Rose & Westra
A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

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File No. 16.0062335.52

June 29, 2018

Ms. Abigail Hendershott
District Supervisor – Remediation and Redevelopment Division
Michigan Department of Environmental Quality (MDEQ)
350 Ottawa Avenue NW #10
Grand Rapids, MI 49503

Re: Wolverine World Wide, Inc. – House Street CSM Progress Report

Dear Ms. Hendershott:

On behalf of Wolverine World Wide, Inc. (Wolverine), this letter is a supplemental response to your April 4, 2018 letter entitled *House Street Per- and Polyfluoroalkyl Substance (PFAS) Investigation – 1855 House Street, Rockford, Kent County, Michigan, Conceptual Site Model Update and Status Report*. As indicated in our May 4, 2018 letter entitled *Wolverine World Wide, Inc. – House Street CSM update and Status Report*, this submittal is a tri-annual progress report for the House Street remedial investigation.

This progress report (through June 22, 2018) includes information available since the submittal of the February 9, 2018 *House Street CSM Update and Status Report*.

INVESTIGATION ACTIONS

1) Soil boring and vertical aquifer profiling (VAP) sampling were performed at locations PMW-14, PMW-17 and PMW-18. Based on the VAP results and field observation, monitoring wells MW-14S/M/D, MW-17S/M/D, and MW-18S/M/D were installed. The draft boring logs for these locations are enclosed. MW-14S/M/D and MW-17S/M/D have been surveyed. The updated locations are shown on enclosed Figure 1.

2) Access efforts continued for PMW-12, PMW-13, PMW-16, PMW-20, PMW-22, PMW-23, and PMW-24. Numerous resident meetings and calls have been completed. R&W/GZA also met with MDEQ to review off site locations.

3) In addition to the VAP sampling conducted during the installation of MW-14, MW-17, and MW-18 wells, MW-14 and MW-17 were also sampled after development and stabilization.

ANALYTICAL DATA RECIEVED

The VAP samples collected from MW-14, MW-17, and MW-18 the monitoring well samples from MW-14 and MW-17 sampling data are summarized on the enclosed Table 1.

The lab reports and geographic information system (GIS) data for these samples have been submitted to the MDEQ through the AECOM GIS maintenance updates.

ANTICIPATED ACTIONS AND SCHEDULE FOR NEXT REPORTING PERIOD

During the next reporting period, July through November, R&W/GZA anticipates continuing to pursue access to the pending well installation locations. Assuming access is granted, drilling will likely resume late August or September.

A full round of static water levels will be completed late August or September.

MW-18 will be surveyed and sampled during this period as well.

REQUESTED DOCUMENTATION

Additionally, your April 4, 2018 letter requested the following cross sections: a cross section along plume centerline; MW-11 nest – MW-10 nest – MW-9 nest transect; MW-21 nest – MW-15 nest – MW-19 nest transect; and revisions to transects A-A, B-B, and C-C as shown on Figure B of the February 9, 2019 CSM Update and Status Report. These and revised Figure B are enclosed.

If you have any questions, please feel free to contact us.

Very truly yours,

Rose & Westra, a Division of GZA GeoEnvironmental, Inc.

Mark A. Westra
Associate Principal

Loretta J. Powers
Senior Project Manager/Consultant Reviewer

maw/ljp

c: Mr. Dave Latchana – Wolverine Worldwide, Inc. *via email David.Latchana@wwwinc.com*
Mr. John V. Byl – Warner Norcross & Judd LLP *via email jbyl@wnj.com*

Enclosures: Draft Boring Logs
Figure 1
Table 1
Figure A
Cross Sections D-D, E-E, and F-F (Sheets D, E, and F-1/F-2)
Revised Cross Sections A-A, B-B, and C-C (Sheets C1/C2/C3, D1/D2/D3, and E1/E2/E3) and Figure B

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Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: MW-18S
Page: 1 **of** 1
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Burt
Logged by: Kevin Hedinger
Date Start/Finish: 5-14-18 / 5-16-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

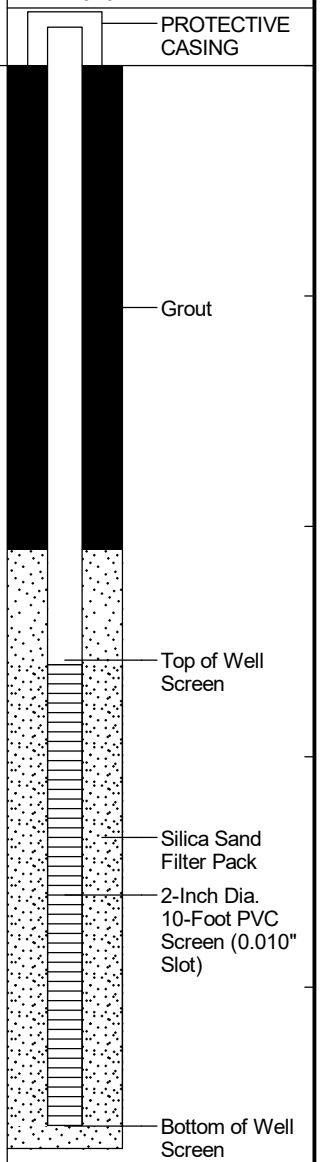
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–23						See SB-18/MW-18D boring log for sample description and classification.		
24						Bottom of Borehole at 23.5 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 13.0 to 23.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-18S

BORING_WELL 62355.52 HOUSE STREET COMPLETE.GPJ GZA_CORP.GDT 6/26/18

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House Street
Belmont, Michigan

Boring No.: PMW-14D
Page: 1 **of** 4
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Bert Graham
Logged by: Christopher Melby
Date Start/Finish: 3-15-18 / 3-15-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/24	0-2	11-5 9-10		Black, TOPSOIL. Changing at 0.3 feet to: Medium brown, fine SAND, trace, Silt.	SAND		PROTECTIVE CASING
8	2	24/24	8-10	2-2 2-1		Loose, brown, fine to medium SAND, trace Silt.		1	Backfill/Cement Pad
18	3	24/12	18-20	2-3 5-3		Loose, brown and gray, coarse SAND, trace Gravel, wet.			
23	4	24/12	23-25	3-1 1-2		Very loose, brown and gray, fine to coarse SAND, wet.			
28	5	24/16	28-30	2-4 4-5		Loose, brown, fine to medium SAND, trace Silt. Changing at 29.0 feet to: Brown, Clayey SILT, little fine Sand, wet.	29' Clayey SAND		

REMARKS

1. Groundwater encountered at approximately 14.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: PMW-14D
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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
31							Clayey SAND		
32									
33	6	24/20	33-35	2-2 5-5		Medium stiff, Clayey SILT, little to trace fine to medium Sand, wet.			
34									
35									
36									
37									
38	7	24/10	38-40	1-1 1-1		Loose, gray, fine SAND, little Clayey Silt, wet.	38' SAND		
39									
40									
41									
42									
43	8	24/16	43-45	4-4 5-7		Loose, gray, fine to medium SAND, little Silt, wet.			
44									
45									
46									
47									
48	9	24/14	48-50	3-7 8-7		Medium dense, gray, fine to medium SAND, little Silt, wet.			
49									
50									
51									
52									
53	10	24/24	53-55	2-3 3-5		Gray, fine to medium SAND, little Silt, wet. Changing at 53.5 feet to: Gray, Clayey SILT, some fine Sand, wet.	53.5' Clayey SILT		Grout
54									
55									
56									
57									
58	11	24/14	58-60	1-1 1-1		Soft, gray, Clayey SILT, little fine Sand, wet.			
59									
60									
61									
62									
63	12	24/24	63-65	3-12 23-24		Hard, gray and brown, Clayey SILT, some fine to coarse Sand, wet.			
64									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-14D

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66							Clayey SILT		
67									
68	13	24/24	68-70	5-13 17-18		Fine to medium SAND, trace Silt, wet. Changing at 69.2 feet to: Fine to coarse SAND, trace Gravel, trace Silt, wet.	68' SAND		
69									
70									
71									
72									
73	14	24/20	73-75	31-19 24-30		Hard, gray and brown, Clayey SILT, some fine to medium Sand, wet. Changing at 74.5 feet to: Gray and brown, fine to medium SAND, little Silt, wet.	73' Clayey SILT 74.5' SAND		
74									
75									
76									
77									
78	15	24/24	78-80	4-8 20-53		Medium dense, brown and gray, fine to medium SAND, trace Silt, wet.			
79									
80									
81									
82									
83	16	24/18	83-85	2-4 8-26		Medium dense, brown and gray, fine to medium SAND, trace Silt, wet.			
84									
85									
86									
87									
88	17	24/24	88-90	3-7 13-34		Medium dense, brown and gray, fine to coarse SAND, trace Silt, wet.			
89									
90									
91									
92									
93	18	24/24	93-95	4-10 18-25		Medium dense, fine to medium SAND, trace Silt, wet.			
94									
95									
96									
97									
98	19	24/24	98-100	4-6 10-12		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-14D

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Belmont, Michigan

Boring No.: PMW-14D
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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
101							SAND		
102									
103	20	24/24	103-105	19-12 19-25		Dense, fine to coarse SAND, little to trace Silt, wet.			
104									
105									
106									
107									Top of Well Screen
108	21	24/20	108-110	5-7 25-30		Dense, brown and gray, medium to coarse SAND, trace Silt, wet.			Silica Sand Filter Pack
109									
110									2-Inch Dia. 5-Foot PVC Screen (0.010" Slot)
111									
112									Bottom of Well Screen
113	22	4/6	113-113.3	12-75/3"		Hard, brown and gray, CLAY & SILT, some medium to coarse Sand embedded in Clay, wet.	113' CLAY & SILT 114'		
114						Bottom of Borehole at 114.0 Feet		2	
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from approximately 107.0 to 112.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-14D

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Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: PMW-14M
Page: 1 **of** 3
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Bert Graham
Logged by: Christopher Melby
Date Start/Finish: 3-15-18 / 3-15-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See PMW-14D boring log for detailed soil descriptions for the first 48.0 feet..			PROTECTIVE CASING
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-14M

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House Street
Belmont, Michigan

Boring No.: PMW-14M
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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31–64									Grout
48–49	1	24/12	48-50	2-2 3-2		Loose, brown and gray, fine to medium SAND, trace Silt, wet.	SAND		
50–51	2	24/24	50-52	1-2 1-2		Very loose, brown and gray, fine to medium SAND, trace Silt, wet.			
52–53	3	24/24	52-54	2-2 3-5		Medium stiff, gray and brown, Clayey SILT, some fine to medium Sand, wet.	52.5' Clayey SILT		

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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House Street
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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
66							Clayey SILT		
67									
68	4	24/20	68-70	7-8 10-12		Medium dense, gray and brown, fine to coarse SAND, some Silt, wet.	68' Silty SAND		Top of Well Screen Silica Sand Filter Pack
69									
70	5	24/24	70-72	2-2 6-15		Loose, gray and brown, fine to medium SAND, little Silt, wet.			2-Inch Dia. 10-Foot PVC Screen (0.010" Slot)
71									
72	6	24/18	72-74	9-12 25-35		Brown and gray, fine to medium SAND, some Silt, wet. Changing at 73.0 feet to: Brown and gray, Clayey SILT, some medium to coarse Sand, embedded in Clayey Silt, wet.	73' Clayey SILT		
73									Bottom of Well Screen
74						Bottom of Borehole at 74.0 Feet	74'	1	
75									
76									
77									
78									
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80									
81									
82									
83									
84									
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99									

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from approximately 68.0 to 73.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-14M

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Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: PMW-14S
Page: 1 **of** 1
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Bert Graham
Logged by: Christopher Melby
Date Start/Finish: 3-15-18 / 3-15-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

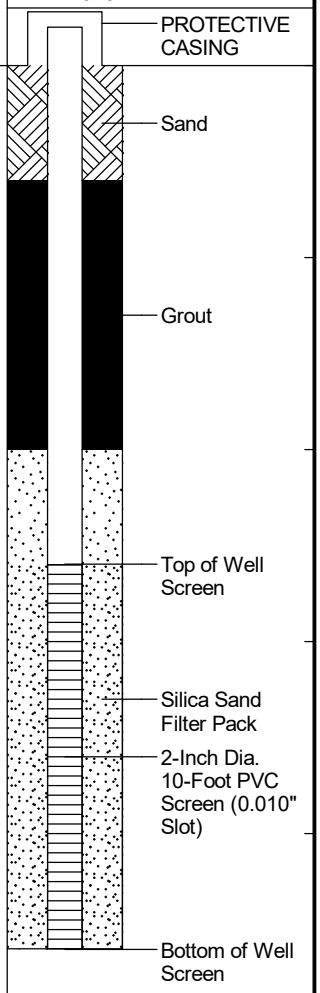
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–23						See PMW-14D boring log for detailed soil descriptions.		
23						Bottom of Borehole at 23.0 Feet		1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from approximately 13.0 to 23.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-14S

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Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: PMW-17D
Page: 1 **of** 10
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christopher Melby / John Morehouse
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0"
Hammer Wt.:	140lbs	1 3/8"
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/24	0-2	2-3 2-3		Dark brown, decaying LEAVES (FILL). Changing at 0.3 feet to: Very dark brown, well sorted, fine grained SAND, some Silt, some decaying Vegetation, moist (SM). Changing at 0.5 feet to: Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, grading coarser, moist (SP).			PROTECTIVE CASING
2	2	24/24	2-4	2-2 2-3		Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, grading coarser, moist (SP).			
3									
4	3	24/24	4-6	2-2 3-3		Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, grading coarser, moist (SP). Changing at 4.5 feet to: Pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP).			Backfill/Cement Pad
5									
6	4	24/24	6-8	3-5 8-9		Changing at 4.6 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist (ML). Changing at 4.7 feet to: Pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 4.8 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist (ML). Changing at 4.9 feet to: Pale brown, very well sorted, fine grained, SAND, trace Silt, moist (SP). Changing at 5.0 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist. Changing at 5.1 feet to: Pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 5.2 feet to: Yellowish brown, very well sorted, SILT, little fine grained Sand, slightly cohesive, non-plastic, moist (ML). Light yellowish brown to pale brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, moist (SW). Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 9.1 feet to: Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 12.3 feet to: Pale brown, poorly sorted, medium to coarse grained SAND, little Gravel, trace Silt, moist (SW). Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace			
7	5	24/24	8-10	5-5 5-5					
8									
9									
10	6	24/24	10-12	3-4 4-4					
11									
12	7	24/24	12-14	5-10 9-6					
13									
14	8	24/24	14-16	3-4 4-4					
15									
16	9	24/24	16-18	3-3 4-4					
17									
18	10	24/24	18-20	3-3 3-4					
19									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide, Inc.
House Street
Belmont, Michigan

