ALLIANT ENERGY
Wisconsin Power and Light Company
Nelson Dewey Generating Station

CCR SURFACE IMPOUNDMENT

STRUCTURAL STABILITY ASSESSMENT

Report Issued: September 20, 2016
Revision 0

HARD HAT SERVICES™
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EXECUTIVE SUMMARY

This Structural Stability Assessment (Report) is prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual from Electric Utilities (40 CFR Parts 257 and 261, also known as the CCR Rule) published on April 17, 2015 and effective October 19, 2015.

This Report assesses the structural stability of each CCR unit at Nelson Dewey Generating Station in Cassville, Wisconsin in accordance with §257.73(b) and §257.73(d) of the CCR Rule. For purposes of this Report, "CCR unit" refers to an existing CCR surface impoundment.

Primarily, this Report is focused on documenting whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded within each CCR unit.

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1 Introduction

The owner or operator of the Coal Combustion Residual (CCR) unit must conduct an initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. This Report is prepared in accordance with the requirements of §257.73(b) and §257.73(d) of the CCR Rule.

1.1 CCR Rule Applicability

The CCR Rule requires a periodic structural stability assessment by a qualified professional engineer (PE) for existing CCR surface impoundments with a height of 5 feet or more and a storage volume of 20 acre-feet or more; or the existing CCR surface impoundment has a height of 20 feet or more.

1.2 Structural Stability Assessment Applicability

The Nelson Dewey Generating Station (NED) in Cassville, Wisconsin (Figure 1) has one existing CCR surface impoundment that meet the requirements of §257.73(b)(1) and/or §257.73(b)(2) of the CCR Rule, which are identified as follows:

- NED Slag Pond

Wisconsin Power and Light Company also has one inactive CCR surface impoundment, the NED WPDES Pond. The NED WPDES Pond will be handled under a separate transmittal in accordance with the CCR Rule, if needed, and is not discussed further herein.

2 FACILITY DESCRIPTION

NED is located north of the Village of Cassville, Wisconsin on the eastern shore of the Mississippi River in Grant County, at 11999 County Highway VV, Cassville, Wisconsin (Figure 1). Located north of the generating plant is Stonefield Village (a state historical landmark) and Nelson Dewey State Park.

NED was a fossil-fueled electric generating station consisting of two steam electric generating units that were retired in December 2015. Sub-bituminous coal was the primary fuel for producing steam. The burning of coal produces a by-product of CCR. The CCR at NED was categorized into two types, slag and fly ash. The fly ash was collected by the electrostatic precipitators and pneumatically conveyed to the on-site fly ash storage silo that is equipped with a baghouse for dust control. The fly ash was then transported off-site for beneficial reuse. The slag was sluiced to a surface impoundment identified as the NED Slag Pond (Figure 2). The NED Slag Pond is located northwest of the generating plant and is presently the only existing CCR surface impoundment at NED.

General Facility Information:

Date of Initial Facility Operations:	1959
WPDES Permit Number:	WI-0002381-07-0
Latitude / Longitude:	42° 43′ 30.792″ N -91° 0′ 40.032″ W
Unit Nameplate Ratings:	Unit 1 (1959): 100 MW Unit 2 (1961): 100MW

2.1 NED Slag Pond

The NED Slag Pond is located northwest of the generating plant and south of the on-site closed ash landfill, Figure 2. The NED Slag Pond receives storm water runoff from part of the on-site closed ash landfill, and the slag handling area. The NED Slag Pond was the primary receiver of process flows from the generating plant prior to December 31, 2015 when the facility's generating units retired. Wastewater was also periodically pumped from the NED WPDES Pond to the NED Slag Pond. Process flows, prior to the facility ceasing operations, included sluiced CCR (slag) from the slag tanks located inside the generating plant, and flows associated with the seal well sump pumps. Flows from the seal well sump pumps included soot blowers, air compressors, boiler blowdown, Unit 1 and Unit 2 floor sumps, oil and hydrogen coolers and demineralization/reverse osmosis multi-media units.

Prior to the facility ceasing operations, the sluiced slag was discharged into the east end of the NED Slag Pond where the majority of CCR was recovered. A dozer was used to push the CCR towards an excavator for dredging. Prior to October 19, 2015, the dredged CCR was stockpiled adjacent to the NED Slag Pond for dewatering. Once dewatered, the CCR was transported off-site for beneficial use. CCR has not been added to any stockpiles outside of the NED Slag Pond on or after October 19, 2015, the effective date of the CCR Rule.

The water used to sluice the CCR from the generating plant to the NED Slag Pond flowed from the east end to the west end of the NED Slag Pond. The southwest corner of the NED Slag Pond consists of the facility's Wisconsin Pollution Discharge Elimination System (WPDES) Outfall 002. The concrete outfall structure includes a rectangular weir restriction that discharges into a 30-inch diameter reinforced concrete pipe (RCP). The water flows through the WPDES Outfall 002, under the embankment on the west side of the NED Slag Pond, and discharges into a riprap lined swale that flows to the southwest into the Mississippi River.

The surface area of the NED Slag Pond is approximately 4.8 acres and has an embankment height of approximately 15 feet from the crest to the toe of the downstream slope. The interior storage depth of the NED Slag Pond is approximately 10 feet. The total volume of impounded CCR and water within the NED Slag Pond is approximately 75,000 cubic yards.

3 STRUCTURAL STABILITY ASSESSMENT- §257.73(d)

This Report documents whether the design, construction, operation, and maintenance of each CCR unit is consistent with recognized and generally accepted good engineering practices for maximum volume of CCR and CCR wastewater which can be impounded.

3.1 NED Slag Pond

The NED Slag Pond is located in an area northwest of the area that was filled during construction of NED in the late 1950's. The original ground surface was at elevation 610 feet above mean sea level as indicated by boring logs taken in the area during planning for plant construction in 1955, Appendix A. The soil present to elevation 500 feet is loose to medium dense fine to medium sand trending to dense sand with depth. In 2007 additional borings were installed near the NED Slag Pond and indicated the presence of sand fill bringing the site grade to 620 feet.

In 2011, geoprobe borings were installed at four locations on the embankments of the NED Slag Pond to determine the materials used to construct the embankments over original grade at approximate elevation 608 to 610 feet. The embankment borings show that slag fill was used to construct the embankments and are underlain by sand, Appendix B.

The locations of the borings in Appendix A and B are shown on Figure 3.

The NED Slag Pond was constructed in 1978 as indicated on the drawings of the outlet structure, Appendix C. The outlet consists of a 30 inch diameter RCP pipe set at invert elevation 615 feet. At some time after the installation of the impoundment, an overflow weir structure was added to allow for measurement of normal outlet flows by adding the steel plate weir shown in Appendix C.

The NED Slag Pond accepts storm water runoff from a part of the closed landfill adjacent to the impoundment and from the former slag handling area located between the NED Slag Pond and the sheet pile bulkhead wall at the Mississippi River.

3.1.1 CCR Unit Foundation and Abutments - §257.73(d)(1)(i)

The foundation of the NED Slag Pond embankment is founded on loose to medium dense sand deposited by the Mississippi River. The sand has adequate strength to support the loads from the 15 foot high embankments. The sand will have minimum internal friction angle of 30˚, which is adequate for structural stability of the impoundment under maximum water elevation.

