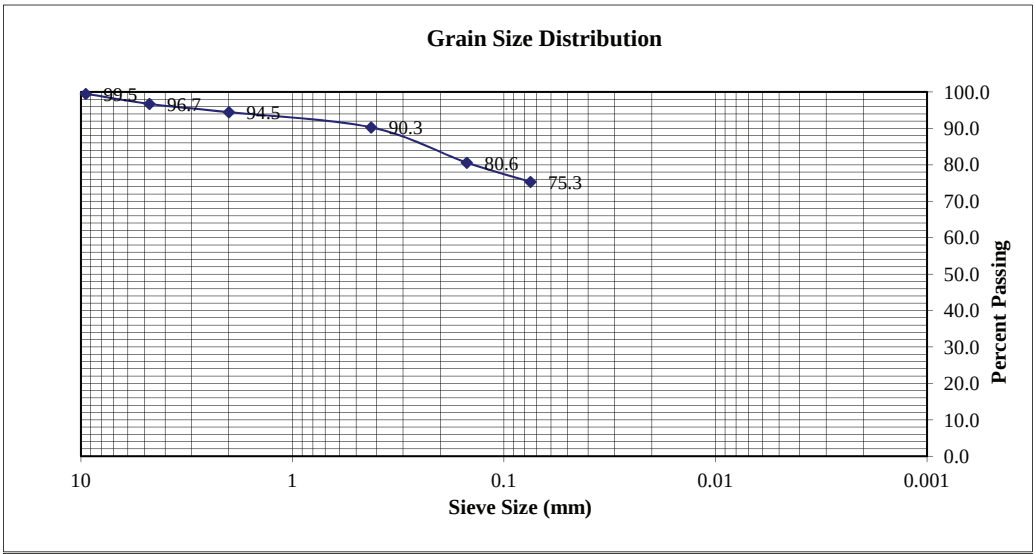
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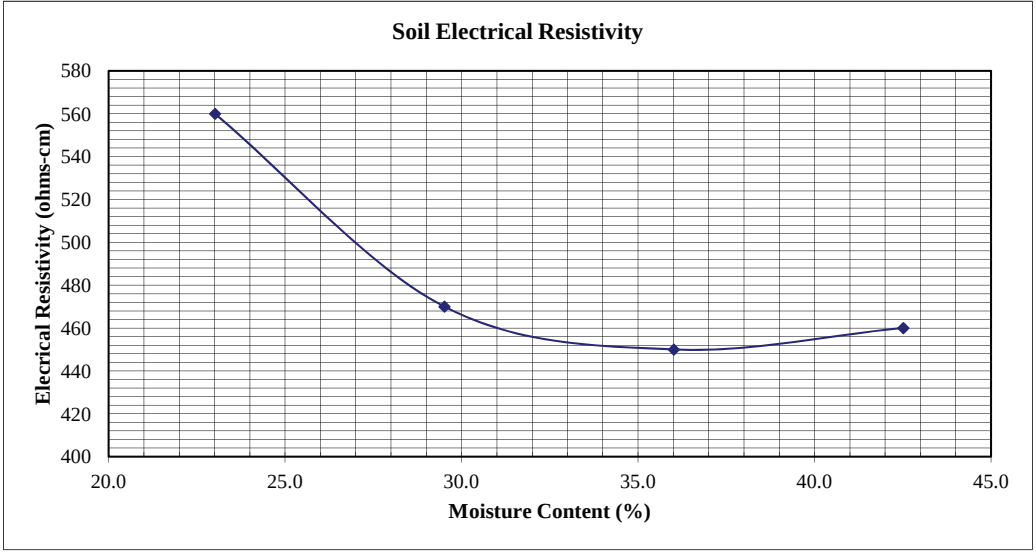
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP23S-6
Date of Sample: 9/30/2013
Sample Location: Pier 23; Test Pit TP23S, 11" below cap @ North & under cap at Pile #2





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP24NW-1
Date of Sample: 10/11/2013
Sample Location: Pier #24; Test Pit TP24NW, 0' below T/Pier Footing
General Description: Sand, yellowish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,yellowish brown (SM)

USDA Soil Classification: Loamy sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	97
#100 (.15 mm)	26
#200 (.075 mm)	13.4
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 4200

Soil pH (AASHTO T289) 7.3

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

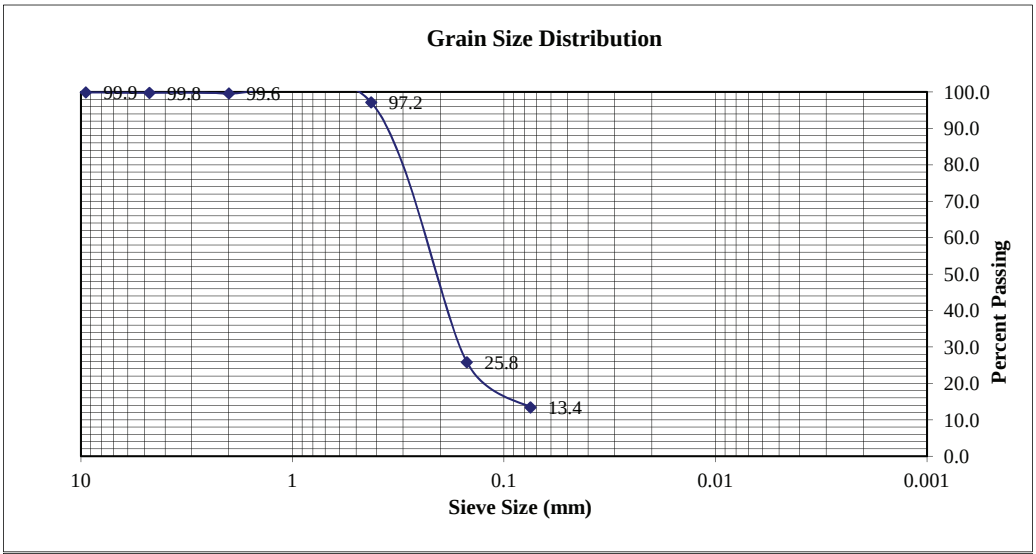
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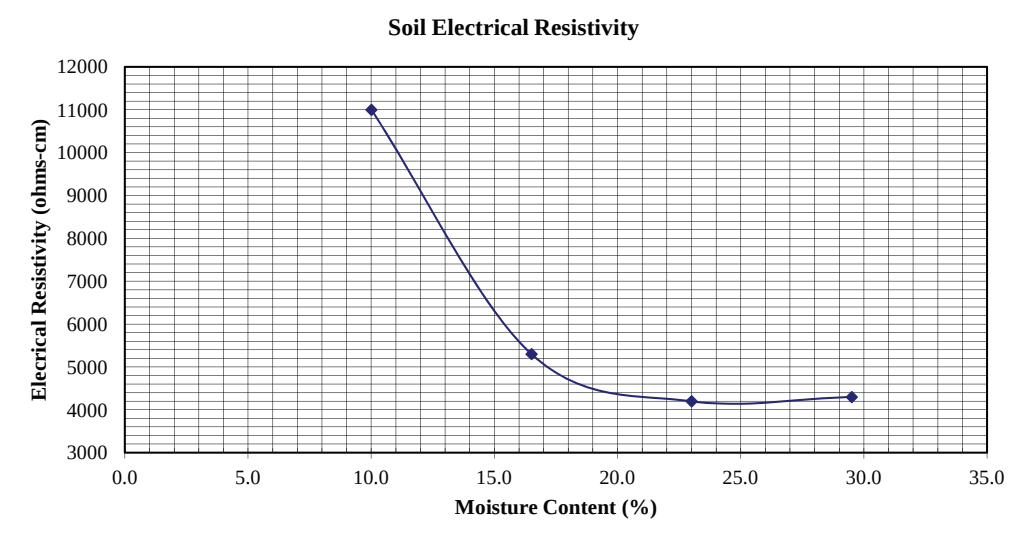
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP24NW-1
Date of Sample: 10/11/13
Sample Location: Pier #24; Test Pit TP24NW, 0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP24NW-3
Date of Sample: 10/11/2013
Sample Location: Pier #24; Test Pit TP24NW, 3' below T/ Pier Footing
General Description: Silt and Clay, dark grayish brown mottled dark yellowish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, dark grayish brown w/ mottled dark yellowish brown (CL)
USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	97
#10 (2.0 mm)	96
#40 (.425 mm)	92
#100 (.15 mm)	84
#200 (.075 mm)	74.5
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1700

Soil pH (AASHTO T289) 7.5

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

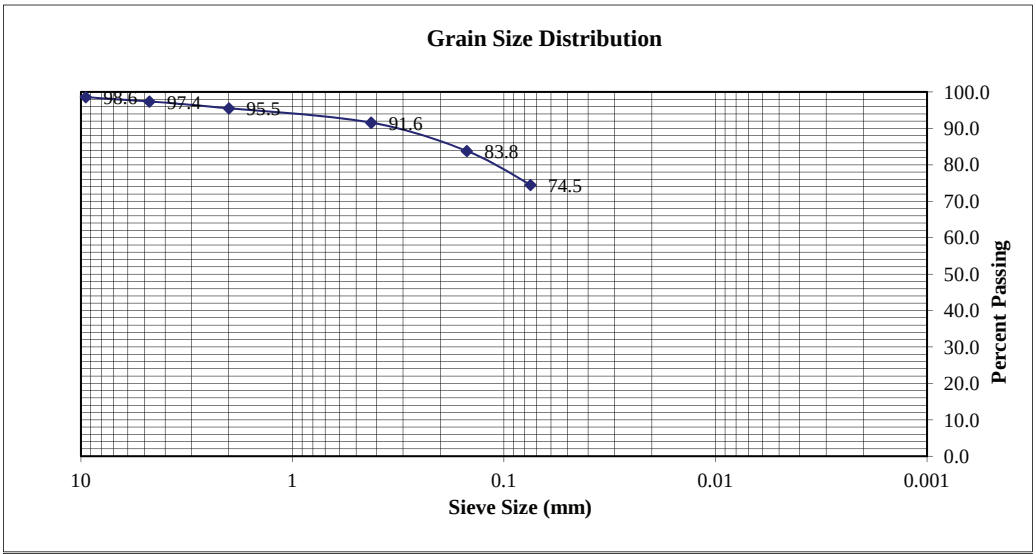
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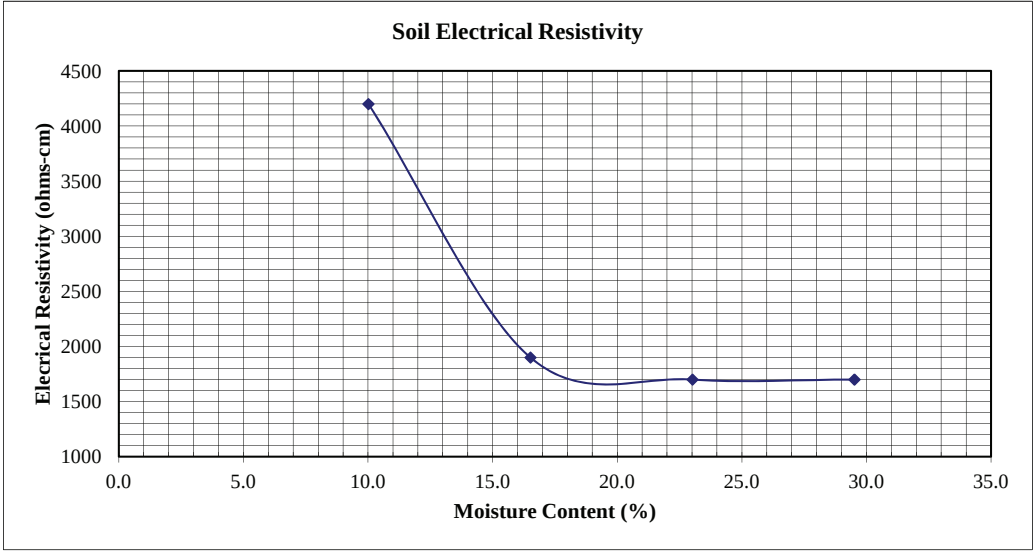
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP24NW-3
Date of Sample: 10/11/13
Sample Location: Pier #24; Test Pit TP24NW, 3' below T/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP24NW-4
Date of Sample: 10/11/2013
Sample Location: Pier #24; Test Pit TP24NW, 10' below to of cap
General Description: Silt, yellowish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILT, yellowish brown (ML)

USDA Soil Classification: Silt

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	99
#100 (.15 mm)	98
#200 (.075 mm)	97.3
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1500

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

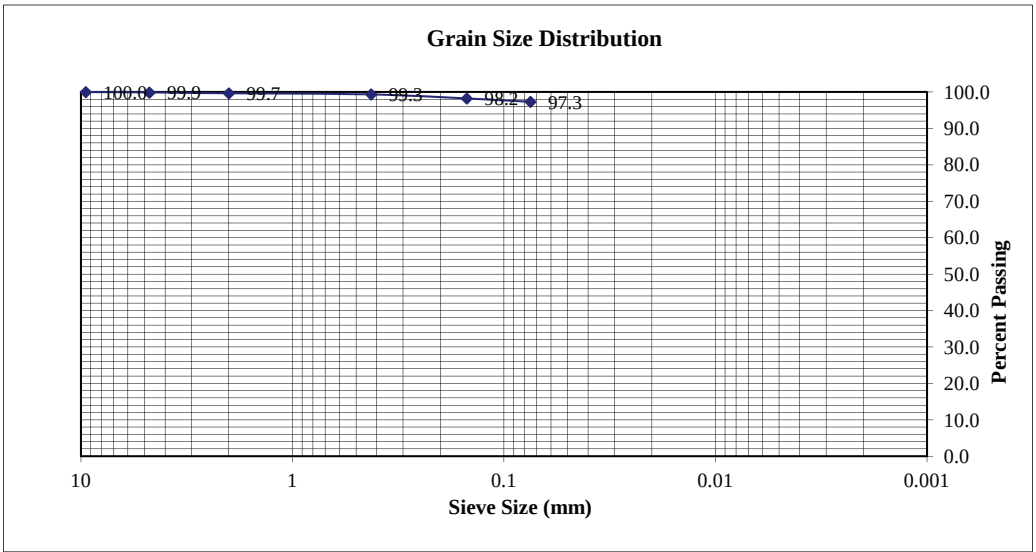
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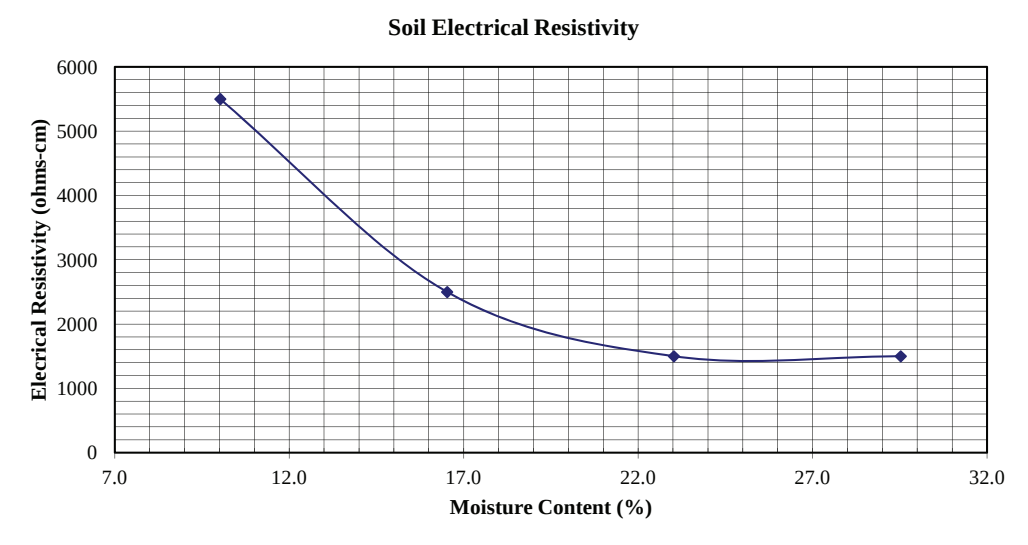
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP24NW-4
Date of Sample: 10/11/13
Sample Location: Pier #24; Test Pit TP24NW, 10' below to of cap





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP24NW-5
Date of Sample: 10/11/2013
Sample Location: Pier # 24; Test Pit: TP24NW, 12' below T/ Pier Footing
General Description: Lean Clay, dark brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, dark brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	95
#100 (.15 mm)	85
#200 (.075 mm)	78.5
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1200

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

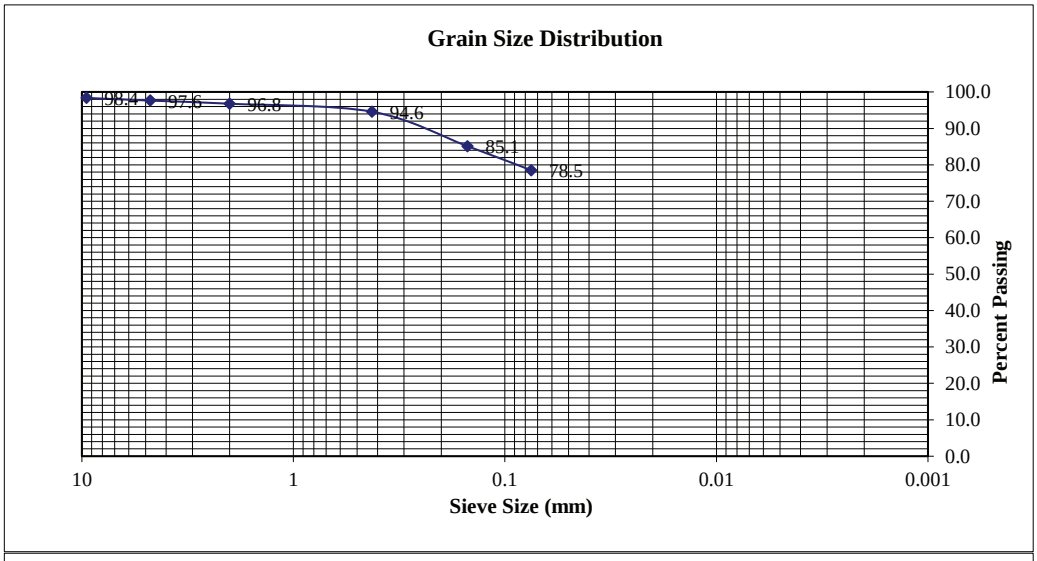
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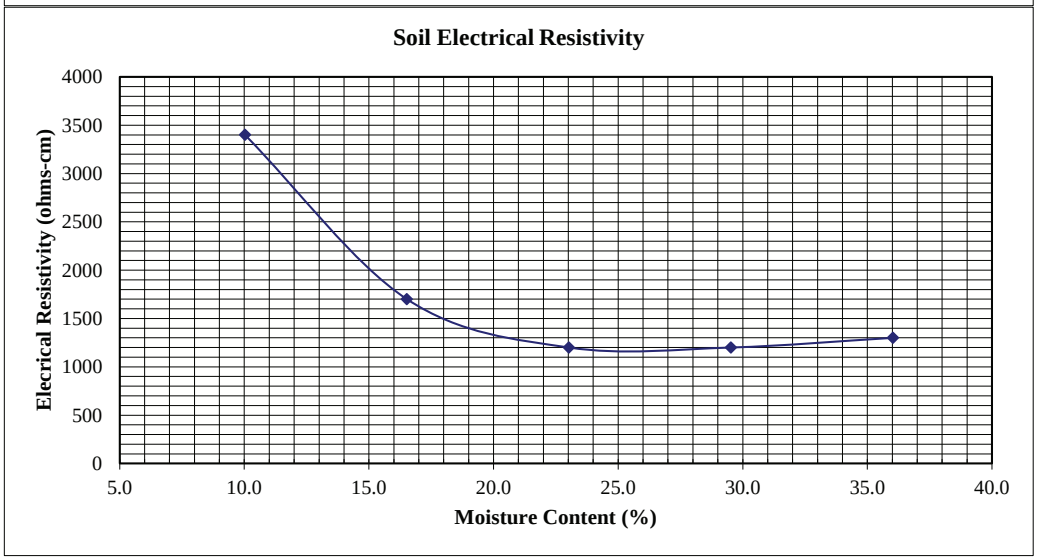
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP24NW-5
Date of Sample: 10/11/13
Sample Location: Pier # 24; Test Pit: TP24NW, 12' below T/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP24S-1
Date of Sample: 9/29/2013
Sample Location: Pier 24; Test Pit TP24S, 0' to 1' below T/Pier Footing
General Description: Silty sand w/ gravel & organics, dark yellowish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ SILT, fine grained ,dark yellowish brown (SP-SM)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	99
#10 (2.0 mm)	98
#40 (.425 mm)	92
#100 (.15 mm)	33
#200 (.075 mm)	6.8
.002 mm	<6.8
D_{10}	0.080

Natural Moisture Content
Moisture Content, % 14.9

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 2800

Soil pH (AASHTO T289) 8.3

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

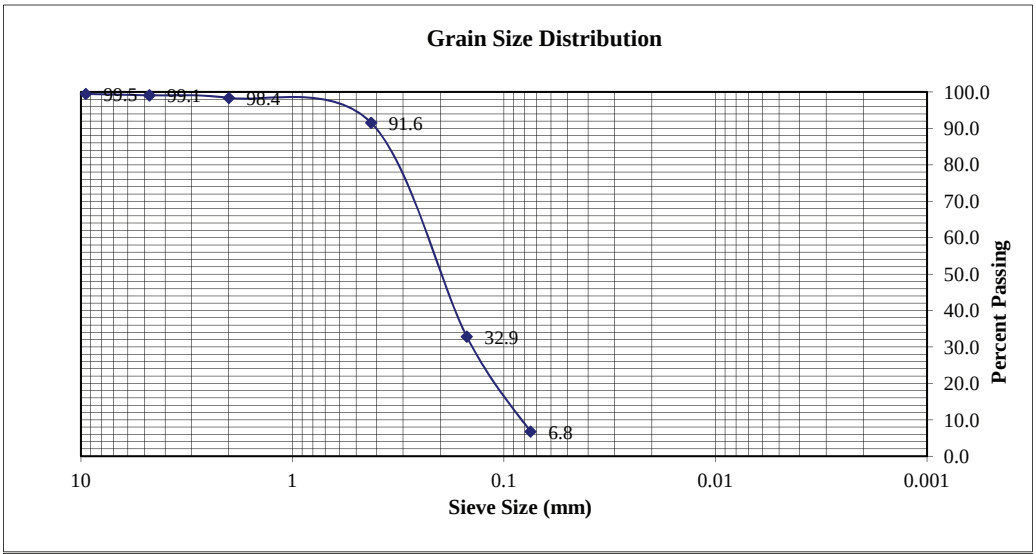
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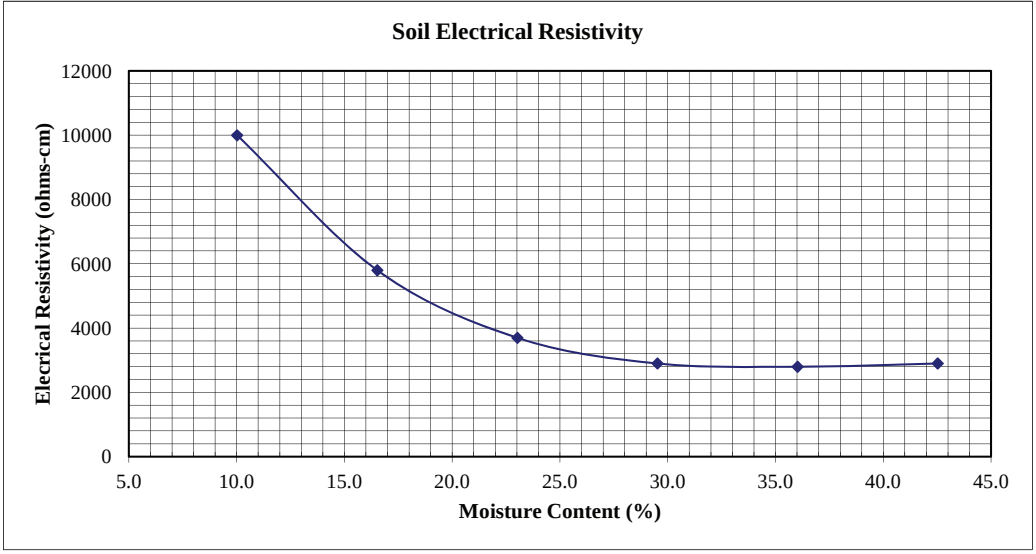
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP24S-1
Date of Sample: 09/29/13
Sample Location: Pier 24; Test Pit TP24S, 0' to 1' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP24S-2
Date of Sample: 9/29/2013
Sample Location: Pier 24; Test Pit TP24S, 1.6' to 3.0' below T/Pier Footing
General Description: Organic silty sand w/ gravel, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND w/ GRAVEL, fine to medium grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	98
3/4" (19 mm)	94
1/2" (12.5 mm)	91
3/8" (9.5 mm)	89
#4 (4.75 mm)	83
#10 (2.0 mm)	78
#40 (.425 mm)	52
#100 (.15 mm)	32
#200 (.075 mm)	25.0
.002 mm	5.4
D_{10}	0.006

Natural Moisture Content
Moisture Content, % 76.7

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1000

Soil pH (AASHTO T289) 7.7

Specific Gravity of Soil (AASHTO T100) 2.156

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

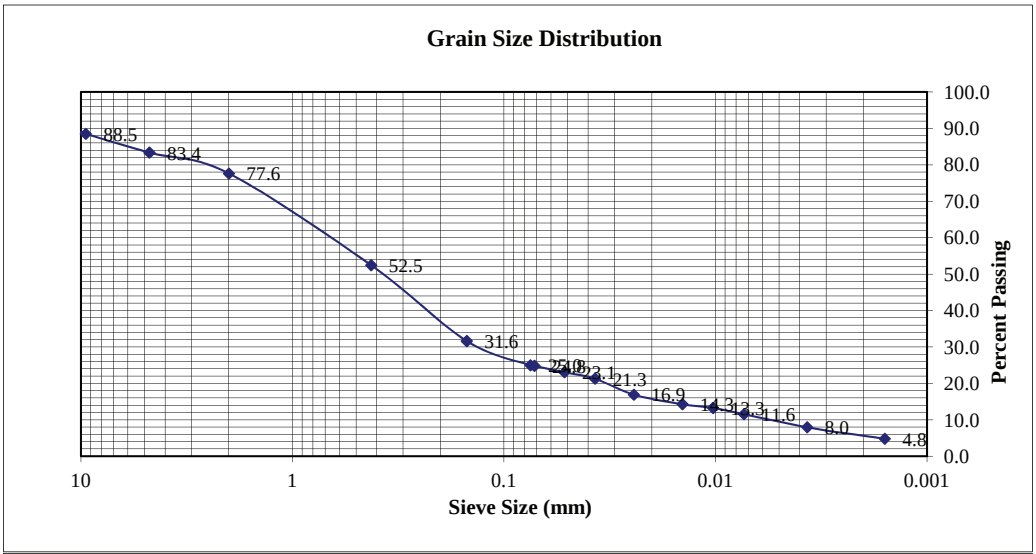
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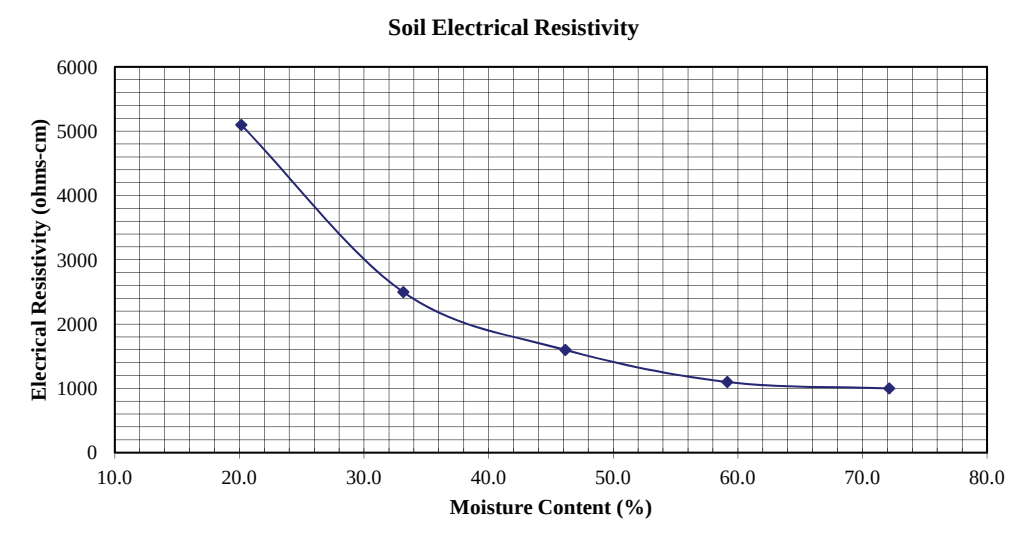
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP24S-2
Date of Sample: 9/29/13
Sample Location: Pier 24; Test Pit TP24S, 1.6' to 3.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP24S-3
Date of Sample: 9/29/2013
Sample Location: Pier 24; Test Pit 24S, 4.3' to 6.4' below T/Pier Footing
General Description: Shredded wood debris, very dark brown
Tests Performed: Natural Moisture Content
TEST RESULTS;
Unified Soils Classification (ASTM:D2487): N/A
USDA Soil Classification: N/A

Natural Moisture Content
Moisture Content, % 223.8

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP24S-4
Date of Sample: 9/29/2013
Sample Location: Pier 24; Test Pit TP24S, 6.5' to 7.5' below T/Pier Footing
General Description: 3/4" Crushed Stone, dark gray
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): "GRAVEL w/ SILT and SAND, dark gray (GP-GM)"

USDA Soil Classification: -

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	84
3/8" (9.5 mm)	68
#4 (4.75 mm)	41
#10 (2.0 mm)	25
#40 (.425 mm)	12
#100 (.15 mm)	8
#200 (.075 mm)	6.6
.002 mm	<6.6
D_{10}	0.300

Natural Moisture Content
Moisture Content, % 8.4

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1000

Soil pH (AASHTO T289) 7.8

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

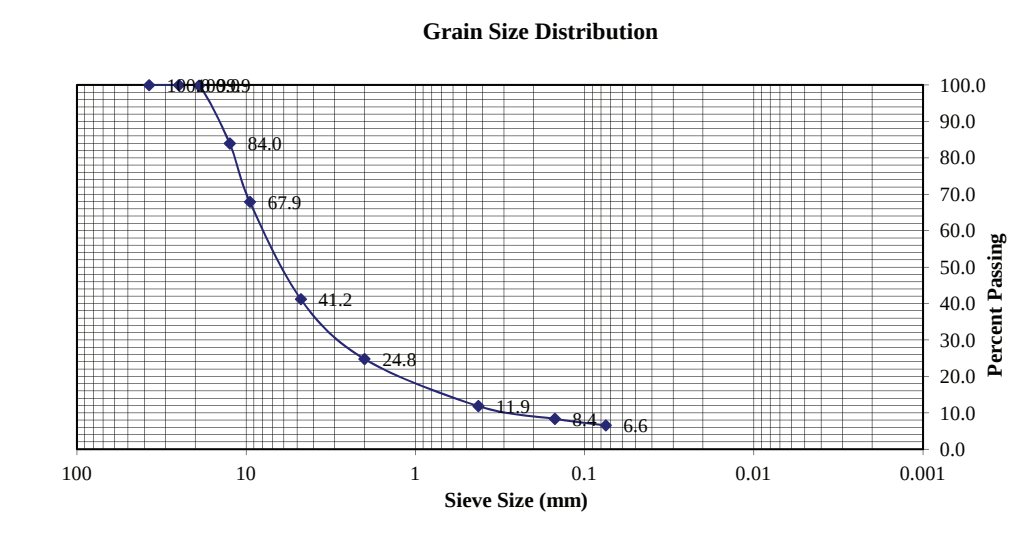
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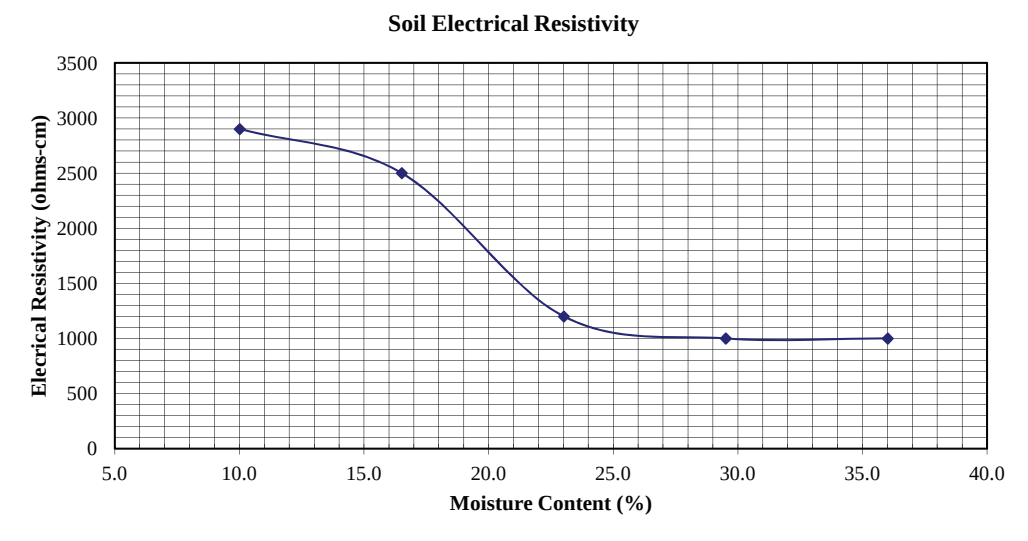
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP24S-4
Date of Sample: 09/29/13
Sample Location: Pier 24; Test Pit TP24S, 6.5' to 7.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP24S-5
Date of Sample: 9/29/2013
Sample Location: Pier #24; Test Pit TP24S, 6.5' to 8.0' below T/Pier Footing
General Description: Organic silty sand, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, black (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	98
#40 (.425 mm)	95
#100 (.15 mm)	63
#200 (.075 mm)	56.9
.002 mm	20.6
D_{10}	<.002

Natural Moisture Content
Moisture Content, % 39.1

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) 33.7
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 7.5

Specific Gravity of Soil (AASHTO T100) 2.420

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

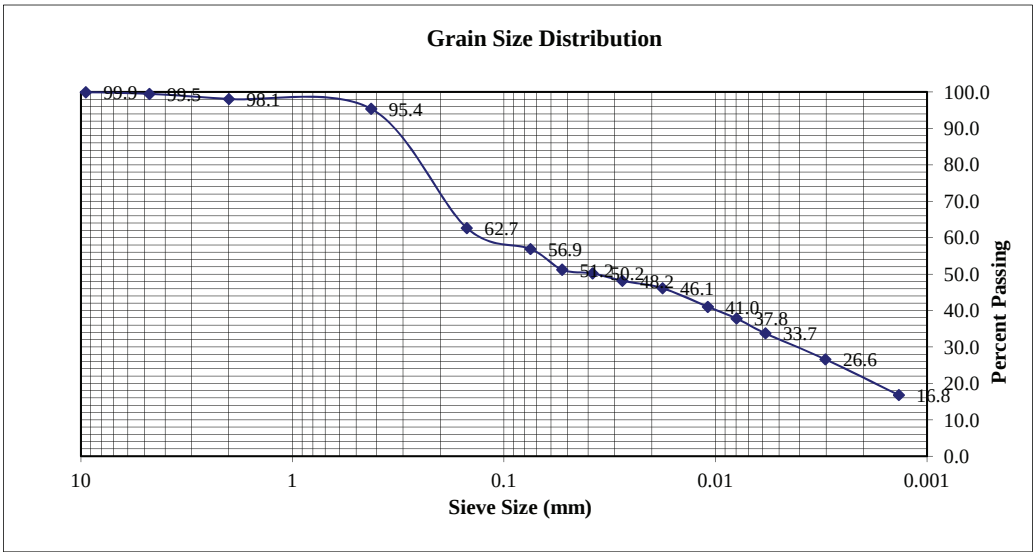
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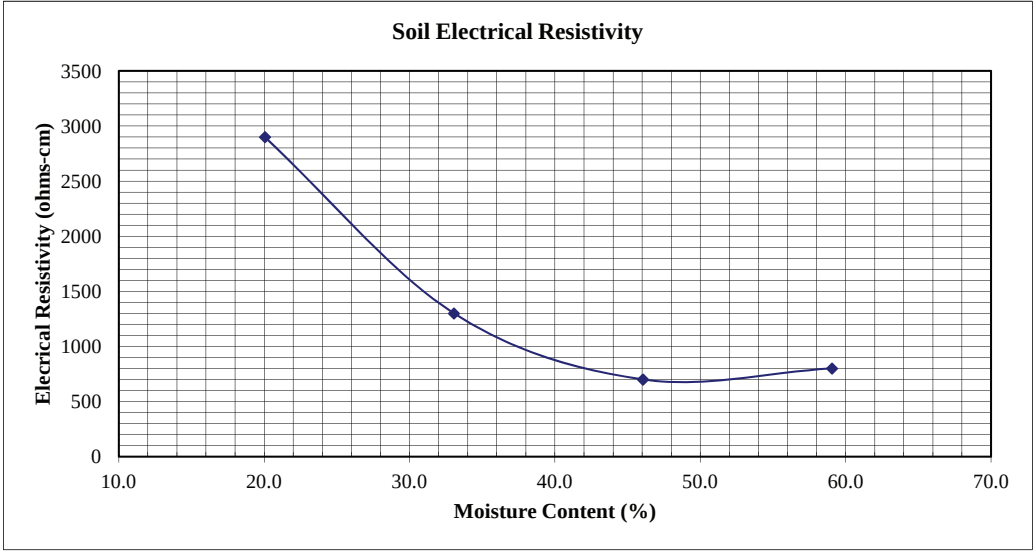
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP24S-5
Date of Sample: 09/29/13
Sample Location: Pier #24; Test Pit TP24S, 6.5' to 8.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP24S-6
Date of Sample: 9/29/2013
Sample Location: Test Pit TP24S; Pier #24, 8.0' below T/Pier Footing
General Description: Fine sand w/ silt & some organics, dark grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND w/ SILT, fine grained ,dark grayish brown (SP-SM)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	96
3/4" (19 mm)	95
1/2" (12.5 mm)	93
3/8" (9.5 mm)	92
#4 (4.75 mm)	90
#10 (2.0 mm)	87
#40 (.425 mm)	82
#100 (.15 mm)	18
#200 (.075 mm)	10.3
.002 mm	<10
D_{10}	0.070

Natural Moisture Content
Moisture Content, % 19.3

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1500

Soil pH (AASHTO T289) 8.3

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

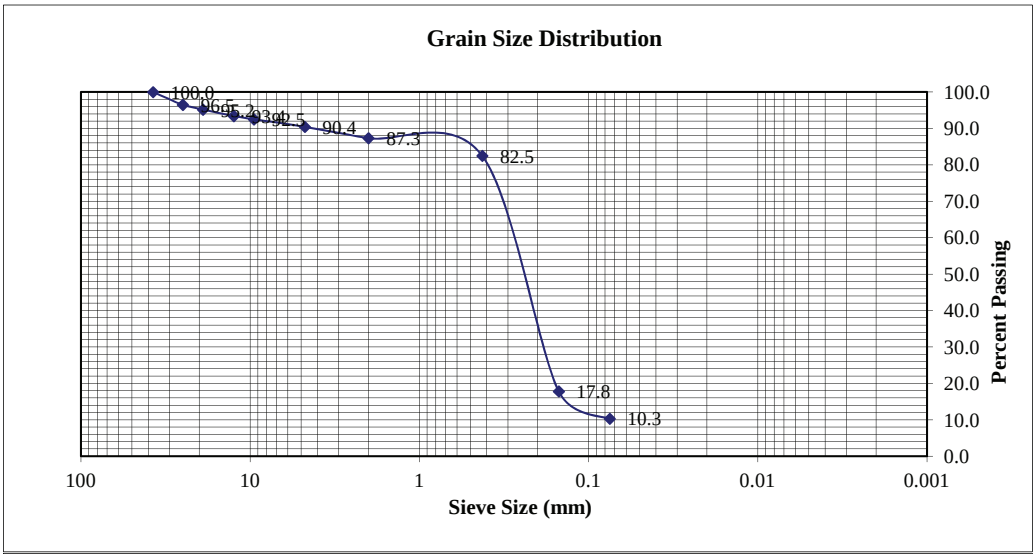
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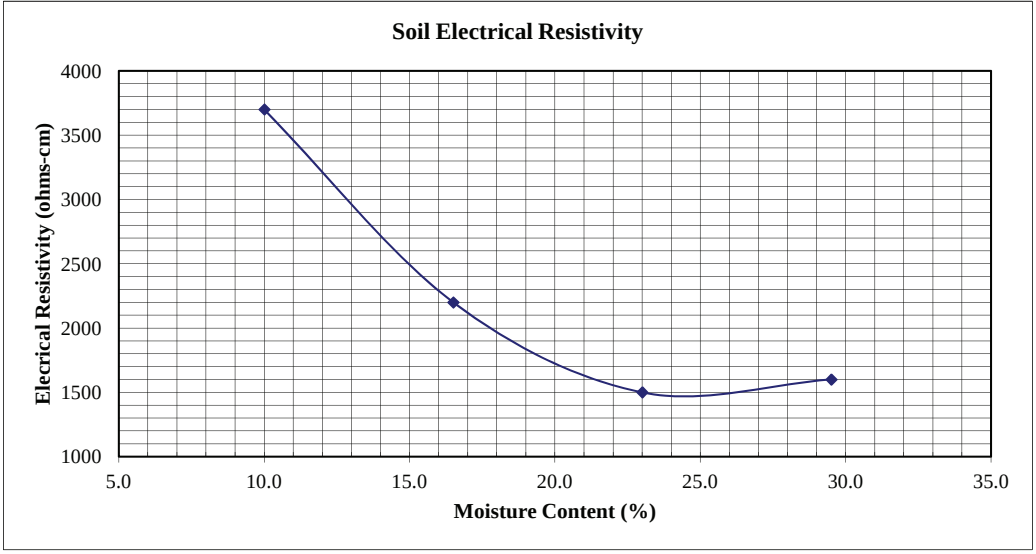
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP24S-6
Date of Sample: 09/29/13
Sample Location: Test Pit TP24S; Pier #24, 8.0' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NE-1
Date of Sample: 10/11/2013
Sample Location: Pier #25; Test Pit TP25NE, top of Pier Footing
General Description: Silty Sand with Clay and Organics, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Minimum Electrical Resistivity, Ph, Soil Sepcific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	97
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	94
#40 (.425 mm)	86
#100 (.15 mm)	58
#200 (.075 mm)	40.7
.002 mm	-
D_{10}	-

Natural Moisture Content
Moisture Content, % 49.8

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1300

Soil pH (AASHTO T289) 8.4

Specific Gravity of Soil (AASHTO T100) 2.418

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: _____
Paul R. Eggen

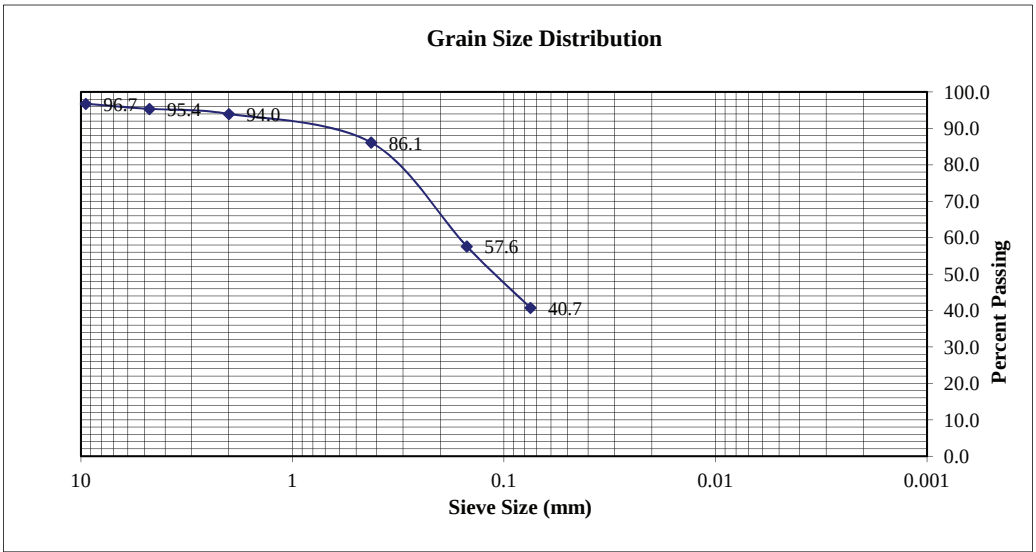
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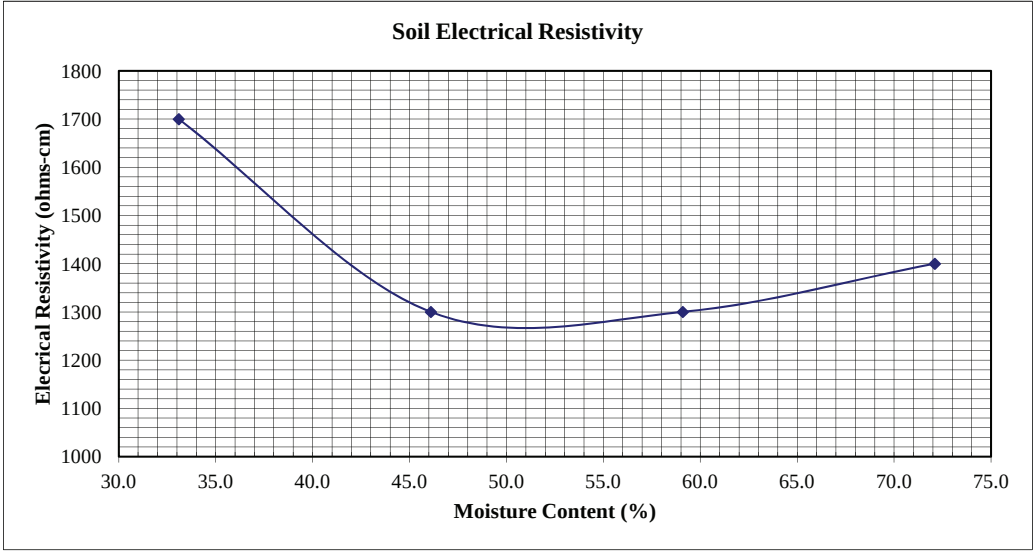
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NE-1
Date of Sample: 10/11/13
Sample Location: Pier #25; Test Pit TP25NE, top of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NE-2
Date of Sample: 10/11/2013
Sample Location: Pier # 25; Test Pit TP25NE, bottom of Pier Footing
General Description: Silty Sand with Organics, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	88
#100 (.15 mm)	43
#200 (.075 mm)	33.2
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 270

Soil pH (AASHTO T289) 7.0

Specific Gravity of Soil (AASHTO T100) 2.114

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

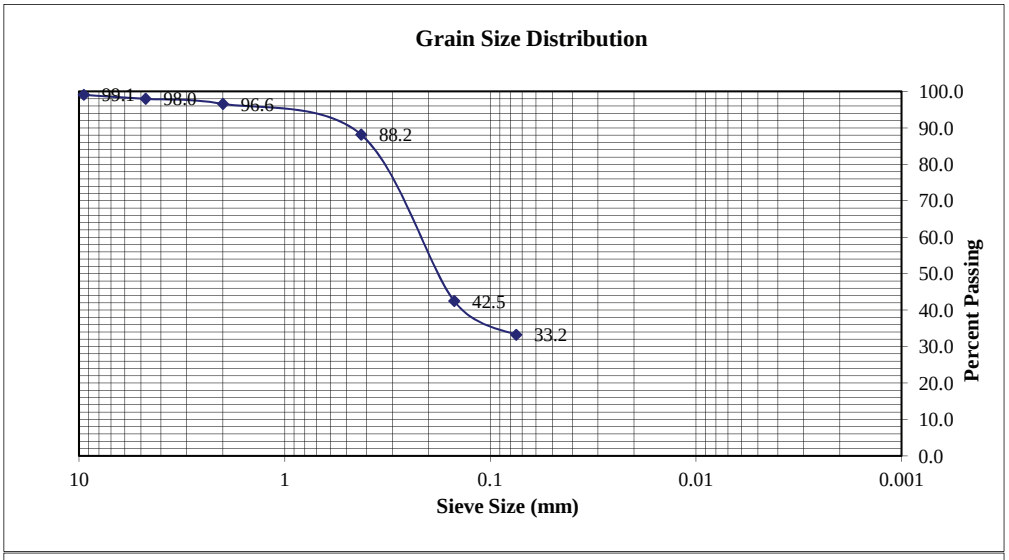
Reviewed By: *Paul R. Eggen*

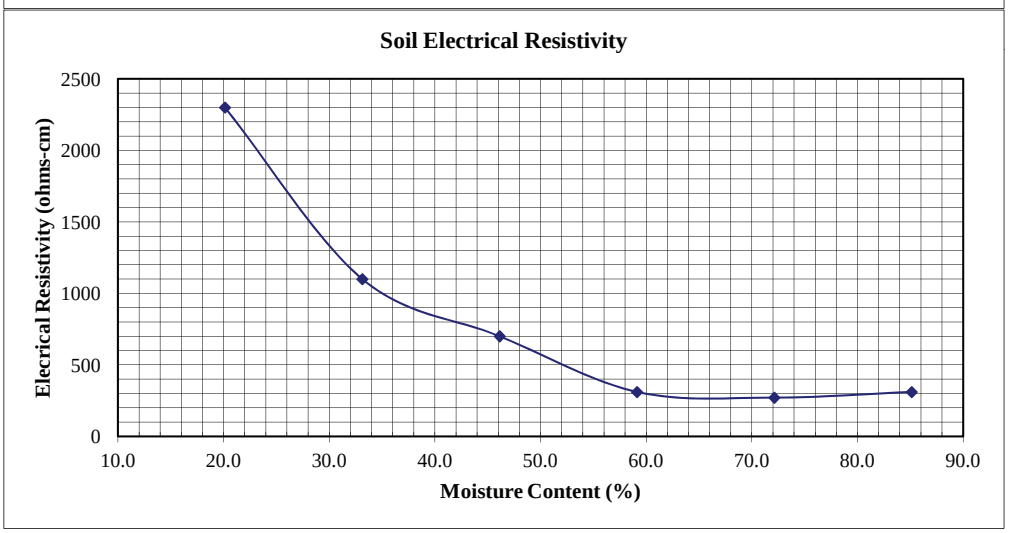
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP25NE-2
Date of Sample: 10/11/13
Sample Location: Pier # 25; Test Pit TP25NE, bottom of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NE-3
Date of Sample: 10/11/2013
Sample Location: Pier #25; Test Pit TP25NE, 10' below T/ Pier Footing
General Description: Silty Sand with Organics, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	88
#100 (.15 mm)	54
#200 (.075 mm)	35.2
.002 mm	-
D_{10}	-

Natural Moisture Content

Moisture Content, % 185.2

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 260

Soil pH (AASHTO T289) 7.7

Specific Gravity of Soil (AASHTO T100) 2.228

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

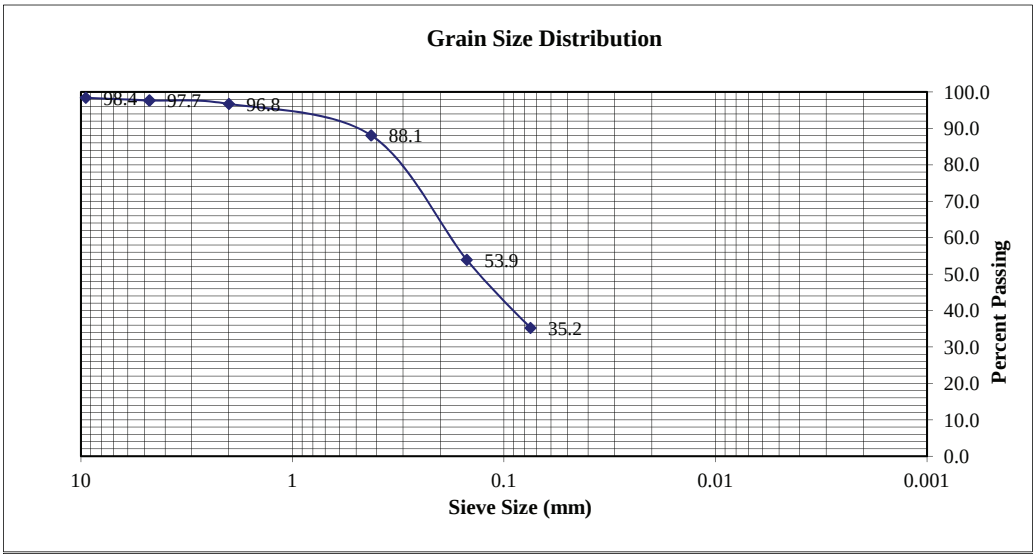
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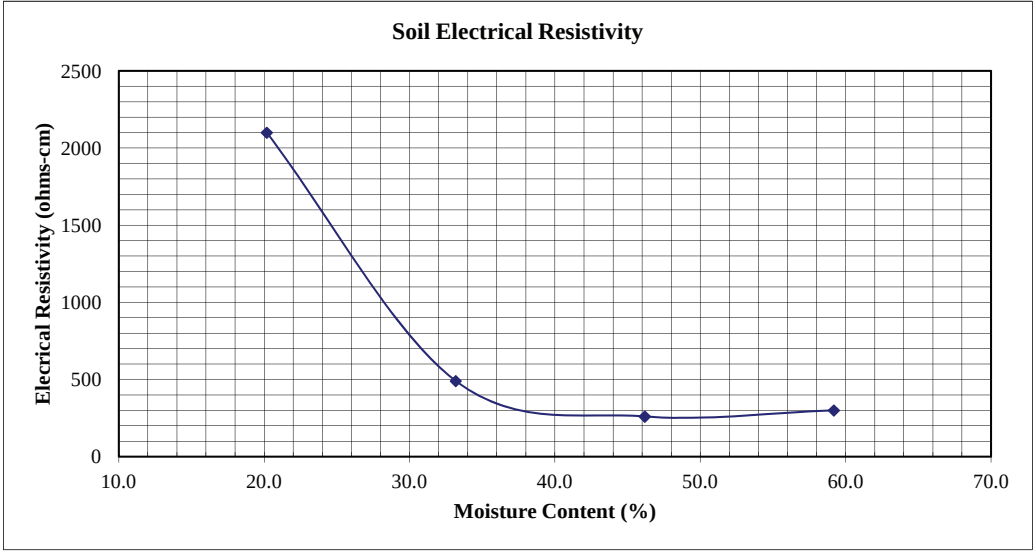
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP25NE-3
Date of Sample: 10/11/13
Sample Location: Pier #25; Test Pit TP25NE, 10' below T/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NE-4
Date of Sample: 10/11/2013
Sample Location: Pier #25: Test Pit TP25NE, 12' below T/Pier Footing
General Description: Silty Sand, black mottled dark grayish brown
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SAND w/ SILT, fine grained ,black mottled dark grayish brown (SP-SM)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	96
#40 (.425 mm)	95
#100 (.15 mm)	16
#200 (.075 mm)	7.0
.002 mm	<7.0
D_{10}	0.110

Natural Moisture Content

Moisture Content, % 30.9

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 8.0

Specific Gravity of Soil (AASHTO T100) 2.609

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

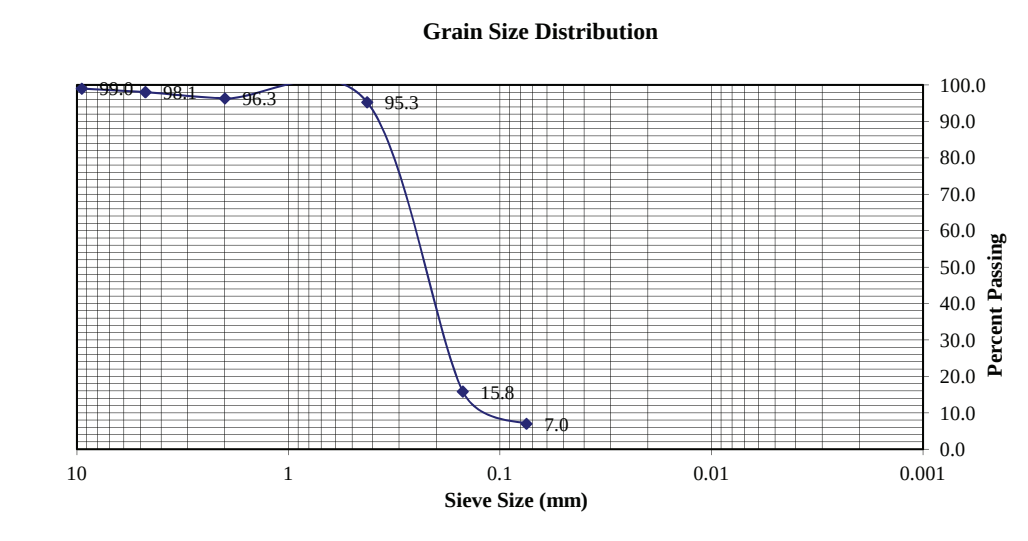
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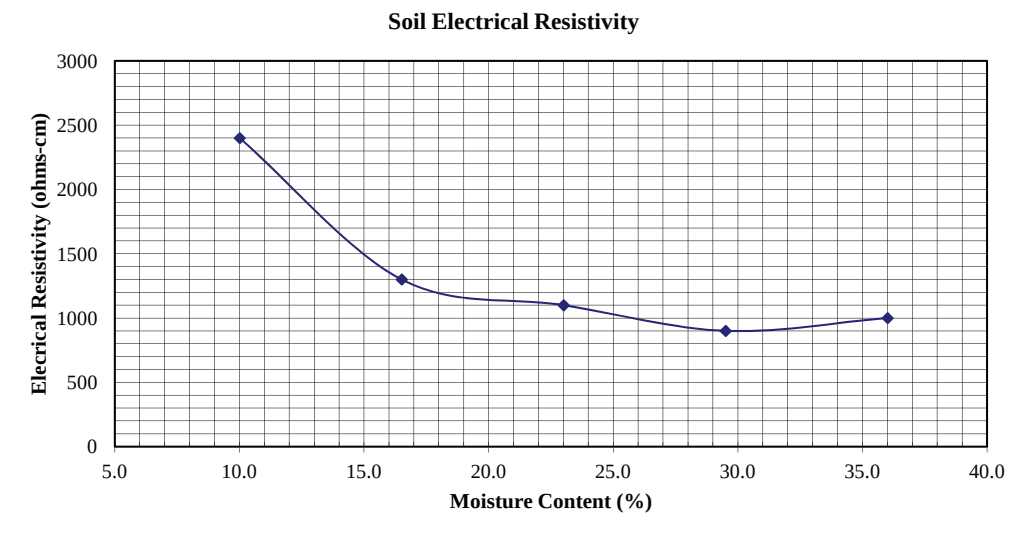
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NE-4
Date of Sample: 10/11/13
Sample Location: Pier #25: Test Pit TP25NE, 12' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP25NE-5
Date of Sample: 10/12/2013
Sample Location: Pier #25; Test Pit TP25NE, 13' below T/Pier Footing
General Description: Silty Sand, light brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SAND, fine grained ,light brown (SP)

USDA Soil Classification: Sand

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	98
#40 (.425 mm)	90
#100 (.15 mm)	8
#200 (.075 mm)	2.7
.002 mm	-
D_{10}	0.16

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 700

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

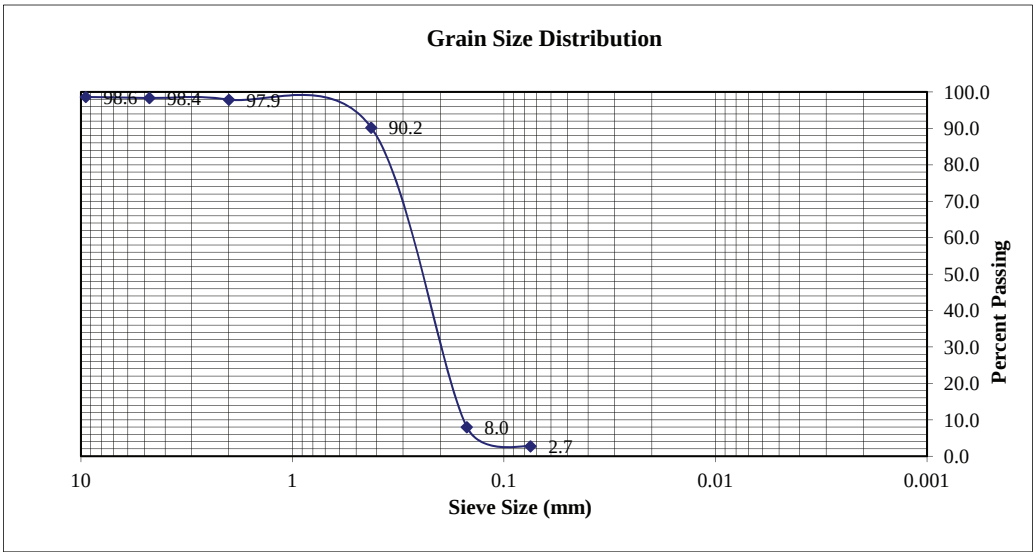
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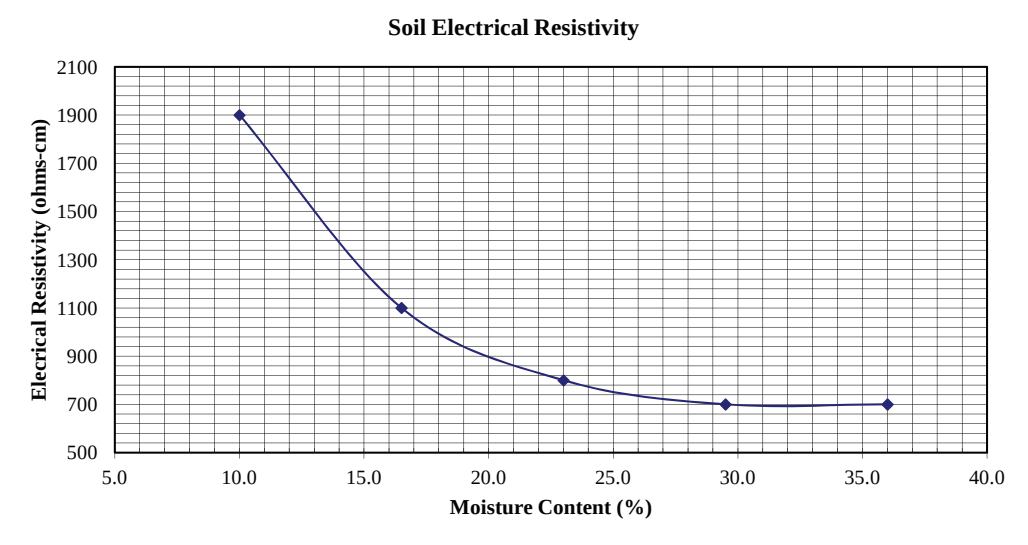
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/16/2013

Sample Number: TP25NE-5
Date of Sample: 10/12/13
Sample Location: Pier #25; Test Pit TP25NE, 13' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25NW-1
Date of Sample: 10/13/2013
Sample Location: Pier 25; Test Pit: TP25NW, 1.5' below B/ Pier Footing, next to pile
General Description: Silty Sand w/Organics, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine to medium grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	99
#10 (2.0 mm)	97
#40 (.425 mm)	86
#100 (.15 mm)	54
#200 (.075 mm)	35.3
.002 mm	-
D_{10}	-

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 550

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.284

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

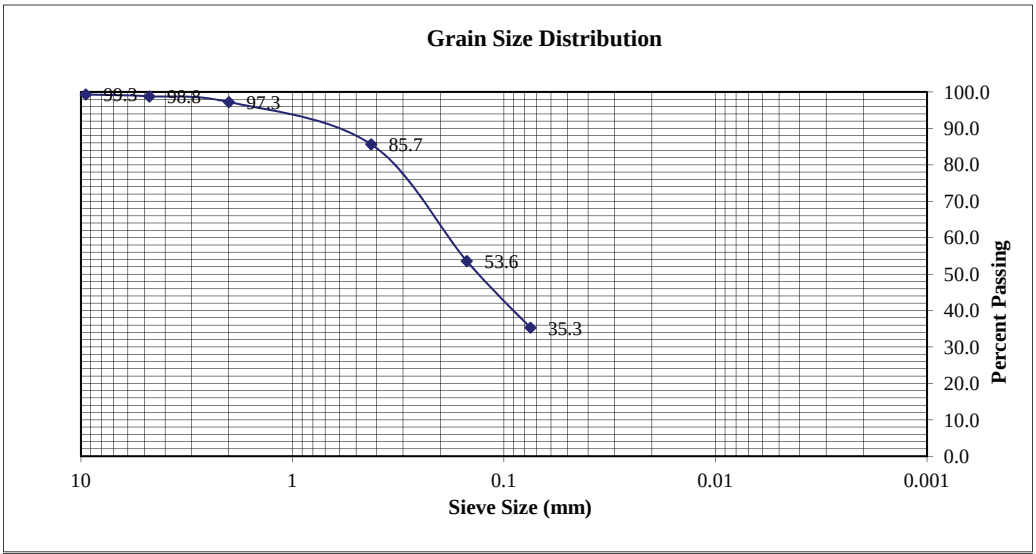
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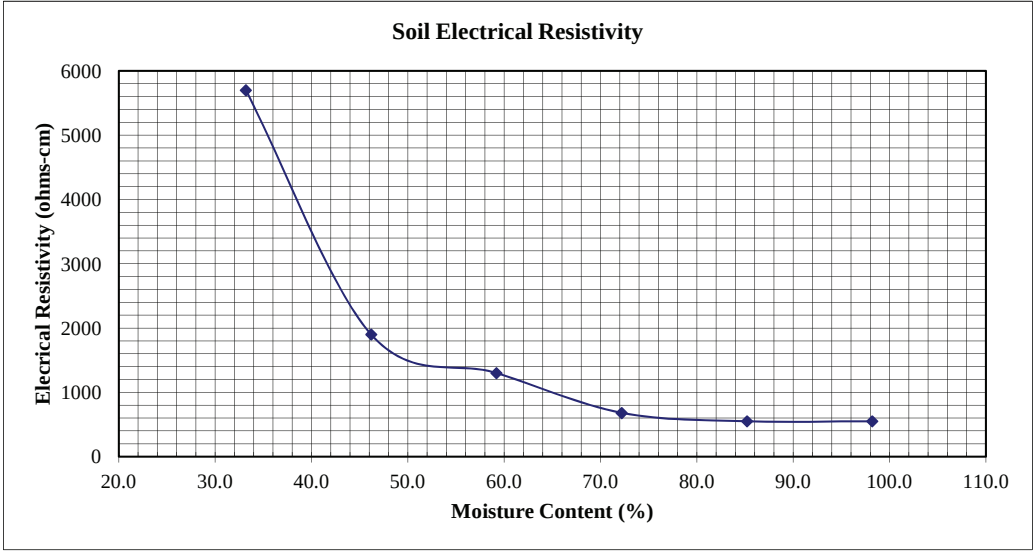
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP25NW-1
Date of Sample: 10/13/13
Sample Location: Pier 25; Test Pit: TP25NW, 1.5' below B/ Pier Footing, next to pile





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25S-1
Date of Sample: 9/30/2013
Sample Location: Pier 25; Test Pit TP25S, 0' to 1.3' Below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	90
#40 (.425 mm)	84
#100 (.15 mm)	58
#200 (.075 mm)	46.2
.002 mm	4.2
D_{10}	0.005

Natural Moisture Content
Moisture Content, % 90.1

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 370

Soil pH (AASHTO T289) 8.2

Specific Gravity of Soil (AASHTO T100) 2.396

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

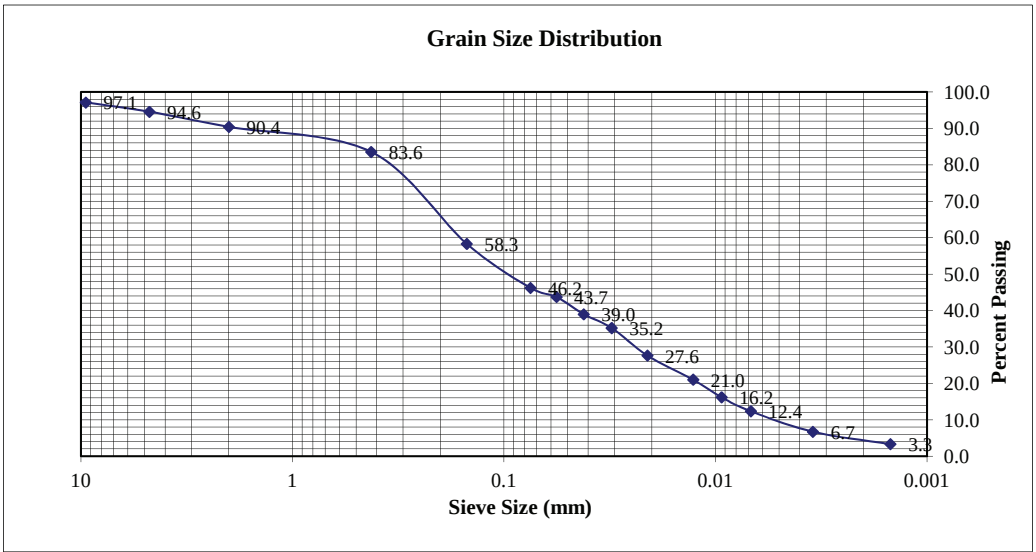
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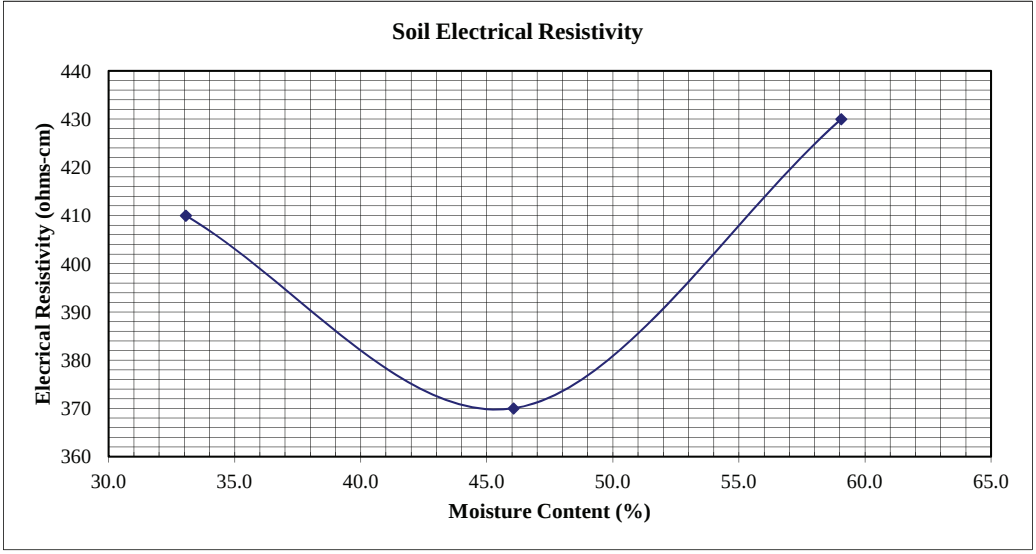
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25S-1
Date of Sample: 9/30/13
Sample Location: Pier 25; Test Pit TP25S, 0' to 1.3' Below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP25S-2
Date of Sample: 9/30/2013
Sample Location: Pier 25; Test Pit TP25S, 1.3' to 6.1' Below T/Pier Footing
General Description: Ash, black
Tests Performed: Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,black (SM)

USDA Soil Classification: Sandy Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	94
#40 (.425 mm)	87
#100 (.15 mm)	57
#200 (.075 mm)	45.6
.002 mm	2.7
D_{10}	0.006

Natural Moisture Content
Moisture Content, % 120.2

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 450

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.313

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

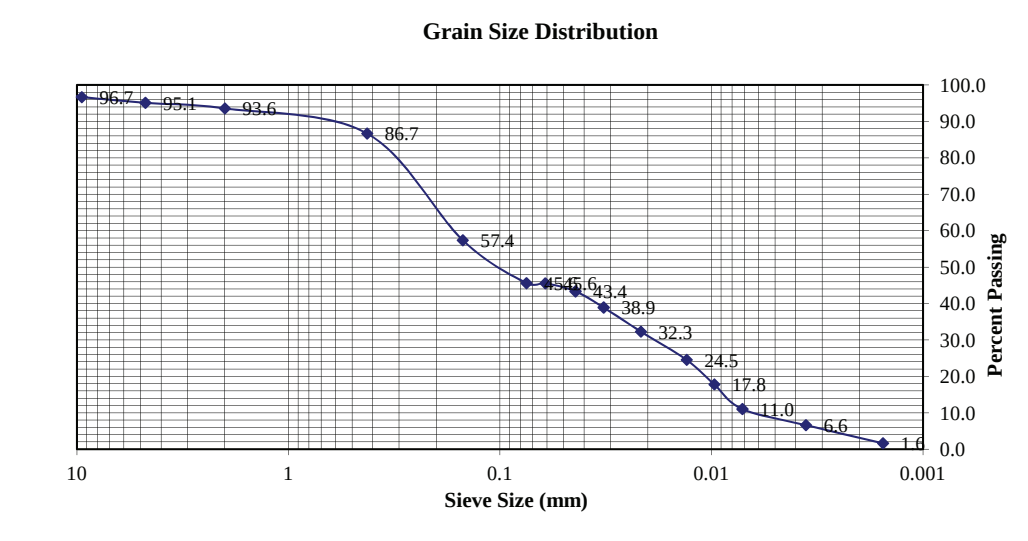
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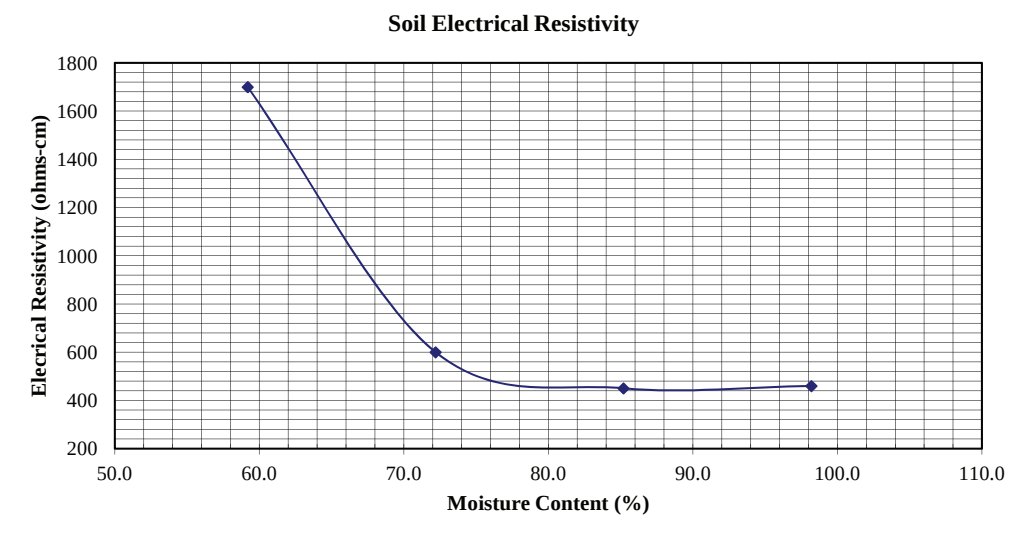
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 11/1/2013

Sample Number: TP25S-2
Date of Sample: 09/30/13
Sample Location: Pier 25; Test Pit TP25S, 1.3' to 6.1' Below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP32NE-1
Date of Sample: 10/14/2013
Sample Location: Pier #32; Test Pit: TP32NE, top of Pier Footing
General Description: SAND w/SILT, dark grayish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SANDY SILT, dark greyish brown (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	94
#100 (.15 mm)	72
#200 (.075 mm)	60.1
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 190

Soil pH (AASHTO T289) 7.6

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

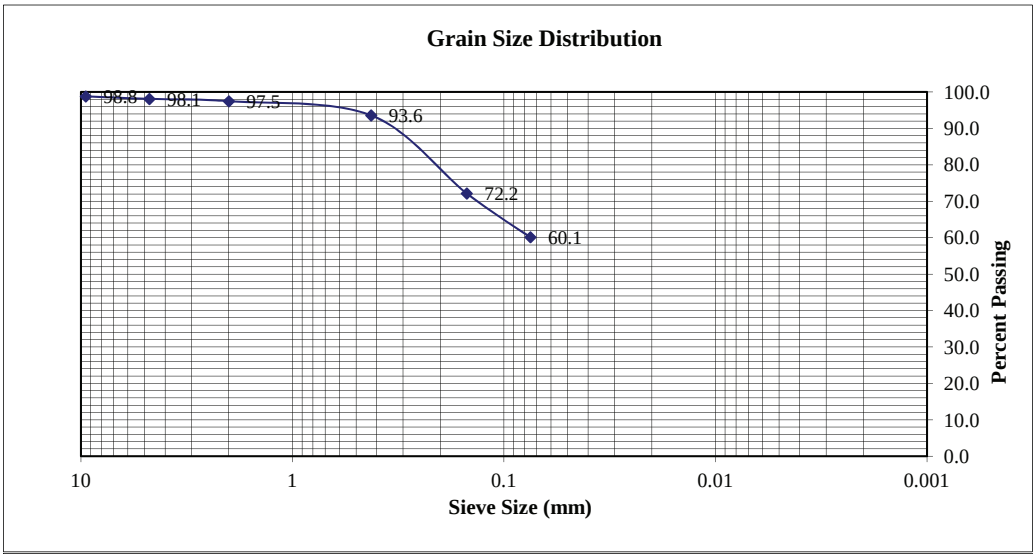
Reviewed By: _____
Paul R. Eggen

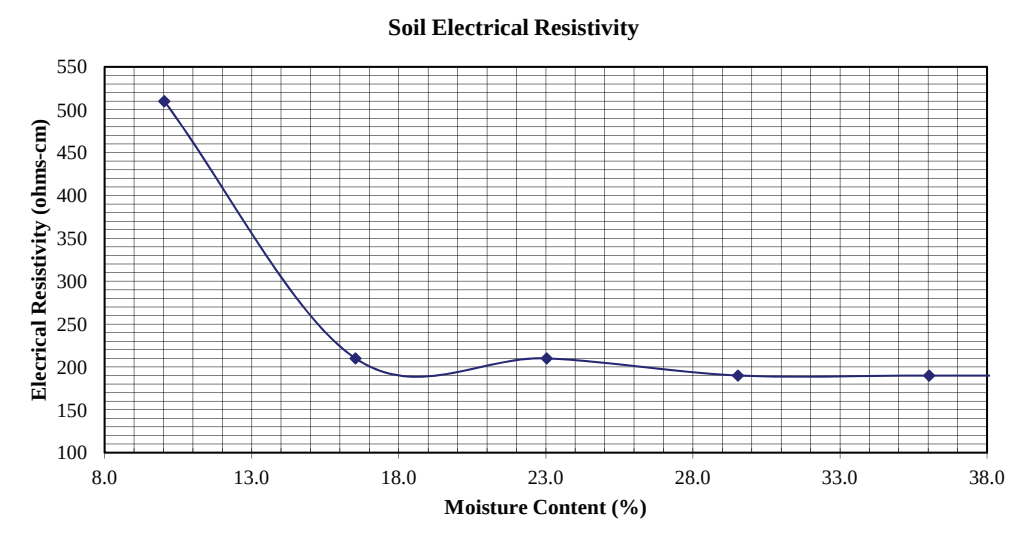
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP32NE-1
Date of Sample: 10/14/13
Sample Location: Pier #32; Test Pit: TP32NE, top of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP32NE-2
Date of Sample: 10/14/2013
Sample Location: Pier #32; Test Pit TP32NE, 6' below T/Pier Footing @ B/Pier Footing
General Description: Fill - Sand, Silt, Clay, topsoil mix with Organics, brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,brown (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	99
3/8" (9.5 mm)	98
#4 (4.75 mm)	96
#10 (2.0 mm)	94
#40 (.425 mm)	88
#100 (.15 mm)	63
#200 (.075 mm)	48.7
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 160

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

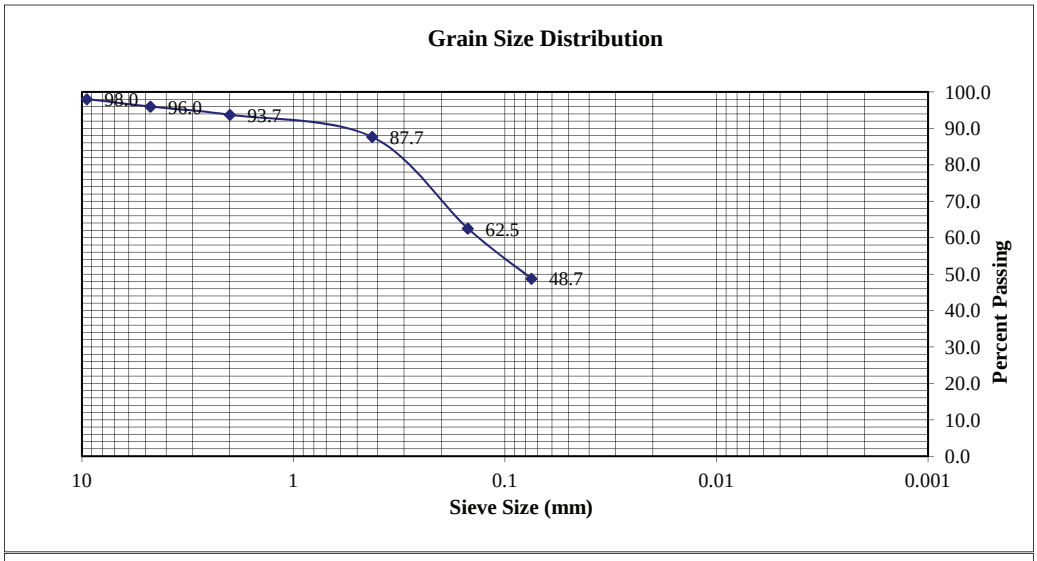
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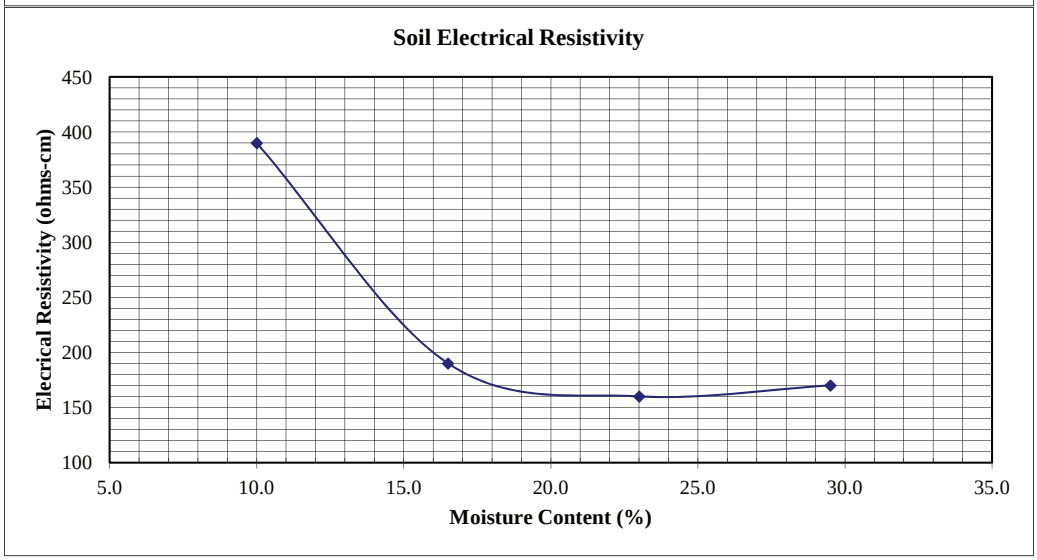
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP32NE-2
Date of Sample: 10/14/13
Sample Location: Pier #32; Test Pit TP32NE, 6' below T/Pier Footing @ B/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP32NE-3
Date of Sample: 10/14/2013
Sample Location: Pier #32; Test Pit TP32NE , 11' below T/Pier Footing, 5' below B/ Pier Footing
General Description: Silty Lean Clay, reddish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, dark reddish brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	96
#100 (.15 mm)	88
#200 (.075 mm)	82.2
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 250

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

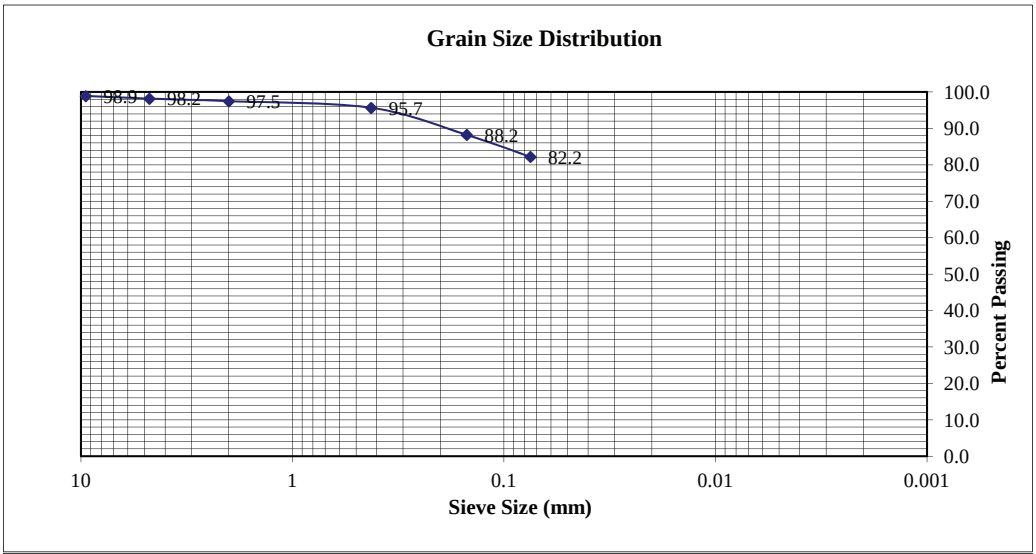
Reviewed By: *Paul R. Eggen*

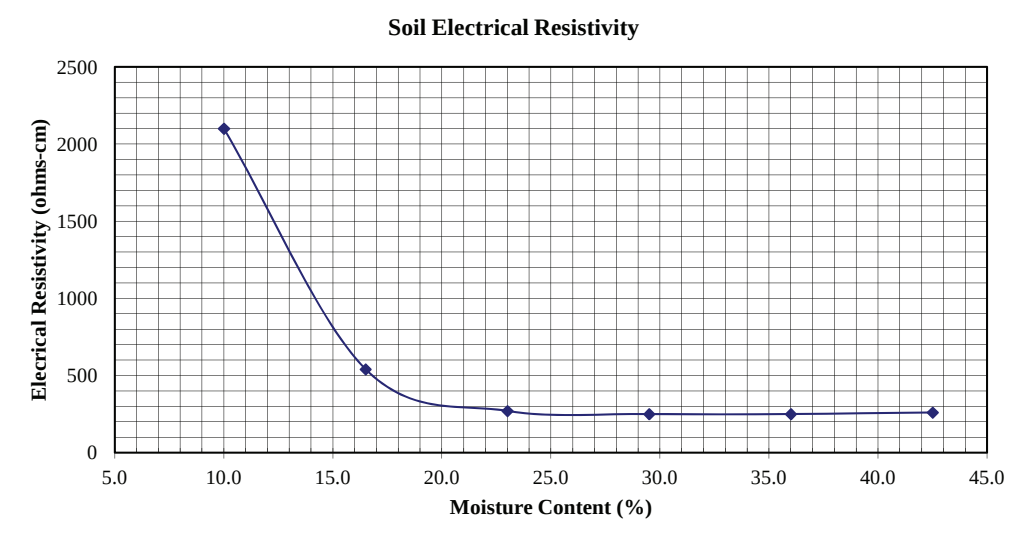
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP32NE-3
Date of Sample: 10/14/13
Sample Location: Pier #32; Test Pit TP32NE , 11' below T/Pier Footing, 5' below B/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP32NE-5
Date of Sample: 10/14/2013
Sample Location: Pier 32; Test Pit TP32NE, 1' to 3' below B/ Pier Footing, adjacent to pile 32-5
General Description: Silty Lean Clay, reddish brown
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): LEAN CLAY, reddish brown (CL)

USDA Soil Classification: Silty clay

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	99
#4 (4.75 mm)	98
#10 (2.0 mm)	97
#40 (.425 mm)	96
#100 (.15 mm)	91
#200 (.075 mm)	87.3
.002 mm	46.0
D_{10}	<.001

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	41.0
Plastic Limit, PL (%)	17.7
Platicity Index (%)	23.3

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 160

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.695

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

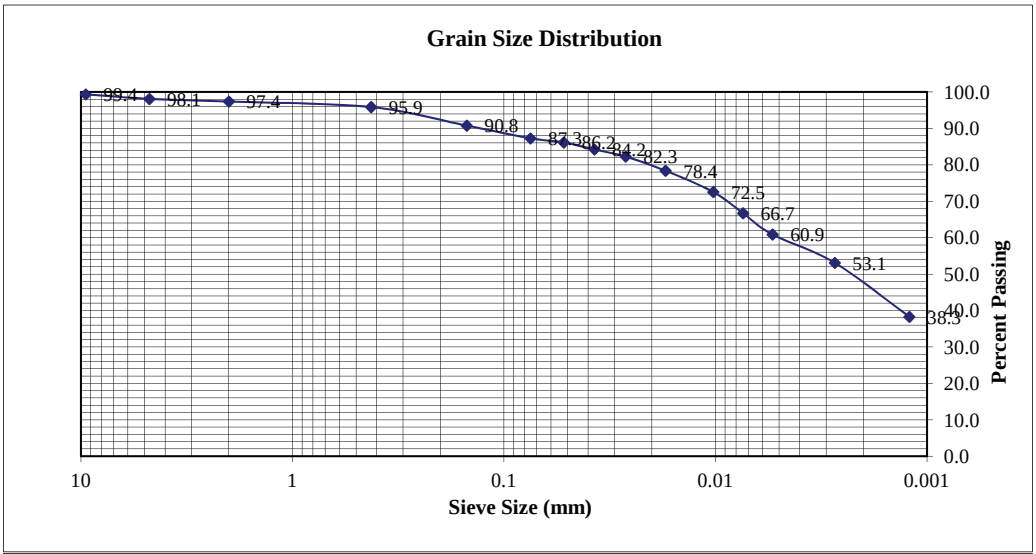
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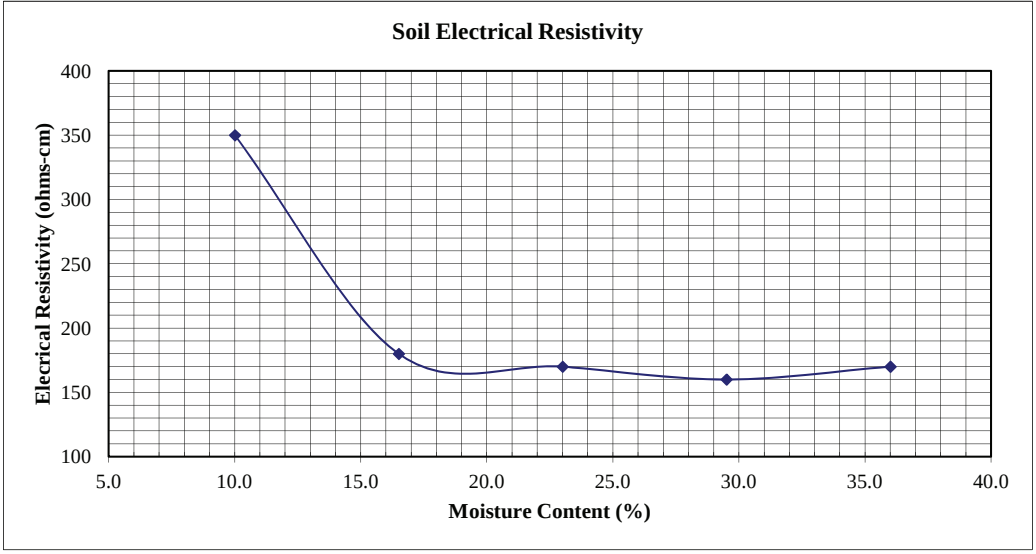
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP32NE-5
Date of Sample: 10/14/13
Sample Location: Pier 32; Test Pit TP32NE, 1' to 3' below B/ Pier Footing, adjacent to pile 32-5





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP32NE-6
Date of Sample: 10/14/2013
Sample Location: Test Pit: TP36NE-6; Pier #32 -15' below T/Pier Footing
General Description: Sandy Silt, brown
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,brown (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	99
#100 (.15 mm)	81
#200 (.075 mm)	50.0
.002 mm	4.4
D_{10}	0.015

Atterberg Limits (AASHTO T89, 90)
Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 3500

Soil pH (AASHTO T289) 8.5

Specific Gravity of Soil (AASHTO T100) 2.697

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

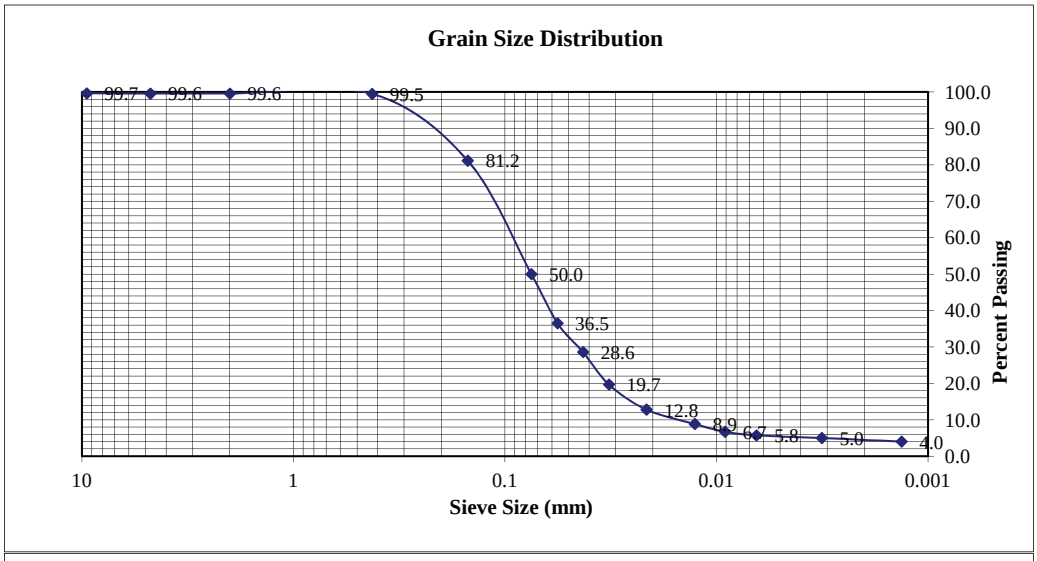
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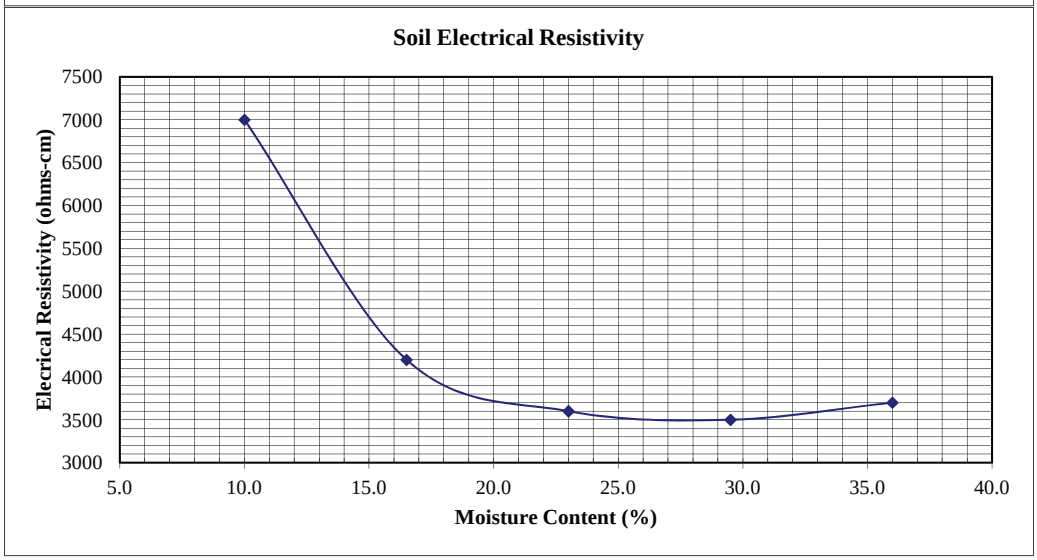
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP32NE-6
Date of Sample: 10/14/13
Sample Location: Test Pit: TP36NE-6; Pier #32 -15' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP39NW-1
Date of Sample: 10/15/2013
Sample Location: Pier #39; Test Pit TP39NW, top of Pier Footing
General Description: Lean Clay with Sandy Silt, reddish brown to dark brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY LEAN CLAY, reddish brown to dark brown (CL)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	94
#40 (.425 mm)	89
#100 (.15 mm)	71
#200 (.075 mm)	60.6
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 370