Boring No.: PMW-17D
Page: 2 **of** 10
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
21	11	24/24	20-22	3-3 4-5		Gravel, moist (SP). Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
22	12	24/24	22-24	3-6 8-8		Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
23						Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
24	13	24/24	24-26	6-10 11-11		Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP). Changing at 22.8 feet to: Brown, poorly sorted, GRAVEL, trace coarse grained Sand, moist (GP). Changing at 22.9 feet to: Light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 23.4 feet to: Brown, very poorly sorted, GRAVEL, trace coarse grained Sand, moist (GP).			
25									
26	14	24/24	26-28	5-10 12-16					
27									
28	15	24/24	28-30	5-12 14-20		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
29						Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
30	16	24/24	30-32	15-12 14-20		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
31									
32	17	24/24	32-34	5-7 8-8		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, moist (SP).			
33						Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
34	18	24/24	34-36	7-8 10-11		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
35									
36	19	24/24	36-38	7-10 9-14		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, moist (SP).			
37									
38	20	24/24	38-40	10-10 12-12		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 39.5 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, moist (ML).			
39									
40	21	24/24	40-42	11-11 11-10		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
41									
42	22	24/24	42-44	6-6 7-9		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
43									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
44	23	24/24	44-46	6-6 8-9		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
45									
46	24	24/24	46-48	7-9 10-10		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
47									
48	25	24/24	48-50	7-4 9-9		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
49									
50	26	24/24	50-52	5-6 8-10		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
51									
52	27	24/24	52-54	6-8 13-18		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
53									
54	28	24/24	54-56	9-12 13-17		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP).			
55									
56	29	24/24	56-58	10-14 25-22		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP). Changing at 57.6 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, non-plastic, moist to wet (ML).			
57									
58	30	24/24	58-60	17-21 31-32		Pale to very pale brown, very well sorted, fine grained SAND, trace Silt, bedded, moist (SP). Changing at 59.0 feet to: Very dark grayish brown, well sorted, fine grained SAND, trace Silt, moist (SP). Changing at 59.1 feet to: Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
59									
60	31	24/24	60-62	13-22 27-27					
61									
62	32	24/24	62-64	12-21 25-33		Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM). Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
63									
64	33	24/24	64-66	2-6 9-13		Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
65									
66	34	24/24	66-68	3-10 11-18		Pale brown, very sell sorted, fine to medium			

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
67						grained SAND, some Silt, bedded, moist (SM).			
68	35	24/24	68-70	7-17 21-23		Pale brown, very sell sorted, fine to medium grained SAND, some Silt, bedded, moist (SM). Changing at 68.3 feet to: Dark yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist (SP). Changing at 68.4 feet to: Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
69									
70	36	24/24	70-72	5-14 22-28					
71									
72	37	24/24	72-74	8-20 22-35		Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM). Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
73									
74	38	24/24	74-76	5-16 28-41		Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM).			
75									
76	39	24/24	76-78	9-21 29-44		Pale brown, very well sorted, fine to medium grained SAND, some Silt, bedded, moist (SM). Changing at 76.8 feet to: Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
77									
78	40	24/24	78-80	2-10 22-24		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
79									
80	41	24/24	80-82	2-8 14-24		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
81									
82	42	24/24	82-84	1-3 6-12		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
83									
84	43	24/24	84-86	1-1 3-8		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP).			
85									
86	44	24/24	86-88	1-2 5-12		Light yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 87.6 feet to: Brown, moderately sorted, coarse grained SAND, some Gravel, wet (SW).			
87									
88	45	24/24	88-90	1-2 9-14		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
89									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
91	46	24/24	90-92	1-2 3-5		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
92	47	24/24	92-94	1-2 4-11		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
94	48	24/24	94-96	1-3 5-9		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
96	49	24/24	96-98	1-4 6-12		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
98	50	24/24	98-100	3-4 8-15		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
100	51	24/24	100-102	2-2 3-10		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP).			
102	52	24/24	102-104	2-7 14-21		Yellowish brown to brown, well sorted, fine to medium grained SAND, trace Silt, trace Gravel, wet (SP). Changing at 103.2 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, wet (ML). Changing at 103.5 feet to: Brown to yellowish brown, well sorted SILT, some fine grained Sand, trace Clay, moderately cohesive, non to slightly plastic, bedded, moist to wet (ML). Changing at 103.6 feet to: Brown to yellowish brown, very well sorted, SILT, some fine grained Sand, slightly cohesive, wet (ML). Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Changing at 108.9 feet to: Yellowish brown to brown, well sorted, SILT, some fine grained Sand, wet (ML). Changing at 109.0 feet to: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 109.5 feet to: Dark yellowish brown, well sorted, fine to medium SAND, trace Silt, wet (SP). Changing at 109.7 feet to: Yellowish brown to brown, very well sorted,			Bentonite/Grout
104	53	24/24	104-106	2-2 3-6					
106	54	24/24	106-108	1-1 3-5					
108	55	24/24	108-110	3-4 8-12					
110	56	24/24	110-112	1-1 3-7					
112	57	24/24	112-114	1-3 5-8					

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
114	58	24/24	114-116	1-4 12-18		fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 116.2 feet to: Dark yellowish brown, well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 116.3 feet: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 116.8 feet to: Dark yellowish brown, well sorted, Silty CLAY, plastic, cohesive, moist (CL). Changing at 116.9 feet to: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 119.0 feet to: Dark yellowish brown, well sorted SILT, some fine grained Sand, slightly cohesive, wet (ML). Changing at 119.1 feet to: Yellowish brown to brown, very well sorted, fine to medium grained SAND, trace Silt, wet (SP). Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, wet (SP). Changing at 121.3 feet to: Grayish brown to to light grayish brown, well sorted, SILT, some fine grained Sand, non-plastic, moderately cohesive, wet (ML). Grayish brown to to light grayish brown, well sorted, SILT, some fine grained Sand, non-plastic, moderately cohesive, wet (ML). Changing at 122.9 feet to: Brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Changing at 126.6 feet to: Gray to grayish brown, well sorted, CLAY & SILT, little fine grained Sand, plastic, cohesive, moist (CL). Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Gray to grayish brown, well sorted, fine grained			
115									
116	59	24/24	116-118	1-5 12-22					
117									
118	60	24/24	118-120	1-1 1-4					
119									
120	61	24/24	120-122	7-10 14-20					
121									
122	62	24/24	122-124	4-7 13-15					
123									
124	63	24/24	124-126	5-10 12-20					
125									
126	64	24/24	126-128	4-10 11-10					
127									
128	65	24/24	128-130	7-12 9-15					
129									
130	66	24/24	130-132	2-4 7-9					
131									
132	67	24/24	132-134	1-4 5-6				1	
133									
134	68	24/24	134-136	1-3 5-6					
135									
136	69	24/24	136-138	1-1 2-6					

REMARKS

1. Groundwater was encountered at approximately 132.4 feet below ground surface.

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
137						SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Gray to grayish brown, well sorted, fine grained SAND, some Silt, trace Clay, cohesive, slightly to moderately plastic, moist (SM). Changing at 132.4 feet to: Grayish brown to brown, very well sorted, SILT, trace Clay, moderately cohesive, non to slightly plastic, wet			
138	70	24/24	138-140	0-1 1-5					
139									
140	71	24/24	140-142	0-4 8-14		Varved, grayish brown, very well sorted, SILT, some Clay, some fine grained Sand, cohesive and slightly to moderately plstic, moist to wet (ML). Brown, well sorted, SILT, little Clay, moderately plastic, cohesive, moist to wet (ML). Changing at 136.3 feet to: Grayish brown, very well sorted, SILT, trace Clay, cohesive, slightly plastic, moist to wet (ML). Changing at 136.4 feet to: Grayish brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM).			
141									
142	72	24/24	142-144	6-10 12-16					
143									
144	73	24/24	144-146						
145						Grayish brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM). Changing 138.9 feet to: Grayish brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Changing at 139.0 feet to: Grayish brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM). Yellowish brown, very well sorted, fine grained SAND, little Silt, wet (SM). Yellowish brown, very well sorted, fine grained SAND, little Silt, wet (SM). Changing at 143.5 feet to: Grayish brown, very well sorted, SILT, trace fine grained Sand, moderately cohesive, wet (ML). Grayish brown, very well sorted, fine grained SAND, trace Silt, wet (SP). Grayish brown to brown, very well sorted, fine grained SAND, little Silt, wet (SM). Changing at 146.6 feet to: Yellowish brown, well sorted, fine grained SAND, trace Silt, wet (SP). Changing at 146.7 feet to: Grayish brown to brown, very well sorted, SILT, little fine grained SAND, wet (ML). Grayish brown to brown, very well sorted, SILT, little fine grained SAND, wet (ML). Grayish brown to brown, very well sorted, fine grained SAND, little Silt, slightly cohesive, wet (SM). Changing at 150.5 feet to: Grayish brown to brown, very well sorted, SILT, moderately cohesive, wet (ML). Changing at 151.9 feet to: Grayish brown to brown, very well sorted, SILT, moderately cohesive, wet (ML). Brown to yellowish brown, very well sorted, fine grained SAND, little Silt, wet (SM). Brown to yellowish brown, very well sorted, fine grained SAND, little Silt, wet (SM). Brown to yellowish brown, very well sorted,			
146	74	24/24	146-148	3-6 14-20					
147									
148	75	24/24	148-150	1-2 5-15					
149									
150	76	24/24	150-152	6-12 25-33					
151									
152	77	24/24	152-154	1-1 3-7					
153									
154	78	24/24	154-156	1-4 14-18					
155									
156	79	24/24	156-158	1-8 24-35					
157									
158	80	24/24	158-160	4-8 9-22					
159									

REMARKS

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	81	17/17	160-161.4	17-31-87/5"		fine grained SAND, little Silt, wet (SM). Changing at 156.6 feet to: Dark grayish brown to dark brown, very well sorted, fine grained SAND, little Silt, wet (SM).			
161									
162	82	24/0	162-164	4-8 15-10		Dark grayish brown to dark brown, very well sorted, fine grained SAND, little Silt, wet (SM). Very dense, light brown, fine SAND, little to trace Silt, wet (SM).			
163						NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
164	83	12/6	164-165	13-50\6"		Very dense, brown, fine SAND, little to trace Silt, wet (SM).			
165									
166	84	24/8	166-168	6-20 35-50		Very dense, brown, fine SAND, little to trace Silt wet (SM).			
167									
168	85	17/10	168-169.4	5-23-50/5"		Very dense, brown, fine SAND, little to trace Silt, wet (SM).			
169									
170	86	16/0	170-171.3	6-23-50/4"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
171									
172	87	23/12	172-173.9	3-10 35-50/5"		Very dense, brown, fine SAND, little to trace Silt, wet (SM).			
173									
174	88	17/0	174-175.4	6-31-50/5"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
175									
176	89	17/0	176-177.4	14-40-50/5"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
177									
178	90	12/0	178-179	15-67		NO RECOVERY. Bailer soils is fine Sand, little to trace Silt.			
179									
180	91	18/0	180-181.5	7-3-90/6"		NO RECOVERY. Bailer soil is fine Sand, little to trace Silt.			
181									
182	92	24/24	182-184	11-16 27-33		Dense, light brown, fine SAND, little to trace Silt, wet (SM).			
183									

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
184	93	24/8	184-186	9-18 30-52		Dense, light brown, fine SAND, little to trace Silt, wet (SM).			
185									
186	94	24/6	186-188	16-23 48-55		Very dense, light brown, fine SAND, little to trace Silt, wet (SM).			
187									
188	95	24/6	188-190	8-12 35-58		Dense, light brown, fine SAND, little to trace Silt, wet (SM).			
189									
190	96	24/8	190-192	5-13 19-25		Dense, light brown, gray, fine SAND, little to trace Silt, wet (SM).			
191									
192	97	24/10	192-194	13-26 35-41		Very dense, brown, fine to medium SAND, little to trace Silt, wet (SM).			
193									
194	98	24/10	194-196	9-20 42-50		Very dense, light brown, fine to medium SAND, little to trace Silt, wet (SM).			
195									
196	99	24/0	196-198	7-22-62/6"		NO RECOVERY. Bailer soil is light brown gray, fine to medium Sand, little to trace Silt, wet.			
197									
198	100	24/1	198-200	10-12 32-44		Dense, gray to light brown, fine SAND, little to trace Silt, wet (SM).			
199									
200	101	24/10	200-202	10-18 32-48		Very dense, gray to light brown, fine to medium SAND, little to trace Silt, wet (SM).			
201									
202	102	24/6	202-204	5-9 20-28		Medium dense, gray to light brown, fine to medium SAND, little to trace Silt, wet (ML).			
203									
204	103	24/16	204-206	7-14 20-33		Dense, gray to light brown, medium SAND, little to trace Silt, wet (SM).			
205									
206	104	24/14	206-208	6-17 27-40		Very dense, gray, medium to coarse SAND,			