3.1.2 Slope Protection - §257.73(d)(1)(ii)

The impoundment is incised on the north and east sides. The west embankment crest is about 50 feet wide and contains an access road. The west slope is 2:1 at its steepest point, although most of the surrounding slope on the upstream and downstream side is 3:1. The slope vegetation is managed and is comprised of shallow rooting vegetation, which is adequate to protect against surface erosion. The south embankment is also 3:1 and is vegetated with shallow rooting grasses, which is adequate to protect against surface erosion.

Sudden drawdown is addressed in Section 3.1.7.

3.1.3 CCR Embankment Density- §257.73(d)(1)(iii)

The embankment is constructed of boiler slag which is known to be similar to an angular well graded sand in gradation. The internal friction angle if compacted is expected to be 34˚ and even if uncompacted will not have a friction angle lower than 30˚. The embankment material and installation is adequate for the structural stability of the impoundment under maximum water elevation.

3.1.4 Vegetation Management - §257.73(d)(1)(iv)

Historically vegetation management has been conducted on a periodic basis. At the time of the initial Annual Inspection in October 2015, small areas of downstream slope of the west embankment could not be properly inspected due to the presence of dense/tall brush and woody vegetation along a portion of slope. Since the Annual Inspection, the

facility has removed woody deep rooting vegetation from the embankment and has managed the remaining grassy vegetation to facilitate effective inspections. The facility plans to continue managing the vegetation on the embankments at a height that facilitates effective inspections.

3.1.5 Spillway Management - §257.73(d)(1)(v)

The NED Slag Pond discharges through a 2 foot wide overflow weir set at elevation 615.3 feet in a concrete wet well in the west corner of the impoundment. The overflowing water discharges through a flush face 30-inch diameter RCP pipe at invert elevation 615.0 feet, Figure 2. The culvert is constructed of non-erodible material and designed to carry sustained flows.

The culvert are checked for malfunction (e.g., blockages, deformations) during the weekly inspections by the facility personnel.

This impoundment currently has a hazard potential classification of "Low," which in turn requires an evaluation of the impacts of a 100 year, 24-hour rainfall event. The Inflow Flood Control Plan, which is a separate document developed to comply with §257.82, shows that the precipitation from this event will drain through the culverts without overtopping the embankments of the impoundment. The freeboard at peak flow will be approximately three feet.

3.1.6 Hydraulic Structures - §257.73(d)(1)(vi)

The discharge structures from the NED Slag Pond are comprised of one 30-inch diameter RCP. On June 22, 2016 the pipes were inspected using remote camera video inspection. The inspection showed that there was minimal deterioration, deformation, distortion, sedimentation, debris, and no bedding deficiencies were observed.

3.1.7 Sudden Drawdown - §257.73(d)(1)(vii)

The outer slope of the NED Slag Pond may be inundated when the Mississippi River exceeds flood stage (614.5 feet) at Cassville, Wisconsin. The maximum flood of record at

Cassville is 620.6 feet, United States Army Corps of Engineers records. The outer banks could be subjected to rapid drawdown after the storm.

The embankment and foundation material at the NED Slag Pond has a permeability greater than 10^{-4} $^{cm}/_{sec}$[1] and would drain quickly on rapid drawdown. There is no structural stability risk from rapid drawdown.

[1] USACE, Slope Stability, EM 1110-2-1902, October 2003

4 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

To meet the requirements of 40 CFR 257.73(d)(3), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Wisconsin; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.73(b) and 40 CFR 257.73(d).

By: _____

Name: Mark Loerop

Date: Sep 20, 2016

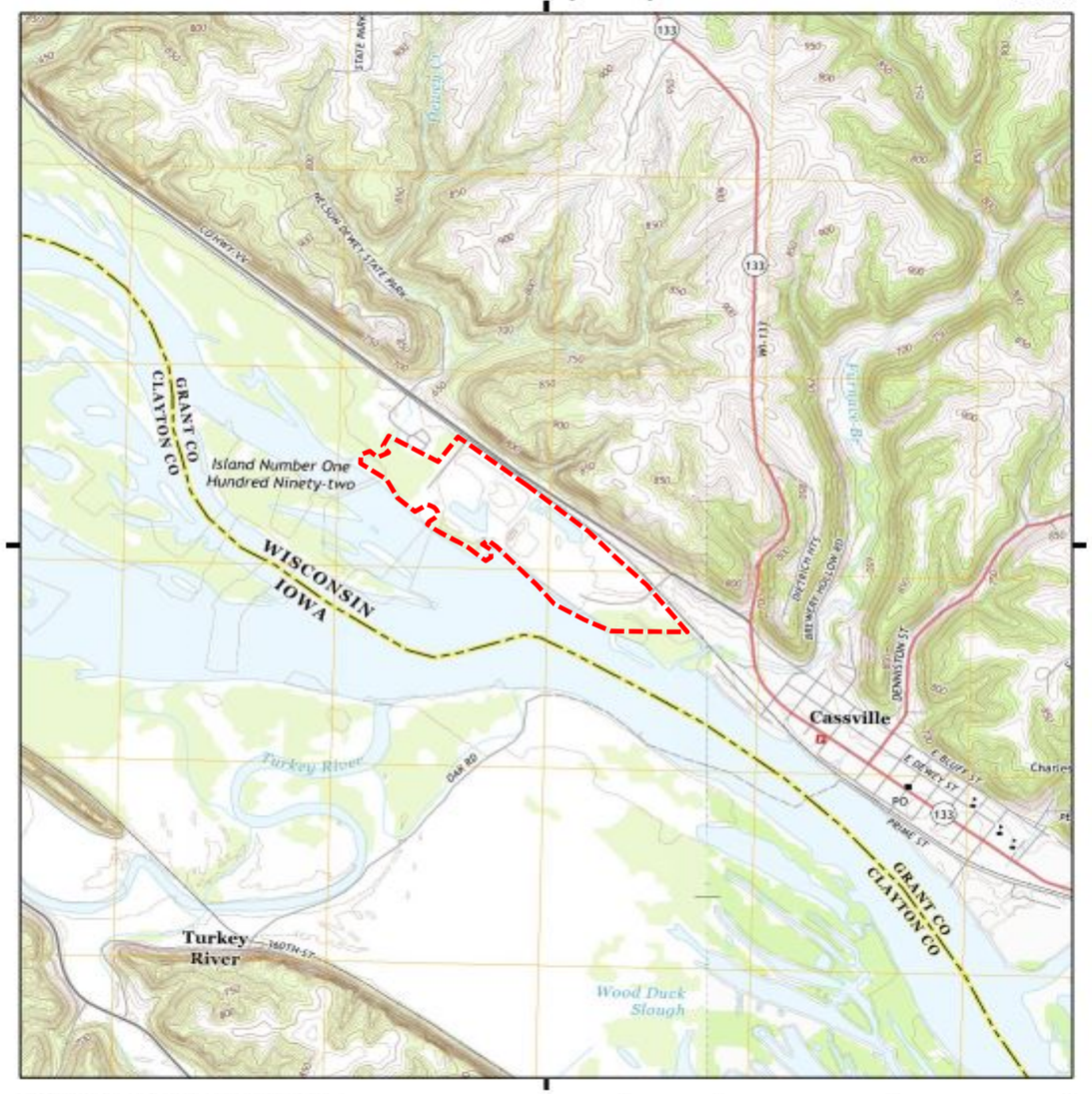
FIGURES

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Structural Stability Assessment

Historical Topo Map

2013



This report includes information from the following map sheet(s).