Soil pH (AASHTO T289) 7.8

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

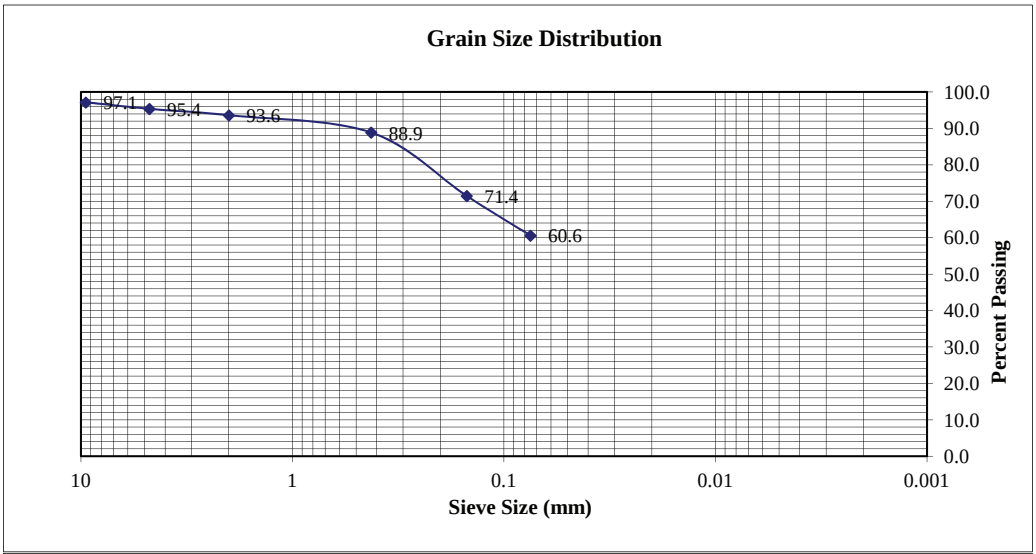
Reviewed By: *Paul R. Eggen*

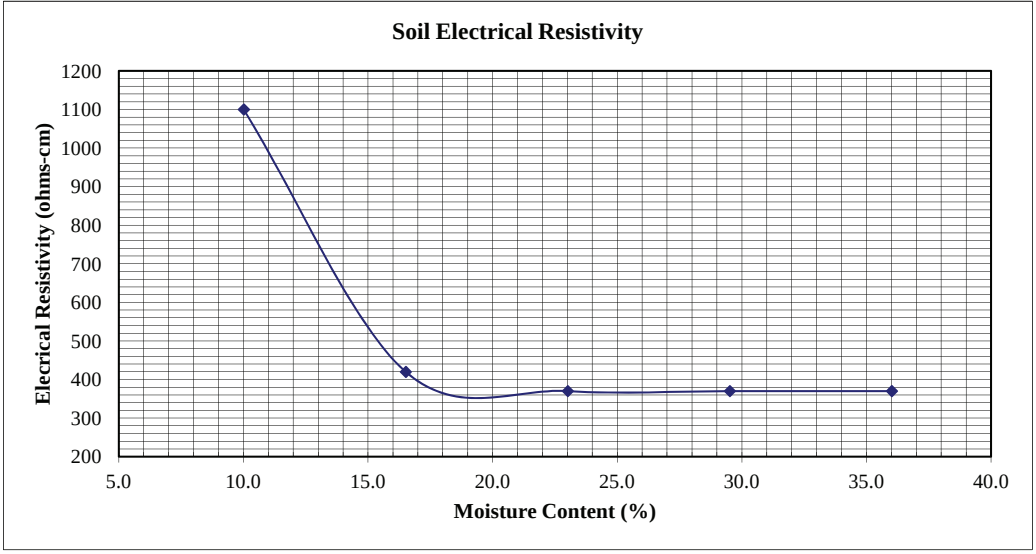
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP39NW-1
Date of Sample: 10/15/13
Sample Location: Pier #39; Test Pit TP39NW, top of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP39NW-2
Date of Sample: 10/15/2013
Sample Location: Pier 39; Test Pit TP39NW, at base of Pier Footing
General Description: Lean Clay with Sandy Silt, reddish brown to brown mottled dark grayish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SANDY LEAN CLAY, reddish brown to brown mottled dark grayish brown (CL)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	98
1/2" (12.5 mm)	97
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	93
#40 (.425 mm)	88
#100 (.15 mm)	72
#200 (.075 mm)	59.6
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 170

Soil pH (AASHTO T289) 7.6

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

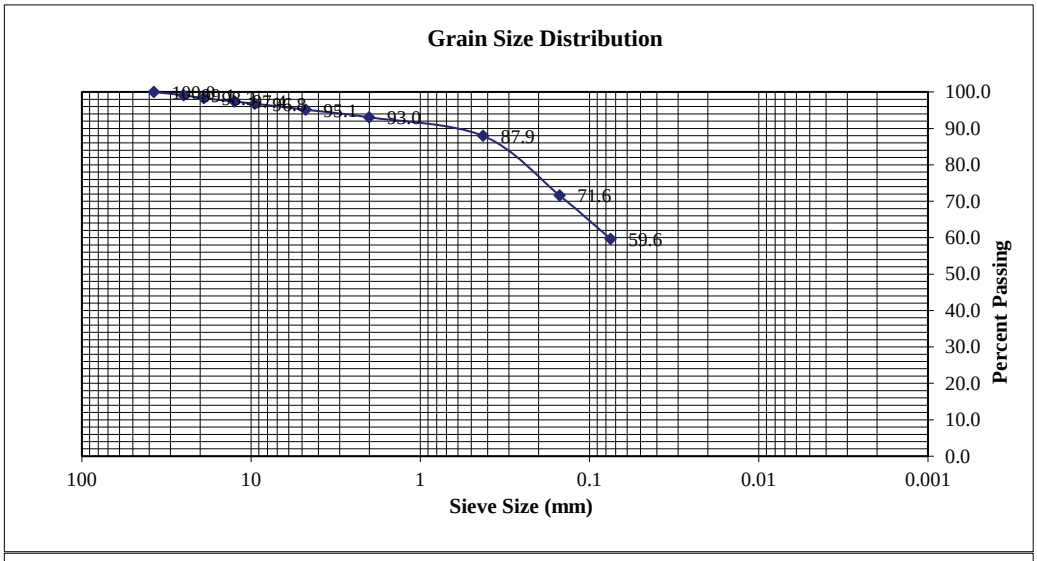
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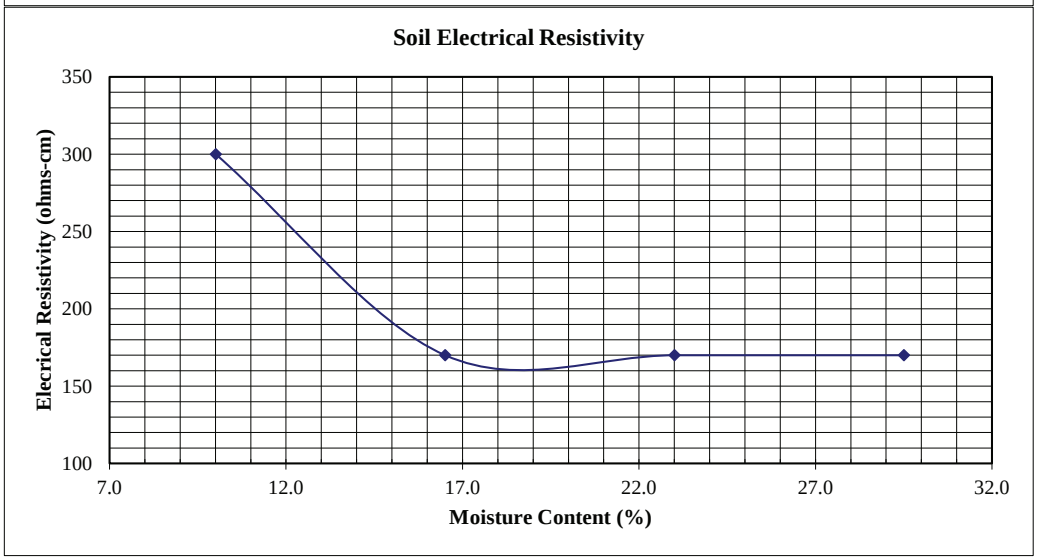
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP39NW-2
Date of Sample: 10/15/13
Sample Location: Pier 39; Test Pit TP39NW, at base of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP39NW-3
Date of Sample: 10/15/2013
Sample Location: Pier #39; Test Pit TP39NW, 4'below base of Pier Footing
General Description: Lean Clay, brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, brown (CL)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	98
#40 (.425 mm)	96
#100 (.15 mm)	83
#200 (.075 mm)	71.9
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 170

Soil pH (AASHTO T289) 7.9

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

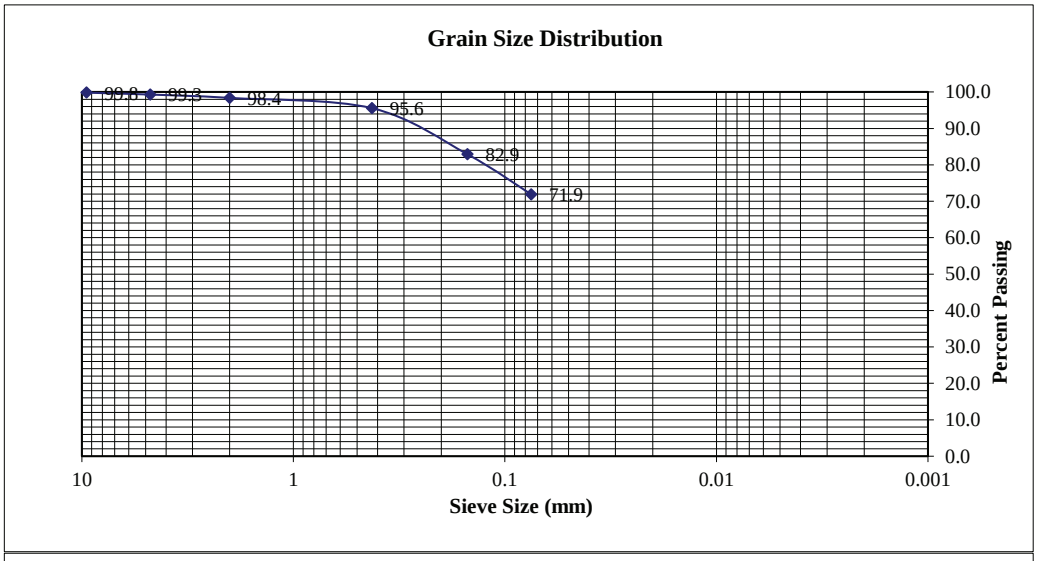
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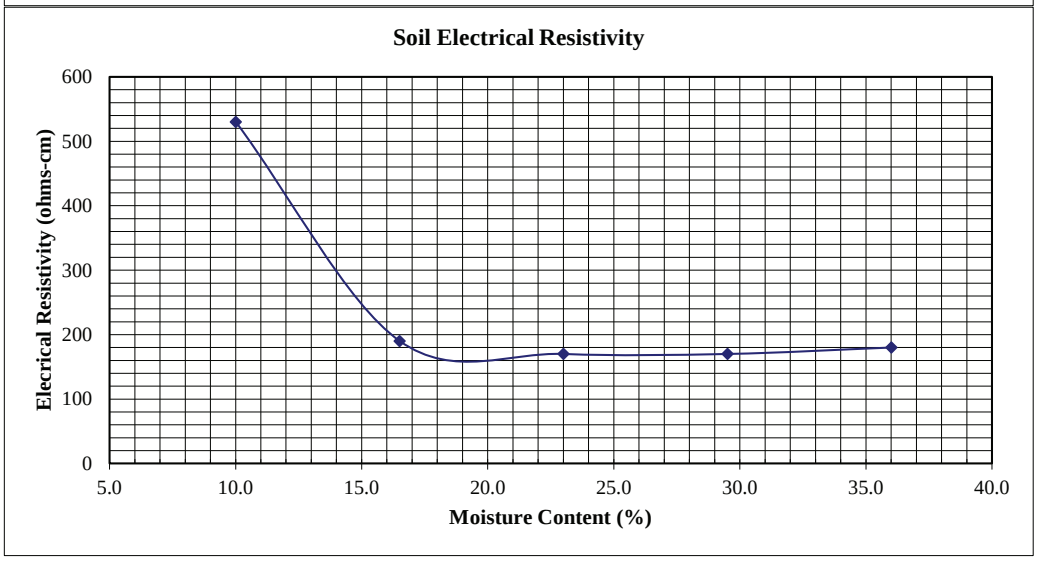
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP39NW-3
Date of Sample: 10/15/13
Sample Location: Pier #39; Test Pit TP39NW, 4'below base of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP39NW-4
Date of Sample: 10/15/2013
Sample Location: Pier 39; Test Pit TP39NW, 1' below to 6"above B/ Pier Footing, NW corner of footing
General Description: Silt, Sand with stone and organics, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SANDY SILT, black (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	97
1/2" (12.5 mm)	95
3/8" (9.5 mm)	94
#4 (4.75 mm)	91
#10 (2.0 mm)	87
#40 (.425 mm)	81
#100 (.15 mm)	64
#200 (.075 mm)	58.5
.002 mm	13.7
D_{10}	<001

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) 24.2
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 80

Soil pH (AASHTO T289) 8.3

Specific Gravity of Soil (AASHTO T100) 2.691

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

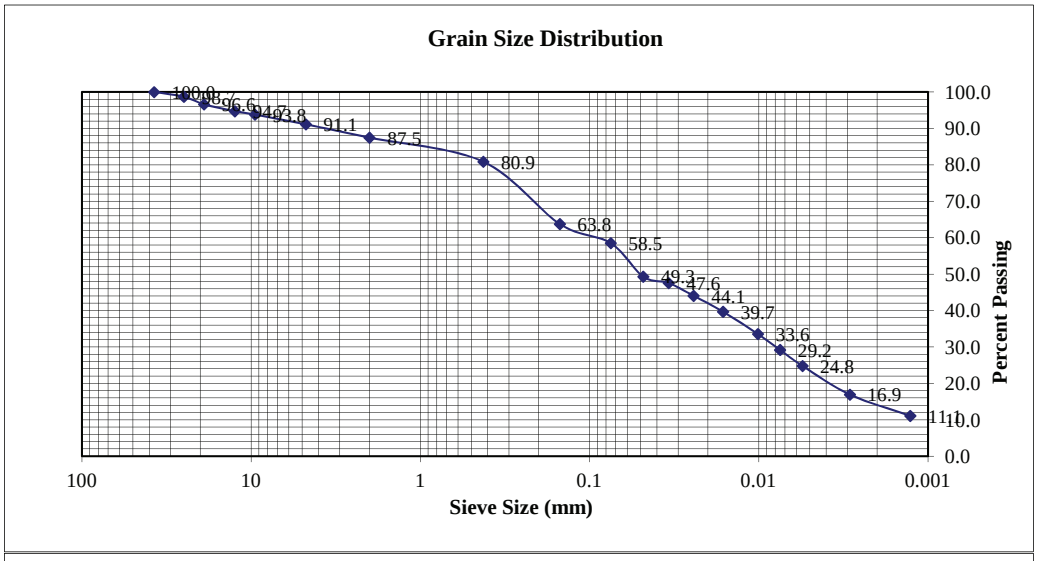
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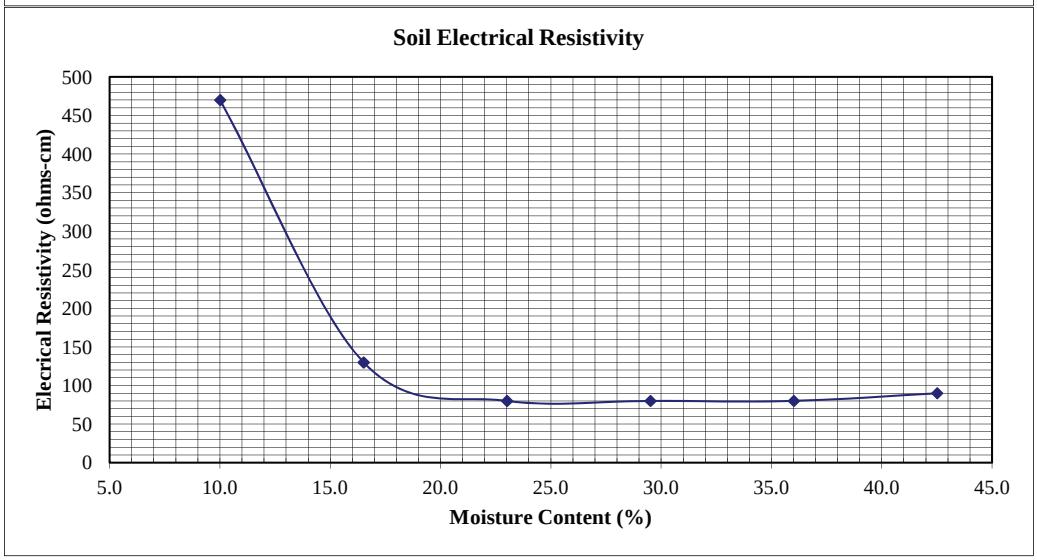
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP39NW-4
Date of Sample: 10/15/13
Sample Location: Pier 39; Test Pit TP39NW, 1' below to 6"above B/ Pier Footing, NW corner of footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP39NW-5
Date of Sample: 10/15/2013
Sample Location: Pier 39; Test Pit TP39NW, 5' below base of cap and 11" below top of cap
General Description: Sandy Silt/Silty Sand, strong brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,strong brown (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	99
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	99
3/8" (9.5 mm)	99
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	98
#100 (.15 mm)	76
#200 (.075 mm)	41.4
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 90

Soil pH (AASHTO T289) 7.6

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

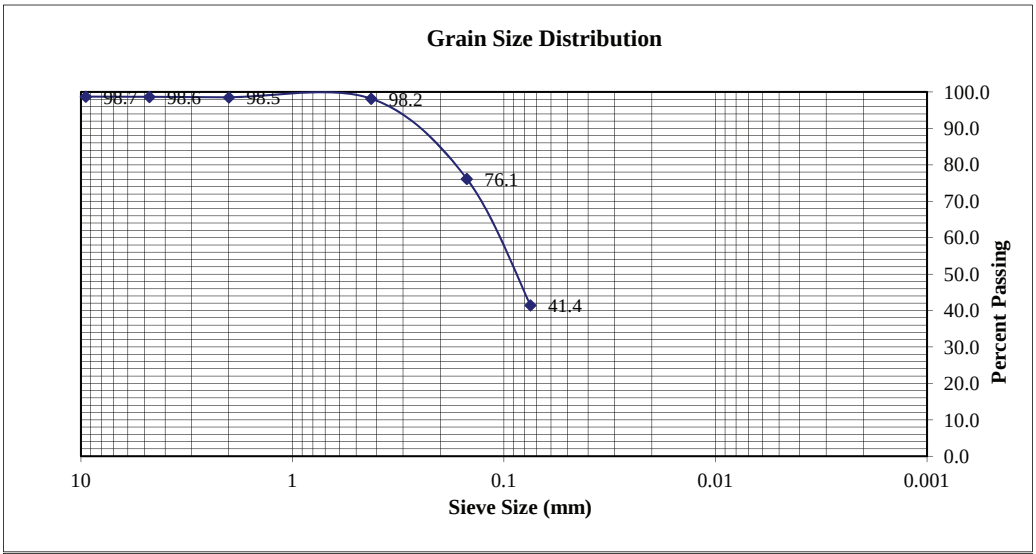
Reviewed By: *Paul R. Eggen*

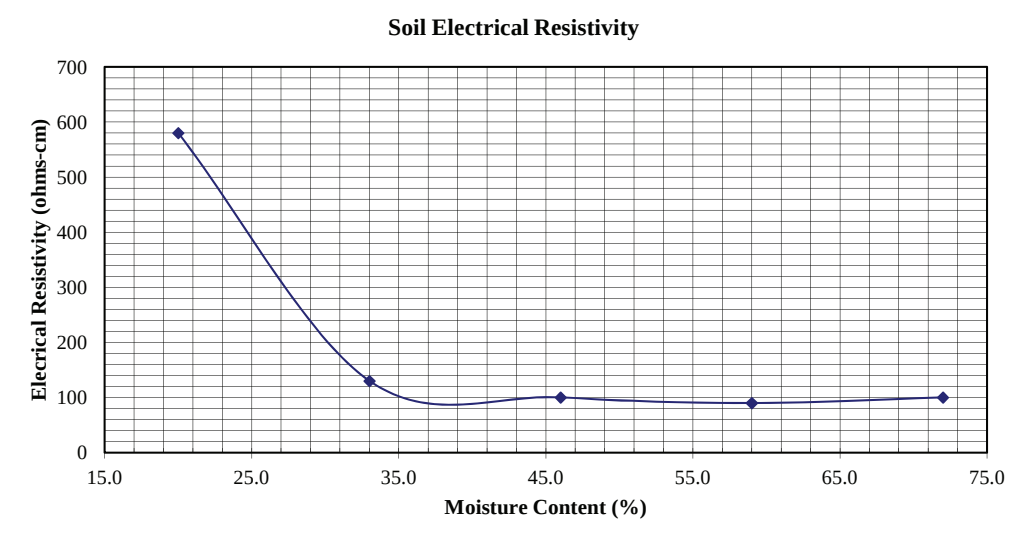
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP39NW-5
Date of Sample: 10/15/13
Sample Location: Pier 39; Test Pit TP39NW, 5' below base of cap and 11" below top of cap





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP39SE-1
Date of Sample: 10/15/2013
Sample Location: Pier #39; Test Pit: TP39SE, t/ Pier Footing
General Description: Silty Sand with some Organics, dark yellowish brown mottled brownish yellow and very d
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, dark yellowish brown mottled w/ brownish yellow and very dark gray (ML)
USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	99
3/4" (19 mm)	99
1/2" (12.5 mm)	98
3/8" (9.5 mm)	97
#4 (4.75 mm)	95
#10 (2.0 mm)	93
#40 (.425 mm)	88
#100 (.15 mm)	71
#200 (.075 mm)	58.4
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 340

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

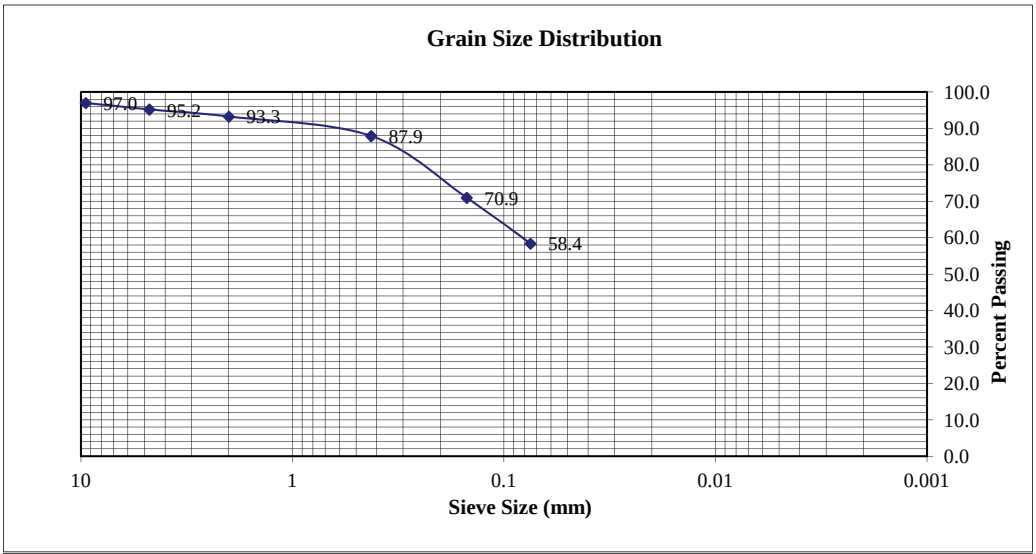
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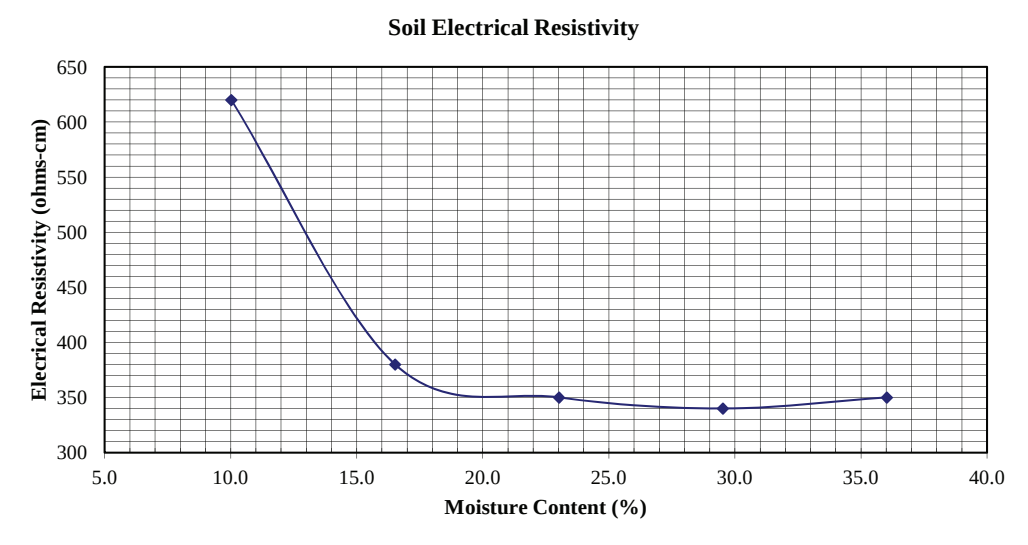
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/17/2013

Sample Number: TP39SE-1
Date of Sample: 10/15/13
Sample Location: Pier #39; Test Pit: TP39SE, t/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP39SE-2
Date of Sample: 10/15/2013
Sample Location: Pier 39; Test Pit TP39SE, 6' BELOW t/ Pier Footing at B/ Pier Footing
General Description: Clay, strong brown
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, strong brown (CL)

USDA Soil Classification: Clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	98
#40 (.425 mm)	97
#100 (.15 mm)	83
#200 (.075 mm)	72.1
.002 mm	31.7
D_{10}	<.001

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	26.0
Plastic Limit, PL (%)	13.5
Platicity Index (%)	12.5

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 200

Soil pH (AASHTO T289) 7.9

Specific Gravity of Soil (AASHTO T100) 2.735

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

Reviewed By: *Paul R. Eggen*

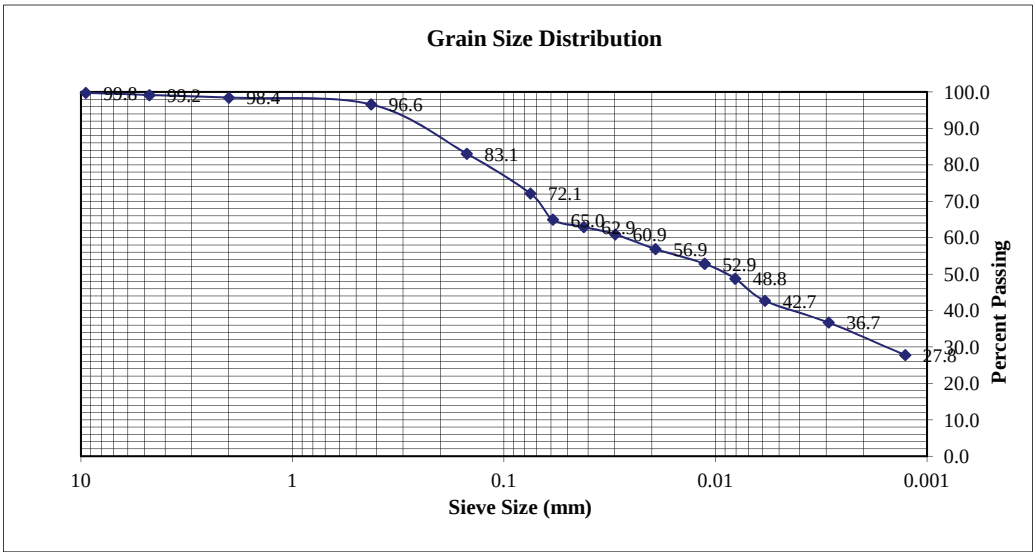
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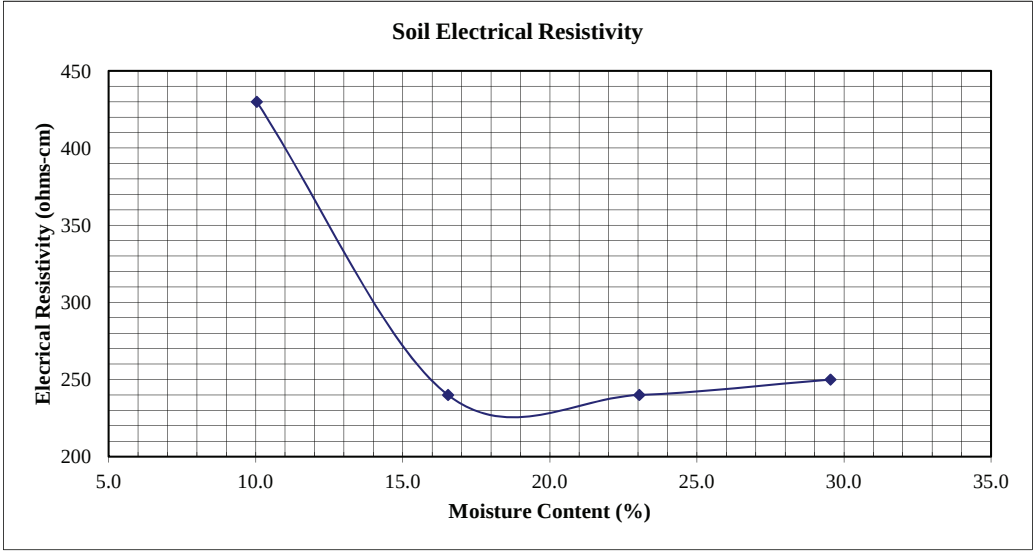
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PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP39SE-2
Date of Sample: 10/15/13
Sample Location: Pier 39; Test Pit TP39SE, 6' BELOW t/ Pier Footing at B/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP39SE-3
Date of Sample: 10/15/2013
Sample Location: Pier 39; Test Pit TP39SE, at B/ Pier Footing
General Description: Silty Sand with Organics, black
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SANDY SILT, black (ML)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	99
#40 (.425 mm)	88
#100 (.15 mm)	61
#200 (.075 mm)	50.4
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 170

Soil pH (AASHTO T289) 7.5

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

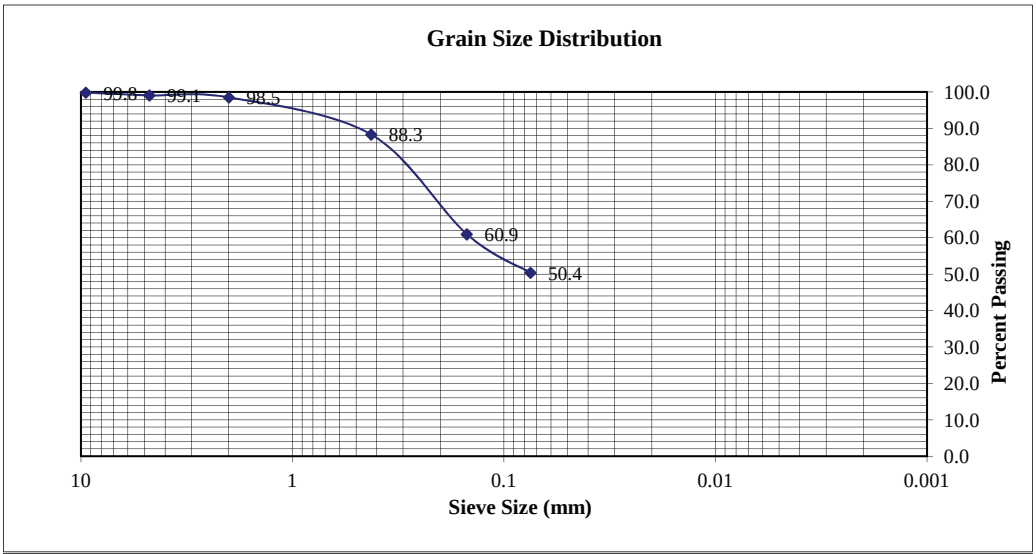
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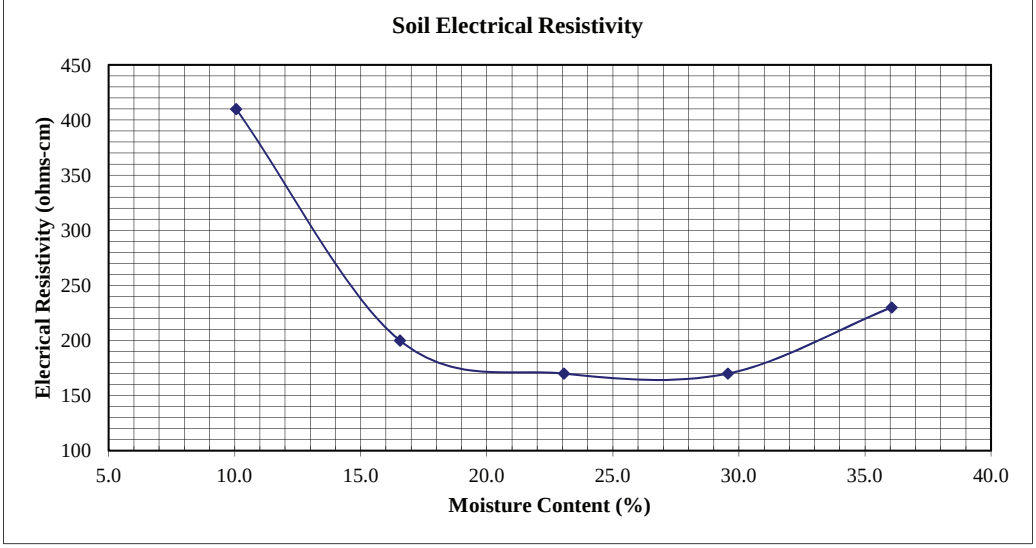
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP39SE-3
Date of Sample: 10/15/13
Sample Location: Pier 39; Test Pit TP39SE, at B/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP39SE-4
Date of Sample: 10/15/2013
Sample Location: Pier #39; Test Pit TP39SE, 10' below T/ Pier Footing
General Description: Silt, dark grayish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILT, dark grayish brown (ML)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	99
#100 (.15 mm)	99
#200 (.075 mm)	98.4
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 1500

Soil pH (AASHTO T289) 7.9

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

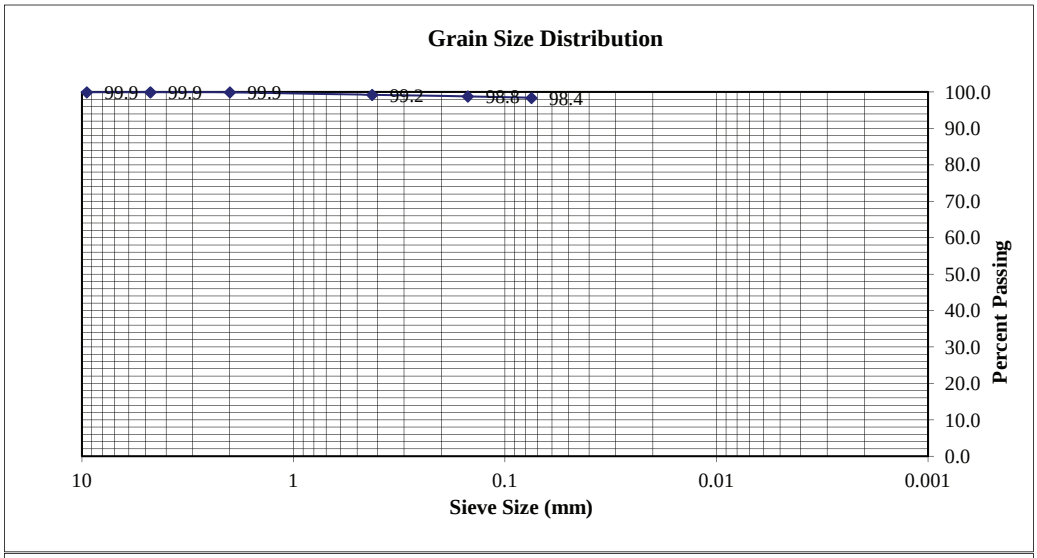
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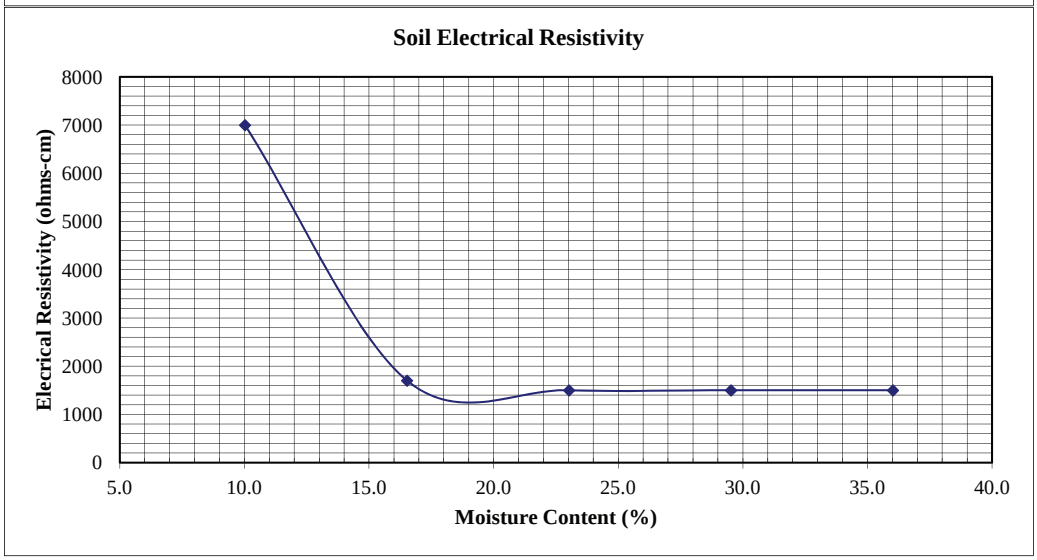
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP39SE-4
Date of Sample: 10/15/13
Sample Location: Pier #39; Test Pit TP39SE, 10' below T/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP43NE-1
Date of Sample: 10/14/2013
Sample Location: Pier #43; Test Pit TP43NE, top of Pier Footing
General Description: Silty, Sandy Clay w/Stone, dark grayish brown
Tests Performed: Grain Size Analysis, , Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): SILTY SAND, fine grained ,dark grayish brown (SM)

USDA Soil Classification: Loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	97
3/4" (19 mm)	95
1/2" (12.5 mm)	93
3/8" (9.5 mm)	92
#4 (4.75 mm)	89
#10 (2.0 mm)	86
#40 (.425 mm)	80
#100 (.15 mm)	61
#200 (.075 mm)	48.9
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 310

Soil pH (AASHTO T289) 8.0

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

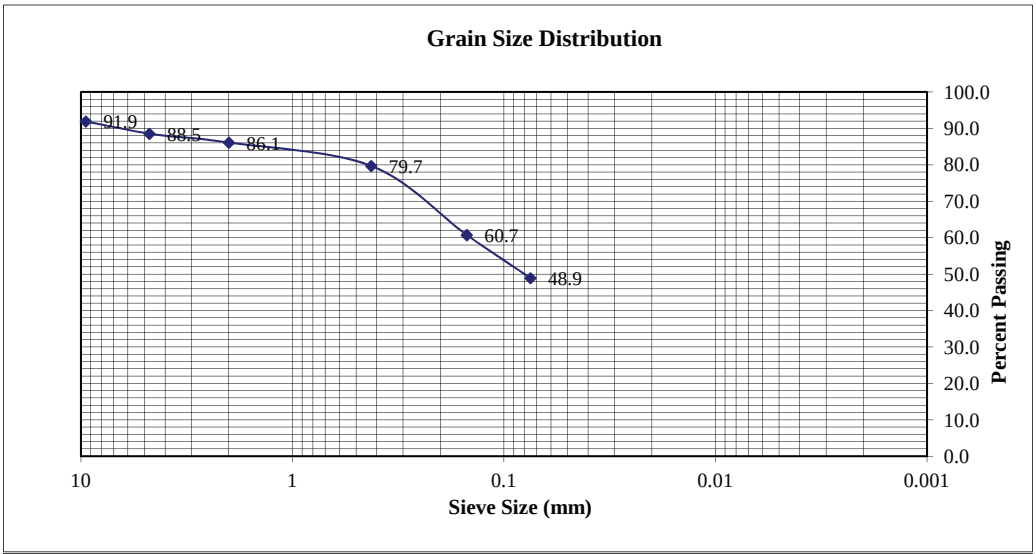
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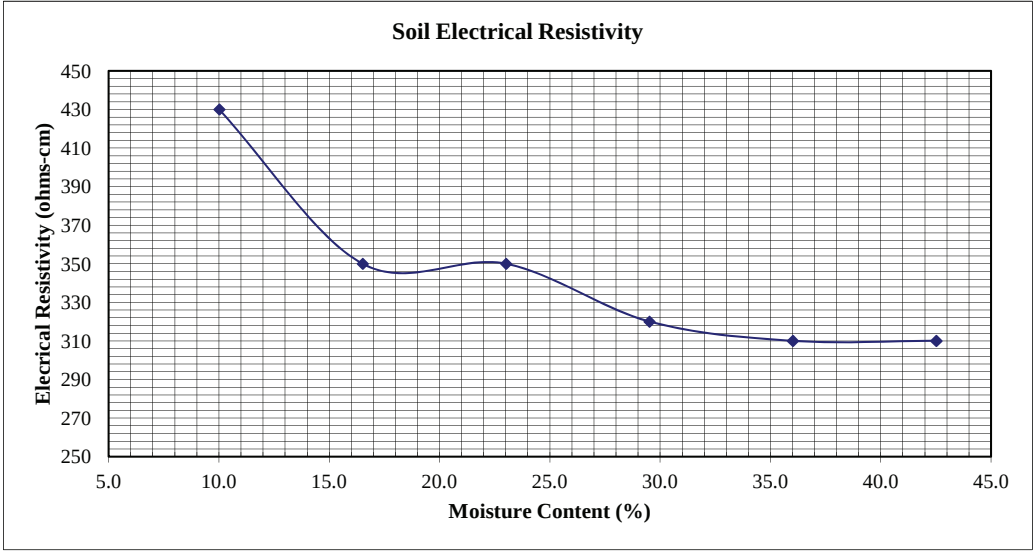
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP43NE-1
Date of Sample: 10/14/13
Sample Location: Pier #43; Test Pit TP43NE, top of Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/31/2013

Sample Number: TP43NE-2
Date of Sample: 10/14/2013
Sample Location: Pier 43; Test Pit: TP43NE, 3' below T/Pier Footing
General Description: Fill, Sandy Silty, Stone, dark grayish brown
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): SILTY SAND w/ GRAVEL, fine grained ,dark grayish brown (SM)

USDA Soil Classification: Sandy loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	98
1" (25 mm)	96
3/4" (19 mm)	91
1/2" (12.5 mm)	85
3/8" (9.5 mm)	80
#4 (4.75 mm)	72
#10 (2.0 mm)	66
#40 (.425 mm)	60
#100 (.15 mm)	37
#200 (.075 mm)	21.1
.002 mm	5.2
D_{10}	0.012

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%) Non-Plastic
Plastic Limit, PL (%) Non-Plastic
Platicity Index (%) -

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 390

Soil pH (AASHTO T289) 7.8

Specific Gravity of Soil (AASHTO T100) 2.663

REMARKS: The above sample was obtained by Brian Wayner of OMNNI Associates.

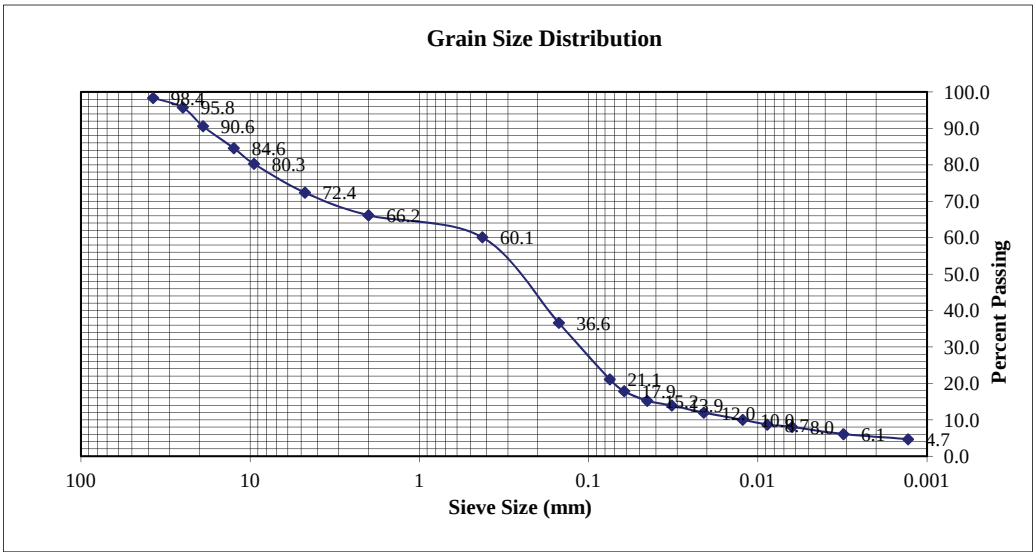
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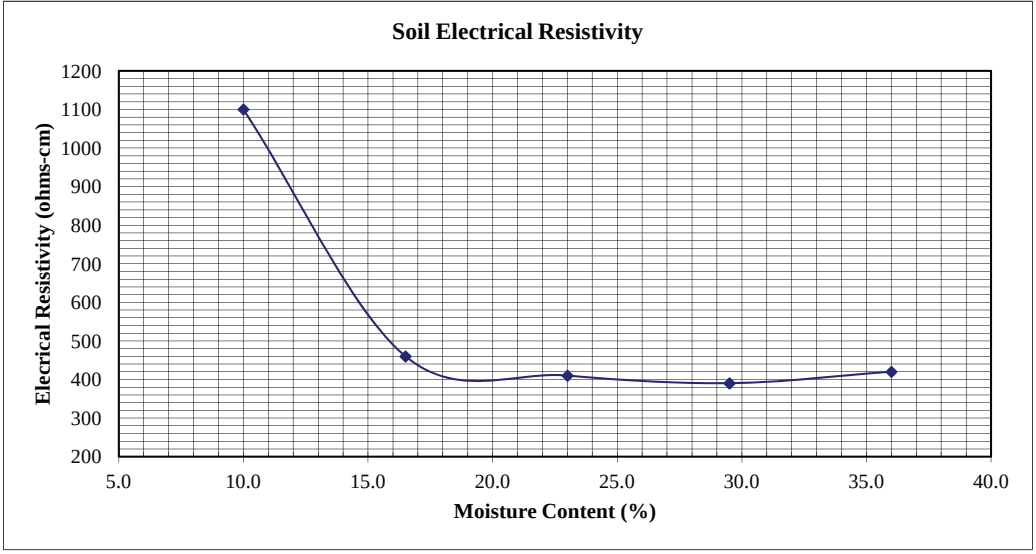
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/31/2013

Sample Number: TP43NE-2
Date of Sample: 10/14/13
Sample Location: Pier 43; Test Pit: TP43NE, 3' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/17/2013

Sample Number: TP43NE-3
Date of Sample: 10/14/2013
Sample Location: Pier #43; Test Pit TP43NE, 5' below T/ Pier Footing
General Description: Sandy Silt, dark gray
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY w/ SAND, dark gray (CL)

USDA Soil Classification: Silt loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	99
#10 (2.0 mm)	98
#40 (.425 mm)	97
#100 (.15 mm)	90
#200 (.075 mm)	81.8
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 350

Soil pH (AASHTO T289) 8.1

REMARKS: The above sample was obtained by Brendan Andrews of OMNNI Associates.

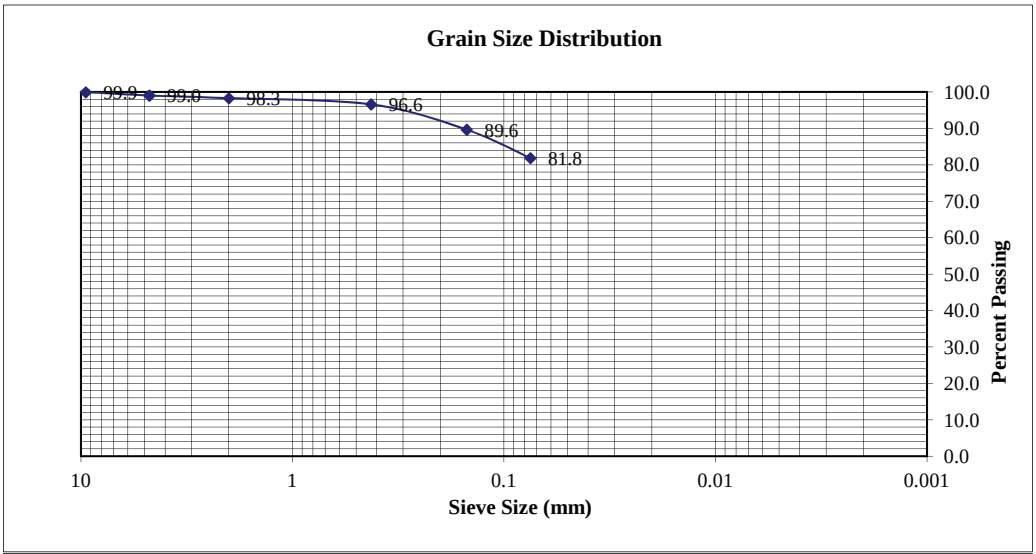
Reviewed By: *Paul R. Eggen*

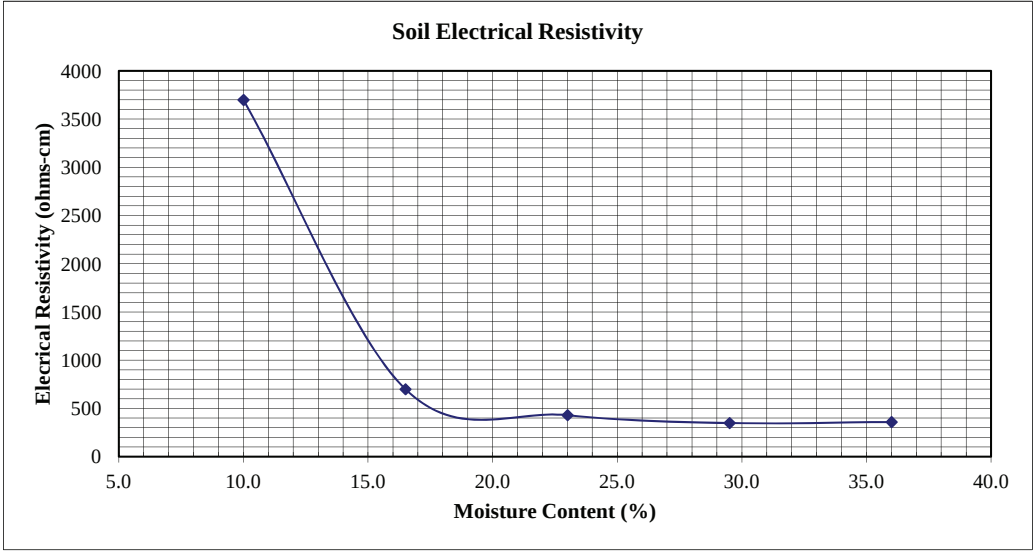
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP43NE-3
Date of Sample: 10/14/13
Sample Location: Pier #43; Test Pit TP43NE, 5' below T/ Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP43NE-4
Date of Sample: 10/14/2013
Sample Location: Pier 43; Test Pit TP43NE, 8.5' below T/Pier Footing
General Description: Gray clay w/ black & brown organics
Tests Performed: Grain Size Analysis, Atterberg Limits, Minimum Electrical Resistivity, pH, Soil Specific Gravity

TEST RESULTS;

Unified Soils Classification (ASTM:D2487): LEAN CLAY, dark grayish brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	100
#40 (.425 mm)	99
#100 (.15 mm)	99
#200 (.075 mm)	98.6
.002 mm	32.0
D_{10}	<.001

Atterberg Limits (AASHTO T89, 90)

Liquid Limit, LL (%)	35.8
Plastic Limit, PL (%)	21.2
Platicity Index (%)	14.6

Soil Electrical Resistivity (AASHTO T-288)

Minimum Electrical Resistivity (Ohms-cm) 900

Soil pH (AASHTO T289) 8.1

Specific Gravity of Soil (AASHTO T100) 2.625

REMARKS: The above sample was obtained by Jason Weiseof OMNNI Associates.

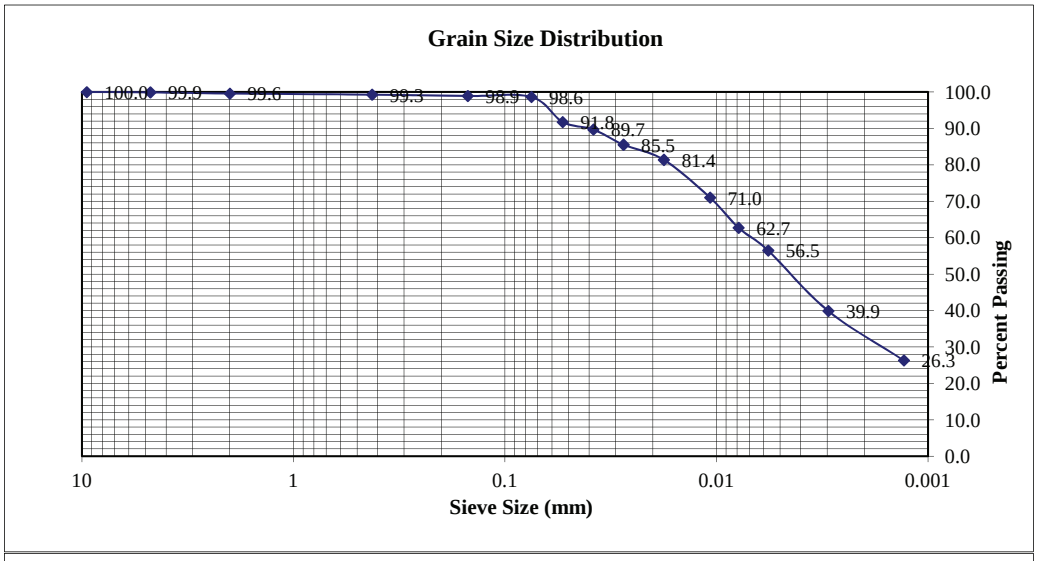
Reviewed By: *Paul R. Eggen*

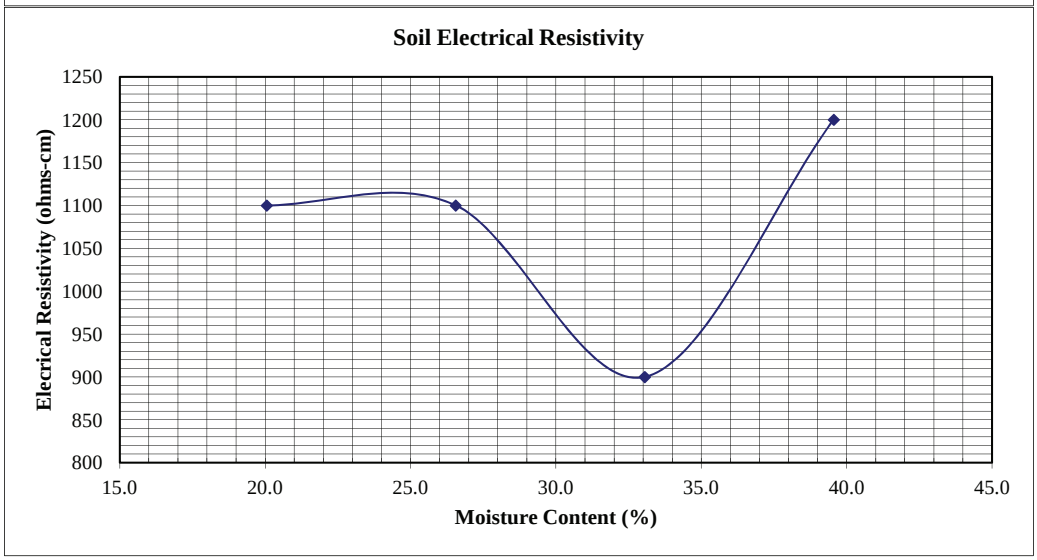
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	11/1/2013

Sample Number: TP43NE-4
Date of Sample: 10/14/13
Sample Location: Pier 43; Test Pit TP43NE, 8.5' below T/Pier Footing





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REPORT OF: LABORATORY TESTS OF SOILS

PROJECT: IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01 **OMNNI PROJECT NO.** T1463A13

CLIENT: WisDOT Northeast Region **DATE:** 10/18/2013

Sample Number: TP43NE-5
Date of Sample: 10/14/2013
Sample Location: Pier #43; Test Pit TP43NE, 6.5' below T/Pier Footing, ~Clay around Piles
General Description: Silt, dark grayish brown
Tests Performed: Grain Size Analysis, Minimum Electrical Resistivity, pH

TEST RESULTS;
Unified Soils Classification (ASTM:D2487): LEAN CLAY, dark grayish brown (CL)

USDA Soil Classification: Silty clay loam

Grain Size Analysis (AASTHTO T88)

SIEVE SIZE	% PASSING
1 1/2" (37.5 mm)	100
1" (25 mm)	100
3/4" (19 mm)	100
1/2" (12.5 mm)	100
3/8" (9.5 mm)	100
#4 (4.75 mm)	100
#10 (2.0 mm)	99
#40 (.425 mm)	97
#100 (.15 mm)	96
#200 (.075 mm)	94.1
.002 mm	-
D_{10}	-

Soil Electrical Resistivity (AASHTO T-288)
Minimum Electrical Resistivity (Ohms-cm) 800

Soil pH (AASHTO T289) 7.9

REMARKS: The above sample was obtained by Jason Weise of OMNNI Associates.

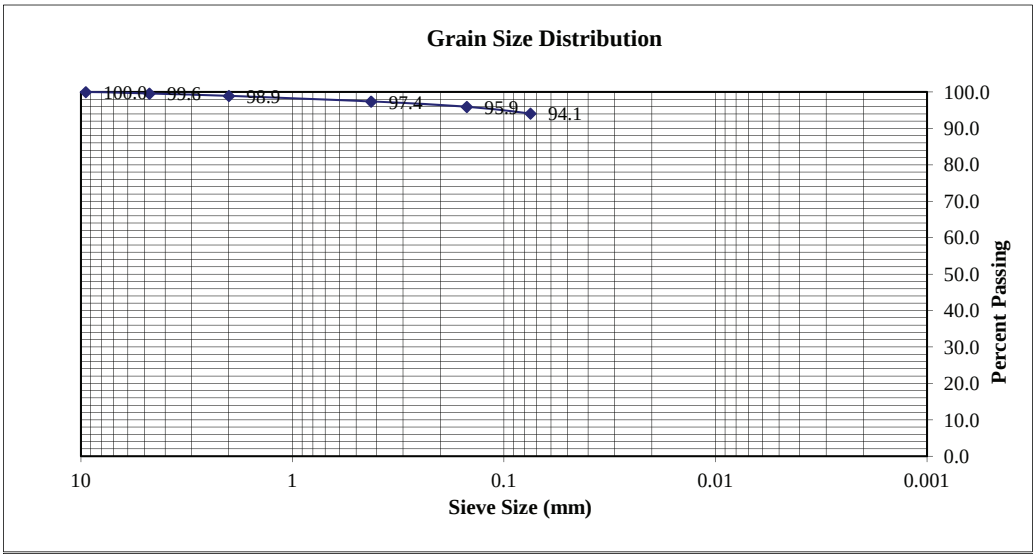
Reviewed By: *Paul R. Eggen*

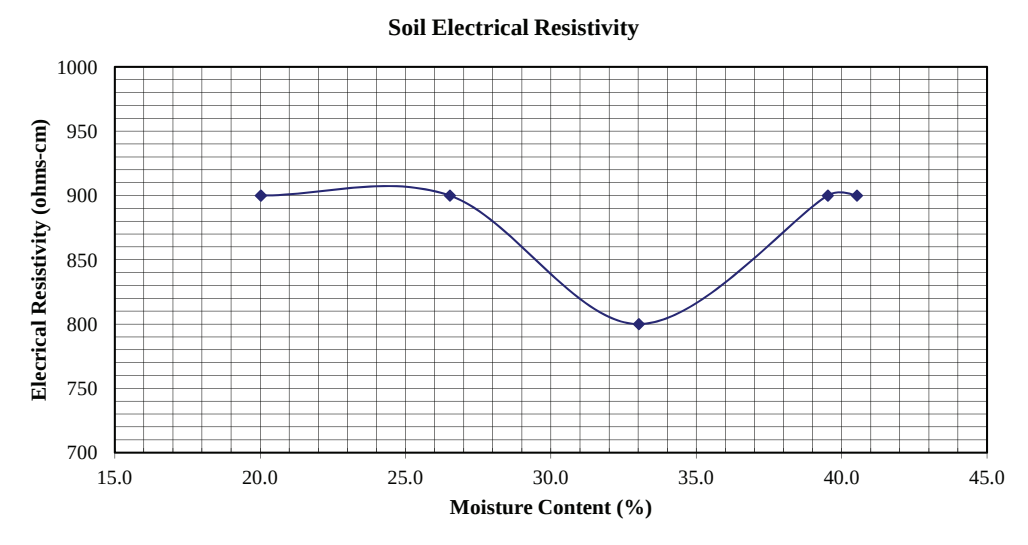
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PROJECT:	IH-43; Leo Frigo Bridge, Pier 22 Investigation; Prj. ID 1220-15-01	**OMNNI PROJECT NO.**	T1463A13
CLIENT:	WisDOT Northeast Region	**DATE:**	10/18/2013

Sample Number: TP43NE-5
Date of Sample: 10/14/13
Sample Location: Pier #43; Test Pit TP43NE, 6.5' below T/Pier Footing, ~Clay around Piles





One Systems Drive, Appleton, WI 54914, Ph. 920/735-6900, fax 920/830-6300

Moisture Content Determination
Test Method
Qualification Memorandum
by
Pace Analytical Services, Inc. (Pace)

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302
Phone: 920.469.2436
Fax: 920.469.8827

November 20, 2013

Brian Wayner
Omnni Associates
One System Drive
Appleton, WI 54914-1654

Pace Analytical uses ASTM D2974-87(A) for determining percent moisture. As required by analysis methods, when samples are not in a dry state prior to analysis the calculated percent moisture value from ASTM D2974-87(A) is used to correct laboratory results of solid samples to report on a dry weight basis. In practice, the percent moisture used in correction methods is the moisture content as a percentage of the total mass of the received sample. This value is one of two calculation methodologies for percent moisture in accordance with ASTM D2974-87(A) and is the standard calculation method used by Pace. Pace's standard method for moisture content (as a percentage of the total mass) calculation is as follows:

$$Moisture\ Content, \% = \frac{[(A - B) * 100]}{A}$$

$$A = mass\ of\ the\ as - recieved\ test\ specimen, g$$
$$B = mass\ of\ the\ oven - dried\ specimen, g$$

Standard Geotechnical practice, as in percent moisture results calculated by OMNNI Associates using AASHTO T265-93 methodology, is to calculate moisture as a percentage of the oven-dried mass. This method of calculating percent moisture is also in accordance with ASTM D2974-87(A), however the results can not used by Pace to correct laboratory results of solid samples. The geotechnical method for moisture content (as a percentage of the oven-dried mass) calculation is as follows:

$$Moisture\ Content, \% = \frac{[(A - B) * 100]}{B}$$

$$A = mass\ of\ the\ as - recieved\ test\ specimen, g$$
$$B = mass\ of\ the\ oven - dried\ specimen, g$$

As it is Pace's standard practice to use ASTM D2974-87(A) for determining percent moisture and because determining the percent moisture as a percentage of the of the oven-dried mass is not useable by the lab for data correction, **all** analytical reports generated by Pace Analytical will reference percent moisture as a percentage of the total mass. For geotechnical and comparison purposes, attached is a table reporting percent moisture results calculated using each of the calculation methodologies that are in accordance with ASTM D2974-87(A).

Brian Basten
Client Services Manager
Pace Analytical Services, Inc.

Sample ID	Lab ID	Collection Date	Analysis Date	Parameter ASTM 2974-87 (A)	Result (as % of total mass)	Result (as % of oven-dried mass)
TP05NE-1	4086632011	10/12/2013	10/13/2013	Percent Moisture	13.5%	15.6%
TP10S-1	4085855014	10/2/2013	10/3/2013	Percent Moisture	16.2%	19.3%
TP10S-2	4085855015	10/2/2013	10/3/2013	Percent Moisture	15.5%	18.3%
TP11S-1	4085673007	9/28/2013	9/29/2013	Percent Moisture	18.9%	23.3%
TP11S-2	4085673008	9/28/2013	9/29/2013	Percent Moisture	15.1%	17.8%
TP12S-1	4085855012	10/2/2013	10/3/2013	Percent Moisture	54.5%	119.8%
TP13NE-1	4086632006	10/12/2013	10/13/2013	Percent Moisture	44.2%	79.2%
TP13NE-2	4086632007	10/12/2013	10/13/2013	Percent Moisture	21.1%	26.7%
TP13NE-3	4086632008	10/12/2013	10/13/2013	Percent Moisture	16.3%	19.5%
TP13NE-4	4086632009	10/12/2013	10/13/2013	Percent Moisture	16.1%	19.2%
TP13NE-5	4086632010	10/12/2013	10/13/2013	Percent Moisture	42.6%	74.2%
TP13NE-6	4086632012	10/12/2013	10/13/2013	Percent Moisture	37.2%	59.2%
TP13NE-7	4086632013	10/12/2013	10/13/2013	Percent Moisture	50.6%	102.4%
TP13S-1	4085673005	9/28/2013	9/29/2013	Percent Moisture	47.7%	91.2%
TP13S-3	4085673006	9/28/2013	9/29/2013	Percent Moisture	61.5%	159.7%
TP14S-1	4085855009	10/2/2013	10/3/2013	Percent Moisture	27.0%	37.0%
TP14S-2	4085855010	10/2/2013	10/3/2013	Percent Moisture	45.5%	83.5%
TP15S-1	4085673001	9/28/2013	9/29/2013	Percent Moisture	45.3%	82.8%
TP15S-3	4085673002	9/28/2013	9/29/2013	Percent Moisture	17.8%	21.7%
TP16SE-1	4085855005	10/2/2013	10/3/2013	Percent Moisture	35.4%	54.8%
TP16SE-2	4085855006	10/2/2013	10/3/2013	Percent Moisture	18.2%	22.2%
TP16SE-3	4085855007	10/2/2013	10/3/2013	Percent Moisture	17.1%	20.6%
TP18SE	4085855004	10/2/2013	10/3/2013	Percent Moisture	45.3%	82.8%
TP18SE-1	4085855001	10/2/2013	10/3/2013	Percent Moisture	46.8%	88.0%
TP18SE-2	4085855002	10/2/2013	10/3/2013	Percent Moisture	19.6%	24.4%
TP19NE-1	4086632001	10/12/2013	10/13/2013	Percent Moisture	37.7%	60.5%
TP19NE-2	4086632003	10/12/2013	10/13/2013	Percent Moisture	64.4%	180.9%
TP19NE-3	4086632004	10/12/2013	10/13/2013	Percent Moisture	60.2%	151.3%
TP19NE-4	4086632005	10/12/2013	10/13/2013	Percent Moisture	17.6%	21.4%
TP19NW-1	4086633003	10/13/2013	10/13/2013	Percent Moisture	33.8%	51.1%
TP19NW-2	4086633004	10/13/2013	10/13/2013	Percent Moisture	18.7%	23.0%
TP19S-1	4085673009	9/28/2013	9/29/2013	Percent Moisture	52.1%	108.8%
TP19S-2	4085673010	9/28/2013	9/29/2013	Percent Moisture	77.4%	342.5%
TP19S-4	4085673012	9/28/2013	9/29/2013	Percent Moisture	16.2%	19.3%
TP19S-5	4085673013	9/28/2013	9/29/2013	Percent Moisture	18.6%	22.9%
TP20S-1	4085695001	9/30/2013	10/1/2013	Percent Moisture	45.7%	84.2%
TP20S-2	4085695002	9/30/2013	10/1/2013	Percent Moisture	78.9%	373.9%
TP20S-4	4085695003	9/30/2013	10/1/2013	Percent Moisture	53.5%	115.1%
TP20S-5	4085695004	9/30/2013	10/1/2013	Percent Moisture	45.9%	84.8%
TP21NW-1	4086633002	10/13/2013	10/13/2013	Percent Moisture	58.6%	141.5%
TP21S-1	4085695005	9/30/2013	10/1/2013	Percent Moisture	13.6%	15.7%
TP21S-2	4085695006	9/30/2013	10/1/2013	Percent Moisture	26.1%	35.3%
TP21S-3	4085695007	9/30/2013	10/1/2013	Percent Moisture	45.9%	84.8%
TP21S-4	4085695008	9/30/2013	10/1/2013	Percent Moisture	43.2%	76.1%
TP22N-1	4085775001	10/1/2013	10/2/2013	Percent Moisture	56.7%	130.9%
TP22N-2	4085775003	10/1/2013	10/2/2013	Percent Moisture	62.5%	166.7%
TP22N-3	4085775004	10/1/2013	10/2/2013	Percent Moisture	27.9%	38.7%
TP22N-4	4085775005	10/1/2013	10/2/2013	Percent Moisture	18.4%	22.5%
TP22S-1	4085674001	9/29/2013	9/29/2013	Percent Moisture	22.6%	29.2%

Sample ID	Lab ID	Collection Date	Analysis Date	Parameter ASTM 2974-87 (A)	Result (as % of total mass)	Result (as % of oven-dried mass)
TP22S-2	4085674002	9/29/2013	9/29/2013	Percent Moisture	49.3%	97.2%
TP22S-3	4085674003	9/29/2013	9/29/2013	Percent Moisture	51.7%	107.0%
TP22S-4	4085674004	9/29/2013	9/29/2013	Percent Moisture	2.0%	2.0%
TP22S-5	4085674005	9/29/2013	9/29/2013	Percent Moisture	53.4%	114.6%
TP22SW-1	4085775006	10/1/2013	10/2/2013	Percent Moisture	38.4%	62.3%
TP22SW-2	4085775007	10/1/2013	10/2/2013	Percent Moisture	15.3%	18.1%
TP22SW-3	4085775008	10/1/2013	10/2/2013	Percent Moisture	18.0%	22.0%
TP23S-1	4085688003	9/30/2013	9/30/2013	Percent Moisture	9.4%	10.4%
TP23S-2	4085688004	9/30/2013	9/30/2013	Percent Moisture	44.8%	81.2%
TP23S-3	4085688005	9/30/2013	9/30/2013	Percent Moisture	66.1%	195.0%
TP23S-4	4085688006	9/30/2013	9/30/2013	Percent Moisture	16.6%	19.9%
TP23S-5	4085688008	9/30/2013	9/30/2013	Percent Moisture	51.6%	106.6%
TP24NW-1	4086571001	10/11/2013	10/12/2013	Percent Moisture	2.7%	2.8%
TP24NW-2	4086571002	10/11/2013	10/12/2013	Percent Moisture	56.8%	131.5%
TP24NW-3	4086571003	10/11/2013	10/12/2013	Percent Moisture	14.9%	17.5%
TP24NW-4	4086571004	10/11/2013	10/12/2013	Percent Moisture	18.9%	23.3%
TP24NW-5	4086571005	10/11/2013	10/12/2013	Percent Moisture	18.0%	22.0%
TP24S-1	4085674006	9/29/2013	9/29/2013	Percent Moisture	13.7%	15.9%
TP24S-2	4085674007	9/29/2013	9/29/2013	Percent Moisture	40.3%	67.5%
TP24S-3	4085674008	9/29/2013	9/29/2013	Percent Moisture	73.3%	274.5%
TP24S-5	4085674009	9/29/2013	9/29/2013	Percent Moisture	27.4%	37.7%
TP24S-6	4085674010	9/29/2013	9/29/2013	Percent Moisture	13.9%	16.1%
TP25NE-1	4086571006	10/11/2013	10/12/2013	Percent Moisture	45.0%	81.8%
TP25NE-2	4086571007	10/11/2013	10/12/2013	Percent Moisture	61.9%	162.5%
TP25NE-3	4086571008	10/11/2013	10/12/2013	Percent Moisture	66.4%	197.6%
TP25NE-4	4086571009	10/11/2013	10/12/2013	Percent Moisture	18.9%	23.3%
TP25NE-5	4086632002	10/12/2013	10/13/2013	Percent Moisture	22.8%	29.5%
TP25NW-1	4086633001	10/13/2013	10/13/2013	Percent Moisture	63.4%	173.2%
TP25S-1	4085688001	9/30/2013	9/30/2013	Percent Moisture	47.6%	90.8%
TP25S-2	4085688002	9/30/2013	9/30/2013	Percent Moisture	56.1%	127.8%
TP32NE-1	4086660001	10/14/2013	10/15/2013	Percent Moisture	14.5%	17.0%
TP32NE-2	4086660002	10/14/2013	10/15/2013	Percent Moisture	14.1%	16.4%
TP32NE-3	4086660003	10/14/2013	10/15/2013	Percent Moisture	16.8%	20.2%
TP32NE-4	4086660004	10/14/2013	10/15/2013	Percent Moisture	27.1%	37.2%
TP32NE-5	4086660005	10/14/2013	10/15/2013	Percent Moisture	18.5%	22.7%
TP32NE-6	4086660006	10/14/2013	10/15/2013	Percent Moisture	17.4%	21.1%
TP39NW-1	4086734001	10/15/2013	10/15/2013	Percent Moisture	11.1%	12.5%
TP39NW-2	4086734002	10/15/2013	10/15/2013	Percent Moisture	13.4%	15.5%
TP39NW-3	4086734003	10/15/2013	10/15/2013	Percent Moisture	15.9%	18.9%
TP39NW-4	4086734004	10/15/2013	10/15/2013	Percent Moisture	29.8%	42.5%
TP39NW-5	4086734005	10/15/2013	10/15/2013	Percent Moisture	20.9%	26.4%
TP39SE-1	4086734006	10/15/2013	10/15/2013	Percent Moisture	9.5%	10.5%
TP39SE-2	4086734007	10/15/2013	10/15/2013	Percent Moisture	14.7%	17.2%
TP39SE-3	4086734008	10/15/2013	10/15/2013	Percent Moisture	50.8%	103.3%
TP39SE-4	4086734009	10/15/2013	10/15/2013	Percent Moisture	15.8%	18.8%
TP43NE-1	4086660007	10/14/2013	10/15/2013	Percent Moisture	10.9%	12.2%
TP43NE-2	4086660008	10/14/2013	10/15/2013	Percent Moisture	22.1%	28.4%
TP43NE-3	4086660009	10/14/2013	10/15/2013	Percent Moisture	29.7%	42.2%
TP43NE-4	4086660010	10/14/2013	10/15/2013	Percent Moisture	27.5%	37.9%

Sample ID	Lab ID	Collection Date	Analysis Date	Parameter ASTM 2974-87 (A)	Result (as % of total mass)	Result (as % of oven-dried mass)
TP43NE-5	4086660011	10/14/2013	10/15/2013	Percent Moisture	27.1%	37.2%

Chemical Analyses
by
Pace Analytical Services, Inc. (Pace)

Leo Frigo Memorial Bridge Investigation
Laboratory Identification Numbers for Samples
Samples Collected Through 10/22/2013

Sample ID	Matrix	Collected	Lab ID
MW10	Water	10/22/2013	4087502006
MW12	Water	10/22/2013	4087502007
MW14	Water	10/22/2013	4087502008
MW16S	Water	10/22/2013	4087502009
MW16S-W	Water	9/28/2013	4085673015
MW18S	Water	10/22/2013	4087502010
MW18S-W	Water	9/28/2013	4085673016
MW2	Water	10/22/2013	4087502001
MW20	Water	10/22/2013	4087502011
MW22N	Water	10/22/2013	4087502012
MW22N-W	Water	9/30/2013	4085688009
MW23N	Water	10/22/2013	4087502013
MW23N-W	Water	9/29/2013	4085674011
MW25S	Water	10/22/2013	4087502014
MW25S-W	Water	9/29/2013	4085674012
MW31	Water	10/22/2013	4087261001
MW33	Water	10/22/2013	4087261002
MW35	Water	10/22/2013	4087261003
MW37	Water	10/22/2013	4087261004
MW39	Water	10/22/2013	4087261005
MW4	Water	10/22/2013	4087502002
MW41	Water	10/22/2013	4087502015
MW43	Water	10/22/2013	4087502016
MW45	Water	10/22/2013	4087502017
MW47	Water	10/22/2013	4087502018
MW49	Water	10/22/2013	4087502019
MW51	Water	10/22/2013	4087502020
MW6	Water	10/22/2013	4087502003
MW8	Water	10/22/2013	4087502004
MW9	Water	10/22/2013	4087502005
TP05NE-1	Soil	10/12/2013	4086632011
TP10S-1	Soil	10/2/2013	4085855014
TP10S-1	Soil	10/2/2013	4085970020
TP10S-2	Soil	10/2/2013	4085855015
TP10S-2	Soil	10/2/2013	4085970021
TP10S-W	Water	10/2/2013	4085855016
TP11S-1	Soil	9/28/2013	4085673007
TP11S-1	Soil	9/28/2013	4085675003
TP11S-2	Soil	9/28/2013	4085673008
TP11S-2	Soil	9/28/2013	4085675004
TP11S-2W	Water	9/28/2013	4085673014
TP12S-1	Soil	10/2/2013	4085855012
TP12S-1	Soil	10/2/2013	4085970018
TP12S-W	Water	10/2/2013	4085855013
TP13NE-1	Soil	10/12/2013	4086632006
TP13NE-2	Soil	10/12/2013	4086632007
TP13NE-3	Soil	10/12/2013	4086632008
TP13NE-4	Soil	10/12/2013	4086632009
TP13NE-5	Soil	10/12/2013	4086632010
TP13NE-6	Soil	10/12/2013	4086632012
TP13NE-7	Soil	10/12/2013	4086632013
TP13S-1	Soil	9/28/2013	4085673005

Leo Frigo Memorial Bridge Investigation
Laboratory Identification Numbers for Samples
Samples Collected Through 10/22/2013

Sample ID	Matrix	Collected	Lab ID
TP13S-1	Soil	9/28/2013	4085675008
TP13S-1W	Water	9/28/2013	4085673004
TP13S-2	Soil	9/28/2013	4085675009
TP13S-3	Soil	9/28/2013	4085673006
TP13S-3	Soil	9/28/2013	4085675010
TP14S-1	Soil	10/2/2013	4085855009
TP14S-1	Soil	10/2/2013	4085970019
TP14S-2	Soil	10/2/2013	4085970015
TP14S-2	Soil	10/2/2013	4085855010
TP14S-3	Soil	10/2/2013	4085970016
TP14S-W	Water	10/2/2013	4085855011
TP15S-1	Soil	9/28/2013	4085673001
TP15S-1W	Water	9/28/2013	4085673003
TP15S-2	Soil	9/28/2013	4085675002
TP15S-3	Soil	9/28/2013	4085673002
TP15S-3	Soil	9/28/2013	4085675001
TP16SE-1	Soil	10/2/2013	4085855005
TP16SE-1	Soil	10/2/2013	4085970013
TP16SE-2	Soil	10/2/2013	4085855006
TP16SE-2	Soil	10/2/2013	4085970017
TP16SE-3	Soil	10/2/2013	4085970014
TP16SE-3	Soil	10/2/2013	4085855007
TP16SE-4	Soil	10/2/2013	4085970009
TP16SE-W	Water	10/2/2013	4085855008
TP17S-1	Soil	9/28/2013	4085675005
TP17S-2	Soil	9/28/2013	4085675006
TP17S-3	Soil	9/28/2013	4085675007
TP18SE	Soil	10/2/2013	4085855004
TP18SE-1	Soil	10/2/2013	4085855001
TP18SE-1	Soil	10/2/2013	4085970010
TP18SE-2	Soil	10/2/2013	4085855002
TP18SE-2	Soil	10/2/2013	4085970011
TP18SE-3	Soil	10/2/2013	4085970012
TP18SE-W	Water	10/2/2013	4085855003
TP19NE-1	Soil	10/12/2013	4086632001
TP19NE-2	Soil	10/12/2013	4086632003
TP19NE-3	Soil	10/12/2013	4086632004
TP19NE-4	Soil	10/12/2013	4086632005
TP19NW-1	Soil	10/13/2013	4086633003
TP19NW-2	Soil	10/13/2013	4086633004
TP19S-1	Soil	9/28/2013	4085673009
TP19S-1	Soil	9/28/2013	4085675011
TP19S-2	Soil	9/28/2013	4085673010
TP19S-2W	Water	9/28/2013	4085673011
TP19S-3	Soil	9/28/2013	4085675012
TP19S-4	Soil	9/28/2013	4085675013
TP19S-4	Soil	9/28/2013	4085673012
TP19S-5	Soil	9/28/2013	4085673013
TP19S-5	Soil	9/28/2013	4085675014
TP20S-1	Soil	9/30/2013	4085695001
TP20S-1	Soil	10/1/2013	4085774005
TP20S-2	Soil	9/30/2013	4085695002

Leo Frigo Memorial Bridge Investigation
Laboratory Identification Numbers for Samples
Samples Collected Through 10/22/2013

Sample ID	Matrix	Collected	Lab ID
TP20S-2	Soil	10/1/2013	4085774006
TP20S-3	Soil	10/1/2013	4085774009
TP20S-4	Soil	9/30/2013	4085695003
TP20S-4	Soil	10/1/2013	4085774008
TP20S-5	Soil	9/30/2013	4085695004
TP20S-5	Soil	10/1/2013	4085774001
TP21NW-1	Soil	10/13/2013	4086633002
TP21S-1	Soil	9/30/2013	4085695005
TP21S-1	Soil	10/1/2013	4085774012
TP21S-2	Soil	9/30/2013	4085695006
TP21S-2	Soil	10/1/2013	4085774013
TP21S-3	Soil	9/30/2013	4085695007
TP21S-3	Soil	10/1/2013	4085774007
TP21S-4	Soil	9/30/2013	4085695008
TP21S-4	Soil	10/1/2013	4085774010
TP22N-1	Soil	10/1/2013	4085775001
TP22N-1	Soil	10/1/2013	4085970004
TP22N-2	Soil	10/1/2013	4085775003
TP22N-2	Soil	10/1/2013	4085970003
TP22N-3	Soil	10/1/2013	4085775004
TP22N-3	Soil	10/1/2013	4085970002
TP22N-4	Soil	10/1/2013	4085775005
TP22N-4	Soil	10/1/2013	4085970007
TP22N-W	Water	10/1/2013	4085775002
TP22S-1	Soil	9/29/2013	4085674001
TP22S-1	Soil	9/30/2013	4085688018
TP22S-2	Soil	9/29/2013	4085674002
TP22S-2	Soil	9/30/2013	4085688017
TP22S-3	Soil	9/29/2013	4085674003
TP22S-3	Soil	9/30/2013	4085688016
TP22S-4	Soil	9/30/2013	4085688015
TP22S-4	Soil	9/29/2013	4085674004
TP22S-5	Soil	9/29/2013	4085674005
TP22SW-1	Soil	10/1/2013	4085970008
TP22SW-1	Soil	10/1/2013	4085775006
TP22SW-2	Soil	10/1/2013	4085775007
TP22SW-2	Soil	10/1/2013	4085970006
TP22SW-3	Soil	10/1/2013	4085775008
TP22SW-3	Soil	10/1/2013	4085970005
TP23S-1	Soil	9/30/2013	4085688003
TP23S-1	Soil	10/1/2013	4085774002
TP23S-2	Soil	9/30/2013	4085688004
TP23S-2	Soil	10/1/2013	4085774003
TP23S-3	Soil	9/30/2013	4085688005
TP23S-3W	Water	9/30/2013	4085688007
TP23S-4	Soil	10/1/2013	4085774004
TP23S-4	Soil	9/30/2013	4085688006
TP23S-5	Soil	9/30/2013	4085688008
TP23S-5	Soil	10/1/2013	4085774015
TP23S-6	Soil	9/30/2013	4085970001
TP24NW-1	Soil	10/11/2013	4086571001
TP24NW-2	Soil	10/11/2013	4086571002

Leo Frigo Memorial Bridge Investigation
Laboratory Identification Numbers for Samples
Samples Collected Through 10/22/2013

Sample ID	Matrix	Collected	Lab ID
TP24NW-3	Soil	10/11/2013	4086571003
TP24NW-4	Soil	10/11/2013	4086571004
TP24NW-5	Soil	10/11/2013	4086571005
TP24S-1	Soil	9/30/2013	4085688014
TP24S-1	Soil	9/29/2013	4085674006
TP24S-2	Soil	9/29/2013	4085674007
TP24S-2	Soil	9/30/2013	4085688011
TP24S-3	Soil	9/29/2013	4085674008
TP24S-4	Soil	9/30/2013	4085688013
TP24S-5	Soil	9/29/2013	4085674009
TP24S-5	Soil	9/30/2013	4085688012
TP24S-6	Soil	9/29/2013	4085674010
TP24S-6	Soil	9/30/2013	4085688010
TP25NE-1	Soil	10/11/2013	4086571006
TP25NE-2	Soil	10/11/2013	4086571007
TP25NE-3	Soil	10/11/2013	4086571008
TP25NE-4	Soil	10/11/2013	4086571009
TP25NE-5	Soil	10/12/2013	4086632002
TP25NW-1	Soil	10/13/2013	4086633001
TP25S-1	Soil	9/30/2013	4085688001
TP25S-1	Soil	10/1/2013	4085774014
TP25S-2	Soil	9/30/2013	4085688002
TP25S-2	Soil	10/1/2013	4085774011
TP32NE-1	Soil	10/14/2013	4086660001
TP32NE-2	Soil	10/14/2013	4086660002
TP32NE-3	Soil	10/14/2013	4086660003
TP32NE-4	Soil	10/14/2013	4086660004
TP32NE-5	Soil	10/14/2013	4086660005
TP32NE-6	Soil	10/14/2013	4086660006
TP39NW-1	Soil	10/15/2013	4086734001
TP39NW-2	Soil	10/15/2013	4086734002
TP39NW-3	Soil	10/15/2013	4086734003
TP39NW-4	Soil	10/15/2013	4086734004
TP39NW-5	Soil	10/15/2013	4086734005
TP39SE-1	Soil	10/15/2013	4086734006
TP39SE-2	Soil	10/15/2013	4086734007
TP39SE-3	Soil	10/15/2013	4086734008
TP39SE-4	Soil	10/15/2013	4086734009
TP43NE-1	Soil	10/14/2013	4086660007
TP43NE-2	Soil	10/14/2013	4086660008
TP43NE-3	Soil	10/14/2013	4086660009
TP43NE-4	Soil	10/14/2013	4086660010
TP43NE-5	Soil	10/14/2013	4086660011

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October 01, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on September 28, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085673001	TP15S-1	Solid	09/28/13 10:09	09/28/13 18:36
4085673002	TP15S-3	Solid	09/28/13 10:24	09/28/13 18:36
4085673003	TP15S-1W	Water	09/28/13 10:35	09/28/13 18:36
4085673004	TP13S-1W	Water	09/28/13 12:33	09/28/13 18:36
4085673005	TP13S-1	Solid	09/28/13 12:35	09/28/13 18:36
4085673006	TP13S-3	Solid	09/28/13 12:50	09/28/13 18:36
4085673007	TP11S-1	Solid	09/28/13 13:58	09/28/13 18:36
4085673008	TP11S-2	Solid	09/28/13 14:15	09/28/13 18:36
4085673009	TP19S-1	Solid	09/28/13 15:45	09/28/13 18:36
4085673010	TP19S-2	Solid	09/28/13 15:48	09/28/13 18:36
4085673011	TP19S-2W	Water	09/28/13 15:46	09/28/13 18:36
4085673012	TP19S-4	Solid	09/28/13 15:52	09/28/13 18:36
4085673013	TP19S-5	Solid	09/28/13 16:01	09/28/13 18:36
4085673014	TP11S-2W	Water	09/28/13 14:25	09/28/13 18:36
4085673015	MW16S-W	Water	09/28/13 17:48	09/28/13 18:36
4085673016	MW18S-W	Water	09/28/13 17:09	09/28/13 18:36

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085673001	TP15S-1	ASTM D2974-87	AH	1
		EPA 9040	DDY	1
		EPA 300.0	JCJ	4
4085673002	TP15S-3	ASTM D2974-87	AH	1
		EPA 9045	HKV	1
		EPA 300.0	JCJ	4
4085673003	TP15S-1W	EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085673004	TP13S-1W	EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085673005	TP13S-1	ASTM D2974-87	AH	1
		EPA 9040	DDY	1
		EPA 300.0	JCJ	4
4085673006	TP13S-3	ASTM D2974-87	AH	1
		EPA 9040	DDY	1
		EPA 300.0	JCJ	4
4085673007	TP11S-1	ASTM D2974-87	AH	1
		EPA 9045	HKV	1
		EPA 300.0	JCJ	4
4085673008	TP11S-2	ASTM D2974-87	AH	1
		EPA 9045	HKV	1
		EPA 300.0	JCJ	4
4085673009	TP19S-1	ASTM D2974-87	AH	1
		EPA 9040	DDY	1
		EPA 300.0	JCJ	4
4085673010	TP19S-2	ASTM D2974-87	AH	1
		EPA 9040	DDY	1
		EPA 300.0	JCJ	4
4085673011	TP19S-2W	SM 9222D	DEY	1

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085673012	TP19S-4	ASTM D2974-87	AH	1
		EPA 9045	HKV	1
		EPA 300.0	JCJ	4
4085673013	TP19S-5	ASTM D2974-87	AH	1
		EPA 9045	HKV	1
		EPA 300.0	JCJ	4
4085673014	TP11S-2W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085673015	MW16S-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085673016	MW18S-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP15S-1 **Lab ID: 4085673001** Collected: 09/28/13 10:09 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.3**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**7.6**	Std. Units	0.10	0.010	1		09/30/13 16:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.6**	mg/kg	7.3	3.6	1	09/29/13 09:30	09/30/13 10:25	24959-67-9	
Chloride	**896**	mg/kg	72.7	36.4	1	09/29/13 09:30	09/30/13 10:25	16887-00-6	
Fluoride	**8.2**	mg/kg	7.3	3.6	1	09/29/13 09:30	09/30/13 10:25	16984-48-8	
Sulfate	**396**	mg/kg	72.7	36.4	1	09/29/13 09:30	09/30/13 10:25	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**461**	mg/kg	50.5	25.2	1	09/29/13 04:30	09/29/13 09:14	7723-14-0	

Sample: TP15S-3 **Lab ID: 4085673002** Collected: 09/28/13 10:24 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**17.8**	%	0.10	0.10	1		09/29/13 18:50		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		09/28/13 21:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.9	2.4	1	09/29/13 09:30	09/30/13 10:33	24959-67-9	
Chloride	**140**	mg/kg	48.7	24.3	1	09/29/13 09:30	09/30/13 10:33	16887-00-6	
Fluoride	**3.5J**	mg/kg	4.9	2.4	1	09/29/13 09:30	09/30/13 10:33	16984-48-8	
Sulfate	**27.3J**	mg/kg	48.7	24.3	1	09/29/13 09:30	09/30/13 10:33	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**123**	mg/kg	27.8	13.9	1	09/29/13 04:30	09/29/13 09:14	7723-14-0	

Sample: TP15S-1W **Lab ID: 4085673003** Collected: 09/28/13 10:35 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4080**	umhos/cm	10.0	1.1	1		09/30/13 17:12		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP15S-1W **Lab ID: 4085673003** Collected: 09/28/13 10:35 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**824**	mg/L	10.0	0.63	1		09/28/13 21:35		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.31**	mg/L	0.25	0.10	1		09/28/13 20:30		H6,M0
9040 pH	Analytical Method: EPA 9040								
pH	**6.9**	Std. Units	0.10	0.010	1		09/28/13 22:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		09/30/13 00:52	24959-67-9	D3
Chloride	**1270**	mg/L	200	100	50		09/30/13 09:22	16887-00-6	
Fluoride	**<1.0**	mg/L	2.0	1.0	5		09/30/13 00:52	16984-48-8	D3
Sulfate	**10.7J**	mg/L	20.0	10.0	5		09/30/13 00:52	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.75**	mg/L	0.40	0.052	1	09/29/13 04:30	09/29/13 09:23	7723-14-0	

Sample: TP13S-1W **Lab ID: 4085673004** Collected: 09/28/13 12:33 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**3830**	umhos/cm	10.0	1.1	1		09/30/13 17:14		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**570**	mg/L	10.0	0.63	1		09/29/13 00:50		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.36**	mg/L	0.25	0.10	1		09/28/13 20:30		H6
9040 pH	Analytical Method: EPA 9040								
pH	**6.9**	Std. Units	0.10	0.010	1		09/28/13 22:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		09/30/13 01:03	24959-67-9	D3
Chloride	**991**	mg/L	200	100	50		09/30/13 09:34	16887-00-6	
Fluoride	**<1.0**	mg/L	2.0	1.0	5		09/30/13 01:03	16984-48-8	D3
Sulfate	**30.3**	mg/L	20.0	10.0	5		09/30/13 01:03	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.72**	mg/L	0.40	0.052	1	09/29/13 04:30	09/29/13 09:25	7723-14-0	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP13S-1 **Lab ID: 4085673005** Collected: 09/28/13 12:35 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**47.7**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**7.5**	Std. Units	0.10	0.010	1		09/30/13 16:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.8**	mg/kg	7.6	3.8	1	09/29/13 09:30	09/30/13 10:41	24959-67-9	
Chloride	**1550**	mg/kg	379	189	5	09/29/13 09:30	09/30/13 12:44	16887-00-6	
Fluoride	**13.3**	mg/kg	7.6	3.8	1	09/29/13 09:30	09/30/13 10:41	16984-48-8	
Sulfate	**101**	mg/kg	75.7	37.9	1	09/29/13 09:30	09/30/13 10:41	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**399**	mg/kg	49.3	24.7	1	09/29/13 04:30	09/29/13 09:15	7723-14-0	

Sample: TP13S-3 **Lab ID: 4085673006** Collected: 09/28/13 12:50 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**61.5**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**7.6**	Std. Units	0.10	0.010	1		09/30/13 16:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<5.2**	mg/kg	10.4	5.2	1	09/29/13 09:30	09/30/13 10:49	24959-67-9	
Chloride	**1800**	mg/kg	208	104	2	09/29/13 09:30	09/30/13 12:52	16887-00-6	
Fluoride	**8.1J**	mg/kg	10.4	5.2	1	09/29/13 09:30	09/30/13 10:49	16984-48-8	
Sulfate	**138**	mg/kg	104	52.0	1	09/29/13 09:30	09/30/13 10:49	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**469**	mg/kg	83.2	41.6	1	09/29/13 04:30	09/29/13 09:15	7723-14-0	

Sample: TP11S-1 **Lab ID: 4085673007** Collected: 09/28/13 13:58 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.9**	%	0.10	0.10	1		09/29/13 18:50		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP11S-1 **Lab ID: 4085673007** Collected: 09/28/13 13:58 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		09/28/13 21:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.8	2.4	1	09/29/13 09:30	09/30/13 10:57	24959-67-9	
Chloride	**1400**	mg/kg	242	121	5	09/29/13 09:30	09/30/13 13:00	16887-00-6	
Fluoride	**3.6J**	mg/kg	4.8	2.4	1	09/29/13 09:30	09/30/13 10:57	16984-48-8	
Sulfate	**646**	mg/kg	48.3	24.2	1	09/29/13 09:30	09/30/13 10:57	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**473**	mg/kg	28.2	14.1	1	09/29/13 04:30	09/29/13 09:16	7723-14-0	

Sample: TP11S-2 **Lab ID: 4085673008** Collected: 09/28/13 14:15 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**15.1**	%	0.10	0.10	1		09/29/13 18:50		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.6**	Std. Units	0.10	0.010	1		09/28/13 21:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.3**	mg/kg	4.7	2.3	1	09/29/13 09:30	09/30/13 11:06	24959-67-9	
Chloride	**281**	mg/kg	46.9	23.5	1	09/29/13 09:30	09/30/13 11:06	16887-00-6	
Fluoride	**2.9J**	mg/kg	4.7	2.3	1	09/29/13 09:30	09/30/13 11:06	16984-48-8	
Sulfate	**50.9**	mg/kg	46.9	23.5	1	09/29/13 09:30	09/30/13 11:06	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**387**	mg/kg	20.9	10.5	1	09/29/13 04:30	09/29/13 09:18	7723-14-0	

Sample: TP19S-1 **Lab ID: 4085673009** Collected: 09/28/13 15:45 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**52.1**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**7.6**	Std. Units	0.10	0.010	1		09/30/13 16:15		H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP19S-1 **Lab ID: 4085673009** Collected: 09/28/13 15:45 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<4.2**	mg/kg	8.3	4.2	1	09/29/13 09:30	09/30/13 11:14	24959-67-9	
Chloride	**1740**	mg/kg	417	209	5	09/29/13 09:30	09/30/13 13:09	16887-00-6	
Fluoride	**12.7**	mg/kg	8.3	4.2	1	09/29/13 09:30	09/30/13 11:14	16984-48-8	
Sulfate	**215**	mg/kg	83.5	41.7	1	09/29/13 09:30	09/30/13 11:14	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**486**	mg/kg	46.4	23.2	1	09/29/13 04:30	09/29/13 09:19	7723-14-0	

Sample: TP19S-2 **Lab ID: 4085673010** Collected: 09/28/13 15:48 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**77.4**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**7.5**	Std. Units	0.10	0.010	1		09/30/13 16:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<8.8**	mg/kg	17.7	8.8	1	09/29/13 09:30	09/30/13 11:22	24959-67-9	
Chloride	**4060**	mg/kg	883	442	5	09/29/13 09:30	09/30/13 13:17	16887-00-6	
Fluoride	**<8.8**	mg/kg	17.7	8.8	1	09/29/13 09:30	09/30/13 11:22	16984-48-8	
Sulfate	**268**	mg/kg	177	88.3	1	09/29/13 09:30	09/30/13 11:22	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**266**	mg/kg	122	60.9	1	09/29/13 04:30	09/29/13 09:19	7723-14-0	

Sample: TP19S-2W **Lab ID: 4085673011** Collected: 09/28/13 15:46 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<9.01**	CFU/100 mL	9.0	9.0	9.01	09/28/13 20:25	09/28/13 20:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5110**	umhos/cm	10.0	1.1	1		09/30/13 17:15		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**786**	mg/L	10.0	0.63	1		09/29/13 01:48		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP19S-2W **Lab ID: 4085673011** Collected: 09/28/13 15:46 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**<0.10**	mg/L	0.25	0.10	1		09/28/13 20:30		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**6.8**	Std. Units	0.10	0.010	1		09/28/13 22:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		09/30/13 01:14	24959-67-9	
Chloride	**1460**	mg/L	200	100	50		09/30/13 09:45	16887-00-6	
Fluoride	**<0.20**	mg/L	0.40	0.20	1		09/30/13 01:14	16984-48-8	
Sulfate	**2.8J**	mg/L	4.0	2.0	1		09/30/13 01:14	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**<0.052**	mg/L	0.40	0.052	1	09/29/13 04:30	09/29/13 09:26	7723-14-0	

Sample: TP19S-4 **Lab ID: 4085673012** Collected: 09/28/13 15:52 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**16.2**	%	0.10	0.10	1		09/29/13 18:50		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		09/28/13 21:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.7	2.4	1	09/29/13 09:30	09/30/13 11:46	24959-67-9	
Chloride	**287**	mg/kg	47.2	23.6	1	09/29/13 09:30	09/30/13 11:46	16887-00-6	
Fluoride	**2.9J**	mg/kg	4.7	2.4	1	09/29/13 09:30	09/30/13 11:46	16984-48-8	
Sulfate	**32.3J**	mg/kg	47.2	23.6	1	09/29/13 09:30	09/30/13 11:46	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**113**	mg/kg	19.5	9.7	1	09/29/13 04:30	09/29/13 09:20	7723-14-0	

