



Submitted to
DTE Energy, Inc.

Submitted by
AECOM
27777 Franklin Road, Suite 2000
Southfield, MI 48034
March 2018
AECOM Project No. 60516675

History of Construction Report

Area 15

DTE Monroe Power Plant

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1 Introduction

The United States Environmental Protection Agency (EPA) promulgated the Resource Conservation and Recovery Act (RCRA) Coal Combustion Residuals (CCR) Rule (“CCR RCRA Rule”) on April 17, 2015. The CCR RCRA Rule requires that owners or operators of existing CCR surface impoundments with a height of five feet or more and a storage volume of 20 acre-feet or more compile a history of construction, which shall contain, to the extent feasible, the information specified in 40 CFR 257.73 (c)(1)(i) through (xii). The history of construction, and any revisions of it, as required by 40 CFR 257.73(c) shall be placed in the operating record and shall be maintained until the CCR unit completes closure of the unit in accordance with 40 CFR 257.102 [40 CFR 257.105(f)(9)].

2 History of Construction Report

The following subsections provide the information required by the Coal Combustion Residual (CCR) Rule (40 Code of Federal Regulations (CFR) Part 257) (the "Rule"). Section §257.73(c)(l) of the CCR Rule states that "...the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xii) of this section."

2.1 Name and Address

The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

DTE Energy LLC (DTE)

Robert Lee

One Energy Plaza, 655 G.O.

Detroit, MI 48226

Name of CCR Surface Impoundment: Monroe Power Plant Inactive Surface Impoundment (Area 15)

State Assigned Identification Number: None

2.2 Location

The USGS quadrangle map showing Monroe, Michigan (Stony Point quadrangle) with the Inactive Surface Impoundment (Area 15) is presented in **Figure 1**.

2.3 Statement of Purpose

The Inactive Surface Impoundment (Area 15) consists of an embankment constructed primarily with rock fill and earth spoils generated during construction of the Monroe Power Plant. The basin was constructed on the existing natural ground surface, which also forms the liner and primarily used for shore protection. The height of the embankment (from the lowest toe elevation to the top of embankment) is approximately 4 feet. A road along the top of the crest has a minimum width of approximately 12 feet and is 20 or more feet wide along the eastern side abutting Lake Erie, which was constructed with additional rock armament for shoreline protection. The northern boundary of Area 15 was formed by the natural ground surface and bottom ash is stored in this area (GZA, 2011)

The southern boundary of the Area 15 is a crushed rock embankment that separates Area 15 from the Coal Ash Runoff basin to the South.

The aerial chronology figure in **Appendix A** shows the progression of bottom ash placement at Area 15 over time.

2.4 Name and size of Watershed

According to the EPA WATERS Geoviewer website (USEPA 2018), Area 15 and the Monroe Power Plant are located within the Plum Creek Subwatershed, which encompasses approximately 23,000 acres.

2.5 Engineering properties of foundation materials

A subsurface exploration was performed at Area 15 by AECOM in November 2017 in support of the slope stability analysis in the Safety Factor Assessment.

A total of nine stratigraphic units were identified as a result of the subsurface explorations. Seven of the units were relevant to this slope stability analysis. Brief descriptions of each relevant unit are as follows:

- **Fill – Perimeter Dikes:** The perimeter dikes were found to be constructed of fill material, consisting of a variety of interlayered materials including sand (USCS type SP, SP-SM, SW), gravel (GP), silty sand (SM), lean clay (CL), silty clay (CL-ML), organic silt as topsoil (OL), asphalt and cobbles.
- **Fill – Divider Berm:** The divider berm was found to be constructed of fill material consisting of moist to wet, light to dark gray crushed limestone classified as sandy gravel (GP and GW-GM) with trace amounts of silt.
- **Silt and Clay:** A unit of soft cohesive silt and clay was encountered below the fill materials at both the divider berm and outer dikes and consisted of cohesive elastic silt (MH) with organics and cohesive silt (ML) with organics, lean clay (CL) and silty clay (CL-ML) with variable proportions of organics, and minor proportions of non-cohesive silt (ML) with organics. The unit contained moderate organic content, which generally decreased and eventually disappeared with depth.
- **Loose Sand:** A unit of loose sand was encountered below the soft cohesive silt and clay unit and consisted of generally wet, gray poorly graded sand (SP), poorly graded sand with silt (SP-SM), silty sand (SM), clayey sand (SC) and silty clayey sand (SC-SM).
- **Sand and Gravel:** A unit of sand and gravel was encountered below the loose sand and consisted of generally wet, gray and brown interbedded silty sand (SM), clayey sand (SC), well-graded sand with silt and gravel (SW-SM) and gravel layers classified as poorly graded gravel (GP) and well graded sand with silt and gravel GW-GM).
- **Till:** Clay till was encountered at all the borings beneath the sand and gravel unit and consisted of very stiff to hard lean Clay (CL) with interbedded minor proportions of silty Clay (CL-ML) and Silt (ML). The clay material contained variable proportions of gravel, sand, silt and clay.
- **Bedrock:** Bedrock primarily consisted of light gray moderately weathered limestone and/or dolomite. In general, the bedrock was found to generally slope downward from west to east (towards Lake Erie), and is shallowest at a possible bedrock ridge noted near the existing overflow weir.

Sections showing subsurface foundation materials are presented in **Appendix B**.

2.6 Engineering properties of materials used in construction

Records of material testing performed during construction of the basin and perimeter dikes from 1968 to 1970 are not available. Presented below are engineering properties of the differing soil materials collected during the geotechnical investigation in November of 2017.

Engineering properties of materials used in construction					
Material	Unit Weight (pcf)	Peak Effective (drained) Shear Strength Parameters		Peak Total (undrained) Shear Strength Parameters	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)
Fill –Dike ¹	120	0	30	0	30
Fill – Divider Berm ¹	130	0	33	0	33
Soft Clay and Silt Strata ²	100	110	32	220	16.4
Loose Sand ¹	120	0	28	0	28
Sand and Gravel ¹	120	0	33	0	33
Till ¹	130	4,000	0	4,000	0
Bedrock	Assumed to be impenetrable in the slope stability models				
Notes:					
1. Engineering parameters estimated based on correlations with SPT N-values, pocket penetrometer readings, our experience with these soil types and engineering judgement.					
2. Shear strength parameters estimated based on interpretation of Consolidated Undrained (CU) Triaxial test data in accordance with the Modified Mohr-Coulomb plot (a p-q and p'-q plot) procedures, as described in Appendix D of the United States Corps of Engineers Manual EM-1110-2-1902 "Slope Stability."					

2.7 Detailed Dimensional Drawings of the CCR Unit

Drawings provided in **Appendix B** show the extent of Area 15 and the location of cross-sections showing the impoundment and subsurface conditions.

2.8 Description of Existing Instrumentation

The locations of the monitoring wells installed for the groundwater program are included as **Figure 2** of this report.

2.9 Area Capacity Curves

Area capacity curves for Area 15 were calculated by AECOM and are included in the "Inflow Design Flood Control System Plan".

2.10 Spillway and Diversion Design Features

The Area 15 discharge structure is an over/under weir constructed at a fixed elevation of 575 feet (datum not indicated on DTE Drawing No. 6C695-270) at the west part of the pond. The flow discharges into the Discharge Canal at NPDES Monitoring Point 001B.

2.11 Construction Specifications and provisions for repair

DTE conducts periodic surveillance and maintenance of Area 15 in accordance with DTE's internal practice.

