History of Construction
Brame Bottom Ash Pond

CLECO Corporation

Rodemacher Unit 2
Project No. 90965

Revision 0
10/14/2016

History of Construction
Brame Bottom Ash Pond

prepared for

CLECO Corporation
Rodemacher Unit 2
Rapides Parish, Louisiana

Project No. 90965

Revision 0
10/14/2016

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

CLECO Corporation
History of Construction
Brame Bottom Ash Pond
Project No. 90965

Report Index

Certification

I hereby certify, as a Professional Engineer in the state of Louisiana, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the CLECO Corporation or others without specific verification or adaptation by the Engineer.

Randell L Sedlacek, P.E.
Louisiana License #38408

Date: 10/14/16

This document has been digitally sealed and signed. October 14, 2016.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
BMcD	Burns & McDonnell
Brame	Brame Energy Center
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
CLECO	CLECO Corporation
CY	Cubic Yards
EPA	Environmental Protection Agency
GPM	Gallons per Minute
HUC	Hydrologic Unit Code
LSU	Louisiana State University
U.S.C	United States Code
USGS	United States Geological Survey

1.0 INTRODUCTION

On April 17, 2015, the Environmental Protection Agency (EPA) issued the final version of the federal Coal Combustion Residual (CCR) Rule to regulate the disposal of CCR materials generated at coal-fired units. The rule will be administered as part of the Resource Conservation and Recovery Act [RCRA, 42 United States Code (U.S.C.) §6901 et seq.], using the Subtitle D approach.

The existing CCR surface impoundments at CLECO Corporation's (CLECO's) Brame Energy Center (Brame) are subject to the CCR Rule and as such CLECO must compile a History of Construction for each CCR surface impoundment per 40 CFR §257.73(c). This report serves as the History of Construction for the Brame Bottom Ash Pond.

This history of construction is in addition to, not in place of, any other applicable site permits, environmental standards, or work safety practices.

2.0 PLAN OBJECTIVES

Per 40 CFR §257.73(c), the History of Construction must contain, to the extent feasible, the following items:

- The name and address of the owner/operator of the CCR unit, the name of the CCR unit, and the identification number of the CCR unit
- The location of the CCR unit on most recent United States Geological Survey (USGS) 7½ minute or 15 minute topographical map
- A statement of the purpose for which the CCR unit is being used
- The name and size of watershed within which the CCR unit is located
- A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed
- A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone or stage of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.
- Detailed dimensional drawings of the CCR Unit, including the following:
  - Plan view and cross sections of the length and width of the CCR unit
  - Foundation improvements
  - Drainage provisions, spillways, diversion ditches, outlets
  - Instrumentation locations
  - Slope protection
  - Normal operating pool surface elevation
  - Maximum pool surface elevation following peak discharge from the inflow design flood
  - Expected maximum depth of CCR within the unit
  - Any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation
- A description of the type, purpose, and location of existing instrumentation
- Area-capacity curves for the CCR unit
- A description of each spillway and diversion design features and capacities and calculations used in their determination
- The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit
- Any record or knowledge of structural instability of the CCR unit

3.0 HISTORY OF CONSTRUCTION

Section		CCR Rule Description	Included	Information	Source
40 CFR §257.73 (c)(1)	(i)	Name and address of the owner/operator of the CCR unit	Y	Cleco Corporation 2030 Donahue Ferry Road P.O. Box 5000 Pineville, LA 71361-5000	Owner
		Name of the CCR unit	Y	Bottom Ash Pond	Owner
		Identification number of the CCR unit	Y	P-0005 (permit number)	Owner
40 CFR §257.73 (c)(1)	(ii)	Location of the CCR unit on most recent United States Geological Survey (USGS) 7½ minute or 15 minute topographical map	Y	See Appendix A	USGS Map
40 CFR §257.73 (c)(1)	(iii)	Statement of the purpose for which the CCR unit is being used	Y	The pond receives bottom ash, economizer ash, sluice water, and other process flows from Rodemacher Unit 2. CCR material is sluiced to the pond at 2.16 MGD for approximately 12 hours each day. Overflow from the adjacent Fly Ash Pond is also pumped directly to the Bottom Ash Pond.	Owner
40 CFR §257.73 (c)(1)	(iv)	Name and size of watershed within which the CCR unit is located	Y	HUC12 = 111402070703 Jacks Creek Watershed Area = 9,407 acres Only approximately 46 acres of this overall watershed actually contributes runoff to the Bottom Ash Pond.	HUC 12 Mapping LSU AGCenter.com
40 CFR §257.73 (c)(1)	(v)	Description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed	Y	Foundation Soils include soft to medium stiff clay and silty clay. See Appendix C	Permit
40 CFR §257.73 (c)(1)	(vi)	Statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit	Y	Embankment constructed of on-site material and includes minimum 3-ft compacted clay. 3-ft compacted clay liner constructed with high-plasticity clay with average Plasticity Index of 41 and average Liquid Limit of 62. See Appendices C & D	Permit
		The method of site preparation and construction of each zone or stage of the CCR unit	Y	Embankment constructed with 3:1 side slopes. Liner was constructed in 8-10 in. horizontal lifts compacted with sheepsfoot compaction. See Appendices C & D	Permit
		The approximate dates of construction of each successive stage of construction of the CCR unit		Began construction in 1978, operational in 1982. No major construction modifications have been made since.	Permit Drawings / Owner
40 CFR §257.73 (c)(1)	(vii)	Detailed dimensional drawings including the following:			
		Plan view and cross sections of the length and width of the CCR unit	Y	See Appendix E	Permit
		Foundation improvements	N	N/A	
		Drainage provisions, spillways, diversion ditches, outlets	Y	24-in CMP, invert EL = 102.6 (discharges to ditch on NW embankment via pumping)	Owner / Design Drawings