Sample: TP19S-5 **Lab ID: 4085673013** Collected: 09/28/13 16:01 Received: 09/28/13 18:36 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.6**	%	0.10	0.10	1		09/29/13 18:50		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: TP19S-5 **Lab ID: 4085673013** Collected: 09/28/13 16:01 Received: 09/28/13 18:36 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.4**	Std. Units	0.10	0.010	1		09/28/13 21:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.5**	mg/kg	4.9	2.5	1	09/29/13 09:30	09/30/13 11:55	24959-67-9	
Chloride	**258**	mg/kg	49.1	24.5	1	09/29/13 09:30	09/30/13 11:55	16887-00-6	
Fluoride	**4.7J**	mg/kg	4.9	2.5	1	09/29/13 09:30	09/30/13 11:55	16984-48-8	
Sulfate	**38.6J**	mg/kg	49.1	24.5	1	09/29/13 09:30	09/30/13 11:55	14808-79-8	
	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**439**	mg/kg	27.3	13.7	1	09/29/13 04:30	09/29/13 09:20	7723-14-0	

Sample: TP11S-2W **Lab ID: 4085673014** Collected: 09/28/13 14:25 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<2.44**	CFU/100 mL	2.4	2.4	2.44	09/28/13 20:25	09/28/13 20:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4750**	umhos/cm	10.0	1.1	1		09/30/13 17:16		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**144**	mg/L	10.0	0.63	1		09/29/13 02:17		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**<0.10**	mg/L	0.25	0.10	1		09/28/13 20:30		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**8.0**	Std. Units	0.10	0.010	1		09/28/13 22:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		09/30/13 01:25	24959-67-9	
Chloride	**1450**	mg/L	400	200	100		09/30/13 10:29	16887-00-6	M0
Fluoride	**<0.20**	mg/L	0.40	0.20	1		09/30/13 01:25	16984-48-8	M0
Sulfate	**228**	mg/L	40.0	20.0	10		09/30/13 09:56	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.65**	mg/L	0.40	0.052	1	09/29/13 04:30	09/29/13 09:26	7723-14-0	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: MW16S-W **Lab ID: 4085673015** Collected: 09/28/13 17:48 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<32.1**	CFU/100 mL	32.1	32.1	32.1	09/28/13 20:25	09/28/13 20:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**8240**	umhos/cm	10.0	1.1	1		09/30/13 17:16		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**2110**	mg/L	10.0	0.63	1		09/29/13 12:23		P6
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**8.1**	mg/L	1.2	0.52	1		09/28/13 20:30		H6
9040 pH	Analytical Method: EPA 9040								
pH	**6.7**	Std. Units	0.10	0.010	1		09/28/13 22:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		09/30/13 01:58	24959-67-9	
Chloride	**2530**	mg/L	400	200	100		09/30/13 11:02	16887-00-6	
Fluoride	**<0.20**	mg/L	0.40	0.20	1		09/30/13 01:58	16984-48-8	
Sulfate	**7.4**	mg/L	4.0	2.0	1		09/30/13 01:58	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**5.9**	mg/L	0.40	0.052	1	09/29/13 04:30	09/29/13 09:27	7723-14-0	

Sample: MW18S-W **Lab ID: 4085673016** Collected: 09/28/13 17:09 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<16.4**	CFU/100 mL	16.4	16.4	16.4	09/28/13 20:25	09/28/13 20:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**9770**	umhos/cm	10.0	1.1	1		09/30/13 17:18		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1200**	mg/L	10.0	0.63	1		09/29/13 20:07		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**<0.10**	mg/L	0.25	0.10	1		09/28/13 20:30		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**7.1**	Std. Units	0.10	0.010	1		09/28/13 22:40		H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Sample: MW18S-W **Lab ID: 4085673016** Collected: 09/28/13 17:09 Received: 09/28/13 18:36 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		09/30/13 02:09	24959-67-9	
Chloride	**3180**	mg/L	400	200	100		09/30/13 11:46	16887-00-6	
Fluoride	**<0.20**	mg/L	0.40	0.20	1		09/30/13 02:09	16984-48-8	
Sulfate	**87.2**	mg/L	20.0	10.0	5		09/30/13 11:35	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**3.3**	mg/L	0.40	0.052	1	09/29/13 04:30	09/29/13 09:27	7723-14-0	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: MBIO/3101 Analysis Method: SM 9222D
QC Batch Method: SM 9222D Analysis Description: 9222D MICRO Fecal Coliform by MF
Associated Lab Samples: 4085673011, 4085673014, 4085673015, 4085673016

METHOD BLANK: 865228 Matrix: Water
Associated Lab Samples: 4085673011, 4085673014, 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	09/28/13 20:25	

METHOD BLANK: 865230 Matrix: Water
Associated Lab Samples: 4085673011, 4085673014, 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	09/28/13 20:25	

SAMPLE DUPLICATE: 865229

Parameter	Units	4085673011 Result	Dup Result	RPD	Max RPD	Qualifiers
Fecal Coliforms	CFU/100 mL	<9.01	<9.01			

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: PMST/8904 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085673001, 4085673002, 4085673005, 4085673006, 4085673007, 4085673008, 4085673009, 4085673010, 4085673012, 4085673013

SAMPLE DUPLICATE: 865118

Parameter	Units	4085673008 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	15.1	15.0	1	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16423 Analysis Method: EPA 120.1
QC Batch Method: EPA 120.1 Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

METHOD BLANK: 865578 Matrix: Water
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	09/30/13 17:11	

LABORATORY CONTROL SAMPLE: 865579

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	646	620	96	80-120	

SAMPLE DUPLICATE: 865580

Parameter	Units	4085673003 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	4080	4200	3	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16402 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014

METHOD BLANK: 865075 Matrix: Water
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	09/28/13 21:24	

LABORATORY CONTROL SAMPLE: 865076

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	202	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865077 865078

Parameter	Units	4085673003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	824	200	200	1030	1030	103	103	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16405 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085673015, 4085673016

METHOD BLANK: 865087 Matrix: Water
Associated Lab Samples: 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	09/29/13 12:14	

LABORATORY CONTROL SAMPLE: 865088

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	490	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865089 865090

Parameter	Units	4085673015 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	2110	500	500	2420	2320	62	43	80-120	4	20	P6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16403 Analysis Method: HACH 8146
QC Batch Method: HACH 8146 Analysis Description: Iron, Ferrous
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

METHOD BLANK: 865079 Matrix: Water
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.021	0.050	09/28/13 20:30	

LABORATORY CONTROL SAMPLE: 865080

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	.6	0.63	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865081 865082

Parameter	Units	4085673003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Ferrous	mg/L	0.31	3	3	3.9	3.9	118	121	80-120	2	20	M0

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16406 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

SAMPLE DUPLICATE: 865091

Parameter	Units	4085673003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	6.9	6.9	0	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16422 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085673001, 4085673005, 4085673006, 4085673009, 4085673010

SAMPLE DUPLICATE: 865577

Parameter	Units	4085673005 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.5	7.5	0	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WET/16413 Analysis Method: EPA 9045
QC Batch Method: EPA 9045 Analysis Description: 9045 pH
Associated Lab Samples: 4085673002, 4085673007, 4085673008, 4085673012, 4085673013

SAMPLE DUPLICATE: 865363

Parameter	Units	4085673012 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	0	5	

SAMPLE DUPLICATE: 865364

Parameter	Units	4085673013 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.4	8.4	0	5	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WETA/19702 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085673001, 4085673002, 4085673005, 4085673006, 4085673007, 4085673008, 4085673009, 4085673010, 4085673012, 4085673013

METHOD BLANK: 865083 Matrix: Solid
Associated Lab Samples: 4085673001, 4085673002, 4085673005, 4085673006, 4085673007, 4085673008, 4085673009, 4085673010, 4085673012, 4085673013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/kg	<2.0	4.0	09/30/13 09:54	
Chloride	mg/kg	<20.0	40.0	09/30/13 09:54	
Fluoride	mg/kg	<2.0	4.0	09/30/13 09:54	
Sulfate	mg/kg	<20.0	40.0	09/30/13 09:54	

LABORATORY CONTROL SAMPLE: 865084

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/kg	20	21.5	108	80-120	
Chloride	mg/kg	200	210	105	80-120	
Fluoride	mg/kg	20	21.7	108	80-120	
Sulfate	mg/kg	200	209	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865085 865086

Parameter	Units	4085673013 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<2.5	24.6	24.6	25.8	25.6	105	104	80-120	1	20	
Chloride	mg/kg	258	246	246	521	522	107	107	80-120	0	20	
Fluoride	mg/kg	4.7J	24.6	24.6	28.5	28.8	97	98	80-120	1	20	
Sulfate	mg/kg	38.6J	246	246	250	252	86	87	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WETA/19704 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

METHOD BLANK: 865124 Matrix: Water
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/L	<0.20	0.40	09/30/13 00:29	
Chloride	mg/L	<2.0	4.0	09/30/13 00:29	
Fluoride	mg/L	<0.20	0.40	09/30/13 00:29	
Sulfate	mg/L	<2.0	4.0	09/30/13 00:29	

LABORATORY CONTROL SAMPLE: 865125

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/L	2	2.0	99	90-110	
Chloride	mg/L	20	18.9	94	90-110	
Fluoride	mg/L	2	1.9	97	90-110	
Sulfate	mg/L	20	19.1	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865126 865127

Parameter	Units	4085673014 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/L	<0.20	2	2	2.4	2.2	110	98	90-110	10	20	
Chloride	mg/L	1450	2000	2000	3700	3480	113	101	90-110	6	20	M0
Fluoride	mg/L	<0.20	2	2	2.0	1.8	95	84	90-110	13	20	M0
Sulfate	mg/L	228	200	200	431	434	102	103	90-110	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WETA/19697 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 4085673001, 4085673002, 4085673005, 4085673006, 4085673007, 4085673008, 4085673009, 4085673010, 4085673012, 4085673013

METHOD BLANK: 865067 Matrix: Solid
Associated Lab Samples: 4085673001, 4085673002, 4085673005, 4085673006, 4085673007, 4085673008, 4085673009, 4085673010, 4085673012, 4085673013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	<20.0	40.0	09/29/13 09:12	

LABORATORY CONTROL SAMPLE: 865068

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	500	493	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865069 865070

Parameter	Units	4085673013 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	439	342	342	748	711	91	80	80-120	5	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

QC Batch: WETA/19698 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

METHOD BLANK: 865071 Matrix: Water
Associated Lab Samples: 4085673003, 4085673004, 4085673011, 4085673014, 4085673015, 4085673016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	<0.052	0.40	09/29/13 09:22	

LABORATORY CONTROL SAMPLE: 865072

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	5	4.8	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865073 865074

Parameter	Units	4085549002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	0.78	5	5	5.7	5.7	98	97	90-110	1	20	

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

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ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA recommended holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085673011	TP19S-2W	SM 9222D	MBIO/3100	SM 9222D	MBIO/3101
4085673014	TP11S-2W	SM 9222D	MBIO/3100	SM 9222D	MBIO/3101
4085673015	MW16S-W	SM 9222D	MBIO/3100	SM 9222D	MBIO/3101
4085673016	MW18S-W	SM 9222D	MBIO/3100	SM 9222D	MBIO/3101
4085673001	TP15S-1	ASTM D2974-87	PMST/8904		
4085673002	TP15S-3	ASTM D2974-87	PMST/8904		
4085673005	TP13S-1	ASTM D2974-87	PMST/8904		
4085673006	TP13S-3	ASTM D2974-87	PMST/8904		
4085673007	TP11S-1	ASTM D2974-87	PMST/8904		
4085673008	TP11S-2	ASTM D2974-87	PMST/8904		
4085673009	TP19S-1	ASTM D2974-87	PMST/8904		
4085673010	TP19S-2	ASTM D2974-87	PMST/8904		
4085673012	TP19S-4	ASTM D2974-87	PMST/8904		
4085673013	TP19S-5	ASTM D2974-87	PMST/8904		
4085673003	TP15S-1W	EPA 120.1	WET/16423		
4085673004	TP13S-1W	EPA 120.1	WET/16423		
4085673011	TP19S-2W	EPA 120.1	WET/16423		
4085673014	TP11S-2W	EPA 120.1	WET/16423		
4085673015	MW16S-W	EPA 120.1	WET/16423		
4085673016	MW18S-W	EPA 120.1	WET/16423		
4085673003	TP15S-1W	SM 2320B	WET/16402		
4085673004	TP13S-1W	SM 2320B	WET/16402		
4085673011	TP19S-2W	SM 2320B	WET/16402		
4085673014	TP11S-2W	SM 2320B	WET/16402		
4085673015	MW16S-W	SM 2320B	WET/16405		
4085673016	MW18S-W	SM 2320B	WET/16405		
4085673003	TP15S-1W	HACH 8146	WET/16403		
4085673004	TP13S-1W	HACH 8146	WET/16403		
4085673011	TP19S-2W	HACH 8146	WET/16403		
4085673014	TP11S-2W	HACH 8146	WET/16403		
4085673015	MW16S-W	HACH 8146	WET/16403		
4085673016	MW18S-W	HACH 8146	WET/16403		
4085673001	TP15S-1	EPA 9040	WET/16422		
4085673003	TP15S-1W	EPA 9040	WET/16406		
4085673004	TP13S-1W	EPA 9040	WET/16406		
4085673005	TP13S-1	EPA 9040	WET/16422		
4085673006	TP13S-3	EPA 9040	WET/16422		
4085673009	TP19S-1	EPA 9040	WET/16422		
4085673010	TP19S-2	EPA 9040	WET/16422		
4085673011	TP19S-2W	EPA 9040	WET/16406		
4085673014	TP11S-2W	EPA 9040	WET/16406		
4085673015	MW16S-W	EPA 9040	WET/16406		
4085673016	MW18S-W	EPA 9040	WET/16406		
4085673002	TP15S-3	EPA 9045	WET/16413		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085673

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085673007	TP11S-1	EPA 9045	WET/16413		
4085673008	TP11S-2	EPA 9045	WET/16413		
4085673012	TP19S-4	EPA 9045	WET/16413		
4085673013	TP19S-5	EPA 9045	WET/16413		
4085673001	TP15S-1	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673002	TP15S-3	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673005	TP13S-1	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673006	TP13S-3	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673007	TP11S-1	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673008	TP11S-2	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673009	TP19S-1	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673010	TP19S-2	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673012	TP19S-4	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673013	TP19S-5	EPA 300.0	WETA/19702	EPA 300.0	WETA/19715
4085673003	TP15S-1W	EPA 300.0	WETA/19704		
4085673004	TP13S-1W	EPA 300.0	WETA/19704		
4085673011	TP19S-2W	EPA 300.0	WETA/19704		
4085673014	TP11S-2W	EPA 300.0	WETA/19704		
4085673015	MW16S-W	EPA 300.0	WETA/19704		
4085673016	MW18S-W	EPA 300.0	WETA/19704		
4085673003	TP15S-1W	EPA 365.4	WETA/19698	EPA 365.4	WETA/19700
4085673004	TP13S-1W	EPA 365.4	WETA/19698	EPA 365.4	WETA/19700
4085673011	TP19S-2W	EPA 365.4	WETA/19698	EPA 365.4	WETA/19700
4085673014	TP11S-2W	EPA 365.4	WETA/19698	EPA 365.4	WETA/19700
4085673015	MW16S-W	EPA 365.4	WETA/19698	EPA 365.4	WETA/19700
4085673016	MW18S-W	EPA 365.4	WETA/19698	EPA 365.4	WETA/19700

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MAT ✓

CHAIN OF CUSTODY

4085673

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	TH63A13
Project Name:	LEO FRIGO MEMORIAL BRIDGE
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity (1)	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
						N	A											
001	TP15S-1	9/28/13	10:09	S				X	X									
002	TP15S-3		10:24	S				X	X									
003	TP15S-1W		10:35	GW						X	X	X	X		0X			
004	TP13S-1W		12:33	GW						X	X	X	X		0X		(1) Added per TB 9-30-13	
005	TP13S-1		12:35	S				X	X									
006	TP13S-3		12:50	S				X	X									
007	TP11S-1		13:58	S				X	X									
008	TP11S-2		14:15	S				X	X									
009	TP19S-1		15:41	S				X	X									
010	TP19S-2		15:48	S				X	X									
011	TP19S-2W		15:46	W						X	X	X	X	X	0X			
012	TP19S-4		15:52	S				X	X									
013	TP19S-5		16:01	S				X	X									

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/28/13 6:36pm	JM with	9/30/13 10:50

PACE Project No.: 4085673

Receipt Temp = °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

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4085673

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
						N	A	N	A	C	N	N	0			
014	TP11S-ZW	9/28/13	14:25	GW				X	X	X	X	X	0X			
015	MW16S-W	"	17:48	"				X	X	X	X	X	X			
016	MW18S-W	"	17:09	"				X	X	X	X	X	X			

(Rush) Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	9/28/13 6:36pm	Jim Wirk	9/28/13 18:50

PACE Project No.

Receipt Temp = °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services,
1241 Bellevue Street, Suit
Green Bay, WI 54

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Assoc. Project # 408673

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☐ no Seals intact: ☑ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☐ no Seals intact: ☑ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used SR-45 Type of Ice: (Wet) Blue Dry None ☐ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 4.0 /Corr: _____ Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents: Date: Dan W. 9/26/13 Initials: DAW

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No ☐N/A	6. Fecal / Ferrous Iron
Rush Tum Around Time Requested:	☑Yes ☐No ☐N/A	7. 9/30/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☐N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

If checked, see attached form for additional comments ☐

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: 9-30-13

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 07, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on September 29, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085674001	TP22S-1	Solid	09/29/13 10:05	09/29/13 17:48
4085674002	TP22S-2	Solid	09/29/13 10:08	09/29/13 17:48
4085674003	TP22S-3	Solid	09/29/13 10:40	09/29/13 17:48
4085674004	TP22S-4	Solid	09/29/13 14:10	09/29/13 17:48
4085674005	TP22S-5	Solid	09/29/13 13:50	09/29/13 17:48
4085674006	TP24S-1	Solid	09/29/13 14:50	09/29/13 17:48
4085674007	TP24S-2	Solid	09/29/13 14:50	09/29/13 17:48
4085674008	TP24S-3	Solid	09/29/13 14:55	09/29/13 17:48
4085674009	TP24S-5	Solid	09/29/13 15:40	09/29/13 17:48
4085674010	TP24S-6	Solid	09/29/13 15:15	09/29/13 17:48
4085674011	MW23N-W	Water	09/29/13 16:02	09/29/13 17:48
4085674012	MW25S-W	Water	09/29/13 16:57	09/29/13 17:48

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085674001	TP22S-1	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674002	TP22S-2	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674003	TP22S-3	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674004	TP22S-4	ASTM D2974-87	AH	1
		EPA 9045	DDY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674005	TP22S-5	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674006	TP24S-1	ASTM D2974-87	AH	1
		EPA 9045	DDY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674007	TP24S-2	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674008	TP24S-3	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674009	TP24S-5	ASTM D2974-87	AH	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674010	TP24S-6	ASTM D2974-87	AH	1

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		EPA 9045	DDY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674011	**MW23N-W**	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085674012	**MW25S-W**	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	HKV	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Sample: TP22S-1 **Lab ID: 4085674001** Collected: 09/29/13 10:05 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**22.6**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**7.5**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.6**	mg/kg	5.2	2.6	1	09/29/13 20:45	09/30/13 21:06	24959-67-9	
Chloride	**1720**	mg/kg	516	258	10	09/29/13 20:45	09/30/13 23:09	16887-00-6	
Fluoride	**5.8**	mg/kg	5.2	2.6	1	09/29/13 20:45	09/30/13 21:06	16984-48-8	
Sulfate	**2970**	mg/kg	516	258	10	09/29/13 20:45	09/30/13 23:09	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**216**	mg/kg	41.3	20.7	1	09/30/13 08:25	09/30/13 12:17	7723-14-0	

Sample: TP22S-2 **Lab ID: 4085674002** Collected: 09/29/13 10:08 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**49.3**	%	0.10	0.10	1		09/29/13 18:50		
9040 pH	Analytical Method: EPA 9040								
pH	**8.0**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.9**	mg/kg	7.9	3.9	1	09/29/13 20:45	09/30/13 21:14	24959-67-9	
Chloride	**1120**	mg/kg	78.8	39.4	1	09/29/13 20:45	09/30/13 21:14	16887-00-6	
Fluoride	**7.9**	mg/kg	7.9	3.9	1	09/29/13 20:45	09/30/13 21:14	16984-48-8	
Sulfate	**5270**	mg/kg	394	197	5	09/29/13 20:45	09/30/13 23:17	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**295**	mg/kg	68.6	34.3	1	09/30/13 08:25	09/30/13 12:18	7723-14-0	

Sample: TP22S-3 **Lab ID: 4085674003** Collected: 09/29/13 10:40 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**51.7**	%	0.10	0.10	1		09/29/13 18:50		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Sample: TP22S-3 **Lab ID: 4085674003** Collected: 09/29/13 10:40 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH	**8.6**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<4.1**	mg/kg	8.3	4.1	1	09/29/13 20:45	09/30/13 21:23	24959-67-9	
Chloride	**158**	mg/kg	82.8	41.4	1	09/29/13 20:45	09/30/13 21:23	16887-00-6	
Fluoride	**6.0J**	mg/kg	8.3	4.1	1	09/29/13 20:45	09/30/13 21:23	16984-48-8	
Sulfate	**1660**	mg/kg	414	207	5	09/29/13 20:45	10/01/13 00:43	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**253**	mg/kg	53.5	26.7	1	09/30/13 08:25	09/30/13 12:19	7723-14-0	

Sample: TP22S-4 **Lab ID: 4085674004** Collected: 09/29/13 14:10 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**2.0**	%	0.10	0.10	1		09/29/13 18:50		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**9.0**	Std. Units	0.10	0.010	1		09/30/13 14:35		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.0**	mg/kg	4.1	2.0	1	09/29/13 20:45	09/30/13 21:31	24959-67-9	
Chloride	**29.8J**	mg/kg	40.8	20.4	1	09/29/13 20:45	09/30/13 21:31	16887-00-6	
Fluoride	**2.4J**	mg/kg	4.1	2.0	1	09/29/13 20:45	09/30/13 21:31	16984-48-8	
Sulfate	**33.8J**	mg/kg	40.8	20.4	1	09/29/13 20:45	09/30/13 21:31	14808-79-8	B
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**402**	mg/kg	19.9	10	1	09/30/13 08:25	09/30/13 12:19	7723-14-0	

Sample: TP22S-5 **Lab ID: 4085674005** Collected: 09/29/13 13:50 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**53.4**	%	0.10	0.10	1		09/29/13 18:51		
9040 pH	Analytical Method: EPA 9040								
pH	**6.2**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Sample: TP22S-5 **Lab ID: 4085674005** Collected: 09/29/13 13:50 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<4.3**	mg/kg	8.6	4.3	1	09/29/13 20:45	09/30/13 21:39	24959-67-9	
Chloride	**2870**	mg/kg	429	214	5	09/29/13 20:45	10/01/13 00:51	16887-00-6	
Fluoride	**<4.3**	mg/kg	8.6	4.3	1	09/29/13 20:45	09/30/13 21:39	16984-48-8	
Sulfate	**3150**	mg/kg	429	214	5	09/29/13 20:45	10/01/13 00:51	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**197**	mg/kg	45.1	22.6	1	09/30/13 08:25	09/30/13 12:20	7723-14-0	

Sample: TP24S-1 **Lab ID: 4085674006** Collected: 09/29/13 14:50 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**13.7**	%	0.10	0.10	1		09/29/13 18:51		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.6**	Std. Units	0.10	0.010	1		09/30/13 14:35		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.3**	mg/kg	4.6	2.3	1	09/29/13 20:45	09/30/13 22:03	24959-67-9	
Chloride	**42.4J**	mg/kg	46.1	23.0	1	09/29/13 20:45	09/30/13 22:03	16887-00-6	
Fluoride	**3.5J**	mg/kg	4.6	2.3	1	09/29/13 20:45	09/30/13 22:03	16984-48-8	
Sulfate	**32.3J**	mg/kg	46.1	23.0	1	09/29/13 20:45	09/30/13 22:03	14808-79-8	B
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**174**	mg/kg	26.5	13.2	1	09/30/13 08:25	09/30/13 12:21	7723-14-0	

Sample: TP24S-2 **Lab ID: 4085674007** Collected: 09/29/13 14:50 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**40.3**	%	0.10	0.10	1		09/29/13 18:51		
9040 pH	Analytical Method: EPA 9040								
pH	**7.2**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.3**	mg/kg	6.7	3.3	1	09/29/13 20:45	09/30/13 22:28	24959-67-9	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Sample: TP24S-2 **Lab ID: 4085674007** Collected: 09/29/13 14:50 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**545**	mg/kg	66.9	33.5	1	09/29/13 20:45	09/30/13 22:28	16887-00-6	
Fluoride	**10.4**	mg/kg	6.7	3.3	1	09/29/13 20:45	09/30/13 22:28	16984-48-8	
Sulfate	**81.6**	mg/kg	66.9	33.5	1	09/29/13 20:45	09/30/13 22:28	14808-79-8	B
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**472**	mg/kg	49.6	24.8	1	09/30/13 08:25	09/30/13 12:22	7723-14-0	

Sample: TP24S-3 **Lab ID: 4085674008** Collected: 09/29/13 14:55 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**73.3**	%	0.10	0.10	1		09/29/13 18:51		
9040 pH	Analytical Method: EPA 9040								
pH	**7.6**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<7.5**	mg/kg	15.0	7.5	1	09/29/13 20:45	09/30/13 22:36	24959-67-9	
Chloride	**2170**	mg/kg	150	74.8	1	09/29/13 20:45	09/30/13 22:36	16887-00-6	
Fluoride	**9.7J**	mg/kg	15.0	7.5	1	09/29/13 20:45	09/30/13 22:36	16984-48-8	
Sulfate	**130J**	mg/kg	150	74.8	1	09/29/13 20:45	09/30/13 22:36	14808-79-8	B
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**444**	mg/kg	107	53.6	1	09/30/13 08:25	09/30/13 12:23	7723-14-0	

Sample: TP24S-5 **Lab ID: 4085674009** Collected: 09/29/13 15:40 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.4**	%	0.10	0.10	1		09/29/13 18:51		
9040 pH	Analytical Method: EPA 9040								
pH	**7.1**	Std. Units	0.10	0.010	1		09/29/13 19:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<13.8**	mg/kg	27.5	13.8	5	09/29/13 20:45	09/30/13 22:44	24959-67-9	D3
Chloride	**396**	mg/kg	275	138	5	09/29/13 20:45	09/30/13 22:44	16887-00-6	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Sample: TP24S-5 **Lab ID: 4085674009** Collected: 09/29/13 15:40 Received: 09/29/13 17:48 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Fluoride	**16.5J**	mg/kg	27.5	13.8	5	09/29/13 20:45	09/30/13 22:44	16984-48-8	D3
Sulfate	**217J**	mg/kg	275	138	5	09/29/13 20:45	09/30/13 22:44	14808-79-8	B,D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**313**	mg/kg	38.0	19.0	1	09/30/13 08:25	09/30/13 12:23	7723-14-0	

Sample: TP24S-6 **Lab ID: 4085674010** Collected: 09/29/13 15:15 Received: 09/29/13 17:48 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**13.9**	%	0.10	0.10	1		09/29/13 18:51		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		09/30/13 14:35		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.3**	mg/kg	4.6	2.3	1	09/29/13 20:45	09/30/13 22:53	24959-67-9	
Chloride	**159**	mg/kg	46.4	23.2	1	09/29/13 20:45	09/30/13 22:53	16887-00-6	
Fluoride	**3.2J**	mg/kg	4.6	2.3	1	09/29/13 20:45	09/30/13 22:53	16984-48-8	
Sulfate	**70.3**	mg/kg	46.4	23.2	1	09/29/13 20:45	09/30/13 22:53	14808-79-8	B
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**132**	mg/kg	23.8	11.9	1	09/30/13 08:25	09/30/13 12:24	7723-14-0	

Sample: MW23N-W **Lab ID: 4085674011** Collected: 09/29/13 16:02 Received: 09/29/13 17:48 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<9.01**	CFU/100 mL	9.0	9.0	9.01	09/29/13 21:10	09/29/13 21:10		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5430**	umhos/cm	10.0	1.1	1		09/30/13 17:20		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**635**	mg/L	10.0	0.63	1		09/29/13 23:08		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Sample: MW23N-W **Lab ID: 4085674011** Collected: 09/29/13 16:02 Received: 09/29/13 17:48 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.15J**	mg/L	0.25	0.10	1		09/30/13 09:30		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**6.8**	Std. Units	0.10	0.010	1		09/29/13 18:50		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		09/30/13 02:42	24959-67-9	
Chloride	**1190**	mg/L	200	100	50		09/30/13 11:57	16887-00-6	
Fluoride	**<0.20**	mg/L	0.40	0.20	1		09/30/13 02:42	16984-48-8	
Sulfate	**13.6**	mg/L	4.0	2.0	1		09/30/13 02:42	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.57**	mg/L	0.40	0.052	1	09/30/13 08:25	09/30/13 13:38	7723-14-0	

Sample: MW25S-W **Lab ID: 4085674012** Collected: 09/29/13 16:57 Received: 09/29/13 17:48 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**9.01**	CFU/100 mL	9.0	9.0	9.01	09/29/13 21:10	09/29/13 21:10		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5230**	umhos/cm	10.0	1.1	1		09/30/13 17:21		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1190**	mg/L	10.0	0.63	1		09/30/13 10:27		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.30J**	mg/L	0.50	0.21	1		09/30/13 09:30		D3,H6, M0
9040 pH	Analytical Method: EPA 9040								
pH	**6.6**	Std. Units	0.10	0.010	1		09/29/13 18:50		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		09/30/13 02:53	24959-67-9	
Chloride	**1030**	mg/L	200	100	50		09/30/13 12:08	16887-00-6	
Fluoride	**<0.20**	mg/L	0.40	0.20	1		09/30/13 02:53	16984-48-8	
Sulfate	**373**	mg/L	200	100	50		09/30/13 12:08	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.78**	mg/L	0.40	0.052	1	09/30/13 08:25	09/30/13 12:29	7723-14-0	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: MBIO/3103
QC Batch Method: SM 9222D
Analysis Method: SM 9222D
Analysis Description: 9222D MICRO Fecal Coliform by MF
Associated Lab Samples: 4085674011, 4085674012

METHOD BLANK: 865856 Matrix: Water
Associated Lab Samples: 4085674011, 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	09/29/13 21:10	

METHOD BLANK: 865858 Matrix: Water
Associated Lab Samples: 4085674011, 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	09/29/13 21:10	

SAMPLE DUPLICATE: 865857

Parameter	Units	4085674011 Result	Dup Result	RPD	Max RPD	Qualifiers
Fecal Coliforms	CFU/100 mL	<9.01	<9.01			

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: PMST/8904 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085674001, 4085674002, 4085674003, 4085674004, 4085674005, 4085674006, 4085674007, 4085674008, 4085674009, 4085674010

SAMPLE DUPLICATE: 865118

Parameter	Units	4085673008 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	15.1	15.0	1	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16423
QC Batch Method: EPA 120.1
Analysis Method: EPA 120.1
Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4085674011, 4085674012

METHOD BLANK: 865578 Matrix: Water
Associated Lab Samples: 4085674011, 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	09/30/13 17:11	

LABORATORY CONTROL SAMPLE: 865579

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	646	620	96	80-120	

SAMPLE DUPLICATE: 865580

Parameter	Units	4085673003 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	4080	4200	3	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16407
QC Batch Method: SM 2320B
Analysis Method: SM 2320B
Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085674011

METHOD BLANK: 865119 Matrix: Water
Associated Lab Samples: 4085674011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	09/29/13 22:56	

LABORATORY CONTROL SAMPLE: 865120

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	198	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865121 865122

Parameter	Units	4085674011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	635	200	200	812	811	88	88	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16410 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085674012

METHOD BLANK: 865265 Matrix: Water
Associated Lab Samples: 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	09/30/13 10:18	

LABORATORY CONTROL SAMPLE: 865266

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	494	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865267 865268

Parameter	Units	4085674012 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	1190	500	500	1660	1650	94	93	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16414 Analysis Method: HACH 8146
QC Batch Method: HACH 8146 Analysis Description: Iron, Ferrous
Associated Lab Samples: 4085674011, 4085674012

METHOD BLANK: 865410 Matrix: Water
Associated Lab Samples: 4085674011, 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.021	0.050	09/30/13 09:30	

LABORATORY CONTROL SAMPLE: 865411

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	.6	0.55	91	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865412 865413

Parameter	Units	10243444001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Ferrous	mg/L	ND	.6	.6	0.77	0.74	129	123	80-120	5	20	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865414 865415

Parameter	Units	4085674012 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Ferrous	mg/L	0.30J	6	6	8.0	7.4	128	119	80-120	7	20	M0

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16409 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085674011, 4085674012

SAMPLE DUPLICATE: 865123

Parameter	Units	4085674011 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	6.8	6.8	0	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16416 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085674001, 4085674002, 4085674003, 4085674005, 4085674007, 4085674008, 4085674009

SAMPLE DUPLICATE: 865417

Parameter	Units	4085674005 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	6.2	6.2	0	20	

SAMPLE DUPLICATE: 865418

Parameter	Units	4085674001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.5	7.5	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WET/16421 Analysis Method: EPA 9045
QC Batch Method: EPA 9045 Analysis Description: 9045 pH
Associated Lab Samples: 4085674004, 4085674006, 4085674010

SAMPLE DUPLICATE: 865566

Parameter	Units	4085674004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	9.0	9.0	0	5	H6

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WETA/19716 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085674001, 4085674002, 4085674003, 4085674004, 4085674005, 4085674006, 4085674007, 4085674008, 4085674009, 4085674010

METHOD BLANK: 865297 Matrix: Solid
Associated Lab Samples: 4085674001, 4085674002, 4085674003, 4085674004, 4085674005, 4085674006, 4085674007, 4085674008, 4085674009, 4085674010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/kg	<2.0	4.0	09/30/13 23:01	
Chloride	mg/kg	<20.0	40.0	09/30/13 23:01	
Fluoride	mg/kg	<2.0	4.0	09/30/13 23:01	
Sulfate	mg/kg	24.6J	40.0	09/30/13 23:01	

LABORATORY CONTROL SAMPLE: 865298

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/kg	20	20.7	104	80-120	
Chloride	mg/kg	200	200	100	80-120	
Fluoride	mg/kg	20	20.5	102	80-120	
Sulfate	mg/kg	200	199	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865299 865300

Parameter	Units	4085674005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<4.3	42.9	42.9	47.4	48.7	110	114	80-120	3	20	
Chloride	mg/kg	2870	2140	2140	5160	5150	107	106	80-120	0	20	
Fluoride	mg/kg	<4.3	42.9	42.9	44.8	45.2	104	106	80-120	1	20	
Sulfate	mg/kg	3150	2140	2140	5460	5480	108	109	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WETA/19704 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085674011, 4085674012

METHOD BLANK: 865124 Matrix: Water
Associated Lab Samples: 4085674011, 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/L	<0.20	0.40	09/30/13 00:29	
Chloride	mg/L	<2.0	4.0	09/30/13 00:29	
Fluoride	mg/L	<0.20	0.40	09/30/13 00:29	
Sulfate	mg/L	<2.0	4.0	09/30/13 00:29	

LABORATORY CONTROL SAMPLE: 865125

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/L	2	2.0	99	90-110	
Chloride	mg/L	20	18.9	94	90-110	
Fluoride	mg/L	2	1.9	97	90-110	
Sulfate	mg/L	20	19.1	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865126 865127

Parameter	Units	4085673014 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/L	<0.20	2	2	2.4	2.2	110	98	90-110	10	20	
Chloride	mg/L	1450	2000	2000	3700	3480	113	101	90-110	6	20	M0
Fluoride	mg/L	<0.20	2	2	2.0	1.8	95	84	90-110	13	20	M0
Sulfate	mg/L	228	200	200	431	434	102	103	90-110	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WETA/19705 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 4085674001, 4085674002, 4085674003, 4085674004, 4085674005, 4085674006, 4085674007, 4085674008, 4085674009, 4085674010

METHOD BLANK: 865149 Matrix: Solid
Associated Lab Samples: 4085674001, 4085674002, 4085674003, 4085674004, 4085674005, 4085674006, 4085674007, 4085674008, 4085674009, 4085674010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	<20.0	40.0	09/30/13 12:16	

LABORATORY CONTROL SAMPLE: 865150

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	500	497	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865151 865152

Parameter	Units	4085674010 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	132	297	297	395	392	88	87	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

QC Batch: WETA/19706 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 4085674011, 4085674012

METHOD BLANK: 865156 Matrix: Water
Associated Lab Samples: 4085674011, 4085674012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	<0.052	0.40	09/30/13 12:38	

LABORATORY CONTROL SAMPLE: 865157

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	5	4.5	90	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865158 865159

Parameter	Units	4085244001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	30.5	100	100	126	128	95	97	90-110	2	20	

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

1q	Nanopure water was added in a 1:1 ratio due to sample matrix. Sample was stirred before analysis.
B	Analyte was detected in the associated method blank.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA recommended holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085674011	MW23N-W	SM 9222D	MBIO/3102	SM 9222D	MBIO/3103
4085674012	MW25S-W	SM 9222D	MBIO/3102	SM 9222D	MBIO/3103
4085674001	TP22S-1	ASTM D2974-87	PMST/8904		
4085674002	TP22S-2	ASTM D2974-87	PMST/8904		
4085674003	TP22S-3	ASTM D2974-87	PMST/8904		
4085674004	TP22S-4	ASTM D2974-87	PMST/8904		
4085674005	TP22S-5	ASTM D2974-87	PMST/8904		
4085674006	TP24S-1	ASTM D2974-87	PMST/8904		
4085674007	TP24S-2	ASTM D2974-87	PMST/8904		
4085674008	TP24S-3	ASTM D2974-87	PMST/8904		
4085674009	TP24S-5	ASTM D2974-87	PMST/8904		
4085674010	TP24S-6	ASTM D2974-87	PMST/8904		
4085674011	MW23N-W	EPA 120.1	WET/16423		
4085674012	MW25S-W	EPA 120.1	WET/16423		
4085674011	MW23N-W	SM 2320B	WET/16407		
4085674012	MW25S-W	SM 2320B	WET/16410		
4085674011	MW23N-W	HACH 8146	WET/16414		
4085674012	MW25S-W	HACH 8146	WET/16414		
4085674001	TP22S-1	EPA 9040	WET/16416		
4085674002	TP22S-2	EPA 9040	WET/16416		
4085674003	TP22S-3	EPA 9040	WET/16416		
4085674005	TP22S-5	EPA 9040	WET/16416		
4085674007	TP24S-2	EPA 9040	WET/16416		
4085674008	TP24S-3	EPA 9040	WET/16416		
4085674009	TP24S-5	EPA 9040	WET/16416		
4085674011	MW23N-W	EPA 9040	WET/16409		
4085674012	MW25S-W	EPA 9040	WET/16409		
4085674004	TP22S-4	EPA 9045	WET/16421		
4085674006	TP24S-1	EPA 9045	WET/16421		
4085674010	TP24S-6	EPA 9045	WET/16421		
4085674001	TP22S-1	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674002	TP22S-2	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674003	TP22S-3	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674004	TP22S-4	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674005	TP22S-5	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674006	TP24S-1	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674007	TP24S-2	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674008	TP24S-3	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674009	TP24S-5	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674010	TP24S-6	EPA 300.0	WETA/19716	EPA 300.0	WETA/19717
4085674011	MW23N-W	EPA 300.0	WETA/19704		
4085674012	MW25S-W	EPA 300.0	WETA/19704		
4085674001	TP22S-1	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085674

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085674002	**TP22S-2**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674003	**TP22S-3**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674004	**TP22S-4**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674005	**TP22S-5**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674006	**TP24S-1**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674007	**TP24S-2**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674008	**TP24S-3**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674009	**TP24S-5**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674010	**TP24S-6**	EPA 365.4	WETA/19705	EPA 365.4	WETA/19708
4085674011	**MW23N-W**	EPA 365.4	WETA/19706	EPA 365.4	WETA/19709
4085674012	**MW25S-W**	EPA 365.4	WETA/19706	EPA 365.4	WETA/19709

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UPPER MIDWEST REGION
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Page 1 of 1

4085674

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)

Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	LEO FRIGO MEMORIAL BRIDGE
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	⑤ Conductivity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	Y/N						N	N	N	N	N				
	Pick Letter						A	A	C	A	I				
001	TP22S-1	9/29/13	10:05	S	X	X								1-402pH 1-402agH	
002	TP22S-2		10:08	S	X	X									
003	TP22S-3		10:40	S	X	X									
004	TP22S-4		14:10	S	X	X									
005	TP22S-5		13:50	S	X	X							⑤ Added per TB 9-30-13 BB		
006	TP24S-1		14:50	S	X	X									
007	TP24S-2		14:50	S	X	X									
008	TP24S-3		14:55	S	X	X									
009	TP24S-5		15:40	S	X	X									
010	TP24S-6		15:15	S	X	X									
011	MW23N-W		16:02	GW			X	X	X	X	X	⑤ X		1-Sterile 4-250mlp 3AG	
012	MW25S-W		16:57	GW			X	X	X	X	X	⑤ X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwaynere@omni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/29/13 5:48pm	Alle Lb	9/29/13 1748

PACE Project No.: 4085674

Receipt Temp = R 0.1 °C

Sample Receipt pH: (OK) / Adjusted

Cooler Custody Seal: Present / Not Present

Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc
1241 Bellevue Street, Suite
Green Bay, WI 5430

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Project # 4085674

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used: NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature: Uncorr: /Corr: 2.0 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 9/29/13
Initials: AM

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 9/30/13 AM 9/29/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☑ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed: AM / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 9-30-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 02, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on September 29, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085675001	15-3	Solid	09/28/13 00:00	09/29/13 17:48
4085675002	15-2	Solid	09/28/13 00:00	09/29/13 17:48
4085675003	11-1	Solid	09/28/13 00:00	09/29/13 17:48
4085675004	11-2	Solid	09/28/13 00:00	09/29/13 17:48
4085675005	17-1	Solid	09/28/13 00:00	09/29/13 17:48
4085675006	17-2	Solid	09/28/13 00:00	09/29/13 17:48
4085675007	17-3	Solid	09/28/13 00:00	09/29/13 17:48
4085675008	13-1	Solid	09/28/13 00:00	09/29/13 17:48
4085675009	13-2	Solid	09/28/13 00:00	09/29/13 17:48
4085675010	13-3	Solid	09/28/13 00:00	09/29/13 17:48
4085675011	19-1	Solid	09/28/13 00:00	09/29/13 17:48
4085675012	19-3	Solid	09/28/13 00:00	09/29/13 17:48
4085675013	19-4	Solid	09/28/13 00:00	09/29/13 17:48
4085675014	19-5	Solid	09/28/13 00:00	09/29/13 17:48

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085675001	15-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675002	15-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675003	11-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675004	11-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675005	17-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675006	17-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675007	17-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675008	13-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675009	13-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675010	13-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675011	19-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675012	19-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675013	19-4	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085675014	19-5	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Sample: 15-3 **Lab ID: 4085675001** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		09/30/13 16:04		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.72**	% (w/w)	0.10	0.10	1		09/30/13 11:11		

Sample: 15-2 **Lab ID: 4085675002** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		09/30/13 16:04		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.6**	% (w/w)	0.10	0.10	1		09/30/13 11:14		R1

Sample: 11-1 **Lab ID: 4085675003** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.64**	%	0.10	0.10	1		09/30/13 16:04		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.8**	% (w/w)	0.10	0.10	1		09/30/13 11:17		

Sample: 11-2 **Lab ID: 4085675004** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.28**	%	0.10	0.10	1		09/30/13 16:04		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.68**	% (w/w)	0.10	0.10	1		09/30/13 11:17		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Sample: 17-1 **Lab ID: 4085675005** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.71**	%	0.10	0.10	1		09/30/13 16:04		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**3.3**	% (w/w)	0.10	0.10	1		09/30/13 11:19		

Sample: 17-2 **Lab ID: 4085675006** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.31**	%	0.10	0.10	1		09/30/13 16:04		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.82**	% (w/w)	0.10	0.10	1		09/30/13 11:20		

Sample: 17-3 **Lab ID: 4085675007** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.0**	% (w/w)	0.10	0.10	1		09/30/13 11:21		

Sample: 13-1 **Lab ID: 4085675008** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.2**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**15.2**	% (w/w)	0.10	0.10	1		09/30/13 11:22		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Sample: 13-2 **Lab ID: 4085675009** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.21**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.2**	% (w/w)	0.10	0.10	1		09/30/13 11:23		

Sample: 13-3 **Lab ID: 4085675010** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.1**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**10.4**	% (w/w)	0.10	0.10	1		09/30/13 11:24		

Sample: 19-1 **Lab ID: 4085675011** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.5**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**19.7**	% (w/w)	0.10	0.10	1		09/30/13 11:25		

Sample: 19-3 **Lab ID: 4085675012** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.23**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.1**	% (w/w)	0.10	0.10	1		09/30/13 11:26		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Sample: 19-4 **Lab ID: 4085675013** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.14**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.28**	% (w/w)	0.10	0.10	1		09/30/13 11:27		

Sample: 19-5 **Lab ID: 4085675014** Collected: 09/28/13 00:00 Received: 09/29/13 17:48 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.54**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.4**	% (w/w)	0.10	0.10	1		09/30/13 11:28		

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

QC Batch: PMST/8908 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085675001, 4085675002, 4085675003, 4085675004, 4085675005, 4085675006, 4085675007, 4085675008, 4085675009, 4085675010, 4085675011, 4085675012, 4085675013, 4085675014

SAMPLE DUPLICATE: 865574

Parameter	Units	4085688010 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	0.14	<0.10		10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

QC Batch: WET/16411 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: D2974 Total Organic Matter
Associated Lab Samples: 4085675001, 4085675002, 4085675003, 4085675004, 4085675005, 4085675006, 4085675007, 4085675008, 4085675009, 4085675010, 4085675011, 4085675012, 4085675013, 4085675014

METHOD BLANK: 865285 Matrix: Solid
Associated Lab Samples: 4085675001, 4085675002, 4085675003, 4085675004, 4085675005, 4085675006, 4085675007, 4085675008, 4085675009, 4085675010, 4085675011, 4085675012, 4085675013, 4085675014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Organic Matter	% (w/w)	<0.10	0.10	09/30/13 11:07	

LABORATORY CONTROL SAMPLE: 865286

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Organic Matter	% (w/w)	199	198	99	80-120	

SAMPLE DUPLICATE: 865287

Parameter	Units	4085675001 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	0.72	0.66	8	10	

SAMPLE DUPLICATE: 865288

Parameter	Units	4085675002 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	1.6	1.4	11	10	R1

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

R1 RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085675

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085675001	15-3	ASTM D2974-87	PMST/8908		
4085675002	15-2	ASTM D2974-87	PMST/8908		
4085675003	11-1	ASTM D2974-87	PMST/8908		
4085675004	11-2	ASTM D2974-87	PMST/8908		
4085675005	17-1	ASTM D2974-87	PMST/8908		
4085675006	17-2	ASTM D2974-87	PMST/8908		
4085675007	17-3	ASTM D2974-87	PMST/8908		
4085675008	13-1	ASTM D2974-87	PMST/8908		
4085675009	13-2	ASTM D2974-87	PMST/8908		
4085675010	13-3	ASTM D2974-87	PMST/8908		
4085675011	19-1	ASTM D2974-87	PMST/8908		
4085675012	19-3	ASTM D2974-87	PMST/8908		
4085675013	19-4	ASTM D2974-87	PMST/8908		
4085675014	19-5	ASTM D2974-87	PMST/8908		
4085675001	15-3	ASTM D2974-87	WET/16411		
4085675002	15-2	ASTM D2974-87	WET/16411		
4085675003	11-1	ASTM D2974-87	WET/16411		
4085675004	11-2	ASTM D2974-87	WET/16411		
4085675005	17-1	ASTM D2974-87	WET/16411		
4085675006	17-2	ASTM D2974-87	WET/16411		
4085675007	17-3	ASTM D2974-87	WET/16411		
4085675008	13-1	ASTM D2974-87	WET/16411		
4085675009	13-2	ASTM D2974-87	WET/16411		
4085675010	13-3	ASTM D2974-87	WET/16411		
4085675011	19-1	ASTM D2974-87	WET/16411		
4085675012	19-3	ASTM D2974-87	WET/16411		
4085675013	19-4	ASTM D2974-87	WET/16411		
4085675014	19-5	ASTM D2974-87	WET/16411		

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4085675

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: ORGANIC CONTENT BY LOSS ON IGNITION	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	15-3	9/28/13		S	N	A	X		1-Ziploc	
002	15-2									
003	11-1									
004	11-2									
005	17-1									
006	17-2									
007	17-3									
008	13-1									
009	13-2									
010	13-3									
011	19-1									
012	19-3									
013	19-4									

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):
Email #1:
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/29/13 5:48pm	[illegible]	9/29/13 1748

PACE Project No.: 4085675

Receipt Temp = R01 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal: Present / ~~Not Present~~ Intact / ~~Not Intact~~

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: ORGANIC CONTENT BY LOSS IGNITION	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
014	19-5	9/25/13		S	N	A	X		1-2ziploc	

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge) Date Needed:	Relinquished By:	Date/Time:	Received By:	Date/Time:	PACE Project No.
Transmit Prelim Rush Results by (complete what you want):	B. D. Wayner	9/29/13 5:48pm			
Email #1:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Receipt Temp = 20.1 °C
Email #2:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Sample Receipt pH OK / Adjusted
Telephone:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Cooler Custody Seal Present / ~~Not Present~~ Intact / Not Intact
Fax:	Relinquished By:	Date/Time:	Received By:	Date/Time:	
Samples on HOLD are subject to special pricing and release of liability					

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services, Inc
1241 Bellevue Street, Suite
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Project # 4085675

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used NA **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: R01 **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 9/29/13
Initials: DMS

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out: DMS 9/29/13	☑Yes ☐No ☐N/A	2. no collection times DMS 9/29/13
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics. OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 9-30-13

Page 15 of 15

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

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(920)469-2436

October 02, 2013

Note: TP22N-W was mislabeled. The sample should have been labeled MW22N-W. (Brian Wayner OMNNI 10/7/13)

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on September 30, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085688001	TP25S-1	Solid	09/30/13 09:15	09/30/13 14:40
4085688002	TP25S-2	Solid	09/30/13 09:21	09/30/13 14:40
4085688003	TP23S-1	Solid	09/30/13 10:14	09/30/13 14:40
4085688004	TP23S-2	Solid	09/30/13 10:20	09/30/13 14:40
4085688005	TP23S-3	Solid	09/30/13 11:00	09/30/13 14:40
4085688006	TP23S-4	Solid	09/30/13 11:03	09/30/13 14:40
4085688007	TP23S-3W	Water	09/30/13 10:40	09/30/13 14:40
4085688008	TP23S-5	Solid	09/30/13 13:08	09/30/13 14:40
4085688009	TP22N-W	Water	09/30/13 13:41	09/30/13 14:40
4085688010	TP24S-6	Solid	09/30/13 00:00	09/30/13 14:40
4085688011	TP24S-2	Solid	09/30/13 00:00	09/30/13 14:40
4085688012	TP24S-5	Solid	09/30/13 00:00	09/30/13 14:40
4085688013	TP24S-4	Solid	09/30/13 00:00	09/30/13 14:40
4085688014	TP24S-1	Solid	09/30/13 00:00	09/30/13 14:40
4085688015	TP22S-4	Solid	09/30/13 00:00	09/30/13 14:40
4085688016	TP22S-3	Solid	09/30/13 00:00	09/30/13 14:40
4085688017	TP22S-2	Solid	09/30/13 00:00	09/30/13 14:40
4085688018	22-1	Solid	09/30/13 00:00	09/30/13 14:40

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085688001	TP25S-1	ASTM D2974-87	SKW	1
		EPA 9040	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688002	TP25S-2	ASTM D2974-87	SKW	1
		EPA 9040	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688003	TP23S-1	ASTM D2974-87	SKW	1
		EPA 9045	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688004	TP23S-2	ASTM D2974-87	SKW	1
		EPA 9040	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688005	TP23S-3	ASTM D2974-87	SKW	1
		EPA 9040	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688006	TP23S-4	ASTM D2974-87	SKW	1
		EPA 9045	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688007	TP23S-3W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688008	TP23S-5	ASTM D2974-87	SKW	1
		EPA 9040	DEY	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688009	TP22N-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085688010	**TP24S-6**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688011	**TP24S-2**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688012	**TP24S-5**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688013	**TP24S-4**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688014	**TP24S-1**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688015	**TP22S-4**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688016	**TP22S-3**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688017	**TP22S-2**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085688018	**22-1**	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP25S-1 **Lab ID: 4085688001** Collected: 09/30/13 09:15 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**47.6**	%	0.10	0.10	1		09/30/13 16:35		
9040 pH	Analytical Method: EPA 9040								
pH	**7.5**	Std. Units	0.10	0.010	1		10/01/13 13:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.9**	mg/kg	7.7	3.9	1	09/30/13 20:48	10/01/13 21:06	24959-67-9	
Chloride	**3980**	mg/kg	771	386	10	09/30/13 20:48	10/02/13 04:03	16887-00-6	
Fluoride	**12.1**	mg/kg	7.7	3.9	1	09/30/13 20:48	10/01/13 21:06	16984-48-8	
Sulfate	**248**	mg/kg	77.1	38.6	1	09/30/13 20:48	10/01/13 21:06	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**358**	mg/kg	69.4	34.7	1	10/01/13 08:30	10/01/13 12:07	7723-14-0	

Sample: TP25S-2 **Lab ID: 4085688002** Collected: 09/30/13 09:21 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**56.1**	%	0.10	0.10	1		09/30/13 16:36		
9040 pH	Analytical Method: EPA 9040								
pH	**7.8**	Std. Units	0.10	0.010	1		10/01/13 13:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<4.6**	mg/kg	9.2	4.6	1	09/30/13 20:48	10/01/13 21:30	24959-67-9	
Chloride	**3780**	mg/kg	461	230	5	09/30/13 20:48	10/02/13 04:27	16887-00-6	
Fluoride	**7.1J**	mg/kg	9.2	4.6	1	09/30/13 20:48	10/01/13 21:30	16984-48-8	
Sulfate	**277**	mg/kg	92.2	46.1	1	09/30/13 20:48	10/01/13 21:30	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**326**	mg/kg	75.9	37.9	1	10/01/13 08:30	10/01/13 12:07	7723-14-0	

Sample: TP23S-1 **Lab ID: 4085688003** Collected: 09/30/13 10:14 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**9.4**	%	0.10	0.10	1		09/30/13 16:36		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP23S-1 **Lab ID: 4085688003** Collected: 09/30/13 10:14 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.7**	Std. Units	0.10	0.010	1		10/01/13 14:05		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<11.2**	mg/kg	22.3	11.2	5	09/30/13 20:48	10/01/13 21:38	24959-67-9	D3
Chloride	**139J**	mg/kg	223	112	5	09/30/13 20:48	10/01/13 21:38	16887-00-6	D3
Fluoride	**<11.2**	mg/kg	22.3	11.2	5	09/30/13 20:48	10/01/13 21:38	16984-48-8	D3
Sulfate	**123J**	mg/kg	223	112	5	09/30/13 20:48	10/01/13 21:38	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**219**	mg/kg	38.4	19.2	1	10/01/13 08:30	10/01/13 12:08	7723-14-0	

Sample: TP23S-2 **Lab ID: 4085688004** Collected: 09/30/13 10:20 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**44.8**	%	0.10	0.10	1		09/30/13 16:36		
9040 pH	Analytical Method: EPA 9040								
pH	**8.3**	Std. Units	0.10	0.010	1		10/01/13 13:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.7**	mg/kg	7.3	3.7	1	09/30/13 20:48	10/01/13 21:47	24959-67-9	
Chloride	**1150**	mg/kg	367	183	5	09/30/13 20:48	10/02/13 04:36	16887-00-6	
Fluoride	**23.5**	mg/kg	7.3	3.7	1	09/30/13 20:48	10/01/13 21:47	16984-48-8	
Sulfate	**176**	mg/kg	73.3	36.7	1	09/30/13 20:48	10/01/13 21:47	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**237**	mg/kg	63.0	31.5	1	10/01/13 08:30	10/01/13 12:08	7723-14-0	

Sample: TP23S-3 **Lab ID: 4085688005** Collected: 09/30/13 11:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**66.1**	%	0.10	0.10	1		09/30/13 16:36		
9040 pH	Analytical Method: EPA 9040								
pH	**7.2**	Std. Units	0.10	0.010	1		10/01/13 13:50		1q,H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP23S-3 **Lab ID: 4085688005** Collected: 09/30/13 11:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<5.9**	mg/kg	11.9	5.9	1	09/30/13 20:48	10/01/13 21:55	24959-67-9	
Chloride	**6180**	mg/kg	594	297	5	09/30/13 20:48	10/02/13 05:00	16887-00-6	
Fluoride	**8.9J**	mg/kg	11.9	5.9	1	09/30/13 20:48	10/01/13 21:55	16984-48-8	
Sulfate	**109J**	mg/kg	119	59.4	1	09/30/13 20:48	10/01/13 21:55	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**193**	mg/kg	76.1	38.0	1	10/01/13 08:30	10/01/13 12:09	7723-14-0	

Sample: TP23S-4 **Lab ID: 4085688006** Collected: 09/30/13 11:03 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**16.6**	%	0.10	0.10	1		09/30/13 16:36		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.2**	Std. Units	0.10	0.010	1		10/01/13 14:05		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.8	2.4	1	09/30/13 20:48	10/01/13 22:03	24959-67-9	
Chloride	**380**	mg/kg	48.5	24.2	1	09/30/13 20:48	10/01/13 22:03	16887-00-6	
Fluoride	**3.3J**	mg/kg	4.8	2.4	1	09/30/13 20:48	10/01/13 22:03	16984-48-8	
Sulfate	**31.4J**	mg/kg	48.5	24.2	1	09/30/13 20:48	10/01/13 22:03	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**138**	mg/kg	20.0	10	1	10/01/13 08:30	10/01/13 12:11	7723-14-0	

Sample: TP23S-3W **Lab ID: 4085688007** Collected: 09/30/13 10:40 Received: 09/30/13 14:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<90**	CFU/100 mL	90.0	90.0	90	09/30/13 16:45	09/30/13 16:45		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**11800**	umhos/cm	20.0	2.2	2		09/30/13 17:24		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1320**	mg/L	10.0	0.63	1		10/01/13 08:52		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP23S-3W **Lab ID: 4085688007** Collected: 09/30/13 10:40 Received: 09/30/13 14:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**<0.21**	mg/L	0.50	0.21	1		10/01/13 09:00		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**7.2**	Std. Units	0.10	0.010	1		09/30/13 18:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		09/30/13 18:01	24959-67-9	D3
Chloride	**3270**	mg/L	400	200	100		10/01/13 11:59	16887-00-6	
Fluoride	**<1.0**	mg/L	2.0	1.0	5		09/30/13 18:01	16984-48-8	D3
Sulfate	**13.3J**	mg/L	20.0	10.0	5		09/30/13 18:01	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**2.8**	mg/L	0.40	0.052	1	10/01/13 08:30	10/01/13 12:22	7723-14-0	

Sample: TP23S-5 **Lab ID: 4085688008** Collected: 09/30/13 13:08 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**51.6**	%	0.10	0.10	1		09/30/13 16:36		
9040 pH	Analytical Method: EPA 9040								
pH	**7.7**	Std. Units	0.10	0.010	1		10/01/13 13:50		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<4.1**	mg/kg	8.2	4.1	1	09/30/13 20:48	10/01/13 22:28	24959-67-9	
Chloride	**3400**	mg/kg	408	204	5	09/30/13 20:48	10/02/13 05:08	16887-00-6	
Fluoride	**6.5J**	mg/kg	8.2	4.1	1	09/30/13 20:48	10/01/13 22:28	16984-48-8	
Sulfate	**67.3J**	mg/kg	81.6	40.8	1	09/30/13 20:48	10/01/13 22:28	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**142**	mg/kg	63.5	31.8	1	10/01/13 08:30	10/01/13 12:12	7723-14-0	

Sample: TP22N-W **Lab ID: 4085688009** Collected: 09/30/13 13:41 Received: 09/30/13 14:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**45.2**	CFU/100 mL	3.2	3.2	3.22	09/30/13 16:45	09/30/13 16:45		

Note: TP22N-W was mislabeled. The sample should have been labeled MW22N-W. (Brian Wayner OMNNI 10/7/13)

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Note: TP22N-W was mislabeled. The sample should have been labeled MW22N-W. (Brian Wayner OMNNI 10/7/13)

ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP22N-W **Lab ID: 4085688009** Collected: 09/30/13 13:41 Received: 09/30/13 14:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5220**	umhos/cm	10.0	1.1	1		09/30/13 17:28		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1030**	mg/L	10.0	0.63	1		10/01/13 10:50		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.65**	mg/L	0.25	0.10	1		10/01/13 09:00		H6
9040 pH	Analytical Method: EPA 9040								
pH	**7.2**	Std. Units	0.10	0.010	1		09/30/13 18:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.40**	mg/L	0.80	0.40	2		10/01/13 12:10	24959-67-9	D3
Chloride	**1380**	mg/L	200	100	50		10/01/13 12:21	16887-00-6	
Fluoride	**<0.40**	mg/L	0.80	0.40	2		10/01/13 12:10	16984-48-8	D3
Sulfate	**1580**	mg/L	200	100	50		10/01/13 12:21	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**5.1**	mg/L	0.40	0.052	1	10/01/13 08:30	10/01/13 12:23	7723-14-0	

Sample: TP24S-6 **Lab ID: 4085688010** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.14**	%	0.10	0.10	1		09/30/13 16:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.33**	% (w/w)	0.10	0.10	1		10/01/13 16:43		

Sample: TP24S-2 **Lab ID: 4085688011** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.7**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**28.3**	% (w/w)	0.10	0.10	1		10/01/13 16:46		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP24S-5 **Lab ID: 4085688012** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.1**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**5.0**	% (w/w)	0.10	0.10	1		10/01/13 16:47		

Sample: TP24S-4 **Lab ID: 4085688013** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.20**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.5**	% (w/w)	0.10	0.10	1		10/01/13 16:48		

Sample: TP24S-1 **Lab ID: 4085688014** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.5**	% (w/w)	0.10	0.10	1		10/01/13 16:49		

Sample: TP22S-4 **Lab ID: 4085688015** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.66**	% (w/w)	0.10	0.10	1		10/01/13 16:52		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Sample: TP22S-3 **Lab ID: 4085688016** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**2.4**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**18.8**	% (w/w)	0.10	0.10	1		10/01/13 16:53		

Sample: TP22S-2 **Lab ID: 4085688017** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.4**	%	0.10	0.10	1		09/30/13 16:36		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**13.1**	% (w/w)	0.10	0.10	1		10/01/13 16:54		

Sample: 22-1 **Lab ID: 4085688018** Collected: 09/30/13 00:00 Received: 09/30/13 14:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.6**	%	0.10	0.10	1		09/30/13 16:37		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**17.7**	% (w/w)	0.10	0.10	1		10/01/13 16:55		

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: MBIO/3105
QC Batch Method: SM 9222D
Analysis Method: SM 9222D
Analysis Description: 9222D MICRO Fecal Coliform by MF
Associated Lab Samples: 4085688007, 4085688009

METHOD BLANK: 866428 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	09/30/13 16:45	

METHOD BLANK: 866430 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	09/30/13 16:45	

SAMPLE DUPLICATE: 866429

Parameter	Units	4085688007 Result	Dup Result	RPD	Max RPD	Qualifiers
Fecal Coliforms	CFU/100 mL	<90	180			

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: PMST/8908
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085688010

SAMPLE DUPLICATE: 865574

Parameter	Units	4085688010 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	0.14	<0.10		10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: PMST/8909 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085688001, 4085688002, 4085688003, 4085688004, 4085688005, 4085688006, 4085688008, 4085688011, 4085688012, 4085688013, 4085688014, 4085688015, 4085688016, 4085688017, 4085688018

SAMPLE DUPLICATE: 865575

Parameter	Units	4085688017 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	1.4	1.4	4	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16423
QC Batch Method: EPA 120.1
Analysis Method: EPA 120.1
Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4085688007, 4085688009

METHOD BLANK: 865578 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	09/30/13 17:11	

LABORATORY CONTROL SAMPLE: 865579

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	646	620	96	80-120	

SAMPLE DUPLICATE: 865580

Parameter	Units	4085673003 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	4080	4200	3	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16431 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085688007, 4085688009

METHOD BLANK: 865706 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/01/13 08:43	

LABORATORY CONTROL SAMPLE: 865707

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	500	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865929 865930

Parameter	Units	4085688007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	1320	500	500	1780	1780	92	91	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16433 Analysis Method: HACH 8146
QC Batch Method: HACH 8146 Analysis Description: Iron, Ferrous
Associated Lab Samples: 4085688007, 4085688009

METHOD BLANK: 865789 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.021	0.050	10/01/13 09:00	

LABORATORY CONTROL SAMPLE: 865790

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	.6	0.55	92	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865791 865792

Parameter	Units	4085688007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Ferrous	mg/L	<0.21	6	6	5.7	6.0	96	101	80-120	5	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16426 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085688007, 4085688009

SAMPLE DUPLICATE: 865661

Parameter	Units	4085688007 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.2	7.3	0	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16442 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085688001, 4085688002, 4085688004, 4085688005, 4085688008

SAMPLE DUPLICATE: 866432

Parameter	Units	4085688001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.5	7.8	4	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16441
QC Batch Method: EPA 9045
Analysis Method: EPA 9045
Analysis Description: 9045 pH
Associated Lab Samples: 4085688003, 4085688006

SAMPLE DUPLICATE: 866431

Parameter	Units	4085688003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.7	8.4	3	5	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WET/16443 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: D2974 Total Organic Matter
Associated Lab Samples: 4085688010, 4085688011, 4085688012, 4085688013, 4085688014, 4085688015, 4085688016, 4085688017, 4085688018

METHOD BLANK: 866449 Matrix: Solid
Associated Lab Samples: 4085688010, 4085688011, 4085688012, 4085688013, 4085688014, 4085688015, 4085688016, 4085688017, 4085688018

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Organic Matter	% (w/w)	<0.10	0.10	10/01/13 16:40	

LABORATORY CONTROL SAMPLE: 866450

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Organic Matter	% (w/w)	199	190	96	80-120	

SAMPLE DUPLICATE: 866451

Parameter	Units	4085688010 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	0.33	0.34	2	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WETA/19732 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085688001, 4085688002, 4085688003, 4085688004, 4085688005, 4085688006, 4085688008

METHOD BLANK: 865619 Matrix: Solid
Associated Lab Samples: 4085688001, 4085688002, 4085688003, 4085688004, 4085688005, 4085688006, 4085688008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/kg	<2.0	4.0	10/01/13 20:49	
Chloride	mg/kg	<20.0	40.0	10/01/13 20:49	
Fluoride	mg/kg	<2.0	4.0	10/01/13 20:49	
Sulfate	mg/kg	<20.0	40.0	10/01/13 20:49	

LABORATORY CONTROL SAMPLE: 865620

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/kg	20	20.5	102	80-120	
Chloride	mg/kg	200	198	99	80-120	
Fluoride	mg/kg	20	20.6	103	80-120	
Sulfate	mg/kg	200	196	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865621 865622

Parameter	Units	4085688001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<3.9	38.6	38.6	41.8	42.0	108	109	80-120	0	20	
Chloride	mg/kg	3980	3860	3860	8120	8090	107	107	80-120	0	20	
Fluoride	mg/kg	12.1	38.6	38.6	49.8	49.8	98	98	80-120	0	20	
Sulfate	mg/kg	248	386	386	637	639	101	102	80-120	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865623 865624

Parameter	Units	4085695001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<3.7	36.9	36.9	38.8	39.0	106	106	80-120	0	20	
Chloride	mg/kg	2250	1840	1840	4260	4220	109	107	80-120	1	20	
Fluoride	mg/kg	13.4	36.9	36.9	49.9	50.2	99	100	80-120	1	20	
Sulfate	mg/kg	76.2	369	369	398	402	87	89	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WETA/19722 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085688007, 4085688009

METHOD BLANK: 865462 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/L	<0.20	0.40	09/30/13 14:45	
Chloride	mg/L	<2.0	4.0	09/30/13 14:45	
Fluoride	mg/L	<0.20	0.40	09/30/13 14:45	
Sulfate	mg/L	<2.0	4.0	09/30/13 14:45	

LABORATORY CONTROL SAMPLE: 865463

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/L	2	2.0	101	90-110	
Chloride	mg/L	20	19.2	96	90-110	
Fluoride	mg/L	2	2.0	100	90-110	
Sulfate	mg/L	20	19.4	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865464 865465

Parameter	Units	4085692001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/L	<0.20	2	2	2.1	2.1	104	106	90-110	2	20	
Chloride	mg/L	20.6	20	20	41.6	41.7	105	105	90-110	0	20	
Fluoride	mg/L	<0.20	2	2	2.1	2.1	96	97	90-110	0	20	
Sulfate	mg/L	52.4	100	100	147	148	95	96	90-110	1	20	

REPORT OF LABORATORY ANALYSIS

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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WETA/19747 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 4085688001, 4085688002, 4085688003, 4085688004, 4085688005, 4085688006, 4085688008

METHOD BLANK: 865675 Matrix: Solid
Associated Lab Samples: 4085688001, 4085688002, 4085688003, 4085688004, 4085688005, 4085688006, 4085688008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	<20.0	40.0	10/01/13 12:06	

LABORATORY CONTROL SAMPLE: 865676

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	500	496	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865677 865678

Parameter	Units	4085688008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	142	795	795	855	830	90	87	80-120	3	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865679 865680

Parameter	Units	4085695008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	350	766	766	967	962	81	80	80-120	1	20	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

QC Batch: WETA/19748 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 4085688007, 4085688009

METHOD BLANK: 865684 Matrix: Water
Associated Lab Samples: 4085688007, 4085688009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	0.079J	0.40	10/01/13 12:20	

LABORATORY CONTROL SAMPLE: 865685

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	5	4.7	95	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865686 865687

Parameter	Units	4085501002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	1.9	20	20	21.1	20.4	96	92	90-110	4	20	

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

1q	Nanopure water was added in a 1:1 basis due to sample matrix. Sample was stirred before analysis.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA recommended holding time.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085688007	TP23S-3W	SM 9222D	MBIO/3104	SM 9222D	MBIO/3105
4085688009	TP22N-W	SM 9222D	MBIO/3104	SM 9222D	MBIO/3105
4085688001	TP25S-1	ASTM D2974-87	PMST/8909		
4085688002	TP25S-2	ASTM D2974-87	PMST/8909		
4085688003	TP23S-1	ASTM D2974-87	PMST/8909		
4085688004	TP23S-2	ASTM D2974-87	PMST/8909		
4085688005	TP23S-3	ASTM D2974-87	PMST/8909		
4085688006	TP23S-4	ASTM D2974-87	PMST/8909		
4085688008	TP23S-5	ASTM D2974-87	PMST/8909		
4085688010	TP24S-6	ASTM D2974-87	PMST/8908		
4085688011	TP24S-2	ASTM D2974-87	PMST/8909		
4085688012	TP24S-5	ASTM D2974-87	PMST/8909		
4085688013	TP24S-4	ASTM D2974-87	PMST/8909		
4085688014	TP24S-1	ASTM D2974-87	PMST/8909		
4085688015	TP22S-4	ASTM D2974-87	PMST/8909		
4085688016	TP22S-3	ASTM D2974-87	PMST/8909		
4085688017	TP22S-2	ASTM D2974-87	PMST/8909		
4085688018	22-1	ASTM D2974-87	PMST/8909		
4085688007	TP23S-3W	EPA 120.1	WET/16423		
4085688009	TP22N-W	EPA 120.1	WET/16423		
4085688007	TP23S-3W	SM 2320B	WET/16431		
4085688009	TP22N-W	SM 2320B	WET/16431		
4085688007	TP23S-3W	HACH 8146	WET/16433		
4085688009	TP22N-W	HACH 8146	WET/16433		
4085688001	TP25S-1	EPA 9040	WET/16442		
4085688002	TP25S-2	EPA 9040	WET/16442		
4085688004	TP23S-2	EPA 9040	WET/16442		
4085688005	TP23S-3	EPA 9040	WET/16442		
4085688007	TP23S-3W	EPA 9040	WET/16426		
4085688008	TP23S-5	EPA 9040	WET/16442		
4085688009	TP22N-W	EPA 9040	WET/16426		
4085688003	TP23S-1	EPA 9045	WET/16441		
4085688006	TP23S-4	EPA 9045	WET/16441		
4085688010	TP24S-6	ASTM D2974-87	WET/16443		
4085688011	TP24S-2	ASTM D2974-87	WET/16443		
4085688012	TP24S-5	ASTM D2974-87	WET/16443		
4085688013	TP24S-4	ASTM D2974-87	WET/16443		
4085688014	TP24S-1	ASTM D2974-87	WET/16443		
4085688015	TP22S-4	ASTM D2974-87	WET/16443		
4085688016	TP22S-3	ASTM D2974-87	WET/16443		
4085688017	TP22S-2	ASTM D2974-87	WET/16443		
4085688018	22-1	ASTM D2974-87	WET/16443		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085688

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085688001	**TP25S-1**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688002	**TP25S-2**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688003	**TP23S-1**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688004	**TP23S-2**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688005	**TP23S-3**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688006	**TP23S-4**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688008	**TP23S-5**	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085688007	**TP23S-3W**	EPA 300.0	WETA/19722		
4085688009	**TP22N-W**	EPA 300.0	WETA/19722		
4085688001	**TP25S-1**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688002	**TP25S-2**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688003	**TP23S-1**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688004	**TP23S-2**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688005	**TP23S-3**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688006	**TP23S-4**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688008	**TP23S-5**	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085688007	**TP23S-3W**	EPA 365.4	WETA/19748	EPA 365.4	WETA/19751
4085688009	**TP22N-W**	EPA 365.4	WETA/19748	EPA 365.4	WETA/19751

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Page 1 of 2

4085688

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL PHOSPHORUS	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	TOTAL PHOSPHORUS	Ferrous Iron	Fecal Coliform	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					N	A	X	X							1-402ag^A, 1-402p^A	
					N	A	X	X								
					N	A	X	X								
					N	A	X	X								
					N	A	X	X								
					N	A	X	X								
				GW	N	A			X	X	X	X	X	4-250mlp	AAAC, 1-sterile^A, 1-402ag^A, 1-402p^A	
				S	N	A	X	X								
				GW	N	A			X	X	X	X	X	4-250mlp	AAAC, 1-sterile	

KMS 9-30-13

TP22N-W was mislabeled. The sample should have been labeled MW22N-W. (Brian Wayner OMNNI 10/7/13)

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/02/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwaynerc@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/30/13 14:20		9/30/13 14:20
	9/30/13 14:40		9-30-13 14:40

PACE Project No. 4085688
Receipt Temp = ROI °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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Page 1 of 2

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	4085688
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: organics analyzed less than 1 ppm	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	010 TP24S-6	9/30/13		S	X		1-polybag A	
002	011 TP24S-2							
003	012 TP24S-5							
004	013 TP24S-4							
005	014 TP24S-1							
006	015 TP22S-4							
007	016 TP22S-3							
008	017 TP22S-2							
009	018 22-1							
	MAT 9.30.13							

(Rush) Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/2/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/30/13 14:20		9/30/13 14:20
	9/30/13 14:40		9-30-13 14:40

PACE Project No.

Receipt Temp = ROI °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc
1241 Bellevue Street, Suite 1
Green Bay, WI 5430

Pace Analytical™

Sample Condition Upon Receipt

Client Name: OMNNI Project # 4085688

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other

Thermometer Used N/A Type of Ice: (Wet) Blue Dry None Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 20.1 /Corr: Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☒ no

Person examining contents: Date: 9-30-13 Initials: SW

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. Pg 1 of COC - No collect time 9-30-13 SW
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☒Yes ☐No ☐N/A	6. Fecal 9-30-13 SW
Rush Turn Around Time Requested:	☒Yes ☐No ☐N/A	7. 10-2-13 9/30/13 SW
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☐Yes ☒No ☐N/A	12. All samples matched by ID + collect date only! No collect time match 9-30-13 SW
-Includes date/time/ID/Analysis Matrix:	S + W	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☒Yes ☐No ☐N/A	13. ☐ HNO3 ☒ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 <2; NaOH+ZnAct ≥9, NaOH ≥12)	☒Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☒No	Initial when completed SW / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	14.
Trip Blank Present:	☐Yes ☐No ☒N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 9-30-13

Page 32 of 32

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 11, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory between September 30, 2013 and October 11, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085695001	TP20S-1	Solid	09/30/13 14:58	09/30/13 18:11
4085695002	TP20S-2	Solid	09/30/13 15:06	09/30/13 18:11
4085695003	TP20S-4	Solid	09/30/13 15:20	09/30/13 18:11
4085695004	TP20S-5	Solid	09/30/13 15:30	09/30/13 18:11
4085695005	TP21S-1	Solid	09/30/13 16:10	09/30/13 18:11
4085695006	TP21S-2	Solid	09/30/13 16:14	09/30/13 18:11
4085695007	TP21S-3	Solid	09/30/13 16:20	09/30/13 18:11
4085695008	TP21S-4	Solid	09/30/13 16:44	09/30/13 18:11
4085695009	TP20S-2 Cl Reanalysis	Solid	09/30/13 15:06	10/11/13 13:40

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(920)469-2436

SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085695001	TP20S-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695002	TP20S-2	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695003	TP20S-4	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695004	TP20S-5	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695005	TP21S-1	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695006	TP21S-2	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695007	TP21S-3	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695008	TP21S-4	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085695009	TP20S-2 Cl Reanalysis	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Sample: TP20S-1 **Lab ID: 4085695001** Collected: 09/30/13 14:58 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.7**	%	0.10	0.10	1		10/01/13 07:39		
9040 pH	Analytical Method: EPA 9040								
pH	**7.7**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.7**	mg/kg	7.4	3.7	1	09/30/13 20:48	10/01/13 22:36	24959-67-9	
Chloride	**2250**	mg/kg	368	184	5	09/30/13 20:48	10/02/13 05:16	16887-00-6	
Fluoride	**13.4**	mg/kg	7.4	3.7	1	09/30/13 20:48	10/01/13 22:36	16984-48-8	
Sulfate	**76.2**	mg/kg	73.6	36.8	1	09/30/13 20:48	10/01/13 22:36	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**722**	mg/kg	42.1	21.1	1	10/01/13 08:30	10/01/13 12:13	7723-14-0	

Sample: TP20S-2 **Lab ID: 4085695002** Collected: 09/30/13 15:06 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**78.9**	%	0.10	0.10	1		10/01/13 07:39		
9040 pH	Analytical Method: EPA 9040								
pH	**7.6**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<9.4**	mg/kg	18.8	9.4	1	09/30/13 20:48	10/01/13 23:00	24959-67-9	
Chloride	**7280**	mg/kg	939	470	5	09/30/13 20:48	10/02/13 05:41	16887-00-6	
Fluoride	**423**	mg/kg	93.9	47.0	5	09/30/13 20:48	10/02/13 05:41	16984-48-8	
Sulfate	**117J**	mg/kg	188	93.9	1	09/30/13 20:48	10/01/13 23:00	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**496**	mg/kg	127	63.3	1	10/01/13 08:30	10/01/13 12:14	7723-14-0	

Sample: TP20S-4 **Lab ID: 4085695003** Collected: 09/30/13 15:20 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**53.5**	%	0.10	0.10	1		10/01/13 07:39		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Sample: TP20S-4 **Lab ID: 4085695003** Collected: 09/30/13 15:20 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH	**7.7**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<21.2**	mg/kg	42.4	21.2	5	09/30/13 20:48	10/01/13 23:08	24959-67-9	D3
Chloride	**2510**	mg/kg	424	212	5	09/30/13 20:48	10/01/13 23:08	16887-00-6	
Fluoride	**31.8J**	mg/kg	42.4	21.2	5	09/30/13 20:48	10/01/13 23:08	16984-48-8	D3
Sulfate	**249J**	mg/kg	424	212	5	09/30/13 20:48	10/01/13 23:08	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**460**	mg/kg	71.7	35.8	1	10/01/13 08:30	10/01/13 12:14	7723-14-0	

Sample: TP20S-5 **Lab ID: 4085695004** Collected: 09/30/13 15:30 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.9**	%	0.10	0.10	1		10/01/13 07:39		
9040 pH	Analytical Method: EPA 9040								
pH	**7.3**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.6**	mg/kg	7.3	3.6	1	09/30/13 20:48	10/01/13 23:17	24959-67-9	
Chloride	**1960**	mg/kg	364	182	5	09/30/13 20:48	10/02/13 05:49	16887-00-6	
Fluoride	**11.1**	mg/kg	7.3	3.6	1	09/30/13 20:48	10/01/13 23:17	16984-48-8	
Sulfate	**62.4J**	mg/kg	72.7	36.4	1	09/30/13 20:48	10/01/13 23:17	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**543**	mg/kg	42.2	21.1	1	10/01/13 08:30	10/01/13 12:15	7723-14-0	

Sample: TP21S-1 **Lab ID: 4085695005** Collected: 09/30/13 16:10 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**13.6**	%	0.10	0.10	1		10/01/13 07:39		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.3**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Sample: TP21S-1 **Lab ID: 4085695005** Collected: 09/30/13 16:10 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<11.4**	mg/kg	22.9	11.4	5	09/30/13 20:48	10/01/13 23:25	24959-67-9	D3
Chloride	**463**	mg/kg	229	114	5	09/30/13 20:48	10/01/13 23:25	16887-00-6	
Fluoride	**14.9J**	mg/kg	22.9	11.4	5	09/30/13 20:48	10/01/13 23:25	16984-48-8	D3
Sulfate	**161J**	mg/kg	229	114	5	09/30/13 20:48	10/01/13 23:25	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**354**	mg/kg	27.2	13.6	1	10/01/13 08:30	10/01/13 12:16	7723-14-0	

Sample: TP21S-2 **Lab ID: 4085695006** Collected: 09/30/13 16:14 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**26.1**	%	0.10	0.10	1		10/01/13 07:40		
9040 pH	Analytical Method: EPA 9040								
pH	**8.1**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.7**	mg/kg	5.4	2.7	1	09/30/13 20:48	10/01/13 23:33	24959-67-9	
Chloride	**1220**	mg/kg	269	134	5	09/30/13 20:48	10/02/13 05:57	16887-00-6	
Fluoride	**3.2J**	mg/kg	5.4	2.7	1	09/30/13 20:48	10/01/13 23:33	16984-48-8	
Sulfate	**87.7**	mg/kg	53.7	26.9	1	09/30/13 20:48	10/01/13 23:33	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**379**	mg/kg	34.9	17.5	1	10/01/13 08:30	10/01/13 12:17	7723-14-0	

Sample: TP21S-3 **Lab ID: 4085695007** Collected: 09/30/13 16:20 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.9**	%	0.10	0.10	1		10/01/13 07:40		
9040 pH	Analytical Method: EPA 9040								
pH	**7.7**	Std. Units	0.10	0.010	1		10/02/13 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.8**	mg/kg	7.5	3.8	1	09/30/13 20:48	10/01/13 23:41	24959-67-9	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Sample: TP21S-3 **Lab ID: 4085695007** Collected: 09/30/13 16:20 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**3970**	mg/kg	750	375	10	09/30/13 20:48	10/02/13 06:06	16887-00-6	
Fluoride	**7.1J**	mg/kg	7.5	3.8	1	09/30/13 20:48	10/01/13 23:41	16984-48-8	
Sulfate	**79.2**	mg/kg	75.0	37.5	1	09/30/13 20:48	10/01/13 23:41	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**351**	mg/kg	44.8	22.4	1	10/01/13 08:30	10/01/13 12:18	7723-14-0	

Sample: TP21S-4 **Lab ID: 4085695008** Collected: 09/30/13 16:44 Received: 09/30/13 18:11 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**43.2**	%	0.10	0.10	1		10/01/13 07:40		
9040 pH	Analytical Method: EPA 9040								
pH	**8.4**	Std. Units	0.10	0.010	1		10/02/13 14:20		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.6**	mg/kg	7.2	3.6	1	09/30/13 20:48	10/02/13 00:06	24959-67-9	
Chloride	**866**	mg/kg	71.7	35.9	1	09/30/13 20:48	10/02/13 00:06	16887-00-6	
Fluoride	**7.7**	mg/kg	7.2	3.6	1	09/30/13 20:48	10/02/13 00:06	16984-48-8	
Sulfate	**263**	mg/kg	71.7	35.9	1	09/30/13 20:48	10/02/13 00:06	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**350**	mg/kg	61.3	30.6	1	10/01/13 08:30	10/01/13 12:19	7723-14-0	

Sample: TP20S-2 Cl Reanalysis **Lab ID: 4085695009** Collected: 09/30/13 15:06 Received: 10/11/13 13:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**78.9**	%	0.10	0.10	1		10/01/13 07:39		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**7170**	mg/kg	962	481	5	10/07/13 23:00	10/09/13 10:40	16887-00-6	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

QC Batch: PMST/8911 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085695001, 4085695002, 4085695003, 4085695004, 4085695005, 4085695006, 4085695007, 4085695008

SAMPLE DUPLICATE: 865688

Parameter	Units	4085324001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	5.8	6.2	8	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

QC Batch: WET/16462 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085695001, 4085695002, 4085695003, 4085695004, 4085695006, 4085695007, 4085695008

SAMPLE DUPLICATE: 867086

Parameter	Units	4085695002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.6	7.6	1	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

QC Batch: WET/16465
QC Batch Method: EPA 9045
Analysis Method: EPA 9045
Analysis Description: 9045 pH
Associated Lab Samples: 4085695005

SAMPLE DUPLICATE: 867097

Parameter	Units	4085695005 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.3	8.3	0	5	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

QC Batch: WETA/19732 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085695001, 4085695002, 4085695003, 4085695004, 4085695005, 4085695006, 4085695007, 4085695008

METHOD BLANK: 865619 Matrix: Solid
Associated Lab Samples: 4085695001, 4085695002, 4085695003, 4085695004, 4085695005, 4085695006, 4085695007, 4085695008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/kg	<2.0	4.0	10/01/13 20:49	
Chloride	mg/kg	<20.0	40.0	10/01/13 20:49	
Fluoride	mg/kg	<2.0	4.0	10/01/13 20:49	
Sulfate	mg/kg	<20.0	40.0	10/01/13 20:49	

LABORATORY CONTROL SAMPLE: 865620

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/kg	20	20.5	102	80-120	
Chloride	mg/kg	200	198	99	80-120	
Fluoride	mg/kg	20	20.6	103	80-120	
Sulfate	mg/kg	200	196	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865621 865622

Parameter	Units	4085688001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<3.9	38.6	38.6	41.8	42.0	108	109	80-120	0	20	
Chloride	mg/kg	3980	3860	3860	8120	8090	107	107	80-120	0	20	
Fluoride	mg/kg	12.1	38.6	38.6	49.8	49.8	98	98	80-120	0	20	
Sulfate	mg/kg	248	386	386	637	639	101	102	80-120	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865623 865624

Parameter	Units	4085695001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<3.7	36.9	36.9	38.8	39.0	106	106	80-120	0	20	
Chloride	mg/kg	2250	1840	1840	4260	4220	109	107	80-120	1	20	
Fluoride	mg/kg	13.4	36.9	36.9	49.9	50.2	99	100	80-120	1	20	
Sulfate	mg/kg	76.2	369	369	398	402	87	89	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

QC Batch: WETA/19995
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085695009

METHOD BLANK: 873722
Matrix: Solid
Associated Lab Samples: 4085695009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	<20.0	40.0	10/09/13 10:48	

LABORATORY CONTROL SAMPLE: 873723

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	196	98	80-120	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

QC Batch: WETA/19747 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 4085695001, 4085695002, 4085695003, 4085695004, 4085695005, 4085695006, 4085695007, 4085695008

METHOD BLANK: 865675 Matrix: Solid
Associated Lab Samples: 4085695001, 4085695002, 4085695003, 4085695004, 4085695005, 4085695006, 4085695007, 4085695008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	<20.0	40.0	10/01/13 12:06	

LABORATORY CONTROL SAMPLE: 865676

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	500	496	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865677 865678

Parameter	Units	4085688008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	142	795	795	855	830	90	87	80-120	3	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 865679 865680

Parameter	Units	4085695008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	350	766	766	967	962	81	80	80-120	1	20	

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA recommended holding time.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085695

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085695001	TP20S-1	ASTM D2974-87	PMST/8911		
4085695002	TP20S-2	ASTM D2974-87	PMST/8911		
4085695003	TP20S-4	ASTM D2974-87	PMST/8911		
4085695004	TP20S-5	ASTM D2974-87	PMST/8911		
4085695005	TP21S-1	ASTM D2974-87	PMST/8911		
4085695006	TP21S-2	ASTM D2974-87	PMST/8911		
4085695007	TP21S-3	ASTM D2974-87	PMST/8911		
4085695008	TP21S-4	ASTM D2974-87	PMST/8911		
4085695009	TP20S-2 CI Reanalysis	ASTM D2974-87	PMST/		
4085695001	TP20S-1	EPA 9040	WET/16462		
4085695002	TP20S-2	EPA 9040	WET/16462		
4085695003	TP20S-4	EPA 9040	WET/16462		
4085695004	TP20S-5	EPA 9040	WET/16462		
4085695006	TP21S-2	EPA 9040	WET/16462		
4085695007	TP21S-3	EPA 9040	WET/16462		
4085695008	TP21S-4	EPA 9040	WET/16462		
4085695005	TP21S-1	EPA 9045	WET/16465		
4085695001	TP20S-1	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695002	TP20S-2	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695003	TP20S-4	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695004	TP20S-5	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695005	TP21S-1	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695006	TP21S-2	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695007	TP21S-3	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695008	TP21S-4	EPA 300.0	WETA/19732	EPA 300.0	WETA/19745
4085695009	TP20S-2 CI Reanalysis	EPA 300.0	WETA/19995	EPA 300.0	WETA/19996
4085695001	TP20S-1	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695002	TP20S-2	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695003	TP20S-4	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695004	TP20S-5	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695005	TP21S-1	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695006	TP21S-2	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695007	TP21S-3	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750
4085695008	TP21S-4	EPA 365.4	WETA/19747	EPA 365.4	WETA/19750

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of 1

CHAIN OF CUSTODY

4085695

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Conductivity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	FILTERED? (YES/NO)				Y/N					
	PRESERVATION (CODE)*				Pick Letter	A	A			
001	TP20S-1	9/30/13	14:58	S	X	X	X			
002	TP20S-2		15:06	S	X	X				
003	TP20S-4		15:20	S	X	X				
004	TP20S-5		15:30	S	X	X			① Not Needed	
005	TP21S-1		16:10	S	X	X				
006	TP21S-2		16:14	S	X	X				
007	TP21S-3		16:20	S	X	X				
008	TP21S-4		16:44	S	X	X				

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/2/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/30/13 6:11pm		9-30-13 6:11pm

PACE Project No.: 4085695
Receipt Temp = ROI °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal: Present / Not Present, Intact / Not Intact

C019a(27Jun2006)
Version 6.0 06/14/06

ORIGINAL

Pace Analytical Services, Inc
1241 Bellevue Street, Suite
Green Bay, WI 5430

Pace Analytical

Sample Condition Upon Receipt

Client Name: Omni Project # 4085695

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr: Biological Tissue is Frozen: ☐ yes ☒ no

Temp Blank Present: ☐ yes ☒ no

Person examining contents:
Date: 9-30-13
Initials:

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

			Comments:
Chain of Custody Present:	☒Yes	☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes	☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes	☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes	☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes	☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes	☒No ☐N/A	6.
Rush Turn Around Time Requested:	☒Yes	☐No ☐N/A	7.
Sufficient Volume:	☒Yes	☐No ☐N/A	8.
Correct Containers Used:	☒Yes	☐No ☐N/A	9.
-Pace Containers Used:	☒Yes	☐No ☐N/A	
-Pace IR Containers Used:	☐Yes	☐No ☒N/A	
Containers Intact:	☒Yes	☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes	☐No ☒N/A	11.
Sample Labels match COC:	☒Yes	☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:			
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes	☐No ☒N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes	☐No ☒N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes	☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes	☐No ☒N/A	14.
Trip Blank Present:	☐Yes	☐No ☒N/A	15.
Trip Blank Custody Seals Present	☐Yes	☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):			

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 10-1-13

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F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 03, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 01, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085774001	20S-5	Solid	10/01/13 00:00	10/01/13 17:26
4085774002	23-1	Solid	10/01/13 00:00	10/01/13 17:26
4085774003	23-2	Solid	10/01/13 00:00	10/01/13 17:26
4085774004	23-4	Solid	10/01/13 00:00	10/01/13 17:26
4085774005	20S-1	Solid	10/01/13 00:00	10/01/13 17:26
4085774006	20S-2	Solid	10/01/13 00:00	10/01/13 17:26
4085774007	21S-3	Solid	10/01/13 00:00	10/01/13 17:26
4085774008	20S-4	Solid	10/01/13 00:00	10/01/13 17:26
4085774009	20S-3	Solid	10/01/13 00:00	10/01/13 17:26
4085774010	21S-4	Solid	10/01/13 00:00	10/01/13 17:26
4085774011	25-2	Solid	10/01/13 00:00	10/01/13 17:26
4085774012	21S-1	Solid	10/01/13 00:00	10/01/13 17:26
4085774013	21S-2	Solid	10/01/13 00:00	10/01/13 17:26
4085774014	25-1	Solid	10/01/13 00:00	10/01/13 17:26
4085774015	23-5	Solid	10/01/13 00:00	10/01/13 17:26

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085774001	20S-5	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774002	23-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774003	23-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774004	23-4	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774005	20S-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774006	20S-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774007	21S-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774008	20S-4	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774009	20S-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774010	21S-4	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774011	25-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774012	21S-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774013	21S-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774014	25-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085774015	23-5	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Sample: 20S-5 **Lab ID: 4085774001** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**4.2**	%	0.10	0.10	1		10/02/13 08:33		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**5.7**	% (w/w)	0.10	0.10	1		10/02/13 15:04		

Sample: 23-1 **Lab ID: 4085774002** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.36**	%	0.10	0.10	1		10/02/13 08:33		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.99**	% (w/w)	0.10	0.10	1		10/02/13 15:06		R1

Sample: 23-2 **Lab ID: 4085774003** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**5.6**	%	0.10	0.10	1		10/02/13 08:33		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**22.5**	% (w/w)	0.10	0.10	1		10/02/13 15:09		

Sample: 23-4 **Lab ID: 4085774004** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.20**	%	0.10	0.10	1		10/02/13 08:33		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.52**	% (w/w)	0.10	0.10	1		10/02/13 15:10		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Sample: 20S-1 **Lab ID: 4085774005** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**4.1**	%	0.10	0.10	1		10/02/13 08:37		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**13.6**	% (w/w)	0.10	0.10	1		10/02/13 15:11		

Sample: 20S-2 **Lab ID: 4085774006** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**24.7**	%	0.10	0.10	1		10/02/13 08:37		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**75.3**	% (w/w)	0.10	0.10	1		10/02/13 15:12		

Sample: 21S-3 **Lab ID: 4085774007** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**6.4**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**9.6**	% (w/w)	0.10	0.10	1		10/02/13 15:13		

Sample: 20S-4 **Lab ID: 4085774008** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**5.6**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**7.8**	% (w/w)	0.10	0.10	1		10/02/13 15:14		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Sample: 20S-3 **Lab ID: 4085774009** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.14**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.93**	% (w/w)	0.10	0.10	1		10/02/13 15:15		

Sample: 21S-4 **Lab ID: 4085774010** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.1**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**5.2**	% (w/w)	0.10	0.10	1		10/02/13 15:16		

Sample: 25-2 **Lab ID: 4085774011** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**3.5**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**22.3**	% (w/w)	0.10	0.10	1		10/02/13 15:17		

Sample: 21S-1 **Lab ID: 4085774012** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.93**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**3.9**	% (w/w)	0.10	0.10	1		10/02/13 15:18		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Sample: 21S-2 **Lab ID: 4085774013** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.99**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**3.3**	% (w/w)	0.10	0.10	1		10/02/13 15:19		

Sample: 25-1 **Lab ID: 4085774014** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**5.9**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**19.9**	% (w/w)	0.10	0.10	1		10/02/13 15:21		

Sample: 23-5 **Lab ID: 4085774015** Collected: 10/01/13 00:00 Received: 10/01/13 17:26 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.7**	%	0.10	0.10	1		10/02/13 08:38		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**11.6**	% (w/w)	0.10	0.10	1		10/02/13 15:22		

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

QC Batch: PMST/8918 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085774001, 4085774002, 4085774003, 4085774004, 4085774005, 4085774006, 4085774007, 4085774008, 4085774009, 4085774010, 4085774011, 4085774012, 4085774013, 4085774014, 4085774015

SAMPLE DUPLICATE: 866632

Parameter	Units	4085714003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	5.5	5.6	2	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

QC Batch: WET/16453 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: D2974 Total Organic Matter
Associated Lab Samples: 4085774001, 4085774002, 4085774003, 4085774004, 4085774005, 4085774006, 4085774007, 4085774008, 4085774009, 4085774010, 4085774011, 4085774012, 4085774013, 4085774014, 4085774015

METHOD BLANK: 866683 Matrix: Solid
Associated Lab Samples: 4085774001, 4085774002, 4085774003, 4085774004, 4085774005, 4085774006, 4085774007, 4085774008, 4085774009, 4085774010, 4085774011, 4085774012, 4085774013, 4085774014, 4085774015

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Organic Matter	% (w/w)	<0.10	0.10	10/02/13 15:02	

LABORATORY CONTROL SAMPLE: 866684

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Organic Matter	% (w/w)	199	168	84	80-120	

SAMPLE DUPLICATE: 866685

Parameter	Units	4085774001 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	5.7	5.5	4	10	

SAMPLE DUPLICATE: 866686

Parameter	Units	4085774002 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	0.99	1.2	15	10	R1

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

R1 RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085774

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085774001	20S-5	ASTM D2974-87	PMST/8918		
4085774002	23-1	ASTM D2974-87	PMST/8918		
4085774003	23-2	ASTM D2974-87	PMST/8918		
4085774004	23-4	ASTM D2974-87	PMST/8918		
4085774005	20S-1	ASTM D2974-87	PMST/8918		
4085774006	20S-2	ASTM D2974-87	PMST/8918		
4085774007	21S-3	ASTM D2974-87	PMST/8918		
4085774008	20S-4	ASTM D2974-87	PMST/8918		
4085774009	20S-3	ASTM D2974-87	PMST/8918		
4085774010	21S-4	ASTM D2974-87	PMST/8918		
4085774011	25-2	ASTM D2974-87	PMST/8918		
4085774012	21S-1	ASTM D2974-87	PMST/8918		
4085774013	21S-2	ASTM D2974-87	PMST/8918		
4085774014	25-1	ASTM D2974-87	PMST/8918		
4085774015	23-5	ASTM D2974-87	PMST/8918		
4085774001	20S-5	ASTM D2974-87	WET/16453		
4085774002	23-1	ASTM D2974-87	WET/16453		
4085774003	23-2	ASTM D2974-87	WET/16453		
4085774004	23-4	ASTM D2974-87	WET/16453		
4085774005	20S-1	ASTM D2974-87	WET/16453		
4085774006	20S-2	ASTM D2974-87	WET/16453		
4085774007	21S-3	ASTM D2974-87	WET/16453		
4085774008	20S-4	ASTM D2974-87	WET/16453		
4085774009	20S-3	ASTM D2974-87	WET/16453		
4085774010	21S-4	ASTM D2974-87	WET/16453		
4085774011	25-2	ASTM D2974-87	WET/16453		
4085774012	21S-1	ASTM D2974-87	WET/16453		
4085774013	21S-2	ASTM D2974-87	WET/16453		
4085774014	25-1	ASTM D2974-87	WET/16453		
4085774015	23-5	ASTM D2974-87	WET/16453		