NW N NE
W E
SW S SE

TP, Turkey River, 2013, 7.5-minute

SE, Cassville, 2013, 7.5-minute

Miles 0.25 0.5 1 1.5

SITE NAME: Nelson Dewey Generating Station
ADDRESS: 11999 County Highway VV
Cassville, WI 53806
CLIENT: Environmental Site Assessors

N

4555570 - 11 page 4

Historical Aerial Photo 5/30/2015

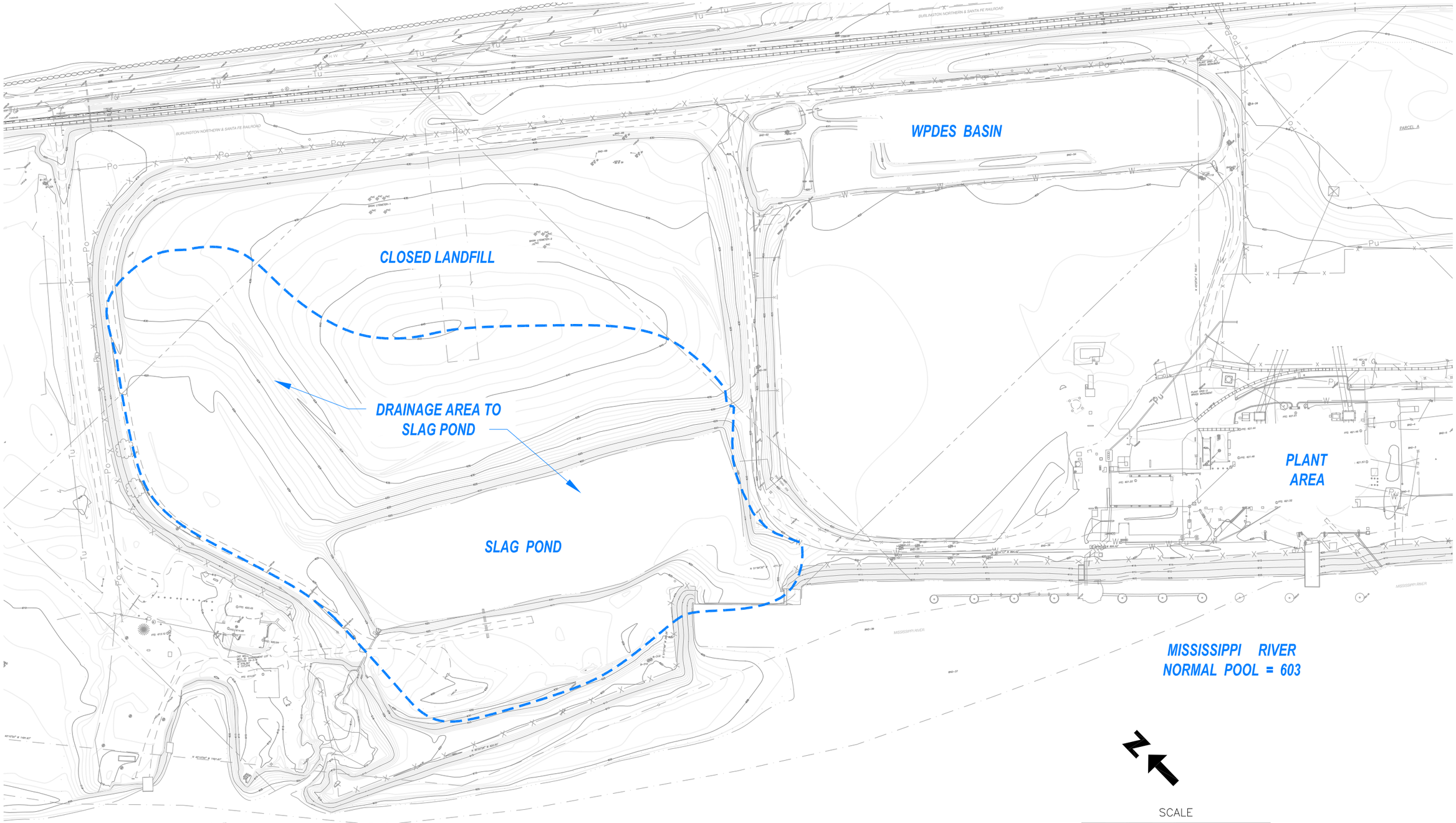
Approximate Property Boundary

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

Site Location
Nelson Dewey Generating Station
Wisconsin Power and Light Company

Drawing
Figure 1

Date
7/13/2016



REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat™ SERVICES

SCALE:	AS SHOWN
DATE:	8-22-16
DRAWN BY:	JFD
CHKD BY:	TJH
APRVD BY:	MWL

CLIENT / LOCATION

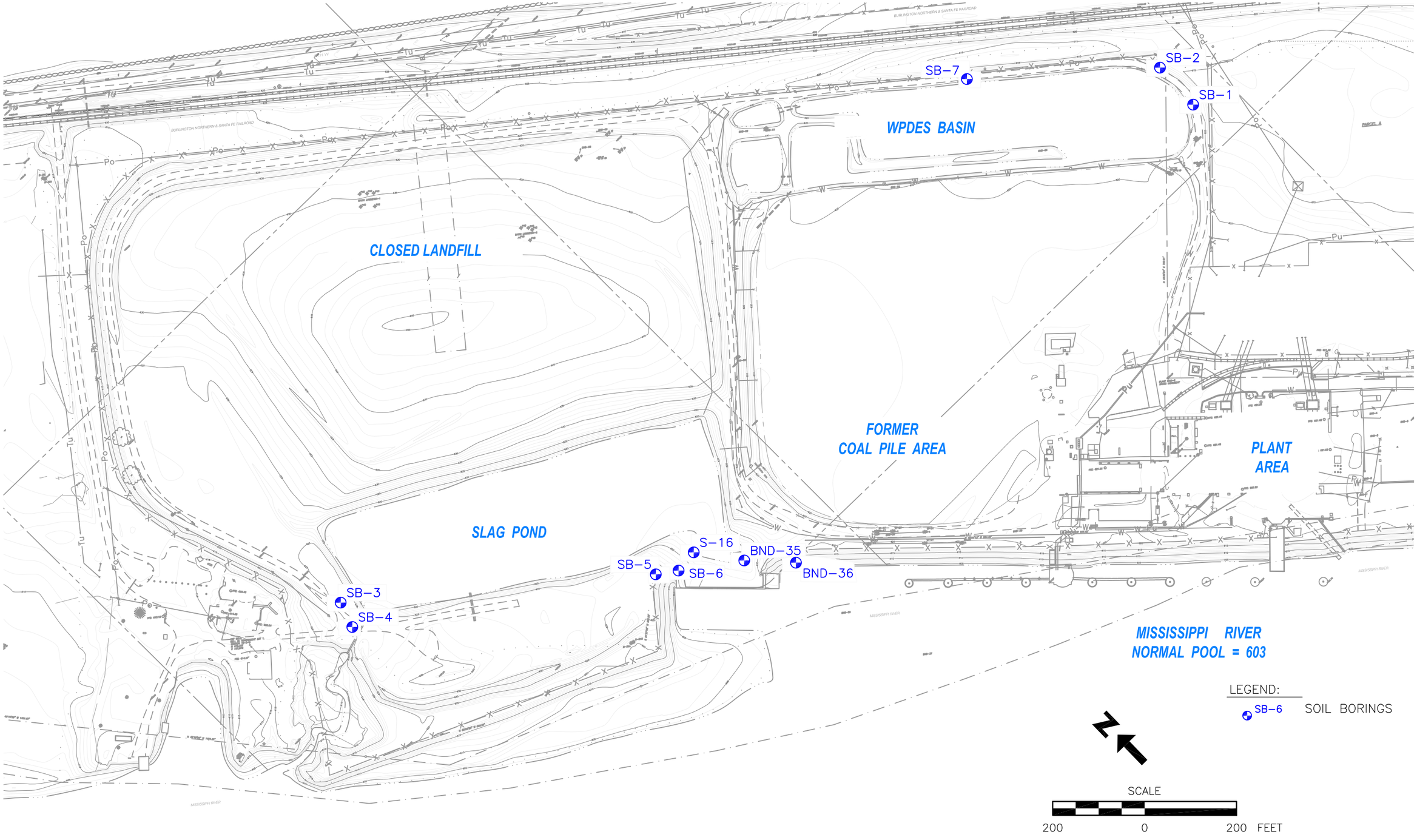
WISCONSIN POWER AND LIGHT
NELSON DEWEY GENERATING STATION
CASSVILLE, WISCONSIN

DRAWING DESCRIPTION

Structural Stability Assessment

SITE PLAN

JOB	154.018.012.007
SHT.	2
DWG.	154018012-IFC



REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat SERVICES

SCALE:	AS SHOWN
DATE:	8-22-16
DRAWN BY:	JFD
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CLIENT / LOCATION

WISCONSIN POWER AND LIGHT
NELSON DEWEY GENERATING STATION
CASSVILLE, WISCONSIN

DRAWING DESCRIPTION

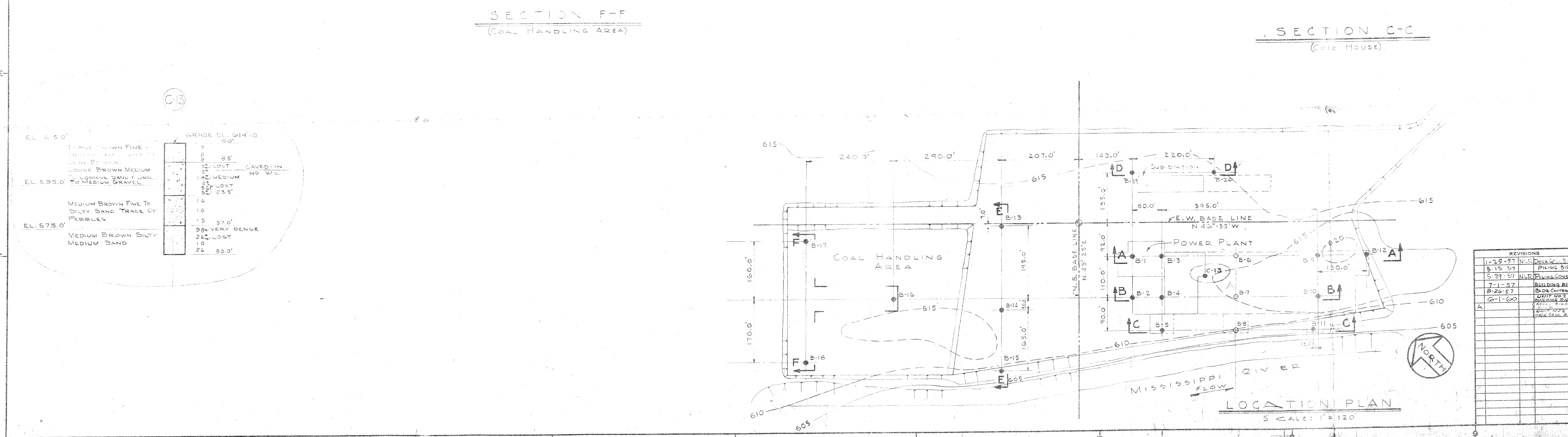
STRUCTURAL STABILITY ASSESSMENT
SITE PLAN

JOB 154.018.012.007
SHT. 3
DWG. 154.018.012-SSA

APPENDIX A – Deep Foundation Soil Borings

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Structural Stability Assessment



NOTES