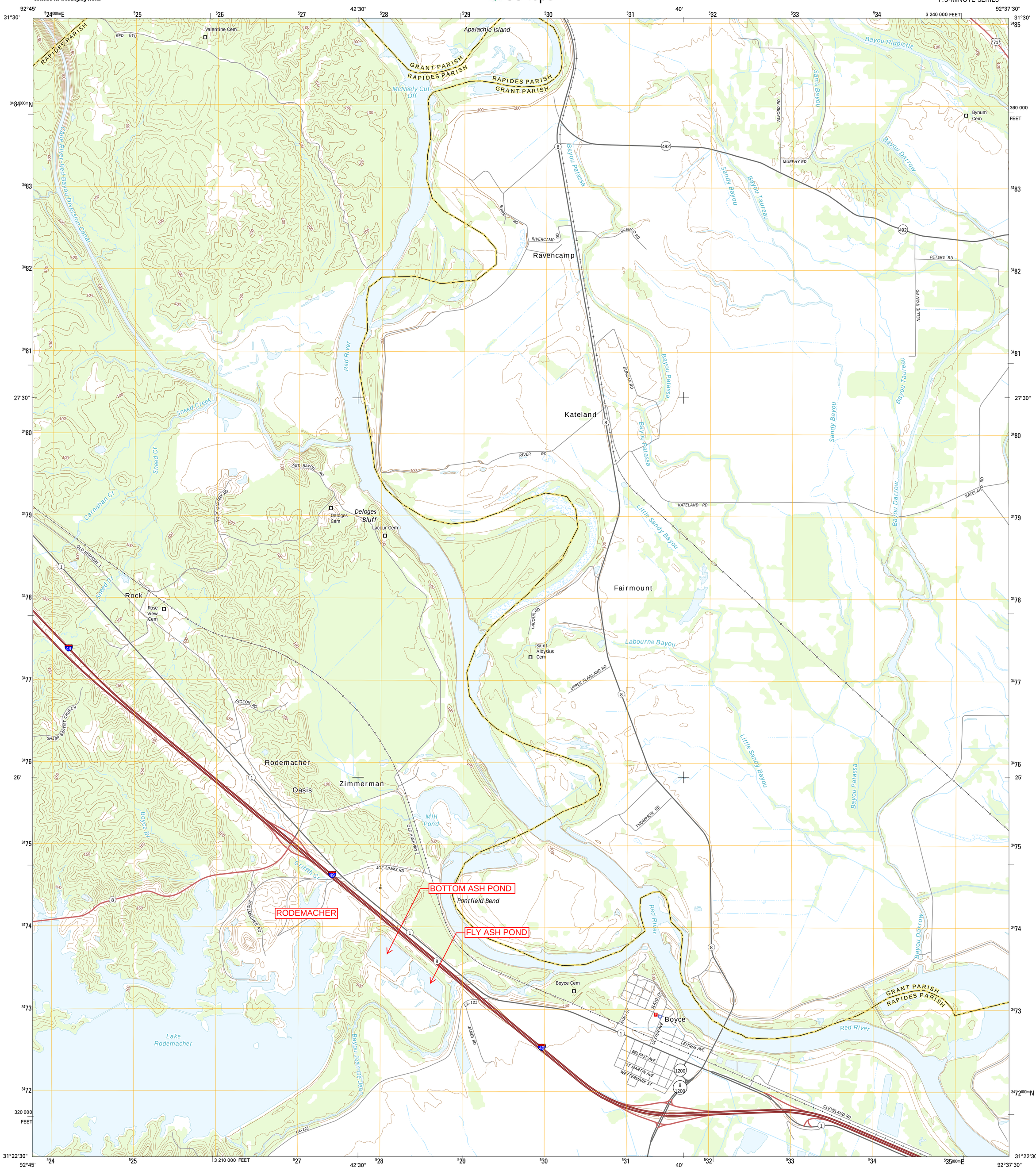
Section	CCR Rule Description	Included	Information	Source
			See Appendix E	
	Instrumentation locations	Y	See Appendix F	Permit
	Slope protection		Exterior Slope: 3:1, vegetated Interior Slope: 3:1, vegetated	Design Drawings
	Normal operating pool surface elevation		Normal operating level between EL 93-94	Owner
	Maximum pool surface elevation following peak discharge from the inflow design flood		Maximum pool surface level at EL 100.5 following peak discharge from the inflow design flood, assuming pond is 50% full of ash to the top of the dike and initial water level of EL 94.	Inflow Design Flood Control System Plan, Oct. 2016
	Expected maximum depth of CCR within the unit		At EL 105, depth of CCR is approximately 20 feet.	Measured in CAD based on Construction Drawings / aerial imagery
	Any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation	Y	Three pumps capable of 5,000 GPM operate on a float to maintain consistent water levels in the pond.	Owner
40 CFR §257.73 (c)(1) (viii)	Description of the type, purpose, and location of existing instrumentation	Y	Pumps - control pond overflow Monitoring wells - monitor uppermost aquifer (compliance and background monitoring). See Appendix F for location. Surface water level gauge (measured manually) See Appendix F for locations and additional information	Permit / Owner
40 CFR §257.73 (c)(1) (ix)	Area-capacity curves for the CCR unit	Y	See Appendix B	Measured in CAD based on Construction Drawings / aerial imagery
40 CFR §257.73 (c)(1) (x)	Description of each spillway and diversion design features and capacities and calculations used in their determination	Y	Perimeter interceptor ditch off of NW embankment. See Appendix D for details	Permit
40 CFR §257.73 (c)(1) (xi)	Construction specifications	N	Not found in records review	
	Provisions for surveillance, maintenance, and repair of the CCR unit	Y	Weekly and Annual Inspections per 40 CFR §257.83.	
40 CFR §257.73 (c)(1) (xii)	Any record or knowledge of structural instability of the CCR unit	N	N/A	

APPENDIX A – USGS TOPOGRAPHICAL MAP

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

BOYCE QUADRANGLE
LOUISIANA
7.5-MINUTE SERIES



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 15R
10 000-foot ticks: Louisiana Coordinate System of 1983 (north zone)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2013
Roads..... HERE, ©2013 - 2014
Names.....GNIS, 2015
Hydrography.....National Hydrography Dataset, 2013
Contours.....National Elevation Dataset, 2008
Boundaries.....Multiple sources; see metadata file 1972 - 2015
Public Land Survey System.....BLM, 2015

MN
GN
1° 5´ 19 MILS
0° 10´ 3 MILS
UTM GRID AND 2015 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
WQ
Grid Zone Designation
15R