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

4085774

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	Appleton, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Tentatively organic content +	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	20S-5	10/1/13		S	X		1-Ziploc[A]	
002	23-1							
003	23-2							
004	23-4							
005	20S-1							
006	20S-2							
007	21S-3							
008	20S-4							
009	20S-3							
010	21S-4							
011	25-2							
012	21S-1							
013	21S-2							

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):

Email #1:	
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	10/1/13 17:26	M.V	10/1/13 1726

PACE Project No.: 4085774

Receipt Temp = 2.0 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal: Present / Not Present; Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

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4085774

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	
Branch/Location:	
Project Contact:	
Phone:	
Project Number:	
Project Name:	
Project State:	
Sampled By (Print):	
Sampled By (Sign):	
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	
Mail To Company:	
Mail To Address:	
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes

A = Air	W = Water
B = Biota	DW = Drinking Water
C = Charcoal	GW = Ground Water
O = Oil	SW = Surface Water
S = Soil	WW = Waste Water
Sl = Sludge	WP = Wipe

FILTERED? (YES/NO) — Y / N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Ignition Loss Organic content	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
014	25-1	10/1/13		S	A		1-Ziploc	
015	23-5	"		S	A		↓	

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge) Date Needed:	Relinquished By:	Date/Time:	Received By:	Date/Time:	PACE Project No.
Transmit Prelim Rush Results by (complete what you want):	Bill Wagner	10/1/13 17:26	Mike	10/1/13 1726	
Email #1:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Receipt Temp = 20 °C
Email #2:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Sample Receipt pH OK / Adjusted
Telephone:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Cooler Custody Seal Present / Not Present Intact / Not Intact
Fax:	Relinquished By:	Date/Time:	Received By:	Date/Time:	
Samples on HOLD are subject to special pricing and release of liability					

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services,
1241 Bellevue Street, Su
Green Bay, WI 54

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Associates Project # 4085774

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2.0 /Corr: Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10/1/13
Initials: MV

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4. Only page 1 10/1/13 MV
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 24hr 10/1/13 MV
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
-Pace IR Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12. No time on samples. 10/1/13 MV
-Includes date/time/ID/Analysis Matrix:	S	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: 10-7-13

Page 15 of 15

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October 11, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory between October 01, 2013 and October 11, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085775001	TP22N-1	Solid	10/01/13 08:50	10/01/13 17:40
4085775002	TP22N-W	Water	10/01/13 11:35	10/01/13 17:40
4085775003	TP22N-2	Solid	10/01/13 09:45	10/01/13 17:40
4085775004	TP22N-3	Solid	10/01/13 09:48	10/01/13 17:40
4085775005	TP22N-4	Solid	10/01/13 09:50	10/01/13 17:40
4085775006	TP22SW-1	Solid	10/01/13 12:05	10/01/13 17:40
4085775007	TP22SW-2	Solid	10/01/13 12:15	10/01/13 17:40
4085775008	TP22SW-3	Solid	10/01/13 12:20	10/01/13 17:40
4085775009	TP22N-1 SO4 Reanalysis	Solid	10/01/13 09:50	10/11/13 13:16

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085775001	TP22N-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775002	TP22N-W	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775003	TP22N-2	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775004	TP22N-3	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775005	TP22N-4	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775006	TP22SW-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775007	TP22SW-2	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775008	TP22SW-3	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085775009	TP22N-1 SO4 Reanalysis	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Sample: TP22N-1 **Lab ID: 4085775001** Collected: 10/01/13 08:50 Received: 10/01/13 17:40 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**56.7**	%	0.10	0.10	1		10/02/13 08:38		
9040 pH	Analytical Method: EPA 9040								
pH	**7.8**	Std. Units	0.10	0.010	1		10/02/13 20:15		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<22.9**	mg/kg	45.8	22.9	5	10/01/13 18:30	10/02/13 23:02	24959-67-9	D3
Chloride	**1130**	mg/kg	458	229	5	10/01/13 18:30	10/02/13 23:02	16887-00-6	
Fluoride	**<22.9**	mg/kg	45.8	22.9	5	10/01/13 18:30	10/02/13 23:02	16984-48-8	D3
Sulfate	**21800**	mg/kg	9170	4580	100	10/01/13 18:30	10/02/13 23:26	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**299**	mg/kg	71.1	35.5	1	10/02/13 08:00	10/02/13 11:22	7723-14-0	

Sample: TP22N-W **Lab ID: 4085775002** Collected: 10/01/13 11:35 Received: 10/01/13 17:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5910**	umhos/cm	10.0	1.1	1		10/02/13 10:46		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**937**	mg/L	40.0	20.0	1		10/02/13 10:47		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**101**	mg/L	10.0	0.63	1		10/02/13 08:07		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**581**	mg/L	125	52.2	2500		10/02/13 09:30		H6,M0
9040 pH	Analytical Method: EPA 9040								
pH	**5.4**	Std. Units	0.10	0.010	1		10/01/13 20:10		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<2.0**	mg/L	4.0	2.0	10		10/02/13 10:05	24959-67-9	M0
Chloride	**1460**	mg/L	200	100	50		10/01/13 19:10	16887-00-6	M0
Fluoride	**<0.20**	mg/L	0.40	0.20	1		10/01/13 18:10	16984-48-8	
Sulfate	**1690**	mg/L	200	100	50		10/01/13 19:10	14808-79-8	M0
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.11J**	mg/L	0.40	0.052	1	10/02/13 08:00	10/02/13 11:31	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Sample: TP22N-2 **Lab ID: 4085775003** Collected: 10/01/13 09:45 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**62.5**	%	0.10	0.10	1		10/02/13 08:38		
9040 pH	Analytical Method: EPA 9040								
pH	**7.3**	Std. Units	0.10	0.010	1		10/01/13 20:25		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<5.4**	mg/kg	10.8	5.4	1	10/01/13 18:30	10/02/13 19:31	24959-67-9	
Chloride	**1920**	mg/kg	1080	539	10	10/01/13 18:30	10/02/13 23:51	16887-00-6	
Fluoride	**7.3J**	mg/kg	10.8	5.4	1	10/01/13 18:30	10/02/13 19:31	16984-48-8	
Sulfate	**5760**	mg/kg	1080	539	10	10/01/13 18:30	10/02/13 23:51	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**264**	mg/kg	68.9	34.4	1	10/02/13 08:00	10/02/13 11:22	7723-14-0	

Sample: TP22N-3 **Lab ID: 4085775004** Collected: 10/01/13 09:48 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.9**	%	0.10	0.10	1		10/02/13 08:38		
9040 pH	Analytical Method: EPA 9040								
pH	**7.3**	Std. Units	0.10	0.010	1		10/03/13 15:40		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.8**	mg/kg	5.6	2.8	1	10/01/13 18:30	10/02/13 19:40	24959-67-9	
Chloride	**685**	mg/kg	55.5	27.8	1	10/01/13 18:30	10/02/13 19:40	16887-00-6	
Fluoride	**3.9J**	mg/kg	5.6	2.8	1	10/01/13 18:30	10/02/13 19:40	16984-48-8	
Sulfate	**998**	mg/kg	278	139	5	10/01/13 18:30	10/02/13 23:59	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**233**	mg/kg	37.0	18.5	1	10/02/13 08:00	10/02/13 11:23	7723-14-0	

Sample: TP22N-4 **Lab ID: 4085775005** Collected: 10/01/13 09:50 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.4**	%	0.10	0.10	1		10/02/13 08:38		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Sample: TP22N-4 **Lab ID: 4085775005** Collected: 10/01/13 09:50 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.2**	Std. Units	0.10	0.010	1		10/01/13 20:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.8	2.4	1	10/01/13 18:30	10/02/13 19:48	24959-67-9	
Chloride	**291**	mg/kg	48.5	24.2	1	10/01/13 18:30	10/02/13 19:48	16887-00-6	
Fluoride	**3.8J**	mg/kg	4.8	2.4	1	10/01/13 18:30	10/02/13 19:48	16984-48-8	
Sulfate	**303**	mg/kg	48.5	24.2	1	10/01/13 18:30	10/02/13 19:48	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**463**	mg/kg	28.8	14.4	1	10/02/13 08:00	10/02/13 11:23	7723-14-0	

Sample: TP22SW-1 **Lab ID: 4085775006** Collected: 10/01/13 12:05 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**38.4**	%	0.10	0.10	1		10/02/13 09:09		
9040 pH	Analytical Method: EPA 9040								
pH	**8.2**	Std. Units	0.10	0.010	1		10/02/13 20:15		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.3**	mg/kg	6.6	3.3	1	10/01/13 18:30	10/02/13 19:56	24959-67-9	
Chloride	**971**	mg/kg	329	164	5	10/01/13 18:30	10/03/13 00:07	16887-00-6	
Fluoride	**7.6**	mg/kg	6.6	3.3	1	10/01/13 18:30	10/02/13 19:56	16984-48-8	
Sulfate	**5840**	mg/kg	1310	657	20	10/01/13 18:30	10/03/13 00:32	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**276**	mg/kg	56.5	28.2	1	10/02/13 08:00	10/02/13 11:24	7723-14-0	

Sample: TP22SW-2 **Lab ID: 4085775007** Collected: 10/01/13 12:15 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**15.3**	%	0.10	0.10	1		10/02/13 09:09		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/01/13 20:30		H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Sample: TP22SW-2 **Lab ID: 4085775007** Collected: 10/01/13 12:15 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.8	2.4	1	10/01/13 18:30	10/02/13 20:04	24959-67-9	
Chloride	**249**	mg/kg	47.9	24.0	1	10/01/13 18:30	10/02/13 20:04	16887-00-6	
Fluoride	**2.9J**	mg/kg	4.8	2.4	1	10/01/13 18:30	10/02/13 20:04	16984-48-8	
Sulfate	**230**	mg/kg	47.9	24.0	1	10/01/13 18:30	10/02/13 20:04	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**107**	mg/kg	39.4	19.7	1	10/02/13 08:00	10/02/13 11:26	7723-14-0	

Sample: TP22SW-3 **Lab ID: 4085775008** Collected: 10/01/13 12:20 Received: 10/01/13 17:40 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.0**	%	0.10	0.10	1		10/02/13 09:09		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/01/13 20:30		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.5**	mg/kg	4.9	2.5	1	10/01/13 18:30	10/02/13 20:38	24959-67-9	
Chloride	**229**	mg/kg	49.4	24.7	1	10/01/13 18:30	10/02/13 20:38	16887-00-6	
Fluoride	**3.5J**	mg/kg	4.9	2.5	1	10/01/13 18:30	10/02/13 20:38	16984-48-8	
Sulfate	**274**	mg/kg	49.4	24.7	1	10/01/13 18:30	10/02/13 20:38	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**457**	mg/kg	29.6	14.8	1	10/02/13 08:00	10/02/13 11:26	7723-14-0	

Sample: TP22N-1 SO4 Reanalysis **Lab ID: 4085775009** Collected: 10/01/13 09:50 Received: 10/11/13 13:16 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**56.7**	%	0.10	0.10	1		10/02/13 08:38		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**13500**	mg/kg	4640	2320	50	10/07/13 23:00	10/09/13 10:32	14808-79-8	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: PMST/8918 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085775001, 4085775003, 4085775004, 4085775005

SAMPLE DUPLICATE: 866632

Parameter	Units	4085714003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	5.5	5.6	2	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: PMST/8919 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085775006, 4085775007, 4085775008

SAMPLE DUPLICATE: 866641

Parameter	Units	4085714002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	7.0	7.1	1	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WET/16454
QC Batch Method: EPA 120.1
Analysis Method: EPA 120.1
Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4085775002

METHOD BLANK: 866731 Matrix: Water
Associated Lab Samples: 4085775002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	10/02/13 10:42	

LABORATORY CONTROL SAMPLE: 866732

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	646	586	91	80-120	

SAMPLE DUPLICATE: 866733

Parameter	Units	4085775002 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	5910	6070	3	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WET/16449
QC Batch Method: SM 2310B
Analysis Method: SM 2310B
Analysis Description: 2310B Acidity, Total
Associated Lab Samples: 4085775002

METHOD BLANK: 866626
Matrix: Water
Associated Lab Samples: 4085775002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acidity, Total	mg/L	19.1J	20.0	10/02/13 10:26	

LABORATORY CONTROL SAMPLE: 866627

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total	mg/L	221	203	92	80-120	

SAMPLE DUPLICATE: 866628

Parameter	Units	4085542002 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total	mg/L	1270	1270	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WET/16445 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085775002

METHOD BLANK: 866511 Matrix: Water
Associated Lab Samples: 4085775002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/02/13 07:56	

LABORATORY CONTROL SAMPLE: 866512

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	201	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 866513 866514

Parameter	Units	4085775002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	101	200	200	235	220	67	60	80-120	6	20	M0

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WET/16458 Analysis Method: HACH 8146
QC Batch Method: HACH 8146 Analysis Description: Iron, Ferrous
Associated Lab Samples: 4085775002

METHOD BLANK: 866879 Matrix: Water
Associated Lab Samples: 4085775002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.021	0.050	10/02/13 09:30	

LABORATORY CONTROL SAMPLE: 866880

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	.6	0.68	114	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 866881 866882

Parameter	Units	4085775002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Ferrous	mg/L	581	1500	1500	1640	1540	71	64	80-120	6	20	M0

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WET/16474 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085775001, 4085775002, 4085775003, 4085775004, 4085775006

SAMPLE DUPLICATE: 867604

Parameter	Units	4085775002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	5.4	5.4	0	20	H6

SAMPLE DUPLICATE: 867605

Parameter	Units	4085775001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.8	7.9	1	20	1q,H6

SAMPLE DUPLICATE: 868321

Parameter	Units	4085775004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.3	7.2	1	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WET/16476 Analysis Method: EPA 9045
QC Batch Method: EPA 9045 Analysis Description: 9045 pH
Associated Lab Samples: 4085775005, 4085775007, 4085775008

SAMPLE DUPLICATE: 867607

Parameter	Units	4085775008 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.0	8.0	0	5	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WETA/19765 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085775001, 4085775003, 4085775004, 4085775005, 4085775006, 4085775007, 4085775008

METHOD BLANK: 866515 Matrix: Solid
Associated Lab Samples: 4085775001, 4085775003, 4085775004, 4085775005, 4085775006, 4085775007, 4085775008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/kg	<2.0	4.0	10/02/13 18:55	
Chloride	mg/kg	<20.0	40.0	10/02/13 18:55	
Fluoride	mg/kg	<2.0	4.0	10/02/13 18:55	
Sulfate	mg/kg	<20.0	40.0	10/02/13 18:55	

LABORATORY CONTROL SAMPLE: 866516

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/kg	20	20.1	100	80-120	
Chloride	mg/kg	200	196	98	80-120	
Fluoride	mg/kg	20	20.3	102	80-120	
Sulfate	mg/kg	200	194	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 866517 866518

Parameter	Units	4085775001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<22.9	229	229	240	235	104	102	80-120	2	20	
Chloride	mg/kg	1130	2290	2290	3430	3420	100	100	80-120	0	20	
Fluoride	mg/kg	<22.9	229	229	240	241	104	105	80-120	0	20	
Sulfate	mg/kg	21800	45700	45700	65700	66200	96	97	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WETA/19995
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085775009

METHOD BLANK: 873722
Matrix: Solid
Associated Lab Samples: 4085775009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/kg	21.7J	40.0	10/09/13 10:48	

LABORATORY CONTROL SAMPLE: 873723

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/kg	200	194	97	80-120	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WETA/19795
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085775002

METHOD BLANK: 866977 Matrix: Water
Associated Lab Samples: 4085775002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/L	<0.20	0.40	10/01/13 18:24	
Chloride	mg/L	<2.0	4.0	10/01/13 18:24	
Fluoride	mg/L	<0.20	0.40	10/01/13 18:24	
Sulfate	mg/L	<2.0	4.0	10/01/13 18:24	

LABORATORY CONTROL SAMPLE: 866978

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/L	2	2.2	110	90-110	
Chloride	mg/L	20	20.7	104	90-110	
Fluoride	mg/L	2	2.1	106	90-110	
Sulfate	mg/L	20	20.8	104	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 866979 866980

Parameter	Units	4085775002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/L	<2.0	20	20	22.6	22.5	113	113	90-110	0	20	M0
Chloride	mg/L	1460	1000	1000	2650	2650	119	119	90-110	0	20	M0
Fluoride	mg/L	<0.20	2	2	2.1	2.1	103	99	90-110	3	20	
Sulfate	mg/L	1690	1000	1000	2880	2880	119	119	90-110	0	20	M0

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WETA/19781 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 4085775001, 4085775003, 4085775004, 4085775005, 4085775006, 4085775007, 4085775008

METHOD BLANK: 866582 Matrix: Solid
Associated Lab Samples: 4085775001, 4085775003, 4085775004, 4085775005, 4085775006, 4085775007, 4085775008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	<20.0	40.0	10/02/13 11:20	

LABORATORY CONTROL SAMPLE: 866583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	500	497	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 866584 866585

Parameter	Units	10243023002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	666	467	467	1180	1100	110	92	80-120	7	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

QC Batch: WETA/19782 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 4085775002

METHOD BLANK: 866589 Matrix: Water
Associated Lab Samples: 4085775002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	<0.052	0.40	10/02/13 11:30	

LABORATORY CONTROL SAMPLE: 866590

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	5	5.0	99	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 866591 866592

Parameter	Units	4085312001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	11.1	20	20	30.6	29.6	98	92	90-110	4	20	

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

1q	Due to sample matrix, DI water was added to sample in a 1:1 ratio and sample was stirred prior to analysis.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA recommended holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL BR
Pace Project No.: 4085775

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085775001	TP22N-1	ASTM D2974-87	PMST/8918		
4085775003	TP22N-2	ASTM D2974-87	PMST/8918		
4085775004	TP22N-3	ASTM D2974-87	PMST/8918		
4085775005	TP22N-4	ASTM D2974-87	PMST/8918		
4085775006	TP22SW-1	ASTM D2974-87	PMST/8919		
4085775007	TP22SW-2	ASTM D2974-87	PMST/8919		
4085775008	TP22SW-3	ASTM D2974-87	PMST/8919		
4085775009	TP22N-1 SO4 Reanalysis	ASTM D2974-87	PMST/		
4085775002	TP22N-W	EPA 120.1	WET/16454		
4085775002	TP22N-W	SM 2310B	WET/16449		
4085775002	TP22N-W	SM 2320B	WET/16445		
4085775002	TP22N-W	HACH 8146	WET/16458		
4085775001	TP22N-1	EPA 9040	WET/16474		
4085775002	TP22N-W	EPA 9040	WET/16474		
4085775003	TP22N-2	EPA 9040	WET/16474		
4085775004	TP22N-3	EPA 9040	WET/16474		
4085775006	TP22SW-1	EPA 9040	WET/16474		
4085775005	TP22N-4	EPA 9045	WET/16476		
4085775007	TP22SW-2	EPA 9045	WET/16476		
4085775008	TP22SW-3	EPA 9045	WET/16476		
4085775001	TP22N-1	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775003	TP22N-2	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775004	TP22N-3	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775005	TP22N-4	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775006	TP22SW-1	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775007	TP22SW-2	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775008	TP22SW-3	EPA 300.0	WETA/19765	EPA 300.0	WETA/19768
4085775009	TP22N-1 SO4 Reanalysis	EPA 300.0	WETA/19995	EPA 300.0	WETA/19996
4085775002	TP22N-W	EPA 300.0	WETA/19795		
4085775001	TP22N-1	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775003	TP22N-2	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775004	TP22N-3	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775005	TP22N-4	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775006	TP22SW-1	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775007	TP22SW-2	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775008	TP22SW-3	EPA 365.4	WETA/19781	EPA 365.4	WETA/19787
4085775002	TP22N-W	EPA 365.4	WETA/19782	EPA 365.4	WETA/19788

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MN: 612-607-1700 WI: 920-469-2436

Page 1 of

4085775

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	4085775
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Conductivity	Acidity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					Y/N:			N	N	N	N				
					Pick Letter:	A	A	A	A	C	A				
001	TP22N-1	10/1/13	8:50	S	X	X						X		1-4oz p^A, 1-4oz ag^A	
002	TP22N-W		11:35	GW			X	X	X	X	X	X		4-250mL p^AAADC	
003	TP22N-2		9:45	S	X	X						X		1-4oz p^A, 1-4oz ag^A	
004	TP22N-3		9:48	S	X	X						X			
005	TP22N-4		9:50	S	X	X						X			
006	TP22SW-1		12:05	S	X	X						X			
007	TP22SW-2		12:15	S	X	X						X			
008	TP22SW-3		12:20	S	X	X						X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/1/13 17:18	M.V	10/1/13 17:18

PACE Project No.: 4085775
Receipt Temp = 2.01 °C
Sample Receipt pH: (OK) Adjusted
Cooler Custody Seal: Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services,
1241 Bellevue Street, Su
Green Bay, WI 5

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omnni Associates Project # 10855775

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other poly bag

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: R01 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10-1-13
Initials: BF

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12. no times on samples. 10-1-13 BF
-Includes date/time/ID/Analysis Matrix:		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☑ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics. OTHER:	☐Yes ☐No	Initial when completed BF / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: BF Date: 10-3-13

Page 25 of 25

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October 04, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 02, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085855001	TP18SE-1	Solid	10/02/13 08:10	10/02/13 16:53
4085855002	TP18SE-2	Solid	10/02/13 08:18	10/02/13 16:53
4085855003	TP18SE-W	Water	10/02/13 08:35	10/02/13 16:53
4085855004	TP18SE	Solid	10/02/13 09:02	10/02/13 16:53
4085855005	TP16SE-1	Solid	10/02/13 09:50	10/02/13 16:53
4085855006	TP16SE-2	Solid	10/02/13 09:58	10/02/13 16:53
4085855007	TP16SE-3	Solid	10/02/13 10:05	10/02/13 16:53
4085855008	TP16SE-W	Water	10/02/13 10:35	10/02/13 16:53
4085855009	TP14S-1	Solid	10/02/13 11:20	10/02/13 16:53
4085855010	TP14S-2	Solid	10/02/13 11:25	10/02/13 16:53
4085855011	TP14S-W	Water	10/02/13 11:50	10/02/13 16:53
4085855012	TP12S-1	Solid	10/02/13 13:10	10/02/13 16:53
4085855013	TP12S-W	Water	10/02/13 13:25	10/02/13 16:53
4085855014	TP10S-1	Solid	10/02/13 15:30	10/02/13 16:53
4085855015	TP10S-2	Solid	10/02/13 15:42	10/02/13 16:53
4085855016	TP10S-W	Water	10/02/13 15:50	10/02/13 16:53

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085855001	TP18SE-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855002	TP18SE-2	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855003	TP18SE-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855004	TP18SE	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855005	TP16SE-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855006	TP16SE-2	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855007	TP16SE-3	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855008	TP16SE-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855009	TP14S-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855010	TP14S-2	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855011	TP14S-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855012	TP12S-1	ASTM D2974-87	SKW	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855013	TP12S-W	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855014	TP10S-1	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855015	TP10S-2	ASTM D2974-87	SKW	1
		EPA 9045	KMS	1

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1
4085855016	**TP10S-W**	SM 9222D	DEY	1
		EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		HACH 8146	DEY	1
		EPA 9040	KMS	1
		EPA 300.0	JCJ	4
		EPA 365.4	DAW	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP18SE-1 **Lab ID: 4085855001** Collected: 10/02/13 08:10 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**46.8**	%	0.10	0.10	1		10/03/13 07:17		
9040 pH	Analytical Method: EPA 9040								
pH	**8.3**	Std. Units	0.10	0.010	1		10/03/13 16:00		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<18.9**	mg/kg	37.8	18.9	5	10/02/13 19:15	10/03/13 21:01	24959-67-9	D3
Chloride	**222J**	mg/kg	378	189	5	10/02/13 19:15	10/03/13 21:01	16887-00-6	D3
Fluoride	**26.4J**	mg/kg	37.8	18.9	5	10/02/13 19:15	10/03/13 21:01	16984-48-8	D3
Sulfate	**291J**	mg/kg	378	189	5	10/02/13 19:15	10/03/13 21:01	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**478**	mg/kg	79.2	39.6	1	10/03/13 08:45	10/03/13 12:09	7723-14-0	

Sample: TP18SE-2 **Lab ID: 4085855002** Collected: 10/02/13 08:18 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**19.6**	%	0.10	0.10	1		10/03/13 07:17		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/03/13 16:25		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<5.1**	mg/kg	10.1	5.1	1	10/02/13 19:15	10/03/13 21:25	24959-67-9	
Chloride	**1230**	mg/kg	506	253	5	10/02/13 19:15	10/03/13 23:20	16887-00-6	
Fluoride	**7.1J**	mg/kg	10.1	5.1	1	10/02/13 19:15	10/03/13 21:25	16984-48-8	
Sulfate	**123**	mg/kg	101	50.6	1	10/02/13 19:15	10/03/13 21:25	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**136**	mg/kg	31.1	15.6	1	10/03/13 08:45	10/03/13 12:10	7723-14-0	

Sample: TP18SE-W **Lab ID: 4085855003** Collected: 10/02/13 08:35 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<6.25**	CFU/100 mL	6.2	6.2	6.25	10/02/13 18:25	10/02/13 18:25		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP18SE-W **Lab ID: 4085855003** Collected: 10/02/13 08:35 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5290**	umhos/cm	10.0	1.1	1		10/03/13 13:51		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<66.7**	mg/L	133	66.7	1		10/03/13 09:51		2q
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**975**	mg/L	10.0	0.63	1		10/03/13 14:00		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**<0.10**	mg/L	0.25	0.10	1		10/03/13 11:15		D3,H6, M0
9040 pH	Analytical Method: EPA 9040								
pH	**7.3**	Std. Units	0.10	0.010	1		10/02/13 20:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		10/03/13 00:40	24959-67-9	D3,M0
Chloride	**1280**	mg/L	400	200	100		10/03/13 01:04	16887-00-6	
Fluoride	**1.2J**	mg/L	2.0	1.0	5		10/03/13 00:40	16984-48-8	D3
Sulfate	**63.3**	mg/L	20.0	10.0	5		10/03/13 00:40	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.26J**	mg/L	0.40	0.052	1	10/03/13 08:45	10/03/13 12:24	7723-14-0	

Sample: TP18SE **Lab ID: 4085855004** Collected: 10/02/13 09:02 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.3**	%	0.10	0.10	1		10/03/13 07:17		
9040 pH	Analytical Method: EPA 9040								
pH	**12.4**	Std. Units	0.10	0.010	1		10/03/13 16:00		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<18.3**	mg/kg	36.6	18.3	5	10/02/13 19:15	10/04/13 00:01	24959-67-9	D3
Chloride	**1980**	mg/kg	366	183	5	10/02/13 19:15	10/04/13 00:01	16887-00-6	
Fluoride	**25.6J**	mg/kg	36.6	18.3	5	10/02/13 19:15	10/04/13 00:01	16984-48-8	D3
Sulfate	**518**	mg/kg	366	183	5	10/02/13 19:15	10/04/13 00:01	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**33.0J**	mg/kg	58.5	29.2	1	10/03/13 08:45	10/03/13 12:10	7723-14-0	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP16SE-1 **Lab ID: 4085855005** Collected: 10/02/13 09:50 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**35.4**	%	0.10	0.10	1		10/03/13 07:18		
9040 pH	Analytical Method: EPA 9040								
pH	**7.9**	Std. Units	0.10	0.010	1		10/03/13 16:00		1q
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<15.2**	mg/kg	30.4	15.2	5	10/02/13 19:15	10/03/13 21:58	24959-67-9	D3
Chloride	**259J**	mg/kg	304	152	5	10/02/13 19:15	10/03/13 21:58	16887-00-6	D3
Fluoride	**19.0J**	mg/kg	30.4	15.2	5	10/02/13 19:15	10/03/13 21:58	16984-48-8	D3
Sulfate	**214J**	mg/kg	304	152	5	10/02/13 19:15	10/03/13 21:58	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**474**	mg/kg	32.6	16.3	1	10/03/13 08:45	10/03/13 12:11	7723-14-0	

Sample: TP16SE-2 **Lab ID: 4085855006** Collected: 10/02/13 09:58 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.2**	%	0.10	0.10	1		10/03/13 07:18		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/03/13 16:25		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.8	2.4	1	10/02/13 19:15	10/03/13 22:23	24959-67-9	
Chloride	**430**	mg/kg	48.1	24.1	1	10/02/13 19:15	10/03/13 22:23	16887-00-6	
Fluoride	**3.0J**	mg/kg	4.8	2.4	1	10/02/13 19:15	10/03/13 22:23	16984-48-8	
Sulfate	**26.9J**	mg/kg	48.1	24.1	1	10/02/13 19:15	10/03/13 22:23	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**80.1**	mg/kg	20.8	10.4	1	10/03/13 08:45	10/03/13 12:12	7723-14-0	

Sample: TP16SE-3 **Lab ID: 4085855007** Collected: 10/02/13 10:05 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**17.1**	%	0.10	0.10	1		10/03/13 07:18		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP16SE-3 **Lab ID: 4085855007** Collected: 10/02/13 10:05 Received: 10/02/13 16:53 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		10/03/13 16:25		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.9	2.4	1	10/02/13 19:15	10/03/13 22:31	24959-67-9	
Chloride	**259**	mg/kg	48.5	24.3	1	10/02/13 19:15	10/03/13 22:31	16887-00-6	
Fluoride	**3.5J**	mg/kg	4.9	2.4	1	10/02/13 19:15	10/03/13 22:31	16984-48-8	
Sulfate	**27.7J**	mg/kg	48.5	24.3	1	10/02/13 19:15	10/03/13 22:31	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**341**	mg/kg	27.6	13.8	1	10/03/13 08:45	10/03/13 12:13	7723-14-0	

Sample: TP16SE-W **Lab ID: 4085855008** Collected: 10/02/13 10:35 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**16.4**	CFU/100 mL	16.4	16.4	16.4	10/02/13 18:25	10/02/13 18:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4560**	umhos/cm	10.0	1.1	1		10/03/13 13:52		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<66.7**	mg/L	133	66.7	1		10/03/13 09:54		2q
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**799**	mg/L	10.0	0.63	1		10/03/13 15:32		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.75J**	mg/L	1.2	0.52	1		10/03/13 11:15		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**6.8**	Std. Units	0.10	0.010	1		10/02/13 20:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		10/03/13 01:29	24959-67-9	D3
Chloride	**1050**	mg/L	80.0	40.0	20		10/03/13 01:37	16887-00-6	
Fluoride	**1.4J**	mg/L	2.0	1.0	5		10/03/13 01:29	16984-48-8	D3
Sulfate	**10.8J**	mg/L	20.0	10.0	5		10/03/13 01:29	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**1.9**	mg/L	0.40	0.052	1	10/03/13 08:45	10/03/13 12:25	7723-14-0	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP14S-1 **Lab ID: 4085855009** Collected: 10/02/13 11:20 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.0**	%	0.10	0.10	1		10/03/13 07:18		
9040 pH	Analytical Method: EPA 9040								
pH	**7.8**	Std. Units	0.10	0.010	1		10/03/13 16:00		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<13.8**	mg/kg	27.7	13.8	5	10/02/13 19:15	10/03/13 22:39	24959-67-9	D3
Chloride	**298**	mg/kg	277	138	5	10/02/13 19:15	10/03/13 22:39	16887-00-6	
Fluoride	**<13.8**	mg/kg	27.7	13.8	5	10/02/13 19:15	10/03/13 22:39	16984-48-8	D3
Sulfate	**174J**	mg/kg	277	138	5	10/02/13 19:15	10/03/13 22:39	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**279**	mg/kg	27.4	13.7	1	10/03/13 08:45	10/03/13 12:14	7723-14-0	

Sample: TP14S-2 **Lab ID: 4085855010** Collected: 10/02/13 11:25 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.5**	%	0.10	0.10	1		10/03/13 07:18		
9040 pH	Analytical Method: EPA 9040								
pH	**7.2**	Std. Units	0.10	0.010	1		10/03/13 16:00		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<3.7**	mg/kg	7.3	3.7	1	10/02/13 19:15	10/03/13 22:47	24959-67-9	
Chloride	**381**	mg/kg	73.4	36.7	1	10/02/13 19:15	10/03/13 22:47	16887-00-6	
Fluoride	**5.1J**	mg/kg	7.3	3.7	1	10/02/13 19:15	10/03/13 22:47	16984-48-8	
Sulfate	**43.3J**	mg/kg	73.4	36.7	1	10/02/13 19:15	10/03/13 22:47	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**326**	mg/kg	39.7	19.8	1	10/03/13 08:45	10/03/13 12:14	7723-14-0	

Sample: TP14S-W **Lab ID: 4085855011** Collected: 10/02/13 11:50 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**3.22**	CFU/100 mL	3.2	3.2	3.22	10/02/13 18:25	10/02/13 18:25		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP14S-W **Lab ID: 4085855011** Collected: 10/02/13 11:50 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4210**	umhos/cm	10.0	1.1	1		10/03/13 13:53		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<66.7**	mg/L	133	66.7	1		10/03/13 09:59		2q
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1190**	mg/L	10.0	0.63	1		10/03/13 11:48		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.39J**	mg/L	0.50	0.21	1		10/03/13 11:15		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**7.0**	Std. Units	0.10	0.010	1		10/02/13 20:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<0.20**	mg/L	0.40	0.20	1		10/02/13 21:35	24959-67-9	
Chloride	**804**	mg/L	80.0	40.0	20		10/03/13 01:45	16887-00-6	
Fluoride	**<1.0**	mg/L	2.0	1.0	5		10/03/13 10:38	16984-48-8	D3
Sulfate	**6.3**	mg/L	4.0	2.0	1		10/02/13 21:35	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**0.56**	mg/L	0.40	0.052	1	10/03/13 08:45	10/03/13 12:25	7723-14-0	

Sample: TP12S-1 **Lab ID: 4085855012** Collected: 10/02/13 13:10 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**54.5**	%	0.10	0.10	1		10/03/13 07:18		
9040 pH	Analytical Method: EPA 9040								
pH	**7.5**	Std. Units	0.10	0.010	1		10/03/13 16:00		1q,H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<22.1**	mg/kg	44.2	22.1	5	10/02/13 19:15	10/03/13 22:55	24959-67-9	D3
Chloride	**5370**	mg/kg	442	221	5	10/02/13 19:15	10/03/13 22:55	16887-00-6	
Fluoride	**<22.1**	mg/kg	44.2	22.1	5	10/02/13 19:15	10/03/13 22:55	16984-48-8	D3
Sulfate	**286J**	mg/kg	442	221	5	10/02/13 19:15	10/03/13 22:55	14808-79-8	D3
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**639**	mg/kg	53.3	26.6	1	10/03/13 08:45	10/03/13 12:15	7723-14-0	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP12S-W **Lab ID: 4085855013** Collected: 10/02/13 13:25 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<3.22**	CFU/100 mL	3.2	3.2	3.22	10/02/13 18:25	10/02/13 18:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**9040**	umhos/cm	10.0	1.1	1		10/03/13 13:53		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<66.7**	mg/L	133	66.7	1		10/03/13 10:03		2q
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**738**	mg/L	10.0	0.63	1		10/03/13 16:28		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**<0.052**	mg/L	0.12	0.052	1		10/03/13 11:15		D3,H6
9040 pH	Analytical Method: EPA 9040								
pH	**7.0**	Std. Units	0.10	0.010	1		10/02/13 20:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		10/03/13 10:46	24959-67-9	D3
Chloride	**2680**	mg/L	800	400	200		10/03/13 10:54	16887-00-6	
Fluoride	**1.2J**	mg/L	2.0	1.0	5		10/03/13 10:46	16984-48-8	D3
Sulfate	**60.8**	mg/L	20.0	10.0	5		10/03/13 10:46	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**<0.052**	mg/L	0.40	0.052	1	10/03/13 08:45	10/03/13 12:26	7723-14-0	

Sample: TP10S-1 **Lab ID: 4085855014** Collected: 10/02/13 15:30 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**16.2**	%	0.10	0.10	1		10/03/13 07:18		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		10/03/13 16:25		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.7	2.4	1	10/02/13 19:15	10/03/13 23:03	24959-67-9	
Chloride	**670**	mg/kg	47.4	23.7	1	10/02/13 19:15	10/03/13 23:03	16887-00-6	
Fluoride	**4.0J**	mg/kg	4.7	2.4	1	10/02/13 19:15	10/03/13 23:03	16984-48-8	
Sulfate	**543**	mg/kg	47.4	23.7	1	10/02/13 19:15	10/03/13 23:03	14808-79-8	

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP10S-1 **Lab ID: 4085855014** Collected: 10/02/13 15:30 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**557**	mg/kg	43.4	21.7	1	10/03/13 08:45	10/03/13 12:16	7723-14-0	

Sample: TP10S-2 **Lab ID: 4085855015** Collected: 10/02/13 15:42 Received: 10/02/13 16:53 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**15.5**	%	0.10	0.10	1		10/03/13 07:18		
9045 pH Soil	Analytical Method: EPA 9045								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/03/13 16:25		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Bromide	**<2.4**	mg/kg	4.8	2.4	1	10/02/13 19:15	10/03/13 23:12	24959-67-9	
Chloride	**560**	mg/kg	47.7	23.9	1	10/02/13 19:15	10/03/13 23:12	16887-00-6	
Fluoride	**<2.4**	mg/kg	4.8	2.4	1	10/02/13 19:15	10/03/13 23:12	16984-48-8	
Sulfate	**409**	mg/kg	47.7	23.9	1	10/02/13 19:15	10/03/13 23:12	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**534**	mg/kg	31.6	15.8	1	10/03/13 08:45	10/03/13 12:18	7723-14-0	

Sample: TP10S-W **Lab ID: 4085855016** Collected: 10/02/13 15:50 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9222D MICRO Fecal Coli by MF	Analytical Method: SM 9222D Preparation Method: SM 9222D								
Fecal Coliforms	**<2.44**	CFU/100 mL	2.4	2.4	2.44	10/02/13 18:25	10/02/13 18:25		
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**9530**	umhos/cm	10.0	1.1	1		10/03/13 13:54		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**102J**	mg/L	133	66.7	1		10/03/13 10:07		D3
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**115**	mg/L	10.0	0.63	1		10/03/13 16:58		
Iron, Ferrous	Analytical Method: HACH 8146								
Iron, Ferrous	**0.068J**	mg/L	0.12	0.052	1		10/03/13 11:15		D3,H6

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Sample: TP10S-W **Lab ID: 4085855016** Collected: 10/02/13 15:50 Received: 10/02/13 16:53 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH	**7.6**	Std. Units	0.10	0.010	1		10/02/13 20:15		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Bromide	**<1.0**	mg/L	2.0	1.0	5		10/03/13 11:02	24959-67-9	D3
Chloride	**2870**	mg/L	400	200	100		10/03/13 11:11	16887-00-6	
Fluoride	**1.5J**	mg/L	2.0	1.0	5		10/03/13 11:02	16984-48-8	D3
Sulfate	**1150**	mg/L	400	200	100		10/03/13 11:11	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	**<0.052**	mg/L	0.40	0.052	1	10/03/13 08:45	10/03/13 12:28	7723-14-0	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: MBIO/3109 Analysis Method: SM 9222D
QC Batch Method: SM 9222D Analysis Description: 9222D MICRO Fecal Coliform by MF
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

METHOD BLANK: 868484 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	10/02/13 18:25	

METHOD BLANK: 868486 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/100 mL	<1	1.0	10/02/13 18:25	

SAMPLE DUPLICATE: 868485

Parameter	Units	4085855003 Result	Dup Result	RPD	Max RPD	Qualifiers
Fecal Coliforms	CFU/100 mL	<6.25	<6.25			

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: PMST/8922 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085855001, 4085855002, 4085855004, 4085855005, 4085855006, 4085855007, 4085855009, 4085855010, 4085855012, 4085855014, 4085855015

SAMPLE DUPLICATE: 867631

Parameter	Units	4085855007 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	17.1	17.2	1	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16491 Analysis Method: EPA 120.1
QC Batch Method: EPA 120.1 Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

METHOD BLANK: 868087 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	10/03/13 13:47	

LABORATORY CONTROL SAMPLE: 868088

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	646	605	94	80-120	

SAMPLE DUPLICATE: 868089

Parameter	Units	4085855003 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	5290	5300	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16481 Analysis Method: SM 2310B
QC Batch Method: SM 2310B Analysis Description: 2310B Acidity, Total
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

METHOD BLANK: 867706 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acidity, Total	mg/L	<10.0	20.0	10/03/13 09:39	

LABORATORY CONTROL SAMPLE: 867707

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total	mg/L	221	205	93	80-120	

SAMPLE DUPLICATE: 867708

Parameter	Units	4085855016 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total	mg/L	102J	106J		20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16485
QC Batch Method: SM 2320B
Analysis Method: SM 2320B
Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085855011

METHOD BLANK: 867808 Matrix: Water
Associated Lab Samples: 4085855011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/03/13 10:58	

LABORATORY CONTROL SAMPLE: 867809

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	499	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867967 867968

Parameter	Units	4085855011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	1190	500	500	1650	1640	93	91	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16490 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4085855003, 4085855008, 4085855013, 4085855016

METHOD BLANK: 867993 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/03/13 13:48	

LABORATORY CONTROL SAMPLE: 867994

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	199	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867995 867996

Parameter	Units	4085855016 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	115	200	200	305	305	95	95	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16489 Analysis Method: HACH 8146
QC Batch Method: HACH 8146 Analysis Description: Iron, Ferrous
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

METHOD BLANK: 867959 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.021	0.050	10/03/13 11:15	

LABORATORY CONTROL SAMPLE: 867960

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	.6	0.57	94	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867961 867962

Parameter	Units	4085855003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Ferrous	mg/L	<0.10	3	3	2.2	2.2	71	74	80-120	3	20	M0

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16475 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

SAMPLE DUPLICATE: 867606

Parameter	Units	4085855003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	7.3	7.3	1	20	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16496 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 4085855001, 4085855004, 4085855005, 4085855009, 4085855010, 4085855012

SAMPLE DUPLICATE: 868389

Parameter	Units	4085855001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH	Std. Units	8.3	8.4	1	20	1q,H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WET/16498 Analysis Method: EPA 9045
QC Batch Method: EPA 9045 Analysis Description: 9045 pH
Associated Lab Samples: 4085855002, 4085855006, 4085855007, 4085855014, 4085855015

SAMPLE DUPLICATE: 868391

Parameter	Units	4085855002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.0	8.0	1	5	H6

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WETA/19811 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085855001, 4085855002, 4085855004, 4085855005, 4085855006, 4085855007, 4085855009, 4085855010, 4085855012, 4085855014, 4085855015

METHOD BLANK: 867619 Matrix: Solid
Associated Lab Samples: 4085855001, 4085855002, 4085855004, 4085855005, 4085855006, 4085855007, 4085855009, 4085855010, 4085855012, 4085855014, 4085855015

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/kg	<2.0	4.0	10/03/13 20:44	
Chloride	mg/kg	<20.0	40.0	10/03/13 20:44	
Fluoride	mg/kg	<2.0	4.0	10/03/13 20:44	
Sulfate	mg/kg	<20.0	40.0	10/03/13 20:44	

LABORATORY CONTROL SAMPLE: 867620

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/kg	20	20.2	101	80-120	
Chloride	mg/kg	200	195	98	80-120	
Fluoride	mg/kg	20	20.2	101	80-120	
Sulfate	mg/kg	200	195	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867621 867622

Parameter	Units	4085855001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<18.9	188	188	194	191	103	101	80-120	2	20	
Chloride	mg/kg	222J	1880	1880	1890	1870	88	87	80-120	1	20	
Fluoride	mg/kg	26.4J	188	188	208	206	96	95	80-120	1	20	
Sulfate	mg/kg	291J	1880	1880	1990	1970	90	89	80-120	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867623 867624

Parameter	Units	4085855002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/kg	<5.1	50.7	50.7	51.9	53.4	102	106	80-120	3	20	
Chloride	mg/kg	1230	2530	2530	3780	3780	101	101	80-120	0	20	
Fluoride	mg/kg	7.1J	50.7	50.7	55.1	54.6	95	94	80-120	1	20	
Sulfate	mg/kg	123	507	507	624	621	99	98	80-120	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WETA/19805 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

METHOD BLANK: 867599 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromide	mg/L	<0.20	0.40	10/02/13 20:46	
Chloride	mg/L	<2.0	4.0	10/02/13 20:46	
Fluoride	mg/L	<0.20	0.40	10/02/13 20:46	
Sulfate	mg/L	<2.0	4.0	10/02/13 20:46	

LABORATORY CONTROL SAMPLE: 867600

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromide	mg/L	2	2.1	103	90-110	
Chloride	mg/L	20	19.9	99	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	19.9	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867601 867602

Parameter	Units	4085855003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bromide	mg/L	<1.0	10	10	11.1	11.0	111	110	90-110	1	20	M0
Chloride	mg/L	1280	2000	2000	3250	3250	98	99	90-110	0	20	
Fluoride	mg/L	1.2J	10	10	10.7	10.6	94	94	90-110	0	20	
Sulfate	mg/L	63.3	100	100	168	167	104	104	90-110	0	20	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WETA/19814 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 4085855001, 4085855002, 4085855004, 4085855005, 4085855006, 4085855007, 4085855009, 4085855010, 4085855012, 4085855014, 4085855015

METHOD BLANK: 867647 Matrix: Solid
Associated Lab Samples: 4085855001, 4085855002, 4085855004, 4085855005, 4085855006, 4085855007, 4085855009, 4085855010, 4085855012, 4085855014, 4085855015

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	<20.0	40.0	10/03/13 12:08	

LABORATORY CONTROL SAMPLE: 867648

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	500	508	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867649 867650

Parameter	Units	4085855014 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	557	543	543	1090	1030	98	87	80-120	5	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867651 867652

Parameter	Units	10243673005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	13000	1470	1470	7280	10200	-390	-189	80-120	34	20	M3,R2

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

QC Batch: WETA/19815 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

METHOD BLANK: 867653 Matrix: Water
Associated Lab Samples: 4085855003, 4085855008, 4085855011, 4085855013, 4085855016

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	<0.052	0.40	10/03/13 12:23	

LABORATORY CONTROL SAMPLE: 867654

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	5	4.9	98	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 867655 867656

Parameter	Units	4085436003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	1.0	5	5	6.1	6.0	102	100	90-110	2	20	

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

1q	Due to sample matrix, DI water was added to sample in a 1:1 ratio and sample was stirred prior to analysis.
2q	Sample result is more negative than the reporting limit. Sample may have high alkalinity.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA recommended holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
M3	Matrix spike recovery was outside laboratory control limits due to matrix interferences.
R2	RPD value was outside control limits due to matrix interference

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085855003	TP18SE-W	SM 9222D	MBIO/3108	SM 9222D	MBIO/3109
4085855008	TP16SE-W	SM 9222D	MBIO/3108	SM 9222D	MBIO/3109
4085855011	TP14S-W	SM 9222D	MBIO/3108	SM 9222D	MBIO/3109
4085855013	TP12S-W	SM 9222D	MBIO/3108	SM 9222D	MBIO/3109
4085855016	TP10S-W	SM 9222D	MBIO/3108	SM 9222D	MBIO/3109
4085855001	TP18SE-1	ASTM D2974-87	PMST/8922		
4085855002	TP18SE-2	ASTM D2974-87	PMST/8922		
4085855004	TP18SE	ASTM D2974-87	PMST/8922		
4085855005	TP16SE-1	ASTM D2974-87	PMST/8922		
4085855006	TP16SE-2	ASTM D2974-87	PMST/8922		
4085855007	TP16SE-3	ASTM D2974-87	PMST/8922		
4085855009	TP14S-1	ASTM D2974-87	PMST/8922		
4085855010	TP14S-2	ASTM D2974-87	PMST/8922		
4085855012	TP12S-1	ASTM D2974-87	PMST/8922		
4085855014	TP10S-1	ASTM D2974-87	PMST/8922		
4085855015	TP10S-2	ASTM D2974-87	PMST/8922		
4085855003	TP18SE-W	EPA 120.1	WET/16491		
4085855008	TP16SE-W	EPA 120.1	WET/16491		
4085855011	TP14S-W	EPA 120.1	WET/16491		
4085855013	TP12S-W	EPA 120.1	WET/16491		
4085855016	TP10S-W	EPA 120.1	WET/16491		
4085855003	TP18SE-W	SM 2310B	WET/16481		
4085855008	TP16SE-W	SM 2310B	WET/16481		
4085855011	TP14S-W	SM 2310B	WET/16481		
4085855013	TP12S-W	SM 2310B	WET/16481		
4085855016	TP10S-W	SM 2310B	WET/16481		
4085855003	TP18SE-W	SM 2320B	WET/16490		
4085855008	TP16SE-W	SM 2320B	WET/16490		
4085855011	TP14S-W	SM 2320B	WET/16485		
4085855013	TP12S-W	SM 2320B	WET/16490		
4085855016	TP10S-W	SM 2320B	WET/16490		
4085855003	TP18SE-W	HACH 8146	WET/16489		
4085855008	TP16SE-W	HACH 8146	WET/16489		
4085855011	TP14S-W	HACH 8146	WET/16489		
4085855013	TP12S-W	HACH 8146	WET/16489		
4085855016	TP10S-W	HACH 8146	WET/16489		
4085855001	TP18SE-1	EPA 9040	WET/16496		
4085855003	TP18SE-W	EPA 9040	WET/16475		
4085855004	TP18SE	EPA 9040	WET/16496		
4085855005	TP16SE-1	EPA 9040	WET/16496		
4085855008	TP16SE-W	EPA 9040	WET/16475		
4085855009	TP14S-1	EPA 9040	WET/16496		
4085855010	TP14S-2	EPA 9040	WET/16496		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085855

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085855011	TP14S-W	EPA 9040	WET/16475		
4085855012	TP12S-1	EPA 9040	WET/16496		
4085855013	TP12S-W	EPA 9040	WET/16475		
4085855016	TP10S-W	EPA 9040	WET/16475		
4085855002	TP18SE-2	EPA 9045	WET/16498		
4085855006	TP16SE-2	EPA 9045	WET/16498		
4085855007	TP16SE-3	EPA 9045	WET/16498		
4085855014	TP10S-1	EPA 9045	WET/16498		
4085855015	TP10S-2	EPA 9045	WET/16498		
4085855001	TP18SE-1	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855002	TP18SE-2	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855004	TP18SE	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855005	TP16SE-1	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855006	TP16SE-2	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855007	TP16SE-3	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855009	TP14S-1	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855010	TP14S-2	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855012	TP12S-1	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855014	TP10S-1	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855015	TP10S-2	EPA 300.0	WETA/19811	EPA 300.0	WETA/19812
4085855003	TP18SE-W	EPA 300.0	WETA/19805		
4085855008	TP16SE-W	EPA 300.0	WETA/19805		
4085855011	TP14S-W	EPA 300.0	WETA/19805		
4085855013	TP12S-W	EPA 300.0	WETA/19805		
4085855016	TP10S-W	EPA 300.0	WETA/19805		
4085855001	TP18SE-1	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855002	TP18SE-2	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855004	TP18SE	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855005	TP16SE-1	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855006	TP16SE-2	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855007	TP16SE-3	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855009	TP14S-1	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855010	TP14S-2	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855012	TP12S-1	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855014	TP10S-1	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855015	TP10S-2	EPA 365.4	WETA/19814	EPA 365.4	WETA/19816
4085855003	TP18SE-W	EPA 365.4	WETA/19815	EPA 365.4	WETA/19817
4085855008	TP16SE-W	EPA 365.4	WETA/19815	EPA 365.4	WETA/19817
4085855011	TP14S-W	EPA 365.4	WETA/19815	EPA 365.4	WETA/19817
4085855013	TP12S-W	EPA 365.4	WETA/19815	EPA 365.4	WETA/19817
4085855016	TP10S-W	EPA 365.4	WETA/19815	EPA 365.4	WETA/19817

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of 2

4085855

CHAIN OF CUSTODY

VBK

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, W = Water, B = Biota, DW = Drinking Water, C = Charcoal, GW = Ground Water, O = Oil, SW = Surface Water, S = Soil, WW = Waste Water, SI = Sludge, WP = Wipe

FILTERED? (YES/NO) — PRESERVATION (CODE)*

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Y/N	Pick Letter	Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Bromide	Acidity	Alkalinity	Total Phosphorus	Ferrous Iron	Chloride, Fluoride, Sulfate, Bromide, pH	Conductivity	Fecal Coliform
							Analyses Requested			N	N	N	N	N	N	N
										A	A	A	C	A	A	A,I
001	TP18SE-1	10/2/13	8:10	S			X	X								
002	TP18SE-2		8:18	S			X	X								
003	TP18SE-W		8:35	GW					X	X	X	X	X	X	X	X
004	TP18SE		9:02	S			X	X								
005	TP16SE-1		9:50	S			X	X								
006	TP16SE-2		9:58	S			X	X								
007	TP16SE-3		10:05	S			X	X								
008	TP16SE-W		10:35	GW					X	X	X	X	X	X	X	X
009	TP14S-1		11:20	S			X	X								
010	TP14S-2		11:25	S			X	X								
011	TP14S-W		11:50	GW					X	X	X	X	X	X	X	X
012	TP12S-1		13:10	S			X	X								
013	TP12S-W		13:25	GW					X	X	X	X	X	X	X	X

CLIENT COMMENTS

LAB COMMENTS (Lab Use Only) — Profile #

1-4oz P^A 1-4oz AG^A
AAAC
4-250mlp 1-125sterile I
4-250mlp^A,A,C 1-125sterile I
AAAC
4-250mlp 1-125sterile I

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner2@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/2/13 16:53	Aaron Wyka Pace	10-2-13 1653

PACE Project No.: 4085855
Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

C019a(27Jun2006)
Version 6.0 06/14/06
ORIGINAL

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4085855

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	~~BRIAN~~
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes

A = Air	W = Water
B = Biota	DW = Drinking Water
C = Charcoal	GW = Ground Water
O = Oil	SW = Surface Water
S = Soil	WW = Waste Water
SI = Sludge	WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	FILTERED? (YES/NO) Y/N			N	N	N	N	N	N	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
						PRESERVATION (CODE)* Pick Letter	A	A	A	A	C	A	A	I			
						Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity Acidity	Total Phosphorus	Ferrous Iron	Conductivity	Fecal Coliform				
014	TP10S-1	10/2/13	15:30	S		X	X							10/2/13 MV	1-4oz Ag A	1-4oz P A
015	TP10S-2	1	15:42	S		X	X								↓	↓
016	TP10S-W	1	15:50	GW				X	X	X	X	X	X		4-250ml P AAHC	1-125ml sterile

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge) Date Needed:	Relinquished By: B. D. Wayner	Date/Time: 10/2/13 16:53	Received By: Susan Kuffle Pace	Date/Time: 10-2-13 1653	PACE Project No.
Transmit Prelim Rush Results by (complete what you want):	Relinquished By:	Date/Time:	Received By:	Date/Time:	Receipt Temp = ROT °C
Email #1: bwayner@OMNNI.com	Relinquished By:	Date/Time:	Received By:	Date/Time:	Sample Receipt pH OK / Adjusted
Email #2:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Cooler Custody Seal Present / Not Present Intact / Not Intact
Telephone:					
Fax:					
Samples on HOLD are subject to special pricing and release of liability					

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc
1241 Bellevue Street, Suite
Green Bay, WI 5430

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Project # 4085855

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used NA **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: R01 /Corr: **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents: Date: 10/2/13 Initials: MV

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5. 10/2/13 MV
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No ☐N/A	6. Fecal Coliform. 10/2/13 MV
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 10/4 10/2/13 MV
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S, W		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☑ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2, NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☑Yes ☐No	Initial when completed: MV Lab Std #ID of preservative: Date/Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 10-3-13

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F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 07, 2013

Note: TP22NW samples were mislabeled. The samples should have been labeled TP22N. (Brian Wayner, OMNNI 10/29/13)

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 03, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4085970001	TP23-6	Solid	09/30/13 00:00	10/03/13 13:30
4085970002	TP22NW-3	Solid	10/01/13 00:00	10/03/13 13:30
4085970003	TP22NW-2	Solid	10/01/13 00:00	10/03/13 13:30
4085970004	TP22NW-1	Solid	10/01/13 00:00	10/03/13 13:30
4085970005	TP22SW-3	Solid	10/01/13 00:00	10/03/13 13:30
4085970006	TP22SW-2	Solid	10/01/13 00:00	10/03/13 13:30
4085970007	TP22NW-4	Solid	10/01/13 00:00	10/03/13 13:30
4085970008	TP22SW-1	Solid	10/01/13 00:00	10/03/13 13:30
4085970009	TP16SE-4	Solid	10/02/13 00:00	10/03/13 13:30
4085970010	TP18SE-1	Solid	10/02/13 00:00	10/03/13 13:30
4085970011	TP18SE-2	Solid	10/02/13 00:00	10/03/13 13:30
4085970012	TP18SE-3	Solid	10/02/13 00:00	10/03/13 13:30
4085970013	TP16SE-1	Solid	10/02/13 00:00	10/03/13 13:30
4085970014	TP16SE-3	Solid	10/02/13 00:00	10/03/13 13:30
4085970015	TP14S-2	Solid	10/02/13 00:00	10/03/13 13:30
4085970016	TP14S-3	Solid	10/02/13 00:00	10/03/13 13:30
4085970017	TP16SE-2	Solid	10/02/13 00:00	10/03/13 13:30
4085970018	TP12S-1	Solid	10/02/13 00:00	10/03/13 13:30
4085970019	TP14S-1	Solid	10/02/13 00:00	10/03/13 13:30
4085970020	TP10S-1	Solid	10/02/13 00:00	10/03/13 13:30
4085970021	TP10S-2	Solid	10/02/13 00:00	10/03/13 13:30

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4085970001	TP23-6	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970002	TP22NW-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970003	TP22NW-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970004	TP22NW-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970005	TP22SW-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970006	TP22SW-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970007	TP22NW-4	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970008	TP22SW-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970009	TP16SE-4	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970010	TP18SE-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970011	TP18SE-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970012	TP18SE-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970013	TP16SE-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970014	TP16SE-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970015	TP14S-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970016	TP14S-3	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970017	TP16SE-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970018	TP12S-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970019	TP14S-1	ASTM D2974-87	SKW	1

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		ASTM D2974-87	HKV	1
4085970020	TP10S-1	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1
4085970021	TP10S-2	ASTM D2974-87	SKW	1
		ASTM D2974-87	HKV	1

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Sample: TP23-6 **Lab ID: 4085970001** Collected: 09/30/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.0**	%	0.10	0.10	1		10/03/13 16:47		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.6**	% (w/w)	0.10	0.10	1		10/03/13 17:47		R1

Sample: TP22NW-3 **Lab ID: 4085970002** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.5**	%	0.10	0.10	1		10/03/13 16:47		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**2.6**	% (w/w)	0.10	0.10	1		10/03/13 17:49		R1

Sample: TP22NW-2 **Lab ID: 4085970003** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**17.5**	%	0.10	0.10	1		10/03/13 16:47		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**8.5**	% (w/w)	0.10	0.10	1		10/03/13 17:52		

Sample: TP22NW-1 **Lab ID: 4085970004** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**22.1**	%	0.10	0.10	1		10/03/13 16:47		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**18.8**	% (w/w)	0.10	0.10	1		10/03/13 17:53		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Sample: TP22SW-3 **Lab ID: 4085970005** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.91**	%	0.10	0.10	1		10/03/13 16:47		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.6**	% (w/w)	0.10	0.10	1		10/03/13 17:54		

Sample: TP22SW-2 **Lab ID: 4085970006** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.14**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.28**	% (w/w)	0.10	0.10	1		10/03/13 17:56		

Sample: TP22NW-4 **Lab ID: 4085970007** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.89**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.5**	% (w/w)	0.10	0.10	1		10/03/13 17:57		

Sample: TP22SW-1 **Lab ID: 4085970008** Collected: 10/01/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.9**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**13.7**	% (w/w)	0.10	0.10	1		10/03/13 17:58		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Sample: TP16SE-4 **Lab ID: 4085970009** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.91**	% (w/w)	0.10	0.10	1		10/03/13 17:59		

Sample: TP18SE-1 **Lab ID: 4085970010** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.1**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**19.7**	% (w/w)	0.10	0.10	1		10/03/13 18:00		

Sample: TP18SE-2 **Lab ID: 4085970011** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.14**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.98**	% (w/w)	0.10	0.10	1		10/03/13 18:01		

Sample: TP18SE-3 **Lab ID: 4085970012** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.13**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.87**	% (w/w)	0.10	0.10	1		10/03/13 18:02		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Sample: TP16SE-1 **Lab ID: 4085970013** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**8.3**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**8.8**	% (w/w)	0.10	0.10	1		10/03/13 18:03		

Sample: TP16SE-3 **Lab ID: 4085970014** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.25**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.5**	% (w/w)	0.10	0.10	1		10/03/13 18:03		

Sample: TP14S-2 **Lab ID: 4085970015** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.90**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**6.4**	% (w/w)	0.10	0.10	1		10/03/13 18:04		

Sample: TP14S-3 **Lab ID: 4085970016** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.16**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.2**	% (w/w)	0.10	0.10	1		10/03/13 18:05		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Sample: TP16SE-2 **Lab ID: 4085970017** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**<0.10**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**0.32**	% (w/w)	0.10	0.10	1		10/03/13 18:06		

Sample: TP12S-1 **Lab ID: 4085970018** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**2.5**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**14.4**	% (w/w)	0.10	0.10	1		10/03/13 18:07		

Sample: TP14S-1 **Lab ID: 4085970019** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.51**	%	0.10	0.10	1		10/03/13 16:48		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**4.3**	% (w/w)	0.10	0.10	1		10/03/13 18:07		

Sample: TP10S-1 **Lab ID: 4085970020** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**0.55**	%	0.10	0.10	1		10/03/13 17:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**2.2**	% (w/w)	0.10	0.10	1		10/03/13 18:08		

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Sample: TP10S-2 **Lab ID: 4085970021** Collected: 10/02/13 00:00 Received: 10/03/13 13:30 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**1.0**	%	0.10	0.10	1		10/03/13 17:05		
Total Organic Matter	Analytical Method: ASTM D2974-87								
Organic Matter	**1.2**	% (w/w)	0.10	0.10	1		10/03/13 18:15		

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Date: 10/07/2013 10:50 AM

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

QC Batch: PMST/8933 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085970001, 4085970002, 4085970003, 4085970004, 4085970005, 4085970006, 4085970007, 4085970008, 4085970009, 4085970010, 4085970011, 4085970012, 4085970013, 4085970014, 4085970015, 4085970016, 4085970017, 4085970018, 4085970019

SAMPLE DUPLICATE: 868497

Parameter	Units	4085922001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	6.3	6.3	0	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

QC Batch: PMST/8934
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4085970020, 4085970021

SAMPLE DUPLICATE: 868547

Parameter	Units	4085970020 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	0.55	0.55	0	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

QC Batch: WET/16500 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: D2974 Total Organic Matter
Associated Lab Samples: 4085970001, 4085970002, 4085970003, 4085970004, 4085970005, 4085970006, 4085970007, 4085970008, 4085970009, 4085970010, 4085970011, 4085970012, 4085970013, 4085970014, 4085970015, 4085970016, 4085970017, 4085970018, 4085970019, 4085970020

METHOD BLANK: 868614 Matrix: Solid
Associated Lab Samples: 4085970001, 4085970002, 4085970003, 4085970004, 4085970005, 4085970006, 4085970007, 4085970008, 4085970009, 4085970010, 4085970011, 4085970012, 4085970013, 4085970014, 4085970015, 4085970016, 4085970017, 4085970018, 4085970019, 4085970020

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Organic Matter	% (w/w)	<0.10	0.10	10/03/13 17:45	

LABORATORY CONTROL SAMPLE: 868615

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Organic Matter	% (w/w)	199	192	97	80-120	

SAMPLE DUPLICATE: 868616

Parameter	Units	4085970001 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	1.6	1.9	19	10	R1

SAMPLE DUPLICATE: 868617

Parameter	Units	4085970002 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	2.6	3.7	34	10	R1

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

QC Batch: WET/16501
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: D2974 Total Organic Matter
Associated Lab Samples: 4085970021

METHOD BLANK: 868618 Matrix: Solid
Associated Lab Samples: 4085970021

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Organic Matter	% (w/w)	<0.10	0.10	10/03/13 18:14	

LABORATORY CONTROL SAMPLE: 868619

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Organic Matter	% (w/w)	199	185	93	80-120	

SAMPLE DUPLICATE: 868620

Parameter	Units	4085970021 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	% (w/w)	1.2	1.3	6	10	

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

R1 RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4085970

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4085970001	TP23-6	ASTM D2974-87	PMST/8933		
4085970002	TP22NW-3	ASTM D2974-87	PMST/8933		
4085970003	TP22NW-2	ASTM D2974-87	PMST/8933		
4085970004	TP22NW-1	ASTM D2974-87	PMST/8933		
4085970005	TP22SW-3	ASTM D2974-87	PMST/8933		
4085970006	TP22SW-2	ASTM D2974-87	PMST/8933		
4085970007	TP22NW-4	ASTM D2974-87	PMST/8933		
4085970008	TP22SW-1	ASTM D2974-87	PMST/8933		
4085970009	TP16SE-4	ASTM D2974-87	PMST/8933		
4085970010	TP18SE-1	ASTM D2974-87	PMST/8933		
4085970011	TP18SE-2	ASTM D2974-87	PMST/8933		
4085970012	TP18SE-3	ASTM D2974-87	PMST/8933		
4085970013	TP16SE-1	ASTM D2974-87	PMST/8933		
4085970014	TP16SE-3	ASTM D2974-87	PMST/8933		
4085970015	TP14S-2	ASTM D2974-87	PMST/8933		
4085970016	TP14S-3	ASTM D2974-87	PMST/8933		
4085970017	TP16SE-2	ASTM D2974-87	PMST/8933		
4085970018	TP12S-1	ASTM D2974-87	PMST/8933		
4085970019	TP14S-1	ASTM D2974-87	PMST/8933		
4085970020	TP10S-1	ASTM D2974-87	PMST/8934		
4085970021	TP10S-2	ASTM D2974-87	PMST/8934		
4085970001	TP23-6	ASTM D2974-87	WET/16500		
4085970002	TP22NW-3	ASTM D2974-87	WET/16500		
4085970003	TP22NW-2	ASTM D2974-87	WET/16500		
4085970004	TP22NW-1	ASTM D2974-87	WET/16500		
4085970005	TP22SW-3	ASTM D2974-87	WET/16500		
4085970006	TP22SW-2	ASTM D2974-87	WET/16500		
4085970007	TP22NW-4	ASTM D2974-87	WET/16500		
4085970008	TP22SW-1	ASTM D2974-87	WET/16500		
4085970009	TP16SE-4	ASTM D2974-87	WET/16500		
4085970010	TP18SE-1	ASTM D2974-87	WET/16500		
4085970011	TP18SE-2	ASTM D2974-87	WET/16500		
4085970012	TP18SE-3	ASTM D2974-87	WET/16500		
4085970013	TP16SE-1	ASTM D2974-87	WET/16500		
4085970014	TP16SE-3	ASTM D2974-87	WET/16500		
4085970015	TP14S-2	ASTM D2974-87	WET/16500		
4085970016	TP14S-3	ASTM D2974-87	WET/16500		
4085970017	TP16SE-2	ASTM D2974-87	WET/16500		
4085970018	TP12S-1	ASTM D2974-87	WET/16500		
4085970019	TP14S-1	ASTM D2974-87	WET/16500		
4085970020	TP10S-1	ASTM D2974-87	WET/16500		
4085970021	TP10S-2	ASTM D2974-87	WET/16501		

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4085970

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) Y/N
PRESERVATION (CODE)* Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: IGNITION OF ORGANIC CONSTIT.	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP23-6	9/13/13		S	X		1-Ziploc	
002	TP22NW-3	10/1/13		S				
003	TP22NW-2	10/1/13		S				
004	TP22NW-1	10/1/13		S				
005	TP22SW-3	10/1/13		S				
006	TP22SW-2	10/1/13		S				
007	TP22NW-4	10/1/13		S				
008	TP22SW-1	10/1/13		S				
009	TP16SE-4	10/2/13		S				
010	TP18SE-1	10/2/13		S				
011	TP18SE-2	10/2/13		S				
012	TP18SE-3	10/2/13		S				
013	TP16SE-1	10/2/13		S	X			

Note: TP22NW samples were mislabeled. The samples should have been labeled TP22N. (Brian Wayner, OMNNI 10/29/13)

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/3/13 10:02	D. Mull	10/3/13 11:15
D. Mull	10/3/13 13:30	M.V	10/3/13 1330

PACE Project No. 4085970
Receipt Temp = R01 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / ~~Not Present~~ Intact / ~~Not Intact~~

Version 6.0 06/14/06

C019a(27Jun2006)

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4085970

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	
Project Contact:	
Phone:	
Project Number:	SAME AS SHEET #1
Project Name:	
Project State:	
Sampled By (Print):	
Sampled By (Sign):	
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	
Mail To Company:	
Mail To Address:	SAME AS SHEET #1
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: IGNITION ORGANIC CONTENT	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
014	~~TP16SE~~ TP16SE-3	10/2/13		S		A	X		1-21 plOC	
015	TP14S-2	"		"			X			
016	TP14S-3									
017	TP16SE-2									
018	TP12S-1									
019	TP14S-1									
020	TP10S-1									
021	TP10S-2						X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. Wayner	10/3/13 10:02	D. Mella	10/3/13 11:15
D. Mella	10/3/13 13:30	M.V—a	10/3/13 1330

PACE Project No.

Receipt Temp = R01 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / ~~Not Present~~ Intact / ~~Not Intact~~

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

Wisconsin Department of Transportation

Pace Analytical Services,
1241 Bellevue Street, Su
Green Bay, WI 5

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Project # 4085970

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☑ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2.0 / Corr: _____ Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10/3/13
Initials: MJ

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

			Comments:
Chain of Custody Present:	☑Yes	☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes	☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes	☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes	☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes	☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes	☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes	☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes	☐No ☐N/A	7. 10/4 10/3/13 MJ
Sufficient Volume:	☑Yes	☐No ☐N/A	8.
Correct Containers Used:	☑Yes	☐No ☐N/A	9.
-Pace Containers Used:	☐Yes	☑No ☐N/A	
-Pace IR Containers Used:	☐Yes	☑No ☐N/A	
Containers Intact:	☑Yes	☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes	☐No ☑N/A	11.
Sample Labels match COC:	☑Yes	☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:	S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes	☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes	☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics. OTHER:	☐Yes	☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes	☐No ☑N/A	14.
Trip Blank Present:	☐Yes	☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes	☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):			

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: 10-4-13

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F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

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October 14, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 11, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4086571001	TP24NW-1	Solid	10/11/13 09:25	10/11/13 17:12
4086571002	TP24NW-2	Solid	10/11/13 09:35	10/11/13 17:12
4086571003	TP24NW-3	Solid	10/11/13 10:20	10/11/13 17:12
4086571004	TP24NW-4	Solid	10/11/13 12:08	10/11/13 17:12
4086571005	TP24NW-5	Solid	10/11/13 12:10	10/11/13 17:12
4086571006	TP25NE-1	Solid	10/11/13 14:50	10/11/13 17:12
4086571007	TP25NE-2	Solid	10/11/13 15:13	10/11/13 17:12
4086571008	TP25NE-3	Solid	10/11/13 15:57	10/11/13 17:12
4086571009	TP25NE-4	Solid	10/11/13 16:16	10/11/13 17:12

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SAMPLE ANALYTE COUNT

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4086571001	TP24NW-1	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571002	TP24NW-2	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571003	TP24NW-3	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571004	TP24NW-4	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571005	TP24NW-5	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571006	TP25NE-1	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571007	TP25NE-2	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571008	TP25NE-3	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2
4086571009	TP25NE-4	ASTM D2974-87	MYH	1
		EPA 300.0	JCJ	2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Sample: TP24NW-1 **Lab ID: 4086571001** Collected: 10/11/13 09:25 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**2.7**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**34.2J**	mg/kg	41.2	20.6	1	10/11/13 20:55	10/13/13 20:25	16887-00-6	
Sulfate	**26.9J**	mg/kg	41.2	20.6	1	10/11/13 20:55	10/13/13 20:25	14808-79-8	B

Sample: TP24NW-2 **Lab ID: 4086571002** Collected: 10/11/13 09:35 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**56.8**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**626**	mg/kg	93.9	46.9	1	10/11/13 20:55	10/14/13 07:41	16887-00-6	
Sulfate	**67.3J**	mg/kg	93.9	46.9	1	10/11/13 20:55	10/14/13 07:41	14808-79-8	B

Sample: TP24NW-3 **Lab ID: 4086571003** Collected: 10/11/13 10:20 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**14.9**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**91.4**	mg/kg	47.8	23.9	1	10/11/13 20:55	10/13/13 20:41	16887-00-6	
Sulfate	**26.4J**	mg/kg	47.8	23.9	1	10/11/13 20:55	10/13/13 20:41	14808-79-8	B

Sample: TP24NW-4 **Lab ID: 4086571004** Collected: 10/11/13 12:08 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.9**	%	0.10	0.10	1		10/12/13 08:20		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Sample: TP24NW-4 **Lab ID: 4086571004** Collected: 10/11/13 12:08 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**143**	mg/kg	49.5	24.8	1	10/11/13 20:55	10/13/13 20:49	16887-00-6	
Sulfate	**32.8J**	mg/kg	49.5	24.8	1	10/11/13 20:55	10/13/13 20:49	14808-79-8	B

Sample: TP24NW-5 **Lab ID: 4086571005** Collected: 10/11/13 12:10 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.0**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**106**	mg/kg	48.3	24.1	1	10/11/13 20:55	10/13/13 21:14	16887-00-6	
Sulfate	**37.4J**	mg/kg	48.3	24.1	1	10/11/13 20:55	10/13/13 21:14	14808-79-8	B

Sample: TP25NE-1 **Lab ID: 4086571006** Collected: 10/11/13 14:50 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**45.0**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**98.0**	mg/kg	74.0	37.0	1	10/11/13 20:55	10/14/13 07:49	16887-00-6	
Sulfate	**158**	mg/kg	74.0	37.0	1	10/11/13 20:55	10/14/13 07:49	14808-79-8	B

Sample: TP25NE-2 **Lab ID: 4086571007** Collected: 10/11/13 15:13 Received: 10/11/13 17:12 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**61.9**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**7710**	mg/kg	1050	525	10	10/11/13 20:55	10/14/13 07:57	16887-00-6	
Sulfate	**227**	mg/kg	105	52.5	1	10/11/13 20:55	10/13/13 21:47	14808-79-8	B

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Sample: TP25NE-3 **Lab ID: 4086571008** Collected: 10/11/13 15:57 Received: 10/11/13 17:12 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**66.4**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**4330**	mg/kg	585	292	5	10/11/13 20:55	10/14/13 08:05	16887-00-6	
Sulfate	**662**	mg/kg	117	58.5	1	10/11/13 20:55	10/13/13 21:55	14808-79-8	

Sample: TP25NE-4 **Lab ID: 4086571009** Collected: 10/11/13 16:16 Received: 10/11/13 17:12 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.9**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**259**	mg/kg	48.6	24.3	1	10/11/13 20:55	10/13/13 22:03	16887-00-6	
Sulfate	**66.9**	mg/kg	48.6	24.3	1	10/11/13 20:55	10/13/13 22:03	14808-79-8	B

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

QC Batch: PMST/8986 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4086571001, 4086571002, 4086571003, 4086571004, 4086571005, 4086571006, 4086571007, 4086571008, 4086571009

SAMPLE DUPLICATE: 874298

Parameter	Units	4086450001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	13.3	13.1	2	10	

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QUALITY CONTROL DATA

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

QC Batch: WETA/20004 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4086571001, 4086571002, 4086571003, 4086571004, 4086571005, 4086571006, 4086571007, 4086571008, 4086571009

METHOD BLANK: 874727 Matrix: Solid
Associated Lab Samples: 4086571001, 4086571002, 4086571003, 4086571004, 4086571005, 4086571006, 4086571007, 4086571008, 4086571009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	<20.0	40.0	10/13/13 20:08	
Sulfate	mg/kg	21.1J	40.0	10/13/13 20:08	

LABORATORY CONTROL SAMPLE: 874728

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	189	94	80-120	
Sulfate	mg/kg	200	186	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 874729 874730

Parameter	Units	4086571004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	143	248	248	389	388	99	99	80-120	0	20	
Sulfate	mg/kg	32.8J	248	248	250	250	88	88	80-120	0	20	

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QUALIFIERS

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13 LEO FRIGO MEMORIAL
Pace Project No.: 4086571

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4086571001	TP24NW-1	ASTM D2974-87	PMST/8986		
4086571002	TP24NW-2	ASTM D2974-87	PMST/8986		
4086571003	TP24NW-3	ASTM D2974-87	PMST/8986		
4086571004	TP24NW-4	ASTM D2974-87	PMST/8986		
4086571005	TP24NW-5	ASTM D2974-87	PMST/8986		
4086571006	TP25NE-1	ASTM D2974-87	PMST/8986		
4086571007	TP25NE-2	ASTM D2974-87	PMST/8986		
4086571008	TP25NE-3	ASTM D2974-87	PMST/8986		
4086571009	TP25NE-4	ASTM D2974-87	PMST/8986		
4086571001	TP24NW-1	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571002	TP24NW-2	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571003	TP24NW-3	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571004	TP24NW-4	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571005	TP24NW-5	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571006	TP25NE-1	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571007	TP25NE-2	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571008	TP25NE-3	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005
4086571009	TP25NE-4	EPA 300.0	WETA/20004	EPA 300.0	WETA/20005

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of

4086571

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	TH463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	CHLORIDE, SULFATE	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					—	A				
001	TP24NW-1	10/1/13	9:25	S			X		2-4oz p	
002	TP24NW-2		9:35				X			
003	TP24NW-3		10:20				X			
004	TP24NW-4		12:08				X			
005	TP24NW-5		12:10				X			
006	TP25NE-1		14:50				X			
007	TP25NE-2		15:13				X			
008	TP25NE-3		15:57				X			
009	TP25NE-4		16:16				X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hrs

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/1/13 17:12	M.V.	10/11/13 1712

PACE Project No. 4086571

Receipt Temp = 20.1 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omnni Associate Project # 4086571

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: R01 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☐ no

Person examining contents:
Date: 10-11-13
Initials: BF

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr. 10-11-13 BF
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: 10-14-13

Page 13 of 13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

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1241 Bellevue Street - Suite 9
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(920)469-2436

October 14, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 12, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4086632001	TP19NE-1	Solid	10/12/13 10:02	10/12/13 18:35
4086632002	TP25NE-5	Solid	10/12/13 08:45	10/12/13 18:35
4086632003	TP19NE-2	Solid	10/12/13 10:20	10/12/13 18:35
4086632004	TP19NE-3	Solid	10/12/13 10:27	10/12/13 18:35
4086632005	TP19NE-4	Solid	10/12/13 11:10	10/12/13 18:35
4086632006	TP13NE-1	Solid	10/12/13 13:06	10/12/13 18:35
4086632007	TP13NE-2	Solid	10/12/13 13:10	10/12/13 18:35
4086632008	TP13NE-3	Solid	10/12/13 13:22	10/12/13 18:35
4086632009	TP13NE-4	Solid	10/12/13 14:48	10/12/13 18:35
4086632010	TP13NE-5	Solid	10/12/13 16:05	10/12/13 18:35
4086632011	TP5NE-1	Solid	10/12/13 17:04	10/12/13 18:35
4086632012	TP13NE-6	Solid	10/12/13 17:54	10/12/13 18:35
4086632013	TP13NE-7	Solid	10/12/13 17:56	10/12/13 18:35

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SAMPLE ANALYTE COUNT

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4086632001	TP19NE-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632002	TP25NE-5	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632003	TP19NE-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632004	TP19NE-3	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632005	TP19NE-4	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632006	TP13NE-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632007	TP13NE-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632008	TP13NE-3	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632009	TP13NE-4	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632010	TP13NE-5	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632011	TP5NE-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632012	TP13NE-6	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086632013	TP13NE-7	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2

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ANALYTICAL RESULTS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Sample: TP19NE-1 **Lab ID: 4086632001** Collected: 10/12/13 10:02 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**37.7**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**391**	mg/kg	64.1	32.1	1	10/13/13 09:00	10/14/13 09:26	16887-00-6	
Sulfate	**319**	mg/kg	64.1	32.1	1	10/13/13 09:00	10/14/13 09:26	14808-79-8	B

Sample: TP25NE-5 **Lab ID: 4086632002** Collected: 10/12/13 08:45 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**22.8**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**862**	mg/kg	258	129	5	10/13/13 09:00	10/14/13 12:19	16887-00-6	
Sulfate	**171**	mg/kg	51.7	25.8	1	10/13/13 09:00	10/14/13 09:34	14808-79-8	B

Sample: TP19NE-2 **Lab ID: 4086632003** Collected: 10/12/13 10:20 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**64.4**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**2130**	mg/kg	561	280	5	10/13/13 09:00	10/14/13 12:43	16887-00-6	
Sulfate	**81.0J**	mg/kg	112	56.1	1	10/13/13 09:00	10/14/13 09:42	14808-79-8	B

Sample: TP19NE-3 **Lab ID: 4086632004** Collected: 10/12/13 10:27 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**60.2**	%	0.10	0.10	1		10/13/13 18:40		

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ANALYTICAL RESULTS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Sample: TP19NE-3 **Lab ID: 4086632004** Collected: 10/12/13 10:27 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1590**	mg/kg	503	251	5	10/13/13 09:00	10/14/13 12:51	16887-00-6	
Sulfate	**149**	mg/kg	101	50.3	1	10/13/13 09:00	10/14/13 09:50	14808-79-8	B

Sample: TP19NE-4 **Lab ID: 4086632005** Collected: 10/12/13 11:10 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**17.6**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**175**	mg/kg	48.4	24.2	1	10/13/13 09:00	10/14/13 09:59	16887-00-6	
Sulfate	**97.8**	mg/kg	48.4	24.2	1	10/13/13 09:00	10/14/13 09:59	14808-79-8	B

Sample: TP13NE-1 **Lab ID: 4086632006** Collected: 10/12/13 13:06 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**44.2**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1870**	mg/kg	359	179	5	10/13/13 09:00	10/14/13 13:00	16887-00-6	
Sulfate	**1600**	mg/kg	359	179	5	10/13/13 09:00	10/14/13 13:00	14808-79-8	B

Sample: TP13NE-2 **Lab ID: 4086632007** Collected: 10/12/13 13:10 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**21.1**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**268**	mg/kg	50.7	25.4	1	10/13/13 09:00	10/14/13 10:48	16887-00-6	
Sulfate	**51.8**	mg/kg	50.7	25.4	1	10/13/13 09:00	10/14/13 10:48	14808-79-8	B

REPORT OF LABORATORY ANALYSIS

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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Sample: TP13NE-3 **Lab ID: 4086632008** Collected: 10/12/13 13:22 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**16.3**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**277**	mg/kg	47.5	23.8	1	10/13/13 09:00	10/14/13 10:56	16887-00-6	
Sulfate	**29.6J**	mg/kg	47.5	23.8	1	10/13/13 09:00	10/14/13 10:56	14808-79-8	B

Sample: TP13NE-4 **Lab ID: 4086632009** Collected: 10/12/13 14:48 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**16.1**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**125**	mg/kg	47.5	23.7	1	10/13/13 09:00	10/14/13 11:04	16887-00-6	
Sulfate	**26.7J**	mg/kg	47.5	23.7	1	10/13/13 09:00	10/14/13 11:04	14808-79-8	B

Sample: TP13NE-5 **Lab ID: 4086632010** Collected: 10/12/13 16:05 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**42.6**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1320**	mg/kg	347	173	5	10/13/13 09:00	10/14/13 13:08	16887-00-6	
Sulfate	**484**	mg/kg	69.4	34.7	1	10/13/13 09:00	10/14/13 11:28	14808-79-8	

Sample: TP5NE-1 **Lab ID: 4086632011** Collected: 10/12/13 17:04 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**13.5**	%	0.10	0.10	1		10/13/13 18:41		

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ANALYTICAL RESULTS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Sample: TP5NE-1 **Lab ID: 4086632011** Collected: 10/12/13 17:04 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**197**	mg/kg	46.1	23.1	1	10/13/13 09:00	10/14/13 11:37	16887-00-6	
Sulfate	**76.8**	mg/kg	46.1	23.1	1	10/13/13 09:00	10/14/13 11:37	14808-79-8	B

Sample: TP13NE-6 **Lab ID: 4086632012** Collected: 10/12/13 17:54 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**37.2**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1050**	mg/kg	319	159	5	10/13/13 09:00	10/14/13 13:16	16887-00-6	
Sulfate	**176**	mg/kg	63.7	31.9	1	10/13/13 09:00	10/14/13 11:45	14808-79-8	B

Sample: TP13NE-7 **Lab ID: 4086632013** Collected: 10/12/13 17:56 Received: 10/12/13 18:35 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**50.6**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1590**	mg/kg	402	201	5	10/13/13 09:00	10/14/13 13:24	16887-00-6	
Sulfate	**145**	mg/kg	80.5	40.2	1	10/13/13 09:00	10/14/13 11:53	14808-79-8	B

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QUALITY CONTROL DATA

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

QC Batch: PMST/8991 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4086632001, 4086632002, 4086632003, 4086632004, 4086632005, 4086632006, 4086632007, 4086632008, 4086632009, 4086632010, 4086632011, 4086632012, 4086632013

SAMPLE DUPLICATE: 874726

Parameter	Units	4086632005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	17.6	18.7	6	10	

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QUALITY CONTROL DATA

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

QC Batch: WETA/20006 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4086632001, 4086632002, 4086632003, 4086632004, 4086632005, 4086632006, 4086632007, 4086632008, 4086632009, 4086632010, 4086632011, 4086632012, 4086632013

METHOD BLANK: 874731 Matrix: Solid
Associated Lab Samples: 4086632001, 4086632002, 4086632003, 4086632004, 4086632005, 4086632006, 4086632007, 4086632008, 4086632009, 4086632010, 4086632011, 4086632012, 4086632013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	<20.0	40.0	10/14/13 09:09	
Sulfate	mg/kg	21.1J	40.0	10/14/13 09:09	

LABORATORY CONTROL SAMPLE: 874732

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	204	102	80-120	
Sulfate	mg/kg	200	200	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 874733 874734

Parameter	Units	4086632005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	175	242	242	425	424	103	103	80-120	0	20	
Sulfate	mg/kg	97.8	242	242	329	325	96	94	80-120	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 874735 874736

Parameter	Units	4086632009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	125	237	237	365	366	101	102	80-120	0	20	
Sulfate	mg/kg	26.7J	237	237	239	238	89	89	80-120	0	20	

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QUALIFIERS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086632

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4086632001	TP19NE-1	ASTM D2974-87	PMST/8991		
4086632002	TP25NE-5	ASTM D2974-87	PMST/8991		
4086632003	TP19NE-2	ASTM D2974-87	PMST/8991		
4086632004	TP19NE-3	ASTM D2974-87	PMST/8991		
4086632005	TP19NE-4	ASTM D2974-87	PMST/8991		
4086632006	TP13NE-1	ASTM D2974-87	PMST/8991		
4086632007	TP13NE-2	ASTM D2974-87	PMST/8991		
4086632008	TP13NE-3	ASTM D2974-87	PMST/8991		
4086632009	TP13NE-4	ASTM D2974-87	PMST/8991		
4086632010	TP13NE-5	ASTM D2974-87	PMST/8991		
4086632011	TP5NE-1	ASTM D2974-87	PMST/8991		
4086632012	TP13NE-6	ASTM D2974-87	PMST/8991		
4086632013	TP13NE-7	ASTM D2974-87	PMST/8991		
4086632001	TP19NE-1	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632002	TP25NE-5	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632003	TP19NE-2	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632004	TP19NE-3	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632005	TP19NE-4	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632006	TP13NE-1	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632007	TP13NE-2	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632008	TP13NE-3	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632009	TP13NE-4	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632010	TP13NE-5	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632011	TP5NE-1	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632012	TP13NE-6	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007
4086632013	TP13NE-7	EPA 300.0	WETA/20006	EPA 300.0	WETA/20007

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/0006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Sulfate	Chloride
001	TP19NE-1	10/2/13	10:02	S		A	X	
002	TP25NE-5		8:45				X	
003	TP19NE-2		10:20				X	
004	TP19NE-3		10:27				X	
005	TP19NE-4		11:10				X	
006	TP13NE-1		13:06				X	
007	TP13NE-2		13:10				X	
008	TP13NE-3		13:22				X	
009	TP13NE-4		14:48				X	
010	TP13NE-5		16:05				X	
011	TP5NE-1		17:04				X	
012	TP13NE-6		17:54				X	
013	TP13NE-7		17:56				X	

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	
Invoice To Phone:	

CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	2-40zpA	

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hours

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/2/13 18:35		
		10/2/13 1835	

PACE Project No.: 40866632

Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / ~~Not Present~~
Intact / ~~Not Intact~~

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omnni Project # 40866632

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other _____

Thermometer Used NA **Type of Ice:** (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: RO **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☒ no

Person examining contents:
Date: 10/12/13
Initials: [illegible]

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
– VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr [illegible] 10/12/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☐Yes ☑No ☐N/A	12. no times on labels. [illegible] 10/12/13
-Includes date/time/ID/Analysis Matrix: [illegible] XS		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [signature] **Date:** 10-14-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 16, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 13, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4086633001	**TP25NW-1**	Solid	10/13/13 11:35	10/13/13 18:18
4086633002	**TP21NW-1**	Solid	10/13/13 14:00	10/13/13 18:18
4086633003	**TP19NW-1**	Solid	10/13/13 17:25	10/13/13 18:18
4086633004	**TP19NW-2**	Solid	10/13/13 17:35	10/13/13 18:18

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SAMPLE ANALYTE COUNT

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4086633001	**TP25NW-1**	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086633002	**TP21NW-1**	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086633003	**TP19NW-1**	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2
4086633004	**TP19NW-2**	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	2

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ANALYTICAL RESULTS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Sample: TP25NW-1 **Lab ID: 4086633001** Collected: 10/13/13 11:35 Received: 10/13/13 18:18 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**63.4**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1410**	mg/kg	543	272	5	12/02/13 19:40	10/14/13 21:00	16887-00-6	
Sulfate	**1150**	mg/kg	543	272	5	12/02/13 19:40	10/14/13 21:00	14808-79-8	

Sample: TP21NW-1 **Lab ID: 4086633002** Collected: 10/13/13 14:00 Received: 10/13/13 18:18 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**58.6**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1890**	mg/kg	483	241	5	12/02/13 19:40	10/14/13 21:25	16887-00-6	
Sulfate	**462**	mg/kg	96.5	48.3	1	12/02/13 19:40	10/14/13 20:36	14808-79-8	

Sample: TP19NW-1 **Lab ID: 4086633003** Collected: 10/13/13 17:25 Received: 10/13/13 18:18 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**33.8**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**607**	mg/kg	301	151	5	12/02/13 19:40	10/14/13 20:44	16887-00-6	
Sulfate	**176J**	mg/kg	301	151	5	12/02/13 19:40	10/14/13 20:44	14808-79-8	D3

Sample: TP19NW-2 **Lab ID: 4086633004** Collected: 10/13/13 17:35 Received: 10/13/13 18:18 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.7**	%	0.10	0.10	1		10/13/13 18:41		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Sample: TP19NW-2 **Lab ID: 4086633004** Collected: 10/13/13 17:35 Received: 10/13/13 18:18 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**283**	mg/kg	49.3	24.7	1	12/02/13 19:40	10/14/13 20:52	16887-00-6	
Sulfate	**27.1J**	mg/kg	49.3	24.7	1	12/02/13 19:40	10/14/13 20:52	14808-79-8	

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QUALITY CONTROL DATA

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

QC Batch: PMST/8991 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4086633001, 4086633002, 4086633003, 4086633004

SAMPLE DUPLICATE: 874726

Parameter	Units	4086632005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	17.6	18.7	6	10	

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QUALITY CONTROL DATA

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

QC Batch: WETA/20022 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4086633001, 4086633002, 4086633003, 4086633004

METHOD BLANK: 875031 Matrix: Solid
Associated Lab Samples: 4086633001, 4086633002, 4086633003, 4086633004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	<20.0	40.0	10/14/13 19:38	
Sulfate	mg/kg	<20.0	40.0	10/14/13 19:38	

LABORATORY CONTROL SAMPLE: 875032

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	199	99	80-120	
Sulfate	mg/kg	200	195	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 875033 875034

Parameter	Units	4086633001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	1410	2720	2720	4270	4220	106	104	80-120	1	20	
Sulfate	mg/kg	1150	2720	2720	3890	3850	101	99	80-120	1	20	

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QUALIFIERS

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3 Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13/006 LEO FRIGO MEMORIA
Pace Project No.: 4086633

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4086633001	**TP25NW-1**	ASTM D2974-87	PMST/8991		
4086633002	**TP21NW-1**	ASTM D2974-87	PMST/8991		
4086633003	**TP19NW-1**	ASTM D2974-87	PMST/8991		
4086633004	**TP19NW-2**	ASTM D2974-87	PMST/8991		
4086633001	**TP25NW-1**	EPA 300.0	WETA/20022	EPA 300.0	WETA/20023
4086633002	**TP21NW-1**	EPA 300.0	WETA/20022	EPA 300.0	WETA/20023
4086633003	**TP19NW-1**	EPA 300.0	WETA/20022	EPA 300.0	WETA/20023
4086633004	**TP19NW-2**	EPA 300.0	WETA/20022	EPA 300.0	WETA/20023

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

CHAIN OF CUSTODY

Page 1 of 1

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/0006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Sulfate, Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP25NW-1	10/13/13	11:35	S		A	X		2-4oz pA	
002	TP21NW-1	10/13/13	14:00				X			
003	TP19NW-1		17:25				X			
004	TP19NW-2		17:35				X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hr

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/13/13 18:18		10/13/13 1818

PACE Project No.: 40866033
Receipt Temp = 20.1 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Associates Project # 40866633

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used N/A **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: 2.0 **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents: Date: 10/13/13 Initials: AM

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
– VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr ATL 10/13/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: ATL 10/13/13	☑Yes ☐No ☐N/A	12. no collection times on labels. ATL 10/13/13
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 10-14-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
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(920)469-2436

October 16, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 14, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4086660001	TP32NE-1	Solid	10/14/13 08:02	10/14/13 17:59
4086660002	TP32NE-2	Solid	10/14/13 08:35	10/14/13 17:59
4086660003	TP32NE-3	Solid	10/14/13 08:50	10/14/13 17:59
4086660004	TP32NE-4	Solid	10/14/13 10:46	10/14/13 17:59
4086660005	TP32NE-5	Solid	10/14/13 11:10	10/14/13 17:59
4086660006	TP32NE-6	Solid	10/14/13 12:10	10/14/13 17:59
4086660007	TP43NE-1	Solid	10/14/13 15:09	10/14/13 17:59
4086660008	TP43NE-2	Solid	10/14/13 15:23	10/14/13 17:59
4086660009	TP43NE-3	Solid	10/14/13 15:50	10/14/13 17:59
4086660010	TP43NE-4	Solid	10/14/13 16:04	10/14/13 17:59
4086660011	TP43NE-5	Solid	10/14/13 17:20	10/14/13 17:59

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SAMPLE ANALYTE COUNT

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4086660001	TP32NE-1	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660002	TP32NE-2	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660003	TP32NE-3	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660004	TP32NE-4	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660005	TP32NE-5	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660006	TP32NE-6	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660007	TP43NE-1	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660008	TP43NE-2	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660009	TP43NE-3	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660010	TP43NE-4	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2
4086660011	TP43NE-5	ASTM D2974-87	SKW	1
		EPA 300.0	JCJ	2

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ANALYTICAL RESULTS

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Sample: TP32NE-1 **Lab ID: 4086660001** Collected: 10/14/13 08:02 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**14.5**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**2610**	mg/kg	461	231	10	10/14/13 20:00	10/16/13 10:01	16887-00-6	
Sulfate	**664**	mg/kg	231	115	5	10/14/13 20:00	10/16/13 09:26	14808-79-8	

Sample: TP32NE-2 **Lab ID: 4086660002** Collected: 10/14/13 08:35 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**14.1**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**3130**	mg/kg	467	233	10	10/14/13 20:00	10/16/13 10:36	16887-00-6	
Sulfate	**158**	mg/kg	46.7	23.3	1	10/14/13 20:00	10/16/13 05:26	14808-79-8	

Sample: TP32NE-3 **Lab ID: 4086660003** Collected: 10/14/13 08:50 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**16.8**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**2640**	mg/kg	489	244	10	10/14/13 20:00	10/16/13 11:45	16887-00-6	
Sulfate	**143**	mg/kg	48.9	24.4	1	10/14/13 20:00	10/16/13 06:24	14808-79-8	

Sample: TP32NE-4 **Lab ID: 4086660004** Collected: 10/14/13 10:46 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.1**	%	0.10	0.10	1		10/15/13 08:48		

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ANALYTICAL RESULTS

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Sample: TP32NE-4 **Lab ID: 4086660004** Collected: 10/14/13 10:46 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**10300**	mg/kg	2720	1360	50	10/14/13 20:00	10/16/13 11:56	16887-00-6	
Sulfate	**226**	mg/kg	54.3	27.2	1	10/14/13 20:00	10/16/13 06:35	14808-79-8	

Sample: TP32NE-5 **Lab ID: 4086660005** Collected: 10/14/13 11:10 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.5**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**3460**	mg/kg	487	243	10	10/14/13 20:00	10/16/13 12:08	16887-00-6	
Sulfate	**70.3**	mg/kg	48.7	24.3	1	10/14/13 20:00	10/16/13 06:47	14808-79-8	

Sample: TP32NE-6 **Lab ID: 4086660006** Collected: 10/14/13 12:10 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**17.4**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**54.8**	mg/kg	48.9	24.5	1	10/14/13 20:00	10/16/13 06:59	16887-00-6	B
Sulfate	**50.9**	mg/kg	48.9	24.5	1	10/14/13 20:00	10/16/13 06:59	14808-79-8	