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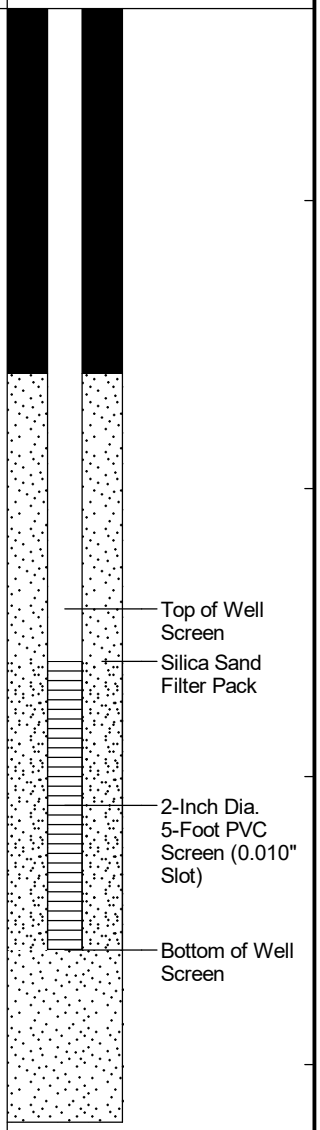
Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
207						trace Silt, wet (SW).			
208	105	24/16	208-210	9-23 32-59		Very dense, gray, medium to coarse SAND, trace Silt, wet (SW). Changing at 208.8 feet to: Very dense, gray, fine SAND, little Silt, wet (SM).			
210	106	24/6	210-212	9-11 14-17		Medium dense, gray and brown, fine SAND, little to trace Silt, wet (SM).			
212	107	24/0	212-214	4-7 26-33		NO RECOVERY. BAiler soil is fine to coarse Sand, little to trace Silt, wet.			
214	108	24/12	214-216	4-7 26-33		Dense, gray, fine to coarse SAND, little Silt, wet (SM).			
216	109	24/10	216-218	4-8 8-30		Medium dense, gray and brown, fine to medium SAND, little to trace Silt, wet (SM).			
218	110	24/12	218-220	5-14 34-30		Dense, gray and brown, fine to medium SAND, little to trace Silt, wet (SM).			
220	111	24/0	220-222	5-7 22-33		NO RECOVERY.			
222	112	24/12	222-224	4-6 33-33		Dense, brown, fine SAND, little Silt, wet (SM). Changing at 223.7 feet to: GRAVEL (potential Bedrock).			
224	113	24/14	224-226	41-35 45-48		Gray, potential weathered BEDROCK. Changing at 13.2 feet to: Brown, Clayey SILT, trace fine to coarse Sand, wet (ML).			
226						Bottom of Borehole at 226.0 Feet			
227									
228									
229									



REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-17D

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Boring No.: PMW-17M
Page: 1 **of** 8
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christopher Melby
Date Start/Finish: 3-2-18 / 3-5-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0"
Hammer Wt.:	140lbs	1 3/8"
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1						See PMW-17D/MW-1D boring log for detailed soil descriptions.	SAND		PROTECTIVE CASING; Backfill/Cement Pad
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: PMW-17M
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File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							SAND		
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-17M

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File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
44							SAND		
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
67							SAND		
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									Grout
81									
82									
83									
84									
85									
86									
87									
88									
89									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-17M

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
91							SAND		
92									
93									
94									
95									
96									
97									
98									
99									
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									

REMARKS

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File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
114							SAND		
115									
116									
117									
118									
119									
120									
121									
122									
123									
124									
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-17M

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File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
137							SAND		
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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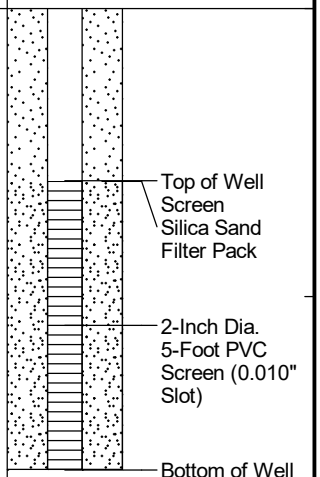
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
161							SAND		
162									
163									
164									
165									
166	1	24	166-168			Brown, fine SAND, little to trace Silt.		1	
167									
168						Bottom of Borehole at 168.0 Feet	168'	2	
169									
170									
171									
172									
173									
174									
175									
176									
177									
178									
179									
180									
181									
182									
183									



REMARKS

1. Soil descriptions based on auger cuttings.
2. Monitoring well was installed in borehole upon completion. Well screen set from approximately 163.0 to 168.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-17M

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Boring No.: PMW-17S
Page: 1 **of** 5
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Christopher Melby
Date Start/Finish: 2-27-18 / 2-28-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0"
Hammer Wt.:	140lbs	1 3/8"
Hammer Fall:	30.0"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–19						See PMW-17D/MW-1D boring log for detailed soil descriptions.	See PMW-17D/MW-1D for Stratum Descriptions		PROTECTIVE CASING; Backfill

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
21							See PMW-17D/MW-1D for Stratum Descriptions		
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
44							See PMW-17D/MW-1D for Stratum Descriptions		
45									
46									
47									
48									
49									
50									
51									Bentonite/Grout
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									

REMARKS

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File No.: 16.0062335.52
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
67							See PMW-17D/MW-1D for Stratum Descriptions		
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									
89									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: PMW-17S

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File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
91–113							See PMW-17D/MW-1D for Stratum Descriptions		
104	1	24/16	104-106	11-5 10-10		Medium dense, brown, fine to medium SAND, trace Silt, wet (SP).	104' SAND (SP)		
106						Bottom of Borehole at 106.0 Feet	108'	1	Top of Well Screen Silica Sand Filter Pack 2-Inch Dia. 5-Foot PVC Screen (0.010" Slot) Bottom of Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from approximately 103.0 to 108.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: SB-18/MW-18D
Page: 1 **of** 6
File No.: 16.0062335.52
Check:

Contractor: Stearns Drilling Company
Foreman: Burt
Logged by: Kevin Hedinger
Date Start/Finish: 5-14-18 / 5-16-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	8.0" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	140lbs	NA
Hammer Fall:	30"	NA
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/19	0-2	1-1 2-2		Loose, light brown, fine Silty SAND, moist (SM). Changing at 0.7 feet to: Loose, tan, fine SAND, moist (SP). Changing at 1.2 feet to: Loose, light brown, fine Silty SAND, moist (SM).	SAND		PROTECTIVE CASING
9	2	24/18	9-11	4-4 6-6		Tan, fine SAND, trace Gravel, moist (SP). Changing at 10.5 feet to: Brown, fine SAND, trace Gravel, wet (SP).		1	Grout
14	3	24/18	14-16	4-7 3-3		Loose, tan, very fine to fine SAND, trace Silt, wet (SP).		2	
19	4	24/24	19-21	2-3 5-4		Loose, tan, very fine to fine Silty SAND, wet (SM).			

REMARKS

1. Groundwater encountered at approximately 10.5 feet below ground surface.
2. Groundwater sample collected from temporary well with a well screen set from 14.0 to 19.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-18/MW-18D

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							SAND		
23									
24	5	24/18	24-26	0-0 1-1		Very loose, tan, fine SAND, wet (SP).		3	
25									
26									
27									
28									
29	6	24/19	29-31	0-3 5-7		Loose, brown, fine SAND, some Clay, wet (SC). Changing at 30.0 feet to: Stiff, brown, CLAY, some Sand, wet (CL).			
30							30' CLAY		
31									
32									
33									
34	7	24/20	34-36	4-6 11-12		Stiff, gray, Silty CLAY, wet (CL). Changing at 34.2 feet to: Medium dense, gray, fine SAND, wet (SP). Changing at 35.8 feet to: Stiff, gray, Silty CLAY, wet (CL).	34.2' SAND	4	
35									
36							35.8' CLAY		
37	8	24/12	37-39	1-2 3-4		Loose, gray, fine SAND, wet (SP).	37' SAND		
38									
39	9	24/12	39-41	1-2 5-9		Loose, gray, fine SAND, wet (SP).			
40									
41									
42									
43									
44	10	24/12	44-46	2-2 6-8		Loose, gray, very fine to fine SAND, wet (SP).		5	
45									
46									
47									

REMARKS

3. Groundwater sample collected from temporary well with a well screen set from 24.0 to 29.0 feet below ground surface.
4. Groundwater sample collected from temporary well with a well screen set from 34.0 to 39.0 feet below ground surface.
5. Groundwater sample collected from temporary well with a well screen set from 44.0 to 49.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-18/MW-18D

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
48							SAND		
49	11	24/15	49-51	2-3 8-14		Medium dense, brown, fine SAND, wet (SP).			
50									
51									
52									
53									
54	12	24/24	54-56	2-2 5-14		Loose, brownish gray, fine to medium SAND, wet (SP). Changing at 55.9 feet to: Brown, SILT, trace Pebbles, wet (ML).		6	
55									
56							55.9' SILT		
57									
58									
59	13	24/15	59-61	3-3 11-15		Medium dense, brown, fine to medium SAND, wet (SP). Changing at 60.3 feet to: Medium dense, brown, medium to coarse SAND, trace Gravel, wet (SW).	59' SAND		
60									
61									
62									
63									
64	14	24/16	64-66	2-4 8-14		Medium dense, brownish gray, medium SAND, wet (SP). Changing at 65.3 feet to: Medium dense, brown, fine to medium SAND, wet (SP). Changing at 65.6 feet to: Medium dense, brown, medium to coarse SAND, some Pebbles, trace Gravel, wet (SW).		7	
65									
66									
67									
68									
69	15	24/24	69-71	4-4 11-12		Medium dense, brownish gray, medium SAND, some Pebbles, trace gravel, wet (SP).			
70									
71									
72									
73									

REMARKS

6. Groundwater sample collected from temporary well with a well screen set from 54.0 to 59.0 feet below ground surface.
7. Groundwater sample collected from temporary well with a well screen set from 64.0 to 69.0 feet below ground surface.

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
74	16	24/22	74-76	3-6 12-16		Medium dense, brown, fine to medium SAND, some Pebbles, some Gravel, wet (SP). Changing at 75.3 feet to: Medium dense, brown, medium SAND, some Pebbles, some Gravel, wet (SP).	SAND	8	Bentonite
79	17	24/20	79-81	7-18 27-34		Dense, brown, medium SAND and GRAVEL, wet (SP-GP).	79' SAND and GRAVEL		
84	18	24/17	84-86	15-16 24-41		Dense, brown, medium Sandy GRAVEL, wet (GP). Changing at 85.7 feet to: Dense, brown, fine to medium SAND, wet (SP).	84' Sandy GRAVEL	9	
89	19	24/13	89-91	7-12 35->50		Dense, brown, fine Sandy GRAVEL, wet (GP).			
94	20	24/15	94-96	3-8 38->50		Dense, brown, fine to medium SAND, little Gravel, wet (SP).	94' SAND	10	

REMARKS

8. Groundwater sample collected from temporary well with a well screen set from 74.0 to 79.0 feet below ground surface.
9. Groundwater sample collected from temporary well with a well screen set from 84.0 to 89.0 feet below ground surface.
10. Groundwater sample collected from temporary well with a well screen set from 94.0 to 99.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-18/MW-18D

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Boring No.: SB-18/MW-18D
Page: 5 **of** 6
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
100	21	24/6	99-101	2-5 13-31		Medium dense, brown, fine SAND, little Gravel, wet (SP).	SAND		
104	22	24/5	104-106	4-30->50		Very dense, brown, fine SAND, trace Pebbles, wet (SP).		11	
109	23	24/0	109-111	3-9 30->50		Very dense, brown, fine SAND, wet (SP).		12	
114	24	24/12	114-116	9-29->50		Very dense, brown, fine SAND, wet (SP).		13	
119	25	24/12	119-121	2-5 17-35		Medium dense, brown, fine SAND, wet (SP).			
124	26	24/16	124-126	2-28 12-10		Dense, brown, fine SAND, wet (SP). Changing	124.2' SILT	14	

REMARKS

11. Groundwater sample collected from temporary well with a well screen set from 104.0 to 109.0 feet below ground surface.
12. Sample bailed from augers.
13. Groundwater sample collected from temporary well with a well screen set from 114.0 to 119.0 feet below ground surface.
14. Groundwater sample collected from temporary well with a well screen set from 124.0 to 129.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Boring No.: SB-18/MW-18D
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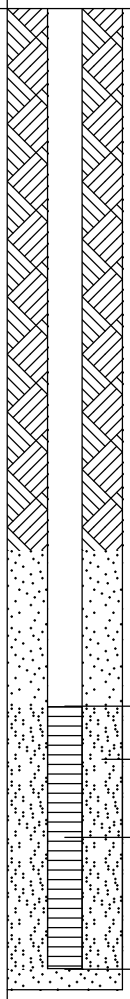
File No.: 16.0062335.52
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
125						at 124.2 feet to: Dense, brown, medium SAND, some Pebbles, wet (SP). Changing at 125.2 feet to: Gray, SILT, trace fine Sand, wet (ML).	SILT	
126								
127								
128								
129	27	24/10	129-131	7-40->50		Very dense, brownish gray, medium to coarse SAND and GRAVEL, little fine Sand, wet (SW-GP).	129' SAND and GRAVEL	
130								
131								
132								
133								
134	28	24/16	134-136	15-32 52->50		Very dense, grayish brown, fine to medium Sandy GRAVEL, wet (GP).	134' Sandy GRAVEL	15
135								
136								
137								
138								
139	29	24/10	139-141	3-12 40-50		Very dense, grayish brown, medium SAND, little Gravel, wet (SP).	139' SAND	
140								
141								
142								
143								
144	30	24/20	144-146	16-44 43->50		Gray, Silty CLAY, moist (CL).	144' Silty CLAY	
145								
146						Bottom of Borehole at 146.0 Feet	146'	3
147								
148								
149								
150								