2.12 Knowledge of Structural Instability

DTE personnel were questioned to identify historical information that could have been indicative of structural instability. DTE revealed that there are no records or knowledge of structural instability associated with Area 15.

3 References

AECOM (2018) "*Inflow Design Flood Control System*"

AECOM (2018). "*Safety Factor Assessment*"

GZA Geoenvironmental (2011) "*Final Report, Round 7 Dam Assessment, DTE Energy Monroe Power Plant, Fly Ash Basin and Bottom Ash Stormwater Pond*"

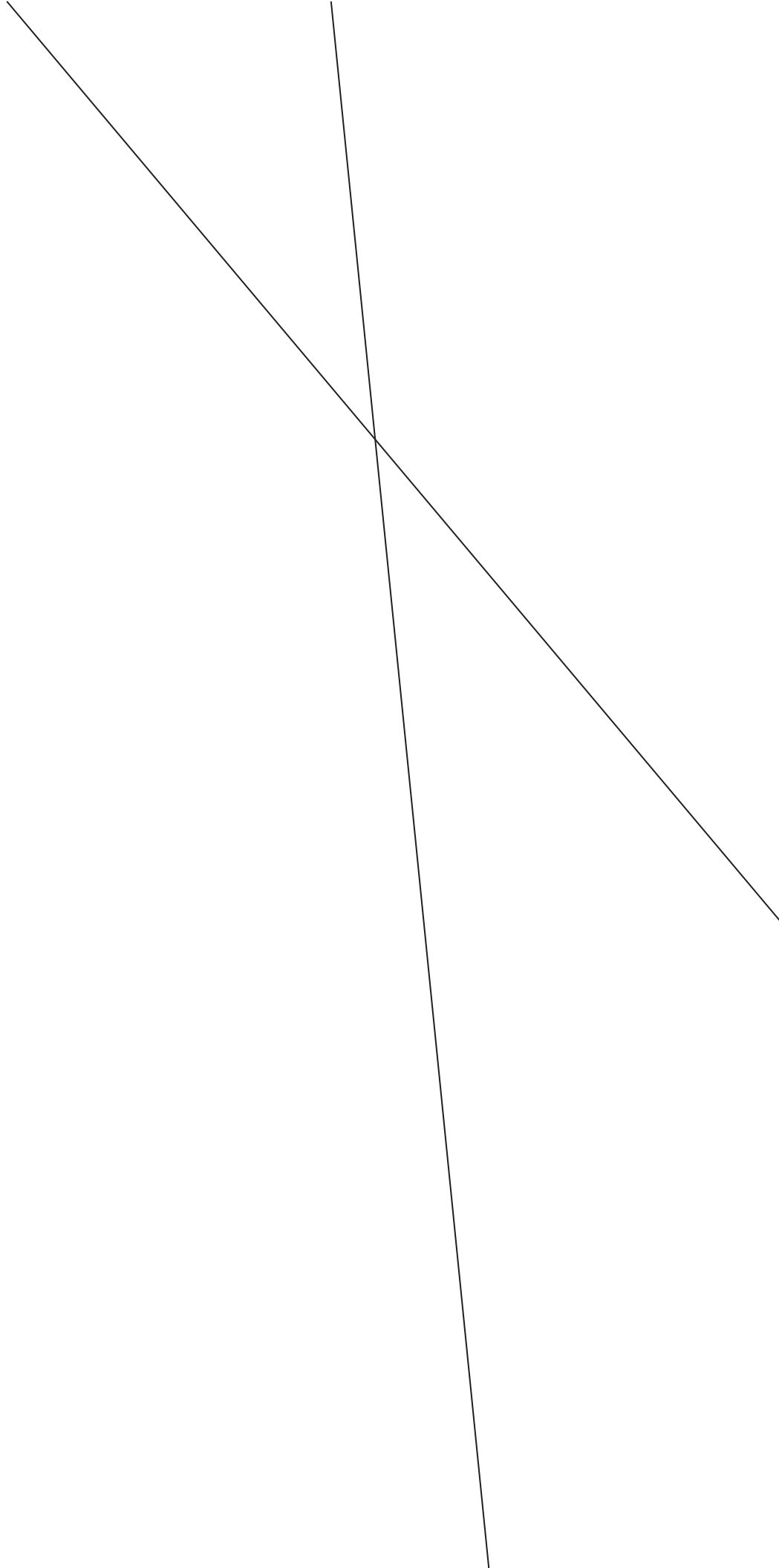
U.S. Environmental Protection Agency [USEPA]. (2015). Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. 40 CFR §257. Federal Register 80, Subpart D, April 17, 2015.

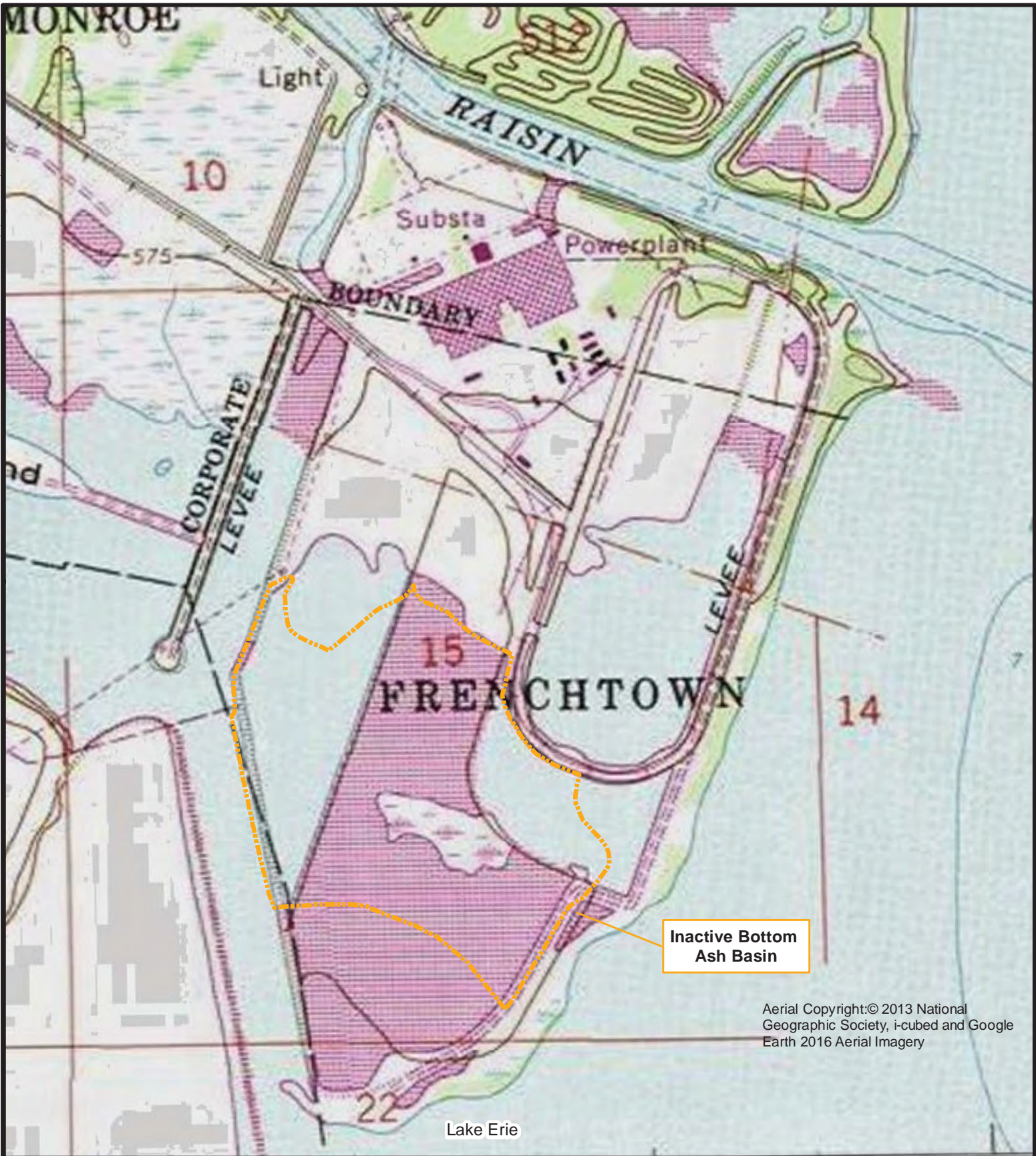
U.S. Environmental Protection Agency [USEPA]. (2018) Waters Geoviewer Mapper (2016).
<https://www.epa.gov/waterdata/waters-geoviewer>