Sample: TP43NE-1 **Lab ID: 4086660007** Collected: 10/14/13 15:09 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**10.9**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**962**	mg/kg	223	112	5	10/14/13 20:00	10/16/13 12:19	16887-00-6	
Sulfate	**875**	mg/kg	223	112	5	10/14/13 20:00	10/16/13 12:19	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

ANALYTICAL RESULTS

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Sample: TP43NE-2 **Lab ID: 4086660008** Collected: 10/14/13 15:23 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**22.1**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1190**	mg/kg	258	129	5	10/14/13 20:00	10/16/13 12:31	16887-00-6	
Sulfate	**52.6**	mg/kg	51.5	25.8	1	10/14/13 20:00	10/16/13 07:22	14808-79-8	

Sample: TP43NE-3 **Lab ID: 4086660009** Collected: 10/14/13 15:50 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**29.7**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1130**	mg/kg	287	144	5	10/14/13 20:00	10/16/13 12:43	16887-00-6	
Sulfate	**40.2J**	mg/kg	57.4	28.7	1	10/14/13 20:00	10/16/13 07:33	14808-79-8	

Sample: TP43NE-4 **Lab ID: 4086660010** Collected: 10/14/13 16:04 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.5**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**443**	mg/kg	55.9	27.9	1	10/14/13 20:00	10/16/13 07:45	16887-00-6	
Sulfate	**<27.9**	mg/kg	55.9	27.9	1	10/14/13 20:00	10/16/13 07:45	14808-79-8	

Sample: TP43NE-5 **Lab ID: 4086660011** Collected: 10/14/13 17:20 Received: 10/14/13 17:59 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.1**	%	0.10	0.10	1		10/15/13 08:48		

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ANALYTICAL RESULTS

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Sample: TP43NE-5 **Lab ID: 4086660011** Collected: 10/14/13 17:20 Received: 10/14/13 17:59 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**400**	mg/kg	54.1	27.0	1	10/14/13 20:00	10/16/13 07:56	16887-00-6	
Sulfate	**<27.0**	mg/kg	54.1	27.0	1	10/14/13 20:00	10/16/13 07:56	14808-79-8	

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QUALITY CONTROL DATA

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

QC Batch: PMST/9003 Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4086660001, 4086660002, 4086660003, 4086660004, 4086660005, 4086660006, 4086660007, 4086660008, 4086660009, 4086660010, 4086660011

SAMPLE DUPLICATE: 875427

Parameter	Units	4086656001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.3	12.0	2	10	

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QUALITY CONTROL DATA

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

QC Batch: WETA/20038 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4086660001, 4086660002, 4086660003, 4086660004, 4086660005, 4086660006, 4086660007, 4086660008, 4086660009, 4086660010, 4086660011

METHOD BLANK: 875316 Matrix: Solid
Associated Lab Samples: 4086660001, 4086660002, 4086660003, 4086660004, 4086660005, 4086660006, 4086660007, 4086660008, 4086660009, 4086660010, 4086660011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	23.7J	40.0	10/16/13 04:29	
Sulfate	mg/kg	<20.0	40.0	10/16/13 04:29	

LABORATORY CONTROL SAMPLE: 875317

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	193	96	80-120	
Sulfate	mg/kg	200	191	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 875318 875319

Parameter	Units	4086660001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	2610	2300	2300	5080	5080	107	107	80-120	0	20	
Sulfate	mg/kg	664	1150	1150	1810	1810	99	99	80-120	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 875320 875321

Parameter	Units	4086660002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	3130	2330	2330	5660	5660	109	109	80-120	0	20	
Sulfate	mg/kg	158	233	233	383	404	96	106	80-120	6	20	

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QUALIFIERS

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A13/006LEO FRIGO MEMORIAL
Pace Project No.: 4086660

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4086660001	TP32NE-1	ASTM D2974-87	PMST/9003		
4086660002	TP32NE-2	ASTM D2974-87	PMST/9003		
4086660003	TP32NE-3	ASTM D2974-87	PMST/9003		
4086660004	TP32NE-4	ASTM D2974-87	PMST/9003		
4086660005	TP32NE-5	ASTM D2974-87	PMST/9003		
4086660006	TP32NE-6	ASTM D2974-87	PMST/9003		
4086660007	TP43NE-1	ASTM D2974-87	PMST/9003		
4086660008	TP43NE-2	ASTM D2974-87	PMST/9003		
4086660009	TP43NE-3	ASTM D2974-87	PMST/9003		
4086660010	TP43NE-4	ASTM D2974-87	PMST/9003		
4086660011	TP43NE-5	ASTM D2974-87	PMST/9003		
4086660001	TP32NE-1	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660002	TP32NE-2	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660003	TP32NE-3	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660004	TP32NE-4	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660005	TP32NE-5	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660006	TP32NE-6	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660007	TP43NE-1	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660008	TP43NE-2	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660009	TP43NE-3	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660010	TP43NE-4	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041
4086660011	TP43NE-5	EPA 300.0	WETA/20038	EPA 300.0	WETA/20041

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of

4086660

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/0006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	JASON WEISS
Sampled By (Sign):	
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Sulfate, Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP32NE-1	10/14/13	8:02	S	—	A	X		2-40zpA	
002	TP32NE-2		8:35	S			X			
003	TP32NE-3		8:50	S			X			
004	TP32NE-4		10:46	S			X	1 BOTTLE	1-40zpA	
005	TP32NE-5		11:10	S			X		2-40zpA	
006	TP32NE-6		12:10	S			X			
007	TP43NE-1		15:09	S			X			
008	TP43NE-2		15:23	S			X			
009	TP43NE-3		15:50	S			X			
010	TP43NE-4		16:04	S			X			
011	TP43NE-5	↓	17:20	S			X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hr

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/14/13 5:59pm	Susan Kuyle Pace	10/14/13 1759

PACE Project No.: 40866660
Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: SMNI Project # 4086660

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other _____

Thermometer Used N/A **Type of Ice:** (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 12.0 I /Corr: **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☒ no

Person examining contents: Date: 10-14-13 Initials: SW

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr TAT 10-14-13 SW
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: 10/14/13 SW	☑Yes ☐No ☐N/A	12. No collect time on samples - 10-14-13 SW
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: 10-15-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
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October 17, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 15, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4086734001	TP39NW-1	Solid	10/15/13 07:40	10/15/13 17:17
4086734002	TP39NW-2	Solid	10/15/13 08:15	10/15/13 17:17
4086734003	TP39NW-3	Solid	10/15/13 08:40	10/15/13 17:17
4086734004	TP39NW-4	Solid	10/15/13 09:28	10/15/13 17:17
4086734005	TP39NW-5	Solid	10/15/13 12:03	10/15/13 17:17
4086734006	TP39SE-1	Solid	10/15/13 12:20	10/15/13 17:17
4086734007	TP39SE-2	Solid	10/15/13 12:58	10/15/13 17:17
4086734008	TP39SE-3	Solid	10/15/13 14:15	10/15/13 17:17
4086734009	TP39SE-4	Solid	10/15/13 14:54	10/15/13 17:17

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SAMPLE ANALYTE COUNT

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4086734001	TP39NW-1	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734002	TP39NW-2	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734003	TP39NW-3	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734004	TP39NW-4	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734005	TP39NW-5	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734006	TP39SE-1	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734007	TP39SE-2	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734008	TP39SE-3	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2
4086734009	TP39SE-4	ASTM D2974-87	MAV	1
		EPA 300.0	JCJ	2

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ANALYTICAL RESULTS

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Sample: TP39NW-1 **Lab ID: 4086734001** Collected: 10/15/13 07:40 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**11.1**	%	0.10	0.10	1		10/15/13 17:50		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1110**	mg/kg	228	114	5	10/15/13 23:00	10/17/13 01:13	16887-00-6	
Sulfate	**322**	mg/kg	45.5	22.8	1	10/15/13 23:00	10/16/13 23:27	14808-79-8	

Sample: TP39NW-2 **Lab ID: 4086734002** Collected: 10/15/13 08:15 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**13.4**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**2890**	mg/kg	229	114	5	10/15/13 23:00	10/17/13 10:27	16887-00-6	
Sulfate	**278**	mg/kg	45.8	22.9	1	10/15/13 23:00	10/16/13 23:51	14808-79-8	

Sample: TP39NW-3 **Lab ID: 4086734003** Collected: 10/15/13 08:40 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**15.9**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**3170**	mg/kg	471	236	10	10/15/13 23:00	10/17/13 10:35	16887-00-6	
Sulfate	**218**	mg/kg	47.1	23.6	1	10/15/13 23:00	10/17/13 00:00	14808-79-8	

Sample: TP39NW-4 **Lab ID: 4086734004** Collected: 10/15/13 09:28 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**29.8**	%	0.10	0.10	1		10/15/13 17:51		

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

ANALYTICAL RESULTS

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Sample: TP39NW-4 **Lab ID: 4086734004** Collected: 10/15/13 09:28 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**7850**	mg/kg	1140	571	20	10/15/13 23:00	10/17/13 10:43	16887-00-6	
Sulfate	**333**	mg/kg	57.1	28.5	1	10/15/13 23:00	10/17/13 00:08	14808-79-8	

Sample: TP39NW-5 **Lab ID: 4086734005** Collected: 10/15/13 12:03 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**20.9**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**3730**	mg/kg	502	251	10	10/15/13 23:00	10/17/13 10:52	16887-00-6	
Sulfate	**184**	mg/kg	50.2	25.1	1	10/15/13 23:00	10/17/13 00:16	14808-79-8	

Sample: TP39SE-1 **Lab ID: 4086734006** Collected: 10/15/13 12:20 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**9.5**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1150**	mg/kg	223	111	5	10/15/13 23:00	10/17/13 11:00	16887-00-6	
Sulfate	**1140**	mg/kg	223	111	5	10/15/13 23:00	10/17/13 11:00	14808-79-8	

Sample: TP39SE-2 **Lab ID: 4086734007** Collected: 10/15/13 12:58 Received: 10/15/13 17:17 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**14.7**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1590**	mg/kg	236	118	5	10/15/13 23:00	10/17/13 11:08	16887-00-6	
Sulfate	**140**	mg/kg	47.2	23.6	1	10/15/13 23:00	10/17/13 00:49	14808-79-8	

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ANALYTICAL RESULTS

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Sample: TP39SE-3 **Lab ID: 4086734008** Collected: 10/15/13 14:15 Received: 10/15/13 17:17 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**50.8**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**11400**	mg/kg	1620	810	20	10/15/13 23:00	10/17/13 11:16	16887-00-6	
Sulfate	**226**	mg/kg	81.0	40.5	1	10/15/13 23:00	10/17/13 00:57	14808-79-8	

Sample: TP39SE-4 **Lab ID: 4086734009** Collected: 10/15/13 14:54 Received: 10/15/13 17:17 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**15.8**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**266**	mg/kg	47.6	23.8	1	10/15/13 23:00	10/17/13 01:05	16887-00-6	
Sulfate	**70.2**	mg/kg	47.6	23.8	1	10/15/13 23:00	10/17/13 01:05	14808-79-8	

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QUALITY CONTROL DATA

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

QC Batch: PMST/9014
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 4086734001, 4086734002, 4086734003, 4086734004, 4086734005, 4086734006, 4086734007, 4086734008, 4086734009

SAMPLE DUPLICATE: 876116

Parameter	Units	4086734003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	15.9	15.9	0	10	

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QUALITY CONTROL DATA

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

QC Batch: WETA/20065 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4086734001, 4086734002, 4086734003, 4086734004, 4086734005, 4086734006, 4086734007, 4086734008, 4086734009

METHOD BLANK: 876133 Matrix: Solid
Associated Lab Samples: 4086734001, 4086734002, 4086734003, 4086734004, 4086734005, 4086734006, 4086734007, 4086734008, 4086734009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	<20.0	40.0	10/16/13 23:11	
Sulfate	mg/kg	<20.0	40.0	10/16/13 23:11	

LABORATORY CONTROL SAMPLE: 876134

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	202	101	80-120	
Sulfate	mg/kg	200	202	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 876135 876136

Parameter	Units	4086734001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	1110	1140	1140	2360	2380	110	112	80-120	1	20	
Sulfate	mg/kg	322	227	227	572	574	110	111	80-120	0	20	

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QUALIFIERS

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463A12/006LEO FRIGO MEMORIAL
Pace Project No.: 4086734

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4086734001	TP39NW-1	ASTM D2974-87	PMST/9014		
4086734002	TP39NW-2	ASTM D2974-87	PMST/9014		
4086734003	TP39NW-3	ASTM D2974-87	PMST/9014		
4086734004	TP39NW-4	ASTM D2974-87	PMST/9014		
4086734005	TP39NW-5	ASTM D2974-87	PMST/9014		
4086734006	TP39SE-1	ASTM D2974-87	PMST/9014		
4086734007	TP39SE-2	ASTM D2974-87	PMST/9014		
4086734008	TP39SE-3	ASTM D2974-87	PMST/9014		
4086734009	TP39SE-4	ASTM D2974-87	PMST/9014		
4086734001	TP39NW-1	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734002	TP39NW-2	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734003	TP39NW-3	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734004	TP39NW-4	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734005	TP39NW-5	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734006	TP39SE-1	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734007	TP39SE-2	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734008	TP39SE-3	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076
4086734009	TP39SE-4	EPA 300.0	WETA/20065	EPA 300.0	WETA/20076

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of 1

Page 12 of 13

CHAIN OF CUSTODY

4086734

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Sulfate, Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP39NW-1	10/15/13	7:40	S		A	X		2-402 PA	
002	TP39NW-2		8:15				X			
003	TP39NW-3		8:40				X			
004	TP39NW-4		9:28				X			
005	TP39NW-5		12:03				X			
006	TP39SE-1		12:20				X			
007	TP39SE-2		12:58				X			
008	TP39SE-3		14:15				X			
009	TP39SE-4		14:54				X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48 hr

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	10/15/13 17:17	[illegible]	10/15/13 1717

PACE Project No.: 4086734

Receipt Temp = 2.0 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Project # 4086734

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used NA **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: R01 /Corr: **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents: Date: 10/15/13 Initials: MV

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48hr TAT 10/15/13 MV
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 10-16-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

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1241 Bellevue Street - Suite 9
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October 28, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 24, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4087221001	TP32NE-4	Solid	10/14/13 10:46	10/24/13 09:55
4087221002	TP39SE-3	Solid	10/15/13 14:15	10/24/13 09:55
4087221003	TP39SE-4	Solid	10/15/13 14:54	10/24/13 09:55
4087221004	TP39NW-4	Solid	10/15/13 09:28	10/24/13 09:55
4087221005	TP12S-1	Solid	10/02/13 13:10	10/24/13 09:55
4087221006	TP19NE-2	Solid	10/12/13 10:20	10/24/13 09:55
4087221007	TP19S-2	Solid	09/28/13 15:48	10/24/13 09:55
4087221008	TP25NE-2	Solid	10/11/13 15:13	10/24/13 09:55
4087221009	TP25S-1	Solid	09/30/13 09:15	10/24/13 09:55
4087221010	TP23S-3	Solid	09/30/13 11:00	10/24/13 09:55
4087221011	TP11S-1	Solid	09/28/13 13:58	10/24/13 09:55
4087221012	TP22N-1	Solid	10/01/13 08:50	10/24/13 09:55
4087221013	TP22N-2	Solid	10/01/13 09:45	10/24/13 09:55
4087221014	TP22S-2	Solid	09/29/13 10:08	10/24/13 09:55
4087221015	TP13NE-1	Solid	10/12/13 13:06	10/24/13 09:55
4087221016	TP22SW-1	Solid	10/01/13 12:05	10/24/13 09:55
4087221017	TP25NW-1	Solid	10/13/13 11:35	10/24/13 09:55

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SAMPLE ANALYTE COUNT

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4087221001	TP32NE-4	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221002	TP39SE-3	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221003	TP39SE-4	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221004	TP39NW-4	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221005	TP12S-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221006	TP19NE-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221007	TP19S-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221008	TP25NE-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221009	TP25S-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221010	TP23S-3	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221011	TP11S-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221012	TP22N-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221013	TP22N-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221014	TP22S-2	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221015	TP13NE-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221016	TP22SW-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1
4087221017	TP25NW-1	ASTM D2974-87	AH	1
		EPA 300.0	JCJ	1

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ANALYTICAL RESULTS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Sample: TP32NE-4 **Lab ID: 4087221001** Collected: 10/14/13 10:46 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**27.1**	%	0.10	0.10	1		10/15/13 08:48		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**8070**	mg/kg	2740	1370	50	10/24/13 11:21	10/25/13 14:43	16887-00-6	

Sample: TP39SE-3 **Lab ID: 4087221002** Collected: 10/15/13 14:15 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**50.8**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**9610**	mg/kg	1620	811	20	10/24/13 11:21	10/25/13 15:38	16887-00-6	

Sample: TP39SE-4 **Lab ID: 4087221003** Collected: 10/15/13 14:54 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**15.8**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**154**	mg/kg	47.6	23.8	1	10/24/13 11:21	10/25/13 15:49	16887-00-6	B

Sample: TP39NW-4 **Lab ID: 4087221004** Collected: 10/15/13 09:28 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**29.8**	%	0.10	0.10	1		10/15/13 17:51		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**7210**	mg/kg	1130	567	20	10/24/13 11:21	10/25/13 16:00	16887-00-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Sample: TP12S-1 **Lab ID: 4087221005** Collected: 10/02/13 13:10 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**54.5**	%	0.10	0.10	1		10/03/13 07:18		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**5420**	mg/kg	882	441	10	10/24/13 11:21	10/25/13 16:11	16887-00-6	

Sample: TP19NE-2 **Lab ID: 4087221006** Collected: 10/12/13 10:20 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**64.4**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**2230**	mg/kg	557	279	5	10/24/13 11:21	10/25/13 16:45	16887-00-6	

Sample: TP19S-2 **Lab ID: 4087221007** Collected: 09/28/13 15:48 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**77.4**	%	0.10	0.10	1		09/29/13 18:50		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**4490**	mg/kg	886	443	5	10/24/13 11:21	10/25/13 16:56	16887-00-6	

Sample: TP25NE-2 **Lab ID: 4087221008** Collected: 10/11/13 15:13 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**61.9**	%	0.10	0.10	1		10/12/13 08:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**6440**	mg/kg	1060	528	10	10/24/13 11:21	10/25/13 17:29	16887-00-6	

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ANALYTICAL RESULTS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Sample: TP25S-1 **Lab ID: 4087221009** Collected: 09/30/13 09:15 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**47.6**	%	0.10	0.10	1		09/30/13 16:35		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**3210**	mg/kg	768	384	10	10/24/13 11:21	10/25/13 17:40	16887-00-6	

Sample: TP23S-3 **Lab ID: 4087221010** Collected: 09/30/13 11:00 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**66.1**	%	0.10	0.10	1		09/30/13 16:36		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**6300**	mg/kg	581	291	5	10/24/13 11:21	10/25/13 17:51	16887-00-6	

Sample: TP11S-1 **Lab ID: 4087221011** Collected: 09/28/13 13:58 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**18.9**	%	0.10	0.10	1		09/29/13 18:50		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Chloride	**1460**	mg/kg	247	124	5	10/24/13 11:21	10/25/13 18:02	16887-00-6	

Sample: TP22N-1 **Lab ID: 4087221012** Collected: 10/01/13 08:50 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**56.7**	%	0.10	0.10	1		10/02/13 08:38		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**11600**	mg/kg	4610	2300	50	10/24/13 11:21	10/25/13 18:13	14808-79-8	

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ANALYTICAL RESULTS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Sample: TP22N-2 **Lab ID: 4087221013** Collected: 10/01/13 09:45 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**62.5**	%	0.10	0.10	1		10/02/13 08:38		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**3710**	mg/kg	1060	531	10	10/24/13 11:21	10/25/13 18:24	14808-79-8	

Sample: TP22S-2 **Lab ID: 4087221014** Collected: 09/29/13 10:08 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**49.3**	%	0.10	0.10	1		09/29/13 18:50		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**6490**	mg/kg	787	393	10	10/24/13 11:21	10/25/13 18:35	14808-79-8	

Sample: TP13NE-1 **Lab ID: 4087221015** Collected: 10/12/13 13:06 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**44.2**	%	0.10	0.10	1		10/13/13 18:40		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**1480**	mg/kg	359	179	5	10/24/13 11:21	10/25/13 18:46	14808-79-8	

Sample: TP22SW-1 **Lab ID: 4087221016** Collected: 10/01/13 12:05 Received: 10/24/13 09:55 Matrix: Solid
Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**38.4**	%	0.10	0.10	1		10/02/13 09:09		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**2930**	mg/kg	1300	651	20	10/24/13 11:21	10/25/13 18:57	14808-79-8	

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ANALYTICAL RESULTS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Sample: TP25NW-1 **Lab ID: 4087221017** Collected: 10/13/13 11:35 Received: 10/24/13 09:55 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: ASTM D2974-87								
Percent Moisture	**63.4**	%	0.10	0.10	1		10/13/13 18:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Preparation Method: EPA 300.0								
Sulfate	**1270**	mg/kg	542	271	5	10/24/13 11:21	10/25/13 19:08	14808-79-8	

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QUALITY CONTROL DATA

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

QC Batch: WETA/20237 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4087221001, 4087221002, 4087221003, 4087221004, 4087221005, 4087221006, 4087221007, 4087221008, 4087221009, 4087221010, 4087221011, 4087221012, 4087221013, 4087221014, 4087221015, 4087221016, 4087221017

METHOD BLANK: 881288 Matrix: Solid
Associated Lab Samples: 4087221001, 4087221002, 4087221003, 4087221004, 4087221005, 4087221006, 4087221007, 4087221008, 4087221009, 4087221010, 4087221011, 4087221012, 4087221013, 4087221014, 4087221015, 4087221016, 4087221017

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	25.9J	40.0	10/25/13 14:19	
Sulfate	mg/kg	<20.0	40.0	10/25/13 14:19	

LABORATORY CONTROL SAMPLE: 881289

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	200	192	96	80-120	
Sulfate	mg/kg	200	196	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 881290 881291

Parameter	Units	4087221001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	8070	13700	13700	21700	22000	100	102	80-120	1	20	
Sulfate	mg/kg	<1370	13700	13700	14000	14200	94	95	80-120	2	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 881292 881293

Parameter	Units	4087221005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	5420	4420	4420	10100	10200	107	109	80-120	1	20	
Sulfate	mg/kg	1370	4420	4420	5560	5500	95	94	80-120	1	20	

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QUALIFIERS

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: LEO FRIGO MEMORIAL RE-RUNS
Pace Project No.: 4087221

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4087221001	TP32NE-4	ASTM D2974-87	PMST/		
4087221002	TP39SE-3	ASTM D2974-87	PMST/		
4087221003	TP39SE-4	ASTM D2974-87	PMST/		
4087221004	TP39NW-4	ASTM D2974-87	PMST/		
4087221005	TP12S-1	ASTM D2974-87	PMST/		
4087221006	TP19NE-2	ASTM D2974-87	PMST/		
4087221007	TP19S-2	ASTM D2974-87	PMST/		
4087221008	TP25NE-2	ASTM D2974-87	PMST/		
4087221009	TP25S-1	ASTM D2974-87	PMST/		
4087221010	TP23S-3	ASTM D2974-87	PMST/		
4087221011	TP11S-1	ASTM D2974-87	PMST/		
4087221012	TP22N-1	ASTM D2974-87	PMST/		
4087221013	TP22N-2	ASTM D2974-87	PMST/		
4087221014	TP22S-2	ASTM D2974-87	PMST/		
4087221015	TP13NE-1	ASTM D2974-87	PMST/		
4087221016	TP22SW-1	ASTM D2974-87	PMST/		
4087221017	TP25NW-1	ASTM D2974-87	PMST/		
4087221001	TP32NE-4	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221002	TP39SE-3	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221003	TP39SE-4	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221004	TP39NW-4	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221005	TP12S-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221006	TP19NE-2	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221007	TP19S-2	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221008	TP25NE-2	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221009	TP25S-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221010	TP23S-3	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221011	TP11S-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221012	TP22N-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221013	TP22N-2	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221014	TP22S-2	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221015	TP13NE-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221016	TP22SW-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238
4087221017	TP25NW-1	EPA 300.0	WETA/20237	EPA 300.0	WETA/20238

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Page 1 of

4086660 4087221

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	JASON WEIS
Sampled By (Sign):	
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Sulfate, Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP32NE-1	10/14/13	8:02	S	—	A	X		2-40zpA	
002	TP32NE-2		8:35	S			X			
003	TP32NE-3		8:50	S			X			
004	TP32NE-4		10:40	S			X	4087221-001 Re for Cl added 10/24/13 per BW LMW	1 BOTTLE 1-40zpA 2-40zpA	
005	TP32NE-5		11:10	S			X			
006	TP32NE-6		12:10	S			X			
007	TP43NE-1		15:09	S			X			
008	TP43NE-2		15:23	S			X			
009	TP43NE-3		15:50	S			X			
010	TP43NE-4		16:04	S			X			
011	TP43NE-5	↓	17:20	S			X			

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge)
Date Needed: 48hr

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/14/13 5:59pm	Susan Kilgore Pace	10/14/13 1759

PACE Project No.: 4086660
Receipt Temp = 1.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Condition Upon Receipt

4067221 LW

Client Name: SMNT Project # 40866660

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other

Thermometer Used N/A Type of Ice: (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 20.1 /Corr: Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☒ no

Person examining contents:
Date: 10-14-13
Initials: SW

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr TAT 10-14-13 SW
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: 10/14/13 SW	☑Yes ☐No ☐N/A	12. No collect time on samples - 10-14-13 SW
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 10-15-13

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4086734

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

FILTERED? (YES/NO): Y/N —
PRESERVATION (CODE)*: Pick Letter A

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Surface chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP39NW-1	10/15/13	7:40	S	X		2-402 PA	
002	TP39NW-2		8:15		X			
003	TP39NW-3		8:40		X			
004	TP39NW-4		9:28		X	4087221004 Re for Cl		
005	TP39NW-5		12:03		X			
006	TP39SE-1		12:20		X			
007	TP39SE-2		12:58		X			
008	TP39SE-3		14:05		X	4087221002 Re for Cl		
009	TP39SE-4		14:54		X	4087221003 Re for Cl		

Added per BW 10/24/13 LMW

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48 hr

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwaynerc@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	10/15/13 17:17	MLV	10/15/13 1717

PACE Project No.: 4086734
Receipt Temp = 12.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

1241 Bellevue Street, Suite 1
Green Bay, WI 5430

40872.1 LKW

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Project # 40861734

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: R01 /Corr: Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10/15/13
Initials: MV

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48hr TAT 10/15/13 MV
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:	S	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

If checked, see attached form for additional comments ☐

Client Notification/ Resolution:
Person Contacted: Date/Time:
Comments/ Resolution:

Project Manager Review: Date: 10-16-13

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CHAIN OF CUSTODY

JBK

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air W = Water
B = Biota DW = Drinking Water
C = Charcoal GW = Ground Water
O = Oil SW = Surface Water
S = Soil WW = Waste Water
SI = Sludge WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	FILTERED? (YES/NO) Y/N			N	N	N	N	N	N	N
						PRESERVATION (CODE)* Pick Letter	A	A	A	A	C	A	A	A	A
							Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL Phosphorus	Bromide ACIDITY	ALKALINITY	TOTAL PHOSPHORUS	FERROUS IRON	Chloride, Fluoride, Sulfate, Bromide, pH	Conductivity	Fecal Coliform
001	TP18SE-1	10/2/13	8:10	S			X	X	X						
002	TP18SE-2		8:18	S			X	X	X						
003	TP18SE-W		8:35	GW					X	X	X	X	X	X	X
004	TP18SE		9:02	S			X	X	X						
005	TP16SE-1		9:50	S			X	X	X						
006	TP16SE-2		9:58	S			X	X	X						
007	TP16SE-3		10:05	S			X	X	X						
008	TP16SE-W		10:35	GW					X	X	X	X	X	X	X
009	TP14S-1		11:20	S			X	X	X						
010	TP14S-2		11:25	S			X	X	X						
011	TP14S-W		11:50	GW					X	X	X	X	X	X	X
012	TP12S-1		13:10	S			X	X	4072210	05	RE				
013	TP12S-W		13:25	GW					X	X	X	X	X	X	X

LAB COMMENTS (Lab Use Only)	Profile #
1-4ozP^A 1-4ozAg^A	
4-250mlp^AAAC 1-125sterile^I	
4-250mlp^A,B,C 1-125sterile^I	
4-250mlp^AAAC 1-125sterile^I	

CLIENT COMMENTS

Cl added per BW 10/3/13

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge) Date Needed: 10/4/13	Relinquished By: Brian D. Wayner	Date/Time: 10/2/13 16:53	Received By: Alaina Wyle Pace	Date/Time: 10-2-13 1653	PACE Project No. 4085855 W
Transmit Prelim Rush Results by (complete what you want):	Relinquished By:	Date/Time:	Received By:	Date/Time:	Receipt Temp = 2.07 °C
Email #1: bwayner@omnni.com	Relinquished By:	Date/Time:	Received By:	Date/Time:	Sample Receipt pH OK / Adjusted
Email #2:	Relinquished By:	Date/Time:	Received By:	Date/Time:	Cooler Custody Seal Present / Not Present Intact / Not Intact
Telephone:	Relinquished By:	Date/Time:	Received By:	Date/Time:	
Fax:	Relinquished By:	Date/Time:	Received By:	Date/Time:	
Samples on HOLD are subject to special pricing and release of liability					

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C019a(27Jun2006)

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CHAIN OF CUSTODY

4085855

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Bromide, Acidity	Alkalinity	Total Phosphorus	Ferrous Iron	Chloride, Fluoride, Sulfate, Bromide, pH	Conductivity	Fecal Coliform
					N				N	N	N	N	N	N	N
							A	A	A	A	C	A	A	A	B
001	TP18SE-1	10/2/13	8:10	S			X	X	X						
002	TP18SE-2		8:18	S			X	X	X						
003	TP18SE-W		8:35	GW					X	X	X	X	X	X	X
004	TP18SE		9:02	S			X	X	X						
005	TP16SE-1		9:50	S			X	X	X						
006	TP16SE-2		9:58	S			X	X	X						
007	TP16SE-3		10:05	S			X	X	X						
008	TP16SE-W		10:35	GW					X	X	X	X	X	X	X
009	TP14S-1		11:20	S			X	X	X						
010	TP14S-2		11:25	S			X	X	X						
011	TP14S-W		11:50	GW					X	X	X	X	X	X	X
012	TP12S-1		13:10	S			X	X							
013	TP12S-W		13:25	GW					X	X	X	X	X	X	X

CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	1-4oz P A, 1-4oz AG A	
	4-250mL p AAAC, 1-125 sterile	I
	4-250mL p A A C, 1-125 sterile	I
	4-250mL p AAAC, 1-125 sterile	I

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/2/13 16:53	Alexink Wilfo Pace	10-2-13 1653

PACE Project No.: 4085855
Receipt Temp = 2.07 °C
Sample Receipt pH: OK / Adjusted
Cooler Custody Seal: Present / Not Present, Intact / Not Intact

C019a(27Jun2006)

Version 6.0 06/14/06

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4085855 W

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	BRIAN
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL PHOSPHORUS	Chloride, Fluoride, Sulfate, Bromide, pH	ALKALINITY ACIDITY	TOTAL PHOSPHORUS	FERROUS IRON	CONDUCTIVITY	FECAL COLIFORM	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					Y/N				N	N	N	N	N	N			
					Pick Letter		A	A	A	A	C	A	A	i			
014	TP10S-1	10/2/13	15:30	S			X	X							10-2-13 MV	1 1-4oz Ag A	1-4oz P A
015	TP10S-2		15:42	S			X	X									
016	TP10S-W		15:50	GW					X	X	X	X	X	X		4-250ml p AHAC	1-125ml sterile

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/2/13 16:53	Susan K Kilgore Pace	10-2-13 1653

PACE Project No.

Receipt Temp = ROT °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

C019a(27Jun2006)

Version 6.0 06/14/06

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4085970

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: EGIT21 ORGANIC CONSTIT	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP23-6	9/3/13		S		A	X		1-2ploc	
002	TP22NW-3	10/1/13		S						
003	TP22NW-2	10/1/13		S						
004	TP22NW-1	10/1/13		S						
005	TP22SW-3	10/1/13		S						
006	TP22SW-2	10/1/13		S						
007	TP22NW-4	10/1/13		S						
008	TP22SW-1	10/1/13		S						
009	TP16SE-4	10/2/13		S						
010	TP18SE-1	10/2/13		S						
011	TP18SE-2	10/2/13		S						
012	TP18SE-3	10/2/13		S						
013	TP16SE-1	10/2/13		S			X			

Note: TP22NW samples were mislabeled. The samples should have been labeled TP22N. (Brian Wayner, OMNNI 10/29/13)

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D Wayner	10/3/13 10:02	D. Mull	10/3/13 11:15
D. Mull	10/3/13 13:30	M.V	10/3/13 1330

PACE Project No.: 4085970
Receipt Temp = R01 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	
Project Contact:	
Phone:	
Project Number:	SAME AS SHEET #1
Project Name:	
Project State:	
Sampled By (Print):	
Sampled By (Sign):	
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	
Mail To Company:	
Mail To Address:	SAME AS SHEET #1
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: IGNITION ORGANIC CONTENT	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
014	~~TP16SE~~ TP16SE-3	10/2/13		S	X		1-2 plot	
015	TP14S-2	↓		↓	↓		↓	
016	TP14S-3							
017	TP16SE-2							
018	TP12S-1							
019	TP14S-1							
020	TP10S-1							
021	TP10S-2	✓		✓	X		✓	

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwaynere OMNNi.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. Wayne	10/3/13 10:02	D. Mella	10/3/13 11:15
D. Mella	10/3/13 13:30	M.V—a	10/3/13 1330

PACE Project No.

Receipt Temp = R01 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of

Page 12 of 13

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	TA463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	4086571
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	CHLORIDE	SULFATE	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP24NW-1	10/11/13	9:25	S		A	X			2-4 oz p^	
002	TP24NW-2		9:35				X				
003	TP24NW-3		10:20				X				
004	TP24NW-4		12:08				X				
005	TP24NW-5		12:10				X				
006	TP25NE-1		14:50				X				
007	TP25NE-2		15:13				X				
008	TP25NE-3		15:57				X				
009	TP25NE-4		16:16				X			✓	

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: ASAP

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/11/13 17:12	M.V	10/11/13 1712

PACE Project No.: 4086571

Receipt Temp = 20.1 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: sulfate	chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP19NE-1	9/12/13	10:02	S	—	A	X			2-40zpA	
002	TP25NE-5		8:45				X				
003	TP19NE-2		10:20				X				
004	TP19NE-3		10:27				X				
005	TP19NE-4		11:10				X				
006	TP13NE-1		13:06				X				
007	TP13NE-2		13:10				X				
008	TP13NE-3		13:22				X				
009	TP13NE-4		14:48				X				
010	TP13NE-5		16:05				X				
011	TP5NE-1		17:04				X				
012	TP13NE-6		17:54				X				
013	TP13NE-7		17:56				X				

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hours

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/12/13 18:35		

PACE Project No.: 40866032

Receipt Temp = 2.0 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / ~~Not Present~~ Intact / ~~Not Intact~~

C019a(27Jun2006)

Version 6.0 06/14/06

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	JASON WEIS
Sampled By (Sign):	
PO #:	Regulatory Program:

Quote #:	4086660
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) Y/N: —
PRESERVATION (CODE)* Pick Letter: A

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Sulfate, Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP32NE-1	10/14/13	8:02	S	X		2-40zpA	
002	TP32NE-2		8:35	S	X			
003	TP32NE-3		8:50	S	X			
004	TP32NE-4		10:46	S	X	1 BOTTLE	1-40zpA	
005	TP32NE-5		11:10	S	X		2-40zpA	
006	TP32NE-6		12:10	S	X			
007	TP43NE-1		15:09	S	X			
008	TP43NE-2		15:23	S	X			
009	TP43NE-3		15:50	S	X			
010	TP43NE-4		16:04	S	X			
011	TP43NE-5		17:20	S	X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hr

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/14/13 5:59 pm	Susan K Wyke Pace	10/14/13 1759
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

PACE Project No. 4086660
Receipt Temp = 1.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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CHAIN OF CUSTODY

Page 1 of 1

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| (Please Print Clearly) | | |

Page 2 of 2

4085855

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Quote #:

| (Please Print Clearly) | | |

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4087221
408657 LW

JSK

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) Y/N: —
PRESERVATION (CODE)* Pick Letter: A

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: CHLORIDE	Analyses Requested: SULFATE	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP24NW-1	10/11/13	9:25	S	X			2-4ozp	
002	TP24NW-2		9:35		X				
003	TP24NW-3		10:20		X				
004	TP24NW-4		12:08		X				
005	TP24NW-5		12:10		X				
006	TP25NE-1		14:50		X				
007	TP25NE-2		15:13		X		4087220 08	fwd CL RE per BW 10/24/13 LW	
008	TP25NE-3		15:57		X				
009	TP25NE-4		16:16		X				

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: ASAP

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/11/13 17:12	M.V — GR	10/11/13 1712

PACE Project No.: 408657 LW

Receipt Temp = 20.1 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal: Present / Not Present, Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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Page 1 of 2

MAT ✓

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4085673 LW

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	TH63A13
Project Name:	LEO FRIGO MEMORIAL BRIDGE
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	FILTERED? (YES/NO) Y/N			N	N	N	N	N		CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
						PRESERVATION (CODE)* Pick Letter			A	A	C	A	1				
							Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL PHOSPHORUS	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity			
001	TP15S-1	9/26/13	10:09	S			X	X									
002	TP15S-3		10:24	S			X	X									
003	TP15S-1W		10:35	GW					X	X	X	X		0X			
004	TP13S-1W		12:33	GW					X	X	X	X		0X		① Add'l per TB 9-30-13	
005	TP13S-1		12:35	S			X	X									
006	TP13S-3		12:50	S			X	X									
007	TP11S-1		13:58	S			X	X	4072211								
008	TP11S-2		14:15	S			X	X									
009	TP19S-1		15:41	S			X	X									
010	TP19S-2		15:48	S			X	X	4072211								
011	TP19S-2W		15:46	W					X	X	X	X	X	0X			
012	TP19S-4		15:52	S			X	X									
013	TP19S-5		16:01	S			X	X									

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/28/13 6:30pm	JM	9/29/13 18:50

PACE Project No.: 4085673 LW

Receipt Temp = °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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4087221
4085673 LW

CHAIN OF CUSTODY

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H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141
CLIENT COMMENTS	LAB COMMENTS (Lab Use Only) / Profile #

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air; B = Biota; C = Charcoal; O = Oil; S = Soil; SI = Sludge; W = Water; DW = Drinking Water; GW = Ground Water; SW = Surface Water; WW = Waste Water; WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO)	PRESERVATION (CODE)*	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity			
					Y/N	Pick Letter	N	N	N	N	N				
							A	A	C	A	i				
014	TP11S-GW	9/23/13	14:25	GW			X	X	X	X	X	2X			
015	MW16S-GW	"	17:48	"			X	X	X	X	X	2X			
016	MW18S-GW	"	17:09	"			X	X	X	X	X	2X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	9/28/13 6:36pm	Jim Wirk	9/24/13 18:50

PACE Project No.

Receipt Temp = °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

C019a(27Jun2006)

Version 5.0 06/14/06

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H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	LEO FRIGO MEMORIAL BRIDGE
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	408567 4
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

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A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL PHOSPHORUS	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	FILTERED? (YES/NO)				Y/N			N	N	N	N	N				
	PRESERVATION (CODE)*				Pick Letter			A	A	C	A	I				
001	TP22S-1	9/29/13	10:05	S		X	X								1-402pA 1-402agA	
002	TP22S-2		10:08	S		X	X	40	7221	014	RF			SO4 PW LW 10/24/13		
003	TP22S-3		10:40	S		X	X									
004	TP22S-4		14:10	S		X	X									
005	TP22S-5		13:50	S		X	X							@ Add per TG 9-30-13 BG		
006	TP24S-1		14:50	S		X	X									
007	TP24S-2		14:50	S		X	X									
008	TP24S-3		14:55	S		X	X									
009	TP24S-5		15:40	S		X	X									
010	TP24S-6		15:45	S		X	X									
011	MW23N-W		16:02	GW				X	X	X	X	X	@ X		1-Sterile 4-250mlpBAC	
012	MW25S-W		16:57	GW				X	X	X	X	X	@ X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwaynere@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/29/13 5:48pm	Alex Ho	9/29/13 1748

PACE Project No.: 40856714

Receipt Temp = R 0.1 °C

Sample Receipt pH (OK) / Adjusted

Cooler Custody Seal Present / Not Present

Intact / Not Intact

(0119a/27Jun2006)

Version 6.0 06/14/06

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

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www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of 1

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/0006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Y/N	Pick Letter	Sulfate	Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP19NE-1	10/2/13	10:02	S		X				2-402pA	
002	TP25NE-5		8:45			X					
003	TP19NE-2		10:20			X					
004	TP19NE-3		10:27			X			40873221-006 Re for Cl		
005	TP19NE-4		11:10			X					
006	TP13NE-1		13:06			X			40873221-005 RE for SO4 added per BW 10/24/13 LW		
007	TP13NE-2		13:10			X					
008	TP13NE-3		13:22			X					
009	TP13NE-4		14:48			X					
010	TP13NE-5		16:05			X					
011	TP5NE-1		17:04			X					
012	TP13NE-6		17:54			X					
013	TP13NE-7		17:52			X					

40873221 LW

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hours

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/12/13 18:35		

PACE Project No.: 40873221

Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / ~~Not Present~~
Intact / ~~Not Intact~~

Version 6.0 06/14/06

C019a/27Jun2006)

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

WISCONSIN DEPARTMENT OF TRANSPORTATION

Baker

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

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Quote #: 4085855

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Company Name:	(Please Print Clearly) OMNNI Associates	Mail To Contact:	Brian Wagner
Branch/Location:	Appleton, WI	Mail To Company:	OMNNI Associates
Project Contact:	Brian Wagner	Mail To Address:	IN; Systems Drive Appleton, WI 54914
Phone:	920/830-6141		
Project Number:	T1463A13	Invoice To Contact:	Brian Wagner
Project Name:	Leo Frigo Memorial Bridge	Invoice To Company:	OMNNI
Project State:	WI	Invoice To Address:	
Sampled By (Print):	Brian Wagner	Invoice To Phone:	
Sampled By (Sign):	Bill Wagner	CLIENT COMMENTS	10/21/13 NV
PO #:		Regulatory Program:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air; B = Biota; C = Charcoal; O = Oil; S = Soil; SL = Sludge; W = Water; DW = Drinking Water; GW = Ground Water; SW = Surface Water; WW = Waste Water; WP = Wipe

PACE LAB #	CLIENT FIELD ID	DATE COLLECTION	TIME	MATRIX	FILTERED? (YES/NO)	PRESERVATION (CODE)*	Analyses Requested	Y/N	Pick Letter:	LAB COMMENTS (Lab Use Only)	Profile #
							Chloride, Fluoride, Sulfate, Bromide, pH		A		
							TOTAL PHOSPHORUS		A		
014	TP105-1	10/9/13	15:30	S				X			
015	TP105-2		15:42	S				X			
016	TP105-3	1	15:50	GW							
							Chloride, fluoride, Sulfate, Bromide, pH	N	A		
							ALKALINITY	N	A		
							ACIDITY	N	A		
							TOTAL PHOSPHORUS	N	C		
							FERROUS IRON	N	A		
							CONDUCTIVITY	N	A		
							FECAL Coliform	N	I		

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):
Email #1: bhagner@omnni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Bill Wagner	10/21/13 16:53	William Kluge/Pace	10-21-13 1653

PACE Project No.

Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C0119a(27Jun2006)

ORIGINAL

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite
Green Bay, WI 5430

Pace Analytical™

Sample Condition Upon Receipt

4087221
4085855 LMW

Client Name: Omni Project #

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: R01 /Corr: Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10/2/13
Initials: MV

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A 10/2/13 MV	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No ☐N/A	6. Fecal Coliform. 10/2/13 MV
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 10/4 10/2/13 MV
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S, WQ		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☑ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics. OTHER:	☑Yes ☐No	Initial when completed MV / Lab Std #ID of preservative / Date/Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

If checked, see attached form for additional comments ☐

Client Notification/ Resolution:
Person Contacted: Date/Time:
Comments/ Resolution:

Project Manager Review: Date: 10-3-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

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4087221
408657 LW

JJK

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	TH63A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, W = Water, B = Biota, DW = Drinking Water, C = Charcoal, GW = Ground Water, O = Oil, SW = Surface Water, S = Soil, WW = Waste Water, SI = Sludge, WP = Wipe

FILTERED? (YES/NO) — Y / N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Chloride, Sulfate	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP24NW-1	10/11/13	9:25	S	X		2-4oz p^	
002	TP24NW-2		9:35		X			
003	TP24NW-3		10:20		X			
004	TP24NW-4		12:08		X			
005	TP24NW-5		12:10		X			
006	TP25NE-1		14:50		X			
007	TP25NE-2		15:13		X	4087 22 008 fw Cl RE per BW 10/24/13 LW		
008	TP25NE-3		15:57		X			
009	TP25NE-4		16:16		X		✓	

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: ASAP

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/11/13 17:12	M.V	10/11/13 17:12

PACE Project No.: 408657 LW

Receipt Temp = 20.1 °C

Sample Receipt pH: OK / Adjusted

Cooler Custody Seal: Present / Not Present

Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

4087221

Client Name: Omnni Associate Project # 40865 LW

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: R01 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10-11-13
Initials: BL

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☑Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr. 10-11-13 BL
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:	S	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 10-14-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

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4087221

4085688 LW

UPPER MIDWEST REGION

MN: 612-607-1700 WI: 920-469-2436

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, W = Water, B = Biota, DW = Drinking Water, C = Charcoal, GW = Ground Water, O = Oil, SW = Surface Water, S = Soil, WW = Waste Water, SI = Sludge, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
010	TP25S-1 001	9/30/13	9:15	S		A	X	X	4087	221		-009	RE for Cl		1-4ozag^A, 1-4ozp^A	
011	TP25S-2 002		9:21			A	X	X								
012	TP23S-1 003		10:14			A	X	X						per BW LW 1/24/13		
013	TP23S-2 004		10:20			A	X	X								
014	TP23S-3 005		11:00			A	X	X	4087	221		-010	RE for Cl			
015	TP23S-4 006		11:03			A	X	X								
016	TP23S-3W 007		10:40	GW					X	X	X	X	X	4-250mlp	AAAC, 1-sterile^A, 1-4ozag^A, 1-4ozp^A	
017	TP23S-5 008		13:08	S		A	X	X								
018	TP22N-W 009		13:41	GW					X	X	X	X	X	4-250mlp	AAAC, 1-sterile	
	MNT 9-30-13															

Rush Turnaround Time Requested - Prelims
(Rush) TAT subject to approval/surcharge)
Date Needed: 10/02/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/30/13 14:20		9/30/13 14:20
	9/30/13 14:40		9-30-13 14:40

PACE Project No. 4085688 LW

Receipt Temp = 1.01 °C

Sample Receipt pH (OK / Adjusted)

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27-Jun2006)

ORIGINAL

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4087221
4085682

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CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) Y/N
PRESERVATION (CODE)* Pick Letter: A

Analyses Requested: Organic Content by Loss on Ignition

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	010 TP24S-6	9/30/13		S		1-polybag A	
002	011 TP24S-2						
003	012 TP24S-5						
004	013 TP24S-4						
005	014 TP24S-1						
006	015 TP22S-4						
007	016 TP22S-3						
008	017 TP22S-2						
009	018 22-1						
	MAT 9.30.13						

(Rush) Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/2/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/30/13 14:20		9/30/13 14:20
	9/30/13 14:40		9-30-13 14:40

PACE Project No.

Receipt Temp = ROT °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27 Jun2006)

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite
Green Bay, WI 543

Pace Analytical™

Sample Condition Upon Receipt

408 7221
Client Name: OMNNI Project # 4085688 Lab

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other
Tracking #:
Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no
Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no
Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other
Thermometer Used N/A Type of Ice: (Wet) Blue Dry None Samples on ice, cooling process has begun
Cooler Temperature Uncorr: ROI /Corr: Biological Tissue is Frozen: ☐ yes ☐ no
Temp Blank Present: ☐ yes ☒ no

Person examining contents:
Date: 9-30-13
Initials: SD

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. Pg 1 of COC - No collect time 9-30-13 SD
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☒Yes ☐No ☐N/A	6. Fecal 9-30-13 SKW
Rush Turn Around Time Requested:	☒Yes ☐No ☐N/A	7. 10-2-13 9/30/13 SD
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☐Yes ☒No ☐N/A	12. all samples matched by ID + Collect date only! No collect time match 9-30-13 SD
-Includes date/time/ID/Analysis Matrix:	S + W	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☒Yes ☐No ☐N/A	13. ☐ HNO3 ☒ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 <2; NaOH+ZnAct ≥9, NaOH ≥12)	☒Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☒No	Initial when completed SKW / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	14.
Trip Blank Present:	☐Yes ☐No ☒N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: ☐ If checked, see attached form for additional comments
Person Contacted: Date/Time:
Comments/ Resolution:

Project Manager Review: Date: 9-30-13

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www.pacelabs.com

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MN: 612-607-1700 WI: 920-469-2436

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MAT ✓

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	LEO FRIGO MEMORIAL BRIDGE
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1 N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	FILTERED? (YES/NO)	PRESERVATION (CODE)*	Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL PHOSPHORUS	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Fe,Mn,Na,S IRON	Fecal Coliform	Conductivity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					Y/N			N	N	N	N	N						
					Pick Letter			A	A	C	A	I						
001	TP15S-1	9/26/13	10:09	S				X	X									
002	TP15S-3		10:24	S				X	X									
003	TP15S-1W		10:35	GW						X	X	X	X		6X			
004	TP13S-1W		12:33	GW						X	X	X	X		6X		① Added per TB 9-30-13	
005	TP13S-1		12:35	S				X	X									
006	TP13S-3		12:50	S				X	X									
007	TP11S-1		13:58	S				X	X	40	72	21	011		Ref for Cl *			
008	TP11S-2		14:15	S				X	X									
009	TP19S-1		15:41	S				X	X									
010	TP19S-2		15:48	S				X	X	40	72	21	007		RE for Cl per BW LW 10/24/13 *			
011	TP19S-2W		15:46	W						X	X	X	X	X	6X			
012	TP19S-4		15:52	S				X	X									
013	TP19S-5		16:01	S				X	X									

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/28/13 6:30pm	JM	9/28/13 18:50

PACE Project No.: 4085673 LW

Receipt Temp = °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

UOM221
4085673 LW

Pace Analytical®
www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of 2

4087221
4085673 LW

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141
CLIENT COMMENTS	LAB COMMENTS (Lab Use Only) / Profile #

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, Si = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO)	PRESERVATION (CODE)*	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity			
					Y/N	Pick Letter	N	N	N	N	N				
							A	A	C	A	i				
014	TP11S-ZW	9/20/13	14:25	GW			X	X	X	X	X	0 X			
015	MW16S-W	"	17:48	"			X	X	X	X	X	X			
016	MW18S-W	"	17:09	"			X	X	X	X	X	X			

(Rush) Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	9/20/13 6:36pm	Jim Wirk	9/24/13 18:50

PACE Project No.

Receipt Temp = °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services, I
1241 Bellevue Street, Suit
Green Bay, WI 54

Pace Analytical™

Sample Condition Upon Receipt

4087221

Client Name: Omni Assoc. Project # 408673 LKW

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☐ no Seals intact: ☑ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☐ no Seals intact: ☑ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____

Thermometer Used SR-45 Type of Ice: (Wet) Blue Dry None ☐ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 4.0 /Corr: Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: Dan W. 9/26/13
Initials: DAW

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
– VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No ☐N/A	6. Fecal / Ferrous Iron
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 9/30/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☐N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics. OTHER:	☐Yes ☐No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):	—	

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: 9-30-13

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www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)

Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	LEO FRIGO MEMORIAL BRIDGE
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	408567
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	Chloride, Fluoride, Sulfate, Bromide, pH	TOTAL PHOSPHORUS	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Fecal Coliform	Conductivity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	FILTERED? (YES/NO)				Y/N			N	N	N	N	N				
	PRESERVATION (CODE)*				Pick Letter			A	A	C	A	I				
001	TP22S-1	9/29/13	10:05	S		X	X								1-402p^A 1-402ag^A	
002	TP22S-2		10:08	S		X	X	40	Y7221-014				RE for SO4 PM BW 10/24/13			
003	TP22S-3		10:40	S		X	X									
004	TP22S-4		14:10	S		X	X									
005	TP22S-5		13:50	S		X	X							⊙ Add per TG 9-30-13 BG		
006	TP24S-1		14:50	S		X	X									
007	TP24S-2		14:50	S		X	X									
008	TP24S-3		14:55	S		X	X									
009	TP24S-5		15:40	S		X	X									
010	TP24S-6		15:15	S		X	X									
011	MW23N-W		16:02	GW				X	X	X	X	X	⊙ X		1-Sterile 4-250ml^3AC	
012	MW25S-W		16:57	GW				X	X	X	X	X	⊙ X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 9/30/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwaynere@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	9/29/13 5:48pm	Alle Ko	9/29/13 1748

PACE Project No. 40856744

Receipt Temp = RJ °C

Sample Receipt pH (OK) / Adjusted

Cooler Custody Seal Present / Not Present

Intact / Not Intact

Version 6.0 06/14/06

ORIGINAL

C019a(27Jun2006)

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services,
1241 Bellevue Street, Suit
Green Bay, WI 543

Pace Analytical™

Sample Condition Upon Receipt

4087221 LW

Client Name: Omni Project # 4085674

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other

Thermometer Used NA Type of Ice: Wet Blue Dry None ☐ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: 2.01 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☐ no

Person examining contents:
Date: 9/29/13
Initials:

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 9/30/13 9/29/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:	WS	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☑ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

If checked, see attached form for additional comments

Client Notification/ Resolution:

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 9-30-13

F-GB-C-031-Rev.01 (01Mar2012) SCUR Form

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www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of 1

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13/0006
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	
Invoice To Phone:	

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air; B = Biota; C = Charcoal; O = Oil; S = Soil; SI = Sludge; W = Water; DW = Drinking Water; GW = Ground Water; SW = Surface Water; WW = Waste Water; WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Sulfate / Chloride	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP19NE-1	10/2/13	10:02	S	X		2-40zp^A	
002	TP25NE-5		8:45		X			
003	TP19NE-2		10:20		X			
004	TP19NE-3		10:27		X		40873221-006 Re for Cl	
005	TP19NE-4		11:10		X			
006	TP13NE-1		13:06		X		40873221-005 RE for SO4 added per BW 10/24/13 LW	
007	TP13NE-2		13:10		X			
008	TP13NE-3		13:22		X			
009	TP13NR-4		14:48		X			
010	TP13NR-5		16:05		X			
011	TP5NE-1		17:04		X			
012	TP13NE-6		17:54		X			
013	TP13NE-7		17:56		X		40873221 LW	

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48hours

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner2@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/2/13 18:35		10/2/13 1835

PACE Project No.: 40873221

Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27-Jun2006)

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical
1241 Bellevue Street, Suite
Green Bay, WI 5430

Sample Condition Upon Receipt

40871201
Project # 40860632 LM

Client Name: Omnni

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other
Tracking #:
Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no
Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no
Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other
Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun
Cooler Temperature Uncorr: /Corr: RO Biological Tissue is Frozen: ☐ yes ☐ no
Temp Blank Present: ☐ yes ☒ no

Person examining contents:
Date: 10/12/13
Initials:

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☐Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr 10/12/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☐Yes ☑No ☐N/A	12. no times on labels. 10/12/13
-Includes date/time/ID/Analysis Matrix:	TS	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

If checked, see attached form for additional comments ☐

Client Notification/ Resolution:
Person Contacted: Date/Time:
Comments/ Resolution:

Project Manager Review: Date: 10-14-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical®
www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463A13
Project Name:	Leo Frigo Memorial Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI ASSOCIATES
Invoice To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Phone:	920/830-6141

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

FILTERED? (YES/NO) — Y/N
PRESERVATION (CODE)* — Pick Letter

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: Chloride, Fluoride, Sulfate, Bromide, pH	Total Phosphorus	Chloride, Fluoride, Sulfate, Bromide, pH	Alkalinity	Total Phosphorus	Ferrous Iron	Conductivity	Acidity	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
							N	N	N	N					
					A	A	A	A	C	A					
001	TP22N-1	10/1/13	8:50	S	X	X	40	8	7221	-002	RE	X	SO4 ①	1-4ozP^A, 1-4ozAG^A	
002	TP22N-W		11:35	GW			X	X	X	X	X	X		4-250mL P^AAADC	
003	TP22N-2		9:45	S	X	X	408	7221	-013		RE	X	SO4 ①	1-4ozP^A, 1-4ozAG^A	
004	TP22N-3		9:48	S	X	X						X			
005	TP22N-4		9:50	S	X	X						X			
006	TP22SW-1		12:05	S	X	X	408	7221	-016		RE	X	SO4 ①		
007	TP22SW-2		12:15	S	X	X						X			
008	TP22SW-3		12:20	S	X	X						X			

per BW LW 10/24/13

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/4/13

Transmit Prelim Rush Results by (complete what you want):
Email #1: bwayner@omni.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/1/13 17:18	[illegible]	10/1/13 1718
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

PACE Project No. 40[illegible]
Receipt Temp = R01 °C
Sample Receipt pH: (OK) Adjusted
Cooler Custody Seal: Present / Not Present; Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

Pace Analytical Service
1241 Bellevue Street, S
Green Bay, WI

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Associates Project # 4087221 4087275 LW

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other poly bag

Thermometer Used NA Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: R01 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10-1-13
Initials: BF

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12. no times on samples. 10-1-13 BF
-Includes date/time/ID/Analysis Matrix:		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☑Yes ☐No ☐N/A	13. ☐ HNO3 ☑ H2SO4 ☐ NaOH ☐ NaOH +ZnAc
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☐No	Initial when completed BF / Lab Std #ID of preservative / Date/Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

If checked, see attached form for additional comment

Client Notification/ Resolution:
Person Contacted: Date/Time:
Comments/ Resolution:

Project Manager Review: BF Date: 10-2-13

Page 1 of 1

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

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www.pacelabs.com

CHAIN OF CUSTODY

Quote #:

(Please Print Clearly)			
Company Name:	OMNNI ASSOCIATES	Mail To Contact:	BRIAN WAYNICK
Branch/Location:	APPLETON, WI	Mail To Company:	OMNNI ASSOCIATES
Project Contact:	BRIAN WAYNICK	Mail To Address:	1N. SYSTEMS DRIVE APPLETON WI 54914
Phone:	920/830-6341		
Project Number:	T14G3A13/CCCC	Invoice To Contact:	BRIAN WAYNICK
Project Name:	Leo Frigo Memorial Bridge	Invoice To Company:	OMNNI
Project State:	WI	Invoice To Address:	
Sampled By (Print):	BRIAN WAYNICK		
Sampled By (Sign):	Brian D. Waynick	Invoice To Phone:	
PO #:		Regulatory Program:	

*Preservation Codes: A=None, B=HCL, C=H2SO4, D=HNO3, E=DI Water, F=Methanol, G=NaOH, H=Sodium Bisulfate Solution, I=Sodium Thiosulfate, J=Other

Data Package Options (billable): ☐ EPA Level III ☐ EPA Level IV

MS/MSD (billable): ☐ On your sample ☐ NOT needed on your sample

Matrix Codes: A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO)	PRESERVATION (CODE)*	Analyses Requested: Pick Letter	Y/N	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	TP25N1W-1	10/13/13	11:35	S			A	-			
002	TP21N1W-1	10/13/13	14:00					X		2-40ml's	
003	TP19N1W-1		17:25					X			
004	TP19N1W-2		17:35					X			

Analyses Requested: Pick Letter A = Sucrose Chloride; Y/N: X; CLIENT COMMENTS: 4987221-017 RECEIVED 10/17/13 per BW

Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge)
Date Needed: 48hrs

Transmit Prelim Rush Results by (complete what you want):
Email #1: brianp@omnnicorp.com
Email #2:
Telephone:
Fax:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Waynick	10/13/13 18:18		

Receipt Temp = 20.1 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal Present / Not Present
Intact / Not Intact

PACE Project No. 4987221

Version 6.0 08/14/06

C019a(27-Jun2006)

ORIGINAL

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

L1087221

Client Name: Omni Associates Project # 40866033 WO#

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used N/A Type of Ice: (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: /Corr: 2.0 Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 10/13/13
Initials: [illegible]

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 48 hr data 10/13/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: date 10/13/13	☑Yes ☐No ☐N/A	12. no collection times on labels. date 10/13/13
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/ Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 10-14-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Page 35 of 35

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

October 28, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 24, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

CERTIFICATIONS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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(920)469-2436

SAMPLE SUMMARY

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4087261001	MW31	Water	10/22/13 09:35	10/24/13 13:20
4087261002	MW33	Water	10/22/13 09:22	10/24/13 13:20
4087261003	MW35	Water	10/22/13 09:11	10/24/13 13:20
4087261004	MW37	Water	10/22/13 08:57	10/24/13 13:20
4087261005	MW39	Water	10/22/13 08:44	10/24/13 13:20

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SAMPLE ANALYTE COUNT

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4087261001	MW31	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087261002	MW33	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087261003	MW35	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087261004	MW37	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087261005	MW39	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Sample: MW31 **Lab ID: 4087261001** Collected: 10/22/13 09:35 Received: 10/24/13 13:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**88600**	umhos/cm	100	11.0	10		10/24/13 17:08		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<20.0**	mg/L	40.0	20.0	1		10/27/13 12:14		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**449**	mg/L	10.0	0.63	1		10/26/13 14:47		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**27100**	mg/L	8000	4000	2000		10/25/13 10:52	16887-00-6	
Sulfate	**2140**	mg/L	2000	1000	500		10/25/13 12:53	14808-79-8	

Sample: MW33 **Lab ID: 4087261002** Collected: 10/22/13 09:22 Received: 10/24/13 13:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**68700**	umhos/cm	100	11.0	10		10/24/13 17:14		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<10.0**	mg/L	20.0	10.0	1		10/27/13 12:20		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**265**	mg/L	10.0	0.63	1		10/26/13 20:02		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**20400**	mg/L	4000	2000	1000		10/25/13 11:25	16887-00-6	
Sulfate	**1390**	mg/L	800	400	200		10/25/13 13:28	14808-79-8	

Sample: MW35 **Lab ID: 4087261003** Collected: 10/22/13 09:11 Received: 10/24/13 13:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**34700**	umhos/cm	100	11.0	10		10/24/13 17:15		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<10.0**	mg/L	20.0	10.0	1		10/27/13 12:27		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**142**	mg/L	10.0	0.63	1		10/26/13 20:14		

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Sample: MW35 **Lab ID: 4087261003** Collected: 10/22/13 09:11 Received: 10/24/13 13:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**10400**	mg/L	2000	1000	500		10/25/13 11:36	16887-00-6	
Sulfate	**685**	mg/L	400	200	100		10/25/13 13:39	14808-79-8	

Sample: MW37 **Lab ID: 4087261004** Collected: 10/22/13 08:57 Received: 10/24/13 13:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**59900**	umhos/cm	100	11.0	10		10/24/13 17:17		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<10.0**	mg/L	20.0	10.0	1		10/27/13 12:36		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**257**	mg/L	10.0	0.63	1		10/26/13 20:23		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**18300**	mg/L	4000	2000	1000		10/25/13 11:47	16887-00-6	
Sulfate	**901**	mg/L	800	400	200		10/25/13 13:50	14808-79-8	

Sample: MW39 **Lab ID: 4087261005** Collected: 10/22/13 08:44 Received: 10/24/13 13:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**33400**	umhos/cm	100	11.0	10		10/24/13 17:18		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<20.0**	mg/L	40.0	20.0	1		10/27/13 12:43		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**453**	mg/L	10.0	0.63	1		10/26/13 20:36		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**9810**	mg/L	2000	1000	500		10/25/13 11:58	16887-00-6	
Sulfate	**592**	mg/L	400	200	100		10/25/13 14:01	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

QC Batch: WET/16724 Analysis Method: EPA 120.1
QC Batch Method: EPA 120.1 Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

METHOD BLANK: 881806 Matrix: Water
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	10/24/13 16:55	

LABORATORY CONTROL SAMPLE: 881807

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	637	655	103	80-120	

SAMPLE DUPLICATE: 881808

Parameter	Units	4087261001 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	88600	87800	1	20	

REPORT OF LABORATORY ANALYSIS

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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

QC Batch: WET/16748 Analysis Method: SM 2310B
QC Batch Method: SM 2310B Analysis Description: 2310B Acidity, Total
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

METHOD BLANK: 883295 Matrix: Water
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acidity, Total	mg/L	11.5J	20.0	10/27/13 12:02	

LABORATORY CONTROL SAMPLE: 883296

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total	mg/L	221	200	90	80-120	

SAMPLE DUPLICATE: 883297

Parameter	Units	4087261003 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total	mg/L	<10.0	<10.0		20	

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

QC Batch: WET/16744 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

METHOD BLANK: 883284 Matrix: Water
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/26/13 14:35	

LABORATORY CONTROL SAMPLE: 883285

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	200	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 883286 883287

Parameter	Units	4087261001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	449	200	200	642	638	96	94	80-120	1	20	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

QC Batch: WETA/20251 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

METHOD BLANK: 881657 Matrix: Water
Associated Lab Samples: 4087261001, 4087261002, 4087261003, 4087261004, 4087261005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<2.0	4.0	10/25/13 10:30	
Sulfate	mg/L	<2.0	4.0	10/25/13 10:30	

LABORATORY CONTROL SAMPLE: 881658

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	19.3	96	90-110	
Sulfate	mg/L	20	19.7	98	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 881659 881660

Parameter	Units	4087261001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	27100	40000	40000	67200	66400	100	98	90-110	1	20	
Sulfate	mg/L	2140	10000	10000	11500	11700	94	95	90-110	1	20	

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QUALIFIERS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087261

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4087261001	MW31	EPA 120.1	WET/16724		
4087261002	MW33	EPA 120.1	WET/16724		
4087261003	MW35	EPA 120.1	WET/16724		
4087261004	MW37	EPA 120.1	WET/16724		
4087261005	MW39	EPA 120.1	WET/16724		
4087261001	MW31	SM 2310B	WET/16748		
4087261002	MW33	SM 2310B	WET/16748		
4087261003	MW35	SM 2310B	WET/16748		
4087261004	MW37	SM 2310B	WET/16748		
4087261005	MW39	SM 2310B	WET/16748		
4087261001	MW31	SM 2320B	WET/16744		
4087261002	MW33	SM 2320B	WET/16744		
4087261003	MW35	SM 2320B	WET/16744		
4087261004	MW37	SM 2320B	WET/16744		
4087261005	MW39	SM 2320B	WET/16744		
4087261001	MW31	EPA 300.0	WETA/20251		
4087261002	MW33	EPA 300.0	WETA/20251		
4087261003	MW35	EPA 300.0	WETA/20251		
4087261004	MW37	EPA 300.0	WETA/20251		
4087261005	MW39	EPA 300.0	WETA/20251		

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WO# : 4087261

4087261

CHAIN OF CUSTODY

PPER MIDWEST REGION
N: 612-607-1700 WI: 920-469-2436

JCJ

Page 1 of 1

4087261

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463B13
Project Name:	Leo Frigo Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes

A = Air	W = Water
B = Biota	DW = Drinking Water
C = Charcoal	GW = Ground Water
O = Oil	SW = Surface Water
S = Soil	WW = Waste Water
Sl = Sludge	WP = Wipe

***Preservation Codes**

A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Chloride, Sulfate	Alkalinity	Acidity	Specific Conductance	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW31	10/22/13	9:35	GW	N	A	X	X	X	X		1-250mL pA	
002	MW33		9:22		N	A	X	X	X	X			
003	MW35		9:11		N	A	X	X	X	X			
004	MW37		8:57		N	A	X	X	X	X			
005	MW39		8:44		N	A	X	X	X	X			

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	SAME
Invoice To Phone:	

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 10/28/13

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/24/13 9:10	Pace GB	10/24/13 0910
Pace GB	10/24/13 1320	Pace GB	10/24/13 1320

PACE Project No.: 40872261

Receipt Temp = R01 °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal: Present / (Not Present) Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical™

Sample Condition Upon Receipt

Client Name: Omni Associates Project # 40272601

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☑ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other Ziploc

Thermometer Used N/A **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: R01 /Corr: **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents: Date: 10/24/13 Initials: MH

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. 10/28/13 mH 10/24/13
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☑No ☐N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix:	W	
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics. OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 10/24/13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

November 02, 2013

Brian Wayner
Omnni Associates, Inc.
One Systems Drive
Appleton, WI 549141654

RE: Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Dear Brian Wayner:
Enclosed are the analytical results for sample(s) received by the laboratory on October 29, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4087502001	MW2	Water	10/22/13 10:04	10/29/13 12:40
4087502002	MW4	Water	10/22/13 10:12	10/29/13 12:40
4087502003	MW6	Water	10/22/13 10:21	10/29/13 12:40
4087502004	MW8	Water	10/22/13 10:34	10/29/13 12:40
4087502005	MW9	Water	10/22/13 10:47	10/29/13 12:40
4087502006	MW10	Water	10/22/13 10:56	10/29/13 12:40
4087502007	MW12	Water	10/22/13 11:15	10/29/13 12:40
4087502008	MW14	Water	10/22/13 11:23	10/29/13 12:40
4087502009	MW16S	Water	10/22/13 11:33	10/29/13 12:40
4087502010	MW18S	Water	10/22/13 11:43	10/29/13 12:40
4087502011	MW20	Water	10/22/13 12:51	10/29/13 12:40
4087502012	MW22N	Water	10/22/13 12:20	10/29/13 12:40
4087502013	MW23N	Water	10/22/13 12:35	10/29/13 12:40
4087502014	MW25S	Water	10/22/13 12:42	10/29/13 12:40
4087502015	MW41	Water	10/22/13 08:32	10/29/13 12:40
4087502016	MW43	Water	10/22/13 08:15	10/29/13 12:40
4087502017	MW45	Water	10/22/13 08:06	10/29/13 12:40
4087502018	MW47	Water	10/22/13 07:54	10/29/13 12:40
4087502019	MW49	Water	10/22/13 07:43	10/29/13 12:40
4087502020	MW51	Water	10/22/13 07:28	10/29/13 12:40

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SAMPLE ANALYTE COUNT

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4087502001	MW2	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502002	MW4	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502003	MW6	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502004	MW8	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502005	MW9	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502006	MW10	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502007	MW12	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502008	MW14	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502009	MW16S	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502010	MW18S	EPA 120.1	DEY	1

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SAMPLE ANALYTE COUNT

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502011	MW20	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502012	MW22N	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502013	MW23N	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502014	MW25S	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502015	MW41	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502016	MW43	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502017	MW45	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502018	MW47	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502019	MW49	EPA 120.1	DEY	1
		SM 2310B	HKV	1

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SAMPLE ANALYTE COUNT

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2
4087502020	MW51	EPA 120.1	DEY	1
		SM 2310B	HKV	1
		SM 2320B	HKV	1
		EPA 300.0	JCJ	2

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW2 **Lab ID: 4087502001** Collected: 10/22/13 10:04 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**8800**	umhos/cm	10.0	1.1	1		10/30/13 10:12		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 14:45		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**218**	mg/L	10.0	0.63	1		10/30/13 10:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2760**	mg/L	400	200	100		10/29/13 21:08	16887-00-6	
Sulfate	**680**	mg/L	200	100	50		10/29/13 16:54	14808-79-8	

Sample: MW4 **Lab ID: 4087502002** Collected: 10/22/13 10:12 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**3120**	umhos/cm	10.0	1.1	1		10/30/13 10:15		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 14:49		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**154**	mg/L	10.0	0.63	1		10/30/13 13:44		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**800**	mg/L	200	100	50		10/29/13 17:19	16887-00-6	
Sulfate	**331**	mg/L	200	100	50		10/29/13 17:19	14808-79-8	

Sample: MW6 **Lab ID: 4087502003** Collected: 10/22/13 10:21 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**1400**	umhos/cm	10.0	1.1	1		10/30/13 10:15		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 14:52		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**304**	mg/L	10.0	0.63	1		10/30/13 13:52		

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW6 **Lab ID: 4087502003** Collected: 10/22/13 10:21 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**116**	mg/L	80.0	40.0	20		10/29/13 21:49	16887-00-6	
Sulfate	**377**	mg/L	200	100	50		10/29/13 17:43	14808-79-8	

Sample: MW8 **Lab ID: 4087502004** Collected: 10/22/13 10:34 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**2760**	umhos/cm	10.0	1.1	1		10/30/13 10:17		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 14:55		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**235**	mg/L	10.0	0.63	1		10/30/13 14:39		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**722**	mg/L	200	100	50		10/29/13 17:52	16887-00-6	
Sulfate	**106**	mg/L	40.0	20.0	10		10/29/13 21:57	14808-79-8	

Sample: MW9 **Lab ID: 4087502005** Collected: 10/22/13 10:47 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**1330**	umhos/cm	10.0	1.1	1		10/30/13 10:22		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:00		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**516**	mg/L	10.0	0.63	1		10/30/13 14:49		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**88.4**	mg/L	40.0	20.0	10		10/29/13 22:05	16887-00-6	
Sulfate	**391**	mg/L	200	100	50		10/29/13 18:16	14808-79-8	

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW10 **Lab ID: 4087502006** Collected: 10/22/13 10:56 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**869**	umhos/cm	10.0	1.1	1		10/30/13 10:27		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:03		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**49.8**	mg/L	10.0	0.63	1		10/30/13 17:29		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**56.1**	mg/L	40.0	20.0	10		10/29/13 22:13	16887-00-6	
Sulfate	**326**	mg/L	200	100	50		10/29/13 18:24	14808-79-8	

Sample: MW12 **Lab ID: 4087502007** Collected: 10/22/13 11:15 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**11500**	umhos/cm	20.0	2.2	2		10/30/13 10:32		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:10		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**592**	mg/L	10.0	0.63	1		10/30/13 18:32		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3650**	mg/L	400	200	100		10/29/13 22:22	16887-00-6	
Sulfate	**92.7**	mg/L	40.0	20.0	10		10/30/13 10:27	14808-79-8	

Sample: MW14 **Lab ID: 4087502008** Collected: 10/22/13 11:23 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4570**	umhos/cm	10.0	1.1	1		10/30/13 10:36		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:28		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1200**	mg/L	10.0	0.63	1		11/01/13 15:36		

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW14 **Lab ID: 4087502008** Collected: 10/22/13 11:23 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**838**	mg/L	200	100	50		10/29/13 18:41	16887-00-6	
Sulfate	**84.4**	mg/L	20.0	10.0	5		10/30/13 10:35	14808-79-8	

Sample: MW16S **Lab ID: 4087502009** Collected: 10/22/13 11:33 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**9540**	umhos/cm	10.0	1.1	1		10/30/13 10:37		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:34		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**791**	mg/L	10.0	0.63	1		10/30/13 20:56		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2900**	mg/L	400	200	100		10/29/13 22:46	16887-00-6	
Sulfate	**13.1J**	mg/L	20.0	10.0	5		10/30/13 10:43	14808-79-8	D3

Sample: MW18S **Lab ID: 4087502010** Collected: 10/22/13 11:43 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4980**	umhos/cm	10.0	1.1	1		10/30/13 10:38		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:39		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**924**	mg/L	10.0	0.63	1		10/30/13 22:41		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1060**	mg/L	200	100	50		10/29/13 18:57	16887-00-6	
Sulfate	**80.9**	mg/L	40.0	20.0	10		10/29/13 23:19	14808-79-8	

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW20 **Lab ID: 4087502011** Collected: 10/22/13 12:51 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**6110**	umhos/cm	10.0	1.1	1		10/30/13 10:40		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:43		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**958**	mg/L	10.0	0.63	1		10/31/13 02:06		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1440**	mg/L	200	100	50		10/29/13 19:05	16887-00-6	
Sulfate	**235**	mg/L	200	100	50		10/29/13 19:05	14808-79-8	

Sample: MW22N **Lab ID: 4087502012** Collected: 10/22/13 12:20 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**7440**	umhos/cm	10.0	1.1	1		10/30/13 10:42		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:48		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**1030**	mg/L	10.0	0.63	1		11/01/13 19:08		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1390**	mg/L	200	100	50		10/29/13 19:13	16887-00-6	
Sulfate	**1600**	mg/L	200	100	50		10/29/13 19:13	14808-79-8	

Sample: MW23N **Lab ID: 4087502013** Collected: 10/22/13 12:35 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5840**	umhos/cm	10.0	1.1	1		10/30/13 10:45		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:52		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**634**	mg/L	10.0	0.63	1		10/31/13 08:38		

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW23N **Lab ID: 4087502013** Collected: 10/22/13 12:35 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1540**	mg/L	200	100	50		10/29/13 19:22	16887-00-6	
Sulfate	**22.7**	mg/L	20.0	10.0	5		10/29/13 23:27	14808-79-8	

Sample: MW25S **Lab ID: 4087502014** Collected: 10/22/13 12:42 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**6540**	umhos/cm	10.0	1.1	1		10/30/13 10:46		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 15:56		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**967**	mg/L	10.0	0.63	1		11/01/13 20:03		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1130**	mg/L	200	100	50		10/29/13 19:30	16887-00-6	
Sulfate	**1030**	mg/L	200	100	50		10/29/13 19:30	14808-79-8	

Sample: MW41 **Lab ID: 4087502015** Collected: 10/22/13 08:32 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**7630**	umhos/cm	10.0	1.1	1		10/30/13 10:47		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 16:01		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**136**	mg/L	10.0	0.63	1		11/01/13 06:15		M0,R1
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2460**	mg/L	200	100	50		10/29/13 19:54	16887-00-6	
Sulfate	**275**	mg/L	200	100	50		10/29/13 19:54	14808-79-8	

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW43 **Lab ID: 4087502016** Collected: 10/22/13 08:15 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**5810**	umhos/cm	10.0	1.1	1		10/30/13 10:49		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 16:04		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**3310**	mg/L	40.0	2.5	1		11/01/13 11:42		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1470**	mg/L	200	100	50		10/29/13 20:03	16887-00-6	
Sulfate	**59.3**	mg/L	40.0	20.0	10		10/29/13 23:35	14808-79-8	

Sample: MW45 **Lab ID: 4087502017** Collected: 10/22/13 08:06 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**7280**	umhos/cm	10.0	1.1	1		10/30/13 10:50		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 16:09		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**2940**	mg/L	40.0	2.5	1		11/01/13 12:18		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2080**	mg/L	200	100	50		10/29/13 20:11	16887-00-6	
Sulfate	**222**	mg/L	200	100	50		10/29/13 20:11	14808-79-8	

Sample: MW47 **Lab ID: 4087502018** Collected: 10/22/13 07:54 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**4720**	umhos/cm	10.0	1.1	1		10/30/13 10:51		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 16:25		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**2570**	mg/L	40.0	2.5	1		11/01/13 12:39		

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ANALYTICAL RESULTS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Sample: MW47 **Lab ID: 4087502018** Collected: 10/22/13 07:54 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1150**	mg/L	200	100	50		10/29/13 20:19	16887-00-6	
Sulfate	**255**	mg/L	200	100	50		10/29/13 20:19	14808-79-8	

Sample: MW49 **Lab ID: 4087502019** Collected: 10/22/13 07:43 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**3020**	umhos/cm	10.0	1.1	1		10/30/13 10:52		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 16:29		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**2410**	mg/L	40.0	2.5	1		11/01/13 13:15		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**532**	mg/L	200	100	50		10/29/13 20:27	16887-00-6	
Sulfate	**375**	mg/L	200	100	50		10/29/13 20:27	14808-79-8	

Sample: MW51 **Lab ID: 4087502020** Collected: 10/22/13 07:28 Received: 10/29/13 12:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
120.1 Specific Conductance	Analytical Method: EPA 120.1								
Specific Conductance	**17400**	umhos/cm	20.0	2.2	2		10/30/13 10:57		
2310B Acidity, Total	Analytical Method: SM 2310B								
Acidity, Total	**<40.0**	mg/L	80.0	40.0	1		10/31/13 16:33		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**3240**	mg/L	40.0	2.5	1		11/01/13 13:53		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5680**	mg/L	800	400	200		10/29/13 23:43	16887-00-6	
Sulfate	**146**	mg/L	80.0	40.0	20		10/29/13 23:51	14808-79-8	

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QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

QC Batch: WET/16780 Analysis Method: EPA 120.1
QC Batch Method: EPA 120.1 Analysis Description: 120.1 Specific Conductance
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502008, 4087502009, 4087502010, 4087502011, 4087502012, 4087502013, 4087502014, 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

METHOD BLANK: 884651 Matrix: Water
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502008, 4087502009, 4087502010, 4087502011, 4087502012, 4087502013, 4087502014, 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	<1.1	10.0	10/30/13 10:08	

LABORATORY CONTROL SAMPLE: 884652

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	637	615	97	80-120	

SAMPLE DUPLICATE: 884653

Parameter	Units	4087502001 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	8800	8730	1	20	

SAMPLE DUPLICATE: 884654

Parameter	Units	4087502011 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	6110	6130	0	20	

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QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

QC Batch: WET/16802 Analysis Method: SM 2310B
QC Batch Method: SM 2310B Analysis Description: 2310B Acidity, Total
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502008, 4087502009, 4087502010, 4087502011, 4087502012, 4087502013, 4087502014, 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

METHOD BLANK: 885840 Matrix: Water
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502008, 4087502009, 4087502010, 4087502011, 4087502012, 4087502013, 4087502014, 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Acidity, Total	mg/L	12.1J	20.0	10/31/13 14:33	

LABORATORY CONTROL SAMPLE: 885841

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total	mg/L	226	197	87	80-120	

SAMPLE DUPLICATE: 885842

Parameter	Units	4087502006 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total	mg/L	<40.0	<40.0		20	B

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QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

QC Batch: WET/16782 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502009, 4087502010, 4087502011, 4087502013

METHOD BLANK: 884676 Matrix: Water
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502009, 4087502010, 4087502011, 4087502013

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/30/13 10:46	

LABORATORY CONTROL SAMPLE: 884677

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	203	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 884678 884679

Parameter	Units	4087502001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	218	200	200	414	409	98	96	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

QC Batch: WET/16795 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

METHOD BLANK: 885660 Matrix: Water
Associated Lab Samples: 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	10/31/13 17:49	

LABORATORY CONTROL SAMPLE: 885661

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	200	202	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 885662 885663

Parameter	Units	4087502015 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	136	200	200	314	252	89	58	80-120	22	20	M0,R1

REPORT OF LABORATORY ANALYSIS

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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

QC Batch: WET/16820 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 4087502008, 4087502012, 4087502014

METHOD BLANK: 887176 Matrix: Water
Associated Lab Samples: 4087502008, 4087502012, 4087502014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<0.63	10.0	11/01/13 15:27	

LABORATORY CONTROL SAMPLE: 887177

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	501	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 887178 887179

Parameter	Units	4087502008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	1200	500	500	1660	1640	92	88	80-120	1	20	

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QUALITY CONTROL DATA

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

QC Batch: WETA/20325 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502008, 4087502009, 4087502010, 4087502011, 4087502012, 4087502013, 4087502014, 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

METHOD BLANK: 884436 Matrix: Water
Associated Lab Samples: 4087502001, 4087502002, 4087502003, 4087502004, 4087502005, 4087502006, 4087502007, 4087502008, 4087502009, 4087502010, 4087502011, 4087502012, 4087502013, 4087502014, 4087502015, 4087502016, 4087502017, 4087502018, 4087502019, 4087502020

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<2.0	4.0	10/29/13 16:38	
Sulfate	mg/L	<2.0	4.0	10/29/13 16:38	

LABORATORY CONTROL SAMPLE: 884437

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	19.5	98	90-110	
Sulfate	mg/L	20	19.5	98	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 884438 884439

Parameter	Units	4087502001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	2760	2000	2000	4900	4840	107	104	90-110	1	20	
Sulfate	mg/L	680	1000	1000	1770	1760	109	108	90-110	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 884440 884441

Parameter	Units	4087502002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	800	1000	1000	1830	1830	103	103	90-110	0	20	
Sulfate	mg/L	331	1000	1000	1340	1340	101	101	90-110	0	20	

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QUALIFIERS

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
R1	RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4087502001	MW2	EPA 120.1	WET/16780		
4087502002	MW4	EPA 120.1	WET/16780		
4087502003	MW6	EPA 120.1	WET/16780		
4087502004	MW8	EPA 120.1	WET/16780		
4087502005	MW9	EPA 120.1	WET/16780		
4087502006	MW10	EPA 120.1	WET/16780		
4087502007	MW12	EPA 120.1	WET/16780		
4087502008	MW14	EPA 120.1	WET/16780		
4087502009	MW16S	EPA 120.1	WET/16780		
4087502010	MW18S	EPA 120.1	WET/16780		
4087502011	MW20	EPA 120.1	WET/16780		
4087502012	MW22N	EPA 120.1	WET/16780		
4087502013	MW23N	EPA 120.1	WET/16780		
4087502014	MW25S	EPA 120.1	WET/16780		
4087502015	MW41	EPA 120.1	WET/16780		
4087502016	MW43	EPA 120.1	WET/16780		
4087502017	MW45	EPA 120.1	WET/16780		
4087502018	MW47	EPA 120.1	WET/16780		
4087502019	MW49	EPA 120.1	WET/16780		
4087502020	MW51	EPA 120.1	WET/16780		
4087502001	MW2	SM 2310B	WET/16802		
4087502002	MW4	SM 2310B	WET/16802		
4087502003	MW6	SM 2310B	WET/16802		
4087502004	MW8	SM 2310B	WET/16802		
4087502005	MW9	SM 2310B	WET/16802		
4087502006	MW10	SM 2310B	WET/16802		
4087502007	MW12	SM 2310B	WET/16802		
4087502008	MW14	SM 2310B	WET/16802		
4087502009	MW16S	SM 2310B	WET/16802		
4087502010	MW18S	SM 2310B	WET/16802		
4087502011	MW20	SM 2310B	WET/16802		
4087502012	MW22N	SM 2310B	WET/16802		
4087502013	MW23N	SM 2310B	WET/16802		
4087502014	MW25S	SM 2310B	WET/16802		
4087502015	MW41	SM 2310B	WET/16802		
4087502016	MW43	SM 2310B	WET/16802		
4087502017	MW45	SM 2310B	WET/16802		
4087502018	MW47	SM 2310B	WET/16802		
4087502019	MW49	SM 2310B	WET/16802		
4087502020	MW51	SM 2310B	WET/16802		
4087502001	MW2	SM 2320B	WET/16782		
4087502002	MW4	SM 2320B	WET/16782		
4087502003	MW6	SM 2320B	WET/16782		
4087502004	MW8	SM 2320B	WET/16782		
4087502005	MW9	SM 2320B	WET/16782		
4087502006	MW10	SM 2320B	WET/16782		
4087502007	MW12	SM 2320B	WET/16782		

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: T1463B13 LEO FRIGO BRIDGE
Pace Project No.: 4087502

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4087502008	MW14	SM 2320B	WET/16820		
4087502009	MW16S	SM 2320B	WET/16782		
4087502010	MW18S	SM 2320B	WET/16782		
4087502011	MW20	SM 2320B	WET/16782		
4087502012	MW22N	SM 2320B	WET/16820		
4087502013	MW23N	SM 2320B	WET/16782		
4087502014	MW25S	SM 2320B	WET/16820		
4087502015	MW41	SM 2320B	WET/16795		
4087502016	MW43	SM 2320B	WET/16795		
4087502017	MW45	SM 2320B	WET/16795		
4087502018	MW47	SM 2320B	WET/16795		
4087502019	MW49	SM 2320B	WET/16795		
4087502020	MW51	SM 2320B	WET/16795		
4087502001	MW2	EPA 300.0	WETA/20325		
4087502002	MW4	EPA 300.0	WETA/20325		
4087502003	MW6	EPA 300.0	WETA/20325		
4087502004	MW8	EPA 300.0	WETA/20325		
4087502005	MW9	EPA 300.0	WETA/20325		
4087502006	MW10	EPA 300.0	WETA/20325		
4087502007	MW12	EPA 300.0	WETA/20325		
4087502008	MW14	EPA 300.0	WETA/20325		
4087502009	MW16S	EPA 300.0	WETA/20325		
4087502010	MW18S	EPA 300.0	WETA/20325		
4087502011	MW20	EPA 300.0	WETA/20325		
4087502012	MW22N	EPA 300.0	WETA/20325		
4087502013	MW23N	EPA 300.0	WETA/20325		
4087502014	MW25S	EPA 300.0	WETA/20325		
4087502015	MW41	EPA 300.0	WETA/20325		
4087502016	MW43	EPA 300.0	WETA/20325		
4087502017	MW45	EPA 300.0	WETA/20325		
4087502018	MW47	EPA 300.0	WETA/20325		
4087502019	MW49	EPA 300.0	WETA/20325		
4087502020	MW51	EPA 300.0	WETA/20325		

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WO#: 4087502

4087502

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Vmft

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463B13
Project Name:	Leo Frigo Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	Brian D. Wayner
PO #:	Regulatory Program:

Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	IN. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	same
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SL = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Chloride, surface Alkalinity, Acidity	Analyses Requested: Specific conductance	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW2	10/22/13	10:04	GW	N	A	X	X		1-250mlp	A
002	MW4		10:12				X	X			
003	MW6		10:21				X	X			
004	MW8		10:34				X	X			
005	MW9		10:47				X	X			
006	MW10		10:56				X	X			
007	MW12		11:15				X	X			
008	MW14		11:23				X	X			
009	MW16S		11:37				X	X			
010	MW18S		11:43				X	X			
011	MW20		12:51				X	X			
012	MW22N		12:20				X	X			
013	MW23N		12:35				X	X	Chloride could be high		

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48 hours

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Brian D. Wayner	10/22/13 12:00	D. Mielke	10/23/13 12:00
D. Mielke	10/23/13 12:40	Susan K Wyle Pace	10/24/13 1240

PACE Project No. 4087502

Receipt Temp = ROT °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present

Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Baker

WISCONSIN DEPARTMENT OF TRANSPORTATION

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UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 2 of 2

4087502

Page 25 of 26

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

(Please Print Clearly)	
Company Name:	OMNNI ASSOCIATES
Branch/Location:	APPLETON, WI
Project Contact:	BRIAN WAYNER
Phone:	920/830-6141
Project Number:	T1463B13
Project Name:	Leo Frigo Bridge
Project State:	WI
Sampled By (Print):	BRIAN WAYNER
Sampled By (Sign):	B. D. Wayner
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	BRIAN WAYNER
Mail To Company:	OMNNI ASSOCIATES
Mail To Address:	1N. SYSTEMS DRIVE APPLETON, WI 54914
Invoice To Contact:	BRIAN WAYNER
Invoice To Company:	OMNNI
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, SI = Sludge, W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO)	PRESERVATION (CODE)*	Analyses Requested: Chloride, Sulfate, Alkalinity, Acidity	Analyses Requested: Specific Conductance	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					Y/N	Pick Letter	N	N			
							A	A			
014	MW25S	10/22/13	12:42	GW			X	X		1-250mlpA	
015	MW41		8:32				X	X			
016	MW43		8:15				X	X			
017	MW45		8:06				X	X			
018	MW47		7:54				X	X			
019	MW49		7:43				X	X			
020	MW51		7:28				X	X			

Chloride Sulfate Alkalinity

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed: 48 hours

Transmit Prelim Rush Results by (complete what you want):

Email #1:	bwayner@omnni.com
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
B. D. Wayner	10/29/13 12:00	D. Mielke	10/29/13 12:00
D. Mielke	10/29/13 12:40	Susan Kilpatrick	10/29/13 1240

PACE Project No.

Receipt Temp = 2.0 I °C

Sample Receipt pH OK / Adjusted

Cooler Custody Seal Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Analytical Services, Inc
1241 Bellevue Street, Suite
Green Bay, WI 5430

Pace Analytical™

Sample Condition Upon Receipt

Client Name: OMNNI ASSOC Project # 4087502

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☒ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other _____

Thermometer Used N/A **Type of Ice:** (Wet) Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROT /Corr: **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☐ no

Person examining contents:
Date: 10-24-13
Initials: SW

Temp should be above freezing to 6°C for all sample except Biota.
Frozen Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☑Yes ☐No ☐N/A	7. RUSH 48hr TAT 10/29/13 SW
Sufficient Volume:	☑Yes ☐No ☐N/A	8. 005 relieved approximately ½ full MH 10/29/13
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: 10/29/13 SW	☑Yes ☐No ☐N/A	12. All samples matched by ID only - 10/29/13 SW
-Includes date/time/ID/Analysis Matrix: W		
All containers needing preservation have been checked. (Non-Compliance noted in 13.)	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ NaOH +ZnAct
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4 ≤2; NaOH+ZnAct ≥9, NaOH ≥12)	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, TOX, TOH, O&G, WIDROW, Phenolics, OTHER:	☐Yes ☑No	Initial when completed / Lab Std #ID of preservative / Date/Time:
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☐No ☑N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 10-29-13

F-GB-C-031-Rev.01 (01Mar2013) SCUR Form

Standard Operating Procedure (SOP)
for
Pace

Pace Analytical Services, Inc.
1241 Bellevue Street Suite 9
Green Bay, WI 54302
Phone: 920 469-2436
Fax: 920 469-8827

STANDARD OPERATING PROCEDURE
Acidity By Radiometer
Reference Methods: SM 2310 B (4a), EPA 305.1

SOP NUMBER:	S-GB-I-072-Rev.02
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S-GB-I-072-Rev.01

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 09/19/13

Kate Grams, Laboratory Quality Manager — Date: 9/19/13

Chad Rusch, Department Manager — Date: 09/19/2013

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-I-072-REV.02

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1. PURPOSE

This procedure is used to measure acidity and dissolved acidity in water samples, which determines the buffering capacity of the water following Methods EPA 305.1 and Standard Method for the Examination of Water and Wastewater, online ed., 1997 2310 B (4a) .

2. SUMMARY OF METHOD

2.1 Acidity of water is its quantitative capacity to react with a strong base to a designated pH. Ideally, the acidity titration end point should correspond to the stoichiometric equivalence point for neutralization of acids present. Consequently, use fixed end point of 8.3 for standard acidity determinations via a potentiometric titration.

3. SCOPE AND APPLICATION

3.1 Personnel: The policies and procedures contained in this SOP are applicable to all personnel involved in the analytical method.

3.2 Parameters: This SOP applies to Acidity, Total. The method covers the range from approximately 10 mg/L acidity to approximately 1,000 mg/L as $CaCO_3$ using a 20-ml sample.

4. APPLICABLE MATRICES

4.1 This SOP is applicable to surface water, wastewater, sewage, and industrial wastes.

5. LIMITS OF DETECTION AND QUANTITATION

5.1 The reporting limit (PQL) of this method for Acidity is 20mg/L. All current MDLs are listed in the LIMs and are available by request from the Quality Department.

6. INTERFERENCES

6.1 Dissolved gases contributing to acidity or alkalinity, such as CO_2, hydrogen sulfide, or ammonia, may be lost or gained during storage to titration. Minimize such effects by titrating promptly after opening sample container, avoiding vigorous shaking. Do not remove interferences from sample because they contribute to the acidity.

6.2 Suspended matter or precipitates may slow electrode response. Allow a pause between titrant additions nearer to the endpoint.

7. SAMPLE COLLECTION, PRESERVATION, SHIPMENT AND STORAGE

7.1 Samples are collected in polyethylene or borosilicate glass. Dissolved acidity samples should be field filtered with a 0.45µm pore diameter filter in the field. The bottle is to be filled completely and capped tightly because samples may subject to microbial action and to loss or gain of CO_2 or other gases when exposed to air.

Table 1: Sample Collection, Preservation, Holdtime, Shipment, And Storage

Matrix	Method(s) EPA 305.1 SM 2310B	Container(s)	Preservation Hold Time	Shipment Conditions	Lab Storage Conditions
Aqueous	Acidity	250 mL plastic/glass containers	None / 14 days	On ice ≤6°C	≤6°C

8. DEFINITIONS

8.1 Definitions can be found in Section 10 of the most recent version of the Pace Analytical Services, Inc. Quality Manual.

9. EQUIPMENT AND SUPPLIES

9.1 Magnetic stirrer w/ PTFE-coated magnetic stir bars.

9.2 Disposable beakers

9.3 Pipettes, glass

9.4 Volumetric flasks, 100 mL, 500 mL, 1L, 2L class A

9.5 Analytical Balance

9.6 Oven, 250° C

9.7 PC with TitraMaster 85 Software by Radiometer

9.8 Radiometer TIM840 Titration Manager

9.9 Radiometer SAC850 Sample Changer

9.10 50 mL beakers with watchglass covers.

10. REAGENTS AND STANDARDS

10.1 Alternative equivalent standards and reagents may be used.

10.2 Purchased reagents or standards are recorded in the Standards Log in Epic Pro. All prepared standards or reagents are recorded in the Standards Log in Epic Pro. Each container must be labeled with a PASI ID#, date prepared or received, initials, and expiration date. Working reagents and standards are given an expiration date of one week unless otherwise noted by vendor or procedure. Purchased standards and reagents may be used until the expiration date from the vender. See Table 2 for information on ordering standards and reagents.

Table 2: Standards and Reagents

* - Boiled with H2O2 for approximately 5 min.

Standard/Reagent	Order Info	Manufacturer/Vendor
pH Buffer 1.679	S11M001	Radiometer
pH Buffer 4.005	S11M002	Radiometer
pH Buffer 7.000	S11M004	Radiometer
pH Buffer 10.012	S11M007	Radiometer
pH Buffer 2.00	SB96-1	Fisher Scientific
pH Buffer 7.00	SB107-4	Fisher Scientific
Potassium Hydrogen Phthalate (KHP)	P243-500	Fisher Scientific
Hydrogen Peroxide 30%	H325--4	Fisher Scientific
NaOH 0.02N	SS282-4	Fisher Scientific

10.2.1 Carbon dioxide free water: Prepare all stock and standard solutions and dilution water with distilled water that has been freshly boiled for at least 15 minutes and cooled to room temperature. The final pH of the water should be ≥ 6.0 and its conductivity should be < 2 µmhos/cm.

10.2.2 Primary Source Calibration Buffers – Ordered through HACH, pH 1.679 #S11M001, pH 4.005 #S11M002, pH 7.000 #S11M004, pH 10.012 #S11M007.

10.2.3 2.0 Secondary Source Buffer - Fisher catalog #SB96-1.

10.2.4 7.0 Secondary Source Buffer - Fisher catalog #SB107-4.

10.2.5 Potassium Hydrogen Phthalate (KHP) - Fisher catalog #P243-500. Used as a source for LCSs and Instrument QC such as CCVs and CRDLs. The KHP is also used to verify the Normality of the NaOH Titrant.

10.2.6 Standard sodium hydroxide (NaOH) titrant 0.02N - Purchase 0.02N sodium hydroxide - Fisher catalog #SS282-4.

10.2.6.1 Each Lot of NaOH is verified in-house to have a Normality of 0.02N NaOH prior to use for sample analysis.

10.2.6.2 Four 10 mL aliquots of 2,450 mg/L Acidity Stock Standard are titrated to a pH of 8.3 with 0.02N NaOH.

10.2.6.3 The Normality for each is calculated according to Section 14.1.

10.2.6.4 The average of the 4 titrations must be w/in 10% of the certified N on the container to use that N in calculations.