Equipment Installed

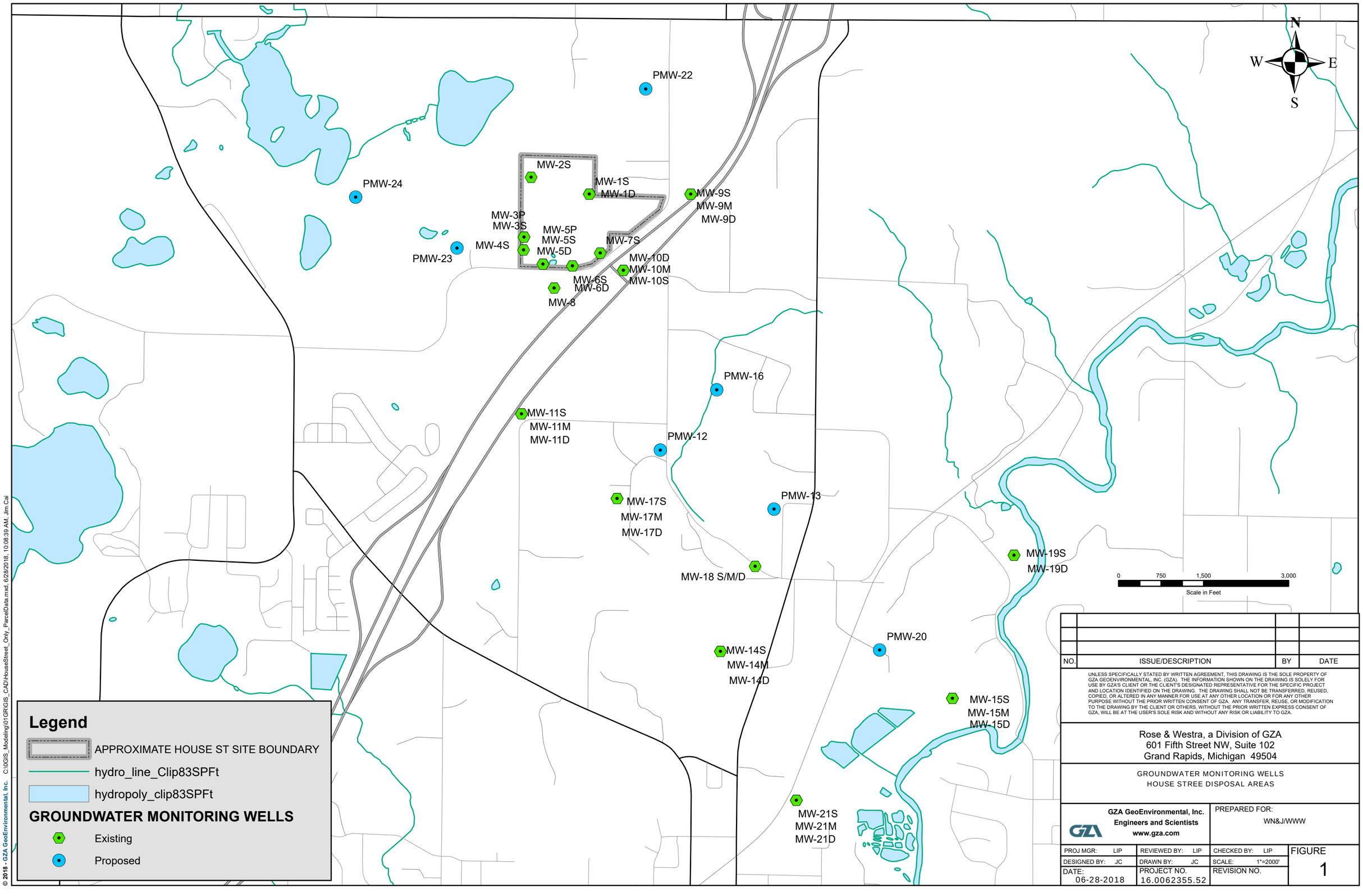


REMARKS

15. Groundwater sample collected from temporary well with a well screen set from 134.0 to 139.0 feet below ground surface.
3. Monitoring well was installed in borehole upon completion. Well screen set from approximately 138.0 to 143.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: SB-18/MW-18D



C:\0GIS_Modeling\01GRGIS_CAD\HouseStreet_Only_ParcelData.mxd, 6/28/2018, 10:08:39 AM, Jim Cai

NO.	ISSUE/DESCRIPTION	BY	DATE

Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

GROUNDWATER MONITORING WELLS
HOUSE STREE DISPOSAL AREAS

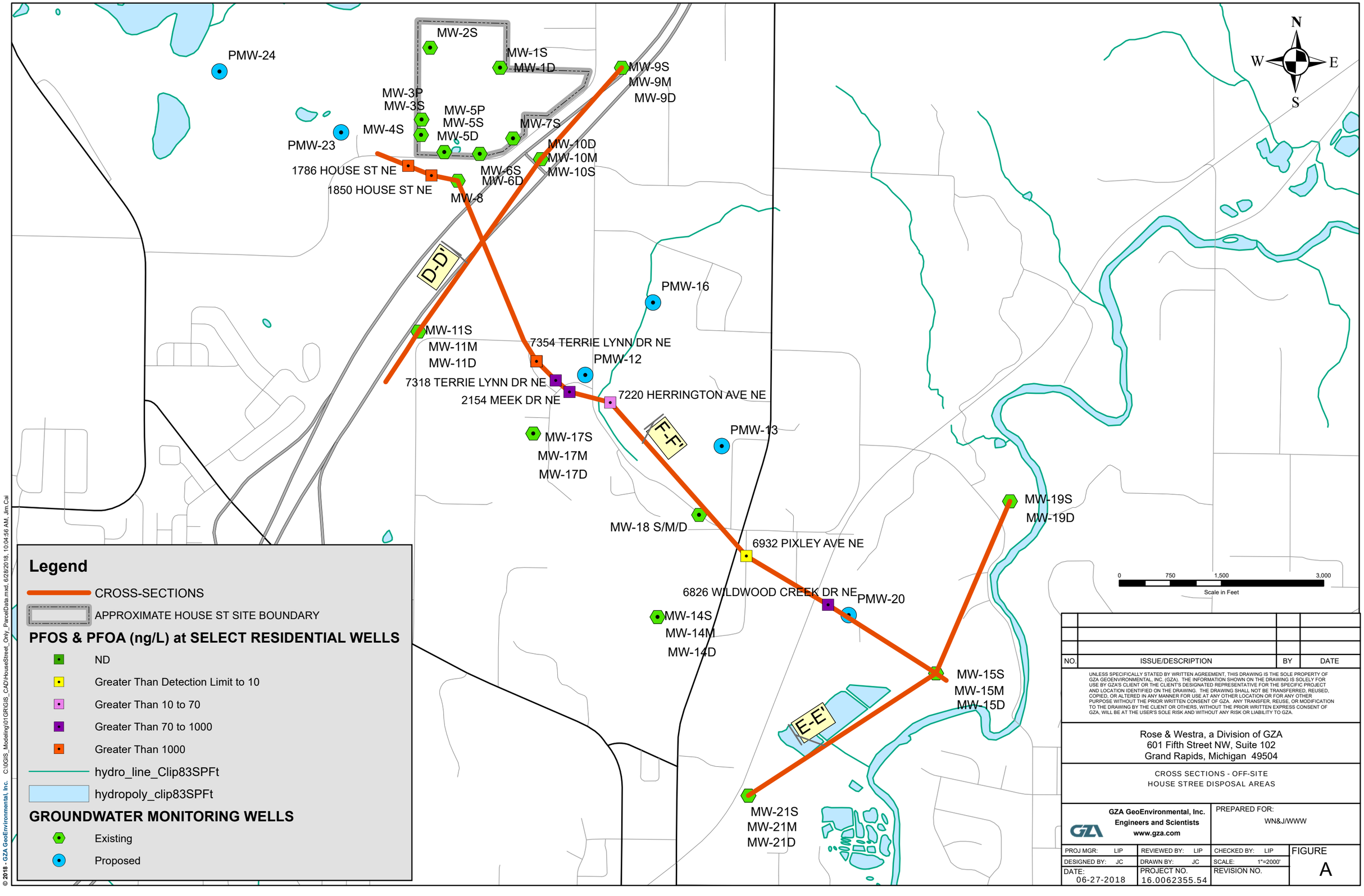
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	FIGURE 1
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1"=2000'	
DATE: 06-28-2018	PROJECT NO. 16.0062355.52	REVISION NO.	

Table 1: MW-14, MW-17, and MW-18 Data
House Street Investigation

Well Information	Sample Date	Sample ID	PFOS+PFOA (ppt)	Total PFAS (ppt)	PFOA (ppt)	PFOS (ppt)
MW-14D	4/10/2018	TD12015-001	ND	ND	<3.6	<3.6
MW-14M	4/10/2018	TD12015-003	ND	ND	<3.6	<3.6
MW-14S	4/10/2018	TD12015-005	ND	ND	<3.7	<3.7
MW-17D	4/17/2018	K1803589-002	1,372	4,323	1,300	72
MW-17M	4/17/2018	K1803589-003	ND	ND	<1.8	<4.5
MW-17S	4/17/2018	K1803589-001	ND	ND	<2	<4.9
PMW-14 (18-23)	3/8/2018	K1802201-001	2	2	2	<4.8
PMW-14 (38-43)	3/8/2018	K1802201-002	ND	ND	<2	<5
PMW-14 (48-53)	3/8/2018	K1802201-003	ND	ND	<1.9	<4.8
PMW-14 (63-68)	3/9/2018	K1802247-001	ND	ND	<1.9	<4.8
PMW-14 (73-78)	3/9/2018	K1802247-002	ND	ND	<2	<5
PMW-14 (83-88)	3/9/2018	K1802247-005	ND	ND	<1.9	<4.8
PMW-14 (93-98)	3/9/2018	K1802247-006	ND	ND	<2.1	<5.2
PMW-14 (103-108)	3/12/2018	K1802302-001	ND	ND	<1.9	<4.6
PMW-17 (83-88)	1/30/2018	K1801045-003	ND	ND	<1.7	<4.2
PMW-17 (93-98)	1/30/2018	K1801045-004	ND	ND	<1.7	<4.2
PMW-17 (103-108)	1/31/2018	K1801045-007	10.7	16.4	4.4	6.3
PMW-17 (113-118)	1/31/2018	K1801045-008	12.2	24.6	7.7	4.5
PMW-17 (153-158)	2/2/2018	K1801045-011	ND	ND	<1.7	<4.2
PMW-17 (163-168)	2/16/2018	K1801593-002	3.8	3.8	3.8	<4.7
PMW-17 (173-178)	2/16/2018	K1801593-004	2.3	2.3	2.3	<4.7
PMW-17 (183-188)	2/19/2018	K1801660-001	ND	ND	<1.9	<4.6
PMW-17 (193-198)	2/20/2018	K1801660-004	5	99.8	5	<4.6
PMW-17 (203-208)	2/20/2018	K1801660-007	200	907	200	<4.8
PMW-17 (213-218)	2/22/2018	K1801740-001	759	2,925	720	39
PMW-18-14-19	5/14/2018	TE17021-002	ND	5.1	<1.7	<3.5
PMW-18-24-29	5/15/2018	TE17021-004	ND	19.4	<1.7	<3.5
PMW-18-34-39	5/15/2018	TE17021-005	ND	ND	<1.7	<3.5
PMW-18-44-49	5/15/2018	TE17021-006	ND	ND	<1.8	<3.6
PMW-18-54-59	5/15/2018	TE17021-007	ND	ND	<1.7	<3.5
PMW-18-64-69	5/15/2018	TE17021-008	2.2	7.8	2.2	<3.6
PMW-18-74-79	5/15/2018	TE17021-011	11	47.1	11	<3.5
PMW-18-84-89	5/15/2018	TE17021-012	37	105.3	26	11
PMW-18-94-99	5/16/2018	TE17020-001	126	351.7	83	43
PMW-18-104-109	5/16/2018	TE17020-004	428	1,331	330	98
PMW-18-114-119	5/16/2018	TE17020-005	414	1,307	330	84
PMW-18-124-129	5/16/2018	TE17020-006	184.5	944.5	180	4.5
PMW-18-134-139	5/16/2018	TE17020-007	100	738	100	<3.6



Legend

- CROSS-SECTIONS
- APPROXIMATE HOUSE ST SITE BOUNDARY

PFOS & PFOA (ng/L) at SELECT RESIDENTIAL WELLS

- ND
- Greater Than Detection Limit to 10
- Greater Than 10 to 70
- Greater Than 70 to 1000
- Greater Than 1000
- hydro_line_Clip83SPFt
- hydropoly_clip83SPFt

GROUNDWATER MONITORING WELLS

- Existing
- Proposed

NO.	ISSUE/DESCRIPTION	BY	DATE

Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

CROSS SECTIONS - OFF-SITE
HOUSE STREE DISPOSAL AREAS

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
WN&J/WWW

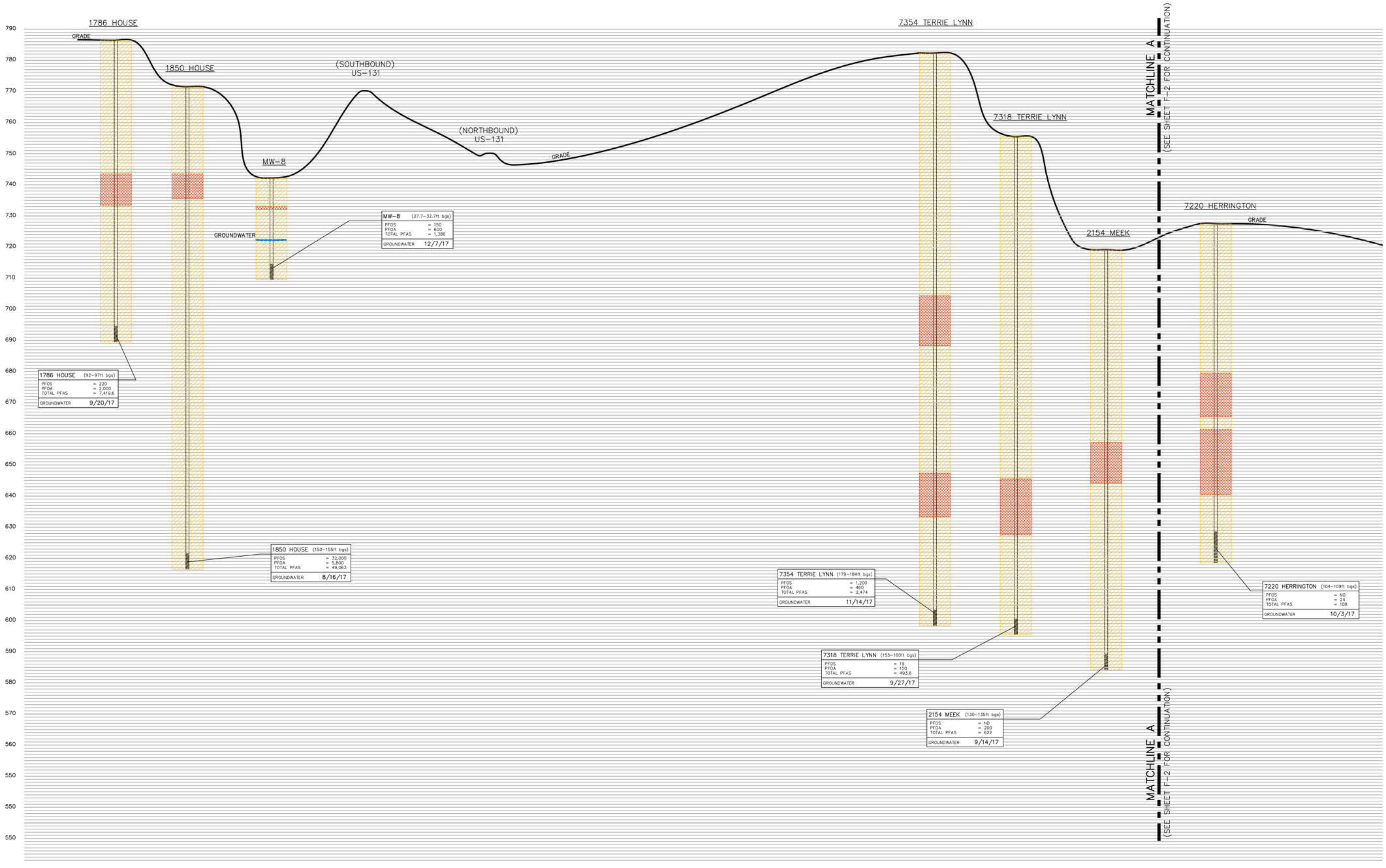
PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	FIGURE
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1"=2000'	A
DATE: 06-27-2018	PROJECT NO. 16.0062355.54	REVISION NO.	