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

LOUISIANA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

1	2	3
4		5
6	7	8

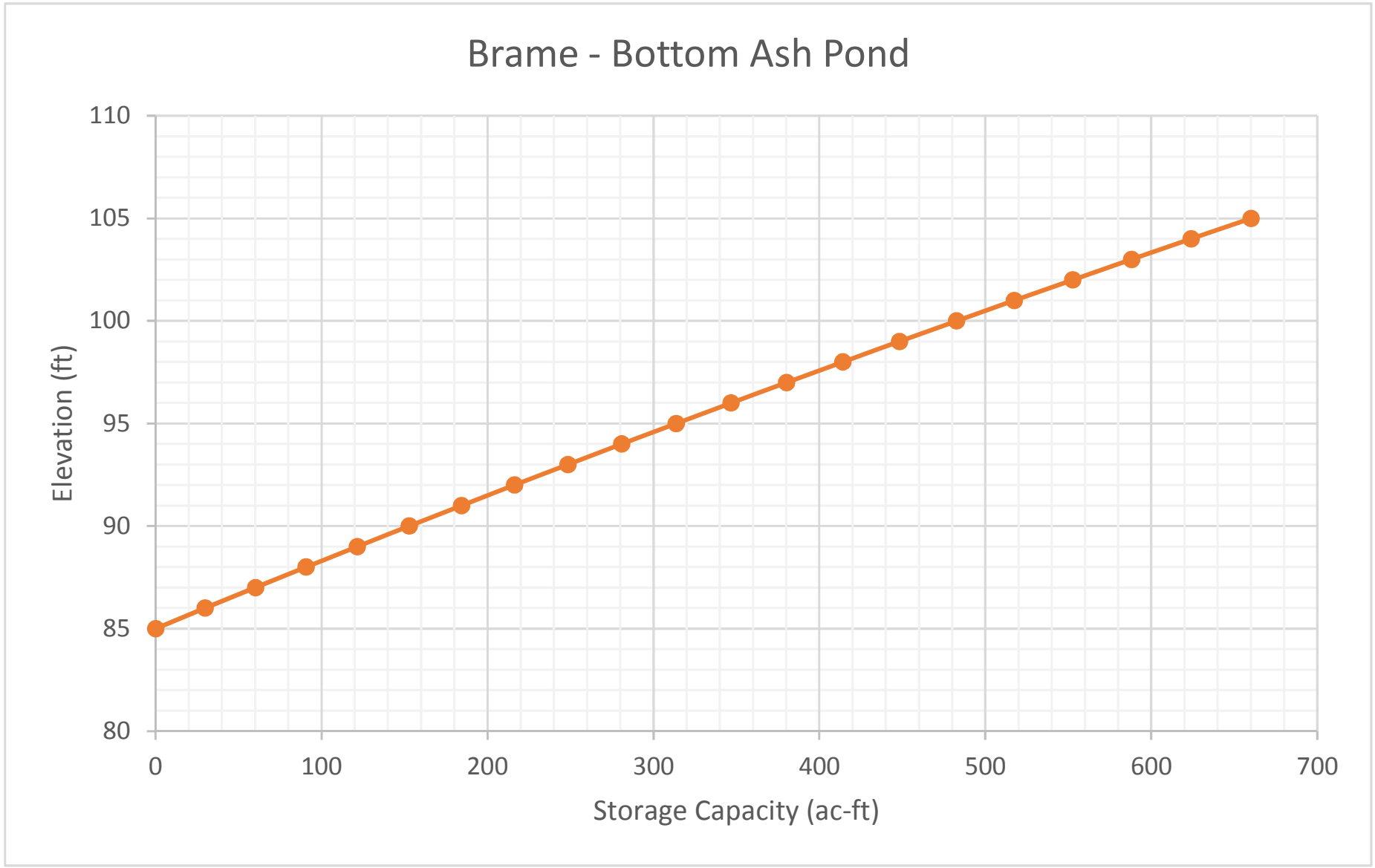
1 Aloha
2 Colfax
3 Dry Prong
4 Lena
5 Rock Hill
6 Jericho
7 Gardner
8 Rapides

ADJOINING QUADRANGLES

BOYCE, LA
2015

NSN 7643016368754
NGA REF NO. USGSX24K5124

APPENDIX B – AREA-CAPACITY CURVE


Brame - Bottom Ash Pond
Elevation (ft)
110
105
100
95
90
85
80
0
100
200
300
400
500
600
700
Storage Capacity (ac-ft)

APPENDIX C – GEOLOGIC DATA

521.D. FACILITY GEOLOGY

1. INFORMATION REQUIRED FOR TYPE I AND II FACILITIES

1.a. Isometric Profiles and Cross-Sections

Exhibits 13 and 14 present the generalized soil conditions beneath the Bottom Ash Pond. The depth to ground water varies from 6 to 10 feet below grade. There is a very soft to medium stiff clay which extends to 20 feet (terminal depth of borings) in all of the borings except Boring 244. In that boring, the clay extended to 12 feet with a silty sand to sandy silt beneath.

1.b. Soil Boring Logs

Exhibits 13 and 14 presents generalized logs of the soil.

1.c. Soil Test Results

The laboratory coefficient of permeability for the in situ clay varies from 1.3×10^{-6} to 3.5×10^{-8} cm/sec. As was shown in Exhibit 13, the approximate limit of the in situ clay barrier is about midway of the Bottom Ash Pond. A 3-foot thick compacted clay layer was placed over the exposed granular soils on the bottom of the Bottom Ash Pond. The extent of the clay blanket was determined in the field by ensuring that the in situ clay had a minimum thickness of 3 feet. Laboratory permeability tests on recompacted samples of the clay varied from 1.1×10^{-7} to 2.1×10^{-8}cm/sec. and the Plasticity Index averaged 41 with an average liquid limit of 62 which classifies the soil as CH according to the Unified Soil Classification System. The clay liner was placed in horizontal lifts of 8 to 10 inches and was compacted with "sheeps foot" compaction equipment. The 3-foot compacted clay liner coupled with the in situ clay layer should form an effective barrier to liquid waste migration to the ground water.

A summary of the laboratory test results is presented in Appendix F.

1.d. Geologic Cross-Sections

Exhibit 5 contains geologic cross-sections which extend to a depth greater than 200 feet below ground surface.

1.e. Faults

There has been no information obtained which would indicate that there exist faults at the facility.

1.f. Seismic Impact Zone

The facility is not located within a seismic impact zone.

SITE PLAN
ORIGINAL ARRANGEMENT SHEET 2
MOHAVE POWER STATION UNIT 2

SOLID WASTE MANAGEMENT PLAN PERMIT APPLICATION

EXHIBIT 12

SARGENT & LUNDY
CHICAGO

S-210A
J

NOTES

REFERENCE DRAWINGS

ASH POND WORK POINTS

BOTTOM ASH POND

S-210

Pond, the Coal Sedimentation Pond, and the Unit 2 Metal Cleaning Waste Pond are situated on the Terrace aquifer, while the Fly Ash Pond, Bottom Ash Pond, and Ash Management Area are situated on the aquifer recharge area for the Alluvial aquifer.

e. if the facility is located in a flood plain, a plan to ensure that the facility does not restrict the flow of the 100-year base flood or significantly reduce the temporary water-storage capacity of the flood plain, and documentation indicating that the design of the facility is such that the flooding does not affect the integrity of the facility or result in the washout of solid waste.

The Fly Ash Pond is the only facility that is constructed within an area previously permitted through the Army Corps of Engineers (COE) under permit number LMNOD-SP dated March 29, 1977. Cleco currently holds a solid waste permit from the LDEQ for this area to mange ash for future plant expansions.

D. Facility Geology. Standards governing facility geology are contained in LAC 33:VII.709.C (Type I and II facilities), LAC 33:VII.717.D (Type I-A and II-A facilities), and LAC 33:VII.719.D (Type III facilities).

1. The following information regarding geology is required for Type I and Type II facilities:

a. isometric profile and cross-sections of soils, by type, thickness, and permeability;

Isometric soil profiles and geologic cross sections have been constructed for the facilities from available data. The locations of the profiles for the cross sections are shown in Appendix G. Five (5) isometric soil profiles and sixteen (16) geologic cross sections, A-A' through P-P', were constructed from available data and are included in this appendix. Historical geologic cross sections constructed for the facilities are included in Appendix H.

b. logs of all known soil borings taken on the facility and a description of the methods used to seal abandoned soil borings;

A copy of the logs of soil borings is included in Appendix I. Please note that the soil boring logs performed by Aquaterra (2004) and Eagle (2005) are included in this appendix. Soil boring logs were not available for the drilling activities performed by Sargent & Lundy (1981); however, geologic cross sections illustrating these logs are available and are included. Design and construction of the units began before the Louisiana Solid Waste Rules and Regulations were established and the units were initially under interim status prior to the standard permits being issued.