10.2.6.5 If a sodium hydroxide titrant container remains in use longer than one month from the date it is initially tested, then it must have the Normality verified monthly by standardization.

10.2.7 Hydrogen Peroxide, 30% - Purchase 30% Hydrogen Peroxide - Fisher catalog #H325-4.

10.2.8 Sulfuric Acid, 0.02N - Purchase 0.02N Sulfuric Acid - Fisher catalog #SA226-4.

10.2.8.1 The Normality must be verified prior to use and monthly by standardization.

10.2.9 Working Standards

10.2.9.1 2,450 mg/L Acidity Stock Standard made from KHP. 10.00g of dried (at least 2 hours at $\geq$ 120C) KHP diluted to 1,000 mL with CO_2 free water.

10.2.9.2 200 mg/L Continuing Calibration Verification (CCV) standard. Dilute 40.85 mL of 2450 mg/L Acidity Stock Standard to 500 mL.

10.2.9.3 20 mg/L Reporting Limit Standard (CRDL). Dilute 50 mL of 200 mg/L CCV to 500 mL.

10.2.10 See Table 3 for a summary of the standards and spike concentrations.

Table 3: Standard and Spike Concentrations

Standard/Spike	Acidity
CCV	200mg/L
LCS/LCSD	200mg/L
RLVS	20mg/L

11. CALIBRATION AND STANDARDIZATION (Including Instrument Set-up):

11.1 Set up – See Section 26, Table 6 for method set up on the TIM840 Titration Manager.

11.2 Turn on the TIM840 Titration Manager, the SAC850 Sample Changer, and open the Titra Master 85 software on the computer.

11.3 Calibrate pH meter as follows: pH meter must be calibrated on a daily basis.

11.3.1 pH calibration points for the TIM840 Titration manager consist of 1.679, 4.005, 7.000, and 10.012.

11.3.2 Pour an aliquot of each buffer in descending pH and place on the SAC 850 Sample Changer in positions 1 through 4.

11.3.3 Follow calibration instructions on the TIM840 Titration Manager.

11.3.4 Sensitivity must be greater than 95%, pH should be 6.65 plus/minus 0.5 (6.15-7.15) at zero point, and response time must be equal to or less than 60 seconds.

11.4 Validate the calibration by reading and recording the secondary source buffers (ICVs) that consist of pH buffers of 2.0 and 7.0.

11.4.1 The reading must within 0.10 units of the true value.

11.4.2 Select the pH method.

11.4.3 Enter the number of analysis to be performed on the TIM840 Titration Manager (2).

11.4.4 Send the Sample Stack to the computer.

11.4.5 Enter the Standard names and IDs into the Sample Stack and send back to the TIM840.

11.4.6 Start the pH analysis run.

11.5 Instrument is now ready for a sequence to be added.

12. PROCEDURE

12.1 Batch desired samples in Epic Pro. Batch must not exceed 20 samples, and must include at least 1 Duplicate Sample (DUP), 1 Method Blank (MB), and 1 Laboratory Control Spike (LCS).

12.2 Open Electronic Prep Log and open a new Acidity template.

12.3 Pull in the Epic Pro batch by using the HBN.

12.4 Pipette 20 mL of each sample into 50 mL Pyrex beakers. Pipette a second one for the DUP.

12.5 Pipette 20 mL of carbon dioxide free water into a 50 mL Pyrex beaker. This will be the MB.

12.6 Pipette 20 mL of 200 mg/L CCV into a 50 mL Pyrex beaker. This will be the LCS.

12.7 Add 1.0 mL of 0.02N H_2SO_4 to each beaker.

12.8 Add 150 uL of 30% hydrogen peroxide to each beaker.

12.9 If the sample reacts right away with the hydrogen peroxide, then discard and us a fresh sample volume of 10 mL or less, bring to 20 mL with of carbon dioxide free water. Add the 1.0 mL of 0.02N H_2SO_4 and the 150 uL of 30% hydrogen peroxide.

12.10 Cover all with watch glasses, and boil for about 5 minutes.

12.11 Cool to room temperature and bring to about 30mL with carbon dioxide free water. Batch is now ready to be put on the instrument.

12.12 Set up the TIM840 Titration Manager with the pH + Acidity method. This will take the pH of the sample and then titrate to the end point of 8.3.

12.12.1 Flush the burette with the NaOH titrant.

12.12.2 Enter the number of analysis to be performed on the TIM840 Titration Manager.

12.12.3 Send the Sample Stack to the computer.

12.12.4 Enter the sample and QC IDs into the Sample Stack and send back to the TIM840.

12.13 The Sequence should start with a CCV, CCB, and CRDL standard. There should be a CCV and CCB every ten samples and the sequence should end with a CCV and CCB. See Section 26, Table 7 for an example of Daily Calibration and analytical sequence.

12.13.1 Each CCV is 20 mL of 200 mg/L Continuing Calibration Verification (CCV) standard with 1.0 mL of 0.02N H_2SO_4 in a 50 mL pyrex beaker. No hydrogen peroxide and Not boiled.

12.13.2 Each CCB is 20 mL of Carbon dioxide free water with 1.0 mL of 0.02N H_2SO_4 in a 50 mL Pyrex beaker. No hydrogen peroxide and Not boiled.

12.13.3 The CRDL is 20 mL of 20 mg/L Reporting Limit Standard (CRDL) with 1.0 mL of 0.02N H_2SO_4 in a 50 mL Pyrex beaker. No hydrogen peroxide and Not boiled.

12.14 Start the run.

12.15 When the run has finished, additional runs can be added to the sequence.

12.16 The data is selected and exported the network.

12.16.1 The data is selected based on the date analyzed.

12.16.2 It is then exported to LIMS in the Radiometer software.

12.16.3 In the "Shortcut to LIMS" folder on the desktop the file is re-named and copied.

12.16.4 It is then pasted in the "Shortcut to Auto-Titrator" folder also located on the desktop.

12.17 LIMS Link is used to perform the acidity calculations and post the data to Epic Pro.

12.17.1 Open LIMS Link and select the "Alkalinity Acidity" method.

12.17.2 Click "New" and name the new LIMS Link file and add the analyst's initials.

12.17.3 Click "Import Instrument" and select the correct instrument from the dropdown (40WET0).

12.17.4 Select the file and click "OK".

12.17.5 Click "No" for Normal, then "Yes" for Acidity.

12.17.6 The file will now load.

12.17.7 Verify Initial volumes, acid amounts, and batch info.

12.17.8 LIMS Link will perform Acidity calculation.

12.17.9 Verify Quality Control is within acceptance criteria.

12.17.10 If all is correct, post data to Epic Pro.

12.18 Verify the batch posted correctly, print out a validation report, and hand in with supporting documentation for secondary review.

13. QUALITY CONTROL

13.1 Samples – All samples and batch QC have a known amount (1.0 mL) of 0.02N H_2SO_4 added to them. If the sample pH is not <4 prior to titration, the sample will need to be analyzed with a smaller sample volume and/or with additional acid being added. These adjustments must be taken into consideration in the final data calculations.

13.2 Method Blank (MB) - An aliquot of laboratory reagent water. The MB is analyzed exactly like a sample. The MB is used to determine whether the methodology is in control.

13.2.1 A MB must be analyzed with each batch of samples of 20 or fewer samples.

13.2.2 If the MB is between the MDL and the RL, then qualify the applicable data. Data that is >10x the MB detection or ND does not need to be qualified.

13.2.3 The MB must be less than the reporting limit (RL).

13.2.4 If the MB is not within control limits, perform the following:

13.2.4.1 Check for errors in calculations. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.2.4.2 If sufficient sample is available, re-prepare the MB and all associated samples if an error in procedure is discovered which cannot be corrected. If the MB is within the RL in this analysis, accept the second set of data. If the MB is still outside the RL after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant MB.

13.2.4.3 If sufficient sample volume is not available, report the sample data with a qualifier flag on each of the samples associated with the non-compliant MB. Contact the project manager regarding the occurrence.

13.2.4.4 In the absence of project specific requirements, sample detects less than 10 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 10 times the method blank contamination are reported without qualification.

13.3 Laboratory Control Sample (LCS) for Ongoing Precision and Recovery (OPR) – The LCS is analyzed exactly like a sample. The LCS is used to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurement.

13.3.1 An LCS must be analyzed with each batch of samples of 20 or fewer samples.

13.3.2 Acceptance Criteria: The LCS recovery must be within the control limits of 80-120% of the true value.

13.3.3 If the recovery is not within control limits, perform the following:

13.3.3.1 Check for errors in calculations, standards preparation and spiking of the LCS solution. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.3.3.2 If sufficient sample is available, re-prepare the LCS and all associated samples if an error in procedure is discovered which cannot be corrected. If the recovery is within the limits in this analysis, accept the second set of data. If the recovery is still outside the limits after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant LCS.

13.3.3.3 If sufficient sample volume is not available, report the sample data with a qualifier flag on each of the samples associated with the non-compliant LCS. Contact the project manager regarding the occurrence.

13.4 Duplicate sample (D) – A duplicate aliquot of a sample to be analyzed along with the original sample. Duplicate analyses indicates the precision associated with the sample collection, preservation and storage, as well as, laboratory procedures.

13.4.1 Duplicate sample analysis will be performed at a frequency of 5% if sufficient sample volume is provided.

13.4.2 Acceptance limits: The RPD must be within 0-20% between the original sample and the duplicate.

13.4.3 If the RPD is exceeded, then:

13.3.4.1 Check for errors in calculations and sample preparation. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.3.4.2 If no error is found, report the sample data with a qualifier flag on the sample associated with the non-compliant duplicate.

13.5 CCV– A standard that is analyzed to verify the calibration and function of the instrument are still in control.

13.5.1 A CCV is analyzed at the beginning of a sequence, after every 10 or fewer samples, and at the end of the sequence.

13.5.2 Acceptance criteria is +/- 20% of the true value of the standard.

13.5.3 If acceptance criteria are not met, re-analyze once.

13.5.4 If acceptance criteria still are not met, correct the problem, recalibrate, and reanalyze all samples and batch QC.

13.6 CCB– A blank that is analyzed to verify the calibration and function of the instrument are still in control.

13.6.1 A CCB is analyzed after CCVs at the beginning of a sequence, after every 10 or fewer samples, and at the end of the sequence.

13.6.2 The CCB must be < RL.

13.6.3 If acceptance criteria are not met, re-analyze once.

13.6.4 If acceptance criteria still are not met, correct the problem, recalibrate, and reanalyze all samples and batch QC.

13.7 CRDL – A standard at the reporting limit (RL) that is analyzed to verify that quantification can be performed at that level.

13.7.1 Analyzed after the first CCB.

13.7.2 Acceptance criteria is +/- 50% of the true value of the RL.

13.7.3 If acceptance criteria are not met, re-analyze once.

13.7.4 If acceptance criteria still are not met, correct the problem, recalibrate, and reanalyze all samples and batch QC.

13.8 Documentation

13.8.1 Draw a single-line strikethrough for any unacceptable or changed data, then DATE and INITIAL and provide a written explanation of the reason for the change.

13.8.2 Data are validated and peer reviewed by lab personnel using a batch cover sheet attached to the raw data and filed.

13.8.3 Any discrepancies and issues occurring with each batch should be included on the cover sheet to be incorporated into a narrative.

14. DATA ANALYSIS AND CALCULATIONS

14.1 Titrant Normality Calculation:

$$\text{Normality (N)} = (A \times B)/(204.2 \times C)$$

Where A = g KHP weighed (10g) to one L (2,450 mg/L Acidity Stock Standard)
B = mL of 2,450 mg/L Acidity Stock Standard (10mL)
C = mL of NaOH titrant used

14.2 The LCS Percent Recovery is calculated as follows:

$$\text{LCS\% Recovery} = \frac{\text{LCS calculated value}}{\text{LCS true value}} \times 100$$

14.3 The relative percent difference (RPD) is calculated as:

$$\text{RPD} = \frac{|S - D| * 100}{(S + D) / 2}$$

where: S = sample value, mg/L
D = duplicate value, mg/L

14.4 LIMS Link Acidity calculations:

$$\text{Acidity, as mg } CaCO_3/L = \frac{(A \times B)-(C \times D) \times 50{,}000}{\text{ML sample}}$$

where: A = mL NaOH titrant used
B = normality of NaOH
C = mL 0.02 N H_2SO_4 used
D = normality of H_2SO_4

Report as "The acidity to pH ___ = ___ mg $CaCO_3$/L."

Milliequivalents per liter are equal to the above result divided by 50.

15. DATA ASSESSMENT AND ACCEPTANCE CRITERIA FOR QUALITY CONTROL MEASURES

Table 4: Quality Control

Method(s) ⇨ Quality Control Measure ⇩	**EPA 305.1 SM 2310B**
Method Blank (MB)	**One per batch of samples, up to 20 environmental samples, whichever is more frequent. Must be distilled with batch.**
Laboratory Control Spike (LCS)	**One per batch of samples, up to 20 environmental samples, whichever is more frequent.**
Sample Duplicate (DUP)	**One pair per batch of samples, up to 20 environmental samples, whichever is more frequent. Must be distilled with batch.**
Initial Calibration	**Minimum of 4 pH Buffers. Must be performed daily prior to sample analysis.**
Calibration Verification (ICV/CCV)	**ICV – analyzed after calibration but before samples. The ICVs are pH buffers. CCV – analyzed prior to, after every 10 samples, and at the end of the sequence. The CCV is not boiled with batch.**
Calibration Blank (CCB)	**CCB – analyzed after every CCV. The CCB is not boiled with batch.**
Reporting Level Check (CRDL)	**CRDL – analyzed after first CCB. The CRDL is not boiled with batch.**

16. CORRECTIVE ACTIONS FOR OUT-OF-CONTROL DATA

Table 5: Analyst/Technician Data Assessment

Analytical Method Acceptance Criteria⇨ Data Assessment Measure ⇩	**SM 2310B If these conditions are not achieved ⇒**
Method Blank (MB)	• 1
Laboratory Control Spike (LCS)	• 2
Sample Duplicate (DUP)	• 3
CRDL standard	• 4
Initial / Continuing Calibration Verification	• 5
Initial / Continuing Calibration Blank	• 6

1. In the absence of project specific requirements, sample detects less than 20 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 20 times the method blank contamination are reported without qualification.

2. If sample volume does not allow re-analysis the entire prep/analytical batch of samples shall be flagged with the appropriate accuracy and/or precision data qualifier to reflect the deficiencies.

3. If DUP fails acceptance criteria with the instrument in control, assume matrix affect and qualify the applicable data.

4. It is analyzed after the calibration, recovery 50-150% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate.

5. If ICV/CCV is outside the control limits reanalyze the ICV/CCV to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. If the ICV/CCV recovers greater than the control limit and the samples bracketing the out of control ICV/CCV are non-detects, the results may be reported without a flag.

6. If ICB/CCB is outside the control limits reanalyze the ICB/CCB to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. Samples that are > 10x the concentration in the CCB the samples do not have to be reanalyzed.

17. CONTINGENCIES FOR HANDLING OUT-OF-CONTROL OR UNACCEPTABLE DATA

17.1 See Section 16.

18. METHOD PERFORMANCE

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.2 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.3 An initial demonstration of capability (IDC) must be performed per S-ALL-Q-020, *Orientation and Training Procedure*s, most current revision or replacement. A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager.

18.4 An annual method detection limit (MDL) study will be completed per S-GB-Q-020, *Determination of the LOD and LOQ*, most current revision or replacement, for this method and whenever there is a major change in personnel or equipment. The results of these studies are retained in the quality assurance office.

18.5 Periodic performance evaluation (PE) samples are analyzed per S-GB-Q-021, *PE/PT Program*, most current revision or replacement, to demonstrate continuing competence. All results are stored in the QA office.

19. METHOD MODIFICATIONS

19.1 Method modifications for EPA 305.1 and Standard Meth*od 2310B* *are* as follows:

19.1.1 Modifications should be targeted to improve quality, efficiency or the cost effectiveness of the procedure.

19.1.2 All major modification to the procedure that may directly affect data quality must be thoroughly documented. A new demonstration of capability and equivalency must be performed and kept on record.

19.1.3 Procedures identified as “Best Practices” by the PACE 3P Program will be incorporated into this document as minimum requirements for Pace laboratories.

19.1.4 This procedure has been adapted to be used with an auto-titration instrument.

19.1.5 Sample and reagent volumes have been reduced to accommodate the analysis by the instrumentation being used.

19.1.6 All samples and batch QC are treated with a known volume of acid prior to being boiled.

19.1.7 If a client fails to provide sufficient volume for the method required Matrix Spike/Matrix Spike Duplicate (MS/MSD), the laboratory will analyze a Laboratory Control Spike Duplicate to demonstrate precision. The analytical batch will be qualified with the "M5" data qualifier.

20. INSTRUMENT/EQUIPMENT MAINTENANCE

20.1 Probe has high response time - Soak probe in pH 4.0 buffer usually for about 2 hours and then rinse with nano-pure water.

20.2 Prior to probe usage - Add KCl crystals, if needed, to the inside of the probe (0.5 cm KCl crystals should be present), add KCl probe solution, if needed, just below filling hole (0.5 cm below the filling hole), make sure this is no air bubbles inside the probe by gentle agitation, any crystal deposit around filling hole should be wiped off.

20.3 After usage (short term storage) - Probe is rinsed with nano-pure water and blotted dry with kimwipes, filling hole is wrapped and covered with parafilm, and probe is stored in pH 7.0 buffer solution.

20.4 Filling solution should be changed at least once a month with new KCl crystals: remove old filling solution, dissolve the old crystals by adding nanopure water and inverting probe. Rinse out the probe by filling with KCl probe solution and inverting probe three times. Repeat rinse again. Add KCl crystals, 0.5 cm crystals should be present. Add probe filling solution to 0.5 cm below filling hole. Gently invert probe three times.

20.5 For long term storage, remove filling solution and dissolve KCl crystals as described above. Fill probe with nano-pure water, parafilm the filling hole and store probe in upright position in KCl filling solution. When probe is ready to use again, add new crystals and filling solution, and soak probe at least 12 hours in nano-pure water.

20.6 Soak the probe in Renovo-N solution for about 2 hours if the probe is heavily contaminated from a sample (usually grease or oil samples will do this), and rinse off with nano-pure water. Renovo-N is a probe cleaning solution.

20.7 Change/replace probe when the calibration specifications are getting close to their acceptance limits. Typically probes are changes every two to three months.

21. TROUBLESHOOTING

21.1 Refer to the following Radiometer operating manuals:
- TitraMaster 85 Software by Radiometer
- Radiometer TIM840 Titration Manager
- Radiometer SAC850 Sample Changer

22. SAFETY

22.1 Each chemical should be regarded as a potential health hazard and exposure should be as low as reasonably achievable. Cautions are included for known extremely hazardous materials.

22.2 A reference file of Safety Data Sheets (SDS) is made available to all personnel involved in the chemical analysis, and is located at the front desk. A formal safety plan has been prepared and is distributed to all personnel with documented training.

22.3 Analysts should take necessary safety precautions when handling chemicals and samples. Proper personal protective equipment may include safety gloves, lab coats, and safety glasses or goggles. Analysts should be familiar with the SDSs for all chemicals and reagents they use for this procedure and the location of the SDSs within the laboratory. Any questions or concerns should be taken to the laboratory Chemical Hygiene/Safety Officer.

23. WASTE MANAGEMENT

23.1 All sample residues from this analysis process must be handled as hazardous waste and disposed of in the proper hazardous waste barrel bound for incineration. For further information on waste management consult the current version of S-GB-S-001, *Regulated Soil Handling – Green Bay Location*, most current revision or replacement.

24. POLLUTION PREVENTION

24.1 Excess samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult the current version of S-GB-W-001, *Waste Handling and Management*, most current revision or replacement.

25. REFERENCES

25.1 U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste, EPA-600/4-79-020, Method 305.1.

25.2 Standard Methods for the Examination of Water and Wastewater, on-line Edition, American Public Health Association, Method SM 2310 B (4a)-97.

26. TABLES, DIAGRAMS, FLOWCHARTS, APPENDICES, ETC.

26.1 Table 6: – Instrument Set Up

26.2 Table 7: – Daily Calibration and Sequence

26.3 Flow chart

27. REVISIONS

Document Number	Reason for Change	Date
S-GB-I-072-Rev.00	First Issue	01May2012
S-GB-I-072-Rev.01	Section 9.1.6.4 and 9.1.8.1: Updated sections to require titrants must be verified monthly by standardization if a new bollte is not opened monthly.	16Nov2012
S-GB-I-072-Rev.02	Throughout Document: Updated SOP to new format following SOP: S-GB-Q-017 *Preparation of SOPs* (most current revision or replacement). Updated SOP references throughout document. Section 7: Table 1: Added. Section 13.1: Added. Section 13.6.2: Changed CCB acceptance criteria to <RL. Section 19: Added appropriate method modifications. Section 26: Renumbered/moved tables to body of document were applicable. Updated Flow chart.	12Sep2013

Table 6: Instrument Set Up

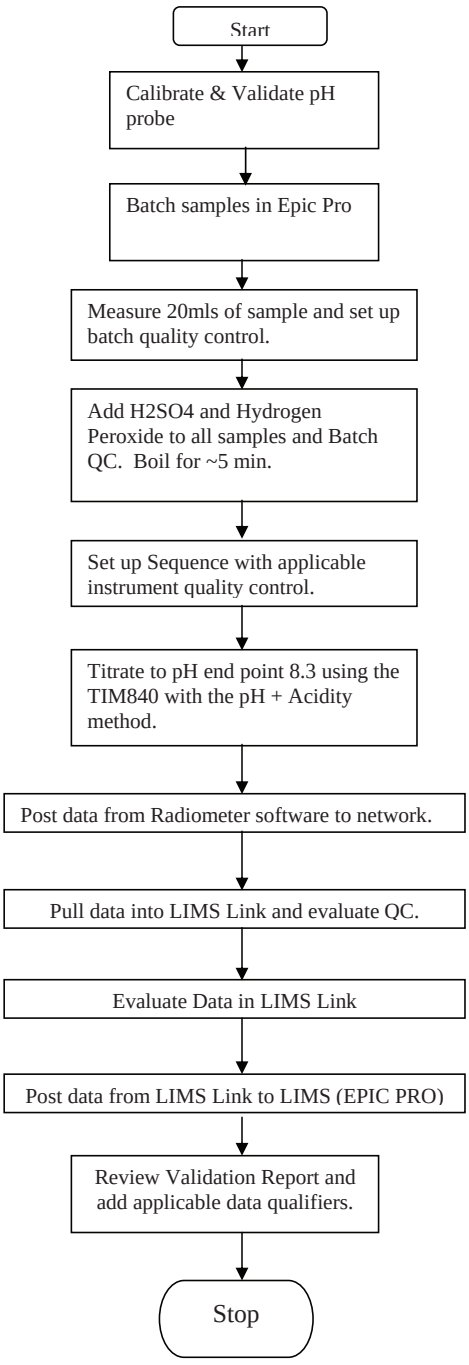
Edit Method	Acidity
Mode:	End Point
Measurement:	pH
Temperature:	Probe
Number of Tests	1
Notification	No
Cell Grounding:	Reference
Blank:	No
Method Parameters	
Electrode:	PHC240192621
Temp Sensor:	T201-a
Titrant:	NaOH 0.02N
Predose Mode:	mL
Predose Unit:	0.0000mL
Start Timer	00min 30s
Max Volume:	25.000mL
Direction:	Increasing pH
Backtitration:	No
Min. Speed:	0.10mL/min
Max. Speed:	1.50mL/min
Number of EP:	1
Auxiliary output	No
1-End point	8.300pH
EP delay:	00min 05s
Proportional band:	4.000pH
Sample	
Sample unit:	mL
Sample amount:	20.000mL
Results	
Number of results:	1
Number of equations:	0
Results factor:	No
Number of digits:	4
Result 1	
ID:	R1
Result unit:	mL
Printouts	
Title:	Analysis Bulletin
Detailed:	Medium
Curve:	Yes

Table 7: Daily Calibration and Sequence

Calibration performed under the procedure and of the IM340 Titration Manager
pH 10.012 Buffer
pH 7.000 Buffer
pH 4.005 Buffer
pH 1.679 Buffer

pH Secondary Source Verified Done using the pH method
pH 2.0 Buffer
pH 7.0 Buffer
Titration Instrument and Batch Samples Done using the pH Acidity method
[illegible]
[illegible]B
RDL
MB
LCS
Sample 1
DUP of Sample 1
Sample 2
Sample 3
Sample 4
Sample 5
Sample 6
Sample 7
[illegible]
[illegible]B
Sample 8
Sample 9
Sample 10
Sample 11
Sample 12
Sample 13
Sample 14
Sample 15
Sample 16
Sample 17
[illegible]
[illegible]B
Sample 18
Sample 19
Sample 20
[illegible]
[illegible]B

FLOW CHART


Start
Calibrate & Validate pH probe
Batch samples in Epic Pro
Measure 20mls of sample and set up batch quality control.
Add H2SO4 and Hydrogen Peroxide to all samples and Batch QC. Boil for ~5 min.
Set up Sequence with applicable instrument quality control.
Titrate to pH end point 8.3 using the TIM840 with the pH + Acidity method.
Post data from Radiometer software to network.
Pull data into LIMS Link and evaluate QC.
Evaluate Data in LIMS Link
Post data from LIMS Link to LIMS (EPIC PRO)
Review Validation Report and add applicable data qualifiers.
Stop

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STANDARD OPERATING PROCEDURE

Ion Chromatography

Referenced Methods: EPA 300.0, SW-846 9056A

SOP NUMBER:	S-GB-I-009-REV.05
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S-GB-I-009-REV.04

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 09/04/13

Kate Grams, Laboratory Quality Manager — Date: 9/3/2013

Chad Rusch, Department Manager — Date: 09/03/2013

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL

Signature	Title	Date

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S-GB-I-009-REV.04

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1. Purpose/Identification of Method

The purpose of this Standard Operating Procedure (SOP) is to provide a consistent procedure in the determination of Bromide, Fluoride, Chloride, Nitrite, Nitrate, and Sulfate ions using Ion Chromatograph following analytical methods EPA 300.0 and SW-846 9056A.

2. Summary of Method

2.1 A small volume of sample, typically 25-100µl, is introduced into an ion chromatograph. The anions of interest are separated and measured, using a system comprised of a guard column, analytical column, suppressor device and conductivity detector.

3. Scope and Application

3.1 **Personnel**: The policies and procedures contained in this SOP are applicable to all personnel involved in the analytical method or non-analytical process.

3.2 **Parameters**: This method is used to determine Bromide, Fluoride, Chloride, Nitrite, Nitrate and Sulfate by use of an Ion Chromatograph.

4. Applicable Matrices

4.1 Drinking water, surface water, mixed domestic and industrial wastewaters, groundwater, reagent waters, soils, and Leachates (when no acetic acid is used).

5. Limits of Detection and Quantitation

5.1 The reporting limit (LOQ) for all analytes is listed in Table 1 for this method. All current MDLs are listed in the LIMS and are available by request from the Quality Manager.

Table 1
REPORTING LIMITS

COMPOUND NAME	Aqueous/Leachates	Solids
	Units mg/L	Units mg/kg
	LOQ	LOQ
Bromide	0.4	4.0
Chloride	4.0	40
Fluoride	0.4	4.0
Sulfate	4.0	40
Nitrate	0.3	3.0
Nitrite	0.2	2.0
Nitrate+Nitrite	0.3	3.0

6. Interferences

6.1 Interferences can be caused by substances with retention times that are similar to and overlap those of the anion of interest. Large amounts of an anion can interfere with the peak resolution of an adjacent anion. Sample dilution and/or fortification can be used to solve most interference problems associated with retention times.

6.2 The water dip or negative peak that elutes near, and can interfere with, the fluoride peak can usually be eliminated by the addition of the equivalent of 1 mL of daily eluent to 5 mL of each standard and sample.

6.3 Method interferences may be caused by contaminants in the reagent water, reagents, glassware, and other sample processing apparatus that lead to discrete artifacts or elevated baseline in ion chromatograms.

6.4 Samples that contain particles larger than 0.45 microns and reagents solutions that contain particles larger than 0.20 microns require filtration to prevent damage to the instrument column or flow system.

6.5 Any anion that is not retained by the column or only slightly retained will elute in the area of fluoride and interfere. Known coelution is caused by carbonate and other small organic anions. At concentrations above 1.5 mg/L, this interference may not be significant; however, it is the responsibility of the user to generate precision and accuracy information in each sample matrix.

6.6 The acetate anion elutes early during the chromatographic run. The retention times of the anions also seem to differ when large amounts of acetates are present. Therefore, this method is not recommended for leachates of solid samples when acetic acid is used for pH adjustment.

6.7 The quantitation of unretained peaks should be avoided, such as low molecular weight organic acids, which are conductive and co elute with or near fluoride and would bias the fluoride quantitation in some drinking and most waste waters.

6.8 Any residual chlorine dioxide present in the sample will result in the formation of additional chlorite prior to analysis. If any concentration of chlorine dioxide is suspected in the sample, purge the sample with an inert gas (argon or nitrogen) for about five minutes or until no chlorine dioxide remains.

7. Sample Collection, Preservation, Shipment and Storage

7.1 See Table G for a summary.

8. Definitions

8.1 Refer to Section 10 of the most current version of the Pace Quality Manual for the terms used at Pace Analytical.

9. Equipment and Supplies

See Table B and Table C for a summary.

10. Reagents and Standards

10.1 See Table D and Table E for a summary.

10.2 All standards and reagents must be maintained in accordance with the most current version of SOP S-GB-Q-026 *Standard and Reagent Management and Traceability*.

10.3 Standard expiration dates should be calculated as follows.

10.3.1 Purchased pre-made stock standards expiration date will be based on the manufacturer's expiration date and stored at ≤6 °C.

10.3.2 Working standards (such as ICV, CCV, LCS/LCSD, MS/MSD, RL, Levels (1-8) of the calibration standards) for Br, Cl, SO4, NO3, and F will be given a one-week expiration date and stored at 4 °C. The expiration date observed may not extend past the earliest expiration date of any standards used to create the solution. Working standards (such as ICV, CCV, LCS/LCSD, MS/MSD, RL, Levels (1-8) of the calibration standards) for NO2 will be given a 1-day expiration date and stored at 4 °C. The expiration date observed may not extend past the earliest expiration date of any standards used to create the solution.

11. Calibration and Standardization

11.1 Perform calibration using the standards listed in Table F. For those anions exhibiting a linear calibration (bromide, chloride, fluoride, nitrite, nitrate and sulfate), these standards define the linear range for the analysis. The correlation coefficient must be 0.995 or greater. If correlation coefficient is less than 0.995 corrective action must be taken and re-calibration must occur before samples are analyzed.

11.2 See Table F for summary.

12. Procedure

12.1 Sample Preparation and Analysis.

12.1.1 Make fresh Daily Eluent each day by diluting 14 mL of Sodium Carbonate Solution and 4 mL Sodium Bicarbonate Solution to a final volume of 2L. See Table J for directions on making X100Eluent.

12.1.2 Fill Daily Eluent reservoir on IC's and daily prep container for samples. Place cap with eluent and helium lines and screw hand tight.

12.1.3 Switch IC to local mode by going to System Control and selecting local (not remote). Turn on Eluent Pressure and Pump.

12.1.4 Open Waste Valve for about 10 seconds to get bubbles out of eluent lines.

12.1.5 Once the waste valve has been closed, turn on SRS by going to "Component – on/off" then "turn SRS on" (It is extremely important the SRS is not turned on until the eluent is flowing through the instrument.)

12.1.6 Flow setting is about 1.36 mL/min for IC-B and about 1.00 mL/min for IC-C. Wait about 15 minutes for Instrument to stabilize, adjust if needed. Output conductivity will be close to 0 µS.

12.1.7 Check historical data for dilutions.

12.1.8 To prepare soils: Weigh 5 grams (+/- 0.1 grams) of soil into a digestion vial. Add 50 mL Nanopure. Sonicate or Stir on stir plate for 1 hour. Allow 24 hours for samples to settle. Filter (using a 0.45um filter) and/or centrifuge as appropriate. Dispose of soil residue as per Section 23. Record all soil preps in the soil prep logbook.

12.1.9 Transfer 5 mL of sample from specimen cup to vial. Add 1 ml of Daily eluent to each vial. Place cap on the top of vial; invert cassettes and using sample insertion tool push cap into the vial.

12.1.10 Create and save a schedule file.

12.1.10.1 Click on the Dionex Symbol. This will open the Peak Net Main Menu. Click the "schedule" icon, then click on file.

12.1.10.2 Navigate to find the schedule file from the last time the instrument was run. Then double click under data file (on line 1 of the schedule).

12.1.10.3 Click on the up file folder. Click on new file.

12.1.10.4 Type in your file name using the following convention: mmddyyX, where mm-month, dd-day, yy-year, and X-instrument. For example, 010107b, where 01 is January 01 is the 1st day, 07 is the year 2007, and b is instrument B. Type in your file name, again in the filename box in this same screen.

12.1.10.5 Click Open. Copy this file name all the way down your schedule.

12.1.10.6 Save file using naming convention in previous step. i.e. 010107b.sch. Then Save.

12.1.10.7 Close schedule and reopen your data file. Column should say the name of your file – for example, 010107b.

12.1.10.8 Delete all information from the sample column and comment column except method reference (EPA 300.0 or SW846 9056).

12.1.10.9 Enter all samples you wish to run as well as any comments that are needed.

12.1.10.10 After last CCB, double click under method column, scroll over and select "shutdown.met". This will turn off the IC.

12.1.11 Start analysis

12.1.10.1 Open up Peaknet Main Menu, Click on the RUN icon. You will see both instruments listed. Single Click on which instrument you are going to run. This will activate this instrument.

12.1.10.2 Go to File and Load the schedule (find schedule in year (ie 2007) and month folder ie 2007-01, then your schedule name 010107b.sch)

12.1.10.3 Enter the starting line number for the schedule. For example, type in 1 for line 1 or the line number where you want to start. Click OK

12.1.10.4 Place sample vials into Cassettes. Load the cassettes into Autosampler with black dots to the right.

12.1.10.5 On the autosampler, push Lcl/Rmt button twice. Then, push Hold/Run button once. The run should start.

12.1.12 Once analytical run has completed, data can be optimized and then evaluated. Each sample produces its own .dxd file with chromatograph and analytes amounts. Open each file in the optimize window, check and correct, if necessary, peak naming and void volumes. If necessary, manual integration can be performed following procedures as described in the most current version of SOP ALL-Q-016 *Manual Integration*. Note necessary dilutions.

12.1.10.1 Go to PeakNet main menu and click the "Optimize" icon.

12.1.10.2 Go to File and then Open Data File. Find your file name and click on it. On the left, there will be all your data files. Double click on the file you want. This will open up a chromatogram.

12.1.10.3 On the tool bar at the top of the screen next to the printer symbol, click on the magnifying glass icon. This will open up the analysis report.

12.1.10.4 Once all samples have been optimized, go back to your schedule and add any rerun notes or other informational comments.

12.1.10.5 Go to the Peaknet main menu. Click on the "Batch" tab. Click on Input Options. Click on Select. Find your file. Click on Open.

12.1.10.6 Click on the "Output" tab. Check the box next to "Print sample analysis reports" and "Update raw data files".

12.1.10.7 Click on the "Export" tab. Navigate to L:/40WTAX (where X is 3 for IC-B and 4 for IC-C). Then type in your file adding .csv at the end. For example, 010107b.csv. Click on Open. Then under report type select "full". Then click OK.

12.1.10.8 Make sure the correct paperless drive printer is selected then click Start. This will print and export your data from the IC program.

12.1.13 Using IC program print results summary and upload results into EpicPro.

12.1.14 See Table I for summary of limits. Control limits of 90-110% are set by the method EPA 300.0.

13. Quality Control

13.1 See Table H for summary of Quality Control Measures. Current list of Data Qualifiers can be found in EpicPro. The following Quality control measures are in place:

13.1.1 **Method Blank** One per batch of samples, up to 20 environmental samples, whichever is more frequent. Method Specific or Less than the CRDL. If analyte is detected in the method blank, method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis.

13.1.2 **Laboratory Control Spike and Duplicate**. One LCS per batch of samples, up to 20 environmental samples, whichever is more frequent. An LCSD is run per client request or when there is insufficient sample for MS/MSD. LCS/LCSD spike recoveries for all analytes of interest are 90 – 110 %.

13.1.3 **Matrix Spike / Matrix Spike Duplicate** One pair per batch of samples, up to 10 environmental samples, whichever is more frequent. The sample used for MS/MSD pair is either determined by the client or selected at random from client samples as sample volume allows. No field, filter, trip or equipment blanks can be used for MS/MSD. MS/MSD spike recoveries for all analytes of interest are 90 – 110 % (80-120% for soil samples).

13.1.4 **Initial Calibration** Minimum of 5 standards. Must be performed before samples are analyzed. Correlation coefficient must be greater than 0.995.

13.1.5 **Initial Calibration Verification (ICV) -** analyzed immediately after calibration; recovery 90 – 110% of true value.

13.1.6 **Continuing Calibration Verification (CCV) -** analyzed after every 10 samples; recovery 90 – 110% of true value.

13.1.7 **Contract Required Detection Limit (CRDL)** – A standard prepared at the concentration of the Pace Reporting Limit. It is analyzed immediately after the ICB or once a month at minimum; recovery 60-140% of true value.

13.1.8 **Initial Calibration Blank (ICB) -** analyzed after ICV. Method Specific or ± CRDL depending on requirements.

13.1.9 **Continuing Calibration Blank (CCB) -** analyzed after every CCV. Method Specific or ± CRDL depending on requirements.

13.1.10 For samples analyzed by method SW-846 9056 some additional requirements are in place:

13.1.10.1 The working calibration curve must be verified on each working day and whenever the anion eluent strength is changed. This is done by analyzing a CCV and CCB initially and then every ten injections. If the response or retention time for any analyte varies from the assigned values by more than +/- 10%, the test must be repeated, using fresh CCV standards. If the results are still more than +/- 10%, an entirely new calibration curve must be prepared for that analyte.

13.1.10.2 After every 10 injections, analyze a midrange calibration standard. If the instrument response has changed by more than 5% from the previous CCV value, the test must be repeated, using fresh CCV standards. If the results are still more than +/- 5% from the previous CCV, an entirely new calibration curve must be prepared for that analyte.

14. Data Analysis and Calculations

14.1 The instrument provides uncalculated (raw) sample results in mg/L. Raw results will be processed by the IC program during result upload.

14.1.1 Liquid Calculation

Raw Data Value (mg/L) x Dilution Factor = Desired Anion (mg/L)

14.1.2 Soil Calculation

$$\frac{\text{Raw Data Value (mg/L) X Final Volume (L) X Dilution Factor X 1000g}}{\text{(Amount used (g) x \% Solids in decimal formX1Kg)}} = \text{Desired Anion (mg/Kg)}$$

14.1.3 Accuracy:

A matrix spike / matrix spike duplicate is analyzed for each analytical batch of 10 or fewer samples.

MS/MSD calculation:

$$\% \text{ Recovery} = \frac{\text{SSR - SR X 100}}{\text{SA}}$$

SSR = Spike sample result
SR = Sample result
SA = Spike added

14.1.4 Precision:

The precision is calculated based on the concentration of the matrix spike / matrix spike duplicate result.

Relative percent difference (RPD) calculation:

$$\% \text{ RPD} = \frac{|\text{MS-MSD}| \text{ x } 100}{(\text{MS+MSD})/2}$$

MS = Matrix spike value
MSD =Matrix spike duplicate Value

14.1.5 A Laboratory Control Sample (LCS) must be prepared and analyzed with every sample batch or every 20 samples whichever is more frequent. A LCS is reagent water, which has a known amount of analyte of interest added. A Laboratory Control Spike Duplicate (LCSD) must be analyzed if there is insufficient sample volume to perform a matrix spike/matrix spike duplicate or if the client requests one.

$$\% \text{ Recovery} = \frac{\text{Control Spike Result X 100}}{\text{Known concentration}}$$

If an LCS or/and LCSD fails, it can be rerun once. Rerun results needs to be associated with original bath.

14.2 If either the LCS or LCSD is outside the control limits all samples associated to the control spikes are flagged with the appropriate "L" data qualifier if the batch cannot be rerun. If the precision fails, use appropriate "R" flag all samples associated to the control spikes.

15. Data Assessment and Acceptance Criteria for Quality Control Measures

15.1 See Tables H, I, and K.

16. Corrective Actions for Out-of-Control Data

16.1 See Table K

17. Contingencies for Handling Out-of-Control or Unacceptable Data

17.1 See Table K

18. Method Performance

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.2 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.3 An initial demonstration of capability (IDC) must be performed per S-ALL-Q-020, *Orientation and Training Procedure*s (most current revision or replacement). A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager.

18.4 An annual method detection limit (MDL) study will be completed per S-GB-Q-020, *Determination of LOD and LOQ* (most current revision or replacement), for this method and whenever there is a major change in personnel or equipment. The results of these studies are retained in the quality assurance office.

18.5 Quarterly Linear Dynamic Range (LDR) studies will be completed.

18.6 Periodic performance evaluation (PE) samples are analyzed per S-GB-Q-021, *PE/PT Program* (most current revision or replacement), to demonstrate continuing competence. All results are stored in the QA office.

19. Method Modifications

19.1 EPA 300.0: Soil extraction procedure stipulates the slurry to be mixed for one hour with an additional settling of the extract for 24 hours prior to analysis.

20. Instrument/Equipment Maintenance

20.1 Refer to the IC Operating Manual.

21. Troubleshooting

21.1 Refer to the IC Operating Manual.

22. Safety

22.1 **Standards and Reagents**: The toxicity and carcinogenicity of standards and reagents used in this method have not been fully defined. Each chemical compound should be treated as a potential health hazard. Reduce exposure by the use of gloves, lab coats and safety glasses. Material Safety Data Sheets (MSDSs) are on file in the laboratory and available to all personnel. Standard solutions should be prepared in a hood whenever possible

22.2 **Samples**: Take precautions when handling samples. Samples should always be treated as potentially hazardous "unknowns". The use of personal protective equipment (gloves, lab coats and safety glasses) is required when handling samples. In the event a sample container must be opened, it is recommended to perform this in a hood whenever possible.

22.3 Required Safety Equipment is listed in Table A.

23. Waste Management

23.1 The Environmental Protection Agency (USEPA) requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult SOP S-GB-W-001 *Waste Handling and Management* and S-GB-S-001, *Regulated Soil Handling – Green Bay Location* (most current revision or replacements).

24. Pollution Prevention

24.1 The quantity of chemicals purchased is based on expected usage during its shelf life and disposal cost of unused material. Actual reagent preparation volumes reflect anticipated usage and reagent stability.

24.2 The laboratory Chemical Hygiene Plan/Health and Safety Plan contains additional information on pollution prevention.

25. References

25.1 Pace Quality Assurance Manual (most current revision ore replacement)

25.2 The NELAC Institute (TNI): Volume 1, Module 2, "Quality Systems" (most current revision or replacement).

25.3 EPA/600/R-93-100-August 1993, Method 300.0, Determination of Anions by Ion Chromatography - Revision 2.1

25.4 USEPA Test Methods for Evaluating Solid Wastes, SW 846, 3rd Edition, Methods 9056A

26. Tables, Diagrams, Flowcharts, Appendices, Addenda etc.

26.1 **FLOWCHART**

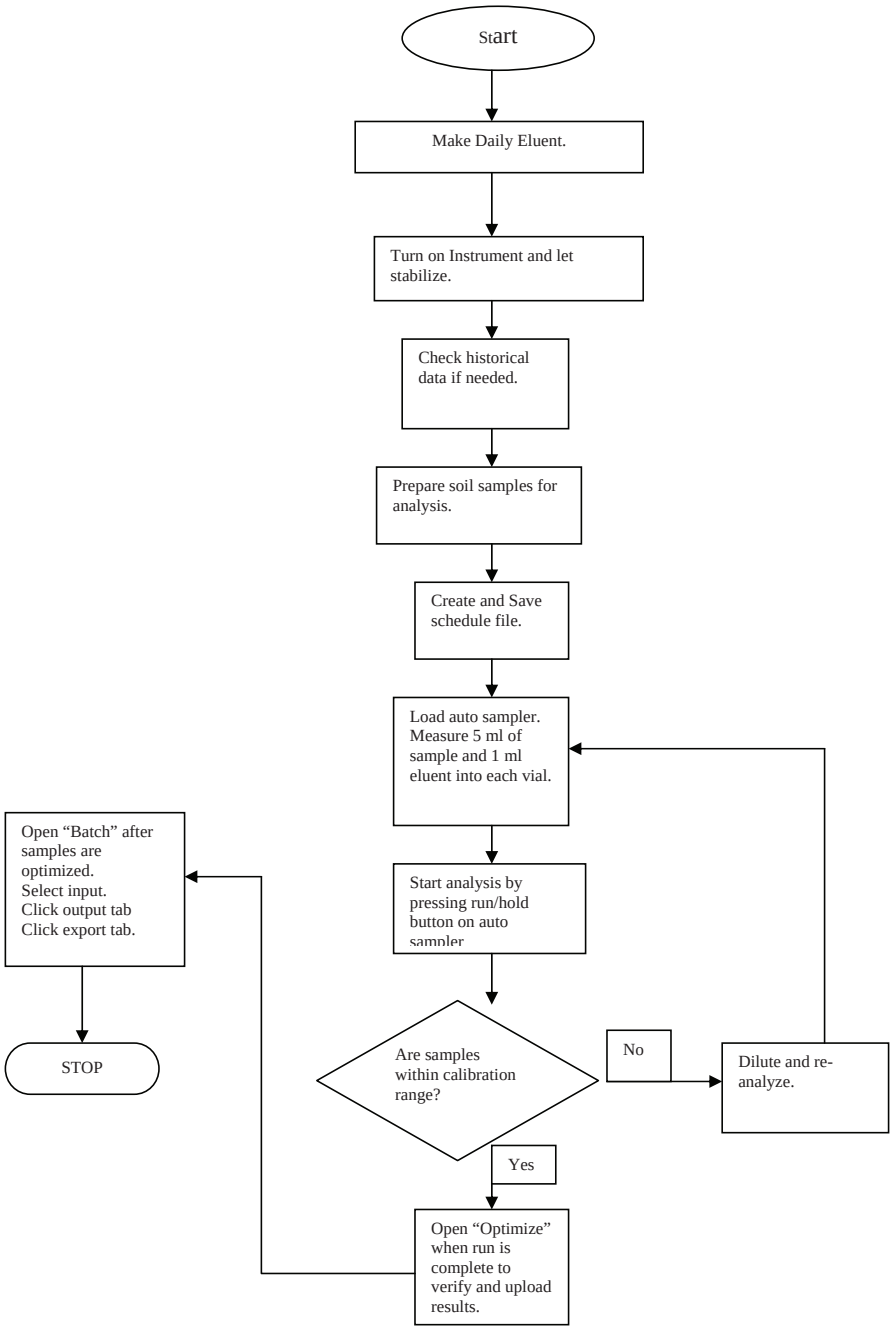
26.2 **TABLES**

26.3 **BATCH TRACKING FORM**

27. Revisions

Revision Number	Reason for Change	Date
GB-I-009-Rev.0	Converted SOP to new corporate format. Added bromide and Soil information.	07Febl2005
GB-I-009-Rev.1	Added chapter "Purpose". Chapter "Matrices" in and "Detection limits" are incorporated in "Scope and Application". Updated "Safety". Updated "Definitions." Added "Responsibilities and Distribution" Updated "Procedures" Updated "Quality Control" Updated "Pollution Prevention and Waste Handling" Updated "Appendix B - Tables" Updated bromide, sulfate and Soil information. Updated ICV/CCV information. Added Procedure for selecting MS/MSD. Added 9056 CCV acceptance requirements.	21Febl2006
S-GB-I-009-Rev.2	Changed file naming convention from yymmddX to mmddyyX Reworded 13.1.9 to clarify CCV control limits for SW846 9060 Added PRL standard requirement and limits. Updated Table J Added more detail to "Procedure" section – specifically on how to create a schedule, start the run, and optimize the chromatographs. Updated section 10 to include standard expiration dates.	13Feb2007
S-GB-I-009-REV.03	Updated signature page. Section 2.2 – Updated Conifer to EpicPro. Section 7 – Deleted. Renumbered document. Section 9.2 – Updated SOP reference. Section 9.3 – Replaced Neat standards with pre-made stocks Section 11.1.13 – Updated Conifer reference to EpicPro Section 11.2.6 – Updated qualifiers. Section 12.1 – Changed Conifer to EpicPro Section 12.7 – Removed CCS references Section 12.1.10.1 – Replaced "previous CCV" with "assigned values" Section 13 – Updated SOP references Section 14 – Updated SOP references. Tables K and L – Updated qualifiers. Tables E and J – Updated curve and standard Information. Table F – Updated curve, CCV, ICV concentrations. Attachment – Added Batch Tracking Benchsheet.	15Dec2009
S-GB-I-009-Rev.04	Updated SOP format to be consistent with SOP: S-GB-Q-017 *Preparation of SOPs* Table 1: Added Updated SOP references throughout document Table G: Added Leachate criteria.	27Sept2012
S-GB-I-009-Rev.05	Table 1: Updated RL (LOQ) for Nitrate and Nitrate+Nitrite. Table B: Added new instrument to equipment listing.	03Sep2013

FLOWCHART


Start
Make Daily Eluent.
Turn on Instrument and let stabilize.
Check historical data if needed.
Prepare soil samples for analysis.
Create and Save schedule file.
Load auto sampler. Measure 5 ml of sample and 1 ml eluent into each vial.
Start analysis by pressing run/hold button on auto sampler
Are samples within calibration range?
No
Dilute and re-analyze.
Yes
Open "Optimize" when run is complete to verify and upload results.
Open "Batch" after samples are optimized. Select input. Click output tab Click export tab.
STOP

Tables

Table A	REQUIRED SAFETY EQUIPMENT
Table B	EQUIPMENT
Table C	SUPPLIES
Table D	REAGENTS
Table E	STANDARDS
Table F	CALIBRATION STANDARD CONCENTRATIONS
Table G	SAMPLE COLLECTION, PRESERVATION, SHIPMENT, AND STORAGE
Table H	QUALITY CONTROL
Table I	CALIBRATION AND STANDARDIZATION
Table J	PREPARTION OF STANDARDS AND REAGENTS
Table K	ANALYST/TECHNICIAN DATA ASSESSMENT
Table L	REPORT REVIEWER/PROJECT MANAGEMENT DATA ASSESSMENT

Table A
REQUIRED SAFETY EQUIPMENT

Item:	Safety Apparel Description	Mandatory for Procedure	Optional
1	Safety Goggles or Glasses	√	
2	Lab Coat	√	
3	Gloves	√	
4	Face Shield		√

Table B
EQUIPMENT

Equipment	Manufacturer	Model(s)	Serial #	Pace ID	Date In Service
DX – 120 Ion Chromatograph	Dionex	DX-120	97040612	40WTA3	09/27/02
Automated Sampler	Dionex	AS40	97070553	40WTA3	09/27/02
ICS-1100 - Ion Chromatograph	Thermo Scientific	ICS-1100	12051009	40WTAB	08/03/12
Automated Sampler	Thermo Scientific	AS-DZ	12050806	40WTAB	08/03/12
ICS 1100 – Ion Chromatograph	Thermo Scientific	ICS-1100	13040963	40WTAD	07/06/13
Automated Sampler	Dionex	AS40	97060050	40WTAD	07/16/2013
Stirplate					
Centrifuge	International Equipment Company	H260	71653487		--
Balance*	Mettler Toledo	AE163	F43426		--

* Or equivalent

Table C
SUPPLIES

Supplies	Manufacturer	Vendor	Catalog #
5.0 mL sample vials with Filter Caps	DIONEX	DIONEX	038141
5.0 mL sample vials	DIONEX	DIONEX	038008
Filter Caps for 5 ml Vial	DIONEX	DIONEX	038009
Stir Bar	N/a	N/a	N/a
50 mL Digestion Vials *	Environmental Express	Environmental Express	
Syringe, 10mL, Disposable (Pack of 20) *	DB	Fisher Scientific	14-829-22A
0.45µm Filter*	Environmental Express	Environmental Express	SF045N
50 mL Disposable PP Beaker*	Fisher Scientific	Fisher Scientific	01-291-10
100 – 5000 µL Pipettor, Variable Volume*	Gilson	VWR	40000-210
1000 µL Pipette, Fixed Volume*	Labsystems	Fisher Scientific	21-377-111K
500 µL Pipette, Fixed Volume*	Labsystems	Fisher Scientific	21-377-111J
250 µL Pipette, Fixed Volume*	Labsystems	Fisher Scientific	21-377-111H
200 µL Pipette, Fixed Volume*	Labsystems	Fisher Scientific	21-377-111G
100 µL Pipette, Fixed Volume*	Labsystems	Fisher Scientific	21-377-111F
50 µL Pipette, Fixed Volume*	Labsystems	Fisher Scientific	21-377-111E

* Or equivalent

Table D
REAGENTS

Reagent	Conc.	Acronym	Manufacturer	Catalog #	Directions found in:
Deionized water		Millipore Water			
CAL/CCV 2000	Per Anion, Br, F, Cl, NO_2, NO_3, SO_4	Calibration and CCV Standard	CPI International	4400-090202DS01	Table J
ICV/SPK 2000	Per Anion, Br, F, Cl, NO_2, NO_3, SO_4	ICV and Spike Standard	Ultra Scientific	ICUS-2541	Table J
Sodium Carbonate (Na_2CO_3)	Neat		Fisher Scientific	S263-500	
Sodium Bicarbonate ($NaHCO_3$)	Neat		Fisher Scientific	S233-500	
Daily Eluent	0.8M Na_2CO_3 0.1M $NaHCO_3$	Daily Eluent			Table J
Sodium Carbonate (Na_2CO_3) Concentrate	0.5M $NaHCO_3$				
Sodium Bicarbonate ($NaHCO_3$) Concentrate	0.5 Na_2CO_3				

Table E
STANDARDS

Standard	Concentration	Direction found in Section:	Acronym
Calibration and Continuing Calibration Verification Stock Standard	200 mg/L F, 2000 mg/L Cl, 100 mg/L NO_2,200 mg/L 200 mg/L NO_3 2000 mg/L SO_4	Table J	CAL/CCV 2000 mg/L
Initial Calibration Verification and Spike Stock Standard	200 mg/L F, 2000 mg/L Cl, 100 mg/L NO_2,200 mg/L 200 mg/L NO_3 2000 mg/L SO_4	Table J	ICV/SPK 2000 mg/L
Level 5 Calibration Standard	0.4 mg/L F, 4 mg/L Cl, 0.20 mg/L NO_2, 0.4 mg/L NO_3 4.0 mg/L SO_4, 0.4 mg/L Br	Table J	CAL1 (also CRDL standard for F, Cl, NO2, Br, NO3, SO4)
Level 4 Calibration Standard	1 mg/L F, 10 mg/L Cl, 0.5 mg/L NO_2, 1.0 mg/L NO_3 10 mg/L SO_4, 1 mg/L Br	Table J	CAL2
Level 3 Calibration Standard	2 mg/L F, 20 mg/L Cl, 1.0 mg/L NO_2, 2 mg/L NO_3 20 mg/L SO_4, 2 mg/L Br	Table J	CAL3
Level 2 Calibration Standard	4 mg/L F, 40 mg/L Cl, 2 mg/L NO_2, 4 mg/L NO_3 40 mg/L SO_4, 4 mg/L Br	Table J	CAL4
Level 1 Calibration Standard	6 mg/L F, 60 mg/L Cl, 3 mg/L NO_2, 6 mg/L NO_3 60 mg/L SO_4, 6 mg/L Br.	Table J	CAL5
Initial Calibration Verification Standard	3 mg/L F, 30 mg/L Cl, 1.5 mg/L NO_2, 3 mg/L NO_3 30 mg/L SO_4, 3 mg/L Br	Table J	ICV 30
Continuing Calibration Verification Standard	3 mg/L F, 30 mg/L Cl, 1.5 mg/L NO_2, 3 mg/L NO_3 30 mg/L SO_4, 3 mg/L Br	Table J	CCV 30

Table F
CALIBRATION STANDARD CONCENTRATIONS

Component Name / Level	Bromide (mg/L)	Fluoride (mg/L)	Chloride (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)
1	6	6	60	3	6	60
2	4	4	40	2	4	40
3	2	2	20	1	2	20
4	1	1	10	0.5	1	10
5	0.4	0.4	4	0.20	0.4	4

Table G
SAMPLE COLLECTION, PRESERVATION, HOLD TIME SHIPMENT AND STORAGE

Matrix	**Analytical Method**	**Container(s)**	**Preservation / Hold Time**	**Shipment Conditions**	**Lab Storage Conditions**
Aqueous	EPA 300.0 SW-846 9056	Clean Plastic or glass containers	None / 48 hrs – NO_2, NO_3 28 days – Br, Cl, F, SO_4	On ice 4+/- 2° Celsius	Walk-in cooler 4± 2° C
Leachate	EPA 300.0 SW-846 9056	Clean Plastic or glass containers	None / After Leach: 48 hr – NO_2, NO_3 28 days – Br, Cl, F, SO_4	On ice 4+/- 2° Celsius	Walk-in cooler 4± 2° C
Soils	EPA M300.0 SW-846 9056	Clean Plastic or glass containers	None / After extraction: 48 hrs – NO_2, NO_3 28 days – Br, Cl, F, SO_4	On ice 4+/- 2° Celsius	Walk-in cooler 4± 2° C

Table H
QUALITY CONTROL

Quality Control Measure	Requirements
Method Blank	One per batch of samples, up to 20 environmental samples, whichever is more frequent.
Laboratory Control Spike and Duplicate	One LCS per batch of samples, up to 20 environmental samples, whichever is more frequent. An LCSD is run per client request or when there is insufficient sample for MS/MSD.
Matrix Spike / Matrix Spike Duplicate	One pair per batch of samples, up to 10 environmental samples, whichever is more frequent. The sample used for MS/MSD pair is either determined by the client or selected at random from client samples as sample volume allows. No field, filter, trip or equipment blanks can be used for MS/MSD. MS/MSD spike recoveries for all analytes of interest are 90 – 110 % (80-120% for soil samples).
Initial Calibration	Minimum of 5 standards. Must be performed before samples are analyzed. Correlation coefficient must be greater than 0.995
Calibration Verification (ICV/CCV)	ICV - analyzed immediately after calibration. CCV - analyzed after every 10 samples.
Calibration Blank (ICB/CCB)	ICB - analyzed Immediately after ICV. CCB - analyzed after every CCV.
Contract Required Detection Limit (CRDL)	Analyzed immediately after ICB and once a month at a minimum.

Table I
CALIBRATION AND STANDARDIZATION

Calibration Measure	Frequency	Acceptance Criteria
Laboratory Control Spike and Duplicate	• One pair per batch of samples, up to 20 environmental samples, whichever is more frequent.	• 90-110%, RPD 20 (80-120%, RPD 20 for soils)
Matrix Spike / Matrix Spike Duplicate	• One pair per batch of samples, up to 10 environmental samples, whichever is more frequent.	• 90-110%, RPD 20 (80-120%, RPD 20 for soils)
Method Blank	• One per batch of samples, up to 20 environmental samples, whichever is more frequent.	• Method Specific or Less than the CRDL
Initial Calibration	• Before analysis of samples	• Correlation coefficient must be greater than 0.995.
Initial Calibration Verification (ICV)	• After initial calibration and before samples	• 90 – 110% of true value
Initial Calibration Blank	• After ICV and before samples	• ± CRDL
Continuing Calibration Verification	• After 10 samples	• 90 – 110 % of true value (EPA 300.0) • For SW-846 9056, see footnotes
Continuing Calibration Blank	• After CCV	• ± CRDL
Contract Reported Detection Limit (CRDL)	• After ICV or once a month at minimum.	• ± 60-140% of the true value

For samples analyzed by method SW-846 9056, see 13.1.9 for additional requirements.

Table J
PREPARATION OF STANDARDS AND REAGENTS

Standard	Acronym	Concentration	Directions	Final Volume
CAL/CCV 2000 mg/L	2000 mg/L Calibration and CCV Stock Standard	200 mg/L F, 2000 mg/L Cl, 100 mg/L NO_2, 200 mg/L NO_3 2000 mg/L SO_4, 200 mg/L Br	This is a purchased solution containing the correct concentration of each ion.	250 ml
ICV/SPK 2000 mg/L	2000 mg/LICV and Spike Stock Standard	200 mg/L F, 2000 mg/L Cl, 100 mg/L NO_2, 200 mg/L NO_3 2000 mg/L SO_4, 200 mg/L Br	This is a purchased solution containing the correct concentration of each ion.	500 ml
ICV 30	ICV	3 mg/L F, 30 mg/L Cl, 1.5 mg/L NO_2, 3 mg/L NO_3 30 mg/L SO_4, 3 mg/L Br	1.5 mL of ICV/SPK 2000 and diluted into Nanopure up to 200 mL.	100 ml
CCV 30	CCV	3 mg/L F, 30 mg/L Cl, 1.5 mg/L NO_2, 3 mg/L NO_3 30 mg/L SO_4, 3 mg/L Br	3.0 mL of CAL/CCV 2000 and diluted into Nanopure up to 200 mL.	200 ml
LCS/LCSD	Laboratory Control Spike/ Laboratory Control Spike Duplicate	2 mg/L Br, 2 mg/L F, 20 mg/L Cl, 1.0 mg/L NO_2, 2 mg/L NO_3 20 mg/L SO_4	0.05 mL of ICV/SPK 2000 added to 4.95 mL of Nanopure	5.0 mL
MS/MSD	Matrix Spike/ Matrix Spike Duplicate	2 mg/L Br, 2 mg/L F, 20 mg/L Cl, 1 mg/L NO_2, 2 mg/L NO_3 20 mg/L SO_4	0.05 mL of ICV/SPK 2000 added to 4.95 mL of Sample	5.0 mL
CAL5	Level 1	6 mg/L F, 60 mg/L Cl, 6 mg/L NO_2, 6 mg/L NO_3 60 mg/L SO_4, 6 mg/L Br.	3.0 mL of CAL/CCV 2000 mg/L in Nanopure	100 mL
CAL4	Level 2	4 mg/L F, 40 mg/L Cl, 2.0 mg/L NO_2, 4 mg/L NO_3 40 mg/L SO_4, 4 mg/L Br	2.0 mL of CAL/CCV 2000 mg/L in Nanopure	100 mL
CAL3	Level 3	2 mg/L F, 20 mg/L Cl, 1.0 mg/L NO_2, 2 mg/L NO_3 20 mg/L SO_4, 2 mg/L Br	1 mL of CAL/CCV 2000 mg/L in Nanopure	100 mL
CAL2	Level 4	1 mg/L F, 10 mg/L Cl, 0.5 mg/L NO_2, 1.0 mg/L NO_3 10 mg/L SO_4, 1 mg/L Br	0.5 mL of CAL/CCV 2000 mg/L in Nanopure	100 mL
CAL1 (also CRDL)	Level 5	0.4 mg/L F, 4 mg/L Cl, 0.20 mg/L NO_2, 0.4 mg/L NO_3 4 mg/L SO_4, 0.4 mg/L Br	0.2 mL of CAL/CCV 2000 mg/L in Nanopure	100 mL
Daily Eluent	Daily Eluent	0.8M Na_2CO_3 0.1M $NaHCO_3$	4 mL Sodium Bicarbonate Concentrate and 14 mL Sodium Carbonate Concentrate diluted in Nanopure up to 1 L.	1 L
Sodium Bicarbonate Concentrate	Sodium Bicarbonate Concentrate	0.5M $NaHCO_3$	21 g $NAHCO_3$ diluted into Nanopure up to 500 mL.	500 mL
Sodium Carbonate Concentrate	Sodium Carbonate Concentrate	0.5M NA_2CO_3	26.49 g NA_2CO_3 diluted into Nanopure up to 500 mL.	500 mL

Table K
ANALYST/TECHNICIAN DATA ASSESSMENT

Data Assessment Measure	If these conditions are not achieved
Method Blank	• 1
Accuracy & Precision Matrix Spike Samples	• 2
Accuracy & Precision Laboratory Control Spikes	• 3
Initial Calibration	• 4
Initial / Continuing Calibration Verification/ Pace Reporting Limit Standard	• 5
Initial / Continuing Calibration Blank	• 6

1. In the absence of project specific requirements, sample detects less than 10 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 10 times the method blank contamination are reported without qualification.

2. In the absence of project specific or method requirements, in-house generated limits will be used. If the concentration of the spike is less than 25% of the concentration of the parent, no further action is needed unless the parent, MS or MSD concentrations are greater than the top standard in the calibration curve. If the parent, MS or MSD is greater than the top standard of the calibration curve, dilute the parent, MS, and MSD to concentrations that are within the curve. The MS and MSD recoveries do not need to be evaluated. If the concentration of the spike is greater than 25% of the concentration of the parent , use appropriate data qualifier for the parent sample if either the MS or MSD fails. If the MS and MSD fails precision control limits flag the parent with the appropriate data qualifier. Generate a Non-Conformance Memo.

3. If sample volume does not allow re-analysis the entire prep/analytical batch of samples shall be flagged with the appropriate accuracy and (precision) data qualifier to reflect the deficiencies. Generate a Non-Conformance Memo.

4. If correlation coefficient is less than 0.995 perform maintenance and recalibrate.

5. If ICV/CCV is outside the control limits reanalyze the ICV/CCV to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed.

6. If ICB/CCB is outside the control limits reanalyze the ICB/CCB to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. Samples that are > 10X the concentration in the CCB the samples do not have to be reanalyzed.

Table L
REPORT REVIEWER/PROJECT MANAGEMENT DATA ASSESSMENT

Analytical Method Acceptance Criteria⇨ Data Assessment Measure ⇩	Method Citation EPA If these conditions are not achieved ⇒	Method Citation SW 846 If these conditions are not achieved ⇒
Holding Time Compliance	• 1	• 1
Sample Receipt Conditions and Preservation	• 2	• 2
Method Citation	• 3	• 3
Reasonableness: Field Duplicate	• 4	• 4
Reasonableness: Analytical Comment Qualifications	• 5	• 5

1. Flag results with the appropriate data qualifier. The number of dates past hold is addressed in the comments section of the report. Dates past hold will be addressed in the case narrative for Level III and IV.

2. In prose describe the receipt conditions as they relate to the acceptance criteria list in Table G

3. Compare to regulatory program in QAPjP or Chain of Custody.

4. Are duplicates within limits of method citation? If not, internally flag for review.

5. Do related suites of tests agree or are reasonable.

Pace Analytical Service, Ine
1241 Bellevue Street, Suite1
Green Bay, WI 54302
Phone: 920-469-2436
Fax: 920-469-8827

IC Batch Tracking

Queue: WETA
Batch:
HBN:

Method: EPA 300.0 EPA 9056
Instrument: 40WTA3 40WTA4
Serial Number: 97040612 98010545

Sample ID	QC	Fluoride	Dil	Chloride	Dil	Nitrite	Dil	Bromide	Dil	Nitrate	Dil	Sulfate	Dil
	MB												
	LCS												

Comments: Check box if there is an issue and document what was done.

Run	#		Notes (Analytes listed here are failures):		Batch Qualifiers	
	1	☐	MB:		B / Z	
	2	☐	LCS/LCSD:			
	3	☐	MS/MSD:		M0 / P6	
	4	☐	DUP:		R1	
	5	☐	Other:			

Concentrations are in ppm

Sample Collection, Preservation, & Handling:

1 ☐ **Hold Time:** Samples must be analyzed within accordance of method specified hold time.
Corrective Action: If samples are analyzed outside of hold time, they must be Qualified and a Labtrack Issued

2 ☐ **Preservation:** Samples must be preserved within accordance of method specified criteria.
Corrective Action: If samples are not preserved within accordance of the method specified criteria, they must

3 ☐ **Storage:** Samples must be stored within accordance of method specified criteria.
Corrective Action: If samples are not stored within accordance of the method specified criteria, they must be

Data Posting

☐ Data was hand entered or posted with problems.
☐ Auto-flagging was used.

Issues: Write any and all out of control issues below:

☐ Labtrack was issued
☐ PM was notified

To the best of my knowledge, all of the above information is correct and all supporting documentation has been provided.

Analyst: _____ **Date:** _____

F-GB4-112-Rev.03 (05Oct2011) IC Batch Form
Pace Analytical - Green Bay Laboratory

Reviewer: _____ **Date:** _____

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Phone: 920.469.2436
Fax: 920.469.8827

STANDARD OPERATING PROCEDURE

Ferrous Iron

Reference Methods: HACH: Ferrous Iron, 1,10-Phenathroline Method 8146

SOP NUMBER:	S-GB-I-017-REV.03
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S-GB-I-017-REV.02

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 09/28/12

Kate Grams, Laboratory Quality Manager — Date: 9/27/12

Chad Rusch, Department Manager — Date: 09/27/2012

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-I-017-REV.03

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1. Purpose/Identification of Method

The purpose of this Standard Operating Procedure (SOP) is to provide a consistent format for performing Ferrous Iron analysis.

2. Summary of Method

The 1,10 phenanthroline indicator in Ferrous Iron reagents reacts with Ferrous Iron in the sample to form an orange color in proportion to the Iron concentration. Ferric Iron (+3) does not react. The Ferric Iron concentration can be determined by subtracting the ferrous iron concentration from the total iron result. Total iron is determined on Inductively Coupled Plasma or Inductively Coupled Plasma Mass Spec.

3. Scope and Application

3.1 This SOP is applicable to drinking, ground, and surface waters and domestic and industrial wastes.

3.2 This SOP utilizes HACH ferrous iron reagent powder pillows.

4. Applicable Matrices

4.1 Drinking, ground, and surface waters

4.2 Domestic and industrial wastes

5. Limits of Detection and Quantitation

5.1 Current MDL and RL can be found in the Laboratory Information Management System (EpicPro) or in the Green Bay Wet Chemistry Method Detection Limit Summary.

6. Interferences

6.1 Samples should be analyzed as soon as possible to avoid oxidation of ferrous iron to ferric iron.

7. Sample Collection, Preservation, Shipment and Storage

Table 1: Sample Collection, Preservation, Shipment, and Storage

Matrix	Container(s)	Preservation	Hold Time*	Shipment Conditions	Lab Storage Conditions
Aqueous	Glass or Plastic	None	Immediate	On ice, $\leq 6^0$C	$\leq 6^0$C

*Immediate Hold time is designated as 15 minutes, samples will receive appropriate data qualifiers when analyzed within the laboratory.

8. Definitions

8.1 Refer to Section 10.0 of the most current version of the Pace Quality Manual for the terms used at Pace Analytical. When definitions are not consistent with NELAC defined terms, an explanation will be provided in this SOP.

9. Equipment and Supplies

Table 2: Equipment

Equipment	Manufacturer	Model(s)/Catalog number •
Spectrophotmeter	HACH	DR2000
Vented Hood	Hamilton	

- Or equivalent

Table 3: Supplies

Supplies	Manufacturer ·	Catalog number
25mL Cells	HACH	
Volumetric Flasks (100, 500mL)	Fisher	Various
Graduated Cylinder (25mL)	Fisher	
Fixed Pipettor	Eppendorf	
Adjustable Pipettor	Eppendorf	
Disposable Pipette Tips	Eppendorf	
Gloves	Fisher	

- Or equivalent

10. Reagents and Standards

10.1 HACH Ferrous Iron Reagent Powder Pillows

10.2 Ferrous Ammonium Sulfate: $Fe(NH_4)_2(SO_4)_2 \cdot 6H_2O$

10.2.1 Stock Ferrous Iron Standard (150 mg/L)

10.2.1.1 Primary Source: Dilute 0.5267 g Ferrous Ammonium Sulfate in ~400 ml DI water in a 500 ml volumetric flask. Dilute to volume. Prepare fresh daily. This primary source standard will be diluted to make the calibration standards, the Continuing Calibration Verification (CCV) Standards, the MS/MSDs, and the LCS/LCSDs.

10.2.1.2 Second Source: Using a Lot of Ferrous Ammonium Sulfate different from the primary source, dilute 0.5267 g Ferrous Ammonium Sulfate in ~400 ml DI water in a 500 ml volumetric flask. Dilute to volume. Prepare fresh daily. This second source standard will be diluted to make the Initial Calibration Verification (ICV) Standard.

10.2.2 Working Standards – Prepare fresh daily

10.2.2.1 50 µg/L Calibration Standard and CRDL Standard: Pipette 0.0333 ml of Primary Source stock standard into ~90 mls of DI water in 100 ml volumetric flask. Dilute to volume. Final concentration is 50 µg/L.

10.2.2.2 100 µg/L Calibration Standard: Pipette 0.0667 ml of Primary Source stock standard into ~90 mls of DI water in 100 ml volumetric flask. Dilute to volume. Final concentration is 100 µg/L.

10.2.2.3 250 µg/L Calibration Standard: Pipette 0.1667 ml of Primary Source stock standard into ~90 mls of DI water in 100 ml volumetric flask. Dilute to volume. Final concentration is 250 µg/L.

10.2.2.4 500 µg/L Calibration Standard: Pipette 0.3333 ml of Primary Source stock standard into ~90 mls of DI water in 100 ml volumetric flask. Dilute to volume. Final concentration is 500 µg/L.

10.2.2.5 1000 µg/L Calibration Standard: Pipette 0.6667 ml of Primary Source stock standard into ~90 mls of DI water in 100 ml volumetric flask. Dilute to volume. Final concentration is 1000 µg/L.

10.2.2.6 Initial Calibration Verification Standard (ICV): Pipette 0.10 ml of Second Source stock standard into 25.0 mls of DI water in a 25 mL sample cell. Final concentration is 600 µg/L.

10.2.2.7 Continuing Calibration Verification Standard (CCV): Pipette 0.10 ml of Primary Source stock standard into 25.0 mls of DI water in a 25 mL sample cell. Final concentration is 600 µg/L.

10.2.2.8 Quality Control Samples: For LCS/LCSD, MS/MSD pipette 0.10 ml of Primary Source stock standard into 25.0 mls of DI water in a 25 mL sample cell. Final concentration is 600 µg/L.

10.3 Deionized Water used for method blanks and Initial and Continuing Calibration Blanks (ICB/CCB).

11. Calibration and Standardization

11.1 The spectrophotometer must be calibrated at least yearly or whenever the continuing calibration standard does not pass control criteria..

11.2 Turn on the spectrophotometer and let warm up for 20 minutes.

11.3 Data is entered into F-GB-I-028 (most current revision or replacement).

11.4 On the spectrophotometer, press “0” then “Read/enter”. The display will show: “Abs”.

11.5 Rotate the wavelength dial until the small display shows: 510 nm.

11.6 Measure 25mLs of Deionized water with graduated cylinder and pour into 25 ml cell with blank.

11.7 Place cell in spectrophotometer and press “zero”.

11.8 Measure 25mL of each calibration standard (50 µg/L Calibration Standard, 100 µg/L Calibration Standard, 250 µg/L Calibration Standard, 500 µg/L Calibration Standard, 1000 µg/L Calibration Standard) and pour each standard into separate, clean 25 ml cells. Read and record each standard’s absorbance on bench sheet.

11.9 Plot the absorbance versus the concentration.

11.10 The correlation coefficient must be 0.995 or higher and the y-intercept less than ½ the PRL of 0.1 mg/L. If these criteria are not met, repeat the calibration steps. If these criteria still are not met, remake standards and recalibrate. If these criteria still are not met, perform maintenance on the spectrophotometer.

12. Procedure

12.1 Turn on the spectrophotometer and let warm up for 20 minutes.

12.2 Prepare Bench sheet.

12.3 On the spectrophotometer, press “0” then “Read/enter”. The display will show: “Abs”.

12.4 Rotate the wavelength dial until the small display shows: 510 nm.

12.5 Measure 25 ml of Sample, ICV, CCV, ICB, MB into 25 mL sample cell using a graduated cylinder. Prepare LCS/LCSD and MS/MSD as stated in section 10.2.

12.6 Zero the spectrophotometer for Initial Absorbance reading.

12.6.1 Place 25 mL cell ICB into spectrophotometer.

12.6.2 Press “zero” to zero the instrument.

12.6.3 Remove ICB from spectrophotometer.

12.7 Measure Initial Absorbance.

12.7.1 One at a time, place samples and QC in spectrophotometer.

12.7.2 Record the initial absorbance on the bench sheet.

12.7.3 Remove cells from spectrophotometer.

12.8 React Samples.

12.8.1 Add one reagent powder pillow to ICB, all QC and samples.

12.8.2 Invert cell several times to mix.

12.8.3 Set and run timer for three minutes to measure the reaction period.

12.9 Zero the spectrophotometer for Final Absorbance reading.

12.9.1 Place 25mL ICB into spectrophotometer.

12.9.2 Press “zero” to zero instrument.

12.9.3 Remove ICB from spectrophotometer.

12.10 Measure Final Absorbance.

12.10.1 One at a time, place samples and QC in spectrophotometer.

12.10.2 Record the final absorbance on the bench sheet.

12.10.3 Remove cells from spectrophotometer.

12.10.4 If samples are above the high standard, dilute un-reacted sample and repeat the analysis.

12.11 Calculations: Data is entered into the most current version of GBI028a or the Pace Electronic Prep Log. Calculations are performed automatically.

13. Quality Control

13.1 Reporting Limit Verification Standard (CRDL) – A standard prepared at the concentration of the Pace Reporting Limit. It is analyzed after the calibration and monthly thereafter, recovery 60-140% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate

13.2 Initial Calibration Verification (ICV)

13.2.1 Prepare an ICV from a different source than the calibration standards.

13.2.2 After the instrument has been calibrated and before samples are run, the accuracy of the initial calibration shall be verified and documented by the analysis of the ICV. When measurements exceed the control limits of +/- 10%, the analysis must be terminated, the problem corrected and the calibration re-verified.

13.3 Continuing Calibration Verification (CCV)

13.3.1 A CCV standard must be analyzed and reported at a frequency of 10% to ensure calibration accuracy during the analytical run. The CCV is made from the same source as the calibration.

13.3.2 If the deviation of the CCV is greater than +/- 10% of the true value, the analysis must be terminated, the problem corrected, the calibration verified and all analytical samples since the last compliant CCV must be reanalyzed.

13.3.3 Only one CCV needs to be created; the same CCV can be read multiple times on the spectrophotometer.

13.4 Initial Calibration (ICB) and Continuing Calibration Blank (CCB)

13.4.1 A calibration blank must be analyzed immediately after every ICV and CCV.

13.4.2 The ICB and CCB must be less than the PRL.

13.4.3 The same 25 mL sample cell with DI water can be used for zeroing the instrument, as the ICB, and as the CCBs.

13.5 Method Blank (MB)

13.5.1 The MB is blank water analyzed exactly like a sample. The MB is used to determine whether the methodology is in control.

13.5.2 A MB must be analyzed with each batch of samples or every 20 samples, whichever is more frequent.

13.5.3 Acceptance Criteria: The MB must be less than the PRL.

13.5.4 If the MB is not within control limits, perform the following:

13.5.4.1 Check for errors in calculations. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.5.4.2 If sufficient sample is available, re-prepare the MB and all associated samples if an error in procedure is discovered which cannot be corrected. If the MB is within the RL in this analysis, accept the second set of data. If the MB is still outside the RL after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant MB.

13.5.4.3 If sufficient sample volume is not available, report the sample data with a qualifier flag on each of the samples associated with the non-compliant MB. Contact the project manager regarding the occurrence.

13.5.4.4 In the absence of project specific requirements, sample detects less than 10 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 10 times the method blank contamination are reported without qualification.

13.6 Laboratory Control Sample (LCS) – A primary source standard is prepared for use as the LCS. The LCS is analyzed exactly like a sample. The LCS is used to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurement.

13.6.1 An LCS must be analyzed with each batch of samples or every 20 samples, whichever more frequent.

13.6.2 Percent Recovery is calculated as follows:

$$\% \text{ Recovery} = \frac{\text{LCS concentration}}{\text{LCS known concentration}} \times 100$$

13.6.3 Acceptance Criteria: The LCS recovery must be within the control limits of 80-120%.

13.6.4 If the recovery is not within control limits, perform the following:

13.6.4.1 Check for errors in calculations, standards preparation and spiking of the LCS solution. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.6.4.2 If sufficient sample is available, re-prepare the LCS and all associated samples if an error in procedure is discovered which cannot be corrected. If the recovery is within the limits in this analysis, accept the second set of data. If the recovery is still outside the limits after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant LCS.

13.6.4.3 If sufficient sample volume is not available, report the sample data with the appropriate data qualifier on each of the samples associated with the non-compliant LCS. Contact the project manager regarding the occurrence.

13.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Aliquots of an environmental sample to which known quantities of the analyte(s) of interest are added in the laboratory. Their purpose is to quantify the bias and precision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS/MSD corrected for background concentrations.

13.7.1 A matrix spike / matrix spike duplicate will be performed on a 5% basis if sample volume permits.

13.7.2 The percent recovery is calculated as follows:

$$\% \text{ Recovery: } \frac{(SSR - SR)}{SA} \times 100$$

Where:
SSR = spiked sample result, mg/L
SR = sample result, mg/L
SA = spike amount, mg/L

13.7.3 Acceptance limits: The percent recovery must be within 80 - 120% of the true value.

13.7.4 If the percent recovery is exceeded, then:

13.7.4.1 Check for errors in calculations and sample preparation. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.7.4.2 If no errors are found in the calculations report the parent sample with the appropriate data qualifier.

13.8 Duplicate sample (D) –A duplicate aliquot of a sample to be analyzed along with the original sample. Duplicate analysis indicates the precision associated with the sample collection, preservation and storage, as well as, laboratory procedures. An MSD is normally performed instead of a Duplicate Sample.

13.8.1 Duplicate sample analysis will be performed at a frequency of 5% if requested by the client.

13.8.2 The relative percent difference (RPD) is calculated as:

$$\textbf{RPD} = \frac{|S - D|}{(S + D)/2} * 100$$

Where: **S** = sample value, mg/L
D = duplicate value, mg/L

13.8.3 Acceptance limits: The RPD must be within 0-20% between the original sample and the duplicate.

13.8.4 If the RPD is exceeded, then:

13.8.4.1 Check for errors in calculations and sample preparation. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.8.4.2 If no errors are found in calculations report the parent sample with the appropriate data qualifier.

13.9 Documentation

13.9.1 Draw a single-line strike through for any unacceptable or changed data, then DATE and INITIAL and provide a written explanation of the reason for the change.

13.9.2 Any discrepancies and issues occurring with each batch should be included in a non-conformance, which is submitted to the QA manager for review, and incorporated into a narrative.

14. Data Analysis and Calculations

See sections 12 and 13 for calculations.

15. Data Assessment and Acceptance Criteria for Quality Control Measures

Table 4: Data Assessment and Acceptance Criteria

Analytical Method ⇨ Calibration Measure ⇩	**EPA 310.2 Frequency**	**Acceptance Criteria**
Laboratory Control Spike and Laboratory Control Spike Duplicate	One LCS per batch of samples, up to 20 environmental samples, whichever is more frequent. A LCSD is required if MS/MSD is not performed or if requested by the client.	Project Specific or For water 80 –120% with 20% RPD
Matrix Spike / Matrix Spike Duplicate (MS/MSD)	One pair per batch of samples, up to 10 environmental samples, whichever is more frequent.	Project Specific or For water 80 –120% with 20% RPD
Method Blank	One per batch of samples, up to 20 environmental samples, whichever is more frequent.	Project Specific or Less than the RL (lowest standard in curve)
Initial Calibration	Analyzed daily before samples Minimum 5 standards plus a blank	Correlation coefficient must be 0.995 or greater
Initial Calibration Verification (ICV)	Analyzed after calibration at two different concentrations. One standard concentration must be below and one standard concentration must be above the inflection point of the calibration curve.	Recovery must be between 90 – 110%
Initial Calibration Blank (ICB)	Analyzed after ICV pair but before samples.	Project specific or Less than RL (lowest standard in curve)
CRDL	Analyzed after Initial Calibration. Analyzed monthly thereafter at a minimum.	60-140%
Continuing Calibration Verification (CCV)	Analyzed after every 10 samples at two different concentrations. One standard concentration must be below and one standard concentration must be above the inflection point of the calibration curve.	Project specific or Recovery between 90 – 110%
Continuing Calibration Blank (CCB)	After each CCV pair but before samples.	Project specific or Less than RL (lowest standard in curve)

16. Corrective Actions for Out-of-Control Data

Table 5: Corrective Action

Analytical Method Acceptance Criteria⇨ Data Assessment Measure ⇩	**Method Citation: EPA 310.2 If these conditions are not achieved ⇒**
Method Blank	• 1
Accuracy & Precision Matrix Spike Samples	• 2
Accuracy & Precision Laboratory Control Spikes	• 3
Initial Calibration	• 4
Initial / Continuing Calibration Verification	• 5
Initial / Continuing Calibration Blank	• 6
Holding Time Compliance	• 7
Sample Receipt Conditions and Preservation	• 8
Method Citation	• 9
Reasonableness: Field Duplicate	• 10
Reasonableness: Analytical Comments Qualifications	• 11
CRDL	• 12

1. In the absence of project specific requirements, sample detects less than 10 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 10 times the method blank contamination are reported without qualification.

2. In the absence of project specific or method requirements, in-house generated limits will be used. If the MS or MSD fail because the concentration of the spike is less than 25% of the concentration of the parent, use appropriate flag for the parent sample. If the parent, MS, or MSD is greater than the top standard in the curve, dilute and reanalyze the parent, MS, and MSD following the above guidance. If the concentration of the spike is greater than 25% of the concentration of the parent, use appropriate flag for the parent sample if either the MS and/or MSD fails. If the MS and MSD fails precision control limits flag the parent with the appropriate precision data qualifier. Generate a Non-Conformance Memo.

3. If sample volume does not allow re-analysis the entire prep/analytical batch of samples shall be flagged with the appropriate accuracy and appropriate precision qualifier to reflect the deficiencies. Generate a Non-Conformance Memo.

4. If correlation coefficient is less than 0.995 perform maintenance and recalibrate.

5. If ICV/CCV is outside the control limits reanalyze the ICV/CCV to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed.

17. Contingencies for Handling Out-of-Control or Unacceptable Data

17.1 See Table 5: Corrective Action and Attachment I: Flow Chart

18. Method Performance

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.1.1 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.1.2 An initial demonstration of capability (IDC) must be performed per S-ALL-Q-020, *Orientation and Training Procedure*s. A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager.

18.1.3 An annual method detection limit (MDL) study will be completed per S-GB-Q-020, *Determination of LOD and LOQ*, for this method and whenever there is a major change in personnel or equipment. The results of these studies are retained in the quality assurance office.

18.1.4 Periodic performance evaluation (PE) samples are analyzed per S-GB-Q-021, *PE/PT Program*, to demonstrate continuing competence. All results are stored in the QA office.

19. Method Modifications

None required for this SOP.

20. Instrument/Equipment Maintenance

20.1 See HACH DR2000 Spectrophotometer operator's manual for information.

21. Troubleshooting

21.1 See HACH DR2000 Spectrophotometer operator's manual for information.

22. Safety

22.1 The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard and exposure should be as low as reasonably achievable. Cautions are included for known extremely hazardous materials.

22.2 A reference file of Material Safety Data Sheets (MSDS) is made available to all personnel involved in the chemical analysis, and is located at the front desk. A formal safety plan has been prepared and is distributed to all personnel with documented training.

22.3 The use of personal protective equipment (gloves, lab coats and safety glasses) is required when handling samples.

23. Waste Management

23.1 Excess reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult the current version of S-GB-S-006, *Waste Handling and Management*.

24. Pollution Prevention

24.1 Pollution prevention encompasses any technique or procedure that reduces or eliminates the quantity or toxicity of waste at the point of generation.

24.2 The quantity of chemicals purchased is based on expected usage during its shelf life and disposal cost of unused material. Actual reagent preparation volumes reflect anticipated usage and reagent stability.

24.3 The laboratory Chemical Hygiene Plan/Health and Safety Plan contains additional information on pollution prevention.

25. References

25.1 Pace Quality Assurance manual (most current revision or replacement).

25.2 The NELAC Institute (TNI); Volume 1, Module 2, “Quality Systems” (most current revision or replacement).

25.3 HACH Water Analysis Handbook: Ferrous Iron, 1,10 Phenathroline Method - Method 8146

26. Tables, Diagrams, Flowcharts, Appendices, Addenda etc.

26.1 Attachment I: Ferrous Iron Bench sheet and Curve Forms

26.2 Attachment I Flow Chart

27. Revisions

Document Number	Reason for Change	Date
GB-I-017-Rev.0	Reformatted body from En Chem to Pace Analytical format.	30 August2005
S-GB-I-017-REV.01	Updated signature page Updated Sections 5 and 6 with current information Deleted Section 7 Renumbered document. Section 9 – Update standard concentrations and volumes Section 12 - Updated data qualifiers Section 12.5.3.4 – Method blank acceptance criteria added. Section 13 – Updated SOP references. Section 14 – Updated SOP reference	22July2008
S-GB-I-017-Rev.02.	Updated signature page. Updated data qualifier wording Updated Attachment I and II: Ferrous Iron Bench sheet and Curve forms.	22Jan2010
S-GB-I-017-Rev.03	Updated SOP format to be consistent with SOP: S-GB-Q-017 *Preparation of SOPs* Updated SOP references throughout document.	14Sep2012

Attachment I: Ferrous Iron Calibration Form

Ferrous Iron Benchsheet

Ferrous Iron Calibration Curve

Date: 2/9/2012
Analyst: DEY

Corr. Coefficient 0.99919516
Y-Intercept 0.00116475
Slope 0.00036422

Log book Number	Concentration (ug/L):	Net Absorbance		Recovery
1229-14-1	0.00	0.000	-3.1979503	NA
1229-14-2	50.00	0.019	48.9688113	97.9
1229-14-3	100.00	0.041	109.37243	109.4
1229-14-4	250.00	0.097	263.127096	105.3
1229-14-5	500.00	0.173	471.794142	94.4
1229-14-6	1000.00	0.369	1009.93547	101.0

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Attachment II: Ferrous Iron Bench sheet

Ferrous Iron Benchsheet

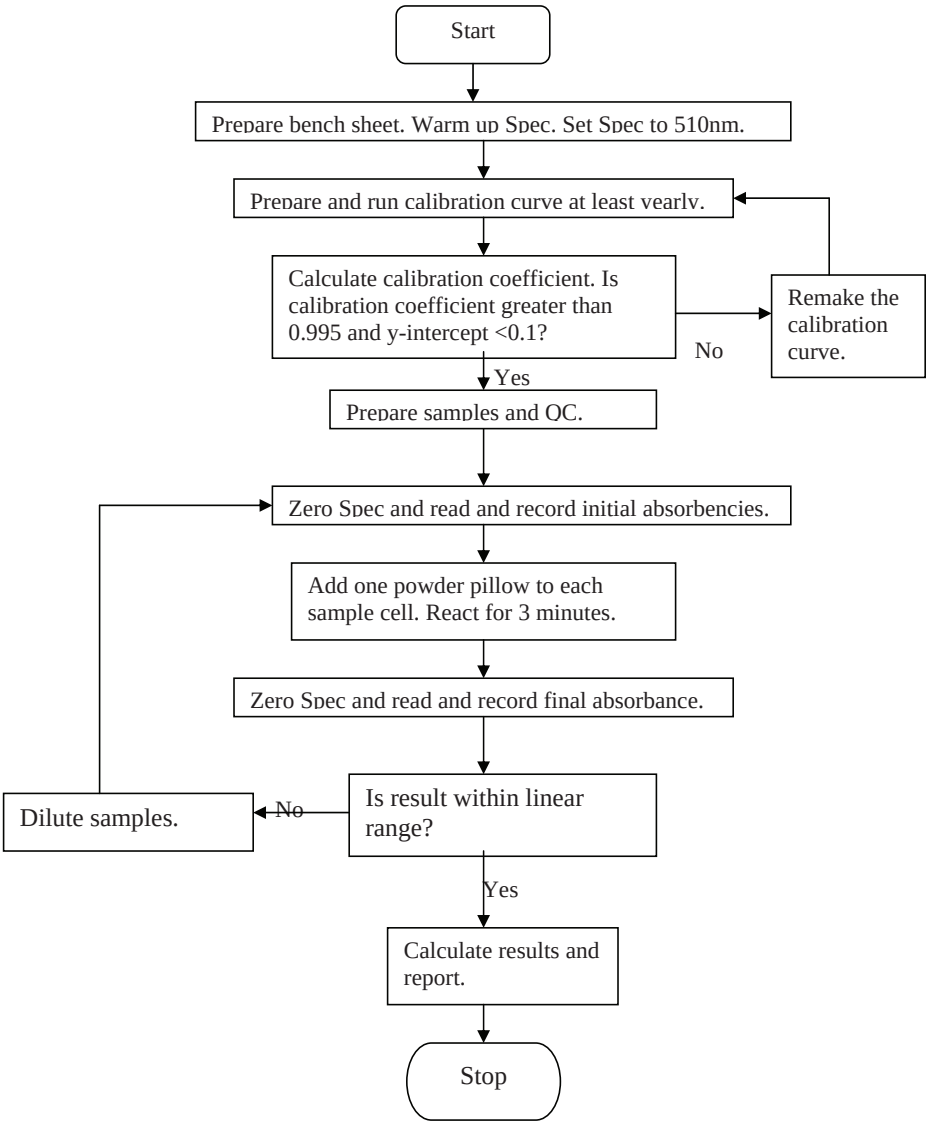
MDL(ug/L): 26 | MATRIX: W | Analysis Date: | WET:
Curve Date: 2/9/12 | Stock std SSR#: 1229-15- | LCS SSR#: 1229-68- | Analyst: | HBN:
Method: Hach 8146 | Fe2 Iron reagent SSR#: 1229-8-3 | CCV SSR#: 1229-69- | Instrument ID: 40WTA1
Data File Name: Ferrous Iron master3 | ICV SSR#: 1229-76- | MS SSR#: 1229-64- | MSD SSR#: 1229-64- | Hach Spec #:9600/9609/9446

Lab #	Sample Date	Prep Time	Sample Vol (mL)	Final Vol (mL)	Absorbances Initial	Absorbances Final	% Solids	Spike Conc. (ug/L)	Net Absorb.	Conc. (ug/L)	Dilution Factor	% RPD	Recovery (%)	Final Conc.	Units	Sample MDL	Flag	Comments
ICV			25	25				600	0.000	-3.20	1.00		-0.5	-3.20	ug/L	26.00		
ICB			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
MB			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
LCS			25	25				600	0.000	-3.20	1.00		-0.5	-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
MS			25	25				600	0.000	-3.20	1.00		-0.5	-3.20	ug/L	26.00		
MSD			25	25				600	0.000	-3.20	1.00	0.00	-0.5	-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
CCV			25	25				600	0.000	-3.20	1.00		-0.5	-3.20	ug/L	26.00		
CCB			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
CCV			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
CCB			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
CCV			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
CCB			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00			-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00	#######	-3.20	ug/L	26.00		
			25	25					0.000	-3.20	1.00	0.00		-3.20	ug/L	26.00		

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Attachment III
FLOW CHART



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STANDARD OPERATING PROCEDURE

Total Phosphorus using Block Digestion and Analyzed by SmartChem

Reference Method: EPA 365.4

SOP NUMBER:	S-GB-I-061-REV.02
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S-GB-I-061-Rev.01

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 10/30/12

Kate Grams, Laboratory Quality Manager — Date: 10/23/12

Chad Rusch, Department Manager — Date: 10/30/2012

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-I-061-REV.02

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1. PURPOSE/IDENTIFICATION OF THE METHOD

This Standard Operating Procedure (SOP) describes the analyses of Total Phosphorus using Block Digestion and Analyzed by SmartChem by EPA 365.4.

2. SUMMARY OF METHOD

2.1 The sample is heated in the presence of sulfuric acid, K_2SO_4 and $HgSO_4$ for two and one half hours. The residue is cooled, diluted to 20 ml and placed on the Auto Analyzer for phosphorus determination. This digestion can also be used for TKN.

2.2 Ammonium molybdate and antimony potassium tartrate react in an acid medium with dilute solutions of phosphorus to form an antimony-phospho-molybdate complex. This complex is reduced to an intensely blue-colored complex by ascorbic acid which is measured at 880 or 660 nm. The color is proportional to the phosphorus concentration.

3. SCOPE AND APPLICATION

3.1 This SOP is applicable to the analysis of Total Phosphorus in drinking, ground, surface, and saline waters, domestic and industrial wastes, soils, and TCLP, ASTM, and SPLP extracts. The applicable range is MDL to the top standard in the curve. This SOP covers two calibration curves/ranges. The lower of the two ranges is referred to Low Level Phosphorus.

3.2 This SOP utilizes the SmartChem Discrete analyzer.

4. APPLICABLE MATRICES

4.1 Drinking, ground, surface, and saline waters

4.2 Domestic and industrial wastes

4.3 Soils and Solid matrices.

4.4 TCLP, ASTM, and SPLP extracts

5. LIMITS OF DETECTION AND QUANTITATION

5.1 Current MDL and RL can be found in the Laboratory Information Management System (EpicPro) or in the Green Bay Wet Chemistry Method Detection Limit Summary.

5.2 The Low Level Phosphorus calibration curve and standards are a factor of 10 lower than the regular Phosphorus calibration.

6. INTERFERENCES

6.1 Arsenates react with the molybdate reagent to produce a blue color similar to that formed with phosphate. Concentrations as low as 0.1 mg/L arsenic may cause a positive error. Treat samples high in arsenates with sodium bisulfite before digestion to eliminate this interference.

6.2 Concentrations of iron greater than 50 mg/L cause a negative error due to competition with the complex for the reducing agent ascorbic acid. Treat samples high in iron with sodium bisulfite before digestion to eliminate this interference, as well as the interference due to arsenates.

6.3 Samples for total phosphorous should only be filtered after digestion. Sample color that absorbs in the photometric range use for analysis will also interfere.

6.4 Glassware washed with commercial detergents can cause a contamination problem. All glassware used should be washed with 1:1 HCl and rinsed with deionized water.

7. SAMPLE COLLECTION, PRESERVATION AND HANDLING

Table 1: Sample Collection, Preservation and Handling

Matrix	Method	Container(s)	Preservation Hold Time	Shipment Conditions	Lab Storage Conditions
Aqueous	EPA 365.4	250 ml plastic containers	H_2SO_4 / 28 days	On ice $\leq 6^o$ Celsius	Walk-in cooler $\leq 6^o$ C
Solid	EPA 365.4	Glass or plastic containers	None / 28 days	On ice $\leq 6^o$ Celsius	Walk-in cooler $\leq 6^o$ C

8. DEFINITIONS

8.1 Refer to Section 10.0 of the most current version of the Pace Quality Manual for the terms used at Pace Analytical. When definitions are not consistent with NELAC defined terms, an explanation will be provided in this SOP.