AECOM

Figures






Inactive Bottom Ash Basin

Aerial Copyright: © 2013 National Geographic Society, i-cubed and Google Earth 2016 Aerial Imagery

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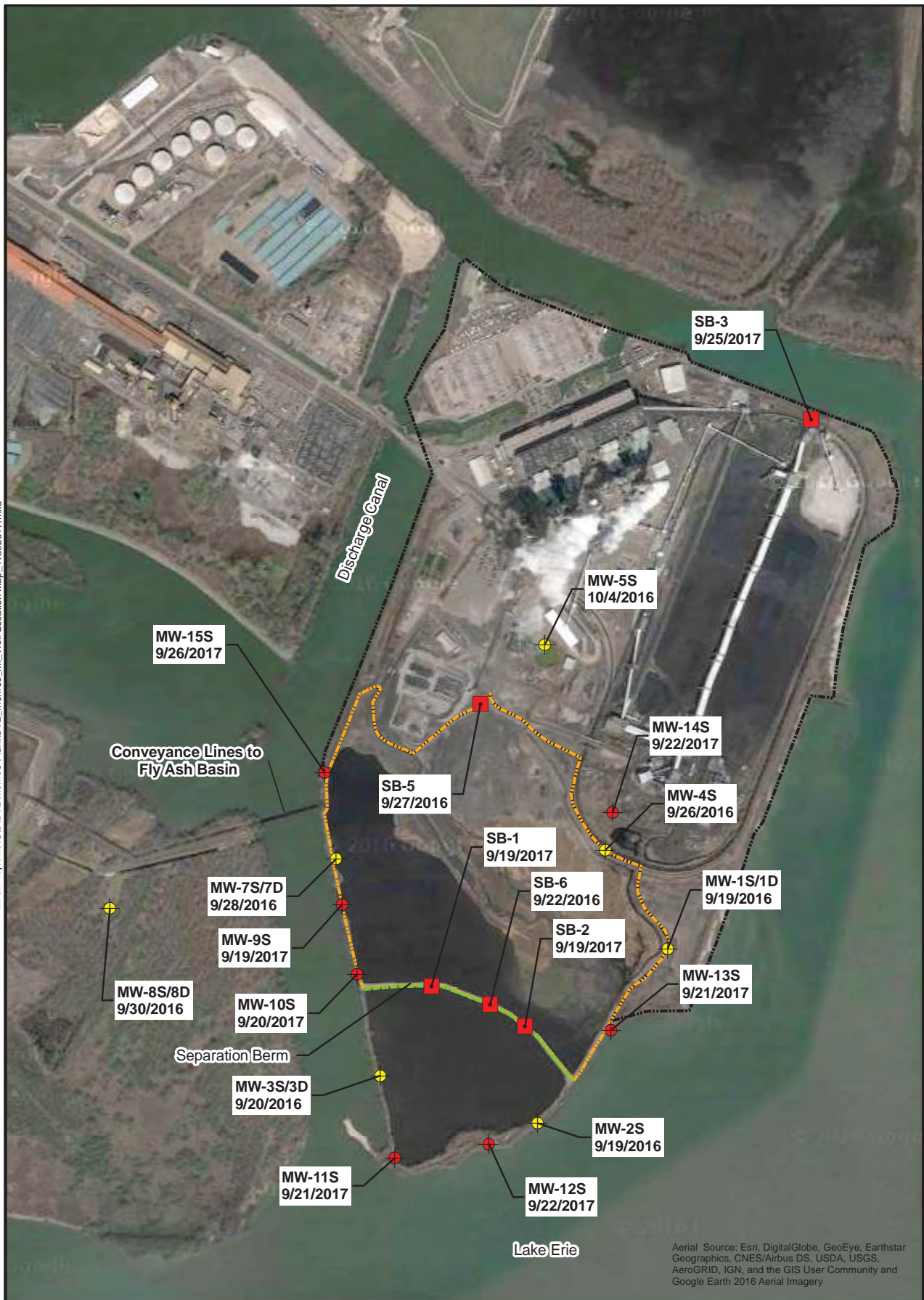
-  Boundary of Inactive Bottom Ash Basin



Monroe Power Plant

FIGURE 1
SITE LOCATION MAP

DATE: 3/22/2018	SCALE 1 inch = 907 feet
CREATED BY: KLP	
JOB NO. 60489524	



Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community and Google Earth 2016 Aerial Imagery

LEGEND:

- New Monitoring Well Location
- Existing Monitoring Well Location
- Soil Boring Location (Lithology Only)
- Unit Separation Berm
- Approximate Plant Boundary
- Approximate Boundary of Inactive Bottom Ash Basin

0 700 1,400 Feet



DTE Energy Monroe Power Plant

FIGURE 2
CCR MONITORING WELL NETWORK WITH INSTALLATION DATE

DATE: 11/30/2017	SCALE 1 inch = 700 feet
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JOB NO. 60489524	



Appendix A

Historical Aerial Photography



1976



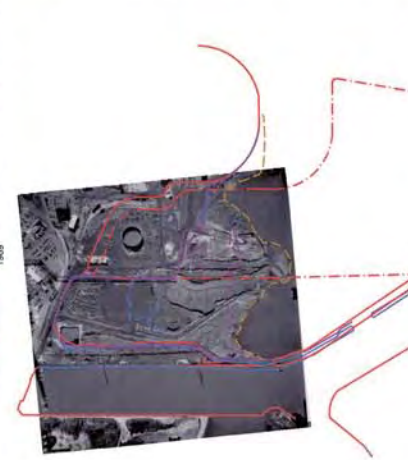
1973



1966



1950



1985



2014



2006

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- 1986 RECLAIMED GROUND
 - 1973 RECLAIMED GROUND
 - 1972 RECLAIMED GROUND
 - 1971 RECLAIMED GROUND
 - 1970 RECLAIMED GROUND
 - 1969 RECLAIMED GROUND
 - 1968 RECLAIMED GROUND
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 - 1953 RECLAIMED GROUND
 - 1952 RECLAIMED GROUND
 - 1951 RECLAIMED GROUND
 - 1950 RECLAIMED GROUND