Abandoned soil borings were sealed in accordance with applicable methods at the time of drilling according to available records reviewed. Since May 1993, soil

borings have been sealed in accordance with applicable portions of "Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook" dated December 2000 (LDEQ and LDOTD, 2000).

c. **results of tests for classifying soils (moisture contents, Atterberg limits, gradation, etc.), measuring soil strength, and determining the coefficients of permeability, and other applicable geotechnical tests;**

A copy of available geotechnical testing used for soil classification is included in Appendix I.

d. **geologic cross-section from available published information depicting the stratigraphy to a depth of at least 200 feet below the ground surface;**

A fence diagram illustrating Rapides Parish geology to approximately 3,000 feet below ground surface is included as Appendix F. (Plate 4, Water Resources of Rapides Parish, Louisiana, Water Resources Bulletin No. 8, Department of Conservation, Louisiana Geological Survey, and Louisiana Department of Public Works, April 1966).

e. **for faults mapped as existing through the facility, verification of their presence by geophysical mapping or stratigraphic correlation of boring logs. If the plane of the fault is verified within the facility's boundaries, a discussion of measures that will be taken to mitigate adverse effects on the facility and the environment;**

There are no known faults within the facility or within one mile of the perimeter of the facility. The review of available published information did not reveal information on faulting near the facility.

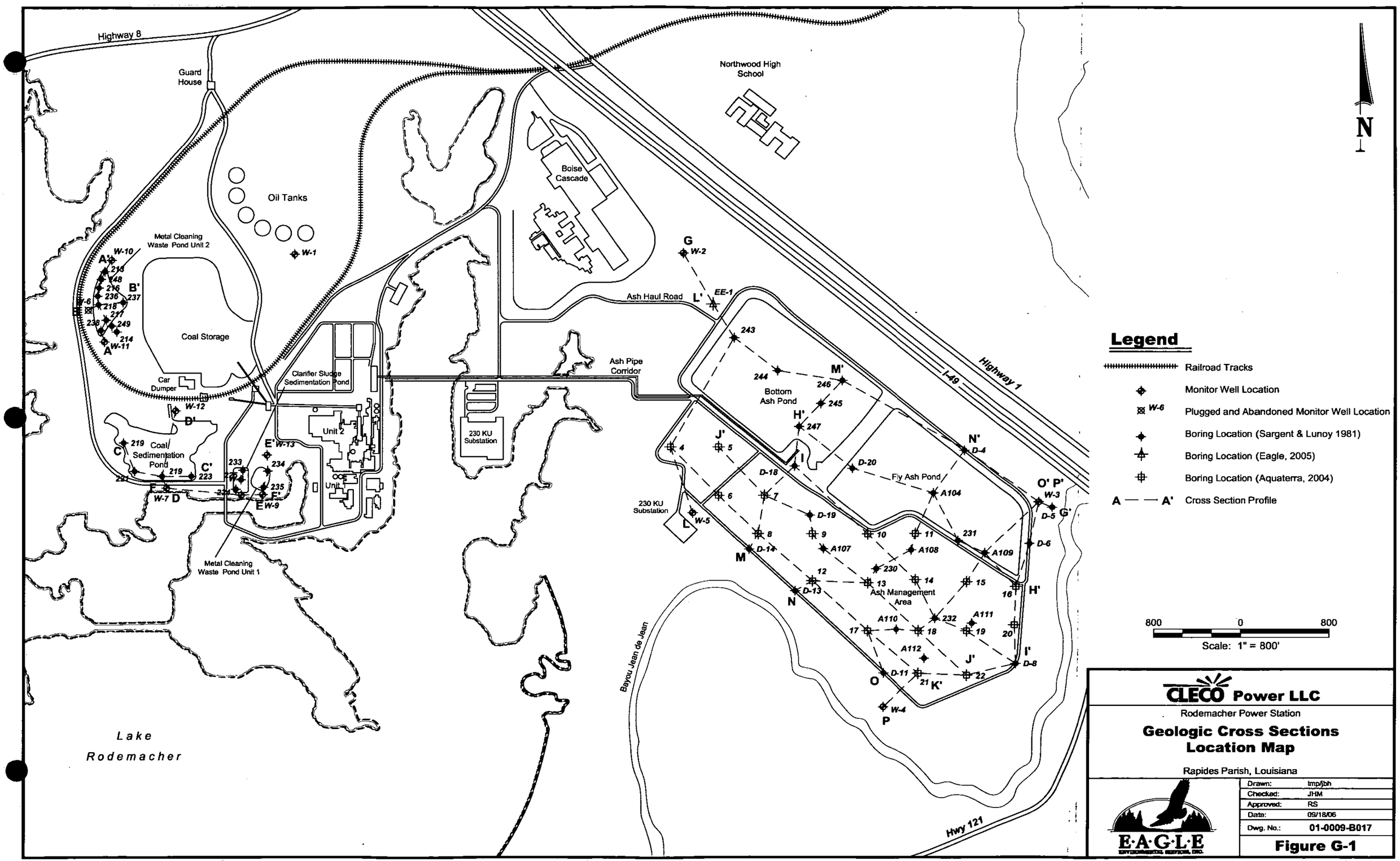
f. **for a facility located in a seismic impact zone, a report with calculations demonstrating that the facility will be designed and operated so that it can withstand the stresses caused by the maximum ground motion, as provided in LAC 33:VII.709.C.2; and**

Not applicable. Review of the "Seismicity Map of the State of Louisiana" (Map MF-1081, Stover and others, United States Geological Survey, 1987) does not indicate seismic activity in the area of the Rodemacher Power Station.

g. **for a facility located in an unstable area, a demonstration of facility design as provided in LAC 33:VII.709.C.3.**

Not applicable. The RPS is not located in an unstable area.

2. **The following information regarding geology is required by Type III wood waste, and construction/demolition-debris facilities:**