8.2 Reagent Base Line (RBL) – Absorbance created when the diluent and method reagents are added to the cuvette. The diluent is a matrix match of the sample matrix.

8.3 Water Base Line (WBL) – Absorbance created when reagent grade water is added to the cuvette. The WBL is used to check the quality of the cuvette, condition of the filters, and lamp. If the value is too high or too low the cuvette will be rejected and will not be used in the analysis.

9. EQUIPMENT AND SUPPLIES

Table 2: Equipment

Equipment	Manufacturer	**Model(s)/Catalog number***
Westco SmartChem Discrete Analyzer	Westco	Discrete Analyzer
Westco Block Digestor	Westco	40 position
Analytical Balance	Mettler	BA310P
500 µL Pipette	Eppendorf	05-402-76 (Fisher Cat#)
250 µL Pipette	Eppendorf	05-402-72 (Fisher Cat#)
1000 uL Pipette	Eppendorf	05-402-69 (Fisher Cat#)
Repipetors (0.5 - 5.0mL)	Barnstead/Thermolyne	13-687-33 (Fisher Cat#)
Vented Hood	Hamilton	
Spoonula (Lab Spoon)	FisherBrand	14-375-10 (Fisher Cat#)
Glass pipette, graduated, widemouth		
Block Digestor #1	Bran & Lubbe	BD-40
Block Digestor #2	Tecator	2040 Digestor
Volumetric flasks, various		

* Or equivalent

Table 3: SUPPLIES

Supplies	**Vendor**	Catalog number*
Digestion tubes – 75 mL	Bran & Lubbe	
Boiling chips	MG Scientific	B336-1
Culture Tubes 13X100	Fisher	71500 13100
* Or equivalent		

10. REAGENTS AND STANDARDS

Table 4: REAGENTS

Reagent	Alias	Concentration	Directions found in
Ammonium Molybdate Tetrahydrate ($[(NH_4)_6Mo_7O_{24}\bullet 4H_20]$		Neat	
Antimony Potassium Tartrate $[K(SbO)C_4H_4O_6\bullet 1/2H_2O]$		Neat	
Molybdate/Antimony Solution			Table 6
Sulfuric Acid		Concentrated	
Sulfuric Acid Solution		4%	Table 6
Ascorbic Acid		Neat	
Ascorbic Acid Solution			Table 6
Acetone			
Sodium Dodecyl Sulfate		Neat	
Sodium Dodecyl Sulfate Solution	SDS	15%	Table 6
Sodium Chloride		Neat	
Acid / Salt Solution	Reagent A		Table 6
Salt Solution	Reagent B		Table 6
Potassium Sulfate (K_2SO_4)		Neat	
Sulfuric Acid-Mercuric Sulfate-Potassium Sulfate Solution	Digestion Solution		Table 6
Reagent Water	Deionized Water		
Mercuric Oxide Red		Neat	
Mercuric Sulfate Solution			Table 6
Hydrochloric Acid		Concentrated	
Hydrochloric Acid – 6 N	Glassware Rinse Solution	6 N	Table 6
Potassium Hypophosphate (KH_2PO_4)		Neat	
Cuvette Cleaning Solution		Westco Part # 3AS-RN00-20	
Cuvette Cleaning Solution			Table 6
Probe Rinse Solution		Westco Part # 3AS-RN00-21	
Probe Rinse Solution			Table 6
Matrix Solution			Table 6

Table 5: STANDARDS

Standard	Concentration	Direction found in Section:	Alias
Potassium hypophosphate (KH_2PO_4) Dry at 105ºC for 1 hour.	-1000 mg/L -100mg/L(LLPhos)	Table 6	Stock Standard
Potassium hypophosphate (KH_2PO_4) Dry at 105ºC for 1 hour. Must be of different Lot # than Stock.	-1000 mg/L -100mg/L(LLPhos)	Table 6	Second Source Stock Standard
Level 1 Calibration Standard	20 mg/L	Table 6	Cal Std. 1
Level 2 Calibration Standard	10 mg/L	Diluted by Instrument from Cal Std. 1	Cal Std. 2
Level 3 Calibration Standard	5.0 mg/L	Diluted by Instrument from Cal Std. 1	Cal Std. 3
Level 4 Calibration Standard	2.0 mg/L	Diluted by Instrument from Cal Std. 1	Cal Std. 4
Level 5 Calibration Standard	1.0 mg/L	Diluted by Instrument from Cal Std. 1	Cal Std. 5
Level 6 Calibration Standard and RLVS standard	0.40 mg/L	Diluted by Instrument from Cal Std. 1	Cal Std. 6
Level 7 Calibration Standard	0.0 mg/L		Cal Std. 7
Initial Check Verification	5.0 mg/L	Table 6	ICV
Continuing Check Verification	10 mg/L	Table 6	CCV
Laboratory Control Spike/Laboratory Control Spike Duplicate	5.0 mg/L	Table 6	LCS/LCSD
Matrix Spike/Matrix Spike Duplicate	5.0 mg/L	Table 6	MS/MSD
Low Level, Level 1 Calibration Standard	2.0 mg/L	Table 6	LL Cal Std. 1
Low Level, Level 2 Calibration Standard	1.0 mg/L	Diluted by Instrument from LL Cal Std. 1	LL Cal Std. 2
Low Level, Level 3 Calibration Standard	0.50 mg/L	Diluted by Instrument from LL Cal Std. 1	LL Cal Std. 3
Low Level, Level 4 Calibration Standard	0.20 mg/L	Diluted by Instrument from LL Cal Std. 1	LL Cal Std. 4
Low Level, Level 5 Calibration Standard	0.10 mg/L	Diluted by Instrument from LL Cal Std. 1	LL Cal Std. 5
Low Level, Level 6 Calibration Standard and RLVS standard	0.04 mg/L	Diluted by Instrument from LL Cal Std. 1	LL Cal Std. 6
Low Level, Level 7 Calibration Standard	0.0 mg/L		LL Cal Std. 7
Low Level Initial Check Verification	0.5 mg/L	Table 6	LL ICV
Low Level Continuing Check Verification	1.0 mg/L	Table 6	LL CCV
Low Level Laboratory Control Spike/Laboratory Control Spike Duplicate	.5 mg/L	Table 6	LL LCS/LCSD
Low Level Matrix Spike/Matrix Spike Duplicate	0.5 mg/L	Table 6	LL MS/MSD

Table 6: PREPARATION OF STANDARDS

Standard	Alias	Final Concentration	Directions	Final Volume
Potassium hypophosphate (KH_2PO_4)	Stock Standard	-1000 mg/L -100mg/L(LLPhos)	Dissolve 4.394 g (0.4394g for LLPhos) of potassium hypophosphate KH_2PO_4 dried at 105˚C for 1 hour in 900 ml of reagent water. Add 2 ml of conc. H_2SO_4 and dilute to 1 liter.	1000 ml
Level 1 Calibration Standard	Cal Std. 1	20 mg/L	Pipette 2.0 ml of stock standard to 100 ml volumetric flask. Dilute to volume with matrix solution. Prepare fresh monthly.	100 ml
Level 1 Low Level Calibration Standard	LL Cal Std. 1	2 mg/L	Pipette 0.2 ml of stock standard to 100 ml volumetric flask. Dilute to volume with matrix solution. Prepare fresh monthly.	100 ml
Initial Check Verification	ICV	5.0 mg/L	Pipette 0.5 ml of second source stock standard to 100 ml volumetric flask. Dilute to volume with matrix solution. Prepare fresh daily.	100 ml
Low Level Initial Check Verification	LL ICV	0.5 mg/L	Pipette 0.05 ml of second source stock standard to 100 ml volumetric flask. Dilute to volume with matrix solution. Prepare fresh daily.	100 ml
Continuing Check Verification	CCV	10 mg/L	Pipette 1.0 ml of stock standard to 100 ml volumetric flask. Dilute to volume with matrix solution. Prepare fresh daily.	100 ml
Low Level Continuing Check Verification	LL CCV	1.0 mg/L	Pipette 0.1 ml of stock standard to 100 ml volumetric flask. Dilute to volume with matrix solution. Prepare fresh daily.	100 ml
Laboratory Control Spike/ Laboratory Control Spike Duplicate	LCS/LCSD	5.0 mg/L	Pipette 0.1 ml of second source stock standard into digestion tubes. Add 20 ml of DI water and 5 ml of digestion solution. After digestion dilute to 20 ml volume with DI water.	20 ml
Low Level Laboratory Control Spike/ Laboratory Control Spike Duplicate	LL LCS/LCSD	0.5 mg/L	Pipette 0.01 ml of second source stock standard into digestion tubes. Add 20 ml of DI water and 5 ml of digestion solution. After digestion dilute to 20 ml volume with DI water.	20 ml
Matrix Spike/ Matrix Spike Duplicate	MS/MSD	5.0 mg/L	Pipette 0.1 ml of second source stock standard into digestion tubes. Add 20 ml DI water and 5 ml of digestion solution. After digestion dilute to 20 ml volume with DI water.	20 ml
Low Level Matrix Spike/ Matrix Spike Duplicate	LL MS/MSD	0.5 mg/L	Pipette 0.01 ml of second source stock standard into digestion tubes. Add 20 ml DI water and 5 ml of digestion solution. After digestion dilute to 20 ml volume with DI water.	20 ml

Table 7: PREPARATION OF REAGENTS

Reagent	Alias	Concentration	Directions	Final Volume
Sodium Dodecyl Sulfate Solution		15% w/w	Dissolve 15 g of SDS $CH_3(CH_2)_{11}OSO_{33}Na$ in 85 ml of reagent water. Stirring and heating may be required to completely dissolve the SDS.	85 ml
Molybdate/Antimony Solution			Dissolve 2 g of ammonium molybdate tetrahydrate, $(NH_4)_6Mo_7O_{24}4H_2O$ and 0.084 g of antimony potassium tartrate $K(SbO)C_4H_4O_6$ $1/2H_2O$ in about 200 ml reagent water. Add 10 ml of 15% w/w SDS and dilute to 250 ml with reagent water. Invert five times to mix. Store solution in an acid washed plastic bottle at room temperature.	250 ml
Sulfuric Acid Solution		4% v/v	Slowly add 40 ml of conc. sulfuric acid to 800 ml of reagent water, cool and dilute to 1 liter. Use this solution as the RB (diluents) if a digested blank is not available. The digested blank from either digestion procedure should be used as the RBL and diluents for the SmartChem auto-preparation	1000 ml
Ascorbic Acid Solution			Dissolve 3 g of ascorbic acid $C_6H_8O_6$ in about 30 ml of reagent water. Add 0.1 ml of acetone CH_3COCH_3 and 0.5 ml of 15% w/w SDS dilute to 50 ml with reagent water. Invert five times to mix. Store solution in an acid washed plastic bottle at room temperature.	50 ml
Mercuric Sulfate Solution			Dissolve 8 g red mercuric oxide HgO in 50 ml of 1:4 sulfuric acid and then dilute to 100 ml. To prepare the 1:4 sulfuric acid solution, carefully add 10 ml conc. H_2SO_4 to 40 ml reagent water.	100 ml
Digestion Solution	Sulfuric acid-mercuric sulfate-potassium sulfate solution		Dissolve 133 g K_2SO_4 in 700 ml of reagent water and then slowly add 200 ml conc. H_2SO_4. Allow the solution to cool and then add 25 ml of mercuric sulfate solution and dilute to 1 liter	1000 ml
Acid / Salt Solution	Reagent A		Dissolve 2.65 g of NaCl in 450 ml of reagent water in a 500 ml volumetric flask. Slowly add 9.0 ml of conc. sulfuric acid while swirling the flask. Mix and allow the solution to cool to room temperature and then add 10 ml of 15% w/w SDS and dilute to 500 ml with reagent water. Invert five times to mix. Store Reagent A in an acid washed plastic bottle at room temperature.	500 ml
Salt Solution	Reagent B		Dissolve 2.65 g of sodium chloride NaCl in 450 ml of reagent water and then add 10 ml of 15% w/w SDS and dilute to 500 ml with reagent water. Invert five times to mix. Store Reagent B in an acid washed plastic bottle at room temperature.	500 ml
Hydrochloric Acid	Glassware Rinse Solution	6 N	Add 500 ml concentrated hydrochloric acid into ~ 400 ml DI water. Dilute to volume.	1000 ml
Cuvette Cleaning Solution			Add 50 ml of cuvette cleaning solution to approximately 700 ml of reagent water and dilute to 1 liter with reagent water. Invert five times to mix. Store the solution at room temperature.	1000 ml
Probe Rinse Solution			Add 0.5 ml of probe rinse solution and dilute to 1 liter of reagent water. Invert five times to mix. Store the solution at room temperature.	1000 ml
Matrix Solution			Add 240 ml digestion solution to 1 liter volumetric flask. Dilute to volume with DI water.	1000 ml

11. CALIBRATION

11.1 **Daily Calibration** – The SmartChem must be calibrated each time it is set up and at least every 24 hours that samples are analyzed. A linear calibration is used. Calibration consists of a minimum of 5 standards plus a blank. The working range is from the current MDL to the highest standard in the calibration curve.

11.2 **Calibration Verification** – Each calibration must be verified by analyzing an Initial Calibration Verification (ICV) and Initial Calibration Blank (ICB). A Continuing Calibration Verification (CCV) and Continuing Calibration Blank (CCB) must also be analyzed after each set of 10 samples.

11.3 **Reporting Limit Verification Standard (CRDL)** – A standard prepared at the concentration of the Pace Reporting Limit. The CRDL is used to show analyte recovery at the reporting limit.

11.4 **Acceptance Criteria** – The correlation coefficient of the response for elements requiring multiple levels must be ≥ 0.995. The results of the ICV/CCV checks must agree within ± 10%. The results of the ICB/CCBs must be <RL.

11.5 Follow steps in section 12 to run calibration curve.

11.6 The SmartChem can automatically prepare diluted standards and samples, as required, to bring high concentration standards and samples into the working range of the method. See the SmartChem Operation Manual Chapter 3 for instructions on how to configure the SmartChem Parameter Method File.

12. PROCEDURE

NOTE: Document all sample volumes, standards and reagents used in the digestion on the prep log.
NOTE: Rinse all glassware with a 50% solution of HCl followed by DI water rinse before each use.

12.1 **Digestion Procedure** – This portion of the SOP describes the steps to digest the samples before analysis. This digestion procedure is the same digestion procedure used for total kjedahl nitrogen analysis. The digestate can be used for both total kjedahl nitrogen and total phosphorus analysis without individual digestions.

12.1.1 Add 3-4 Teflon boiling chips to a digestion tube. (Too many boiling chips may cause the sample to boil over.)

12.1.2 Aqueous – Pipette, using clean wide-mouth graduated glass pipette, 20 ml of sample into the digestion tube.

12.1.3 Solid – Weigh out 0.20 g of sample to the nearest 100th on a calibrated balance and add to digestion tube. Bring to volume of about 20 ml with DI water. Mix the sample with a vortex mixer

12.1.4 For liquid samples, prepare one method blank by adding 20 ml of DI water to digestion tube using a calibrated automatic pipette.

12.1.5 For soil samples, prepare one method blank by weighing out 0.20 g of Teflon chips to the nearest 100th on a calibrated balance and add to digestion tube. Bring to volume of about 20 ml with DI water.

12.1.6 For liquid samples, prepare one LCS (and LCSD if needed) by adding 20 ml DI water and 0.1 ml (0.01 mL for LL) of 1000 mg/L second source stock standard into digestion tube using calibrated automatic pipette. A LCSD is only necessary when requested by client. See Table 6.

12.1.7 For soil samples, prepare one LCS (and LCSD if needed) by weighing out 0.20 g Teflon chips to the nearest 100th on a calibrated balance and add to digestion tube. Add 20 ml DI water and 0.1 ml (0.01 mL for LL) of 1000 mg/L second source stock standard using calibrated automatic pipette. A LCSD is only necessary when requested by client. See Table 6.

12.1.8 For liquid samples, prepare one MS/MSD pair per 10 samples by adding 20 ml sample and 0.1 ml of 1000 mg/L second source stock standard into digestion tube using calibrated automatic pipette. See Table 6.

12.1.9 For soil samples, prepare one MS/MSD pair per 10 samples by weighing out 0.20 g of sample to the nearest 100th on a calibrated balance and add to digestion tube. Add 20 ml DI water and 0.1 ml (0.01 mL for LL) of 1000 mg/L second source stock standard using calibrated automatic pipette. See Table 6.

12.1.10 Using repipettor, add 5 ml mercuric sulfate/potassium sulfate digestion solution. Vortex samples to mix.

12.1.11 Place tubes in block digestor and press run on control panel. The digestor will heat to 160˚C and maintain temperature for 1 hour. The temperature will reset to 380˚C and continue to heat for 1½ hours.

12.1.12 Remove digestion tubes, cool and dilute the liquid residue back up to 20 ml with DI water. Vortex and pour into cuvette. If samples have large particulate matter, filter prior to analysis. Store in refrigerator until analysis. Analyze within 5 days.

12.1.13 Prepare calibration curve and check standards as described in Tables 5 and 6 of section 10.

12.2 **Method Parameters** – The method is equivalent to the EPA protocol 365.4. Modifications to this test method may void EPA equivalency. If modifications are made, then the analyst must perform the required testing to document the method performance in accordance with USEPA requirements. See Table 10 Method Parameters

12.3 **Basic System Operation (Analytical)** - This portion of the SOP is designed to allow the user to set up and run a method. For a more detailed explanation of the many other options, the user should refer to the SmartChem Software Reference Manual. It is assumed that a method program has already been created for the chemistries you wish to run.

12.3.1 If not already on, turn on computer, printer, monitor, and the SmartChem instrument. The SmartChem on/off toggle switch is located on the left side of the instrument.

12.3.2 Log into the PC and Network. Click twice on SmartChem New and enter the username: *SmartChem New WESTCO* and password: *JOE*.

12.3.3 Build Sequence in LIMSLink of batched samples:

12.3.3.1 Go into LIMSLink and click on the "*Running Man*".

12.3.3.2 Select the *Prep* method and click *Start New* followed by *OK*.

12.3.3.3 In the first two lines enter ICVI followed ICB in the third line and CRDL in the fourth.

12.3.3.4 Click on Get Samples and enter the Batch, the Instrument ID (40WTA9) and click OK.

12.3.3.5 Repeat the last step for each batch of samples in the sequence.

12.3.3.6 Export to SmartChem – click on Import Instrument, Export to SmartChem

12.3.4 SmartChem Sequence Loading and Analysis:

12.3.4.1 Go to Sample Entry.

12.3.4.2 Double click on the desired Method to be run. For Phos/Phos.LL the method is ***P101912-EPA365.4-40WTA9-DAW***.

12.3.4.3 Click on Import from file button

12.3.4.4 Load Sequence file (create Run Plan) - open the SmartChem folder, scroll all the way to the right, and double click on *SmartChem*.

12.3.4.5 Save – Click on the red disk to save with the format ***P101912-EPA365.4-40WTA9-DAW***. 073112 is the month, day, year of the analysis. 40WTA9 is the instrument. WETA is the QUEUE and CCR is an example of analyst initials. Spaces must be used where they are. Click OK.

12.3.4.6 Save External File by clicking *YES* and Save the run plan as ***P101912***.

12.3.4.7 Go to System Monitor.

12.3.4.8 Select and Click on the Run Plan that was created.

12.3.4.9 Verify that the selected Run Plan is correct.

12.3.4.10 Load Samples, Standards, Controls, Diluent, and Empty Cups as displayed in the System Monitor.

12.3.4.11 Check the Probe Rinse, DI Water and Cleaning Solution bottles.

12.3.4.12 NOTE: When filling the Probe Rinse and Cuvette Wash Reservoirs, pour the solutions slowly to minimize foaming. If the probe, DI Water, and/or Cuvette Wash reservoirs require filling while a run is in progress, do not remove the cap and lift the siphon tube above the liquid surface. Insert a long stem funnel through the open port in the reservoir cap and fill the container slowly with the respective solution to minimize foaming.

12.3.4.13 Click Start in System Monitor to display user selectable options before beginning the analysis.

12.3.4.14 If a Wash Cuvette and/or WBL is required before the start of the analysis, then click on the appropriate button. It is recommended that a Wash Cuvette and WBL be run at the start of each day.

12.3.4.15 NOTE: It is recommended that a new WBL be run after a Wash Cuvette operation is performed and/or after the removal and/or replacement of the same or a new cuvette into the reaction tray.

12.3.4.16 Click the Start Button to begin analysis. A box will open. Make sure the Calibration and RBL options are selected for a run that is using a new calibration and click OK.

12.4 **Adding new batches on a Sequence:** Add an additional letter to the name when saving. This is so it will not overwrite the original file. Deselect the *Calibration* and *RBL* boxes if the calibration is not going to be re-analyzed.

12.5 **Shutdown:**

12.5.1 Click on the EXIT icon.

12.5.2 Turn off computer, printer and switch on surge suppresser.

13 QUALITY CONTROL

13.1 Refer to the most current version of the Pace Quality Manual Attachment I *Quality Control Calculations* and SOP S-GB-Q-009 *Common Laboratory Calculations and Statistical Evaluation of Data* for equations and calculation details.

13.2 **Initial Calibration Verification (ICV)**

13.2.1 The ICV must be analyzed before samples.

13.2.2 Concentration must be within ± 10% of the true value. When measurements are outside the control limits, the analysis must be terminated, the problem corrected, and the calibration re-verified.

13.2.3 If the ICV is greater than the control limit and the samples are non-detects, the sample may be reported without a flag.

13.2.4 The lot number of the Potassium hypophosphate Standard used to make the ICV must be different from that of the calibration curve standards.

13.3 **Continuing Calibration Verification (CCV)**

13.3.1 The CCV is analyzed after every 10 samples.

13.3.2 Concentration must be within ± 10% of the true value. When measurements are outside the control limits, the analysis must be terminated, the problem corrected, and the calibration re-verified. If the reset CCV fails, recalibrate and reanalyze all samples back to the last acceptable CCV.

13.3.3 If the CCV is greater than the control limit and the samples are non-detects, the sample may be reported without a flag.

13.3.4 The lot number of the Potassium hypophosphate Standard used to make the CCV must be different from that of the ICV.

13.4 **Initial Calibration Blank (ICB) and Continuing Calibration Blank (CCB)**

13.4.1 The ICB must be analyzed after the ICV and before samples. The CCB must be analyzed after the CCV and before samples.

13.4.2 The absolute value must be < PRL. When measurements are above the PRL, terminate analysis; correct the problem, and the calibration re-verified. If the reset of the ICB/CCB fails, recalibrate and reanalyze all analytical samples analyzed since the last compliant calibration blank.

13.4.3 If the sample concentration is greater than ten times the concentration in the ICB or CCB, the samples do not need to be reanalyzed.

13.5 **Reporting Limit Verification Standard (RLVS)** – A standard prepared at the concentration of the Pace Reporting Limit. It is analyzed after the calibration, recovery 60-140% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate.

13.6 **Method Blank (MB)**

13.6.1 A MB is carried through all prep procedures and analyzed with a frequency of 5% or one per batch of up to 20 environmental samples. One MB must be digested with each batch.

13.6.2 The absolute value must be < PRL.

13.6.2.1 When measurements are above the PRL, terminate analysis, correct the problem, verify the calibration, and reanalyze all analytical samples analyzed since the last compliant calibration blank.

13.6.2.2 If the analyte is detected in the method blank, method blank criteria is evaluated and flagged with appropriate qualifier to the MDL when MDL reporting is required: qualify with appropriate qualifier sample results less than 10 times the absolute value detected in the blank. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample-by-sample basis. Other criteria may apply, such as regulatory limit and the analyte concentration in the samples.

13.7 **Laboratory Control Sample (LCS)**

13.7.1 The LCS is carried through all preparation procedures with frequency of 5% or one per batch of up to 20 environmental samples. A Laboratory Control Spike Duplicate (LCSD) must be analyzed if there is insufficient sample volume to perform a matrix spike/matrix spike duplicate or if the client requests one. Must be digested with batch.

13.7.2 Concentration must be within ± 10% of the true value for waters. For soils, the concentration must be within calculated in –house limits or default limits of + 20%.

Accuracy Calculation: $\text{LCS \% Recovery} = \frac{(\text{LCS})}{\text{SA}} * 100$

LCS = LCS Result
SA = Spike Added

Precision Calculation: See section 13.8

13.7.2.1 When measurements are outside the control limits, check for errors in calculations, standards preparation and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.7.2.2 If no errors are found and sufficient sample is available, re-prepare the LCS (and/or LCSD) and all associated samples. If the recovery is within the limits in the analysis, accept the second set of data. If the recovery is still out side the limits after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant LCS.

13.7.2.3 If sufficient sample volume is not available, report the sample data with appropriate qualifier on each of the samples associated with the non-compliant LCS (and/or LCSD). Contact the project manager regarding the occurrence.

13.7.3 When an LCSD is performed, the precision between the LCS and LCSD must be =/< 20% RPD.

13.7.3.1 When measurements are outside the control limits, check for errors in calculations, standards preparation and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.7.3.2 If no calculation errors are found when measurements are outside the control limits, flag the associated samples with appropriate data qualifier.

13.7.3.3 The lot number of the Potassium hypophosphate Standard used to make the CCV must be different from that of the LCS.

13.8 **Matrix Spike (MS) and Matrix Spike Duplicate (MSD)**

13.8.1 One pair per up to 10 environmental samples or 10% frequency whichever is more frequent. Must be digested with batch.

13.8.2 Both QC samples must be calculated for accuracy and precision.

Accuracy Calculation: Spike Percent Recovery = $\frac{(SSR - SR)}{SA} * 100$

SSR = Spike Sample Result
SR = Sample Result
SA = Spike Added

The relative percent difference (RPD) is calculated as: **RPD** = $\frac{|S - D|}{(S + D)/2} * 100$

where **S** = sample value, mg/L
D = duplicate value, mg/L

13.8.3 Concentration must be within ± 10% of the true value for waters. For soils, the concentration must be within calculated in –house limits or default limits of ± 20%.

13.8.4 When measurements are outside the control limits, check for errors in calculations, standards preparation and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.8.5 If the four times the concentration of the spike is less than the level of the parent, accuracy need not be calculated.

13.8.6 If no calculation errors are found when measurements are outside the control limits, flag the parent sample with appropriate qualifier.

13.8.7 The precision between the MS and MSD must be =/< 20% RPD.

13.8.7.1 When measurements are outside the control limits, check for errors in calculations, standards preparation and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.8.7.2 If no calculation errors are found when measurements are outside the control limits, flag the parent sample with appropriate qualifier.

13.8.8 The parent sample used for MS/MSD pair is either determined by the client or selected at random from client samples as sample volume allows. No field, filter, trip or equipment blanks can be used for MS/MSD.

13.8.9 The lot number of the Potassium hypophosphate Standard used to make the CCV must be different from that of the MS/MSD.

13.9 The appropriate leach blank must be digested and analyzed along with the appropriate samples as leached on the same leach date. The absolute value must be < PRL. When measurements are above the PRL, terminate analysis, investigate and correct the problem, verify the calibration, and reanalyze all analytical samples analyzed.

13.10 When preparation of a sample exceeds 28 days past the time of collection, notify the project manager before proceeding. If a sample is run past 28 days after collection, flag with appropriate data qualifier.

13.11 If a sample was diluted due to matrix effects and the result is a non-detect, the result must be qualified with appropriate data qualifier.

14 DATA ANALYSIS AND CALCULATIONS

14.1 See Section 13 for additional calculations. The instrument provides calculated sample results in mg/L. Calculations are only necessary if a dilution was used

Liquid Calculation

Raw Data Value (mg/L) x Dilution Factor = Phosphorous (mg/L)

Soil Calculation

$$\frac{\text{Raw Data Value (mg/L)} * 0.020\ \text{L} * \text{Dilution Factor}}{(0.0002\ \text{Kg} * \%\ \text{solids in decimal form})} = \text{Phosphorus (mg/Kg)}$$

14.2 SmartChem SW will construct and display the calibration curve and calculate all sample results. When the SmartChem is programmed to auto-rerun over-ranged samples, or perform a sample pre-dilution, the dilution corrected results will be reported based on the dilution factors used in the results section of the report. The calibration curve can be reconstructed by plotting instrument response (optical density or absorbance) against standard concentration. Compute sample concentration by comparing the sample response with the standard curve. Multiply calculated sample concentrations by appropriate dilution factor used.

14.3 The concentration value of a sample reported for an over-ranged sample by SmartChem before it is re-run at a pre-selected dilution factor in the Method File is an “estimate” and should not be considered an accurate value since the sample exceeded the highest standard concentration used to generate the calibration curve equation.

14.4 The concentration value of a sample reported for an over-ranged sample by SmartChem before it is re-run at a pre-selected dilution factor in the Method File is an “estimate” and should not be considered an accurate value since the sample exceeded the highest standard concentration used to generate the calibration curve equation.

14.5 Report only those values that fall between the lowest and the highest calibration standards. Samples exceeding the highest standard should be diluted and reanalyzed. Results lower than the MDL should be reported as required by your laboratory certification agency.

15 DATA ASSESSMENT AND ACCEPTANCE CRITERIA FOR QUALITY CONTROL MEASURES

15.1 See Section 13: Quality Control and Table 8: QC Summary

16 CORRECTIVE ACTIONS FOR OUT-OF-CONTROL DATA

16.1 See Table 9 Corrective Action

17 CONTINGENCIES FOR HANDLING OUT-OF-CONTROL OR UNACCEPTABLE DATA

17.1 See Table 9 Corrective Action and Attachment III: Flow Chart

18 METHOD PERFORMANCE

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual and specific Standard Operating Procedures.

18.1.1 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.1.2 An initial demonstration of capability (IDC) must be performed per S-ALL-Q-020, *Orientation and Training Procedure*s. A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager.

18.1.3 An annual method detection limit (MDL) study will be completed per S-GB-Q-020, *Determination of LOD and LOQ*, for this method and whenever there is a major change in personnel or equipment. The results of these studies are retained in the quality assurance office.

18.1.4 Periodic performance evaluation (PE) samples are analyzed per S-GB-Q-021, *PE/PT Program*, to demonstrate continuing competence. All results are stored in the QA office.

18.1.5 Linear Calibration Range (LCR): The LCR must be determined initially and verified every three months or whenever a significant change in instrument response is observed or expected. The initial demonstration of linearity must use sufficient standards to ensure that the resulting curve is linear. The verification of linearity must use a minimum of a blank and three standards. If any verification data exceeds the initial values by +/- 10%, linearity must be reestablished. If any portion of the range is shown to be nonlinear, sufficient standards must be used to clearly define the nonlinear portion

18.1.5.1 Criteria: All standards must be within +/- 10% of the true value with the exception of the highest standard analyzed over the calibration range that should be outside the 10% rule.

18.1.6 Pace Analytical Services, Inc – Green Bay Laboratory will not use any data over the highest calibration standard used. All samples will be diluted and reanalyzed that are over the calibration range.

19 METHOD MODIFICATIONS

19.1 This method has been modified to include a digestion procedure for soil and solid matrices.

20 INSTRUMENT/EQUIPMENT MAINTENANCE

20.1 Any daily or periodic maintenance must be recorded in the instrument daily logbook. Additional information may be found in the most current revision of SOP: S-GB-Q-008, *Preventative, Routine, and Non-routine Maintenance.*

21 TROUBLESHOOTING

21.1 Please see the instrument manual for information on instrument troubleshooting.

22 SAFETY

22.1 **Standards and Reagents**: The toxicity and carcinogenicity of standards and reagents used in this method have not been fully defined. Each chemical compound should be treated as a potential health hazard. Reduce exposure by the use of gloves, lab coats and safety glasses. Material Safety Data Sheets (MSDSs) are on file in the laboratory and available to all personnel. Standard solutions should be prepared in a hood whenever possible.

22.2 **Samples**: Take precautions when handling samples. Samples should always be treated as potentially hazardous "unknowns". The use of personal protective equipment (gloves, lab coats and safety glasses) is required when handling samples. In the event a sample container must be opened, it is recommended to perform this in a hood whenever possible.

23 WASTE MANAGEMENT

23.1 Procedures for handling waste generated during this analysis are addressed in S-GB-S-006, *Waste Handling and Management* (most current revision or replacement).

23.2 In order to minimize the amount of waste generated during this procedure, analyst should prepare reagents in an amount which may be used in a reasonable amount of time (e.g., before a reagent expires).

24 POLLUTION PREVENTION

24.1 Pollution prevention encompasses any technique or procedure that reduces or eliminates the quantity or toxicity of waste at the point of generation.

24.2 The laboratory Chemical Hygiene Plan/Health and Safety Plan contains additional information on pollution prevention.

25 REFERENCES

25.1 EPA 600 4-79-020, Revised March 1983, Method 365.4

25.2 Standard Methods for the Examination of Water and Wastewater, Phosphorous – SM 4500-P A, B, and F -2011)

25.3 SmartChem Method #411N-0405C

26 TABLES, DIAGRAMS, FLOWCHARTS, APPENDICES, ADDENDA ETC.

26.1 Table 8: **QUALITY CONTOL**

26.2 Table 9: **ANALYST/TECHNICIAN DATA ASSESSMENT**

26.3 Table 10: **METHOD PARAMETERS**

26.4 Flowchart

27 REVISIONS

Revision Number	Reason for Change	Date
S-GB-I-061-Rev.0	First Issue.	11Jan2010
S-GB-I-061-Rev.01	Section 5.3 and 14.3: Updated SOP Number of Waste Handling and Management SOP to S-GB-S-006 Section 11.4: Removed use of Quadratic Curve Fit.	13Sept2010
S-GB-I-061-Rev.02	Updated SOP references throughout document. Throughout Document: Updated SOP format to be consistent with SOP: S-GB-Q-017 *Preparation of SOPs.* Throughout Document: Incorporated Low Level analysis procedure. Throughout Document: Updated Tables to have continuous numbering system, then updated all sections which referenced tables to correct one. Section 12: Updated procedure to SmartChem (from Lachat) operating instructions. Section 25.2: Updated SM Reference to 2011 Edition Section 26: Removed TPO4 Spreadsheet, added Table 10.	23Oct2012

Table 8: QUALITY CONTROL

Preparation Method ⇨ Quality Control Measure ⇩	**EPA 365.4**
Method Blank	One per batch of samples, up to 20 environmental samples, whichever is more frequent. Must be digested with batch.
Laboratory Control Spike and Duplicate	One per batch of samples, up to 20 environmental samples, whichever is more frequent. A LCSD is required if MS/MSD is not performed. Must be digested with batch.
Matrix Spike / Matrix Spike Duplicate	One pair per batch of samples, up to 10 environmental samples, whichever is more frequent. Must be digested with batch.
Initial Calibration	Minimum of 5 standards plus blank. Must be performed every time before samples are analyzed.
RLVS Standard	After the calibration
Calibration Verification (ICV/CCV)	ICV – analyzed after calibration but before samples. CCV – analyzed after every 10 samples.
Calibration Blank (ICB/CCB)	ICB – analyzed after ICV. CCB – analyzed after every CCV pair.
Leach Blank	The appropriate leach blank must be digested and analyzed along with the appropriate samples as leached on the same leach date.

Table 9: ANALYST/TECHNICIAN DATA ASSESSMENT

Analytical Method Acceptance Criteria⇨ Data Assessment Measure ⇩	**EPA 365.4 If these conditions are not achieved ⇒**
Method Blank and Leach Blanks	• 1
Accuracy & Precision Matrix Spike Samples	• 2
Accuracy & Precision Laboratory Control Spikes	• 3
Initial Calibration	• 4
RLVS standard	• 5
Initial / Continuing Calibration Verification	• 6
Initial / Continuing Calibration Blank	• 7

1. In the absence of project specific requirements, sample detects less than 10 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 10 times the method blank contamination are reported without qualification.

2. In the absence of project specific or method requirements, in-house generated limits will be used. If the concentration of the spike is less than 25% of the concentration of the parent, dilute parent to a level that the subsequent spike concentration will be greater than 25% the parent and so the parent concentration is above the EQL. Rerun the parent, MS, and MSD at this new dilution. If the MS and/or MSD fails at the diluted concentration, appropriately flag the parent sample. If the parent, MS, or MSD is greater than the top standard in the curve, dilute and reanalyze the parent, MS, and MSD following the above guidance. If the concentration of the spike is greater than 25% of the concentration of the parent, appropriately flag the parent sample if either the MS and/or MSD fails. If the MS and MSD fails precision control limits flag the parent with the appropriate data qualifier.

3. If sample volume does not allow re-analysis the entire prep/analytical batch of samples shall be flagged with the appropriate accuracy and appropriate precision qualifier to reflect the deficiencies.

4. If correlation coefficient is less than 0.995 perform maintenance and recalibrate.

5. It is analyzed after the calibration, recovery 60-140% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate.

6. If ICV/CCV is outside the control limits reanalyze the ICV/CCV to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. If the ICV/CCV recovers greater than the control limit and the samples bracketing the out of control ICV/CCV are non-detects, the results may be reported without a flag.

7. If ICB/CCB is outside the control limits reanalyze the ICB/CCB to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. Samples that are > 10X the concentration in the CCB the samples do not have to be reanalyzed.

FLOWCHART

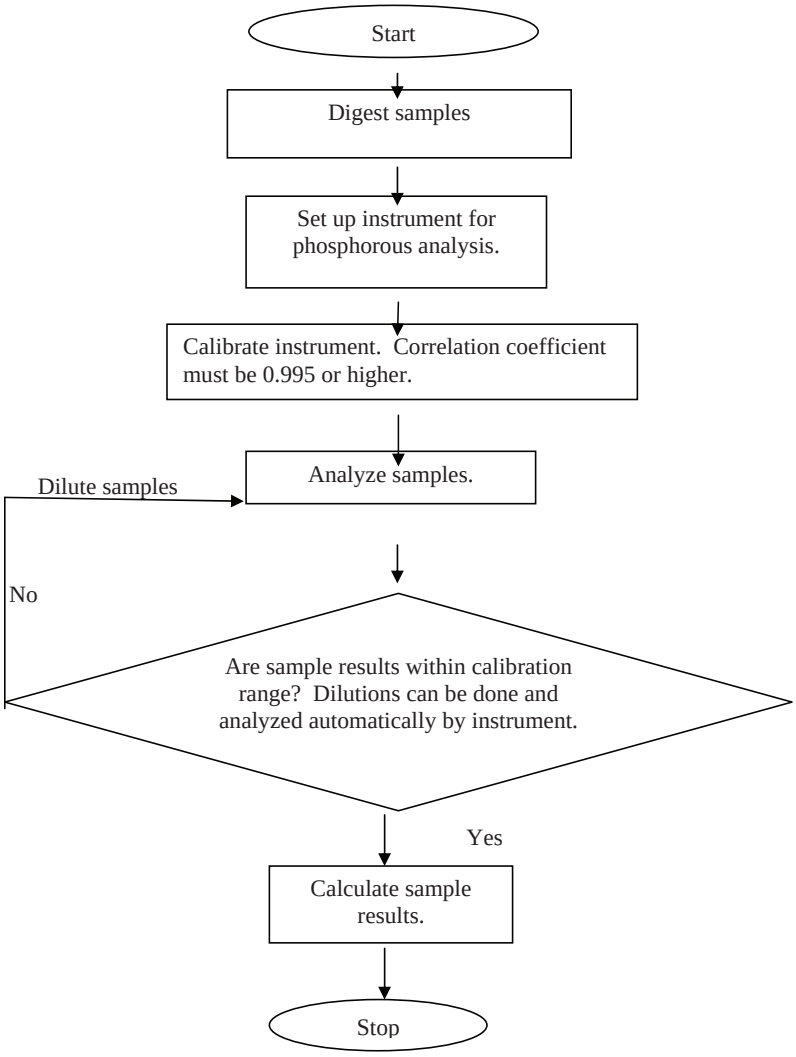

Start
Digest samples
Set up instrument for phosphorous analysis.
Calibrate instrument. Correlation coefficient must be 0.995 or higher.
Analyze samples.
Dilute samples
No
Are sample results within calibration range? Dilutions can be done and analyzed automatically by instrument.
Yes
Calculate sample results.
Stop

Table 10
Method Parameters

Type	End Point
Direction	Direct
Decimals	3
Model	Linear
Filter 1	880 or 660 nm
Sample Blanking	No or "Yes after Reagent 1
Calibration Codes	OP4H and OP4L

High Range TP Method 0.05 – 20.00 mg/L P Hg digestion					
Method Code: WTPH	**Volume**	**Delay Time**	**Read Time**	**Rinse**	**Code**
Range: 0.05 – 20.00 mg/L P	**µL**	**sec.**	**sec.**	**µL**	
Sample Volume	40				
Reagent 1-**Acid / Salt Reagent**	264	36	0	0	TPRA
Reagent 2 – Molybdate	64	0	0	0	TPMO
Reagent 3 – Ascorbic Acid	106	0	306	0	TPAS
Ma□im□m □otal Rea□tion	□□0				
Minim□m □ample and	3				

STANDARD OPERATING PROCEDURE

Measurement of Specific Conductance in Water

REFERENCE METHODS: EPA 120.1 AND SW-846 METHOD 9050A

LOCAL SOP NUMBER:	S-GB-I-066-REV.01
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S -GB-I-066-REV.00
SOP TEMPLATE NUMBER:	SOT-ALL-I-016-Rev.00

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 12/10/12

Kate Grams, Laboratory Quality Manager — Date: 12/6/12

Chad Rusch, Department Manager — Date: 12/06/12

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-I-066-Rev.01

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1. Purpose

1.1. This Standard Operating Procedure (SOP) documents the procedures used by PASI – Green Bay to determine to measure specific conductance in water samples while meeting the requirements of EPA Method 120.1 and SW-846 Method 9050A.

2. Summary of Method

2.1. The specific conductance of the sample is measured directly using a self-contained conductivity meter (Wheatstone bridge-type or equivalent). The conductivity meter should use an automated temperature compensation probe to adjust measurements to equivalent specific conductance at 25°C. If the conductivity probe is not temperature compensating, samples of different temperatures must be equilibrated to and results reported at 25°C.

3. Scope and Application

3.1. This procedure is restricted to use by, or under the supervision of, analysts experienced with electrode measurements. Each analyst must demonstrate the capability to generate acceptable results with this method to be considered qualified to report sample results.

3.2. This SOP applies to the measurement of specific conductance.

4. Applicable Matrices

4.1. This method is applicable to water samples, including drinking water, surface water, groundwater, saline water, and domestic and industrial wastewaters.

5. Limits of Detection and Quantitation

5.1. The reporting limit (LOQ) is 10 µS/cm for this method. All current MDLs are listed in the LIMS and are available by request from the Quality Manager.

6. Interferences

6.1. Coatings of oily material or particulate matter can impair electrode response. The electrode should be thoroughly rinsed and cleaned between samples.

7. Sample Collection, Preservation, Storage and Handling

7.1. ***Samples s***hould be stored separately from all standards, reagents, and highly contaminated samples.

Table A – Sample Collection, Preservation, Storage and Hold time.

Matrix	Collection per sample	Preservation	Storage	Hold time
Aqueous	One (1) 100 mL Polyethylene or glass	None	≤6°C	Samples must be analyzed within 28 days of collection.

8. Definitions

8.1. Refer to Glossary section of the Pace Quality Assurance Manual (QAM) for a comprehensive list of terms and definitions.

8.2. **Run Sequence Log** – A logbook that lists all injections and analyses performed on a particular piece of equipment regardless of the use of the data collected from each analysis.

8.3. **Microsiemens per cm (µS/cm) –** This unit of conductance. Equivalent to µMho per centimeter (µMho/cm). A siemens is the reciprocal of the ohm, the standard unit of electrical resistance.

9. Equipment and Supplies

Table B - Equipment

Equipment	Vendor	Model / Version	Description / Comments
Conductivity Meter with optional Automatic Temperature Compensation Probe	Fisher	Model Accumet # 30	
Conductivity Electrode	Fisher	Model # 13-620-155	Fisher p/n 8165BN, or equivalent
Automatic Temperature Compensation Probe (optional)	Fisher		
Analytical Balance	Mettler	PJ 480	Capable of weighing to 0.01g

Table C - Supplies

Item	Vendor	Model / ID	Catalog #	Description
Disposable Beakers, 50-mL	Fisher		01-29107	
Magnetic Stirrer	Fisher	Corning		
Spin Bars	Fisher			
Wash Bottle	Fisher			
Graduated cylinders	Fisher			50-mL or 100-mL
Laboratory Wipe Tissues	Fisher		06-666A	Kimwipes

10. Reagents and Standards

Table D - Reagents

Reagent	Concentration/ Description	Requirements/ Vendor/ Item #
Reagent water	De-ionized water	ASTM Type II water
Potassium Chloride	Neat	J.T Baker, Cat. # 3046-01
Conductivity Probe Storage Solution	Redi-Stor Conductivity Probe Storage Solution	Fisher, Cat. # 09-330-1

Table E - Standards

Standard	Description	Comments
Primary Standard, 1413 µS/cm	This standard solution is used for daily calibration of the measurement system.	Made from neat potassium chloride. Dissolve 0.7456 g of pre-dried KCl (2 hours at 105°C) in DI water and dilute to 1 liter.
Secondary Source, Primary Standard, 10 µS/cm	This standard solution is used to verify calibration before sample analysis.	Fisher 09-328-1, or equivalent
Secondary Source, Primary Standard, 100 µS/cm	This standard solution is used to verify calibration before sample analysis.	Fisher 09-328-2, or equivalent
Secondary Source, Primary Standard, 1000 µS/cm	This standard solution is used to verify calibration before sample analysis.	Fisher 09-328-3, or equivalent
Secondary Source, Primary Standard, 10000 µS/cm	This standard solution is used to verify calibration before sample analysis.	Fisher 09-328-4, or equivalent
Laboratory Control Standard	NSI Universal Wastewater Std	Catalog # QCI-084

Table F – Analytical Standard Storage Conditions

Standard Type	Description	Expiration	Storage
Primary Standard, 1413 µS/cm	Prepare according to prep directions below.	Good for 1 year from preparation date.	Room Temperature
Secondary Source, Primary Standard, 10 µS/cm	Fisher Traceable Conductivity Standard, Catalog # 09-328-1, or equivalent	Manufacturer's recommended expiration date	Manufacturer's recommended storage conditions
Secondary Source Primary Standard, 100 µS/cm	Fisher Traceable Conductivity Standard, Catalog # 09-328-2, or equivalent	Manufacturer's recommended expiration date	Manufacturer's recommended storage conditions
Secondary Source Primary Standard, 1000 µS/cm	Fisher Traceable Conductivity Standard, Catalog # 09-328-3, or equivalent	Manufacturer's recommended expiration date	Manufacturer's recommended storage conditions
Secondary Source Primary Standard, 10000 µS/cm	Fisher Traceable Conductivity Standard, Catalog # 09-328-4, or equivalent	Manufacturer's recommended expiration date	Manufacturer's recommended storage conditions
Laboratory Control Standard	APG Standard, Catalog # 4052, or equivalent	Manufacturer's recommended expiration date	Manufacturer's recommended storage conditions

11. Calibration and Standardization

11.1.1. As most conductivity meters do not require regular calibration, the measurement system must be verified at the beginning of the analysis batch against both primary and secondary calibration verification standards. To demonstrate accuracy through the measurement range, standards of varying concentrations from the secondary source must be analyzed. These should bracket the expected range of measurements for all samples.

11.1.2. After the initial verification, the calibration must be verified using the primary standard after every 20 samples and at the end of the analysis batch.

11.1.3. If the initial or continuing calibration verifications do not meet the acceptance criteria, the meter may need to be recalibrated. This should be done only after verifying the integrity of the calibration verification solution.

11.1.4. Some manufacturers may supply a calibration device with the meter that has a known cell constant. If available, use the device provided. However, if recalibration is required and no device is supplied, the primary standard may be as a reference material.

11.2. **Initial Calibration**

11.2.1. The instrument must be standardized with the 1413 µS/cm Primary Standard KCl solution daily before use.

11.2.2. Set the nominal cell constant to 1.0.

11.2.3. Immerse the conductivity electrode in a reference solution of known conductance. Press the "Standardize" key. Enter the reference solution true value. The meter calculates the cell constant: reference solution known value / displayed conductivity value.

11.2.4. Record the cell constant and the slope. If using conductivity cell of 1.0, the slope should be 1.0.

Table G – Calibration standard compound concentrations

Analyte	PQL water (µS/cm)	Primary Std (µS/cm)	Secondary Std 1 (µS/cm)	Secondary Std 2 (µS/cm)	Secondary Std 3 (µS/cm)	Secondary Std 4 (µS/cm)
Specific Conductance	10	1413	10	100	1000	10000

11.3. **Calibration Verification**

11.3.1. **Initial Calibration Verification –** Perform initial calibration using the primary and initial calibration verification using secondary source check standards (e.g. 1413, 10, 100, 1000, and 10000 µS/cm).

11.3.2. **Continuing Calibration Verification –** Perform continuing calibration verification using the 100 µS/cm secondary source check standard (e.g. 100µS/cm).

11.3.3. **Calculations (CCV)** - The values obtained from the analysis of the CCV are compared to the true values and a percent difference calculated. The percent difference must meet the method specified criteria for the analysis to proceed for an additional 10 samples.

The equation for this calculation is as follows:

% Diff: $[Result_{CCV} - TrueValue_{CV}] / TrueValue_{CV} \times 100$

Table H – Calibration Acceptance and Verification Criteria

Calibration Metric	Parameter / Frequency	Criteria	Comments
Initial Calibration Verification	At the beginning of the analytical batch, prior to the analysis of samples.	% Diff ±10%	Acceptance criteria are ±10% for specific conductance. See S-ALL-Q-025
Continuing Calibration Verification	After the analysis of every 10 samples including QC samples.	% Diff ±10%	If the requirements for continuing calibration are not met, corrective actions must be taken prior to reanalysis of standards. Only two analyses of the same standard are permitted back to back.

11.4. **Calibration Corrective Actions**

11.4.1. **Initial Calibration Verification Problems**

11.4.1.1. Reanalyze the original primary standard to determine instrument consistency.

11.4.1.2. Prepare and analyze a new primary standard to determine preparation consistency / standard integrity.

11.4.1.3. Document instrument maintenance

11.4.1.4. Reanalyze primary standard to determine if maintenance was effective in restoring performance.

11.4.1.5. Complete recalibration of instrument as per sections 10.1 and 10.2.

11.4.2. **Continuing Verification Problems**

11.4.2.1. Reanalyze the original CCV standard to determine instrument consistency.

11.4.2.2. Prepare and analyze a new CCV standard to determine preparation consistency / standard integrity.

11.4.2.3. Document instrument maintenance

11.4.2.4. Reanalyze CCV standard to determine if maintenance was effective in restoring performance.

11.4.2.5. Complete recalibration of instrument.

11.4.2.6. If samples were analyzed in spite of verification failures, note the following exceptions for addressing those results. Deviations from this requirement must be noted on the analytical run log with a thorough explanation for the deviation from policy.

Exceptions: If calibration verification is above the upper control limit, samples non-detected for conductivity may be reported without reanalysis.

12. Procedure

12.1. **Sample Analysis**

12.1.1. Allow samples and standards to warm to room temperature prior to analysis. Conductivity must be measured at (or temperature corrected to) 25°C.

12.1.2. Place a 40-45 mLs of the sample in a 50-mL disposable beaker, using sufficient volume to cover the sensing elements of the electrode and provide adequate clearance for the magnetic stirring bar. Place a magnetic stirring bar in the beaker and place the beaker on the stirrer. Turn on the stirrer to a moderate speed.

12.1.3. Rinse the electrode with DI water and gently wipe with a tissue between each standard and sample. Place the pH electrode and ATC electrodes into the sample beaker, taking care to provide adequate clearance for the stirring bar.

12.1.4. Wait for the meter reading to stabilize and record the result to three significant figures.

12.1.5. Rinse the probe with DI water and return to step 11.2.2.

12.2. **Data Reduction**

12.2.1. **Quantitative Analysis –Raw Data Results:**

12.2.1.1. The data system will display the concentration of each analyte as µS/cm.

12.2.1.2. If the conductivity of the sample is >999 µS/cm, the units on the meter changes to mS/cm. In order to report the result in µS/cm, the digital readout must then be multiplied by 1000.

12.2.2. No further calculations are necessary unless a dilution of the sample has been performed or the laboratory must report in an alternative set of units. If the initial analysis of the sample or a dilution of the sample has a concentration that exceeds the calibration range, the sample must be analyzed at a higher dilution.

12.2.3. Results Calculation – Aqueous Sample

Raw Data Value (µS/cm) x Dilution Factor = Specific Conductance (µS/cm)

13. Quality Control

Table I –Quality Control Criteria and Corrective Actions

QA Sample	Components	Frequency	Acceptance Criteria	Corrective Action
Method Blank (MB)	Reagent water	One per 20 samples	Conductivity must be less than MDL	Re-analyze associated samples if blank result is greater than RL
Duplicate Sample	Sample	One every 10 samples or fewer	<20 % RPD	Assess sample for possible interferences. Reanalyze one or more samples to determine if incident is isolated. If so, qualify results and report. If variation occurs across multiple samples, investigate the source of the problem, correct and reanalyze samples.
Initial Calibration Verification	Four ICV Standards	Daily after primary calibration	+/- 10%	Terminate analysis, correct problem, and rerun
Initial Calibration Blank	Reagent Water	Daily after ICV standards	Conductivity must be less than MDL.	Terminate analysis, correct problem, and rerun.
Continuing Calibration Verification	100 µS/cm ICV Standard	After every 10 samples	+/- 10%	Terminate analysis, correct problem, and rerun all samples that are not bracketed by acceptable QC.
Initial Calibration Blank	Reagent Water	After every 10 samples following CCV	Conductivity must be less than MDL.	Terminate analysis, correct problem, and rerun all samples that are not bracketed by acceptable QC.
Laboratory Control Standard	LCS Standard	After each MB	+/-20%	Terminate analysis, correct problem, and rerun

14. Data Analysis and Calculations

14.1. RPD equation

$$RPD = \frac{|D_1 - D_2|}{[(D_1 + D_2)/2]} * 100$$

Where RPD = relative percent difference
D_1 = first sample result
D_2 = second sample result

15. Data Assessment and Acceptance Criteria for Quality Control Measures

15.1. See section 13, Table I Quality Control Criteria and Corrective Actions.

16. Corrective Actions for Out-of-Control Data

16.1. See section 13, Table I Quality Control Criteria and Corrective Actions.

17. Contingencies for Handling Out-of-Control or Unacceptable Data

17.1. See section 13, Table I Quality Control Criteria and Corrective Actions.

18. Method Performance - There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.1. The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.2. An initial demonstration of capability (IDC) must be performed per *S-ALL-Q-020, Orientation and Training Procedures*. A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager.

18.3. An annual method detection limit (MDL) study will be completed per *S-GB-Q-020, Determination of LOD and LOQ*, for this method and whenever there is a major change in personnel or equipment. The results of these studies are retained in the quality assurance office.

18.4. Periodic performance evaluation (PE) samples are analyzed per *S-GB-Q-021, PE/PT Program*, to demonstrate continuing competence. All results are stored in the QA office.

19. Method Modifications

19.1. Not applicable to this SOP.

20. .Instrument/Equipment Maintenance

20.1. Any daily or periodic maintenance must be recorded in the instrument daily logbook.

21. Troubleshooting

21.1. See instrument manual for troubleshooting.

22. Safety

22.1. Each chemical should be regarded as a potential health hazard and exposure should be as low as reasonably achievable. Cautions are included for known extremely hazardous materials.

22.2. A reference file of Material Safety Data Sheets (MSDS) is made available to all personnel involved in the chemical analysis, and is located at the front desk. A formal safety plan has been prepared and is distributed to all personnel with documented training.

22.3. Analysts should take necessary safety precautions when handling chemicals and samples. Proper personal protective equipment may include safety gloves, lab coats, and safety glasses or goggles. Analysts should be familiar with the MSDS sheets for all chemicals and reagents they use for this procedure and the location of the MSDS sheets within the laboratory. Any questions or concerns should be taken to the laboratory Chemical Hygiene/Safety Officer.

23. Waste Management

23.1. Excess samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult the current version of S-GB-W-001, *Waste Handling and Management.*

24. Pollution Prevention

24.1. In order to minimize the amount of waste generated during this procedure, analyst should prepare reagents in an amount which may be used in a reasonable amount of time (i.e. before a reagent expires)

24.2. The company wide Chemical Hygiene and Safety Manual contains additional information on pollution prevention.

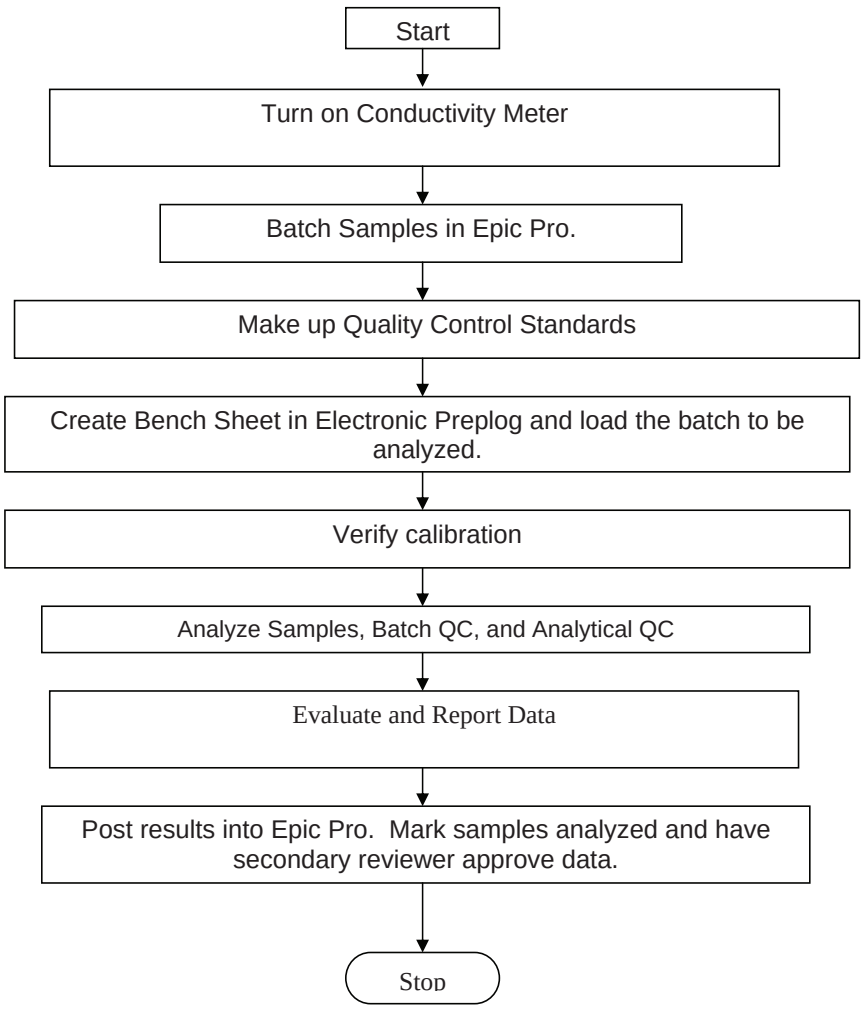
25. References

25.1. Methods for Chemical Analysis of Water and Wastes, EPA-60/4-82-005, December 1982, Method 120.1.

25.2. “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”; EPA SW-846, latest revision. Method 9050A “Specific Conductance”.

26. Tables, Diagrams, Flowcharts, Attachments, Appendices, etc.

Attachment I - FLOWCHART



27.

Revisions

Document Number	Reason for Change	Date
SOT-ALL-I-016-Rev.00	1. Restructured document format. 2. Added tables and other content to create an "SOP Template" in which local edits are allowed. 3. Modified signature page to include department manager and SOP template number. 4. Updated SOP template number. 5. Made the tuning criteria red so edits can be made to reflect local tuning criteria used. 6. Updated calibration sections with new calibration policies described in the PASI Quality Manual revision 10.0.	12Dec2006
S-ALL-GB-I-016-REV.00	First issue incorporating Green Bay Laboratory information	03Sept2008
S-GB-I-066-Rev.00	Updated Signature Page Updated Benchsheet	08Nov2010
S-GB-I-066-Rev.01	Updated SOP references throughout document Updated SOP to new format following S-GB-Q-017 *Preparation of SOPs*. Throughout Document: Updated all sections to include electronic prep log. Section 12.2.12: Added instrument operating readout change to mS/cm if result is >999 µS/cm. Attachments: Removed Benchsheet (electronic prep log).	06Dec2012

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STANDARD OPERATING PROCEDURE

Measurement of Volatile Solids and Solids in Waters

Reference Methods: Standard Methods 2540-B, -C, -D, -E, -G, ASTM D2974 and EPA 160.4

SOP NUMBER:	S-GB-I-068-Rev.01
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S- GB-I-068-Rev.00

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 12/03/12

Kate Grams, Laboratory Quality Manager — Date: 11/29/12

Chad Rusch, Department Manager — Date: 12/03/12

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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1. Purpose /Identification of Method

1.1 This Standard Operating Procedure (SOP) describes operations used to measure the parameters in the following table:

Table 1.

Test		Matrix	Method	Reports as
TS	Total Solids	Water	SM 2540B	mg/L
TS	Total Solids	Solid	SM 2540G	%
TSS	Total Suspended Solids	Water	SM 2540D	mg/L
TDS	Total Dissolved Solids	Water	SM 2540C	mg/L
TVS	Total Volatile Solids	Water	EPA 160.4	mg/L
TVS	Total Volatile Solids	Solid	EPA 160.4	%
TVSS	Total Volatile Suspended Solids	Water	EPA 160.4	mg/L
OM	Organic Matter	Solid	ASTM D2974-87(C)	%
FOC	Fractional Organic Carbon	Solid	ASTM D2974-87	%

2. Summary of Method

2.1 Total Solids (TS) – A well-mixed sample is evaporated to dryness and the residue solids are measured gravimetrically.

2.2 Total Suspended Solids (TSS) – A well-mixed sample is filtered. The residue collected by the filter is dried and measured gravimetrically.

2.3 Total Dissolved Solids (TDS) – A well-mixed sample is filtered. The filtrate passing through the filter is evaporated to dryness and the residue solids are measured gravimetrically.

2.4 Total Volatile Solids (TVS, TVSS) – Residue obtained from the determination of TS, or TSS is ignited at 550ºC in a muffle furnace. The loss of weight on ignition is reported as % Volatile Solids for solid samples and mg/L Volatile Solids for liquid samples.

2.5 Fractional Organic Carbon (FOC) - Residue obtained from the determination of TS is ignited at 440ºC in a muffle furnace. The weight loss after ignition is multiplied by a 0.58 factor and reported as % Fractional Organic Carbon.

2.6 Organic Matter (OM) - Residue obtained from the determination of TS is ignited at 440ºC in a muffle furnace. The weight loss after ignition is reported as % Organic Matter.

3. Scope and Application

3.1 This method is applicable to the determination of Total Solids (TS), Total Suspended Solids (TSS), Total Dissolved Solids (TDS), and Total Volatile Solids (TVS) in water samples.

3.2 This method is applicable to the determination of Total Solids (TS) and its Volatile (TVS) fractions in soil and semisolid samples. The terms total solids apply to matter left after drying in an oven at 103-105º C and igniting in a muffle furnace at a 550ºC temperature and a defined time interval.

3.3 This method is applicable to the determination of Fractional Organic Carbon (FOC) and Organic Matter (OM) in soil and semisolid samples. The term fractional organic carbon (FOC) applies to the weight loss after ignition, multiplied by a 0.58 factor and reported as % Fractional Organic Carbon.

3.4 This procedure is restricted to use by, or under the supervision of, analysts experienced with the use of laboratory information systems, balances, desiccators, and ovens. Each analyst must demonstrate the capability to generate acceptable results with this method to be considered qualified to report sample results.

4. Applicable Matrices

4.1 This SOP applies to surface water, mixed domestic and industrial wastewaters, groundwater, reagent waters, soils, and sludges.

5. Limits of Detection and Quantitation

5.1 The reporting limit (LOQ) for all analytes is listed in Table 1 for the listed methods. All current MDLs are listed in the LIMS and are available by request from the Quality Manager.

Table 2.
REPORTING LIMITS

COMPOUND NAME	Aqueous	Solids
	Units mg/L	Units %w/w
	LOQ	LOQ
TS	20	0.1
TSS	10	
TDS	20	
TVS, TVSS	20	
FOC		0.058
OM		0.1

6. Interferences

6.1 Non-representative materials, e.g., leaves and sticks should be removed from the sample prior to measurement unless it is determined that their inclusion is desired.

6.2 Measurements are subject to negative bias for samples containing significant quantities of ammonium carbonate, volatile organics, or other volatile materials that could be lost during drying.

6.3 The residue of samples for TS and TDS that are highly mineralized, especially containing significant concentrations of calcium, magnesium, chloride, and/or sulfate may be hygroscopic and will require longer drying, desiccation, and rapid weighing.

6.4 Samples for TS and TDS containing high concentrations of bicarbonate will require careful, and possibly prolonged, drying to ensure that all bicarbonate is converted to carbonate.

6.5 The volumes of aliquots for TS and TDS should be selected to limit the total residue to 200 mg to prevent the residue from crusting over and trapping water during drying.

6.6 Samples for TSS with high TDS, such as saline waters, brines, and some wastes, may be subject to positive bias. Care must be taken to properly rinse the filter to minimize the bias.

7. Sample Collection, Preservation Shipment and Storage

Table 3
SAMPLE COLLECTION, PRESERVATION, HOLD TIME SHIPMENT AND STORAGE

Matrix	Analytical Method	Container(s)	Preservation / Hold Time	Shipment Conditions	Lab Storage Conditions
Aqueous	SM 2540B SM 2540C SM 2540D EPA 160.4	Clean Plastic or glass containers	None / 7 Days	On ice ≤6° Celsius	Walk-in cooler ≤6° C
Soils	SM 2540G ASTM D2974-87	Clean Plastic or glass containers	None / 7 Days	On ice ≤6° Celsius	Walk-in cooler ≤6° C

8. Definitions

8.1 Batch – A grouping of 20, or less, environmental samples of similar matrix, which are prepared and/or analyzed together with the same method.

8.2 Blank Sample – A sample analyzed to determine potential contamination attributed to sample handling and analysis.

8.3 Duplicate Sample – A second aliquot of the same environmental sample analyzed in the same manner as the original sample in order to evaluate precision.

8.4 Environmental Sample – An environmental sample or field sample is a representative sample of any material (aqueous, non-aqueous, or multimedia) collected from any source for which determination of composition or contamination is requested or required.

8.5 Laboratory Control Sample (LCS) – A blank matrix sample spiked with a known concentration of analytes of interest. Laboratory accuracy is evaluated using the LCS.

8.6 Laboratory Information Management System (LIMS) – This is a system for transferring, processing, storing, and reporting analytical results.

8.7 Replicate Samples – Samples collected at the same time, from the same place, for the same analysis, as the original sample in order to determine precision between samples.

8.8 Pace Reporting Limit (PRL) – The lowest level that will be reported by this method. Reporting limits are corrected for sample amounts, including the dry weight of solids, unless otherwise specified.

8.9 Solid – matrix such as soils, sediments, sludge, organic liquids, oils or aqueous products and by-products of industrial processes, and aqueous samples with more than 10% settleable solids.

8.10 Total Solids Content (TSC) – Total Solids Content is the term applied to the material residue left in the vessel after evaporation of a sample and its subsequent drying in an oven at a defined temperature of 103-105ºC.

8.11 Volatile Solids – Residue obtained from the determination of TS is ignited at 550ºC in a muffle furnace. The loss of weight on ignition is reported as % Volatile Solids.

8.12 Refer to Section 10 of the Pace Quality Manual for additional terms used in this SOP.

9. Equipment and Supplies

9.1 Analytical balance – Electronic, capable of weighing to 0.1 mg.

9.2 Vacuum Filtration System – Includes filter holder, membrane filter funnel, vacuum flask and vacuum pump.

9.3 Glass Fiber Filters (for TDS) – GE Water & Process Technologies PreSep Prefiler, Glass, 1.0 Micron, 47mm, or equivalent.

9.4 Glass Fiber Filters (for TSS) – Pre-weighed from Environmental Express, ProWeigh 47mm Glass Fiber Filters, 1.5 µm, with matched aluminum evaporating dishes, or equivalent.

9.5 Graduated Cylinders – 25, 50, 100, 250, 500 and 1000mL.

9.6 Wide bore serological pipettes and pipette helper.

9.7 Drying Ovens – Capable of maintaining 103-105ºC and 178-182ºC.

9.8 Desiccator

9.9 Indicating Desiccant – Drierite Anhydrous Calcium Sulfate, Stock # 2305, or equivalent.

9.10 Laboratory Scoopulas

9.11 Muffle furnace (for volatile solids) – Capable of maintaining temperature of 440ºC and 550ºC.

9.12 Evaporating Beaker (TS/TDS/TVS/OM/FOC) – 50 mL

10. Reagents and Standards

10.1 ERA DataPacK Total Volatile Solids Standard, Cat # 913 for TVS, OM, and FOC analysis, or equivalent.

10.2 ERA QC Plus Solids, Cat #4033 for TS, TSS, and TDS analyses, or equivalent.

10.3 NSI Solutions, Cat # QCI-084 for TS, TSS, and TDS analysis, or equivalent.

10.4 Nanopure Reagent Water – ASTM Type II, or equivalent.

11. Calibration and Standardization

11.1 Balance Calibration – The only required calibration is the analytical balance.

11.2 The balance must be calibrated at least annually by an outside agency and checked **daily** across the range of use, using Class 1 or 2 weights as per the most current version of SOP S-GB-Q-030 *Support Equipment.*

11.3 Each weighing of the batch is bracketed at the beginning and end with either a 1g or 50g verification.

11.3.1 1g for TSS and TVSS with a tolerance of +/-0.0100g

11.3.2 50g for TS, TDS, TVS, OM, and FOC with a tolerance of +/-0.5000g

12. Procedure

12.1 Create the analytical batch in Horizon.

12.2 Open the Electronic Logbook and create a new worksheet for the batch to be analyzed.

12.3 Pre-Weighed Dried Beaker. Ignite the evaporating beaker at 550ºC for 1 hour in a muffle furnace. Cool in desiccator and store there until ready to use. Record their weight prior to use.

12.4 Check that the oven temperature is within required specifications before placing samples into oven as per the most current version of SOPS-GB-Q-030 *Support Equipment*. Document temperature in the Electronic Logbook.

12.5 **Weighing Dry/Muffle Weights**

12.5.1 Oven temperatures are the same as those described for the test being conducted.

12.5.2 Place the samples back into the oven for 15 minutes and repeat desiccating, cooling, and weighing steps until weight change is ≤0.0005g.

12.5.3 If the first and second weights agree within 0.0005 g, or if the weight loss between the first and second weighing is less than 4%, the analysis is complete. If not, place them back into the oven for and additional 15 minutes. Cool in the desiccator, and weigh a third time.

12.5.4 If the third weigh is within 0.0005 g of either the first or second weight or if the weight loss between the second and the third weighing is less than 4%, the analysis is complete.

12.5.5 If the weight loss between the second and third weighing is more than 0.0005g and 4%, heat, cool, and weigh the sample a fourth time and use the fourth weight to calculate the result.

12.6 **Total Solids Determination (TS)**

12.6.1 For each sample and QC point place a pre-dried evaporating beaker on the balance and record the weight. The initial weights must be confirmed by obtaining a second weight. The weight change must be ≤0.0005g before use.

12.6.2 Method blank (MB) – Using a graduated cylinder, measure out 50mL of Nanopure (or equivalent) water and pour into a tared and dried evaporating beaker. Record the volume for TS-waters and weight for TS-solids analysis in Electronic Logbook.

12.6.3 Laboratory Control Sample (LCS) – Using a graduated cylinder, measure out 50mL of NSI Solutions (or equivalent) and pour into a tared and dried evaporating beaker. Record the volume for TS-waters and weight for TS-solids analysis in Electronic Logbook.

12.6.4 Sample Duplicate (DUP) – At least one DUP must be analyzed per ten samples.

12.6.5 Sample

12.5.4.1 For Solid Samples – Weight out 1 to 1.5g of sample in a tared and dried evaporating beaker. Record the weight in Electronic Logbook.

12.5.4.2 For Aqueous Samples - Shake the sample thoroughly and measure an aliquot (between 1mL and 50mL, typically 50mL) into a pre-dried evaporating beaker using a graduated cylinder. Record the volume in Electronic Logbook.

12.6.6 Place the samples to dry in the oven overnight at 103-105^{O}C. (Overnight is a period of time $\geq$ 8 hours.)

12.6.7 After drying overnight, remove from oven and place into the desiccator to cool. After the samples have cooled, obtain the weight of the samples as per Section 13.5, and record in Electronic Logbook.

12.6.8 If Total Volatile Solids (TVS) are also to be performed proceed to Section 12.9. Note: TVS utilizes a different LCS than the TS.

12.7 **Total Suspended Solids Determination (TSS)**

12.7.1 Record Filter IDs and weights in Electronic Logbook for samples and batch QC.

12.7.2 Method blank (MB) – Using a graduated cylinder measure out 1000mL of Nanopure (or equivalent) water, record the volume in Electronic Logbook.

12.7.3 Laboratory Control Sample (LCS) – Using a graduated cylinder measure out 50mL of Alpha-Trol (or equivalent); record the volume in Electronic Logbook.

12.7.4 Sample Duplicate (DUP) – At least one DUP must be analyzed per ten samples.

12.7.5 For wastewater, the Pace Analytical Services, Inc. - Green Bay Laboratory uses 500mL in order to meet Wisconsin Reporting Limit requirement of 2.0 mg/L.

12.7.6 For South Carolina work a sample volume is chosen to yield between 2.5 and 200 mg dried residue. If volume filtered fails to meet minimum yield, increase sample volume up to 1 L.

12.7.7 Shake the sample thoroughly and measure the chosen aliquot using a graduated cylinder.

12.7.8 Prepare the filter system with a fresh pre-weighed filter. Handle the filter with forceps only. Wet the filter with a small volume of Nanopure water to seat it. Discard the rinse water.

12.7.9 Filter the sample and wash the filter 3 times with approximately 10mL of Nanopure water. Maintain the filter vacuum for about 1 minute after filtration is complete.

12.7.10 Remove the filter with forceps and place it back into the evaporating dish.

12.7.11 Place the samples (filters and residue) to dry in the oven a minimum of 3 hours at 103-105^{O}C.

12.7.12 After drying, remove from oven and place into the desiccator to cool. After the samples have cooled, record the weight of the samples as per Section 13.5.

12.7.13 If Total Volatile Suspended Solids (TVSS) are also to be performed proceed to Section 11.10. TVSS utilizes a different LCS than TSS.

12.8 **Total Dissolved Solids (TDS)**

12.8.1 For each sample and QC point place a pre-dried evaporating beaker on the balance and record the weight. The initial weights must be confirmed by obtaining a second weight. The weight change must be ≤0.0005g before use.

12.8.2 Method blank (MB) – Using a graduated cylinder measure out 50mL of Nanopure (or equivalent) water, record the volume in Electronic Logbook.

12.8.3 Laboratory Control Sample (LCS) – Using a graduated cylinder measure out 50mL of APG Solids APG plus Standard (or equivalent), record the volume in Electronic Logbook.

12.8.4 Sample Duplicate (DUP) – At least one DUP must be analyzed per ten samples.

12.8.5 Shake the sample thoroughly and measure a 50mL aliquot using a graduated cylinder.

12.8.6 Prepare the filter system with a fresh filter. Handle the filter with forceps only. Wet the filter with a small volume of Nanopure water to seat it. Discard the rinse water.

12.8.7 Filter the sample and transfer the filtrate to a pre-weighed dried evaporating beaker.

12.8.1 Place the samples to dry in an oven that has it temperature under a program. The oven starts out at <100 degrees C and increases in temperature according to the program until it reaches 178 - 182 degrees C. It is then held there for a minimum of 1 hour.

12.8.2 After drying overnight, remove from oven and place into the desiccator to cool. After the samples have cooled, record the weight of the samples as per Section 13.5.

12.9 **Total Volatile Solids (TVS)**

12.9.1 For each sample and QC point place a pre-dried evaporating beaker on the balance and record the weight. The initial weights must be confirmed by obtaining a second weight. The weight change must be ≤0.0005g before use.

12.9.2 Method blank (MB) – Using a graduated cylinder, measure out 50mL of Nanopure (or equivalent) water, pour into a tared evaporating beaker. Record the weight in Electronic Logbook.

12.9.3 Laboratory Control Sample (LCS) – Using a graduated cylinder, measure out 50mL of ERA DataPacK Total Volatile Solids Standard (or equivalent), pour into a tared evaporating beaker. Record the weight in Electronic Logbook.

12.9.4 Sample Duplicate (DUP) – At least one DUP must be analyzed per ten samples.

12.9.5 Sample

12.5.4.3 For Solids Samples – Weight out 1 to 1.5g of sample in a pre-dried, tared evaporating beaker. Record the weight in Electronic Logbook.

12.5.4.4 For Aqueous Samples - Shake the sample thoroughly and measure an aliquot (between 1mL and 50mL, typically 50mL) into a pre-dried evaporating beaker using a graduated cylinder. Record the volume in Electronic Logbook.

12.9.6 Follow TS Section to obtain a dried residue.

12.9.7 Place the evaporating beaker or filter and evaporating dish into the muffle furnace at **550°C** for 1 hour.

12.9.8 After 1 hour, remove from muffle furnace and place into the desiccator to cool. After the samples have cooled, record the weight of the samples as per Section 13.5.

12.10 **Total Volatile Suspended Solids (TVSS)**

12.10.1 Method blank (MB) – Using a graduated cylinder, measure out 1000mL of Nanopure (or equivalent) water, record the volume in Electronic Logbook.

12.10.2 Laboratory Control Sample (LCS) – Using a graduated cylinder, measure out 50mL of ERA DataPacK Total Volatile Solids Standard (or equivalent), pour into a tared evaporating beaker. Record the weight in Electronic Logbook.

12.10.3 Sample Duplicate (DUP) – At least one DUP must be analyzed per ten samples.

12.10.4 Shake the sample thoroughly and measure the chosen aliquot (see sections 11.7.5 and 11.7.6) using a graduated cylinder. Record the volume in Electronic Logbook.

12.10.5 Follow TSS Section to obtain a dried residue.

12.10.6 Place the filter and evaporating dish into the muffle furnace at **550°C** for 1 hour. Write the filter number on the evaporating dish – paper label will burn off.

12.10.7 After 1 hour, remove from muffle furnace and place into the desiccator to cool. After the samples have cooled, record the weight of the samples as per Section 13.5 in Electronic Logbook.

12.11 **Fractional Organic Carbon (FOC) and Organic Matter (OM)**

12.11.1 For each sample and QC point place a pre-dried evaporating beaker on the balance and record the weight. The initial weights must be confirmed by obtaining a second weight. The weight change must be ≤0.0005g before use.

12.11.2 Method blank (MB) – Using a graduated cylinder, measure out 50mL of Nanopure (or equivalent) water, pour into a tared evaporating beaker, record the weight in Electronic Logbook.

12.11.3 Laboratory Control Sample (LCS) – Using a graduated cylinder, measure out 50mL of ERA DataPacK Total Volatile Solids Standard (or equivalent), pour into a tared evaporating beaker, and record the weight in Electronic Logbook.

12.11.4 Sample Duplicate (DUP) – At least one DUP must be analyzed per ten samples.

12.11.5 Samples – Into a tared evaporating beaker weigh out about 1-1.5g of sample. Record the weight in Electronic Logbook.

12.11.6 Follow TS Section to obtain a dried residue.

12.11.7 Place the evaporating beakers into the muffle furnace at **440ºC** for 1 hour.

12.11.8 After 1 hour, remove from muffle furnace and place into the desiccator to cool. After the samples have cooled, record the weight of the samples as per Section 13.5 in Electronic Logbook.

12.12 **Entering Results into Horizon**

12.12.1 Post samples and batch QC using Electronic Logbook.

12.12.2 Evaluate batch QC in Horizon.

13. Quality Control

13.1 Refer to the most current version of the Pace Quality Manual Appendix I *Quality Control Calculations* and SOP S-GB-Q-009 *Common Laboratory Calculations and Statistical Evaluation of Data* for equations and calculation details.

13.2 Method Blank (MB) – A MB is carried through all prep procedures and analyzed with a frequency of 5% or one per batch of up to 20 environmental samples.

13.2.1 TS, TDS, TVS, FOC, and OM all use 50mL of deionized water for the method blank.

13.2.2 TSS and TVSS both use 1000mL of deionized water for the method blank.

13.2.3 For tests that are reported in %, the MB is evaluated in mg/Kg. The mg/kg result must be less than 20 mg/kg. Data can be reported if the sample mg/Kg result is 10x greater than the method blank. The value reported in Epic Pro will be adjusted to 0%.

13.2.4 For tests that are reported in mg/L the absolute value must be < PRL.

13.2.5 When measurements are above the PRL, terminate analysis, correct the problem, verify the calibration, and reanalyze all analytical samples analyzed since the last compliant calibration blank

13.2.6 If the analyte is detected in the method blank between the MDL and the PRL, then samples need to be qualified with a "B" when MDL reporting is required and sample results are greater than the MDL and less than 10 times the absolute value detected in the blank. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample-by-sample basis. Other criteria may apply, such as regulatory limit and the analyte concentration in the samples.

13.3 Laboratory Control Sample (LCS) – The LCS is carried through all preparation procedures with frequency of 5% or one per batch of up to 20 environmental samples.

13.3.1 ERA DataPacK Total Volatile Solids Standard, Cat. # 913 is used for TVS, FOC, and OM analysis. Equivalent can be used.

13.3.2 APG Solids APG Plus standard, Cat #4033 is used for TDS analysis. Equivalent can be used.

13.3.3 NSI Solutions, Cat # QCI-084 for TS, TSS, and TDS analysis, or equivalent. Equivalent can be used.

13.3.4 A Laboratory Control Spike Duplicate (LCSD) must be analyzed if the client requests one.

13.3.5 The LCS recovered concentration must be within calculated in-house limits or default limits of $\pm$ 20%.

13.3.6 For tests that are reported in %, the LCS is evaluated in mg/L.

13.3.7 When measurements are outside the control limits, check for errors in calculations, standards preparation, and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.3.8 If no errors are found, sufficient sample is available, it is within hold, re-prepare the LCS (and/or LCSD) and all associated samples. If the recovery is within the limits in the analysis, accept the second set of data. If the recovery is still outside the limits after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant LCS.

13.3.9 If sufficient sample volume is not available or the samples are now outside of hold, report the sample data with a qualifier flag (L0) on each of the samples associated with the non-compliant LCS (and/or LCSD). Contact the project manager regarding the occurrence.

13.3.10 When an LCSD is performed, the precision between the LCS and LCSD must be ≤10% RPD.

13.3.11 When measurements are outside the control limits, check for errors in calculations, standards preparation and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.3.12 If no calculation errors are found when measurements are outside the control limits, flag the parent sample with an appropriate data qualifier.

13.4 Duplicate – Analyze one sample in duplicate per 10 samples or less. The sample used for the duplicate is selected at random, unless specified by the client. The relative percent different (RPD) between duplicates must be ≤10%.

13.4.1 When measurements are outside the control limits, check for errors in calculations, standards preparation and spiking. If an error or problem is found and can be corrected by amending the calculations and the results falls within the limits, accept the data and report without a qualifier flag.

13.4.2 If no calculation errors are found when measurements are outside the control limits, flag the parent sample with an "R1" data qualifier

13.5 Constant Weight – Place the samples back into the 103-105ºC oven, and/or 440/550ºC muffle furnace for 15 minutes and repeat cooling, weighing, and desiccating steps until weight change is ≤0.0005g or the weight loss between the two weights is less than 4%.

13.6 Balance – The balance must be verified daily across the range of use, before use, as per the most current version of SOP S-GB-Q-030 *Support Equipment*.

13.6.1 Each weighing of the batch is bracketed at the beginning and end with either a 1g or 50g verification.

13.6.2 1g for TSS and TVSS with a tolerance of +/-0.0100g

13.6.3 50g for TS, TDS, TVS, OM, and FOC with a tolerance of +/-0.5000g

13.7 Oven – The oven temperature must be within required specifications before placing samples into oven and the temp is recorded in the Electronic Logbook with the correction factor, as per the most current version of SOP S-GB-Q-030 *Support Equipment.*

13.8 Hold – When preparation of a sample exceeds 7 days past the time of collection, notify the project manager before proceeding. If a sample is run past 7 days after collection, flag the result with an "appropriate data qualifier and fill out a LabTrack report.

13.9 See attachments Table A and Table B for a summary of QC

14. Data Analysis and Calculations

14.1 Total Solids (TS), Total Suspended Solids (TSS), Total Dissolved Solids (TDS) in mg/L $= \frac{(A - B) \times 1000 \times 1000}{V}$

Where: V = sample volume (mL)

Total Solids
A = final weight (dry weight of residue and dish, g)
B = dish weight (g)

Total Suspended Solids
A = final weight (dry weight of residue and filter, g)
B = filter weight (g)

Total Dissolved Solids
A = final weight (dry weight of residue and dish, g)
B = dish weight (g)

14.2 Volatile Solids (TVS and TVSS mg/L) $= \frac{(A - D) \times 1000 \times 1000}{V}$

14.3 Volatile Solids (TVS %) $= \frac{(A - D) \times 100}{(A - B)}$

14.4 % FOC $= ((1-((D-B) / (A – B))) \times 100) \times (0.58)$

14.5 % OM = ((1-((D-B) / (A-B))) x 100)

Where:

A = dry weight (weight of dried residue and dish, g)
B = dish weight (g)
C = weight of wet sample and dish (g)
D = muffled weight (weight of residue and dish after ignition, g)
V = volume (mL)

14.6 Precision - The relative percent difference (RPD) is calculated as:

$$\textbf{RPD} = \frac{|S - D|}{(S + D)/2} * 100$$

Where: **S** = sample value
D = duplicate value

14.7 Constant Weight is calculated as:

$$\textbf{Constant Weight (\%)} = \frac{|FW - CW|}{(FW + CW)/2} * 100$$

Where: FW = First Weighing, mg

CW = Confirmation Weighing, mg

If FW – CW is 0.0005 g or less, then there is not a need to calculate as a percentage

15. Data Assessment and Acceptance Criteria for Quality Control Measures

15.1 See Section 13 and Table 3: Quality Control, and Table 4: Data Assessment for a listing of Quality Control Criteria.

Table 5.
QUALITY CONTROL

Preparation Method ⇨ Quality Control Measure ⇩	**SM 2540G – ASTM D2974-87** **Frequency**	**Acceptance Criteria**
Method Blank	One per batch of samples, up to 20 environmental samples, whichever is more frequent.	For solid samples the MB must be < 20 mg/Kg and is reported as 0%. For aqueous samples the MB absolute value must be <RL. Detections > MDL but < RL must be evaluated for data qualification.
Laboratory Control Spike and Duplicate	One per batch of samples, up to 20 environmental samples, whichever is more frequent. None performed on TVSS.	Recovery must be within +/- 20% of the true value. RPD must be < 10%
Duplicate	One pair per batch of samples, up to 10 environmental samples, whichever is more frequent.	RPD must be < 10%

Table 6.
ANALYST/TECHNICIAN DATA ASSESSMENT

Analytical Method Acceptance Criteria⇨ Data Assessment Measure ⇩	**SM2540G – ASTM 2974-87 If these conditions are not achieved ⇒**
Method Blank	• 1
Duplicate	• 2
Accuracy & Precision Laboratory Control Spikes	• 3

1. In the absence of project specific requirements, sample detects less than 20 times the method blank contamination level are reported with the appropriate data qualifier. Sample detects greater than 20 times the method blank contamination are reported without qualification.
2. In the absence of project specific or method requirements, in-house generated limits will be used. If the DUP fails precision control limits flag the parent with the appropriate data qualifier.
3. If sample volume does not allow re-analysis the entire prep/analytical batch of samples shall be flagged with the appropriate qualifier qualifiers to reflect the deficiencies.

16. Corrective Actions for Out-of-Control Data

16.1 See Section 13 and Table 6.

17. Contingencies for Handling Out-of-Control or Unacceptable Data

17.1 If not specifically listed in Section 13 or Table 6, the contingencies are as follows. If there is no additional sample volume to perform re-analyses, all data will be reported as final with applicable qualifiers.

18. Method Performance

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.1.1 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.1.2 Demonstration of Capability (DOC) – Every analyst who performs this method must first document acceptable accuracy and precision by passing a demonstration of capability study (DOC). DOC's must be repeated annually. Analyze 4 replicate environmental sample aliquots. Calculate the mean and standard deviations of the results. The relative percent different (RPD) between replicates must be $\leq$ 5% or the study must be repeated.

19. Method Modifications

19.1 Not applicable to this SOP.

20. Instrument/Equipment Maintenance

20.1 Maintain the analytical balance, ovens, and furnaces according to the most current revision of SOP S-GB-Q-030, *Support Equipment.*

21. Troubleshooting

21.1 Refer to the support equipment operating manual.

22. Safety

22.1 **Standards and Reagents**: The toxicity and carcinogenicity of standards and reagents used in this method have not been fully defined. Each chemical compound should be treated as a potential health hazard. Reduce exposure by the use of gloves, lab coats and safety glasses. Material Safety Data Sheets (MSDSs) are on file in the laboratory and available to all personnel. Standard solutions should be prepared in a hood whenever possible.

22.2 **Samples**: Take precautions when handling samples. Samples should always be treated as potentially hazardous "unknowns". The use of personal protective equipment (gloves, lab coats and safety glasses) is required when handling samples. In the event a sample container must be opened, it is recommended to perform this in a hood whenever possible.

23. Waste Management

23.1 Procedures for handling waste generated during this analysis are addressed in S-GB-W-001 *Waste Handling and Management* most current revision or replacement).

23.2 In order to minimize the amount of waste generated during this procedure, analyst should prepare reagents in an amount which may be used in a reasonable amount of time (e.g., before a reagent expires).

24. Pollution Prevention

24.1 Pollution prevention encompasses any technique or procedure that reduces or eliminates the quantity or toxicity of waste at the point of generation.

24.2 The laboratory Chemical Hygiene Plan/Health and Safety Plan contains additional information on pollution prevention.

25. References

25.1 Pace Analytical Quality Assurance Manual (most current revision or r*eplacement).*

25.2 *T*he NELAC Institute (TNI); Volume 1, Module 2, "Quality Systems" (most current revision or replacement).

25.3 Method 2540-G, Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.

25.4 ASTM D2974-87, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils, May 29, 1987

25.5 VA30007.00.004, Recommendations Regarding the Sampling and Analysis of Fractional Organic Carbon (FOC) in Soils, Technical Decision Compendium, Rule OAC 3745-300-07, March 2000

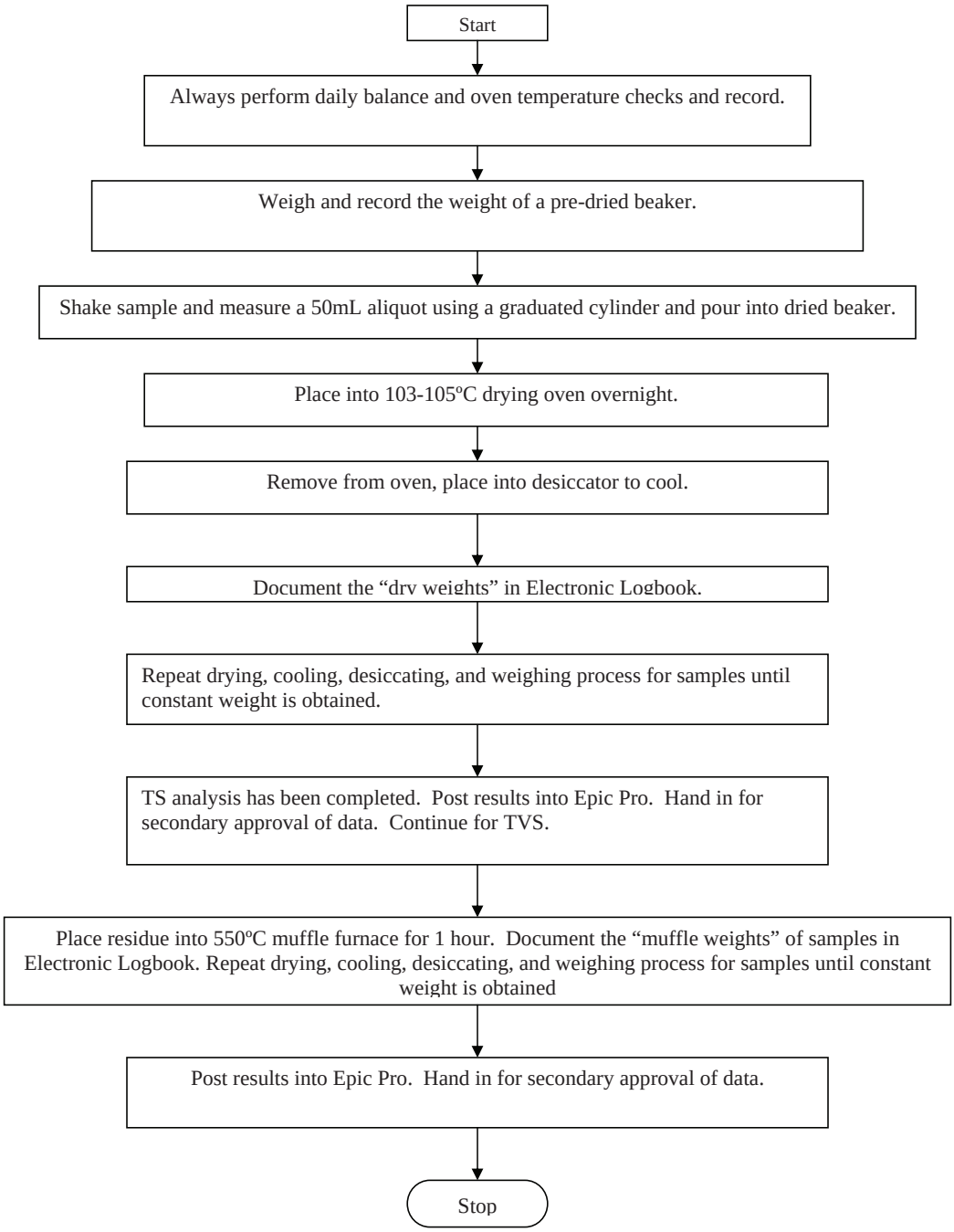
26. Tables, Diagrams, Flowcharts, Appendices, Addenda, etc.