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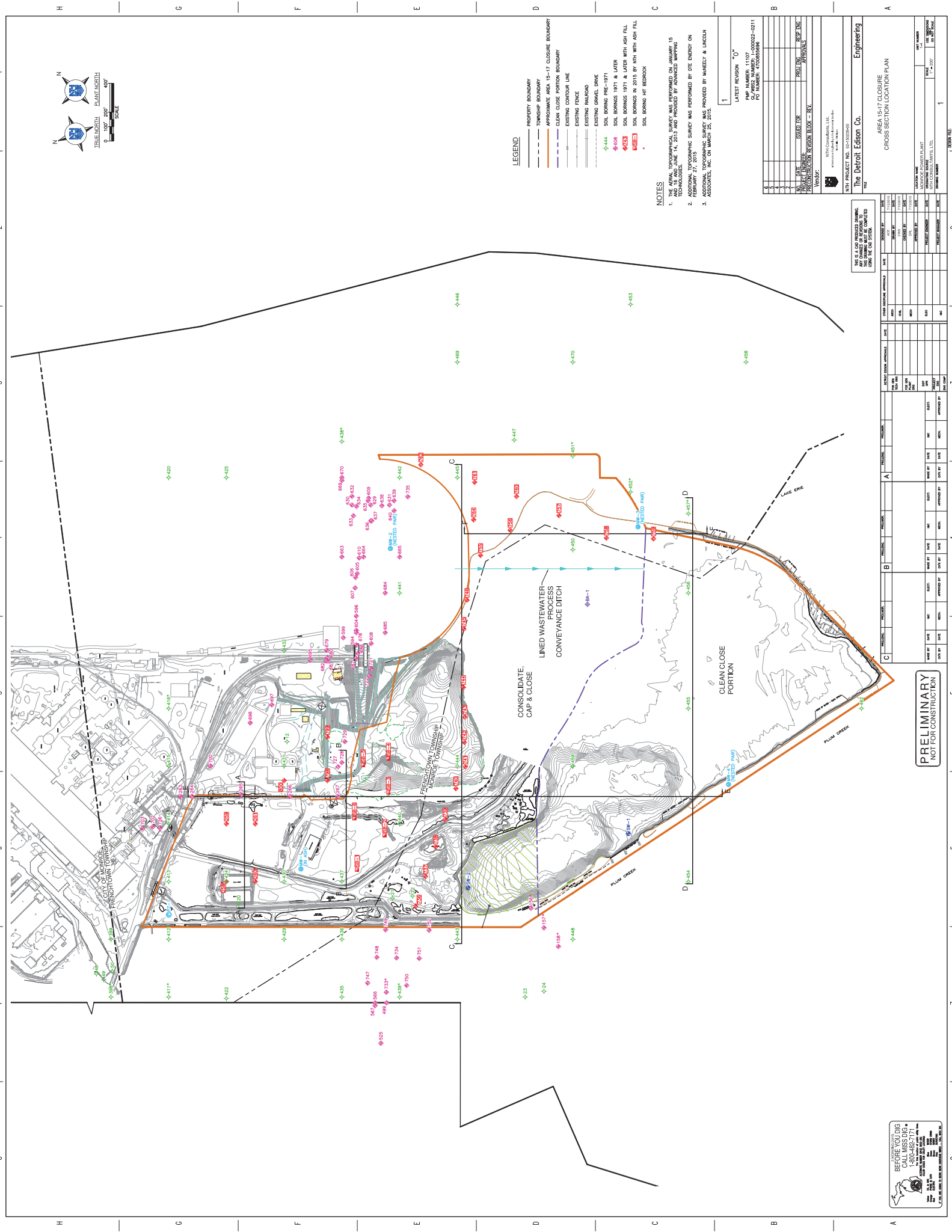
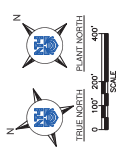


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Appendix B

Construction and Site Drawings



- LEGEND**
- PROPERTY BOUNDARY
 - TOWNSHIP BOUNDARY
 - APPROXIMATE AREA 15-17 CLOSURE BOUNDARY
 - CLEAN CLOSE PORTION BOUNDARY
 - EXISTING CONTOUR LINE
 - EXISTING FENCE
 - EXISTING RAILROAD
 - EXISTING GRAVEL DRIVE
 - SOIL BORING PRE-1971
 - SOIL BORINGS 1971 & LATER
 - SOIL BORINGS 1971 & LATER WITH ASH FILL
 - SOIL BORINGS IN 2015 BY NTH WITH ASH FILL
 - SOIL BORING HIT BEDROCK

NOTES

1. ALL TOPOGRAPHIC SURVEYING WAS PERFORMED ON MARCH 15 AND 16 AND JUNE 14, 2013 AND PROVIDED BY ADVANCED MAPPING TECHNOLOGIES.
2. ALL SOIL BORING SURVEYING WAS PROVIDED BY MANEELY & LINCOLN ASSOCIATES, INC. ON MARCH 25, 2015.
3. ADDITIONAL TOPOGRAPHIC SURVEYING WAS PERFORMED BY MANEELY & LINCOLN ASSOCIATES, INC. ON MARCH 25, 2015.