CLECO Power LLC

Rodemacher Power Station

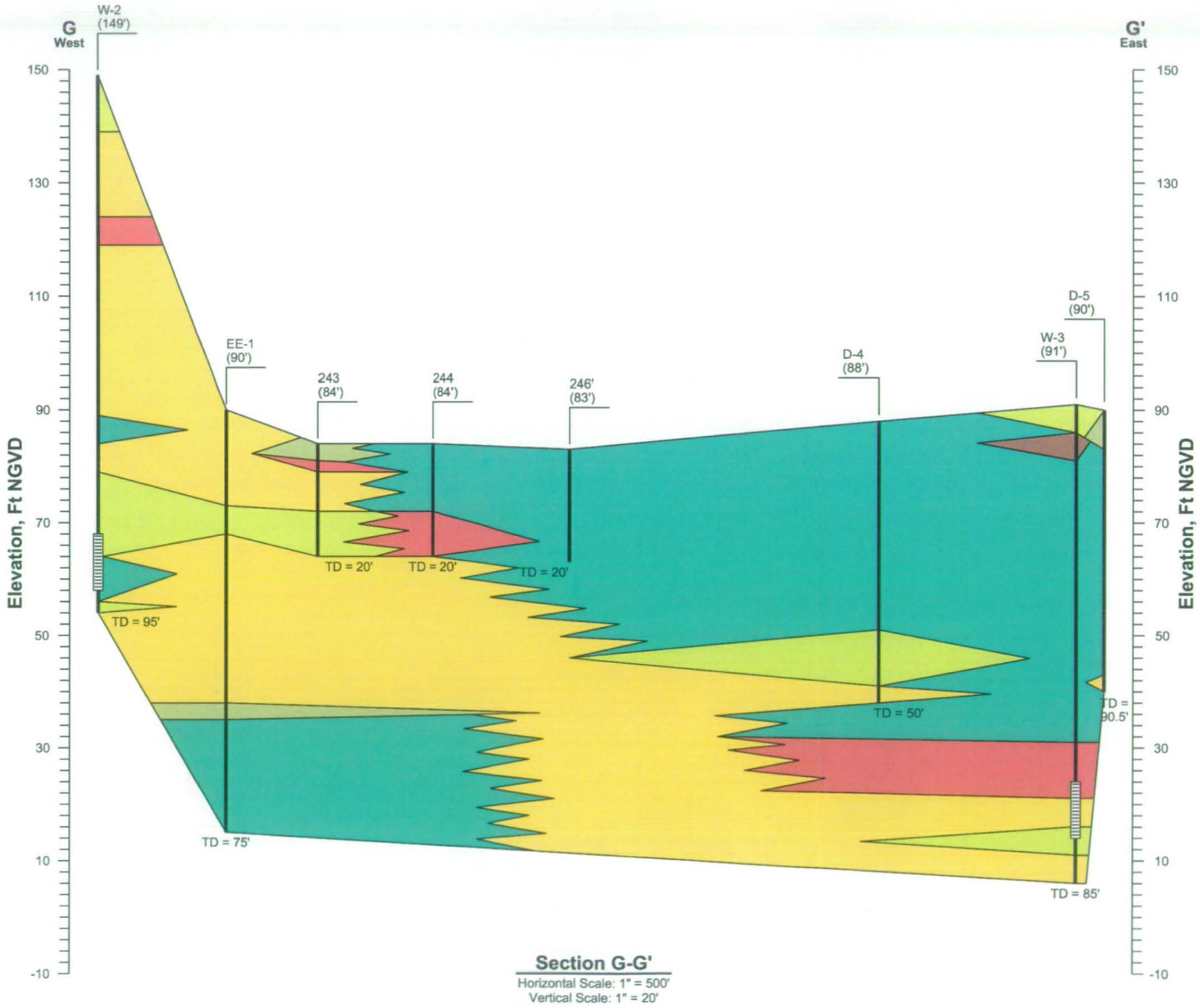
Geologic Cross Sections Location Map

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL, ENGINEERING, INC.

Drawn:	tmp/jbh
Checked:	JHM
Approved:	RS
Date:	09/18/06
Dwg. No.:	01-0009-B017

Figure G-1



Section G-G'
Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

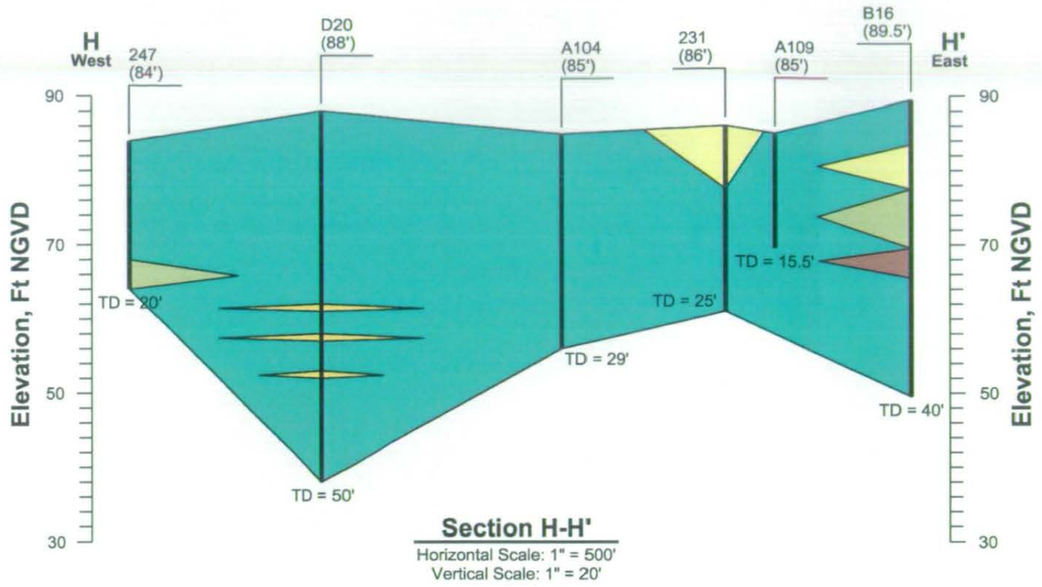
Geologic Cross Sections G-G'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL DIVISION, INC.

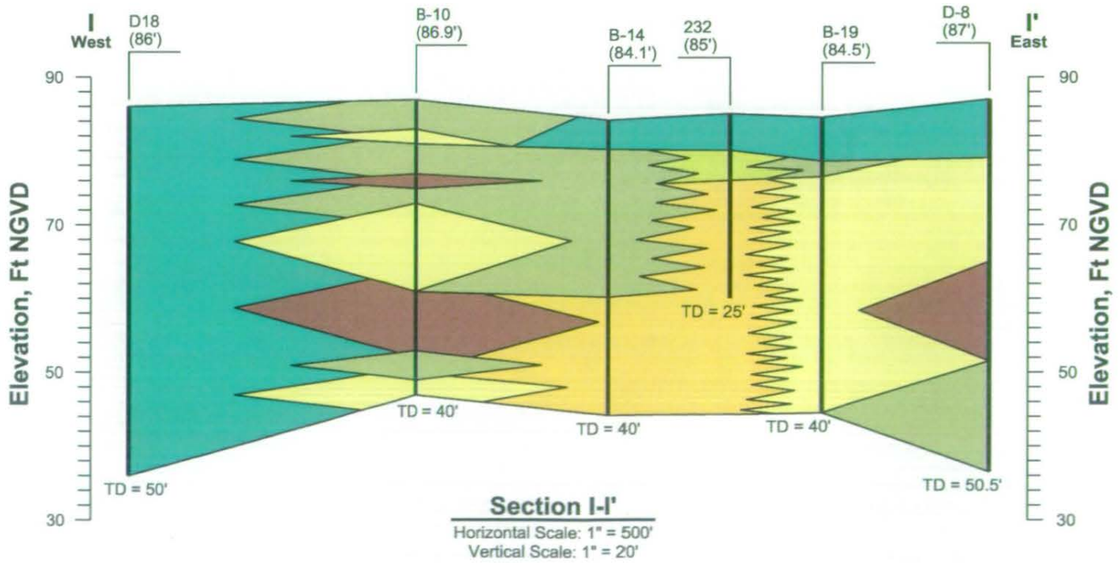
Drawn:	lmp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B008

Figure G-5



Section H-H'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'