NORTHWEST

F

SOUTHEAST

F'



GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

NORTHWEST-SOUTHEAST GEOLOGIC CROSS-SECTION F-F' (Northwest Half)
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 225'
VERTICAL SCALE: 1" = 15'

DRAWN BY KJB | DESIGN BY MAW | DATE 6/28/18

FILE NO.: 62335.52_GSM

NO.	REVISIONS	BY	DATE
	REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS		

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

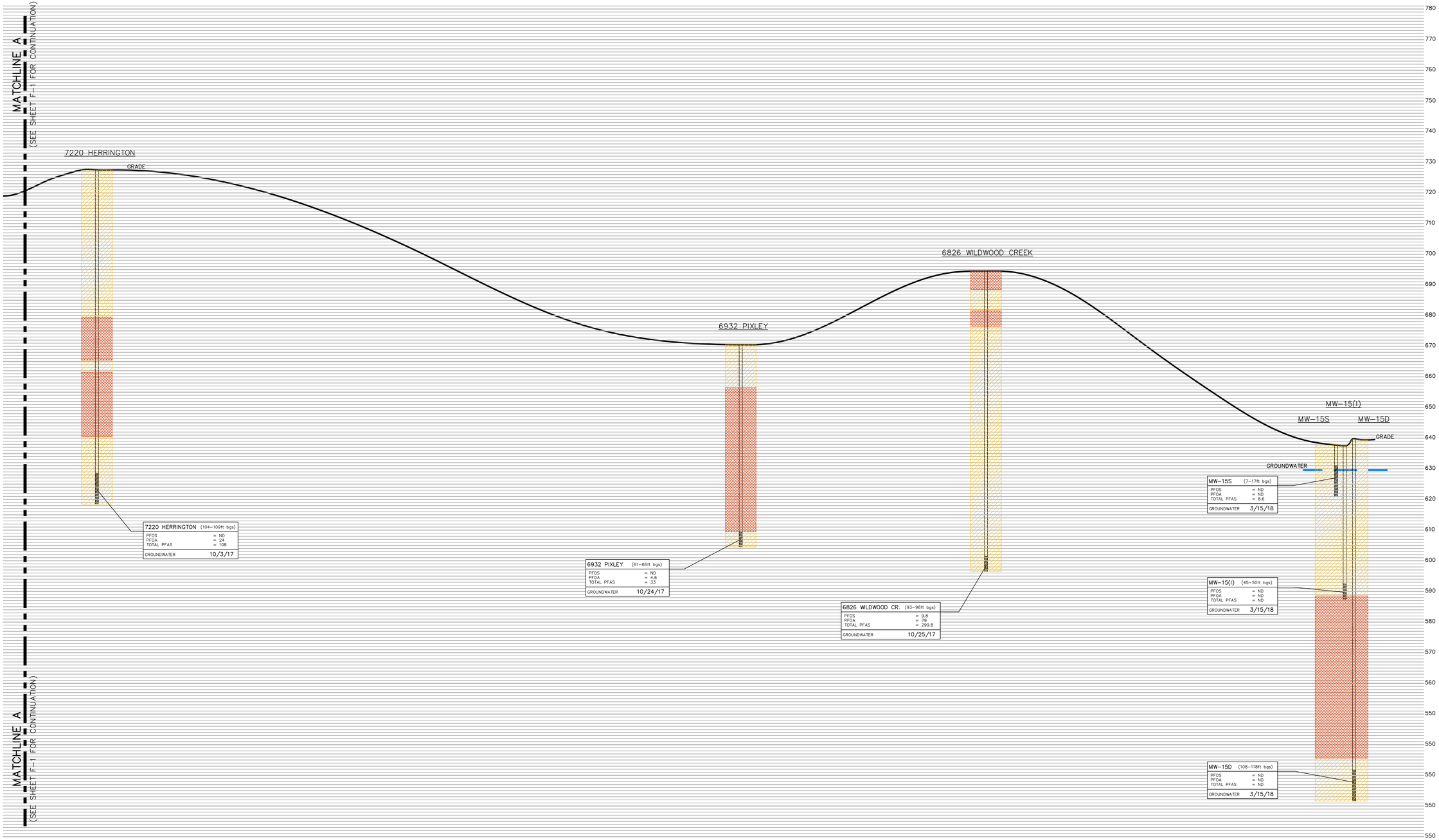
PROJECT NO.
16.0062335.52

SHEET NO.
F-1

NORTHWEST
F

SOUTHEAST
F'

MATCHLINE A
(SEE SHEET F-1 FOR CONTINUATION)



MATCHLINE A
(SEE SHEET F-1 FOR CONTINUATION)

GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

NORTHWEST–SOUTHEAST GEOLOGIC CROSS-SECTION F–F' (Southeast Half)
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 225'
VERTICAL SCALE: 1" = 15'

DRAWN BY	DESIGN BY	DATE
KJB	MAW	6/28/18

FILE NO.: 62335.52_CSM

NO.	REVISIONS	BY	DATE

REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

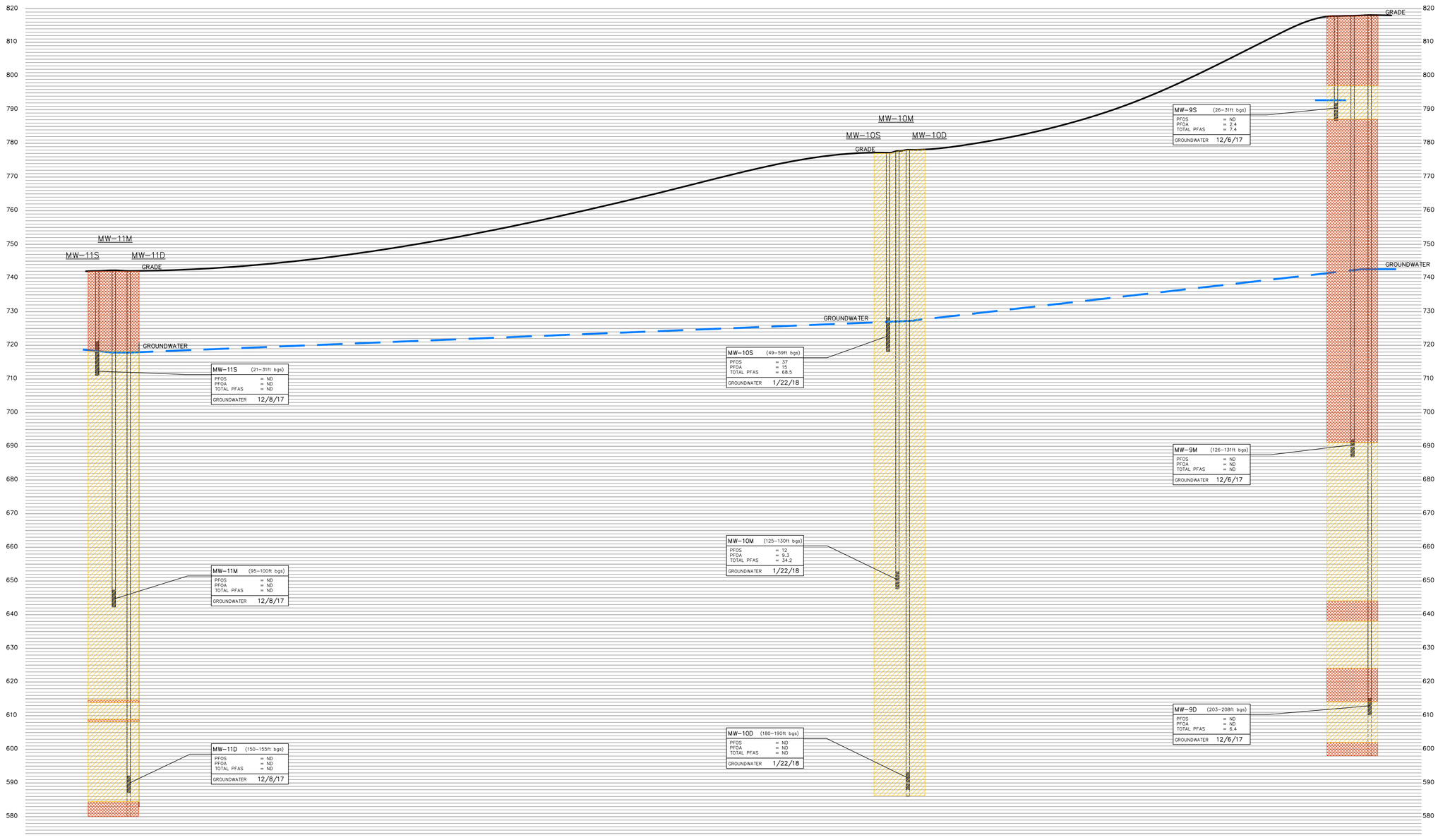
SHEET NO.
F-2

SOUTHWEST

D

NORTHEAST

D'



GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

SOUTHWEST–NORTHEAST GEOLOGIC CROSS–SECTION D–D'
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 225'
VERTICAL SCALE: 1" = 15'

DRAWN BY KJB | DESIGN BY MAW | DATE 6/28/18

FILE NO.: 62335.52_CSM

NO.	BY	DATE	REVISIONS
			REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL–ENVIRONMENTAL–ECOLOGICAL–WATER–CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

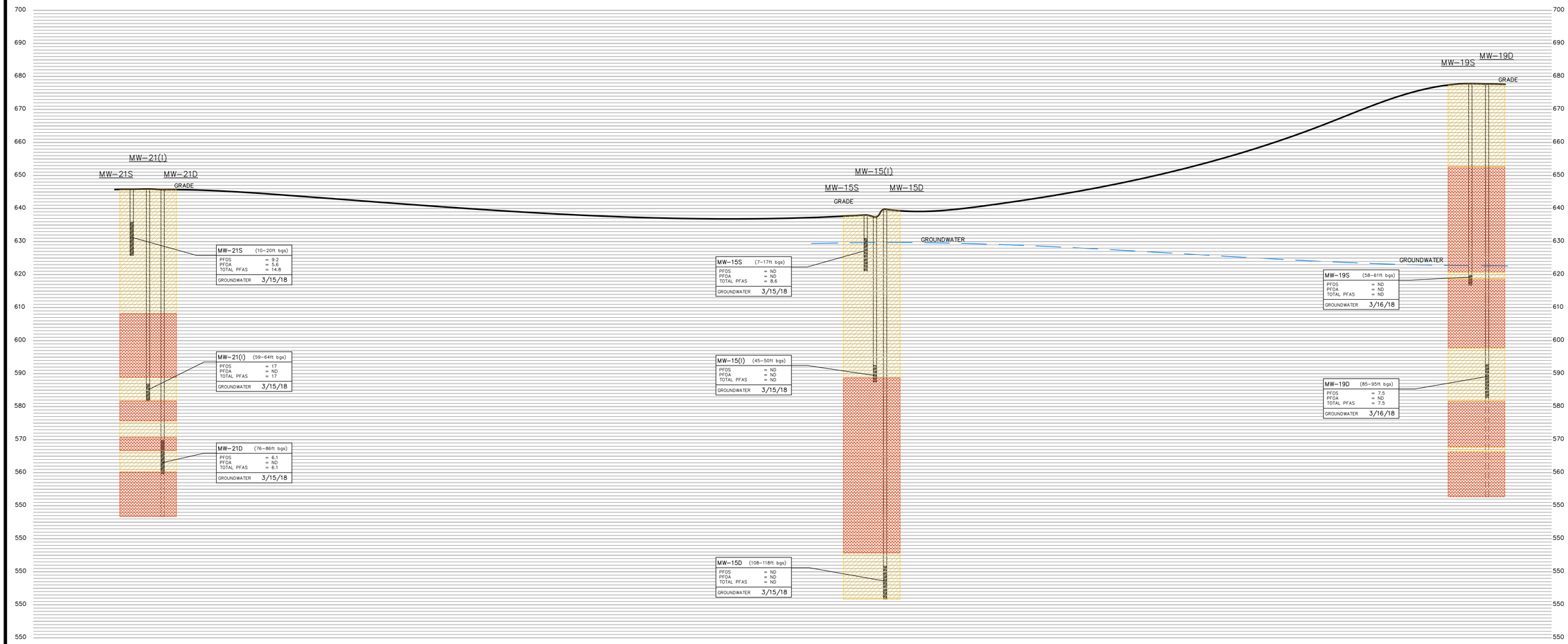
SHEET NO.
D

SOUTHWEST

E

NORTHEAST

E'



GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

SOUTHWEST–NORTHEAST GEOLOGIC CROSS-SECTION E–E'
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 225'
VERTICAL SCALE: 1" = 15'