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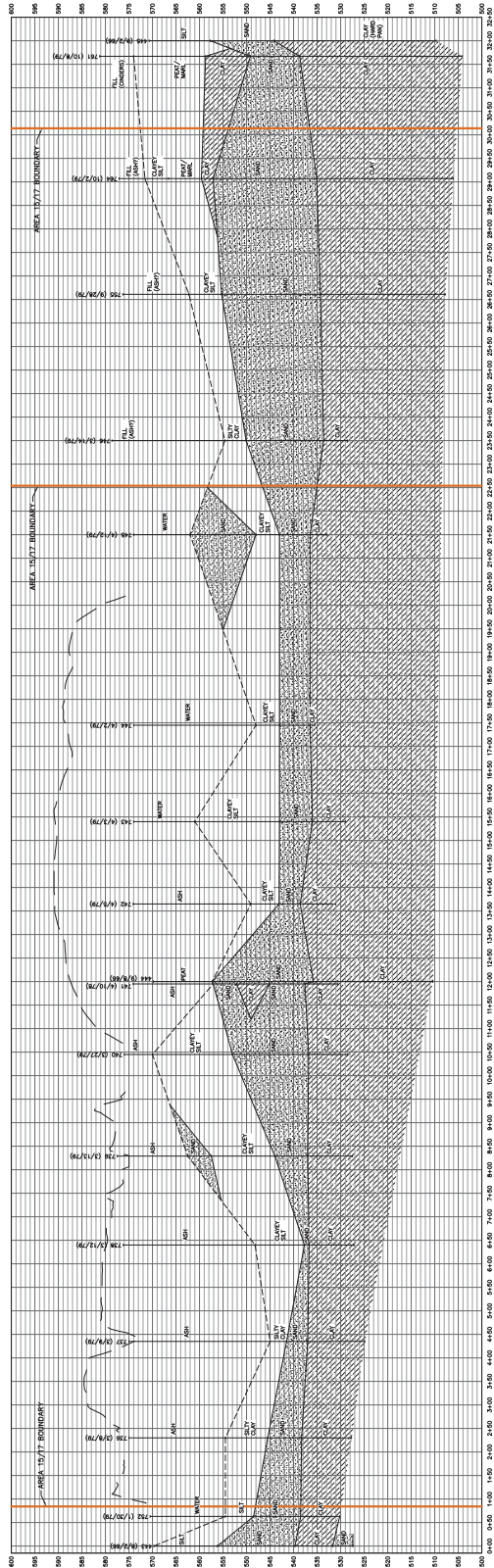
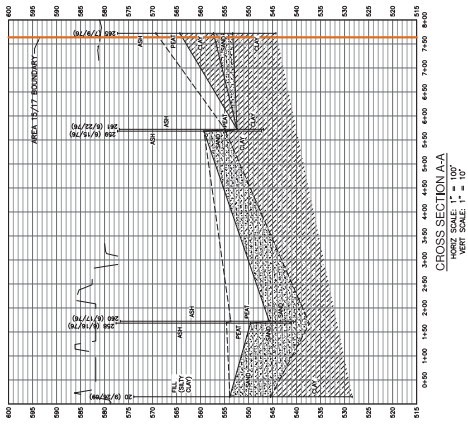
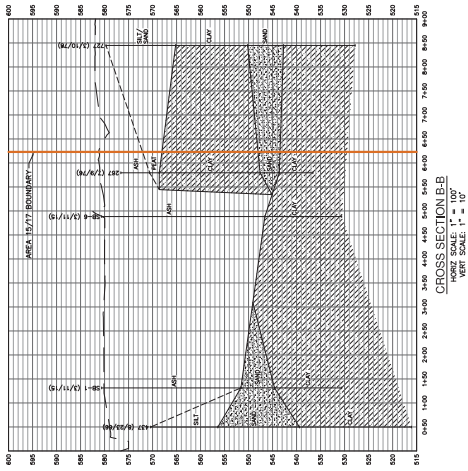
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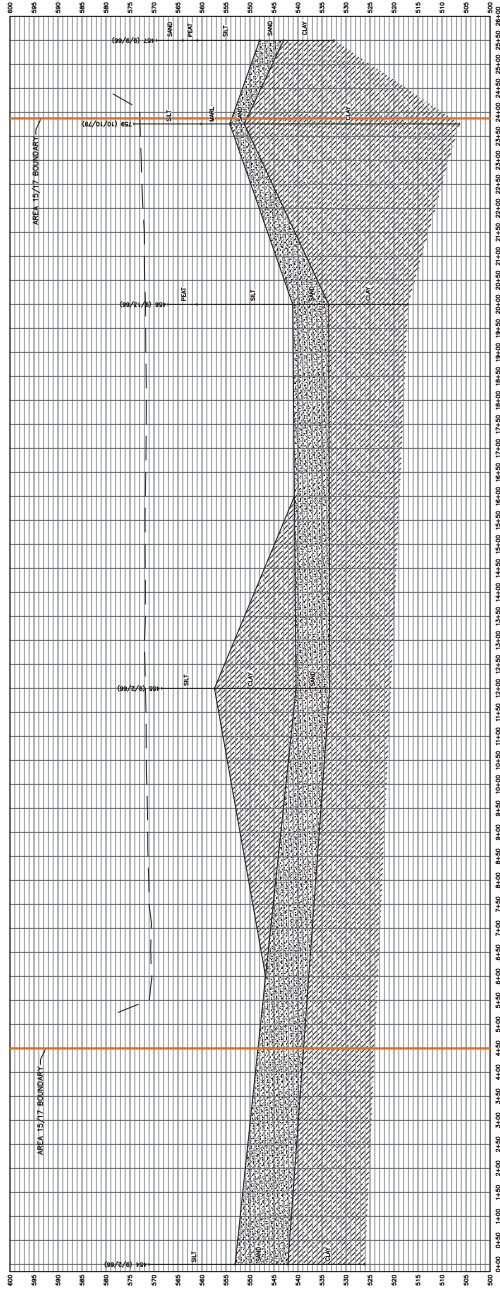
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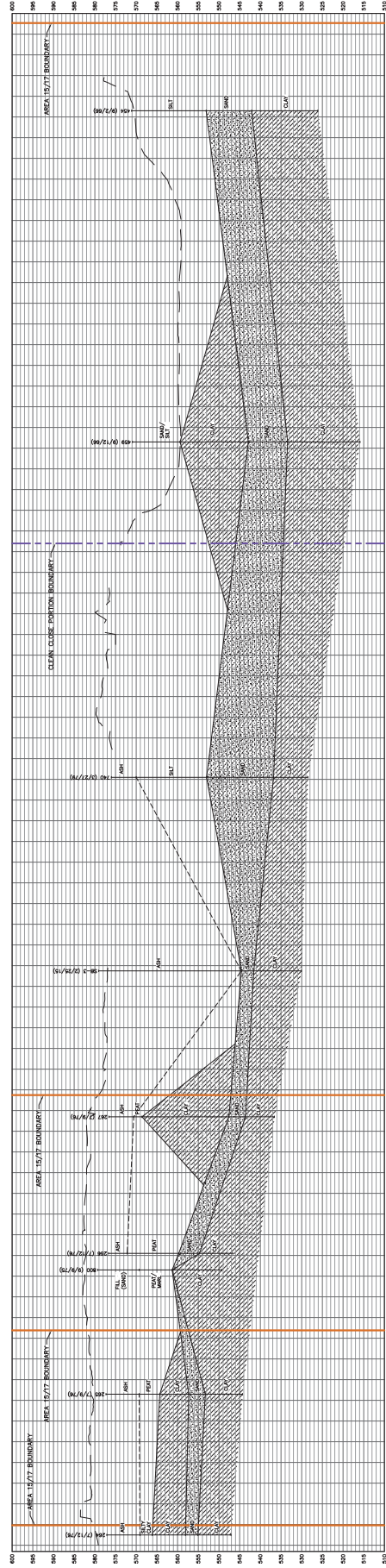
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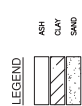
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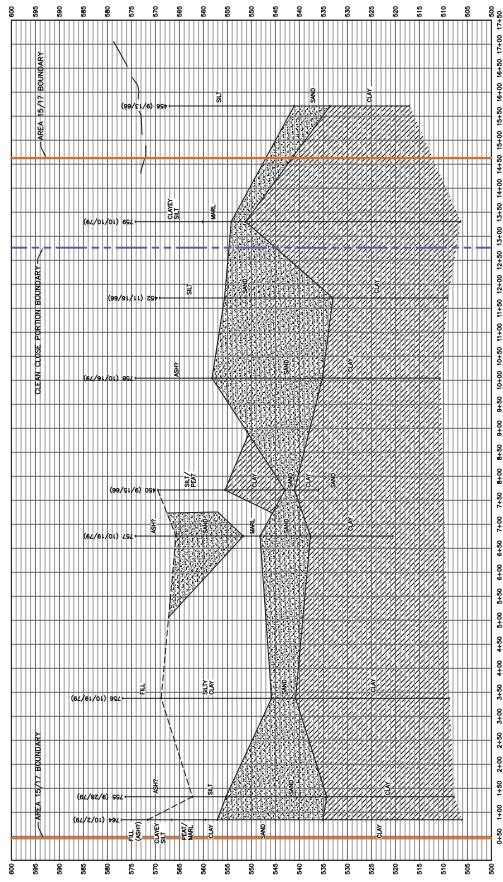
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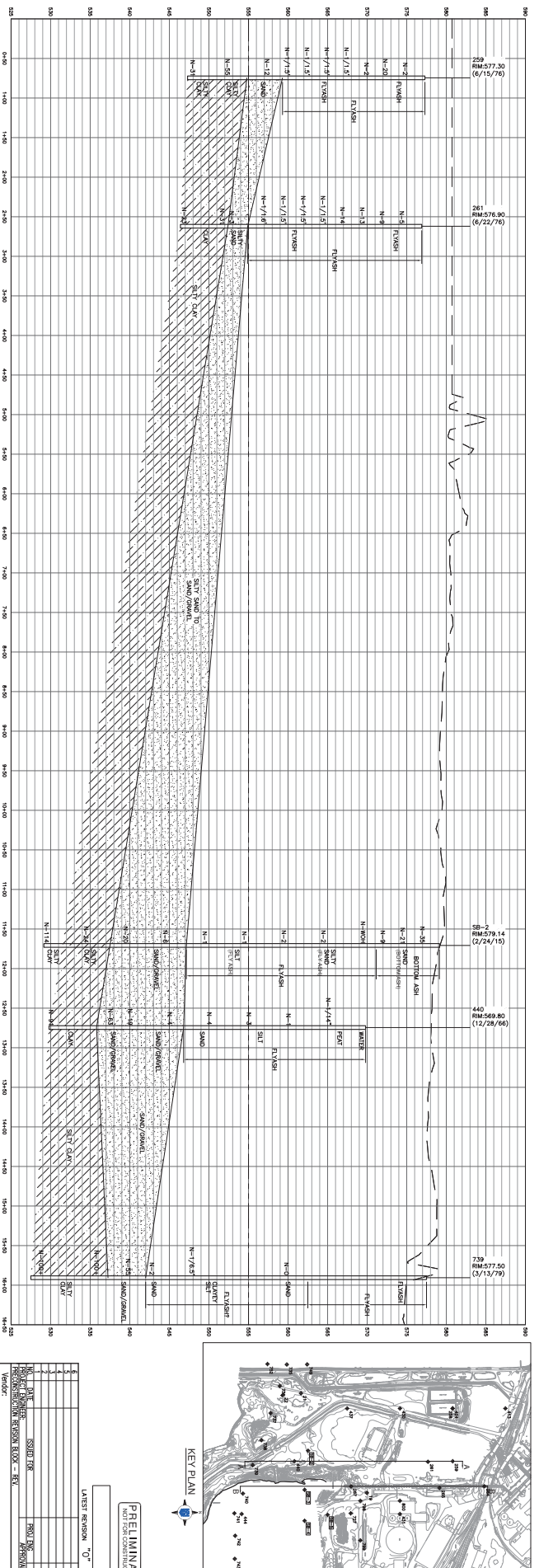
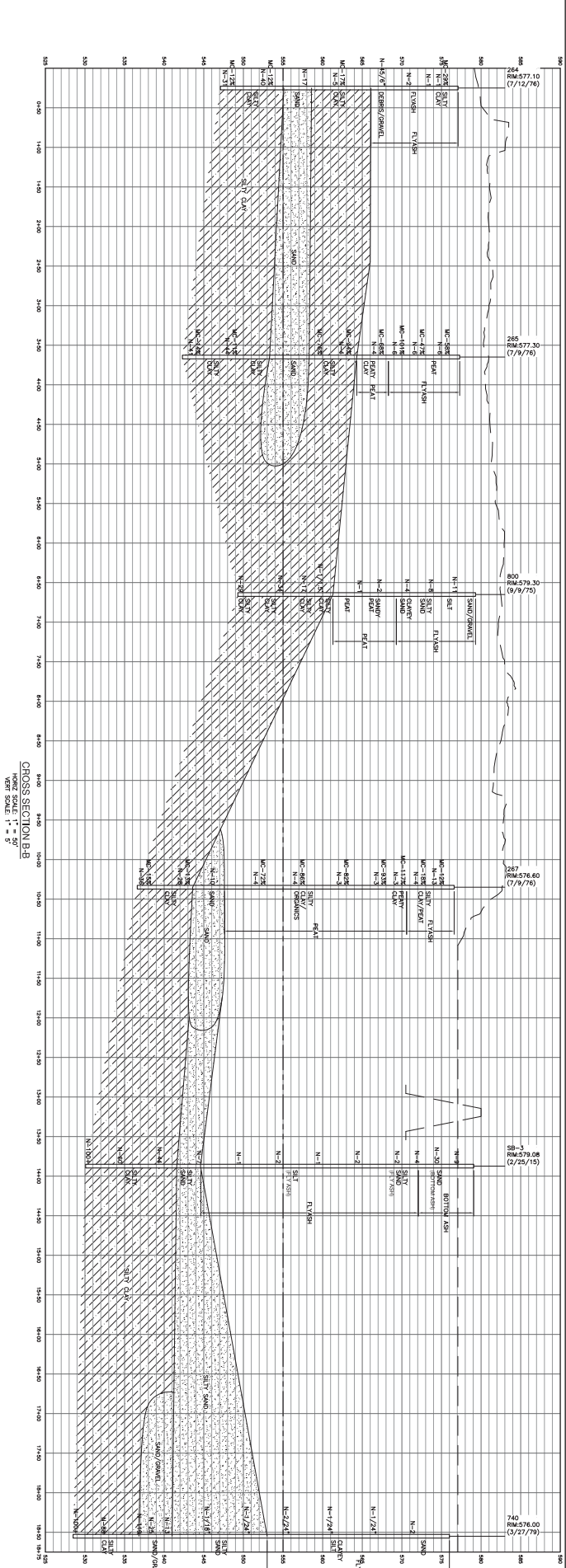
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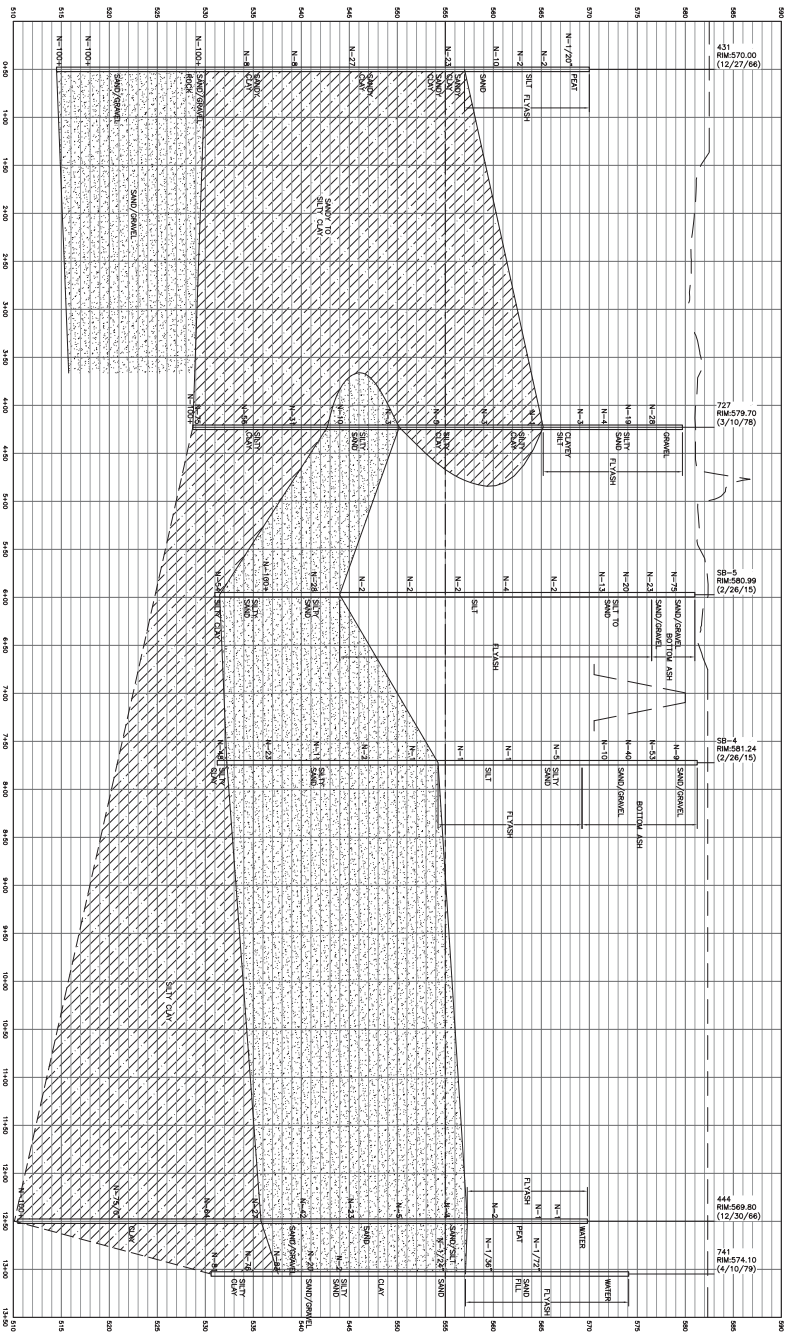
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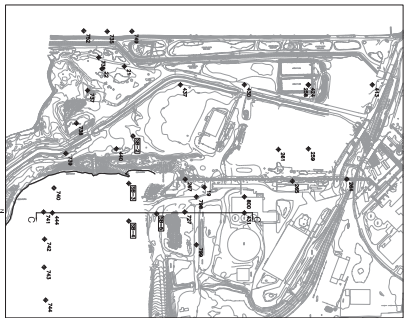
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	SILTY CLAY AND CLAYEY SILT
	SILT
	SAND