1. Borings B-6, B-7, & B-8 (Indicated thus ⊕) were originally called for, but not made in the field at the direction of Sargent & Lundy.
2. Figures immediately to the right of the soil log indicate number of blows required to drive the standard sampling spoon 12 inches.
3. ∗ Indicates lost circulating water.

REFERENCE DRAWINGS

M-2 - Development Plan

REVISIONS		
1-25-57	NLR	Dock Cell Bids
3-15-57		Piling Bids
5-29-57	NLR	Piling Const.
7-1-57		Building Bids
8-26-57		Bldg. Contract
6-1-60		Unit No 2 Building Bids
A		Added Boring C-13 Unit No 2 Dock Cell Bids

SOIL BORINGS
LOCATION PLAN & SECTIONS
NELSON DEWEY GEN. STATION
WISCONSIN POWER & LIGHT CO.
CASSVILLE, WISCONSIN

SCALE: VERT. 1"=20' HORZ. NO SCALE & AS NOTED
DRAWN: W. EHRENWERTH
DATE: JANUARY 25, 1957 11-25-57
CHECKED: N.L. RABBERS 5-20-57
APPROVED: E.J. Staukiewicz

SARGENT & LUNDY
ENGINEERS
CHICAGO, ILLINOIS

JOB NO.	JOB NO.	JOB NO.	JOB NO.
2358			
2916			

DRAWING NO.
B-5

TTL Associates, Inc.
1915 N 12th Street
Toledo, Ohio 43624
Telephone: 419-324-2222
Fax: 419-241-1808

BORING NUMBER BND-35

CLIENT Washington Group | PROJECT NAME Nelson Dewey Units 1 and 2
PROJECT NUMBER 3128.01 | PROJECT LOCATION Cassville, WI
DRILLING CONTRACTOR TTL Associates TB CM | RIG NO. 550 | GROUND ELEVATION 620.63 ft
DRILLING METHOD Rotary Wash | GROUND WATER LEVELS:
DATE STARTED 9/18/07 | COMPLETED 9/18/07 | ▽ AT TIME OF DRILLING 19.0 ft / Elev 601.6 ft
LOGGED BY KKC | CHECKED BY | AT END OF DRILLING None
NOTES | 0hrs AFTER DRILLING Backfilled w/Grout