DRAWN BY	DESIGN BY	DATE
KJB	MAW	6/28/18

FILE NO.: 62335.52_CSM

NO.	REVISIONS	BY	DATE

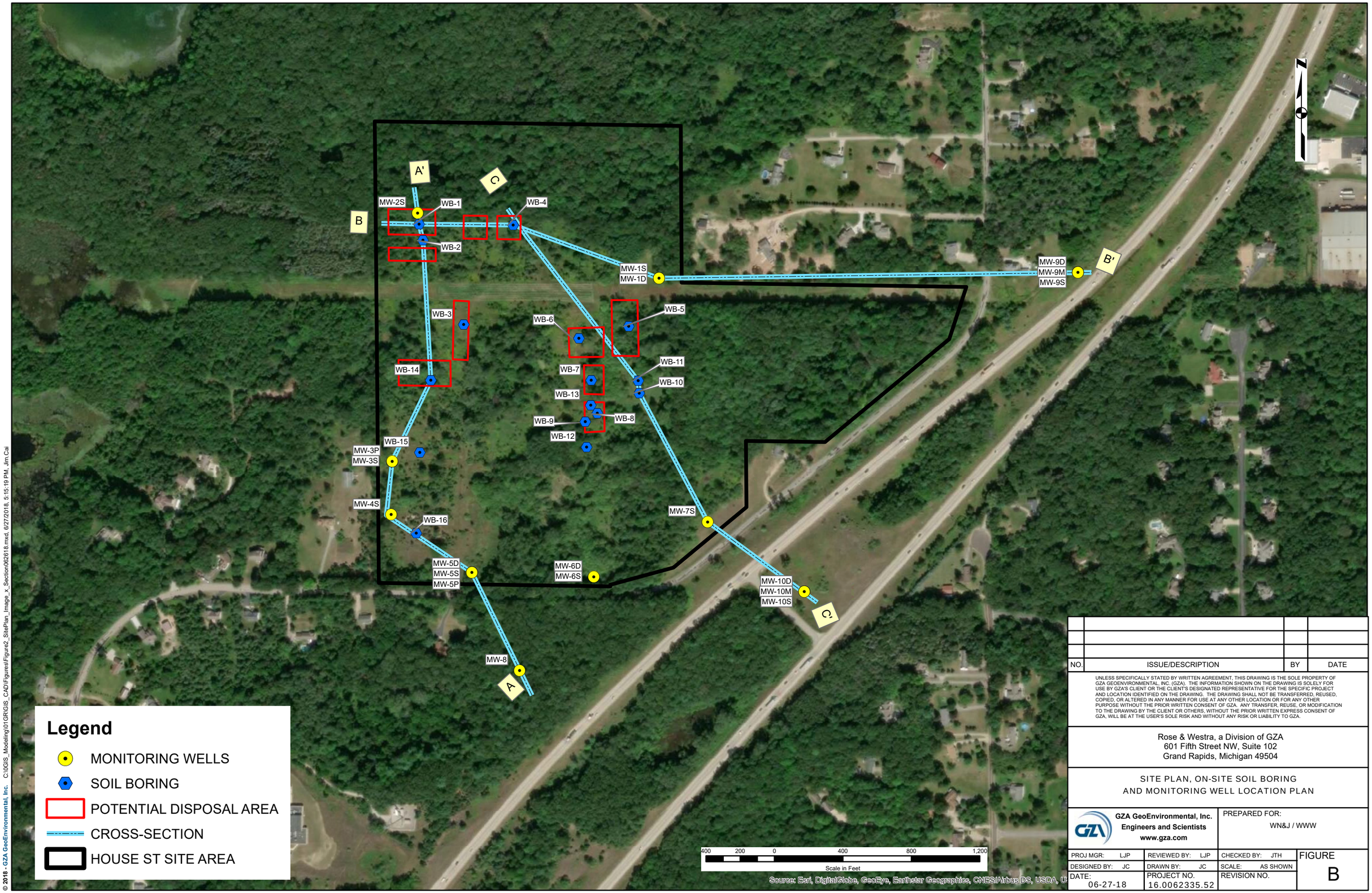
REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL-ENVIRONMENTAL-ECOLOGICAL-WATER-CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

SHEET NO.
E



NO.	ISSUE/DESCRIPTION	BY	DATE

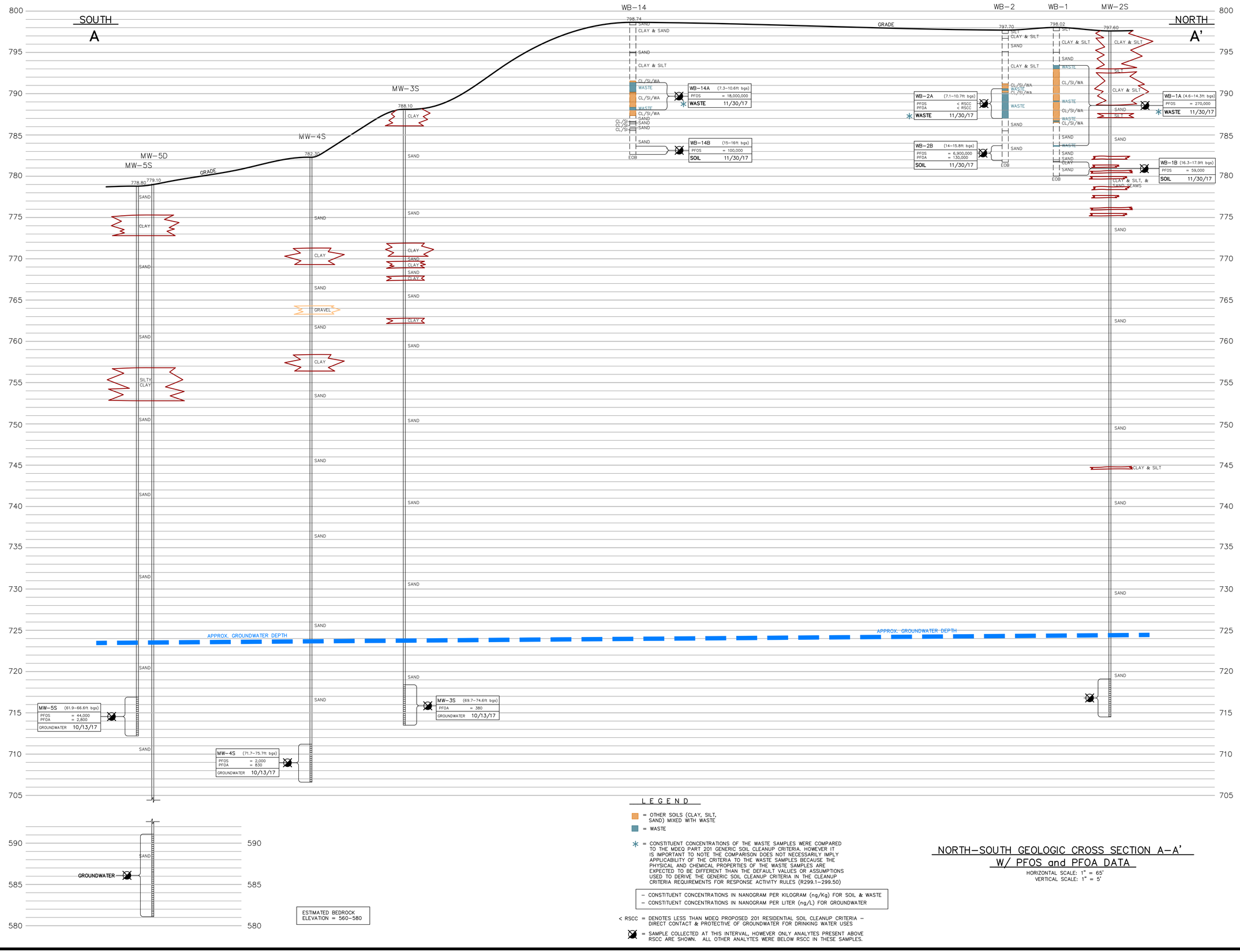
Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

SITE PLAN, ON-SITE SOIL BORING AND MONITORING WELL LOCATION PLAN

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR: WN&J / WWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JTH	FIGURE
DESIGNED BY: JC	DRAWN BY: JC	SCALE: AS SHOWN	B
DATE: 06-27-18	PROJECT NO. 16.0062335.52	REVISION NO.	



LEGEND

= OTHER SOILS (CLAY, SILT, SAND) MIXED WITH WASTE

= WASTE

* = CONSTITUENT CONCENTRATIONS OF THE WASTE SAMPLES WERE COMPARED TO THE MDEQ PART 201 GENERIC SOIL CLEANUP CRITERIA. HOWEVER IT IS IMPORTANT TO NOTE THE COMPARISON DOES NOT NECESSARILY IMPLY APPLICABILITY OF THE CRITERIA TO THE WASTE SAMPLES BECAUSE THE PHYSICAL AND CHEMICAL PROPERTIES OF THE WASTE SAMPLES ARE EXPECTED TO BE DIFFERENT THAN THE DEFAULT VALUES OR ASSUMPTIONS USED TO DERIVE THE GENERIC SOIL CLEANUP CRITERIA IN THE CLEANUP CRITERIA REQUIREMENTS FOR RESPONSE ACTIVITY RULES (R299.1–299.50)

– CONSTITUENT CONCENTRATIONS IN NANOGRAM PER KILOGRAM (ng/Kg) FOR SOIL & WASTE
– CONSTITUENT CONCENTRATIONS IN NANOGRAM PER LITER (ng/L) FOR GROUNDWATER

< RSCC = DENOTES LESS THAN MDEQ PROPOSED 201 RESIDENTIAL SOIL CLEANUP CRITERIA – DIRECT CONTACT & PROTECTIVE OF GROUNDWATER FOR DRINKING WATER USES

= SAMPLE COLLECTED AT THIS INTERVAL, HOWEVER ONLY ANALYTES PRESENT ABOVE RSCC ARE SHOWN. ALL OTHER ANALYTES WERE BELOW RSCC IN THESE SAMPLES.

NORTH–SOUTH GEOLOGIC CROSS SECTION A–A'
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 65'
VERTICAL SCALE: 1" = 5'

DRAWN BY KJB | DESIGN BY MAH | DATE 2/9/18

FILE NO.: 62335.52_GSM

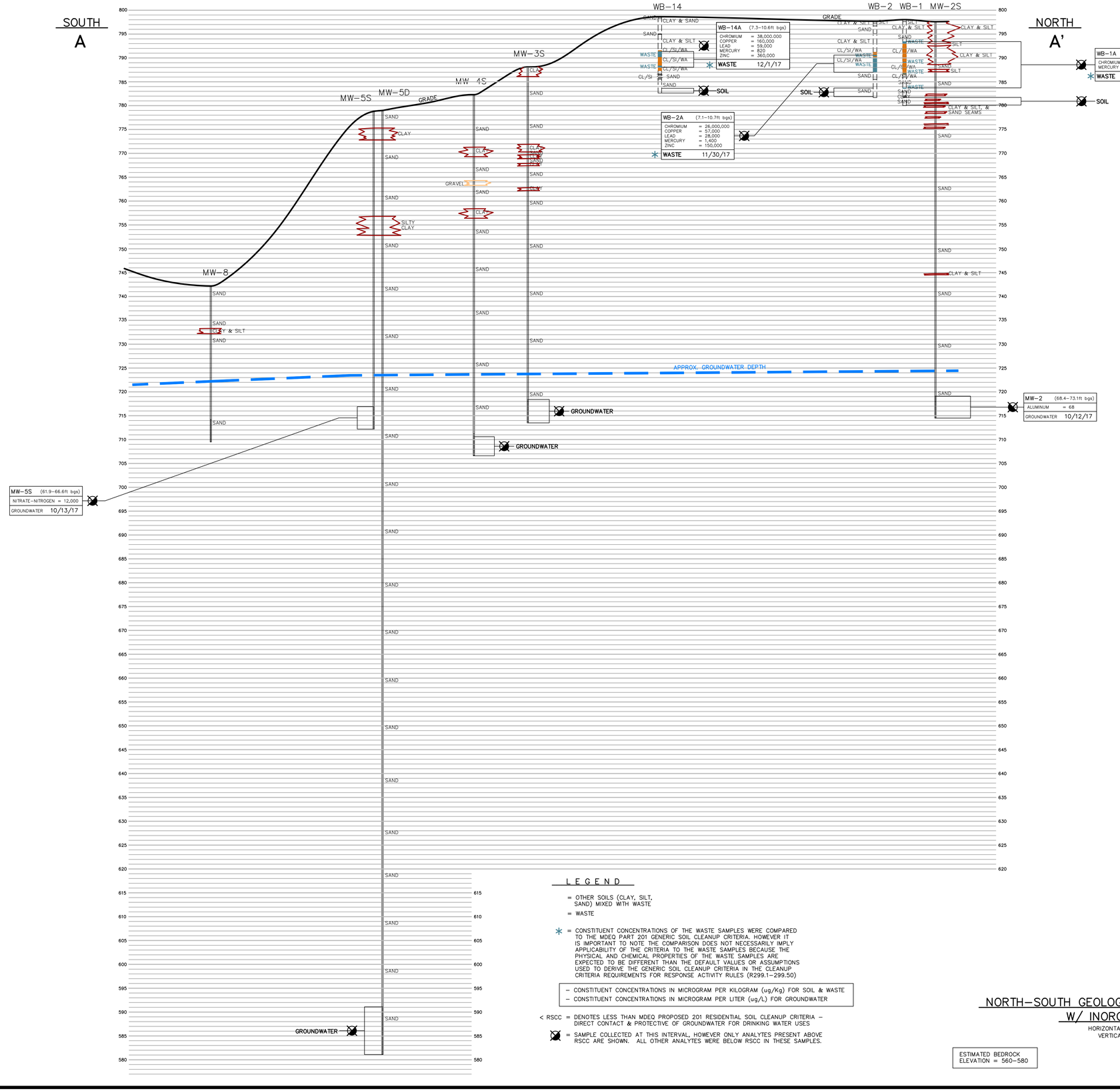
NO.	REVISIONS	BY	DATE
	REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS		

WOLVERINE WORLD WIDE, INC.
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL–ENVIRONMENTAL–ECOLOGICAL–WATER–CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

SHEET NO.
C1



LEGEND

= OTHER SOILS (CLAY, SILT, SAND) MIXED WITH WASTE

= WASTE

* = CONSTITUENT CONCENTRATIONS OF THE WASTE SAMPLES WERE COMPARED TO THE MDEQ PART 201 GENERIC SOIL CLEANUP CRITERIA. HOWEVER IT IS IMPORTANT TO NOTE THE COMPARISON DOES NOT NECESSARILY IMPLY APPLICABILITY OF THE CRITERIA TO THE WASTE SAMPLES BECAUSE THE PHYSICAL AND CHEMICAL PROPERTIES OF THE WASTE SAMPLES ARE EXPECTED TO BE DIFFERENT THAN THE DEFAULT VALUES OR ASSUMPTIONS USED TO DERIVE THE GENERIC SOIL CLEANUP CRITERIA IN THE CLEANUP CRITERIA REQUIREMENTS FOR RESPONSE ACTIVITY RULES (R299.1-299.50)

- CONSTITUENT CONCENTRATIONS IN MICROGRAM PER KILOGRAM (ug/Kg) FOR SOIL & WASTE
- CONSTITUENT CONCENTRATIONS IN MICROGRAM PER LITER (ug/L) FOR GROUNDWATER

< RSCC = DENOTES LESS THAN MDEQ PROPOSED 201 RESIDENTIAL SOIL CLEANUP CRITERIA - DIRECT CONTACT & PROTECTIVE OF GROUNDWATER FOR DRINKING WATER USES

= SAMPLE COLLECTED AT THIS INTERVAL, HOWEVER ONLY ANALYTES PRESENT ABOVE RSCC ARE SHOWN. ALL OTHER ANALYTES WERE BELOW RSCC IN THESE SAMPLES.