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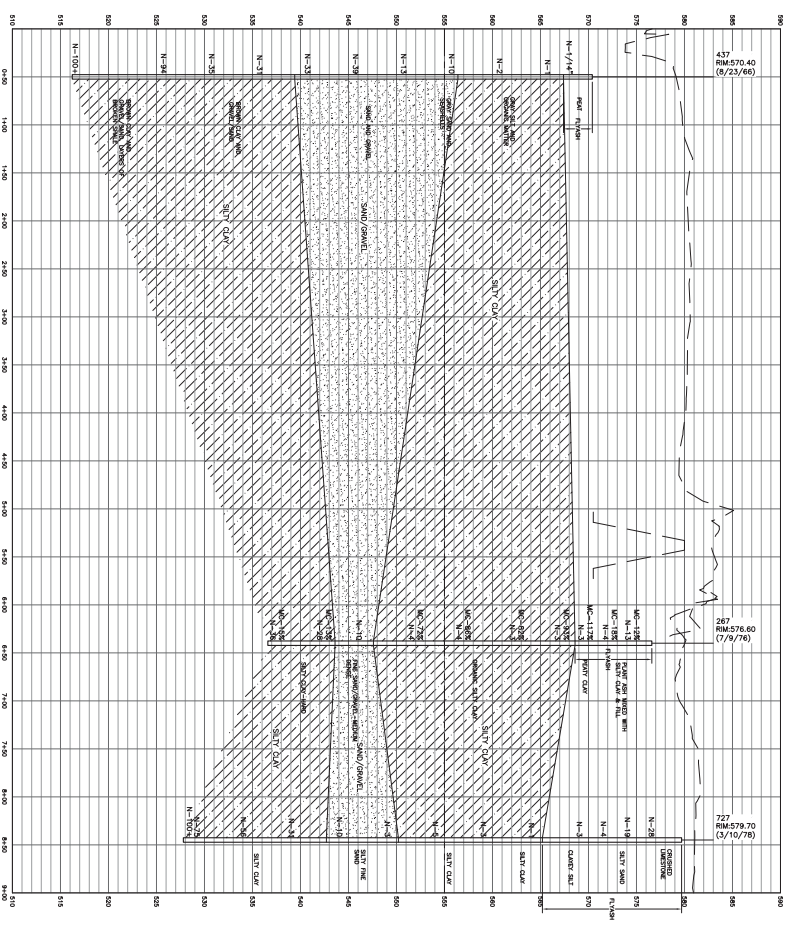
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THE DETROIT EDISON CO. AREA 15 CROSS SECTION D-D AND CROSS SECTION E-E		Engineering	
Vendor: NTH CONSULTING, LLC 11000 WOODLAND AVENUE, SUITE 200 DETROIT, MI 48202		NTH PROJECT NO. 2010-000000	
DATE: 11/15/11 TIME: 10:00 AM		SHEET NO. 4 OF 4	