Section I-I'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

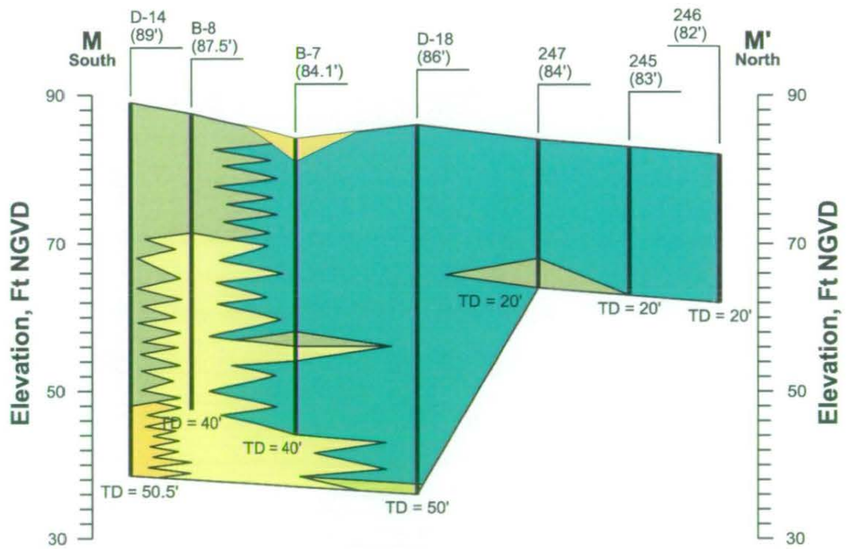
Geologic Cross Sections H-H' and I-I'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B009

Figure G-6



Section M-M'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

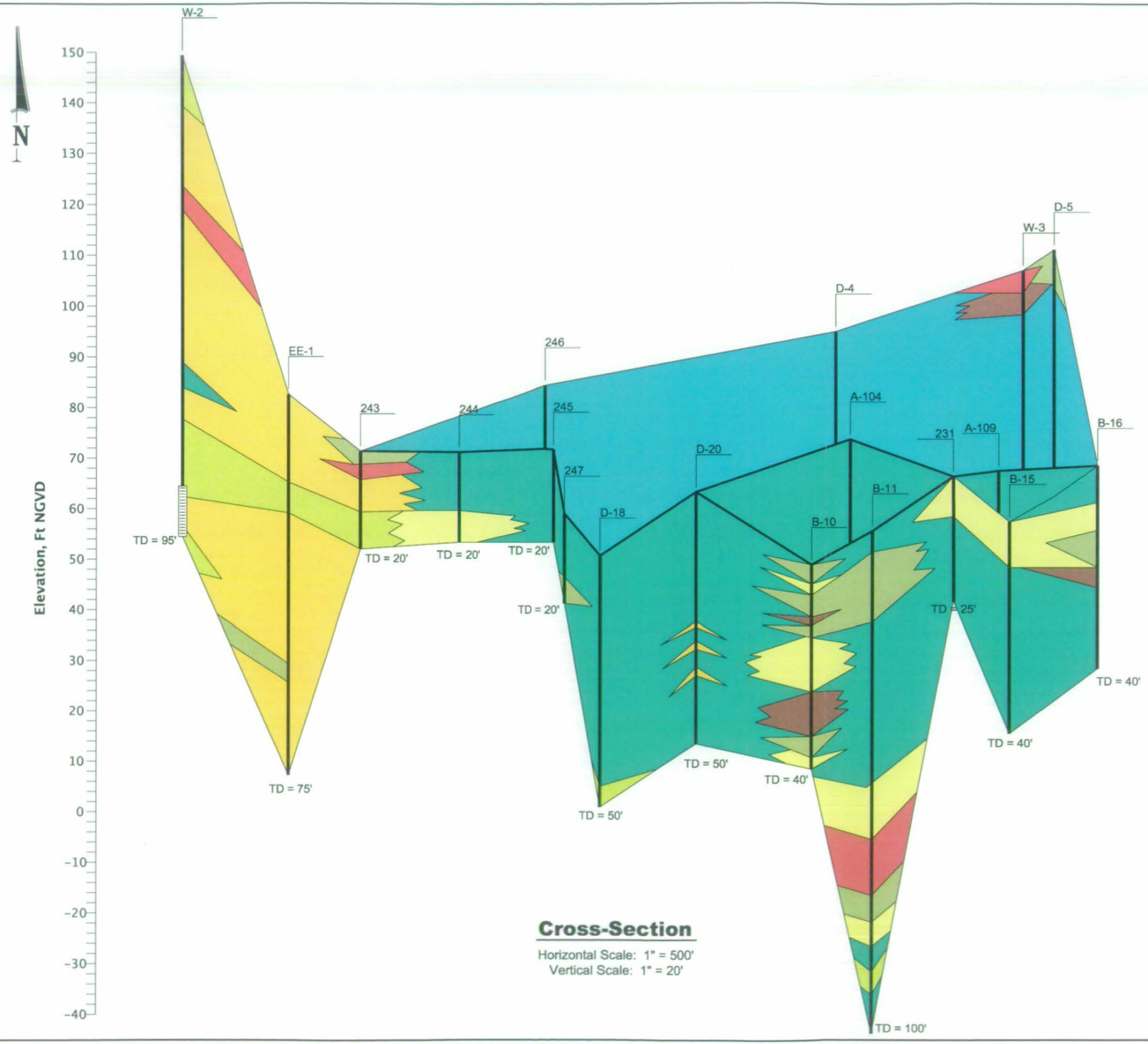
Geologic Cross Section M-M'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	lmp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B013

Figure G-10



Cross-Section

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- TD — Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

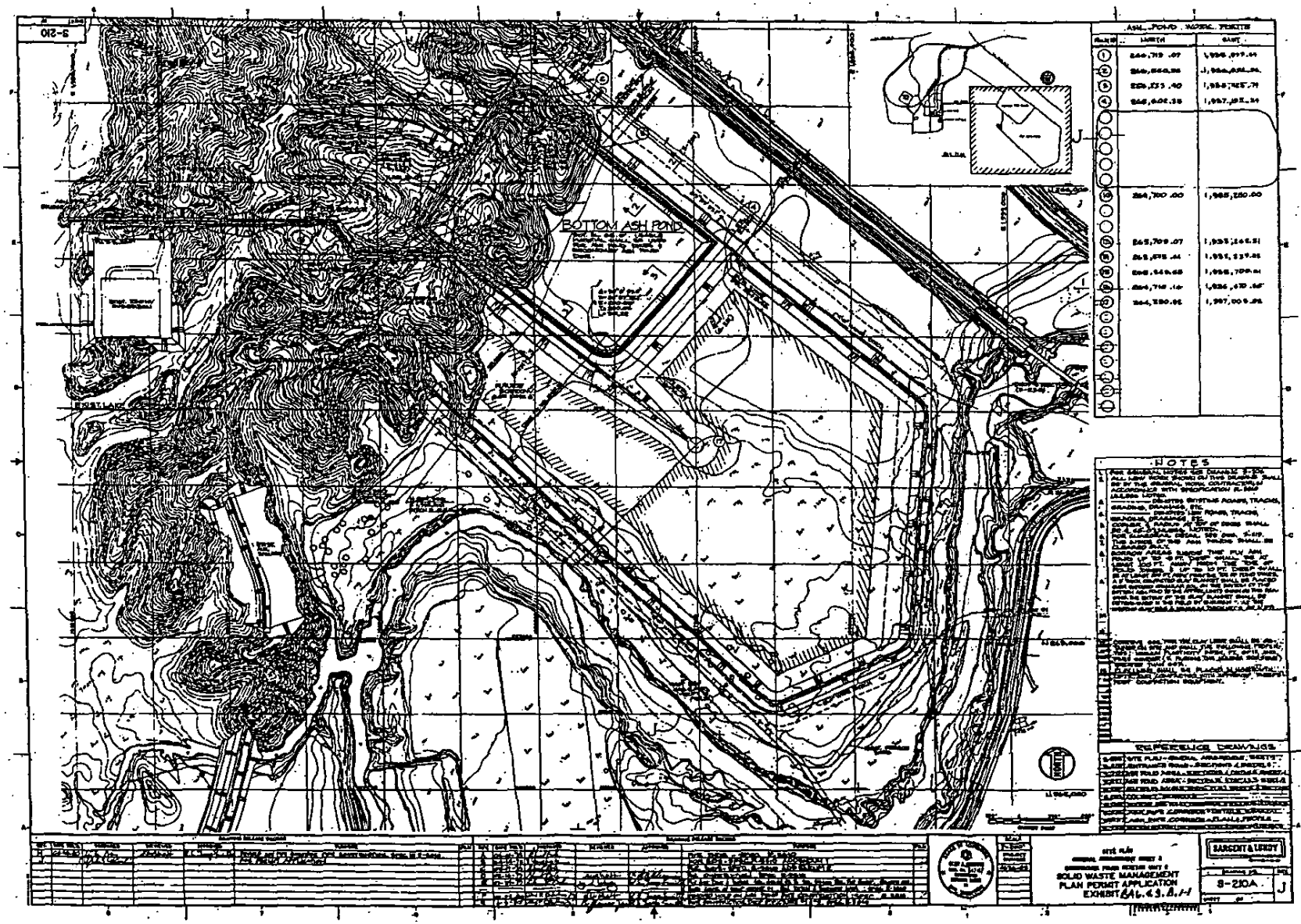
Isometric Soil Profile
Bottom Ash and Fly Ash Pond