NORTH-SOUTH GEOLOGIC CROSS SECTION A-A' W/ INORGANICS DATA

HORIZONTAL SCALE: 1" = 130'
VERTICAL SCALE: 1" = 10'

DRAWN BY KJB | DESIGN BY MAW | DATE 6/29/18

FILE NO.: 62335.52_C.GM

NO.	BY	DATE
REVISIONS		

REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

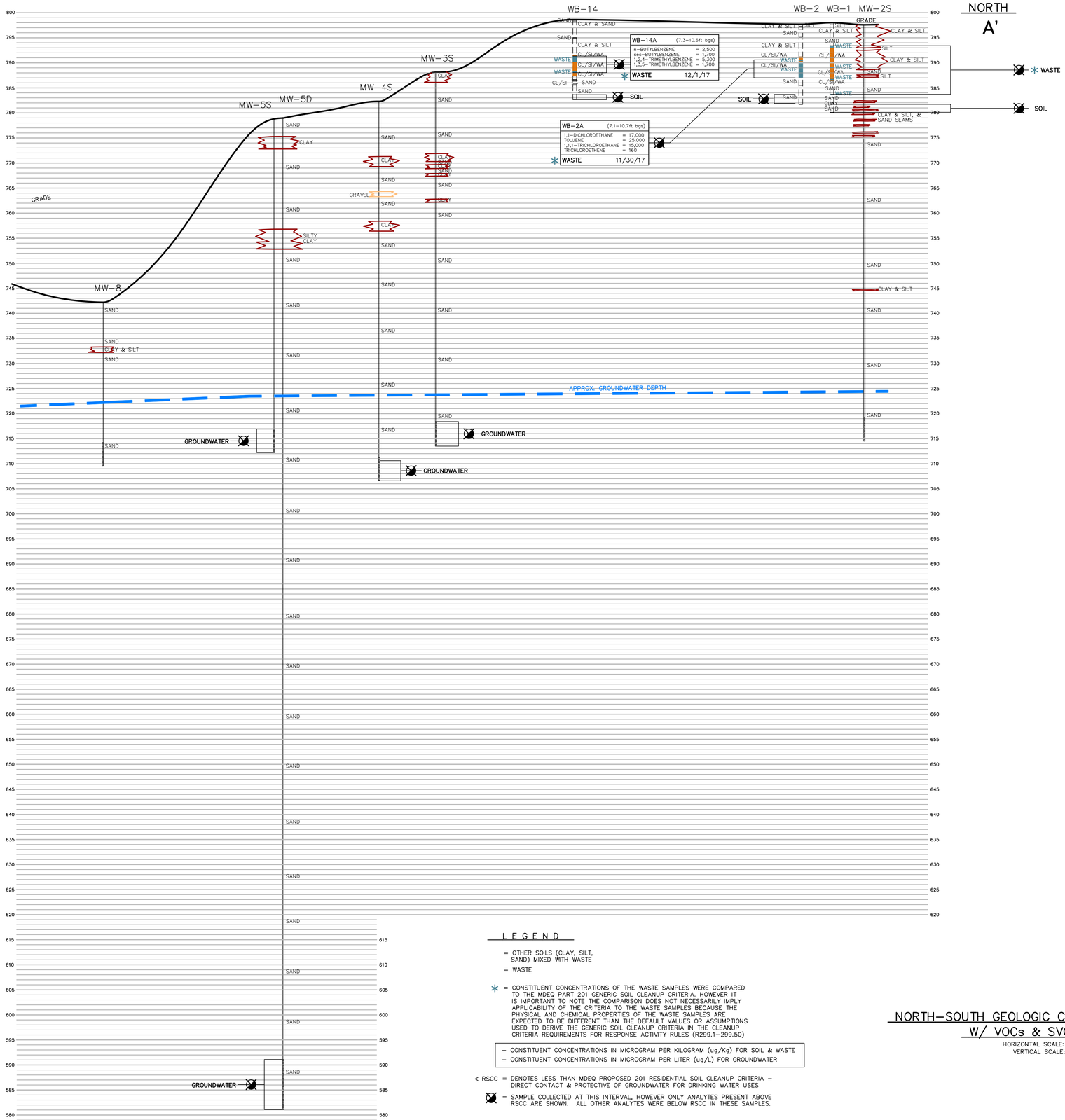
ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL-ENVIRONMENTAL-ECOLOGICAL-WATER-CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

SHEET NO.
C2

SOUTH
A

NORTH
A'



LEGEND

= OTHER SOILS (CLAY, SILT, SAND) MIXED WITH WASTE

= WASTE

* = CONSTITUENT CONCENTRATIONS OF THE WASTE SAMPLES WERE COMPARED TO THE MDEQ PART 201 GENERIC SOIL CLEANUP CRITERIA. HOWEVER IT IS IMPORTANT TO NOTE THE COMPARISON DOES NOT NECESSARILY IMPLY APPLICABILITY OF THE CRITERIA TO THE WASTE SAMPLES BECAUSE THE PHYSICAL AND CHEMICAL PROPERTIES OF THE WASTE SAMPLES ARE EXPECTED TO BE DIFFERENT THAN THE DEFAULT VALUES OR ASSUMPTIONS USED TO DERIVE THE GENERIC SOIL CLEANUP CRITERIA IN THE CLEANUP CRITERIA REQUIREMENTS FOR RESPONSE ACTIVITY RULES (R299.1-299.50)

– CONSTITUENT CONCENTRATIONS IN MICROGRAM PER KILOGRAM (ug/Kg) FOR SOIL & WASTE
– CONSTITUENT CONCENTRATIONS IN MICROGRAM PER LITER (ug/L) FOR GROUNDWATER

< RSCC = DENOTES LESS THAN MDEQ PROPOSED 201 RESIDENTIAL SOIL CLEANUP CRITERIA – DIRECT CONTACT & PROTECTIVE OF GROUNDWATER FOR DRINKING WATER USES

= SAMPLE COLLECTED AT THIS INTERVAL, HOWEVER ONLY ANALYTES PRESENT ABOVE RSCC ARE SHOWN. ALL OTHER ANALYTES WERE BELOW RSCC IN THESE SAMPLES.

NORTH-SOUTH GEOLOGIC CROSS SECTION A-A'
W/ VOCs & SVOCs DATA

HORIZONTAL SCALE: 1" = 130'
VERTICAL SCALE: 1" = 10'

ESTIMATED BEDROCK ELEVATION = 560-580

DRAWN BY KJB | DESIGN BY MAW | DATE 6/29/16

FILE NO.: 62335.52_GSM

NO.	BY	DATE	REVISIONS

REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

SHEET NO.
C3

WEST
B

EAST
B'

WB-1
WB-4
MW-1D
MW-1S
MW-9S
MW-9M
MW-9D
GRADE
GROUNDWATER

WB-1A (4.6-14.3ft bgs)
PFOS = 270,000
WASTE 11/30/17

WB-1B (16.3-17.9ft bgs)
PFOS = 59,000
SOIL 11/30/17

WB-4A (8.3-10.7ft bgs)
PFOS = 79,000,000
PFOA = 240,000
WASTE 11/29/17

WB-4B (14-15.8ft bgs)
PFOS = 33,000
SOIL 11/29/17

MW-9S (26-31ft bgs)
PFOS = ND
PFOA = 2.4
TOTAL PFAS = 7.4
GROUNDWATER 12/6/17

MW-9M (126-131ft bgs)
PFOS = ND
PFOA = ND
TOTAL PFAS = ND
GROUNDWATER 12/6/17

MW-9D (203-208ft bgs)
PFOS = ND
PFOA = ND
TOTAL PFAS = 6.4
GROUNDWATER 12/6/17

LEGEND

= OTHER SOILS (CLAY, SILT, SAND) MIXED WITH WASTE

= WASTE

* = CONSTITUENT CONCENTRATIONS OF THE WASTE SAMPLES WERE COMPARED TO THE MDEQ PART 201 GENERIC SOIL CLEANUP CRITERIA. HOWEVER IT IS IMPORTANT TO NOTE THE COMPARISON DOES NOT NECESSARILY IMPLY APPLICABILITY OF THE CRITERIA TO THE WASTE SAMPLES BECAUSE THE PHYSICAL AND CHEMICAL PROPERTIES OF THE WASTE SAMPLES ARE EXPECTED TO BE DIFFERENT THAN THE DEFAULT VALUES OR ASSUMPTIONS USED TO DERIVE THE GENERIC SOIL CLEANUP CRITERIA IN THE CLEANUP CRITERIA REQUIREMENTS FOR RESPONSE ACTIVITY RULES (R299.1-299.50)

- CONSTITUENT CONCENTRATIONS IN NANOGRAM PER KILOGRAM (ng/Kg) FOR SOIL & WASTE
- CONSTITUENT CONCENTRATIONS IN NANOGRAM PER LITER (ng/L) FOR GROUNDWATER

< RSCC = DENOTES LESS THAN MDEQ PROPOSED 201 RESIDENTIAL SOIL CLEANUP CRITERIA - DIRECT CONTACT & PROTECTIVE OF GROUNDWATER FOR DRINKING WATER USES

= SAMPLE COLLECTED AT THIS INTERVAL, HOWEVER ONLY ANALYTES PRESENT ABOVE RSCC ARE SHOWN. ALL OTHER ANALYTES WERE BELOW RSCC IN THESE SAMPLES.

ESTIMATED BEDROCK ELEVATION = 560-580

EAST-WEST GEOLOGIC CROSS SECTION B-B'
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 130'
VERTICAL SCALE: 1" = 10'

DRAWN BY KJB | DESIGN BY MAW | DATE 6/28/18

FILE NO.: 62335.52_CSM

NO.	REVISIONS	BY	DATE
	REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS		

WNJ/WWW
FORMER HOUSE STREET SITE
CONCEPTUAL SITE MODEL

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL-ENVIRONMENTAL-ECOLOGICAL-WATER-CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062335.52

SHEET NO.
D1

WEST
B

EAST
B'

WB-1
WB-4
MW-1D
MW-1S
MW-9S
MW-9M
MW-9D

GRADE

SILT
CLAY & SILT
SAND
WASTE
CL/SI/WA
CLAY
SA/SI/WA

WB-1A (4.6-14.3ft bgs)
CHROMIUM = 2,800,000
MERCURY = 120
WASTE 11/30/17

WB-4A (8.3-10.7ft bgs)
CHROMIUM = 25,000,000
COPPER = 52,000
LEAD = 26,000
MERCURY = 2,400
ZINC = 140,000
WASTE 11/29/17

MW-1S (68.4-73.1ft bgs)
ALUMINUM = 84
GROUNDWATER 10/12/17

SOIL

SEAMS OF CLAY & SILT, & SAND

GROUNDWATER

LEGEND

= OTHER SOILS (CLAY, SILT, SAND) MIXED WITH WASTE

= WASTE

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- CONSTITUENT CONCENTRATIONS IN NANOGRAM PER KILOGRAM (ng/Kg) FOR SOIL & WASTE
- CONSTITUENT CONCENTRATIONS IN NANOGRAM PER LITER (ng/L) FOR GROUNDWATER

< RSCC = DENOTES LESS THAN MDEQ PROPOSED 201 RESIDENTIAL SOIL CLEANUP CRITERIA - DIRECT CONTACT & PROTECTIVE OF GROUNDWATER FOR DRINKING WATER USES

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ESTIMATED BEDROCK ELEVATION = 560-580

EAST-WEST GEOLOGIC CROSS SECTION B-B'
W/ INORGANICS DATA

HORIZONTAL SCALE: 1" = 130'
VERTICAL SCALE: 1" = 10'