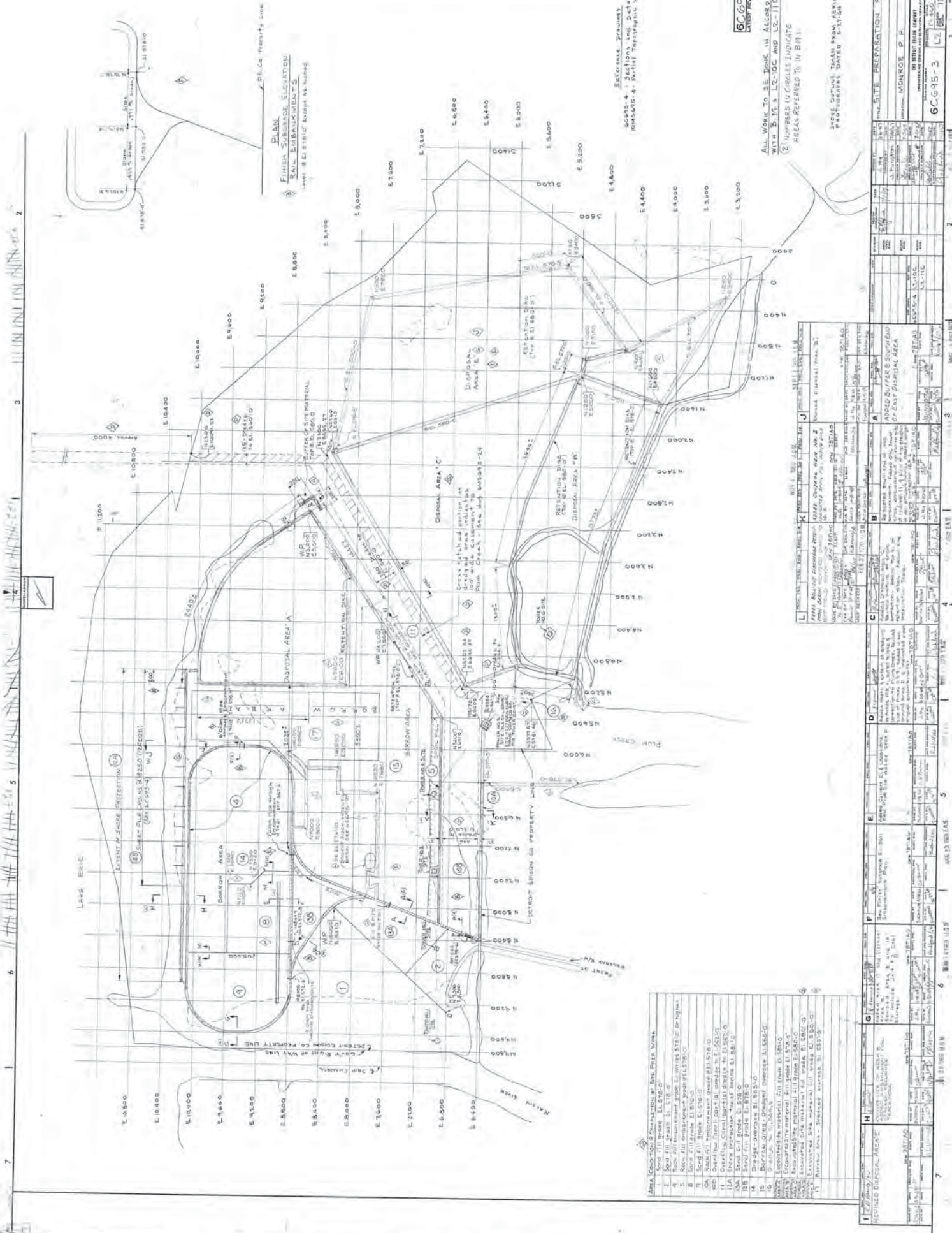
LEGEND

- SAND
- SILTY CLAY AND CLAYEY SILT
- SAND/GRAVEL
- PREVIOUSLY NOTED BRIDGE FOOTING

KEY PLAN

BEFORE YOU DIG
 CALL MISS DIG
 1-800-485-2771

FOR A LIST OF CALL CENTER SERVICE AREAS, VISIT MISSDIG.COM



6095-3
 DIST. 10/15/50

ALL WORK TO BE DONE IN ACCORDANCE
 WITH D. M. S. L2-10C AND L2-11C.
 (2) NUMBERS IN CIRCLES INDICATE
 AREAS REFERRED TO IN BIRM.