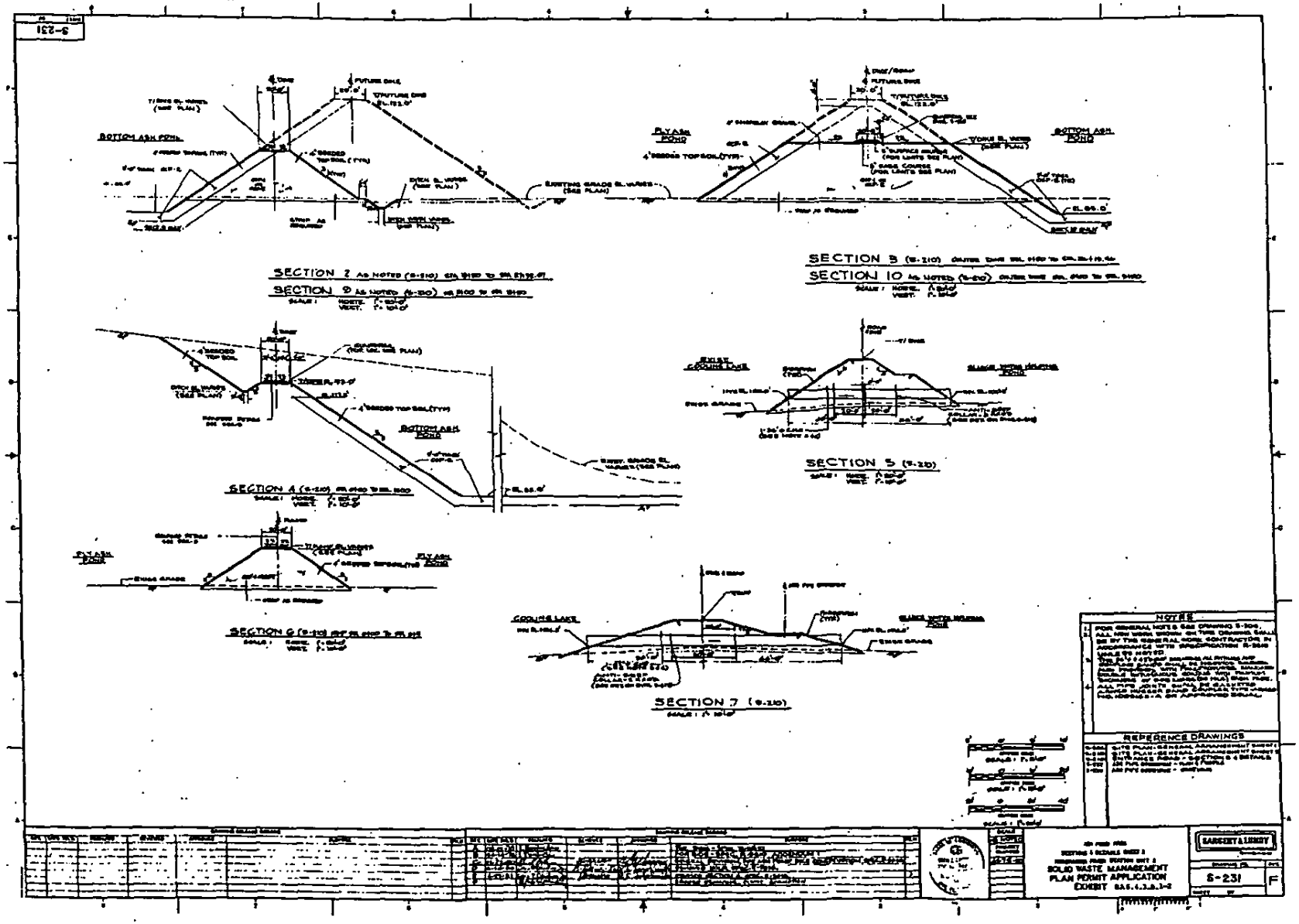
Rapides Parish, Louisiana

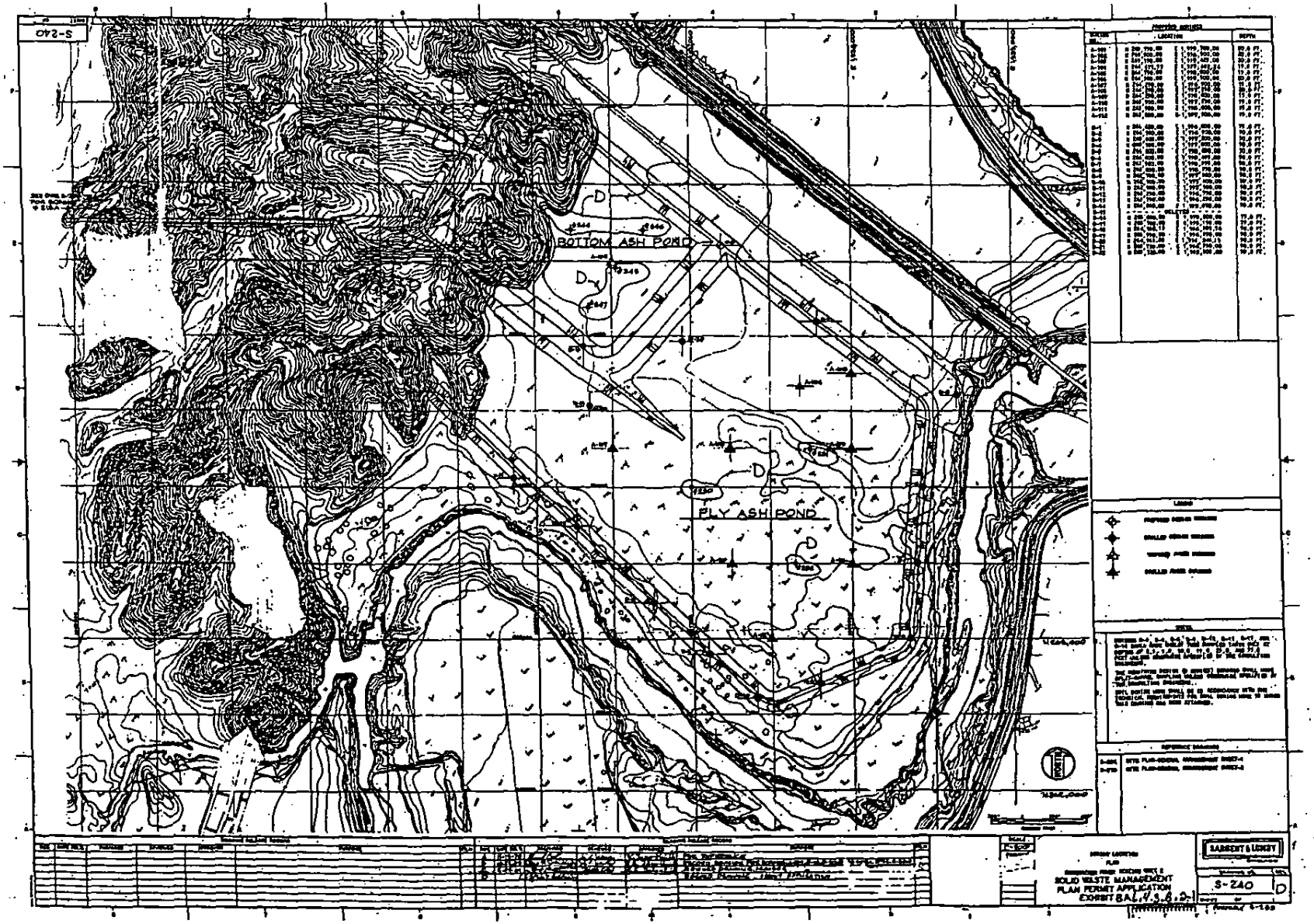
E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

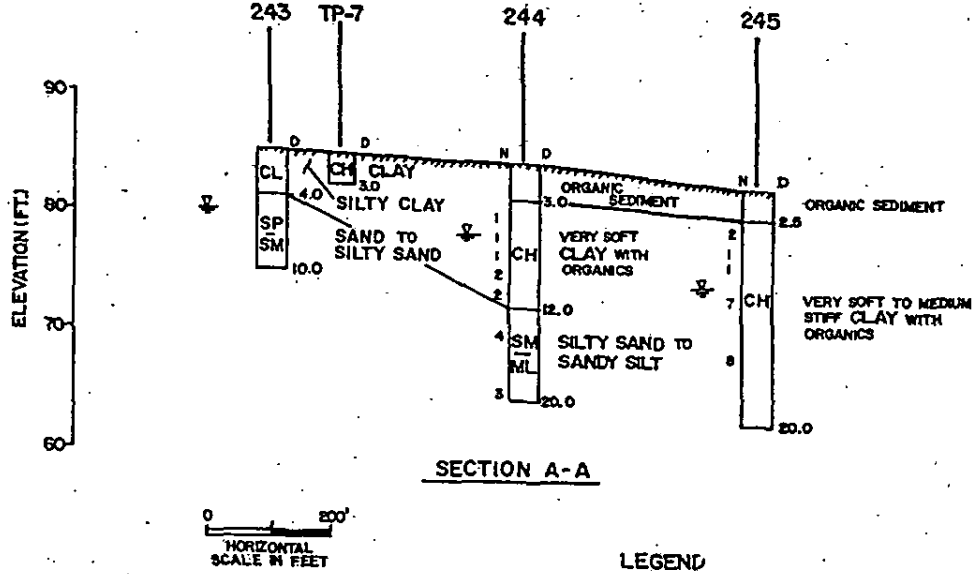
Drawn:	jbh
Checked:	JHM
Approved:	RS
Date:	05/17/05
Dwg. No.:	01-0009-C004

Figure G-15

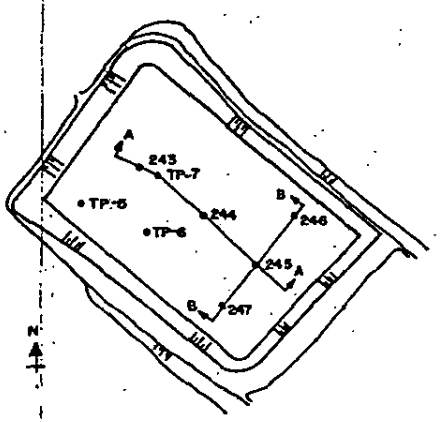

BOTTOM ASH POND
NOTES
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT
SARGENT & LUNDY
S-210A
J


SECTION 7
SECTION 9
SECTION 10
SECTION 8