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL / ▲ SPT N VALUE ▲ (20 40 60 80)
620	0		CRUSHED STONE - 18 Inches						
			1.5'	SS 1	100	10-10-10-10 (20)	NP		▲
			FILL - Moist Medium Dense Brown POORLY GRADED SAND w/Trace Gravel	SS 2	100	10-10-14-14 (24)	NP		▲
615	5			SS 3	100	4-6-5-4 (11)	NP		▲
			6.0'						
			FILL - Moist Loose Brown POORLY GRADED SAND	SS 4	100	4-4-3-2 (7)	NP		▲
			-Very Loose Dark Brown	SS 5	100	1-1-1-1 (2)	NP		▲
610	10		11.0'						
			Moist Loose Brown POORLY GRADED SAND (SP)						
				SS 6	100	2-2-3 (5)	NP		▲
605	15								
			▽ -Very Loose	SS 7	22	4-1-2 (3)	NP		▲
600	20		23.5'						
			Wet Very Loose Brown SILTY SAND w/Trace Gravel (SM) (Free Water in Jar Noted)	SS 8	100	2-2-2 (4)	NP		▲ 19 ●
595	25								
			-Loose (Free Water in Jar Noted)	SS 9	100	4-2-3 (5)	NP		▲
590	30								

(Continued Next Page)

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PROJECT NUMBER 3128.01 | PROJECT LOCATION Cassville, WI

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL / ▲ SPT N VALUE ▲
			33.5'						
	35		Moist Medium Dense Brown POORLY GRADED SAND w/Trace Gravel,Clay,and Silt (SP)	SS 10	89	4-7-9 (16)	NP		▲
585									
	40			SS 11	78	4-7-11 (18)	NP		▲
580									
	45			SS 12	67	11-15-12 (27)	NP		▲
575									
	50			SS 13	78	10-17-12 (29)	NP		▲
570									
	55		-Wet (Free Water in Jar Noted)	SS 14	100	10-11-7 (18)	NP		20 ●
565			58.5'						
	60		Wet Very Dense Brown POORLY GRADED SAND (SP) (Free Water in Jar Noted)	SS 15	100	17-29-36 (65)	NP		▲
560			63.5'						
	65		Moist Medium Dense Brown POORLY GRADED SAND (SP)	SS 16	67	5-5-7 (12)	NP		▲
555									

(Continued Next Page)

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PROJECT NUMBER 3128.01 **PROJECT LOCATION** Cassville, WI

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
	70			SS 17	56	4-6-9 (15)	NP		▲
550									
	75			SS 18	67	9-9-14 (23)	NP		▲
545									
	80		80.0'	SS 19	67	7-8-12 (20)	NP		▲
			Bottom of hole at 80.0 feet.						

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BORING NUMBER BND-36

CLIENT Washington Group | PROJECT NAME Nelson Dewey Units 1 and 2
PROJECT NUMBER 3128.01 | PROJECT LOCATION Cassville, WI
DRILLING CONTRACTOR TTL Associates TB CM | RIG NO. 550 | GROUND ELEVATION 620.19 ft
DRILLING METHOD Rotary Wash | GROUND WATER LEVELS:
DATE STARTED 9/17/07 | COMPLETED 9/17/07 | ▽ AT TIME OF DRILLING 10.5 ft / Elev 609.7 ft
LOGGED BY KKC | CHECKED BY | AT END OF DRILLING None
NOTES | 0hrs AFTER DRILLING Backfilled w/Grout

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL / ▲ SPT N VALUE ▲ (20 40 60 80)
620	0	CRUSHED STONE - 8 Inches						
		0.7' FILL - Moist Medium Dense Brown POORLY GRADED SAND w/Trace Gravel,Clay,and Silt	SS 1	100	7-7-8-10 (15)	NP		▲
			SS 2	100	9-8-7-10 (15)	NP		3 ● ▲
615	5		SS 3	100	3-7-10-12 (17)	NP		▲
			SS 4	100	7-10-12-16 (22)	NP		▲
		8.0' FILL - Moist Loose Brown POORLY GRADED SAND w/Trace Gravel	SS 5	100	5-4-3-2 (7)	NP		▲
610	10	10.0' ▽ Moist Medium Stiff Gray SANDY LEAN CLAY (CL)						
		10.5' Moist Loose Brown POORLY GRADED SAND w/Trace Clay and Silt (SP)	SS 6	100	1-3-3 (6)	NP		▲
605	15							
		18.5' Wet Medium Dense Brown POORLY GRADED SAND (SP) (Free Water in Jar Noted)	SS 7	100	3-6-7 (13)	NP		▲
600	20							
		23.5' Moist Loose Brown POORLY GRADED SAND (SP)	SS 8	100	3-4-5 (9)	NP		▲
595	25							
		-Very Loose	SS 9	100	1-1-3 (4)	NP		▲
590	30							

(Continued Next Page)

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PROJECT NUMBER 3128.01 | PROJECT LOCATION Cassville, WI

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL / ▲ SPT N VALUE ▲
585	35		-Wet Loose (Free Water in Jar Noted)	SS 10	44	4-4-4 (8)	NP		▲
			38.5'						
580	40		Moist Medium Dense Brown POORLY GRADED SAND (SP)	SS 11	89	8-12-18 (30)	NP		▲
575	45			SS 12	89	8-8-8 (16)	NP		▲
570	50			SS 13	89	7-8-10 (18)	NP		▲
			53.5'						
565	55		Moist Dense Brown POORLY GRADED SAND (SP)	SS 14	100	8-10-24 (34)	NP		▲
			58.5'						
560	60		Moist Medium Dense Brown POORLY GRADED SAND w/Silt (SP/SM)	SS 15	0	8-10-12 (22)	NR		▲
555	65		-Wet (Free Water in Jar Noted)	SS 16	56	8-8-8 (16)	NP		▲ 25 ●

(Continued Next Page)

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PROJECT NUMBER 3128.01 **PROJECT LOCATION** Cassville, WI

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	UNCONF. COMP. STR. (tsf)	DRY UNIT WT. (pcf)	PL MC LL 20 40 60 80 ▲ SPT N VALUE ▲ 20 40 60 80
			68.5'						
550	70		Moist Dense Brown POORLY GRADED SAND (SP)	SS 17	0	8-15-18 (33)	NR		▲
			73.5'						
545	75		Moist Medium Dense Brown POORLY GRADED SAND (SP)	SS 18	67	6-8-10 (18)	NP		▲
	80		80.0'	SS 19	67	6-8-12 (20)	NP		▲
			Bottom of hole at 80.0 feet.						