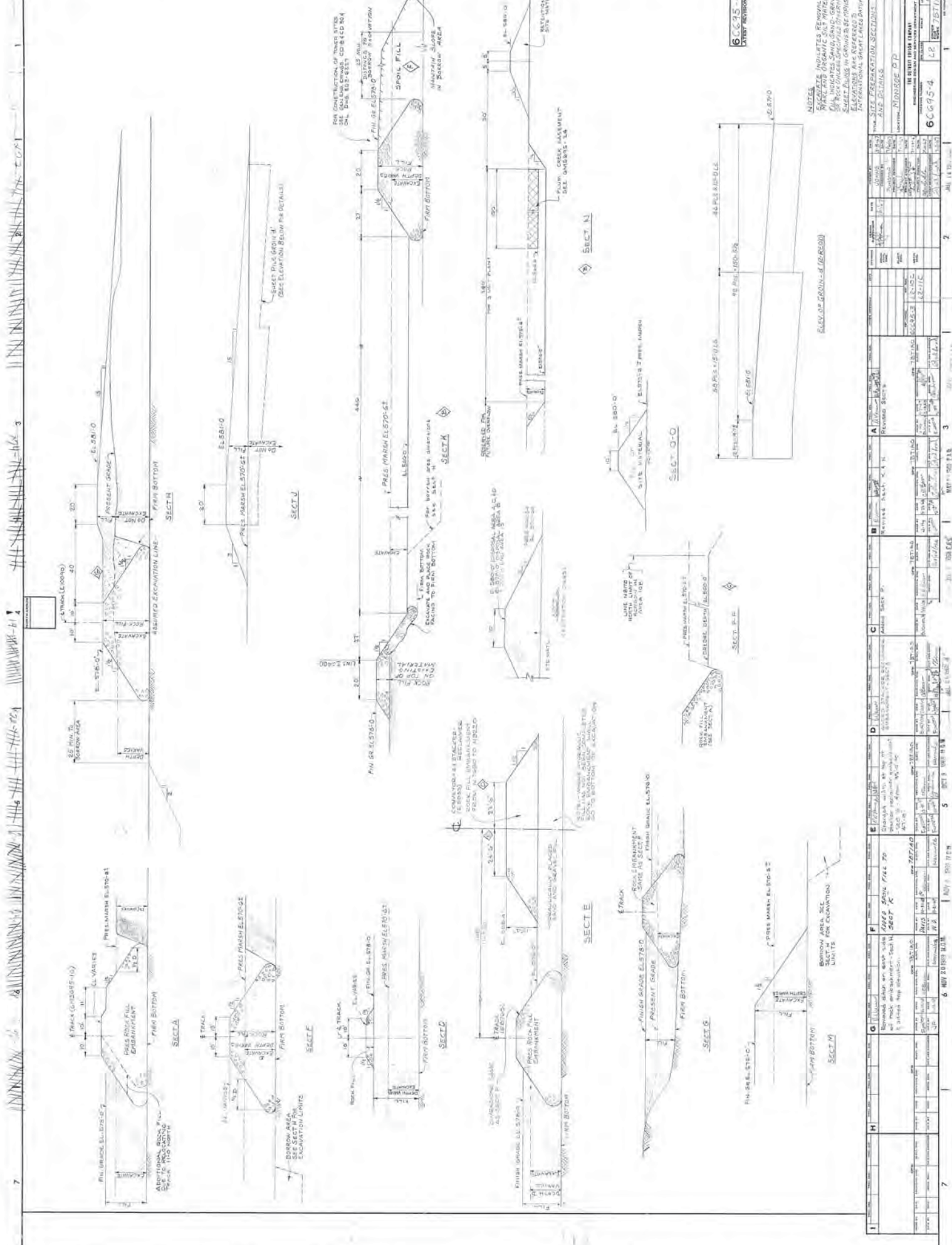
SEE BIRM FOR
 PRELIMINARY DATA

AREA, LOCATION & COMPARISON OF DATE FILED WORK

NO.	DESCRIPTION	DATE FILED
1	Area 1	8/15/50
2	Area 2	8/15/50
3	Area 3	8/15/50
4	Area 4	8/15/50
5	Area 5	8/15/50
6	Area 6	8/15/50
7	Area 7	8/15/50
8	Area 8	8/15/50
9	Area 9	8/15/50
10	Area 10	8/15/50
11	Area 11	8/15/50
12	Area 12	8/15/50
13	Area 13	8/15/50
14	Area 14	8/15/50
15	Area 15	8/15/50
16	Area 16	8/15/50
17	Area 17	8/15/50

NO.	DESCRIPTION	DATE FILED
1	Area 1	8/15/50
2	Area 2	8/15/50
3	Area 3	8/15/50
4	Area 4	8/15/50
5	Area 5	8/15/50
6	Area 6	8/15/50
7	Area 7	8/15/50
8	Area 8	8/15/50
9	Area 9	8/15/50
10	Area 10	8/15/50
11	Area 11	8/15/50
12	Area 12	8/15/50
13	Area 13	8/15/50
14	Area 14	8/15/50
15	Area 15	8/15/50
16	Area 16	8/15/50
17	Area 17	8/15/50

6095-3
 DIST. 10/15/50



NOTES:
 1. INDICATES BOUNDARY OF
 TRACK AND ORGANIC SITE MATERIALS.
 2. INDICATES SAND, SAND, GRAVEL.
 3. INDICATES SAND, SAND, GRAVEL.
 4. SHEET PLANS IN CROSS SECTION ARE
 ELEVATIONS ARE REFERRED TO
 INTERNATIONAL GREAT LAKES DATUM (IGLD)

6CG95-4
 RUBY MURPHY

DATE: 07/10/2014

PROJECT: RAILROAD TRACK

SCALE: AS SHOWN

PROJECT NO: 6CG95-4

SHEET NO: 787103

SECT A

SECT B

SECT C

SECT D

SECT E

SECT F

SECT G

SECT H

SECT I

SECT J

SECT K

SECT L

SECT M

SECT N

SECT A

SECT B

SECT C

SECT D

SECT E

SECT F

SECT G

SECT H

SECT I

SECT J

SECT K

SECT L

SECT M

SECT N

SECT A

SECT B

SECT C

SECT D

SECT E

SECT F

SECT G

SECT H

SECT I

SECT J

SECT K

SECT L

SECT M

SECT N

SECT A

SECT B

SECT C

SECT D

SECT E

SECT F

SECT G

SECT H

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6 NOV 2013 10:14 AM

NOT TO SCALE

DATE PLOTTED

DATE PRINTED