DRAWN BY KJB | DESIGN BY MAW | DATE 6/28/18

FILE NO.: 62335.52_CSM

NO.	REVISIONS	BY	DATE
	REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS		

WNJ/WWW
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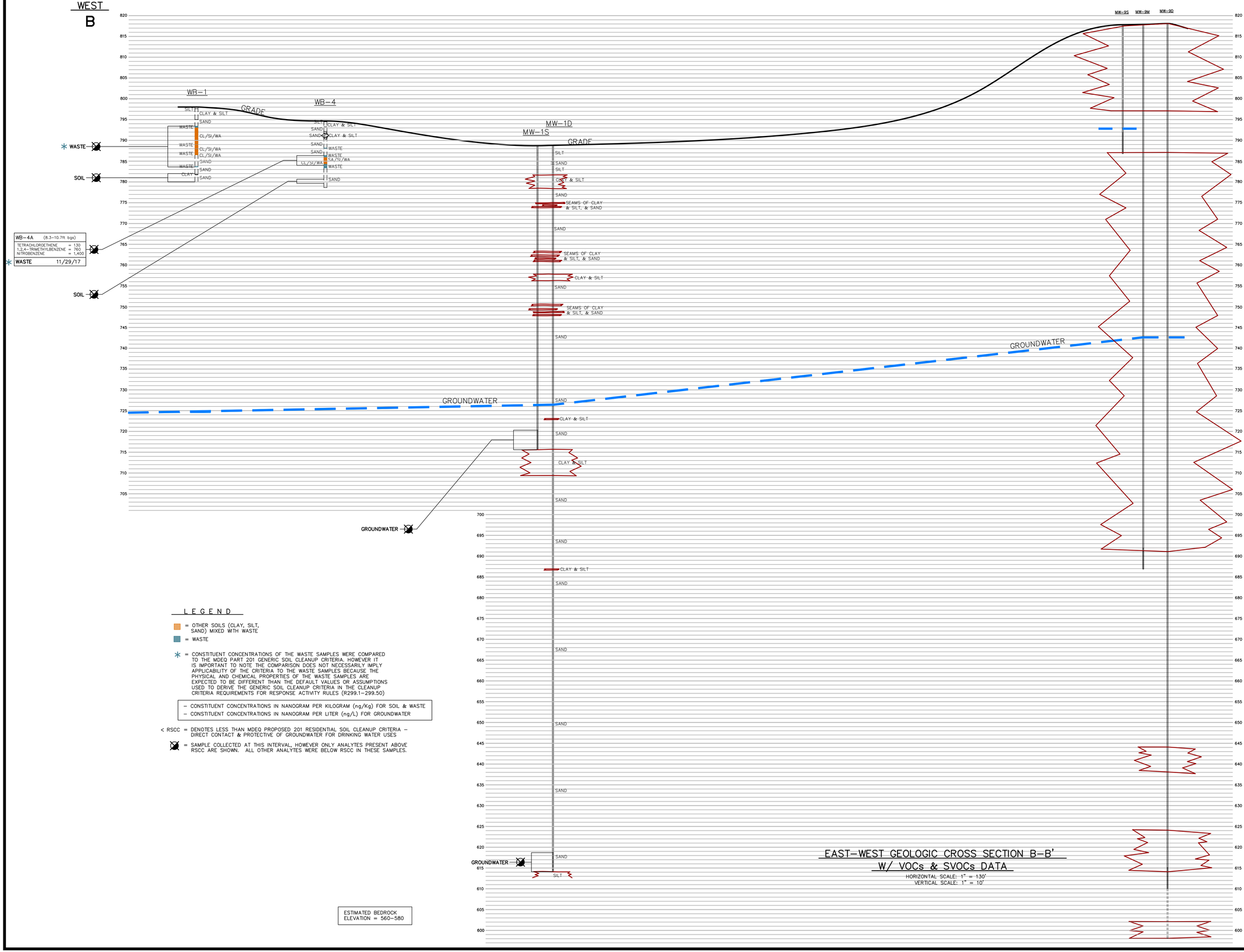
SHEET NO.
D2

WEST
B

EAST
B'



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W/ VOCs & SVOCs DATA

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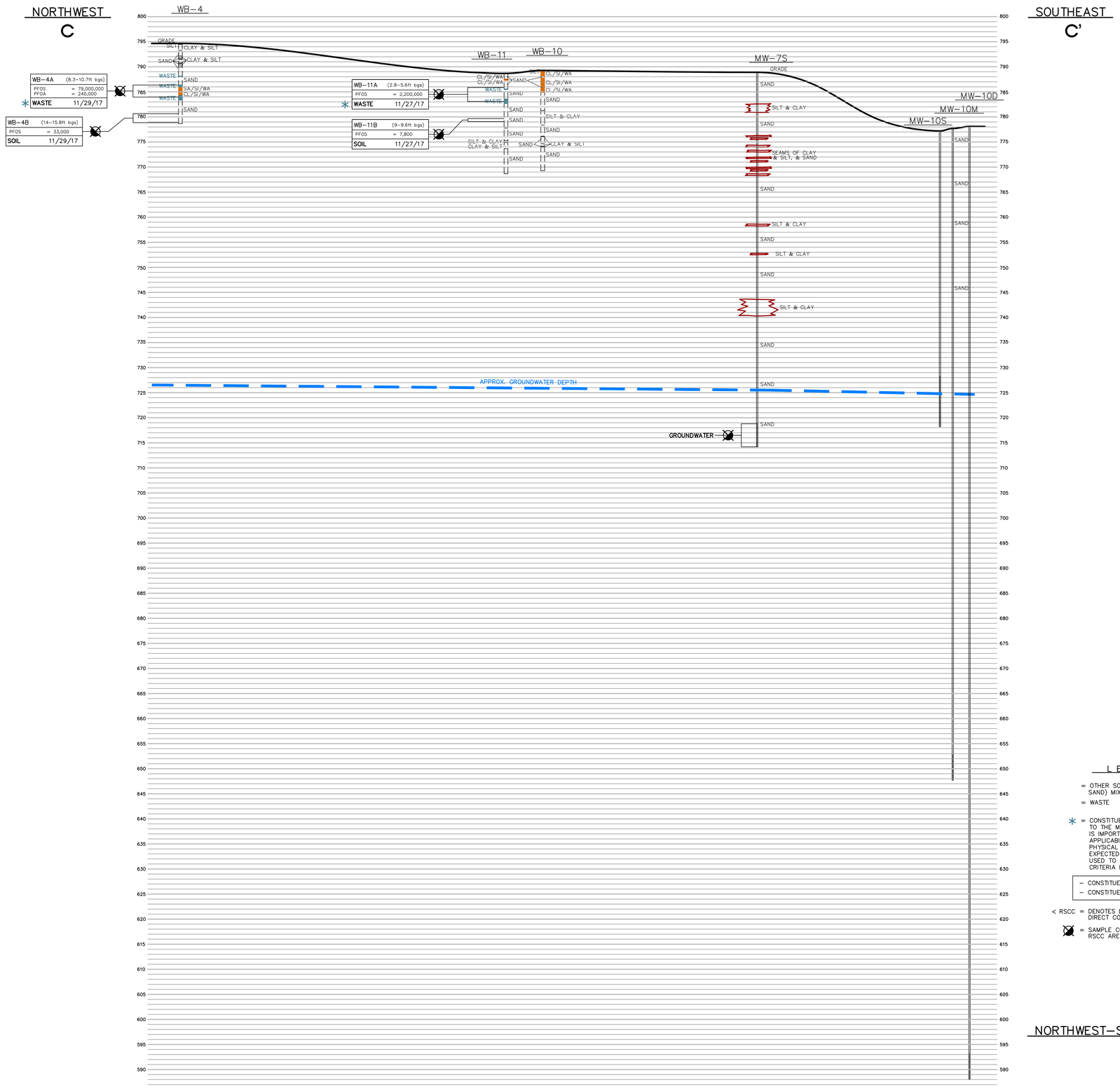
SHEET NO.
D3

NORTHWEST

C

SOUTHEAST

C'



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NORTHWEST-SOUTHEAST GEOLOGIC CROSS SECTION C-C' W/ PFOS and PFOA DATA

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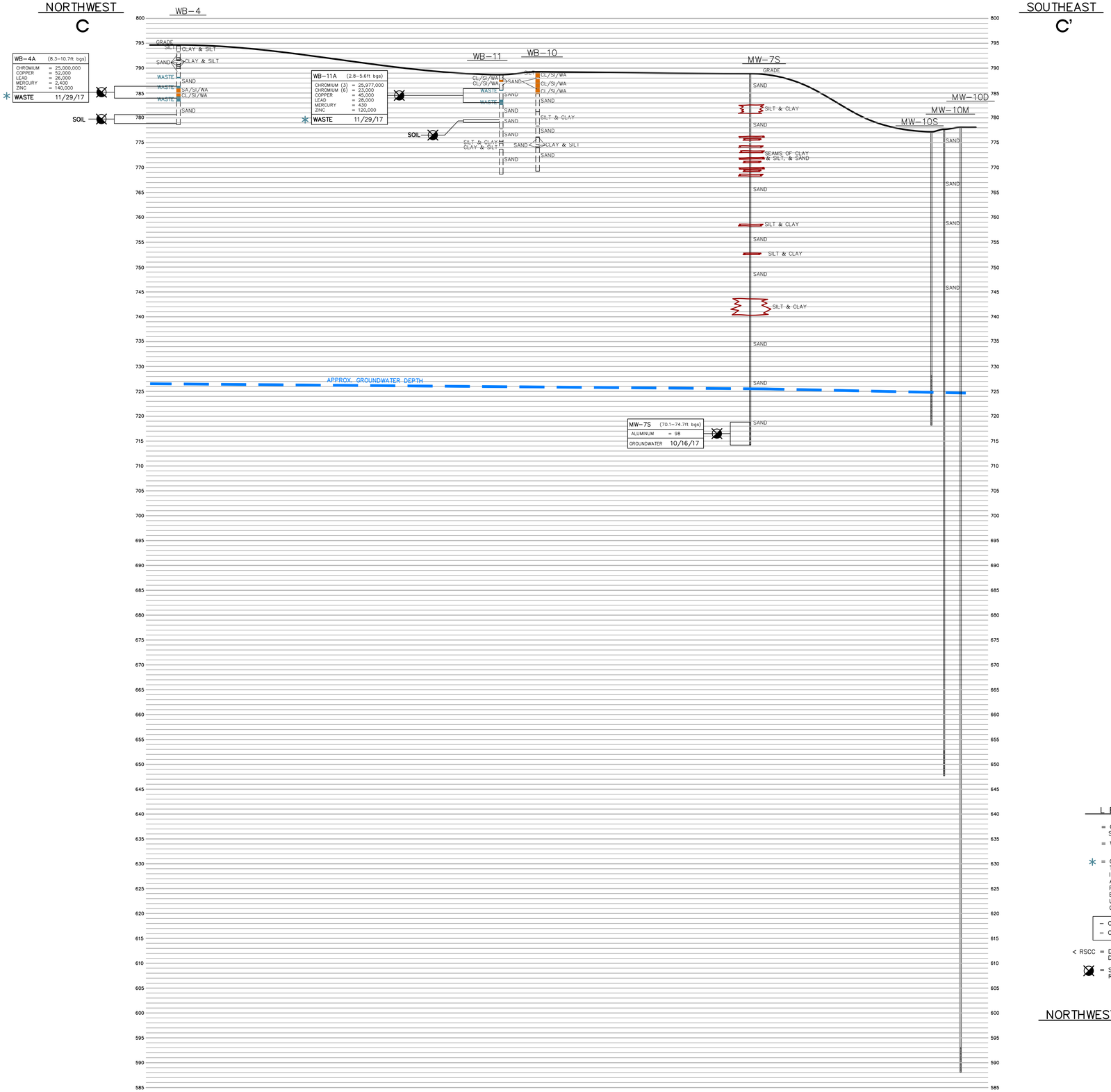
SOUTHEAST

C'



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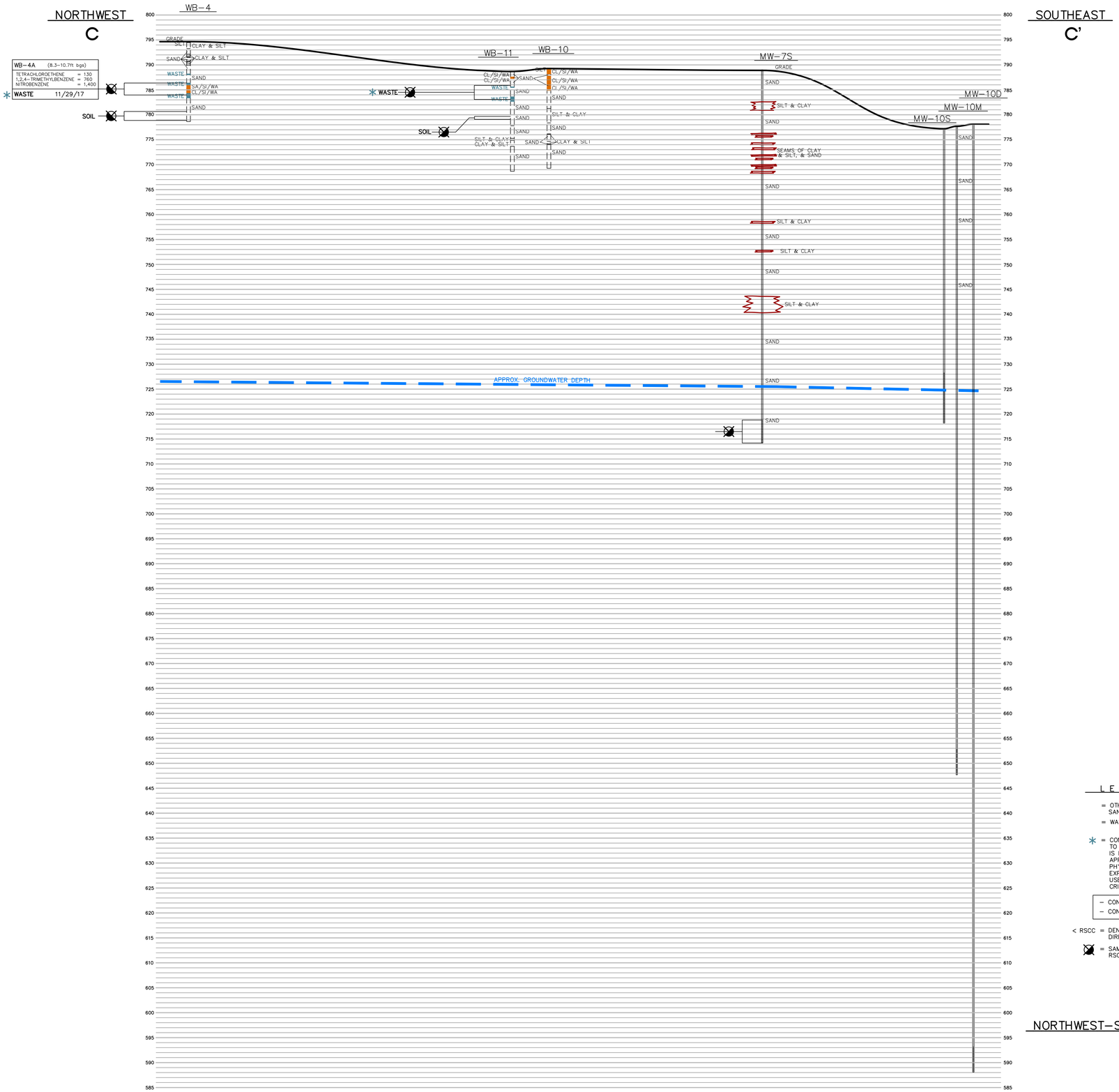

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