APPENDIX B – Embankment Soil Borings

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Structural Stability Assessment

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Cassville, WI

BORING NO.: *SB3*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								LOGGED BY: *John Noyes* **EDITED BY:** *John Noyes* **CHECKED BY:** *Mark Loerop* **DATE BEGAN:** *02-24-11* **DATE FINISHED:** *02-24-11* **GROUND SURFACE ELEVATION:**
	SP1	2.5'/5'				0		GRAVEL; yellowish-brown; well graded; fine to coarse grained; wet/frozen. (Fill)
								ASH (slag-); black; well graded; fine to coarse grained; angulat to sub-angular; dry to moist. (Fill)
	SP2	4'/5'				-5		
						-10		
	SP3	5'/5'						
▽	SP4	5'/5'				-15		
						-20		SAND; gray; poorly graded; fine grained; wet; trace silt. (SP)
						-25		Bottom of boring @ 20.0'. Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Backfilled to groundsurface w/ bentonite chips on 2-24-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Cassville, WI

BORING NO.: *SB4*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
	SP1	2.5'/5'				0		GRAVEL; yellowish-brown; well graded; fine to coarse grained; wet/frozen. (Fill)
								ASH (slag-); black; well graded; fine to coarse grained; angulat to sub-angular; dry to moist. (Fill)
	SP2	4'/5'				-5		
						-10		
	SP3	5'/5'						
▽						-15		SAND; gray; poorly graded; fine grained; wet; trace silt and organic matter. (SP)
	SP4	5'/5'						
						-20		Bottom of boring @ 20.0'. Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1" PVC temp well w/ 5' screen placed in open hole. W.L. checked ~1hr after drilling = dry. PVC was removed and boring backfilled to groundsurface w/ bentonite chips on 2-24-11.
						-25		

LOGGED BY: *John Noyes*

EDITED BY: *John Noyes*

CHECKED BY: *Mark Loerop*

DATE BEGAN: *02-24-11*

DATE FINISHED: *02-24-11*

GROUND SURFACE ELEVATION:

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Cassville, WI

BORING NO.: *SB5*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								LOGGED BY: *John Noyes* **EDITED BY:** *John Noyes* **CHECKED BY:** *Mark Loerop* **DATE BEGAN:** *02-24-11* **DATE FINISHED:** *02-24-11* **GROUND SURFACE ELEVATION:**
	SP1	3'/5'				0		ASH (slag-); black; well graded; fine to coarse grained; angulat to sub-angular; dry to moist. (Fill)
	SP2	3'/5'				-5		
	SP3	4'/5'				-10		
▽	SP4	5'/5'				-15		SAND; brown; poorly graded; fine grained; wet; trace silt and organic matter. (SP)
						-20		Bottom of boring @ 20.0'. Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 2-24-11.
						-25		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Cassville, WI

BORING NO.: *SB6*

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								LOGGED BY: *John Noyes* **EDITED BY:** *John Noyes* **CHECKED BY:** *Mark Loerop* **DATE BEGAN:** *02-24-11* **DATE FINISHED:** *02-24-11* **GROUND SURFACE ELEVATION:**
	SP1	3'/5'				0		ASH (slag-); black; well graded; fine to coarse grained; angulat to sub-angular; dry to moist. (Fill)
	SP2	3'/5'				-5		
	SP3	3'/5'				-10		
▽						-15		
	SP4	5'/5'				-20		SAND; brown; poorly graded; fine grained; wet; trace silt and organic matter. (SP)
						-25		Bottom of boring @ 20.0'. Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 2-24-11.

APPENDIX C – Wet Well and Overflow Weir Information and Picture

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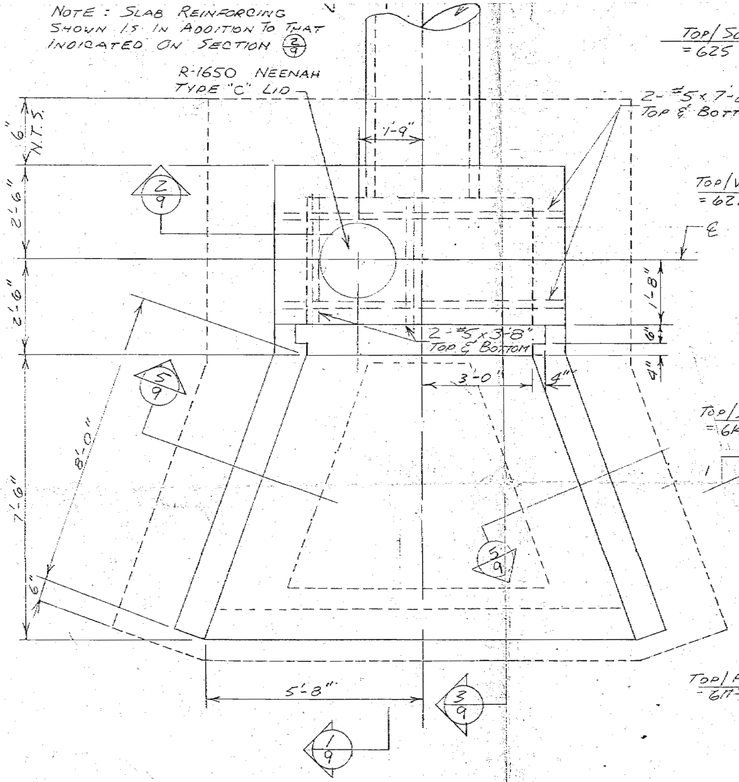
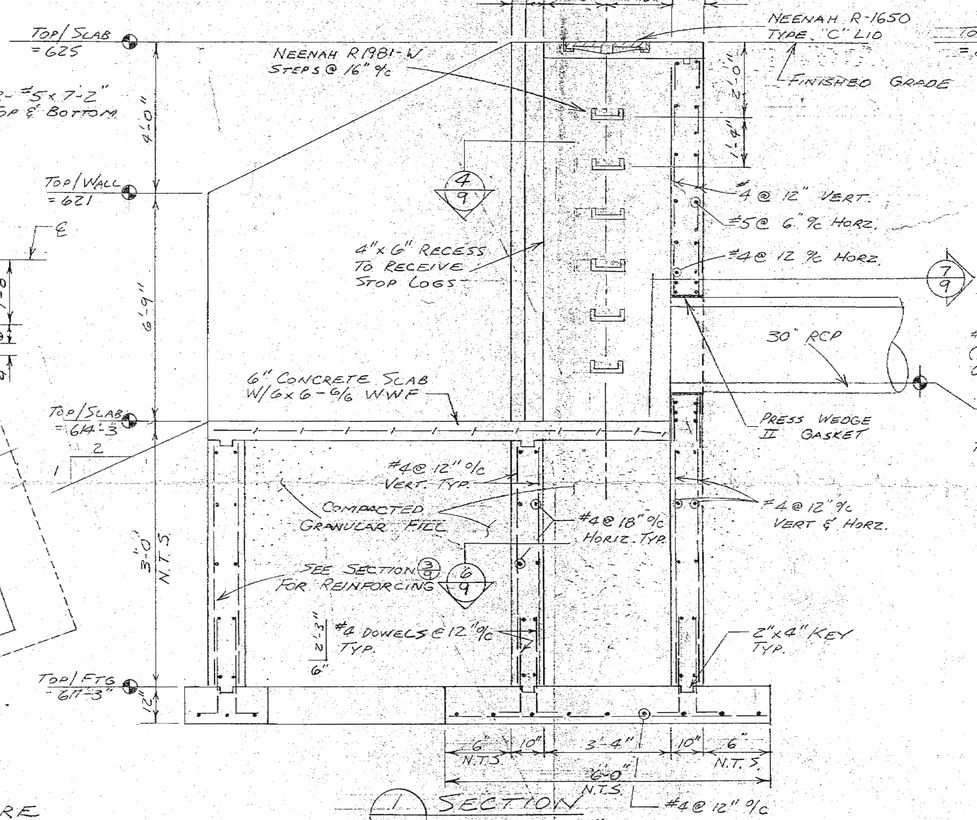
Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Structural Stability Assessment