26.1 Flow charts – Attachment I.

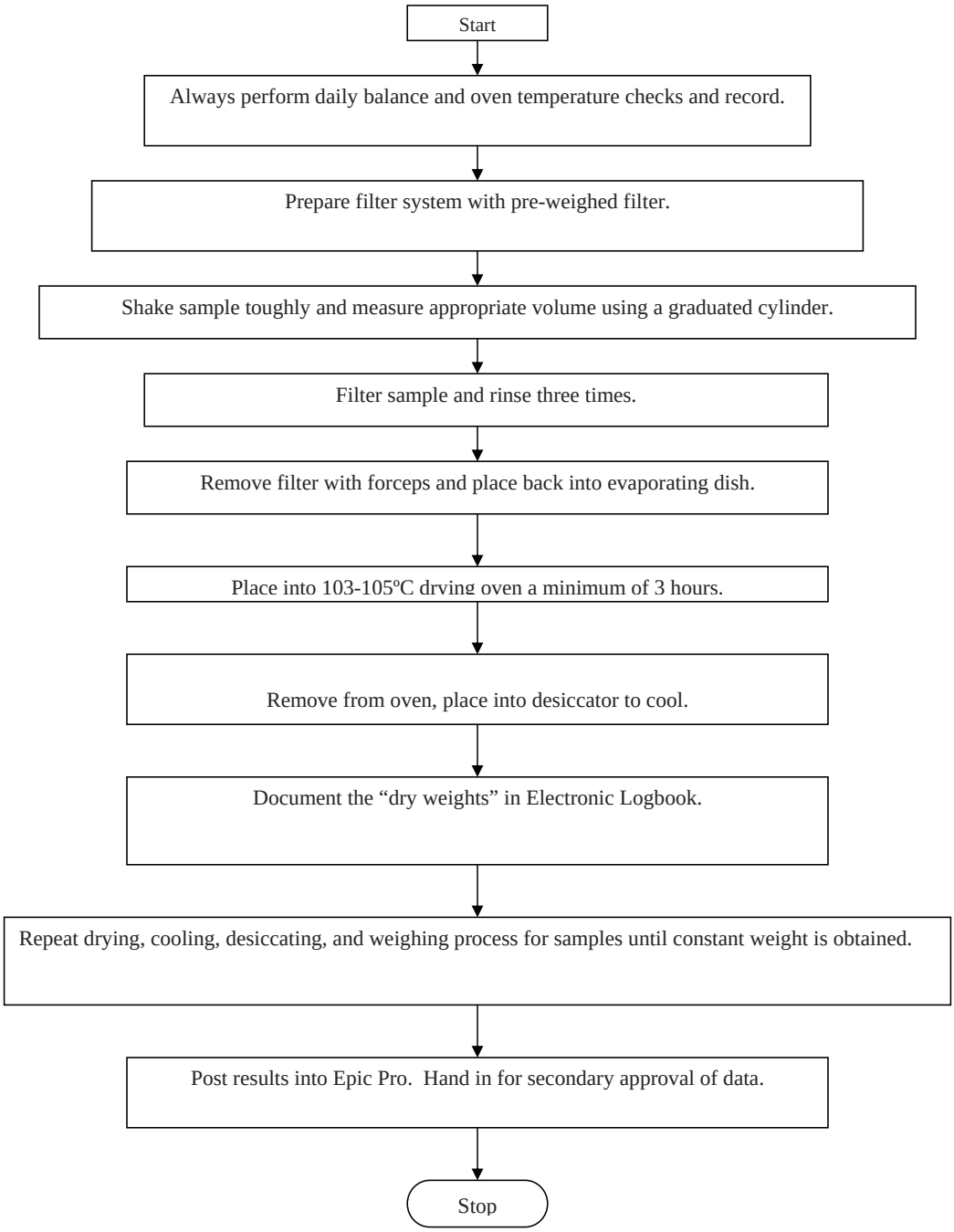
27. Revisions

Document Number	Reason for Change	Date
S-ALL-GB-I-014-Rev.1	Consolidated SOPs ALL-I-014-rev.1, ALL-GB-I-014-rev.1, and GB-I-050-Rev.0. Section 12.6.2 – added South Carolina minimum residue requirements.	24Aug2007
S-ALL-GB-I-014-Rev.2	Corrected FOC and OM calculations and definitions	05Oct2007
S-ALL-GB-I-014-Rev.3	Clarified analysis steps for each test. Changed qualifiers to match Epic Pro.	28Apr2008
S-ALL-GB-I-014-Rev.4	Included notations on how to evaluate MB and LCS for tests reporting in %. Updated Signature Page to Periodic Review.	29May2009
S-GB-I-068-Rev.00	Updated numbering format to match SOP: S-ALL-Q-003, Document Numbering Changed Qualifier from & to L0 and * to R1.	21Sept2010
S-GB-I-068-Rev.01	Updated SOP format to be consistent with SOP: S-GB-Q-017 *Preparation of SOPs* Updated SOP references throughout document. Throughout document: Changed LimsLink to Electronic Prep Log. Sections 2, 3.2, 8.1.2: Removed information relating to Fixed Solids (FS). Sections 2, 3.3, 12.11: Removed information relating to ASH. Section 12.8.1: Changed temperature program to ramp up to 100 deg C. Section 12.10.2: Added LCS requirement to TVSS methods. Tables A and B: Moved and renamed in appropriate sections of SOP.	29Nov2012

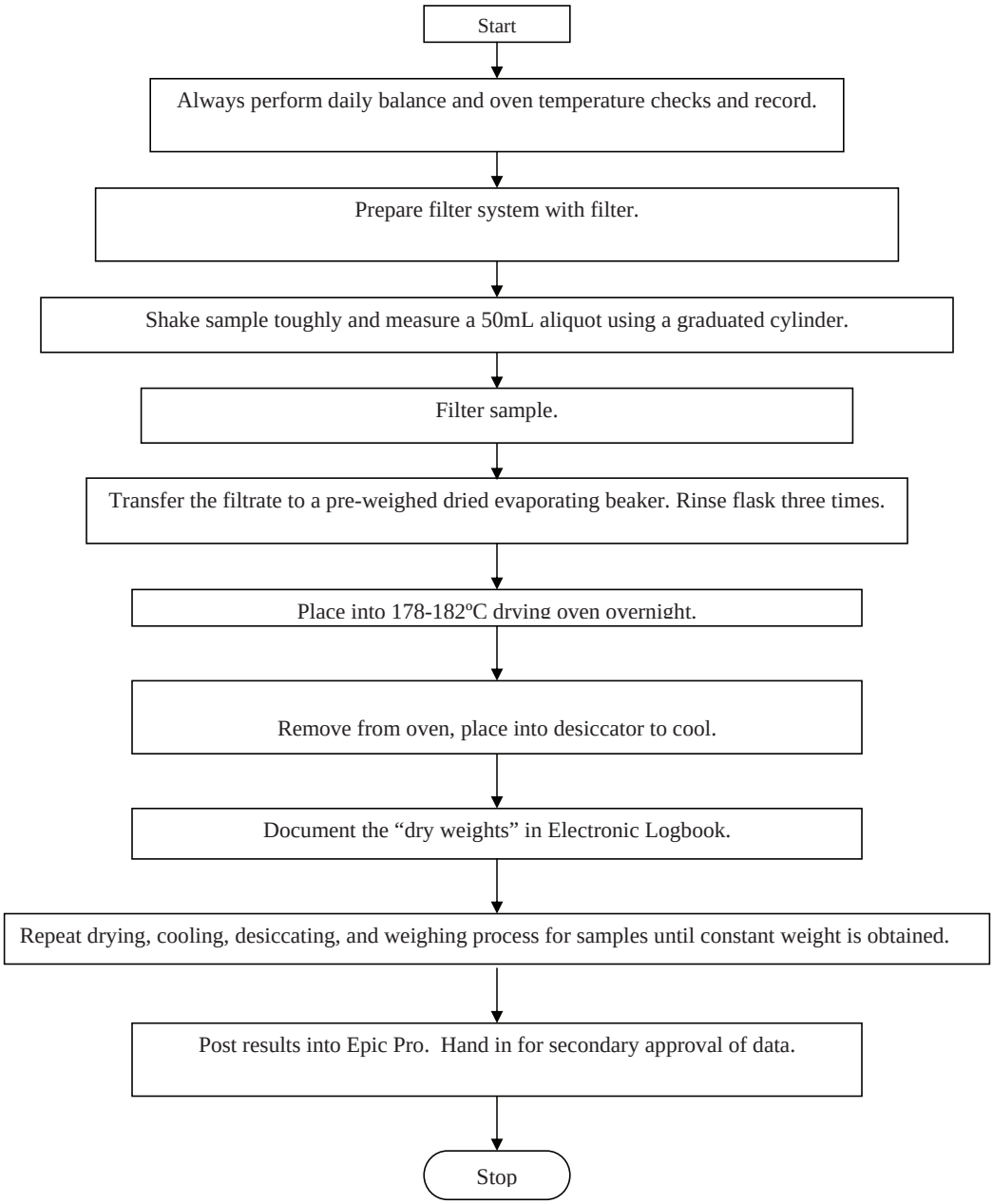
Attachment I – TS and TVS FLOWCHART



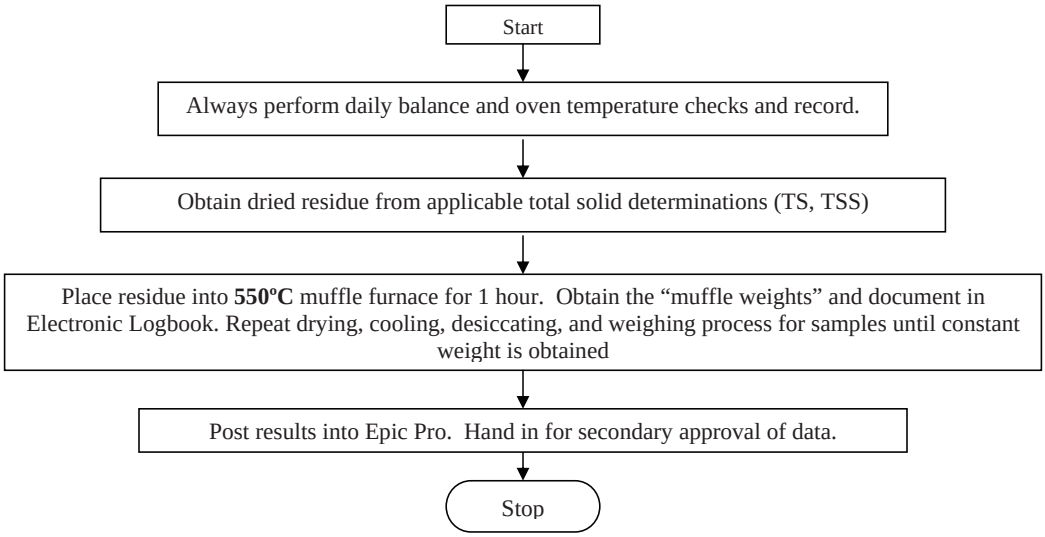
Attachment I – TSS FLOWCHART



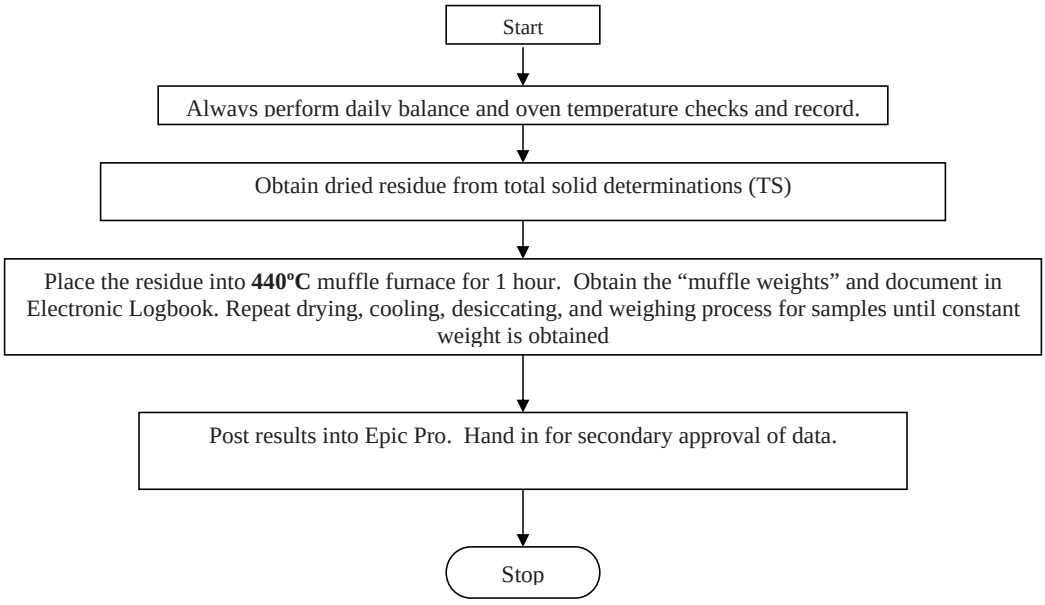
Attachment I – TDS FLOWCHART



Attachment I – TVS and TVSS FLOWCHART



Attachment I – OM and FOC FLOWCHART



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STANDARD OPERATING PROCEDURE

Alkalinity by Titration Using the Radiometer TIM840

Reference Methods: Standard Methods for the Examination of Water and Wastewater, 2320B

SOP NUMBER	S-GB-I-069-Rev.02
EFFECTIVE DATE	Date of final signature
SUPERSEDES	S-GB-I-069-Rev.01

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 09/19/13

Kate Grams, Laboratory Quality Manager — Date: 9/19/2013

Chad Rusch, Department Manager — Date: 09/19/2013

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-I-069-REV.02

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1. PURPOSE/IDENTIFICATION OF METHOD

1.1 This procedure is used to measure alkalinity and dissolved alkalinity in aqueous samples. The procedure references Standard Method for the Examination of Water and Wastewater, online ed., 1997, Method 2320 B-1997.

2. SUMMARY OF METHOD

2.1 Alkalinity of water is its acid-neutralization capacity. Alkalinity is a measure of an aggregate property of water and can be interpreted in terms of specific substances when titrated to different end points. These pH end points indicate a function of carbonate, bicarbonate, and hydroxide content in the water. A sample is titrated first to a pH of 8.3, then to a final pH of 4.5. Total Alkalinity, Hydroxide Alkalinity, Carbonate Alkalinity, and Bicarbonate Alkalinity can be determined by titration. Two concentrations of titrants can be used to determine alkalinity or high alkalinity. If the resulting concentration for total alkalinity is less than 20mg/L, a fresh aliquot of sample is titrated first to a pH of 4.5 and then to 4.2. The Low Level Alkalinity (LLALK) result is calculated from the volumes of titrant used to reach these two points. For Drinking Water Alkalinity determination, only Total Alkalinity is determined.

3. SCOPE AND APPLICATION

3.1 Personnel: The policies and procedures contained in this SOP are applicable to all personnel involved in the analytical method.

3.2 Parameters: This SOP applies to Alkalinity, Total as $CaCO_3$; Alkalinity, Hydroxide; Alkalinity, Phenolphthalein; Alkalinity, Bicarbonate; and Alkalinity, Carbonate. The method covers the range from approximately 10 mg/L alkalinity to approximately 10,000 mg/L as $CaCO_3$ using a 20-ml sample. Samples <20 mg/L are tested using a low level alkalinity method while samples >1,000 mg/L are titrated with a higher normality titrant. If a sample is unable to be titrated with the high normality titrant (concentration >7500mg/L), a lower sample volume may be used.

4. APPLICABLE MATRICES

4.1 This SOP is applicable to drinking water, surface water, wastewater. sewage, and industrial wastes.

5. LIMITS OF DETECTION AND QUANTITATION

5.1 The reporting limit (PQL) of this method for Alkalinity is listed in Table 1 below. All current MDLs are listed in the LIMs and are available by request from the Quality Department.

Table 1: Reporting Limits

Compound Name	Aqueous PQL (mg/L)*
Alkalinity, Total as $CaCO_3$	10
Alkalinity, Hydroxide	10
Alkalinity, Phenolphthalein	10
Alkalinity, Bicarbonate	10
Alkalinity, Carbonate	10

*MDL and PQL are the same for the dissolved parameter.

6. INTERFERENCES

6.1 Dissolved gases contributing to acidity or alkalinity, such as CO_2, hydrogen sulfide, or ammonia, may be lost or gained during storage to titration. Minimize such effects by titrating promptly after opening sample container, avoiding vigorous shaking. Do not remove interferences from sample because they contribute to the alkalinity.

6.2 Soaps, oily matter, suspended solids, or precipitates may coat the glass electrode and cause a sluggish response. Allow a pause between Titrant additions nearer to the endpoint.

6.3 Substances such as salts of weak organic and inorganic acids in large amount may cause interference.

7. SAMPLE COLLECTION/PRESERVATION, SHIPMENT AND STORARGE

7.1 Samples are collected in polyethylene or borosilicate glass. Dissolved alkalinity samples should be field filtered with a 0.45µm pore diameter filter in the field. The bottle is to be filled completely and capped tightly because samples may subject to microbial action and to loss or gain of CO_2 or other gases when exposed to air. See Table 2 for a summary.

Table 2: Sample Collection, Preservation, Holdtime, Shipment, And Storage

Matrix	Method SM 2320B	Container(s)	Preservation Hold Time	Shipment Conditions	Lab Storage Conditions
Aqueous	Alkalinity	250 mL plastic/glass containers	None / 14 days	On ice ≤6°C	≤6°C

8. DEFINITIONS

8.1 Definitions can be found in Section 10 of the most recent version of the Pace Analytical Services, Inc. Quality Manual

9. EQUIPMENT AND SUPPLIES (INCLUDING COMPUTER HARDWARE AND SOFTWARE)

9.1 Magnetic stirrer w/ PTFE-coated magnetic stir bars.

9.2 Disposable beakers

9.3 Pipettes, glass

9.4 Volumetric flasks, 100 mL, 500 mL, 1L, 2L class A

9.5 Analytical Balance

9.6 Oven, 250° C

9.7 PC with TitraMaster 85 Software by Radiometer Analytical

9.8 Radiometer Analytical TIM840 Titration Manager

9.9 Radiometer Analytical SAC850 Sample Changer

10. REAGENTS AND STANDARDS

10.1 Alternative equivalent standards and reagents may be used.

10.2 Purchased reagents or standards are recorded in the alkalinity logbook or standards log in Epic Pro. All prepared standards or reagents are recorded in the wetchem logbook or standards log in Epic Pro. Each container must be labeled with an ID#, date prepared or received, initials, and expiration date. Stock reagents and standards are given an expiration date of one year unless otherwise noted by vendor or procedure. Reagents and standards made in the lab are given an expiration date of 3 months from when it was made unless the stock material expires earlier. See Table 3 for information on ordering standards and reagents.

Table 3: Standards and Reagents

Standard/Reagent	Order Info	Manufacturer/Vendor
ph Buffer 1.679	S11M001	Radiometer
ph Buffer 4.005	S11M002	Radiometer
ph Buffer 7.000	S11M004	Radiometer
ph Buffer 10.012	S11M007	Radiometer
ph Buffer 2.00	SB96-1	Fisher Scientific
ph Buffer 7.00	SB107-4	Fisher Scientific
Second Source Stock	14278-10	HACH
Sodium Carbonate (Na_2CO_3)	S263-500	Fisher Scientific
H2SO4 0.10N	SA220-4	Fisher Scientific
H2SO4 0.02N	SA226-4	Fisher Scientific

10.3 Reagent Water: Prepare all working standard solutions and blanks with Nanopure water that has been acidified to a pH of about 4.2 with 0.02N H_2SO_4.

10.3.1 Dilute 5.0mL of 0.02N H_2SO_4 to 2,000mL with Nanopure water.

10.3.2 The Reagent water is also used for all Method Blanks (MBs) and Continuing Calibration Blanks (CCBs).

10.4 1000mg/L Alkalinity Standard – Sodium Carbonate (Na_2CO_3) 1000mg/L. In a 1L volumetric flask, dissolve 1.06 grams Na_2CO_3 (dried at 250°C for 4 hours) in about 900ml DI water. Dilute to the mark and invert 3 times. Equivalent standards may be used.

10.5 Calibration Buffers - Commercially purchased buffers at the following pH levels 1.679, 4.005, 7.000 and 10.012.

10.6 Initial Calibration Verification (ICV) buffers– Commercially purchased secondary source buffers at the following pH levels 7.0 and 2.0.

10.7 Working standards

10.7.1 10mg/L Reporting Limit Verification Standard (RLVS) – Pipette 0.200mL of 1,000mg/L Alkalinity Standard into a titration beaker and add 19.8mL of reagent water by pipette. Can also be made in bulk.

10.7.2 20mg/L Low Level Check (LLC)– Pipette 0.400mL of 1,000mg/L Alkalinity Standard into a titration beaker and add 19.6mL of reagent water by pipette. Can also be made in bulk.

10.7.3 25mg/L Continuing Calibration Check (CCV) for Low Level Alkalinity (LLALK) – Pipette 0.50mL of 1,000 mg/L Alkalinity Standard into a titration beaker and add 19.5mL of reagent water by pipette. Can also be made in bulk.

10.7.4 500mg/L Continuing Calibration Check (CCV) – Pipette 10mL of 1,000mg/L Alkalinity Standard into a titration beaker and add 10mL of reagent water by pipette. Can also be made in bulk.

10.7.5 1,000mg/L Continuing Calibration Check (CCV) for High Level Alkalinity – Pipette 20mL of 1,000 mg/L Alkalinity Standard into a titration beaker.

10.8 Laboratory Control Spike (LCS) and Duplicate (LCSD)

10.8.1 For normal alkalinity and high titrant, make up a 500mg/L concentrated LCS/LCSD as follows: 0.40mL of Secondary Source Stock (25,000mg/L) to 20mL with reagent water.

10.8.2 For low-level alkalinity, make up a 25mg/L concentrated LCS/LCSD as follows: 0.020mL of Secondary Source Stock (25,000mg/L) to 20mL with reagent water.

10.9 Matrix Spike (MS) and Matrix Spike Duplicate (MSD)

10.9.1 For normal alkalinity and high titrant, make up a 500mg/L concentrated MS/MSD as follows: 0.40mL of Secondary Source Stock (25,000mg/L) to 20mL with parent sample.

10.9.2 For low-level alkalinity, make up a 25mg/L concentrated MS/MSD as follows: 0.020mL of Secondary Source Stock (25,000mg/L) to 20mL with parent sample.

10.10 High Level Sulfuric Acid Titrant, 0.1N – purchased commercially. Shelf life is 1 year.

10.10.1 Each Lot of 0.1N H_2SO_4 is verified in house to have a Normality of 0.1N H_2SO_4 prior to sample analysis.

10.10.2 Four 20 mL aliquots of $NaCO_3$ Solution are titrated to a pH of 4.5 with 0.1N H_2SO_4.

10.10.3 The average of the 4 titrations must be within 10% of the certified Normality on the container to use that Normality in calculations.

10.10.4 If a Sulfuric Acid Titrant container remains in use longer than one month from the date it is opened, then it must have the Normality verified monthly by standardization.

10.11 Sulfuric Acid Titrant, 0.02N – purchased commercially. Shelf life is 1 year.

10.11.1 Each Lot of 0.02N H_2SO_4 is verified in house to have a Normality of 0.02N H_2SO_4 prior to sample analysis.

10.11.2 Four 10 mL aliquots of $NaCO_3$ Solution are titrated to a pH of 4.5 with 0.02N H_2SO_4.

10.11.3 The average of the 4 titrations must be within 10% of the certified Normality on the container to use that Normality in calculations.

10.11.4 If a Sulfuric Acid Titrant container remains in use longer than one month from the date it is opened, then it must have the Normality verified monthly by standardization.

10.12 See Table 4 below for a summary of the standard and spike concentrations.

Table 4: Standard and Spike Concentrations

Standard/Spike	Alkalinity	Low Level Alkalinity	High Alkalinity
CCV	500mg/L	25mg/L	1,000mg/L
LCS/LCSD	500mg/L	25mg/L	500mg/L
MS/MSD	500mg/L	25mg/L	500mg/L
LLC	20mg/L	NA	NA
RLVS	NA	10mg/L	NA

11. CALIBRATION AND STANDARDIZATION

11.1 Set up – See Table 7 in Section 26 for method set up on the TIM840 Titration Manager.

11.2 Calibrate pH meter as follows. pH meter must be calibrated on a daily basis.

11.2.1 pH calibration points for the TIM840 Titration manager consist of 1.679, 4.005, 7.000, and 10.012.

11.2.2 Pour an aliquot of each buffer in ascending pH and place on the SAC 850 Sample Changer in positions 1 through 4.

11.2.3 Follow calibration instructions on the TIM840 Titration Manager.

11.3 Validate the calibration by recording the reading of secondary source buffers (ICVs) that consist of pH buffers at 7.0 and 2.0. The reading must within 0.10 units of the true value.

12. PROCEDURE

12.1 Run normal alkalinity first, if there is no known analytical history to the samples.

12.2 Create a batch in Epic Pro.

12.3 Pipette 20mL of samples into labeled titration beakers.

12.4 Set up analytical run with CCVs and CCBs bracketing every 10 samples. See Section 26, Table 8 for an example of Daily Calibration and analytical sequence.

12.5 Set up one Low Level Check per batch after calibration and ICV buffer readings.

12.6 Verify the 0.02N H_2SO_4 reservoir has sufficient volume to analyze the batch.

12.7 Flush the burette with Sulfuric Acid Titrant, 0.02N H_2SO_4.

12.8 Set up the sequence in the TIM840 Titration Manager with the pH + Alkalinity method. This method is used for normal and high level alkalinity analysis. This method will take the pH of the sample and then titrate to two end points, 8.3 and 4.5.

12.9 Start the sequence.

12.10 When the sequence has finished, additional runs can be added.

12.11 Data is posted to the network and then pulled into LIMS Link to do the calculations and QC evaluations.

12.12 The data is posted from LIMS Link to Epic Pro with applicable qualifiers being added.

12.13 For samples equal to or less than an Alkalinity concentration of 20mg/L, take a fresh aliquot of sample.

Note: this must be done with the method blank as well and the 25mg/L LCS will only be done if the normal alkalinity titration is not done first.

12.13.1 Set up the sequence as before with the exception of the method. Select the pH+Low Level Alkalinity (LLALK) method. This will titrate to the two endpoints of 4.5 and 4.2.

12.13.2 Use the Sulfuric Acid Titrant, 0.02N H_2SO_4.

12.13.3 Post and evaluate the data through LIMS Link. Calculate for Low Level Alkalinity.

12.13.4 For samples that have a history of low level alkalinity results the LL Alkalinity method can be used first without running the normal alkalinity. If this is done the 25mg/L LCS must be analyzed. If samples exceed 50mg/L and/or have an initial pH >8.3, then the normal alkalinity method must be conducted on a fresh aliquot of sample.

12.14 For samples having or exceeding an Alkalinity concentration of 1,000mg/L**,** take a fresh aliquot of sample.

12.14.1 Titrate with High Level Sulfuric Acid Titrant, 0.1N H_2SO_4 instead of Low Level Sulfuric Acid Titrant, 0.02N H_2SO_4.

12.14.2 Use the pH + Alkalinity method, noting the change in titrant Normality.

12.14.3 Since this is a different titrant samples will need to have new batch QC treated the same as the samples.

12.14.4 Should the sample result still be too high (>7,500mg/L), use a smaller volume of a fresh aliquot of sample and repeat the procedure.

12.14.5 Post and evaluate the data through LIMS Link.

13. QUALITY CONTROL

13.1 Method Blank (MB): An aliquot of laboratory reagent water. The MB is analyzed exactly like a sample. The MB is used to determine whether the methodology is in control.

13.1.1 A MB must be analyzed with each batch of samples or every 20 samples, whichever more frequent.

13.1.2 Acceptance Criteria: The MB must be less than the reporting

limit (RL).

13.1.3 If one sample in the batch triggers the Low Level Alkalinity step, then the Method Blank must also go through that step.

13.1.4 If the MB is not within control limits, perform the following:

13.1.4.1 Check for errors in calculations. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.1.4.2 If sufficient sample is available, re-prepare the MB and all associated samples if an error in procedure is discovered which cannot be corrected. If the MB is within the RL in this analysis, accept the second set of data. If the MB is still outside the RL after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate flag to the samples associated with the non-compliant MB.

13.1.4.3 If sufficient sample volume is not available, report the sample data with a qualifier flag on each of the samples associated with the non-compliant MB. Contact the project manager regarding the occurrence.

13.1.4.4 In the absence of project specific requirements, sample detects less than 10 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 10 times the method blank contamination are reported without qualification.

13.2 Laboratory Control Sample (LCS) for Ongoing Precision and Recovery (OPR): The LCS is used to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurement.

13.2.1 An LCS must be analyzed with each batch of samples, or every 20 samples, whichever is more frequent.

13.2.2 Acceptance Criteria: The true value is obtained from the vendor. The LCS recovery must be within the control limits of 80 - 120%.

13.2.3 If the recovery is not within control limits, perform the

following:

13.2.3.1 Check for errors in calculations, standards preparation and spiking of the LCS solution. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.2.3.2 If sufficient sample is available, re-prepare the LCS and all associated samples if an error in procedure is discovered which cannot be corrected. If the recovery is within the limits in this analysis, accept the second set of data. If the recovery is still outside the limits after re-analysis, contact the PM to determine the resolution. If the client does not require additional work, report the data, applying an appropriate data qualifier flag to the samples associated with the non-compliant LCS.

13.2.3.3 If sufficient sample volume is not available, report the sample data with an appropriate data qualifier flag on each of the samples associated with the non-compliant LCS. Contact the project manager regarding the occurrence.

13.3 Matrix Spike / Matrix Spike Duplicate (MS/MSD): Aliquots of an environmental sample to which known quantities of the analyte(s) of interest are added in the laboratory. Their purpose is to quantify the bias and precision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS/MSD corrected for background concentrations.

13.3.1 A matrix spike / matrix spike duplicate will be performed on a 5% basis if sample volume permits.

13.3.2 Acceptance limits: The % recovery must be between 80 – 120% of the true value.

13.3.3 If the % Recovery is exceeded, then:

13.3.3.1 Check for errors in calculations and sample preparation. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.3.3.2 If no errors are found in calculation or sample preparation, report the parent sample with the appropriate data qualifier.

13.3.3.3 The precision of the MS/MSD must be calculated. See section 14.4 for calculation of Relative Percent Difference.

13.4 Duplicate sample (D): A duplicate aliquot of a sample to be analyzed along with the original sample. Duplicate analyses indicates the precision associated with the sample collection, preservation and storage, as well as, laboratory procedure.

13.4.1 Duplicate sample analysis will be performed at a frequency of 5% if requested by the client.

13.4.2 Acceptance limits: The RPD must be within 0-20% between the original sample and the duplicate.

13.4.3 If the RPD is exceeded, then:

13.4.3.1 Check for errors in calculations and sample preparation. If an error or problem is found and can be corrected by amending the calculations and the result falls within the limits, accept the data and report without a qualifier flag.

13.4.3.2 If no errors are found in calculations or sample preparation report the parent sample with an appropriate data qualifier.

13.5 Continuing Calibration Verification (CCV)

13.5.1 The CCV is analyzed before and after every 10 samples.

13.5.2 Concentration must be within ± 20% of the true value. When measurements are outside the control limits, the analysis must be terminated, the problem corrected, and the calibration re-verified. If the reset CCV fails, recalibrate and reanalyze all samples back to the last acceptable CCV.

13.5.3 If the CCV is greater than the control limit and the samples are non-detects, the samples may be reported without a flag.

13.6 Continuing Calibration Blank (CCB)

13.6.1 The CCB must be analyzed after the CCV and before samples.

13.6.2 The absolute value must be < PRL. When measurements are above the PRL, terminate analysis, correct the problem, and the calibration re-verified. If the reset of the CCB fails, recalibrate and reanalyze all analytical samples analyzed since the last compliant calibration blank.

13.6.3 If the sample concentration is greater than ten times the concentration in the CCB, the samples do not need to be reanalyzed.

13.7 Low Level Check (LLC): A standard prepared at the lowest concentration reportable without using the low-level endpoints. It is analyzed after the calibration, recovery 60-140% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate.

13.8 Reporting Limit Verification Standard (RLVS): A standard prepared at the concentration of the Pace Reporting Limit. It is analyzed after the calibration, recovery 60-140% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate.

13.9 Documentation

13.9.1 Draw a single-line strike through for any unacceptable or changed data, then DATE and INITIAL and provide a written explanation of the reason for the change.

13.9.2 Any discrepancies and issues occurring with each batch should be included in a non-conformance, which is submitted to the QA manager for review, and incorporated into a narrative.

14. DATA ANALYSIS AND CALCULATIONS

14.1 Titrant Normality calculation

$$\text{Normality (N)} = (A \times B)/(53 \times C)$$

Where A = g $NaCO_3$ weighed (2.5g) to one L ($NaCO_3$ Solution)
B = mL of $NaCO_3$ Solution
C = mL of H_2SO_4 titrant used

14.2 The LCS Percent Recovery is calculated as follows:

$$\text{LCS\% Recovery} = \frac{\text{LCS calculated value}}{\text{LCS true value}} \times 100$$

14.3 The MS/MSD percent recovery is calculated as follows:

$$\text{MS/MSD\% Recovery} = \frac{(SSR - SR)}{SA} \times 100$$

SSR - Spiked sample result
SR - Sample result
SA - Spike amount

14.4 The relative percent difference (RPD) is calculated as:

$$RPD = \frac{|S - D|}{(S + D)/2} * 100$$

Where:
S = sample value, mg/L
D = duplicate value, mg/L

If MS/MSD is used to calculate RPD use SSR and SR in place of S and D.

14.5 Potentiometric titration to pH 4.5:

$$\text{Total Alkalinity, as mg } CaCO_3/L = \frac{A \times N \times 50{,}000}{\text{mL sample}}$$

where: A = volume of Titrant used (R2 on TIM840)
N = normality of H_2SO_4

Report as "The alkalinity to pH ___ = ___ mg $CaCO_3$/L."

14.5.1 To report as milliequivalents per liter, divide the above result by 50.

14.5.2 This calculation is used to determined Total Alkalinity using the Low Level Sulfuric Acid Titrant, 0.02 N H_2SO_4 and the High Level Sulfuric Acid Titrant, 0.1 N H_2SO_4.

14.6 Potentiometric titration of Low Level Alkalinity:

$$\text{Total Alkalinity, mg } CaCO_3/L = \frac{(2B-C) \times N \times 50{,}000}{\text{mL sample}}$$

where: B = mL Titrant to first recorded pH (R1 on TIM840)
C = total mL Titrant to reach pH 0.3 unit lower (R2 on TIM840)
N = normality of H_2SO_4

14.7 "Phenolphthalein Alkalinity" (P): The term traditionally used for the quantity measured by the titration to pH 8.3.

14.8 Calculation of Alkalinity relationships: The results obtained from the phenolphthalein (pH 8.3) and total (pH 4.5) alkalinity determinations offer a means for stochiometric classification of the three principle forms of alkalinity present in many waters. These classifications are entire alkalinity to bicarbonate, carbonate, and hydroxide according to this scheme:

14.8.1 Carbonate (CO_3^{2-}) alkalinity (C) is present when phenol alkalinity is not zero but is less than total alkalinity.

14.8.2 Hydroxide (OH^-) alkalinity (H) is present if phenol alkalinity is more than half of the total alkalinity.

14.8.3 Bicarbonate (HCO_3^-) alkalinity (B) is present if the phenol alkalinity is less than half of the total alkalinity

14.8.4 These relationships may be calculated using the following chart:

Result of Titration	Hydroxide (H)	Carbonate(C)	Bicarbonate (B)
P = 0	0	0	T
P < 1/2T	0	2P	T-2P
P = 1/2T	0	2P	0
P > 1/2T	2P-T	2(T-P)	0
P = T	T	0	0

15. DATA ASSESSMENT AND ACCEPTANCE CRITERIA FOR QUALITY CONTROL MEASURES

Table 5: Quality Control

Method ⇨ Quality Control Measure ⇩	SM 2320B
Method Blank (MB)	One per batch of samples, up to 20 environmental samples, whichever is more frequent. Must be processed with batch.
Laboratory Control Spike (LCS)	One per batch of samples, up to 20 environmental samples, whichever is more frequent. Must be processed with batch.
Matrix Spike, Matrix Spike Duplicate (MS/MSD)	One pair per batch of samples, up to 20 environmental samples, whichever is more frequent. Must be processed with batch.
Sample Duplicate (DUP)	By client request. Must be processed with batch.
Initial Calibration	Minimum of 4 pH Buffers. Must be performed daily prior to sample analysis.
Calibration Verification (ICV/CCV)	ICV – analyzed after calibration but before samples. The ICVs are pH buffers. CCV – analyzed prior to, after every 10 samples, and at the end of the sequence.
Calibration Blank (CCB)	CCB – analyzed after every CCV.
Reporting Level Check (CRDL)	CRDL – analyzed after first CCB.

16. CORRECTIVE ACTIONS FOR OUT-OF-CONTROL DATA

Table 6: Analyst/Technician Data Assessment

Analytical Method Acceptance Criteria⇨ Data Assessment Measure ⇩	**SM 2320B If these conditions are not achieved ⇒**
Method Blank (MB)	• 1
Laboratory Control Spike (LCS)	• 2
Matrix Spike, Matrix Spike Duplicate (MS/MSD)	• 3
Sample Duplicate (DUP)	• 4
CRDL standard	• 5
Initial / Continuing Calibration Verification	• 6
Initial / Continuing Calibration Blank	• 7

1. In the absence of project specific requirements, sample detects less than 20 times the method blank contamination level is reported with the appropriate data qualifier. Sample detects greater than 20 times the method blank contamination are reported without qualification.

2. If sample volume does not allow re-analysis the entire prep/analytical batch of samples shall be flagged with the appropriate accuracy and/or precision data qualifier to reflect the deficiencies.

3. If the parent, MS, or MSD is greater than the instruments working range, reanalyze the parent, MS, and MSD using the higher N Titrant. If still outside the working range dilute and qualify data. If the concentration of the spike is less than 25% of the concentration of the parent the MS and MSD recoveries are not evaluated. Any failures resulting from this are qualified appropriately. If the concentration of the spike is greater than 25% of the concentration of the parent, appropriately qualify the parent sample if either the MS and/or MSD fails accuracy. If the MS and MSD fails precision control limits flag the parent with the appropriate precision data qualifier.

4. If DUP fails acceptance criteria with the instrument in control, assume matrix affect and qualify the applicable data.

5. It is analyzed after the calibration, recovery 50-150% of true value. If outside the limits, reanalyze once. If still outside the limits, recalibrate.

6. If ICV/CCV is outside the control limits reanalyze the ICV/CCV to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. If the ICV/CCV recovers greater than the control limit and the samples bracketing the out of control ICV/CCV are non-detects, the results may be reported without a flag.

7. If ICB/CCB is outside the control limits reanalyze the ICB/CCB to verify the instrument is out of control. If the 2nd analysis is outside control limits, perform maintenance and recalibrate. Samples that bracket the out of control standards must be reanalyzed. Samples that are > 10X the concentration in the CCB the samples do not have to be reanalyzed.

17. CONTINGENCIES FOR HANDLING OUT-OF-CONTROL OR UNACCEPTABLE DATA

17.1 See Section 16.

18. METHOD PERFORMANCE

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.2 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.3 An initial demonstration of capability (IDC) must be performed per S-ALL-Q-020, *Orientation and Training Procedure*s. A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager.

18.4 An annual method detection limit (MDL) study will be completed per S-GB-Q-020, *Determination of LOD and LOQ*, for this method and whenever there is a major change in personnel or equipment. The results of these studies are retained in the quality assurance office.

18.5 Periodic performance evaluation (PE) samples are analyzed per S-GB-Q-021, *PE/PT Program*, to demonstrate continuing competence. All results are stored in the QA office.

19. METHOD MODIFICATIONS

19.1 Method modifications for Standard Method 2320B are as follows

19.1.1 Modifications should be targeted to improve quality, efficiency or the cost effectiveness of the procedure.

19.1.2 All major modification to the procedure that may directly affect data quality must be thoroughly documented. A new demonstration of capability and equivalency must be performed and kept on record.

19.1.3 Procedures identified as “Best Practices” by the PACE 3P Program will be incorporated into this document as minimum requirements for Pace laboratories.

19.1.4 This procedure has been adapted to be used with an auto-titration instrument.

19.1.5 Sample and reagent volumes have been reduced to accommodate the analysis by the instrumentation being used.

19.2 If a client fails to provide sufficient volume for the method required Matrix Spike/Matrix Spike Duplicate (MS/MSD), the laboratory will analyze a Laboratory Control Spike Duplicate to demonstrate precision. The analytical batch will be qualified with the "M5" data qualifier.

20. INSTRUMENT/EQUIPMENT MAINTENANCE

20.1 Probe has high response time - Soak probe in pH 4.0 buffer usually for about 2 hours and then rinse with nano-pure water.

20.2 Prior to probe usage - Add KCl crystals**,** if needed**,** to the inside of the probe (0.5 cm KCl crystals should be present), add KCl probe solution**,** if needed**,** just below filling hole (0.5 cm below the filling hole), make sure this is no air bubbles inside the probe by gentle agitation, an**y** crystal deposit around filling hole should be wiped off.

20.3 After usage (short term storage) - Probe is rinsed with nano-pure water and blotted dry with kimwipes, filling hole is wrapped and covered with parafilm, and probe is stored in pH 7.0 buffer solution.

20.4 Filling solution should be changed at least once a month with new KCl crystals: remove old filling solution, dissolve the old crystals by adding nanopure water and inverting probe. Rinse out the probe by filling with KCl probe solution and inverting probe three times. Repeat rinse again. Add KCl crystals, 0.5 cm crystals should be present. Add probe filling solution to 0.5 cm below filling hole. Gently invert probe three times.

20.5 For long term storage, remove filling solution and dissolve KCl crystals as described above. Fill probe with nano-pure water, parafilm the filling hole and store probe in upright position in KCl filling solution. When probe is ready to use again, add new crystals and filling solution, and soak probe at least 12 hours in nano-pure water.

20.6 Soak the probe in Renovo-N solution for about 2 hours if the probe is heavily contaminated from a sample (usually grease or oil samples will do this), and rinse off with nano-pure water. Renovo-N is a probe cleaning solution.

20.7 Change/replace probe when the calibration specifications are getting close to their acceptance limits. Typically probes are changes every two to three months.

21. TROUBLESHOOTING

21.1 Refer to the following Radiometer operating manuals:
- TitraMaster 85 Software by Radiometer
- Radiometer TIM840 Titration Manager
- Radiometer SAC850 Sample Changer

22. SAFETY

22.1 Each chemical should be regarded as a potential health hazard and exposure should be as low as reasonably achievable. Cautions are included for known extremely hazardous materials.

22.2 A reference file of Safety Data Sheets (SDS) is made available to all personnel involved in the chemical analysis, and is located at the front desk. A formal safety plan has been prepared and is distributed to all personnel with documented training.

22.3 Analysts should take necessary safety precautions when handling chemicals and samples. Proper personal protective equipment may include safety gloves, lab coats, and safety glasses or goggles. Analysts should be familiar with the SDSs for all chemicals and reagents they use for this procedure and the location of the SDSs within the laboratory. Any questions or concerns should be taken to the laboratory Chemical Hygiene/Safety Officer.

23. WASTE MANAGEMENT

23.1 All sample residues from this analysis process must be handled as hazardous waste and disposed of in the proper hazardous waste barrel bound for incineration. For further information on waste management consult the current version of S-GB-S-001, Regulated Soil Handling – Green Bay Location, most current revision or replacement.

24. POLLUTION PREVENTION

24.1 Excess samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult the current version of S-GB-W-001, Waste Handling and Management, most current revision or replacement.

25. REFERENCES

25.1 Standard Methods for the Examination of Water and Wastewater, on-line Edition, 2320B-1997.

25.2 Methods for Chemical Analysis of Water and Wastes. U.S. EPA – 600/4-79-020, 1983. Method 310.1.

26. TABLES, DIAGRAMS, FLOWCHARTS, APPENDICES, ETC.

26.1 Table 7: Instrument Set Up

26.2 Table 8: Daily Calibration and Sequence

26.3 Flow chart

27. REVISIONS

Document Number	Reason for Change	Date
S-GB-I-069-Rev.00	New Issue	18Feb2011
S-GB-I-069-Rev.01	Section 9.5: Updated Working Standard Solution Mixes Section 11.1.5: Corrected calculation to use R2 from R1	05Aug2011
S-GB-I-069-Rev.02	Throughout Document: Updated SOP to new format following SOP: S-GB-Q-017 *Preparation of SOPs* (most current revision or replacement). Updated SOP references throughout document. Sections 10.10 and 10.11: Added information on verification o normality of titrant. Section 12.14.4: Included contingency if results are >7500mg/L. Section 19: Added appropriate method modifications. Section 26: Renumbered/moved tables to body of document were applicable.	11Sep2013

Table 7: Instrument Set Up

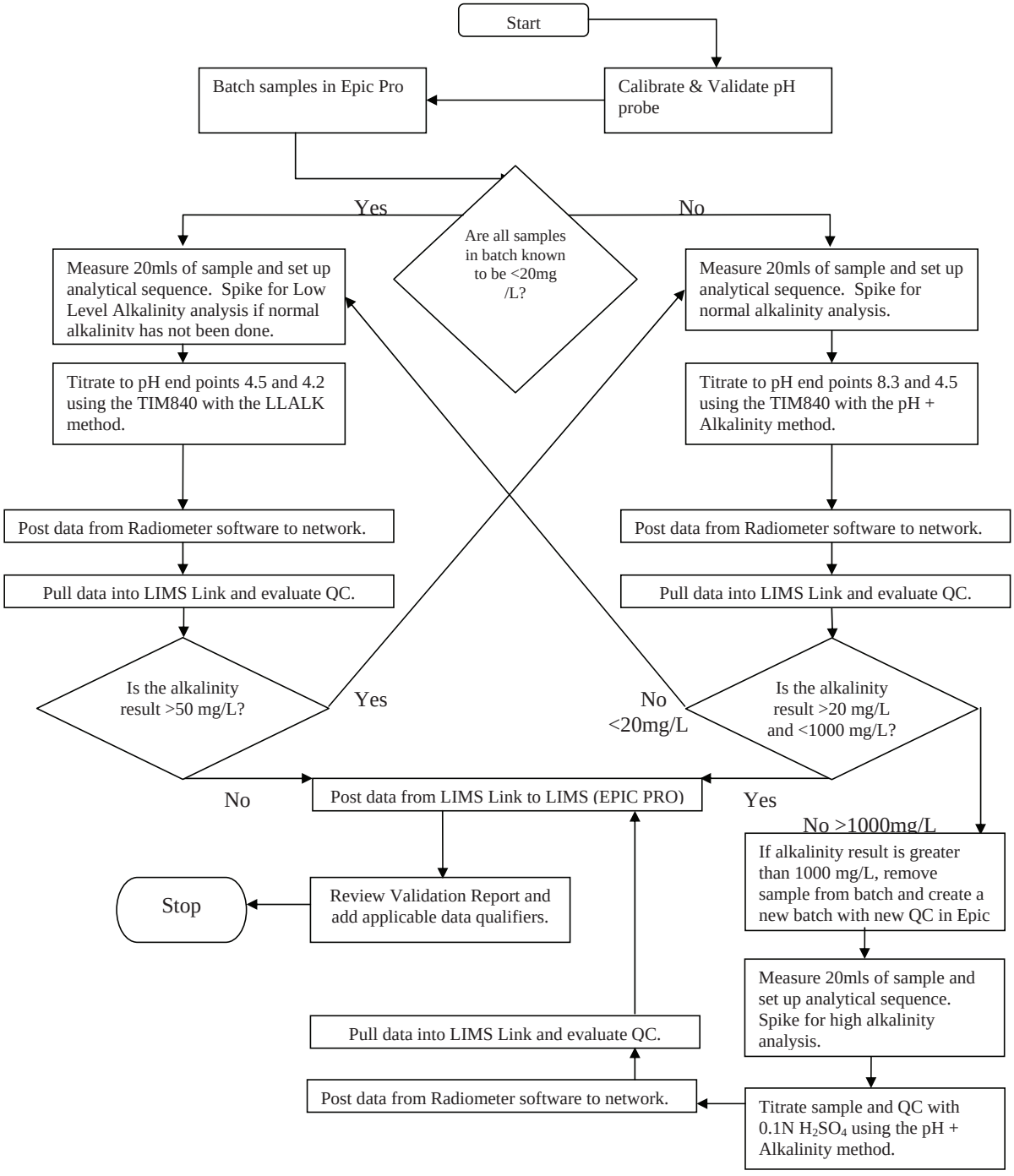
Edit Method	LLALK	Alkalinity
Mode:	End Point	End Point
Measurement:	pH	pH
Temperature:	Probe	Probe
Number of Tests	1	1
Notification	No	No
Cell Grounding:	Reference	Reference
Blank:	No	No
Method Parameters		
Electrode:	PHC240192621	PHC240192621
Temp Sensor:	T201-a	T201-a
Titrant:	H2SO4 N	H2SO4 N
Predose Mode:	mL	mL
Predose Unit:	0.0000mL	0.0000mL
Start Timer	00min 00s	00min 00s
Max Volume:	30.000mL	30.000mL
Direction:	Decreasing pH	Decreasing pH
Backtitration:	No	No
Min. Speed:	0.01mL/min	0.01mL/min
Max. Speed:	0.50mL/min	1.00mL/min
Number of EP:	2	2
Auxiliary output	No	No
1-End point	4.500pH	8.300pH
EP delay:	00min 20s	00min 20s
Proportional band:	1.000pH	0.500pH
2-End point	4.200pH	4.500pH
EP delay:	00min 20s	00min 20s
Proportional band:	1.000pH	1.000pH
Sample		
Sample unit:	mL	mL
Sample amount:	20.000mL	20.000mL
Results		
Results by:	Cumulate	Cumulate
Number of results:	2	2
Number of equations:	0	0
Results factor:	No	No
Number of digits:	4	4
Result 1		
ID:	R1	R1
Result unit:	mL	mL
Calculate with EP no.:	1	1
Result 2		
ID:	R2	R2
Result unit:	mL	mL
Calculate with EP no.:	2	2
Printouts		
Title:	Analysis Bulletin	Analysis Bulletin
Detailed:	Medium	Medium
Curve:	Yes	Yes

Table 8: Daily Calibration and Sequence

Calibration Performed Under the Probe Data Out the IM40 Titration Manager
pH 10.012 Buffer
pH 7.000 Buffer
pH 4.005 Buffer
pH 1.679 Buffer

pH Secondary Source Verification Done Using the pH Method
pH 2.0 Buffer
pH 7.0 Buffer
Titration Cell Instrument Blank and Batch Samples Done Using the pH Alkalinity Method
Type
QC
RDL
MB
LCS
Sample 1
MS of Sample 1
MSD of Sample 1
Sample 2
Sample 3
Sample 4
Sample 5
Sample 6
Type
QC
Sample 7
Sample 8
Sample 9
Sample 10
Sample 11
Sample 12
Sample 13
Sample 14
Sample 15
Sample 16
Type
QC
Sample 17
Sample 18
Sample 19
Sample 20
Type
QC

FLOW CHART


Start
Calibrate & Validate pH probe
Batch samples in Epic Pro
Are all samples in batch known to be <20mg /L?
Yes
No
Measure 20mls of sample and set up analytical sequence. Spike for Low Level Alkalinity analysis if normal alkalinity has not been done.
Titrate to pH end points 4.5 and 4.2 using the TIM840 with the LLALK method.
Post data from Radiometer software to network.
Pull data into LIMS Link and evaluate QC.
Is the alkalinity result >50 mg/L?
Yes
No
Measure 20mls of sample and set up analytical sequence. Spike for normal alkalinity analysis.
Titrate to pH end points 8.3 and 4.5 using the TIM840 with the pH + Alkalinity method.
Post data from Radiometer software to network.
Pull data into LIMS Link and evaluate QC.
Is the alkalinity result >20 mg/L and <1000 mg/L?
No <20mg/L
Yes
No >1000mg/L
Post data from LIMS Link to LIMS (EPIC PRO)
Review Validation Report and add applicable data qualifiers.
Stop
If alkalinity result is greater than 1000 mg/L, remove sample from batch and create a new batch with new QC in Epic
Measure 20mls of sample and set up analytical sequence. Spike for high alkalinity analysis.
Titrate sample and QC with 0.1N H_2SO_4 using the pH + Alkalinity method.
Post data from Radiometer software to network.
Pull data into LIMS Link and evaluate QC.

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STANDARD OPERATING PROCEDURE

MEASUREMENT OF pH IN WATER, SOIL, AND WASTE

REFERENCE METHODS: SM 4500-H^+ AND SW-846 METHODS 9040B AND 9045C

LOCAL SOP NUMBER:	S-GB-I-071-REV.01
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S -GB-I-071-REV.00
SOP TEMPLATE NUMBER:	SOT-ALL-I-015-Rev.00

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 09/28/12

Kate Grams, Laboratory Quality Manager — Date: 9/26/12

Chad Rusch, Department Manager — Date: 09/27/2012

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-I-071-REV.01

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1. Purpose

The purpose of this SOP is to provide a laboratory specific procedure to measure pH in water, soil, and waste samples while meeting the requirements of SM Method 4500-H^+ and SW846 Methods 9040B and 9045C.

2. Summary of Method

2.1. Water samples and wastes containing at least 20% water are measured electrometrically using a combination pH electrode with temperature compensation. The method for analyzing this type of sample is either SM Method 4500-H^+ or SW846 9040B and must be reported referencing one of these methods.

2.2. Soils and solids containing less than 20% water are mixed with reagent water and the pH of the resulting aqueous suspension is measured in the same manner as a water sample. The method for analyzing this type of sample is SW846 9045C and must be reported referencing this method.

3. Scope and Application

3.1. This method is applicable to water samples (including drinking water, surface water, groundwater, saline water, and domestic and industrial wastewaters), soils, sludges, and solid wastes.

3.2. Since pH measurement requires some water content, concentrated acids and bases and concentrated acids and bases mixed with inert substances cannot be measured.

3.3. This SOP was prepared for method-compliant use by all Pace Analytical environmental laboratories.

3.4. This procedure is restricted to use by, or under the supervision of, analysts experienced with electrode measurements. Each analyst must demonstrate the capability to generate acceptable results with this method to be considered qualified to report sample results.

4. Interferences

4.1. The glass electrode, in general, is not subject to solution interferences from color, turbidity, colloidal matter, oxidants, reductants or high salinity.

4.2. Sodium error at pH levels greater than 10 can be reduced or eliminated by using a "low sodium error" electrode.

4.3. Coatings of oily material or particulate matter can impair electrode response. These coatings can usually be removed by gentle wiping or washing with detergent, then rinsing with distilled water. An additional treatment with hydrochloric acid (1:9) may be necessary to remove any remaining film.

4.4. Sample temperature can cause variations in electrometric measurement of pH in two ways, by causing a change in electrode output and by actually altering the sample pH. Since both variation sources cannot be fully controlled, measurements should be made using a temperature compensating electrode and the analysts should report the sample temperature at the time of analysis along with the pH result. **Coatings of oily material or particulate matter can impair electrode response. The electrode should be thoroughly rinsed and cleaned between samples. Wiping of the electrode using an optical safe wipe may be required to remove oil or clay like soils.**

5. Safety

5.1. Standards and Reagents

The toxicity and carcinogenicity of standards and reagents used in this method have not been fully defined. Each chemical compound should be treated as a potential health hazard. Reduce exposure by the use of gloves, lab coats and safety glasses. Material Safety Data Sheets (MSDSs) are on file in the laboratory and available to all personnel. Standard solutions should be prepared in a hood whenever possible.

5.2. Samples

Take precautions when handling samples. Samples should always be treated as potentially hazardous "unknowns". The use of personal protective equipment (gloves**,** lab coats and safety glasses) is required when handling samples. In the event a sample container must be opened, it is recommended to perform this in a hood whenever possible.

6. Definitions

Refer to Glossary section of the Pace Quality Assurance Manual (QAM) for a comprehensive list of terms and definitions. In addition to those listed in the QAM, the following are additional terms found in this SOP.

7. Sample Collection, Preservation, and Handling

Table 7.1 – Sample Collection, Preservation, Storage and Hold time.

Sample type	Collection per sample	Preservation	Storage	Hold time
Aqueous	Plastic container (125 mL).	None	If samples cannot be analyzed immediately, they must be stored at 4±2 °C	Samples should be analyzed as soon as possible following collection, preferably at the collection site.(1,2)
Soil	Plastic container (4-oz)	None	If samples cannot be analyzed immediately, they must be stored at 4±2 °C	Samples should be analyzed as soon as possible following collection, preferably at the collection site.(2)

(1) For aqueous samples analyzed and reported according to SM 4500-H^+, PASI observes a 15 minute hold time. Laboratories must qualify results as exceeding the recommended hold time for this ***field parameter*** when analysis occurs beyond this time frame.

(2) For samples analyzed and reported according to either SW-846 9040B or 9045C, PASI observes a 24 hour hold time. Laboratories must qualify results as exceeding the recommend hold time when analysis occurs beyond this time frame.

Samples should be stored separately from all standards, reagents, and highly contaminated samples. To avoid contamination, no food or drink products can be located near samples.

8. Equipment and Supplies

8.1. Instrumentation

Equipment	Vendor	Model / Version	Description / Comments
pH Meter	Orion	Orion 720A	
Glass Combination Electrode with Automatic Temperature Compensation	Orion	9157BN	Orion Triode pH Electrode
Analytical Balance	Mettler	PJ 480	Capable of weighing to 0.01 g

8.2. General Supplies

Item	Vendor	Model / ID	Catalog #	Description
Disposable Beakers, 50-mL	Fisher		01-29107	
Magnetic Stirrer	Fisher	Corning		
Spin Bars	Fisher			
Wash Bottle	Fisher			
Graduated cylinders	Fisher			50-mL or 100-mL
Laboratory Wipe Tissues	Fisher		06-666A	Kimwipes

9. Reagents and Standards

9.1. Reagents

Reagent	Concentration/ Description	Requirements/ Vendor/ Item #
Reagent water	De-ionized water	ASTM Type II water
Electrode Filling Solution	Used for filling electrode	Orion p/n 90004

9.2. Analytical Standards

9.2.1. Definitions

Standards are required for initial calibration, calibration verification standards, and second source verification.

Table 9.2 Standard Definitions and vendors

Standard	Description	Comments
Primary Calibration Buffer, pH 2.00 ± 0.02	This standard solution is used for daily calibration of the measurement system.	Fisher p/n SB96-1, or equivalent
Primary Calibration Buffer, pH 7.00 ± 0.01	This standard solution is used for daily calibration of the measurement system.	Fisher p/n SB107-4, or equivalent
Primary Calibration Buffer, pH 10.00 ± 0.02	This standard solution is used for daily calibration of the measurement system.	Fisher p/n SB115-4, or equivalent
Primary Calibration Buffer, pH 12.45 ± 0.01	This standard solution is used for daily calibration of the measurement system. Manufactured by Oakton – p/n 00654-12	MG Scientific p/n T-00654-12, or equivalent
Secondary Source Calibration Buffer, pH 4.00 ± 0.01	This standard solution is used to verify calibration before sample analysis.	Fisher p/n SB101-4, or equivalent
Secondary Source Calibration Buffer, pH 7.00 ± 0.01	This standard solution is used to verify calibration before sample analysis. Manufactured by Oakton – p/n 00654-04.	Fisher p/n13300153, or equivalent

9.2.2. **Storage Conditions**

Table 9.3 – Analytical Standard Storage Conditions

Standard Type	Description	Expiration	Storage
Primary Calibration Buffer, pH 2.00 ± 0.02	Fisher p/n SB96-1, or equivalent	Manufacturer's recommended expiration date	Store at room temperature
Primary Calibration Buffer, pH 7.00 ± 0.01	Fisher p/n SB107-4, or equivalent	Manufacturer's recommended expiration date	Store at room temperature
Primary Calibration Buffer, pH 10.00 ± 0.02	Fisher p/n SB115-4, or equivalent	Manufacturer's recommended expiration date	Store at room temperature
Primary Calibration Buffer, pH 12.45 ± 0.01	MG Scientific p/n T-00654-12, or equivalent	Manufacturer's recommended expiration date	Store at room temperature
Secondary Source Calibration Buffer, pH 4.00 ± 0.01	Fisher p/n SB101-4, or equivalent	Manufacturer's recommended expiration date	Store at room temperature
Secondary Source Calibration Buffer, pH 7.00 ± 0.01	Fisher p/n13300153, or equivalent	Manufacturer's recommended expiration date	Store at room temperature

10. Calibration

10.1. Calibration - The measurement system must be calibrated daily with four calibration buffer solutions. These solutions must bracket the range of pH values measured. Additional calibration points are recommended provided the pH meter can accept additional calibration data points.

10.1.1. Press ***power*** to turn the meter on. Press **2nd/channel** until the correct input channel is selected.

10.1.2. Press the **mode** key until the pH mode indicator is displayed.

10.1.3. Press **calibrate.** CALIBRATE is displayed. The time and date of the last calibration is displayed.

10.1.4. After a few seconds ENTER NO. BUFFERS is displayed. Use the numeric keys to enter the number of buffers to be used, then press **yes**. Enter four for the number of buffers to be used.

10.1.5. Place a stir bar in the beaker, put the beaker on the stirrer, and adjust the stirrer to a moderate speed. When the BUFFER 1 prompt appears place electrode(s) in first buffer containing stir bar on.

10.1.6. When the electrode signal has stabilized, the prompt READY CAL AS will appear. Use the numeric keys to enter the value of the buffer. Press **yes** to enter the value.

10.1.7. Rinse the electrode with DI water and gently wipe with a tissue. Repeat steps 5 and 6 for each buffer.

10.1.8. The average electrode slope is displayed at the SLOPE prompt.

10.1.9. The meter automatically proceeds to MEASURE mode.

10.1.10. Record the readings for each buffer used during calibration along with the slope in the pH logbook. (See Attachment I.)

10.2. **Initial Calibration Verification –** The calibration must be verified with two secondary source calibration buffers prior to conducting measurements on samples. Perform initial calibration verification using the two secondary source calibrations buffers (4.00 and 7.00 pH Units). The control criteria for this verification is listed in Table 12.1.

10.3. **Continuing Calibration Verification –** The calibration must be verified with a single point verification buffer (pH 7.00) every 10 samples. The control criterion for this verification is listed in Table 12.1.

11. Procedure

11.1. Water Samples

11.1.1. Allow samples to warm to room temperature. Unless a temperature compensated probe is used, samples must be within ±2°C of the standard buffer solutions used for calibration.

11.1.2. Place the sample in a 50-mL disposable beaker, using sufficient volume to cover the sensing elements of the electrode and provide adequate clearance for the magnetic stirring bar. Place a magnetic stirring bar in the beaker and place the beaker on the stirrer. Turn on the stirrer to a moderate speed. The sample should be noticeably mixing but should not develop a vortex.

11.1.3. Rinse the electrode with DI water and gently wipe with a tissue. Place the pH electrode into the sample beaker, taking care to provide adequate clearance for the stirring bar.

11.1.4. Wait for the meter reading to stabilize and note the pH.

11.2. Soil and Solid Samples

11.2.1. Place 20g of sample into a 50-mL disposable beaker. Add 20mLs of DI water and a stirring bar to the beaker and place it on the stirrer. Turn the stirrer to a moderate speed and continuously stir the suspension for 5 minutes.

11.2.2. If the matrix is hydroscopic and has absorbed all the water leaving no remaining free liquid for analysis, repeat the preparation using 20g of sample and 40mLs of DI water.

11.2.3. Turn off the stirrer and allow the sample to sit, permitting the suspended particulates an opportunity to settle to the bottom of the container. Samples may be allowed to sit for up to one hour prior to analysis. Excessive solids in suspension may speed the clogging of the frit between the electrodes.

11.2.4. Place the pH electrode and ATC electrodes into the sample beaker, taking care to immerse the combination electrode just below the suspension. Wait for the meter reading to stabilize and record the pH result and time analyzed. Record the results to 0.1 pH units.

12. Quality Control

12.1. Batch Quality Control

Table 12.1 – Batch Quality Control Criteria

QA Sample	Components	Frequency	Acceptance Criteria	Corrective Action
Secondary Source Calibration Buffers	4.00 and 7.00 pH Units Secondary Calibration Buffer Solutions	Daily after calibration	± 0.1 pH Units	Re-calibrate
CCV Buffer	7.00 pH Units Secondary Calibration Buffer Solution	One after every 10 samples and at the end of the batch of samples.	± 0.1 pH Units	Terminate analysis, correct the problem, re-calibrate the system, and re-analyze the check solutions and all samples that are not bracketed by acceptable QC.
Duplicate Sample	Sample	One per batch of 20 or fewer samples for soil matrices. None required for aqueous samples.	5.0% RPD	Terminate analysis, correct the problem, re-calibrate the system, and re-analyze the check solutions and all samples that are not bracketed by acceptable QC.
Calibration of pH Probe				Calibrate the temperature function of the pH probe on an annual basis as per the current revision of PASI SOP S-GB-Q-030, *Support Equipment.* Record the calibration in the thermometer calibration logbook and label the probe with the date of calibration.

13. Method Performance

13.1. Demonstration of Capability (DOC): Every analyst who performs this method must first document acceptable accuracy and precision by passing a demonstration of capability study (DOC) per S-ALL-Q-020, *Orientation and Training Procedures* (most current revision or replacement). All results must be in control to qualify the analyst for reporting sample results (within 0.1 pH units of the true value). Results of DOC studies for each analyst shall be retained in the lab quality assurance office. DOCs must be repeated annually. For this test four analysis of the second source pH 7 buffer will serve as the DOCs.

13.2. Method Modifications: If the matrix is hydroscopic and has absorbed all the water leaving no remaining free liquid for analysis, repeat the preparation using 20g of sample and 40mLs of DI water. This is a method modification of 9045C. Method 9045C requires a 1:1 ratio, but since this would not be possible with a sample of this nature the noted procedure will be followed and the sample qualified as such.

14. Pollution Prevention and Waste Management

14.1. Procedures for handling waste generated during this analysis are addressed in S-GB-W-001, *Waste Handling and Management* (most current revision or replacement).

14.2. In order to minimize the amount of waste generated during this procedure, analyst should prepare reagents in an amount which may be used in a reasonable amount of time (i.e. before a reagent expires)

14.3. The company wide Chemical Hygiene and Safety Manual contains additional information on pollution prevention.

15. References

15.1. Method 4500-H^+ B., Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998.

15.2. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"; EPA SW-846, latest revision. Method 9040B "pH Electrometric Measurement".

15.3. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"; EPA SW-846, latest revision. Method 9045C "Soil and Waste pH".

15.4. Pace Analytical Quality Manual; latest revision.

15.5. NELAC Standard; Quality Systems section; latest revision.

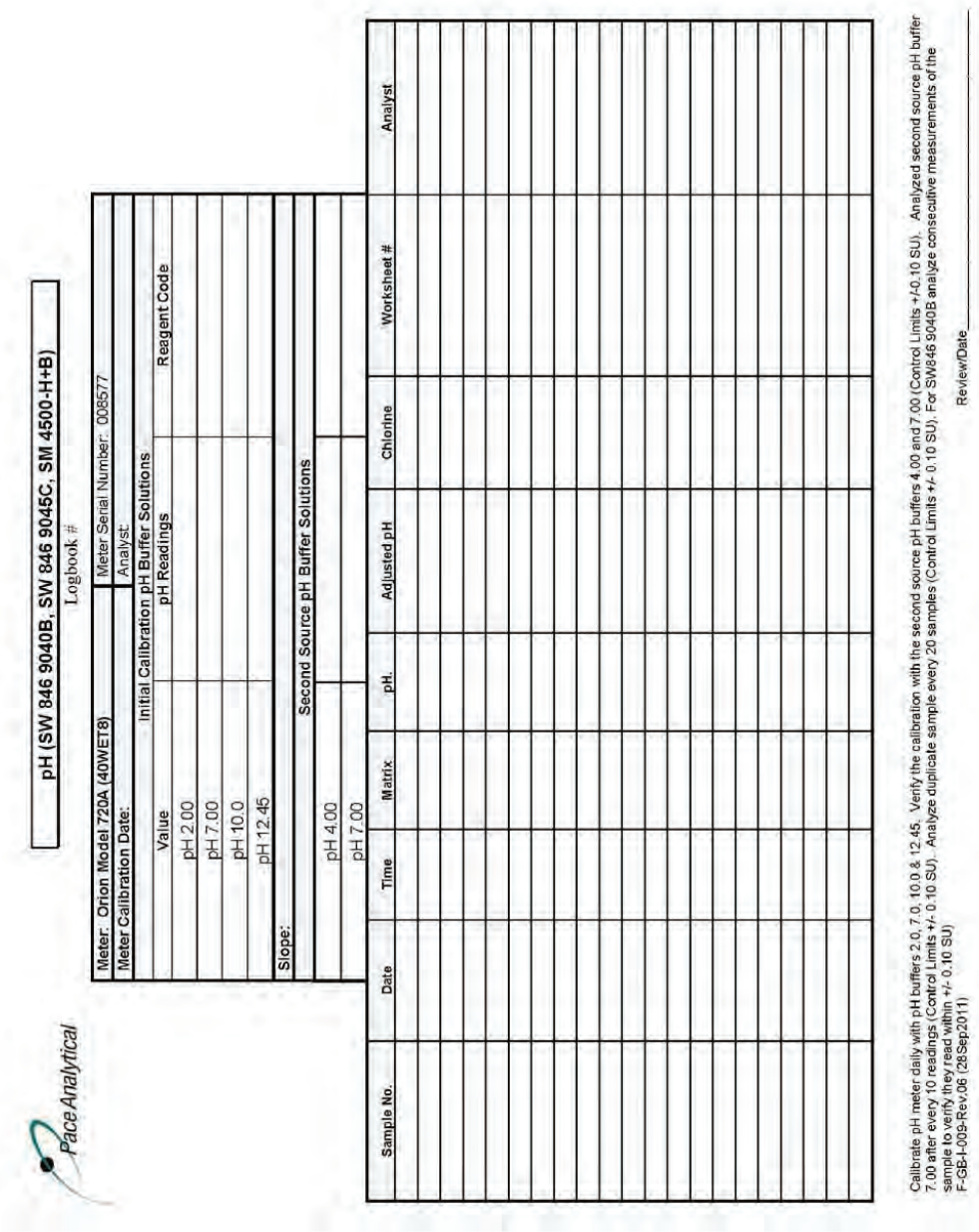
16. Tables, Diagrams, Flowcharts, Attachments, Appendices, etc.

Attachment I - pH Logbook Template.

17. Revisions

Document Number	Reason for Change	Date
SOT-ALL-I-015-rev.00	Restructured document format to new corporate template. Included requirement for duplicate analysis for all aqueous matrices	12Dec2006
S-ALL-GB-I-015-REV.00	Corporate Template updated for use in the Green Bay Laboratory	27Aug2008
S-ALL-GB-I-015_REV.01	Update Signature Page Update Benchsheet	26May2009
S-GB-S-071-Rev.00	Updated SOP numbering following current revision of S-ALL-Q-003 Updated Waste Management and Handling SOP throughout document. Updated pH Logbook to new revision.	27Sep2011
S-GB-I-071-Rev.01	Section 13.2 – Added Method Modification information	26Sept2012

ATTACHMENT I
pH Logbook



pH (SW 846 9040B, SW 846 9045C, SM 4500-H+B)

Logbook #

Meter: Orion Model 720A (40WET8) | Meter Serial Number: 006577

Meter Calibration Date: | Analyst:

Initial Calibration pH Buffer Solutions

Value	pH Readings	Reagent Code
pH 2.00		
pH 7.00		
pH 10.0		
pH 12.45		

Slope:

Second Source pH Buffer Solutions

pH 4.00		
pH 7.00		

Sample No.	Date	Time	Matrix	pH.	Adjusted pH	Chlorine	Worksheet #	Analyst

Calibrate pH meter daily with pH buffers 2.0, 7.0, 10.0 & 12.45. Verify the calibration with the second source pH buffers 4.00 and 7.00 (Control Limits +/-0.10 SU). Analyzed second source pH buffer 7.00 after every 10 readings (Control Limits +/- 0.10 SU). Analyze duplicate sample every 20 samples (Control Limits +/- 0.10 SU). For SW846 9040B analyze consecutive measurements of the sample to verify they read within +/- 0.10 SU)

F-GB-I-009-Rev.06 (28Sep2011)

Review/Date

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STANDARD OPERATING PROCEDURE

Fecal Coliform Determination Using the Membrane Filter Technique

Reference Methods: Standard Methods for the Examination of Water and Wastes 9222D

SOP NUMBER:	S-GB-MB-001-REV.00
EFFECTIVE DATE:	Date of Final Signature
SUPERSEDES:	S-GB-I-019-REV.02

APPROVAL

Nils Melberg, Laboratory General Manager — Date: 10/05/12

Kate Grams, Laboratory Quality Manager — Date: 10/4/2012

Chad Rusch, Department Manager — Date: 10/04/2012

PERIODIC REVIEW

SIGNATURES BELOW INDICATE NO CHANGES HAVE BEEN MADE SINCE APPROVAL.

Signature	Title	Date

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S-GB-MB-001-REV.00

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1. Purpose /Identification of Method

The purpose of this Standard Operating Procedure (SOP) is to provide a consistent format for determining fecal coliform in water and sludges.

2. Summary of Method

2.1 Fecal coliforms are identified and enumerated in a pre-determined volume or weight of sample.

2.2 The sample is passed through a 47 mm filter using a filter funnel and vacuum system. Any organisms in the sample are concentrated on the surface of the membrane.

2.3 The filter is then placed in a Petri dish with nutrient medium. The passage of nutrients though the filter facilitates the growth of organisms on the upper surface of the membrane.

2.4 Bacteria that develop various shades of blue colonies within 24 hours at 44.5 ^{o}C on the M-FC medium are identified as fecal coliform.

3. Scope and Application

3.1 The fecal coliform membrane filter (MF) technique is highly reproducible, can be used to test relatively large volumes of sample, and yields numerical results more rapidly than the multiple-tube procedure. The fecal coliform membrane filter technique is extremely useful in monitoring drinking water, stream pollution, raw water sources, wastewater treatment systems, batching waters, seawaters, general water-quality monitoring, and domestic sewage sludge.

3.2 The procedure is not recommended as a substitute for the total coliform test in the examination of potable waters, because no coliform bacteria of any kind should be tolerated in treated water.

4. Applicable Matrices

4.1 Aqueous

4.2 Sludges

5. Limits of Detection and Quantitation

Analysis	Matrix	LOD (unit)	LOQ (unit)
Fecal Coliforms	Aqueous	1 CFU/100 mL	1 CFU/100 mL
Fecal Coliforms	Solid	1 CFU/g	1 CFU/g

6. Interferences

6.1 Turbidity caused by the presence of solids or other interfering material may not permit testing of a sample volume sufficient to yield significant results. For sludges determined by this method, this is generally not a problem because of the relatively high fecal coliform density in the sludge accompanied by numerous dilutions, which reduces the solids content.

6.2 Low coliform estimates may be caused by the presence of high numbers of non-coliforms or of toxic substances.

7. Sample Collection, Preservation and Handling

7.1 Samples are collected aseptically in a minimum of a 100 mL sterile plastic or glass bottle. Fill the bottle to the 100 mL fill line. For duplicate analysis purposes the lab provides 250 mL sterile plastic bottles.

7.2 Samples are shipped and stored at 4°C.

7.3 Samples must be analyzed within 8 hours of sampling. Samples analyzed after 8 hours must be flagged with an appropriate data qualifier.

8. Definitions

8.1 Definitions can be found in Section 10 of the most recent version of the Pace Analytical Services, Inc. Quality Manual.

9. Equipment and Supplies (Equivalent may be used)

9.1 Sterile disposable Petri dishes purchased from Fisher.

9.2 Cellulose filters, 47 mm purchased from Fisher.

9.3 Sterile disposable pipettes, 2 mL and 10 mL purchased from Fisher.

9.4 Filter funnel, Magnetic - 300 mL

9.5 Alcohol burner.

9.6 Forceps.

9.7 MF-Millipore Incubator.

9.8 Ultraviolet Sterilization Box

9.9 Commercial Grade Blender

9.10 500 mL Polypropylene blender container

10. Reagents and Standards

10.1 M-FC Broth.

10.2 Pre-filled sterile dilution vials.

11. Calibration

11.1 Not applicable to this SOP.

12. Procedure

12.1 The expected bacterial density will govern size of the sample. An ideal sample volume will yield between 20 and 60 coliform colonies per membrane. If the bacterial density of the sample is unknown, filter several decimal volumes to establish the fecal coliform density. Estimate volume expected to yield a countable membrane and select two additional quantities representing one-tenth and ten times this volume, respectively. See table below.

Suggested sample volumes for membrane filter Fecal Coliform Test							
	Volume (X) to be filtered mL						
Water Source	100	50	10	1	0.1	0.01	0.001
Lakes, reservoirs	X	X					
Wells, springs	X	X					
Water supply intake		X	X	X			
Natural bathing water		X	X	X			
Sewage treatment plant,							
Secondary effluent			X	X	X		
Farm ponds, rivers				X	X	X	
Stormwater runoff				X	X	X	
Raw municipal sewage					X	X	X
Feedlot runoff					X	X	X

12.2 Based upon the expected bacterial density of the sample, the sample may require dilutions as indicated in the table above. Sample volumes down to 1 mL can be pipetted and filtered without diluting. Waters and sludges that can be pipetted are diluted as follows.

12.2.1 Dilution A, if a 0.1 mL sample is required: Use a sterile pipette to transfer 11 mL of well mixed sample to a pre-filled 99mL sterile buffer dilution vial and mix vigorously. Shake the vial in a 60 degree arc, a minimum of 25 times. A volume of 1.0 mL of this mixture is 0.1 mL of the original sample.

12.2.2 Dilution B, if a 0.01 mL sample is required: Use a sterile pipette to transfer 11 mLs of Dilution A to a pre-filled sterile buffer dilution vial and mix vigorously. Shake the vial in a 60 degree arc, a minimum of 25 times. A volume of 1.0 mL of this mixture is 0.01 mL of the original sample.

12.2.3 Dilution C: If a 0.001 mL sample is required: Use a sterile pipette to transfer 11 mL of Dilution B to a pre-filled sterile buffer dilution vial and mix vigorously. Shake the vial in a 60 degree arc, a minimum of 25 times. A volume of 1.0 mL of this mixture is 0.001 mL of the original sample.

12.2.4 Dilution D, If a 0.0001 mL sample is required: Use a sterile pipette to transfer 11 mL of Dilution C to a pre-filled sterile buffer dilution vial. Shake the vial in a 60 degree arc, a minimum of 25 times. A volume of 1.0 mL of this mixture is 0.0001 mL of the original sample.

12.3 Procedure for solid samples (samples that cannot be pipetted)

12.3.1 On a weigh boat that has been sterilized in the U.V. box, weigh 1.0 gram of sample and put it in the blender. Whenever possible, the sample tested should contain all material, which will be included in the sludge. For example, if wood chips are part of sludge compost, some mixing or grinding means may be needed to achieve homogeneity before testing. One exception would be large pieces of solid material that may be discarded before blending.

12.3.2 Add one 99 mL pre-filled sterile buffered dilution vial to the blender container, cover, and blend on high-speed for 2 minutes. One milliliter of this sample contains 0.01 g of the original sample, which is equivalent to dilution in 12.2.2 (dilution B).

12.3.3 Follow steps in 12.2.3 if further dilution of the sample is required.

12.4 Invert an ampoule containing MF-C medium two to three times to mix the broth. Remove cap from the ampoule and dispense the broth into a sterile Petri dish, evenly saturating the absorbent pad.

12.5 Using a flame-sterilized forceps, place the membrane filter into the funnel assembly that has been sterilized in the U.V. box.

12.6 Pour or pipette the sample into the funnel, and turn on the vacuum and allow the sample to draw completely through the filter.

12.7 Rinse the funnel with sterile buffered water. Turn on the vacuum and allow the sample to draw completely through the filter.

12.8 Remove the membrane filter from the funnel.

12.9 Place the membrane filter into the prepared Petri dish.

12.10 Invert the Petri dish and incubate at 44.5 $\pm$ 0.2^{o}C for 24 $\pm$ 2 hours. Document the date, time, temperature and corrected temperature when samples are transferred in or out of incubation.

13. Quality Control

13.1 Media Checks

13.1.1 The pH of each lot of media (broth) is checked and documented on the Certificate of Analysis upon receipt of new lot.

13.1.2 Positive and negative controls are performed on each new lot of media.

13.2 Positive Control

13.2.1 Run with each lot of growth media (broth), prior to use for sample analysis.

13.2.2 Filter 100mL of positive control made fromEscherichia coli (ATCC®8739TM* Epower).

13.2.3 Resulting count must be within the predetermined quantitative assay.

13.3 Negative Control

13.3.1 Run with each lot of growth media (broth), prior to use for sample analysis.

13.3.2 Filter 100mL of negative control made from Enterobacter aerogenes (ATCC®13048TM* Epower).

13.3.3 Resulting count for Fecals must be non-detect.

13.4 BOD Seed Check

13.4.1 Run with each batch of samples.

13.4.2 Filter 100mL of nanopure water with several drops of BOD seed added.

13.4.3 Resulting count must be TNTC

13.4.4 If no growth appears, the run is invalid. Notify the project managers. Any data reported must be qualified.

13.5 Sterility Blank

13.5.1 Run at the end of each batch of samples.

13.5.2 Filter a vial of sterile buffer.

13.5.3 Count must result in no colonies detected.

13.5.4 If any colonies are detects, the run is invalid. Notify the project managers. Any data reported must be qualified.

13.6 Duplicate Read – A sample plate is read twice.

13.6.1 Performed once per sample batch.

13.6.2 Ideally performed by an analyst that is not the primary analyst for the batch.

13.6.3 Counts must be with in 10% each other if done by two different analysts, 5% if done by only one analyst.

13.7 Duplicate Analysis – A sample is plated and analyzed twice.

13.7.1 Performed once per sample batch.

13.7.2 Result of 3.27Rlog must be <0.1566 provided at least one plate for the sample and DUP have colony counts in the ideal range.

13.7.3 If not, the PM must be contacted to determine how the client wants to proceed. Any reported data would be qualified as failing precision.

13.7.4 If the client does not supply enough sample volume to perform the Duplicate Analysis, qualify the sample data in the batch as follows: Insufficient sample volume supplied to perform duplicate analysis.

13.8 Each lot of pre-filled sterile dilution water vials must come with certification of analysis. If a certificate is not included the vials must be checked in the lab.

14. Data Analysis and Calculations

14.1 Calculations for liquid samples

14.1.1 The typical fecal coliform colony is blue or a shade of blue. Non-fecal coliform colonies are gray to cream-colored.

14.1.2 Count the colonies using membrane filters with 20 to 60 fecal coliform colonies.

$$\text{Fecal coliform colonies/100 mL} = \frac{\text{coliform colonies counted X 100}}{\text{mL sample filtered}}$$

14.1.3 If the total number of bacterial colonies, coliforms plus non-coliforms colonies, exceeds 200 per membrane, or if the colonies are not distinct enough for accurate counting, report results as “too numerous to count” (TNTC). In other words, if everything is grown together, report TNTC.

14.1.4 If no filter has a fecal coliform count falling in the ideal range, total the fecal coliform counts on all filters and report as number per 100 mL. For example if duplicate 50 mL portions were examined and the two membranes had five and three fecal coliform colonies, respectively, report the count as 8/100 mL.

$$8 \text{ Fecal coliform colonies/100 mL} = \frac{(5+3)\text{ X }100}{(50+50)}$$

14.1.5 Similarly, if 50, 25, and 10 mL portions were examined and the counts were 15,6, and <1 fecal coliform colonies, respectively, report the count as 25/100 mL.

$$25 \text{ Fecal coliform colonies/100 mL} = \frac{[(15+6+0)]\text{ X }100}{(50+25+10)}$$

14.1.6 On the other hand, if 10, 1, and 0.1 mL portions were examined with counts of 40, 9, and <1 fecal coliform colonies, respectively, select the 10 mL portion only for calculating the fecal coliform density because this filter had a fecal coliform count falling in the ideal range (between 20 to 60 colonies). The result is 400/100 mL.

$$400 \text{ Fecal coliform colonies/100 mL} = \frac{40\text{ X }100}{10}$$

In the example above, if the membrane with 40 fecal coliform colonies also had a total bacterial colony count greater than 200, report the coliform count as >400/100 mL. Request a new sample and select more appropriate volumes for filtration.

In other words, if you can count the fecal coliform colonies but the total colonies (fecal + non-fecal) is greater than 200, report using >X/100 mLs where X is the number of fecal coliform colonies counted.

14.1.7 In cases where less than 1 fecal coliform colony/100mL is calculated, report as 1 fecal coliform colony/100mL.

14.2 Calculations for sludge samples

14.2.1 The typical fecal coliform colony is blue or a shade of blue. Non-fecal coliform colonies are gray to cream-colored.

14.2.2 Count the colonies using membrane filters with 20 to 60 fecal coliform colonies.

$$\text{Fecal coliform colonies/g} = \frac{\text{coliform colonies X 100}}{\text{(mL sample X \% dry solids)}}$$

14.2.3 For example, a sludge that was 3.8% solid was analyzed using the following dilutions: 0.000010 mL, 0.0001 mL, and 0.0010 mL. The results were 0, 1, 23 fecal coliform colonies, respectively. Report the fecal coliform density as 605,000 (3 sig figs) coliform colonies/g.

$$\text{605,000 fecal coliform colonies /g} = \frac{\text{23 X 100}}{\text{0.0010 X 3.8\%}}$$

14.2.4 Whenever possible, the coliform density is calculated using only those MF plates that have between 20 and 60 blue colonies. However, there may be occasions when the total number of colonies on a plate will be above or below the ideal range. If the colonies are not discrete and appear to be growing together, results should be reported as "too numerous too count" (TNTC). If no filter has a coliform count falling in the ideal range (20 to 60), total the coliform counts on all countable filters and report as coliform colonies/g. For example, a sludge that was 4.3% solid was analyzed using the following dilutions: 0.00001 mL, 0.0001 mL, and 0.001 mL. The results were 2, 18, and TNTC fecal coliform colonies, respectively. Report the fecal coliform density as $4.2 \text{ X } 10^6$ coliform colonies/g.

$$\text{4,230,000 fecal coliform colonies/g} = \frac{\text{[(2 +18) X 100]}}{\text{[(0.00001 + 0.0001) X 4.3]}}$$

14.2.5 If the total number of bacterial colonies, coliforms plus non-coliforms colonies, exceeds 200 per membrane, or if the colonies are not distinct enough for accurate counting, report results as "too numerous to count" (TNTC). In other words, if everything is grown together, report TNTC.

14.2.6 If you can count the fecal coliform colonies but the total colonies (fecal + non-fecal) is greater than 200, report using >X/g where X is the number of fecal coliform colonies counted.

14.3 Calculations for Precision on the Duplicate Analysis.

14.3.1 The difference of the Logarithms of the parent and duplicate analyses is multiplied by 3.27 and must be <0.1566 to be accepted.

14.3.2 $3.27(L1-L2) < 0.1566$

Where L1 is the Log of the parent, and L2 is the Log of the Duplicate.

14.3.3 The average of the range of Logarithms for each matrix is evaluated yearly to demonstrate precision of the quantitative method for that matrix.

15. Data Assessment and Acceptance Criteria for Quality Control Measures

15.1 BOD Seed Check: TNTC

15.2 Sterility Blank: 0 CFU/100mL or 0 CFU/g

15.3 Duplicate Read: Within 10% of secondary analyst reading, or 5% within primary analyst read.

15.4 Duplicate Analysis: Result of 3.27Rlog must be <0.1566 provided at least one plate for the sample and DUP have colony counts in the ideal range.

16. Corrective Actions for Out-of-Control Data

16.1 In instances which Section 15 are unacceptable, the Project Manager must be notified, a Nonconformance must be completed, and all data must be appropriately qualified.

17. Contingencies for Handling Out-of-Control or Unacceptable Data

17.1 Verify sterility water does not contain Chlorine.

18. Method Performance

18.1 There are several requirements that must be met to insure that this procedure generates accurate and reliable data. A general outline of requirements has been summarized below. Further specifications may be found in the Laboratory Quality Manual.

18.1.1 The analyst must read and understand this procedure with written documentation maintained in his/her training file.

18.1.2 Periodic performance evaluation (PE) samples are analyzed per S-GB-Q-021, *Proficiency Testing Program* (most current revision or replacement), to demonstrate continuing competence. All results are stored in the QA office.

18.1.3 An initial demonstration of capability (IDOC) must be performed per S-ALL-Q-020, *Orientation and Training Procedure*s (most current revision or replacement). A record of the IDC will be maintained in his/her QA file with written authorization from the Laboratory Manager and Quality Manager. One analyst can use the PE analysis as their IDOC and/or continuing demonstration of capability (CDOC).

18.1.4 Additional analysts can perform their DOCs using Catelog #78 (Water Supply Source Water Microbe) from ERA. Each order should have enough volume for two analysts to perform DOCs.

19. Method Modification

19.1 Not applicable to this SOP.

20. Instrument/Equipment Maintenance

20.1 The ultraviolet light box must be checked quarterly.

20.1.1 The U.V. box is checked using the Heterotrophic plate count Petri film.

20.1.2 Several drops of BOD seed are added to approximately 50 mLs of buffer water.

20.1.3 1 mL of the seed/water mixture is pipetted onto each of 3 Petri film plates and pressed down per the Petri film method.

20.1.4 The film cover on 2 of the plates is then pulled back.

20.1.5 One of these plates is exposed to U.V. light in the sterilization box for 2 min.

20.1.6 The other plate is exposed for 5 minutes.

20.1.7 The film is placed back over the 2 exposed plates and they are incubated (along with the non-exposed plate which is the positive control) for 48 hours at 35 degrees C.

20.1.8 The CFUs on the 3 plates (positive control, 2 minute exposed, and 5 min exposed) are then counted. The data is recorded on a bench sheet and on the appropriate page in the microbiology quality control binder. There needs to be a 99% reduction in colony counts between the positive control and the two U.V. exposed plates. If there is not, perform maintenance on the U.V. box and recheck

21. Troubleshooting

21.1 See Section 20.

22. Safety

22.1 All samples, standards, and reagents should be treated as hazardous. Safety glasses, gloves, and lab coats are to be worn. The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined. However, each chemical compound should be treated as a potential health hazard. Exposure to these chemicals must be reduced to the lowest possible level by a safe technique. Special care should be taken when handling the high concentration acids and oxidizing reagents used for sample digestion.

22.2 The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of any chemical. A reference file of Material Safety Data Sheets (MSDS) and a formal safety plan are made available to all personnel involved in chemical analysis and should be consulted prior to handling samples and standards.

22.3 Excess reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult the current version of S-GB-W-001, *Waste Handling and Management* (most current revision or replacement).

22.4 Samples that are being analyzed for fecal coliform bacteria are likely to contain fecal material from animal or human sources and may, therefore, contain disease-causing organisms. In order to work safely, lab personnel must wear personal protective equipment, use proper aseptic technique, and keep the work area sanitized.

23. Waste Management

23.1 Excess reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. For further information on waste management consult the current version of S-GB-W-001, *Waste Handling and Management* (most current revision or replacement).

24. Pollution Prevention

24.1 Pollution prevention encompasses any technique or procedure that reduces or eliminates the quantity or toxicity of waste at the point of generation.

24.2 The quantity of chemicals purchased is based on expected usage during its shelf life and disposal cost of unused material. Actual reagent preparation volumes reflect anticipated usage and reagent stability.

24.3 The laboratory Chemical Hygiene Plan/Health and Safety Plan contains additional information on pollution prevention.

25. References

Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992 Method 9222D.

26. Tables, Diagrams, Flowcharts, Appendices, Addenda etc.

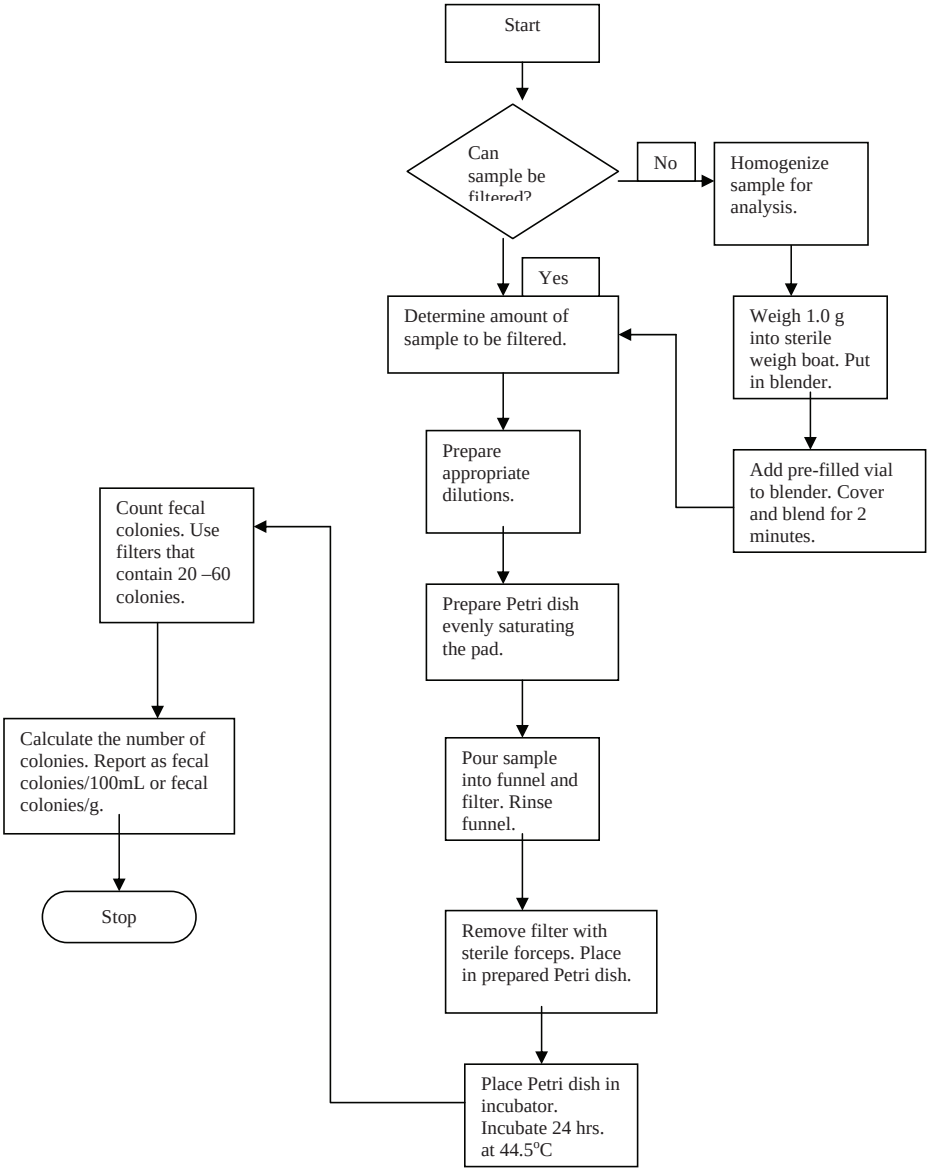
Flow chart – Attachment I

Benchsheet – Attachment II

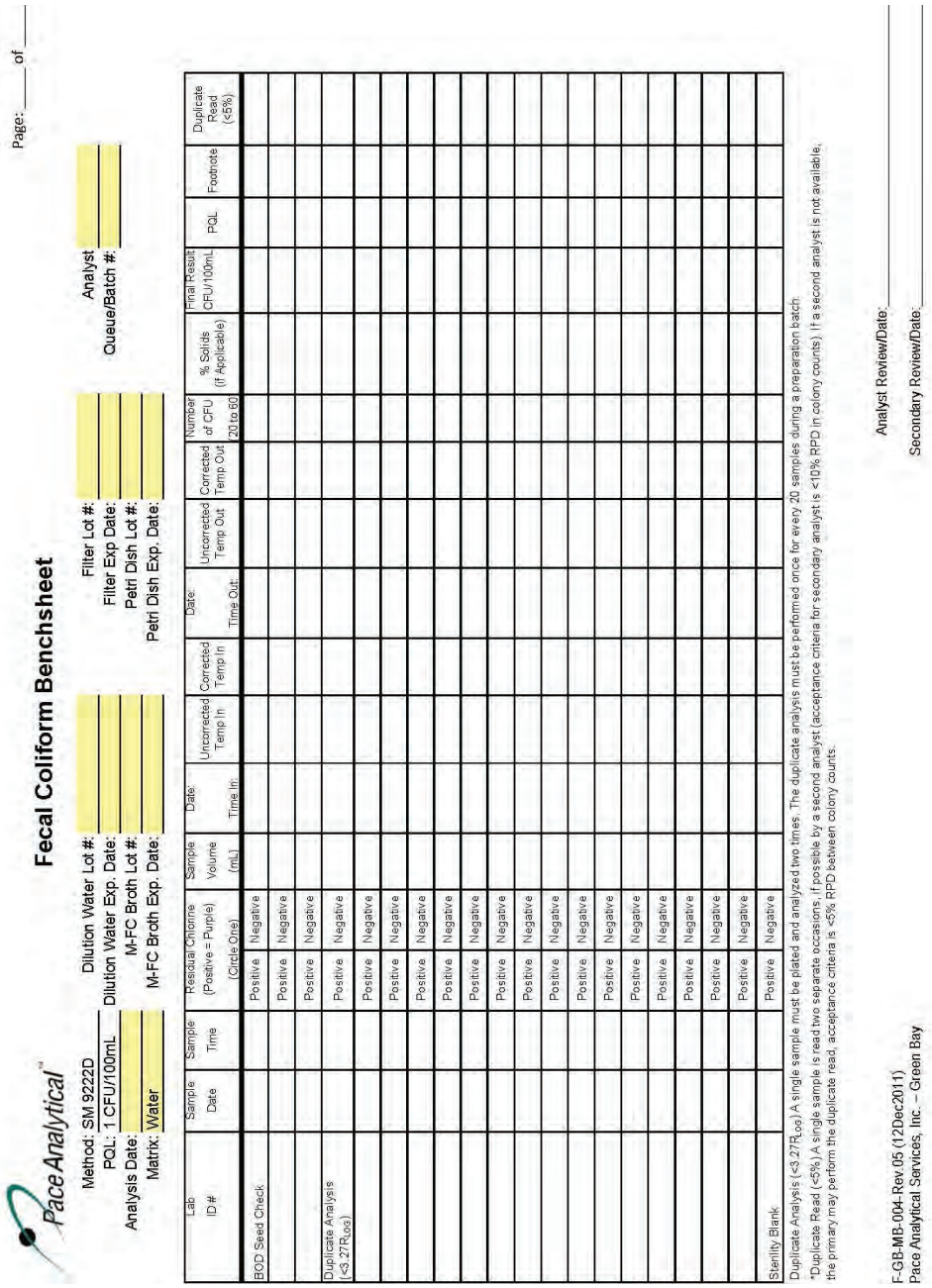
27. Revisions

Document Number	Reason for Change	Date
GB-I-019-Rev. 0	New Issue	13Sept2005
S-GB-019-Rev.1	Updated Section 5,6,7, and 15 with current information. Added Section 12.11.7	17Aug2007
S-GB-I-019-Rev.02	Updated signature page. Deleted Section 7. Renumbered document. Section 13 – Updated SOP references. Section 14 – Updated SOP reference	29Jul2008
S-GB-I-019-Rev.03	Updated Signature Page Section 8: Changed filter capacity from 1000 to 300 mL Added Updated Bench sheet	13Apr2010
S-GB-MB-001-Rev.00	Entire Document: Updated to current SOP outline following S-GB-Q-017, *Preparation of SOPs* (most current revision or replacement). Section 7: Updated to EPA recognized 8 hour hold time (from 6 hours). Section 12: Added BOD Seed, Sterility Check, Negative and Positive Tests and standards. Section 13: Added PE for Demonstration of Capability. Attachment II: Updated BOD Bench sheet to encompass soil/water.	18Jul2012

Attachment I - Flow Chart



Attachment II: Bench sheet



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Fecal Coliform Benchsheet

Method: SM 9222D
PQL: 1 CFU/100mL
Analysis Date:
Matrix: Water

Dilution Water Lot #:
Dilution Water Exp. Date:
M-FC Broth Lot #:
M-FC Broth Exp. Date:

Filter Lot #:
Filter Exp Date:
Petri Dish Lot #:
Petri Dish Exp. Date:

Analyst
Queue/Batch #:

Lab ID #	Sample Date	Sample Time	Residual Chlorine (Positive = Purple) (Circle One)	Sample Volume (mL)	Date: Time In:	Uncorrected Temp In	Corrected Temp In	Date: Time Out:	Uncorrected Temp Out	Corrected Temp Out	Number of CFU 20 to 60	% Solids (If Applicable)	Final Result CFU/100mL	PQL	Footnote	Duplicate Read (<5%)
BOD Seed Check			Positive Negative													
			Positive Negative													
			Positive Negative													
Duplicate Analysis (<3.27R_{LOG})			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
Sterility Blank:			Positive Negative													

Duplicate Analysis (<3.27R_{LOG}) A single sample must be plated and analyzed two times. The duplicate analysis must be performed once for every 20 samples during a preparation batch.
*Duplicate Read (<5%) A single sample is read two separate occasions, if possible by a second analyst (acceptance criteria for secondary analyst is <10% RPD in colony counts). If a second analyst is not available, the primary may perform the duplicate read, acceptance criteria is <5% RPD between colony counts.

Analyst Review/Date: _____

Secondary Review/Date: _____

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Fecal Coliform Benchsheet

Method: SM 9222D
PQL: 1 CFU/100mL
Analysis Date:
Matrix: Water

Dilution Water Lot #:
Dilution Water Exp. Date:
M-FC Broth Lot #:
M-FC Broth Exp. Date:

Filter Lot #:
Filter Exp Date:
Petri Dish Lot #:
Petri Dish Exp. Date:

Analyst
Queue/Batch #:

Lab ID #	Sample Date	Sample Time	Residual Chlorine (Positive = Purple) (Circle One)	Sample Volume (mL)	Date: Time In:	Uncorrected Temp In	Corrected Temp In	Date: Time Out:	Uncorrected Temp Out	Corrected Temp Out	Number of CFU (20 to 60)	% Solids (If Applicable)	Final Result CFU/100mL	PQL	Footnote	Duplicate Read (<5%)
BOD Seed Check			Positive Negative													
			Positive Negative													
			Positive Negative													
Duplicate Analysis ($\leq 3.27R_{LOG}$)			Positive Negative													
			Positive Negative													
			Positive Negative													
			Positive Negative													
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			Positive Negative													
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			Positive Negative													
			Positive Negative													
Sterility Blank:			Positive Negative													

Duplicate Analysis ($\leq 3.27R_{LOG}$) A single sample must be plated and analyzed two times. The duplicate analysis must be performed once for every 20 samples during a preparation batch.
*Duplicate Read (<5%) A single sample is read two separate occasions. If possible by a second analyst (acceptance criteria for secondary analyst is <10% RPD in colony counts). If a second analyst is not available, the primary may perform the duplicate read, acceptance criteria is <5% RPD between colony counts.

Analyst Review/Date: _____

Secondary Review/Date: _____

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