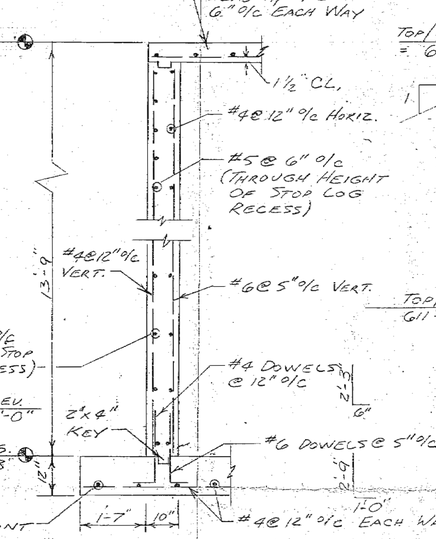
NOTE: SLAB REINFORCING SHOWN IS IN ADDITION TO THAT INDICATED ON SECTION 3/9



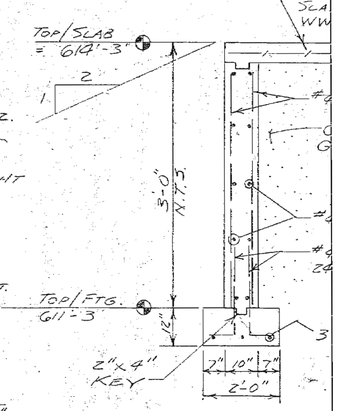
PLAN VIEW - OUTFALL STRUCTURE
SCALE: 1/2" = 1'-0"

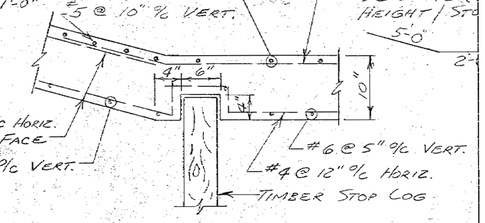


1/9 SECTION
SCALE 1/2" = 1'-0"



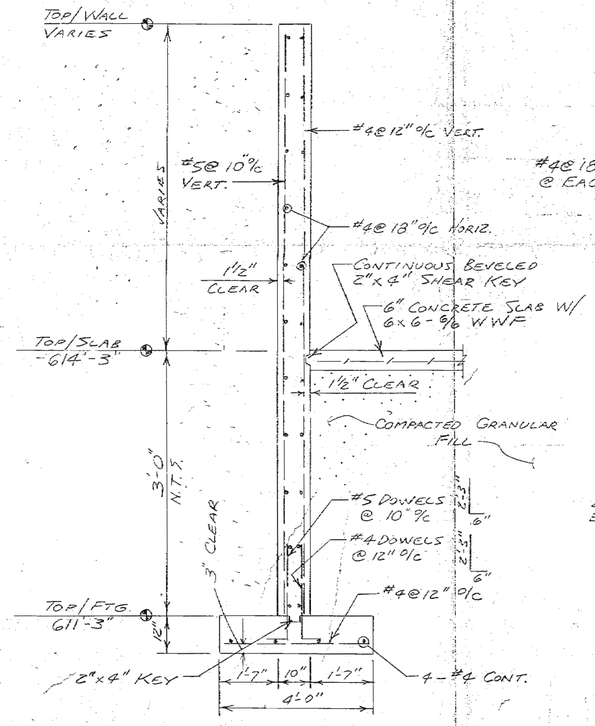
3/9 SECTION
SCALE 1/2" = 1'-0"



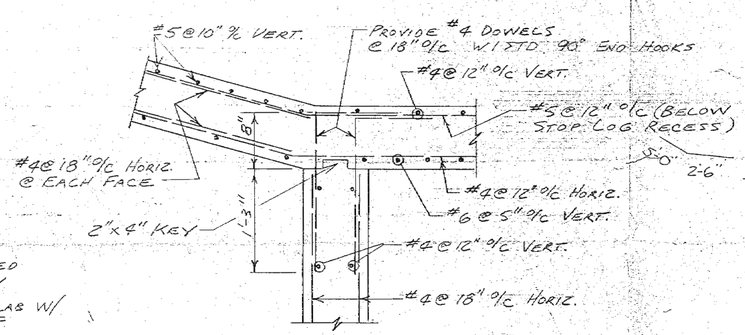


2/9 SECTION
SCALE 1/2" = 1'-0"

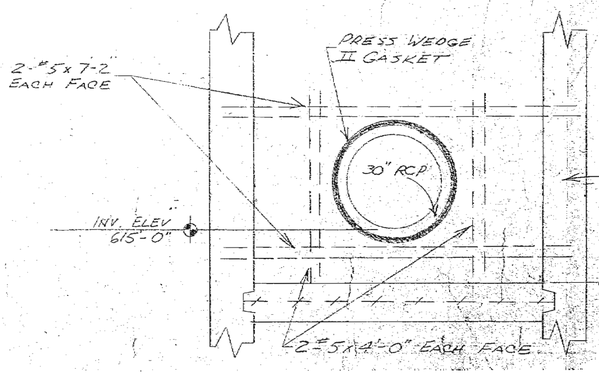
4/9 SECTION
SCALE 1" = 1'-0"



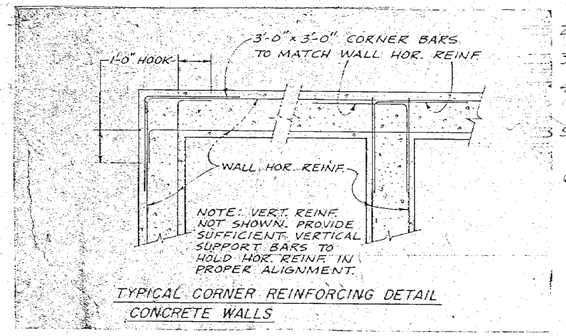
5/9 SECTION
SCALE 1/2" = 1'-0"



6/9 SECTION
SCALE 1" = 1'-0"



7/9 SECTION
SCALE: NONE



TYPICAL CORNER REINFORCING DETAIL
CONCRETE WALLS

NOTE:
REINFORCING SHOWN IS IN ADDITION TO THAT INDICATED ON SECTION 4/9

SEE SECTION 3/9 FOR WALL REINFORCING TYP.

TOP SLAB ELEV. = 614'-3"

NOTES

1) MINIMUM CONCRETE COMPRESSIVE STRENGTH @ 2
2) REINFORCING BARS: ASTM A-615 GRADE 60
3) WELDED STEEL WIRE FABRIC: ASTM A 185 60,000 PSI
4) FILL MATERIAL SHALL BE FREE DRAINING (LESS PASSING #200 SIEVE) GRANULAR MATERIAL
5) UNDER SLAB FILL SHALL BE COMPACTED TO 95 MAXIMUM DRY DENSITY, ASTM D1557
6) N.T.S. WHERE SHOWN INDICATES DRAWING NOT

NO.	BY	DATE	REVISION

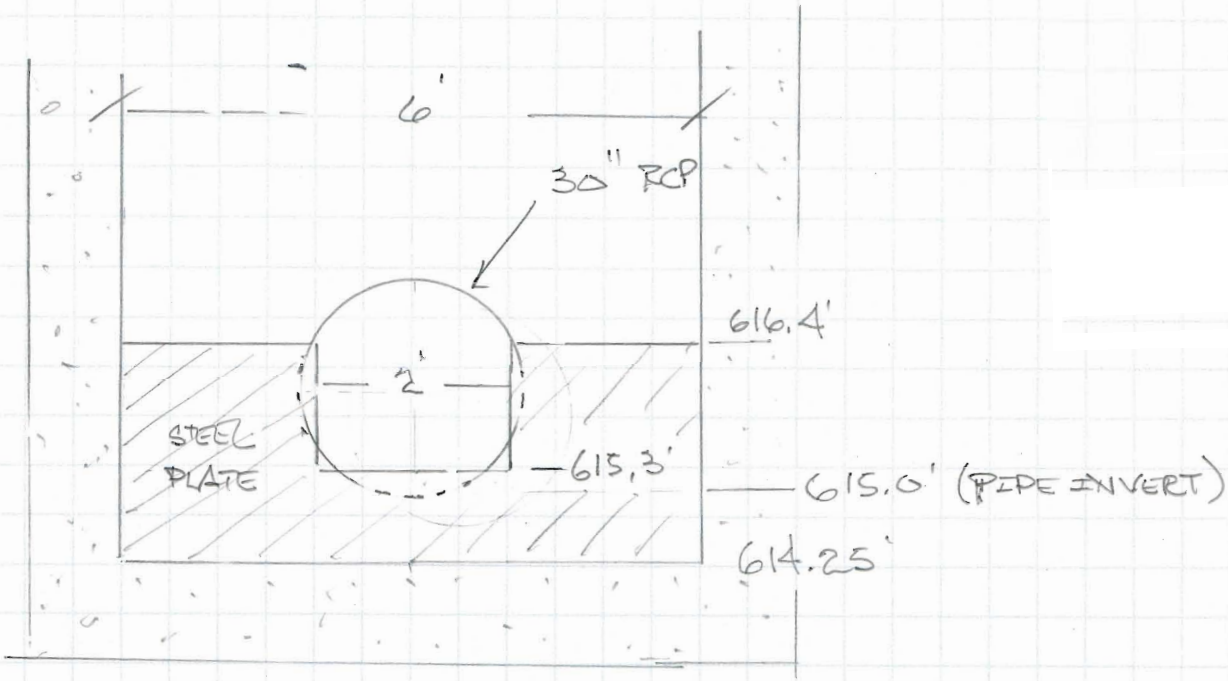
OUTFALL STRUCTURAL PLAN & DE

ASH DISPOSAL FACILIT
WISCONSIN POWER AND LIGHT CO
NELSON DEWEY GENERATING S
CASSVILLE, WISCONSIN

WARZYN

DRAWN GBH	SCALE AS SHOWN
CHECKED RAJ	DATE 3-29-78
APPROVED RWT	

NELSON DEWEY OUTLET STRUCTURE



FROM WARZYN 2 OF 22 3-21-78

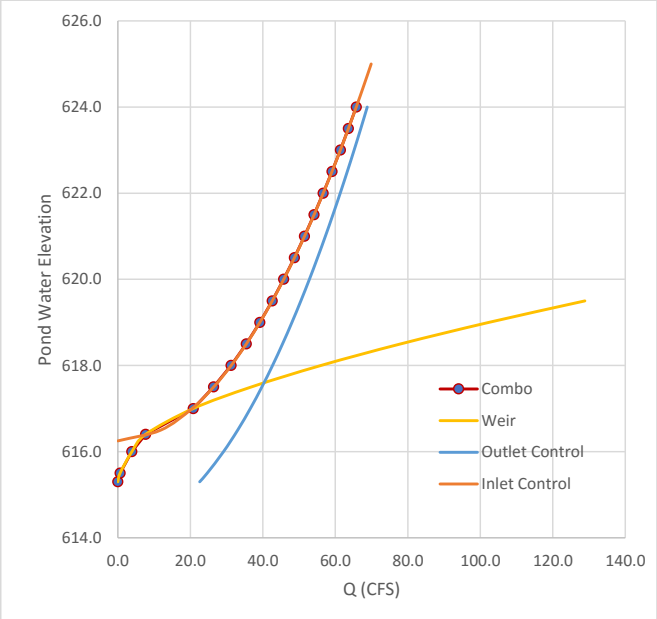
&

PICTURE OF WET WELL


2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
2.0
9
8
7
6
5
4
3
2
1

CASSville - Slag Pond Outlet Discharge Curve

2.5	FT = Pipe Diameter Steel
0.625	FT = Hydraulic Radius
3.1933	k in Q outlet control equation
615	FT = Pipe Inlet Invert Elevation
50	FT = Length
0.025	= n for RCP
0.6	= Co for Inlet Control
614.25	FT = Tail Water Elevation
2	FT = Weir Width (to 616.4')
3.3	= Weir Coefficient



OUTLET CONTROL / BARROW CONTROL

Q CFS	Elevation	Head Ft
22.579	615.3	1.0
24.636	615.5	1.3
29.15	616.0	1.8
33.053	616.5	2.3
36.541	617.0	2.8
39.725	617.5	3.3
42.671	618.0	3.8
45.427	618.5	4.3
48.025	619.0	4.8
50.489	619.5	5.3
52.839	620.0	5.8
55.088	620.5	6.3
57.249	621.0	6.8
59.332	621.5	7.3
61.344	622.0	7.8
63.292	622.5	8.3
65.181	623.0	8.8
67.018	623.5	9.3
68.805	624.0	9.8

INLET CONTROL

Q CFS	Elevation	Head (to pipe middle) Ft
0	616.3	0
11.813	616.5	0.25
20.461	617.0	0.75
26.415	617.5	1.25
31.254	618.0	1.75
35.439	618.5	2.25
39.179	619.0	2.75
42.592	619.5	3.25
45.751	620.0	3.75
48.706	620.5	4.25
51.491	621.0	4.75
54.134	621.5	5.25
56.653	622.0	5.75
59.065	622.5	6.25
61.382	623.0	6.75
63.615	623.5	7.25
65.772	624.0	7.75
67.86	624.5	8.25
69.886	625.0	8.75

Weir Equation

Q = Cw * L * H^1.5

H Ft	Q CFS	2 foot widt + 4' Width	
615.3	0.0	0.0	
615.5	0.6	0.6	
616.0	3.9	3.9	
616.4	7.6	7.6	0
617.0	20.8	14.6	6.1
617.5	36.8	21.5	15.2
618.0	56.0	29.3	26.7
618.5	78.0	37.8	40.2
619.0	102.3	47.0	55.3
619.5	128.9	56.8	72.0

Combo Discharge Curve

615.3	0.0	Weir Control
615.5	0.6	
616.0	3.9	
616.4	7.6	
617.0	20.8	Inlet Control
617.5	26.4	
618.0	31.3	
618.5	35.4	
619.0	39.2	
619.5	42.6	
620.0	45.8	
620.5	48.7	
621.0	51.5	
621.5	54.1	
622.0	56.7	
622.5	59.1	
623.0	61.4	
623.5	63.6	
624.0	65.8	