SECTION 4
SECTION 5
SECTION 6
SECTION 7
NOTES
REFERENCE DRAWINGS
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT
S-231
F


BOTTOM ASH POND
FLY ASH POND
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT B.4.1.3.4.2-1
S-240
D



SECTION A-A



PLAN
N.T.S.

LEGEND

TP = TEST PIT

D = DEPT IN FEET

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

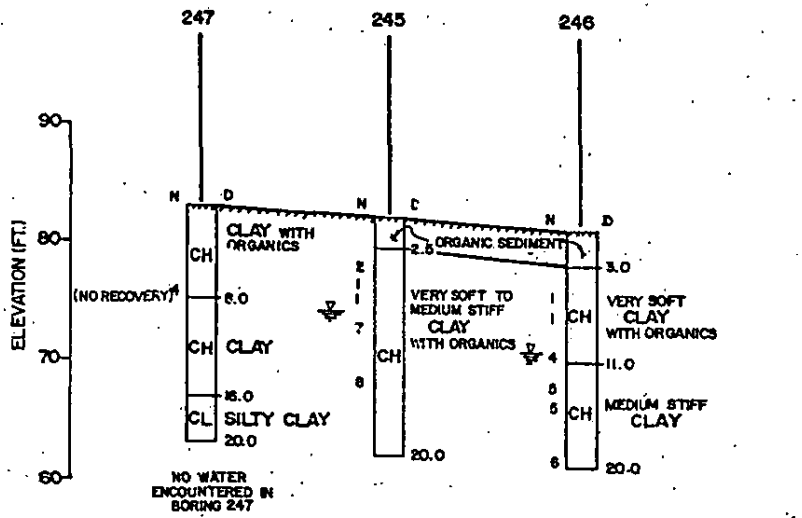
▽ = GROUND WATER LEVEL

= BOTTOM OF POND (TOP OF BORINGS)

GENERALIZED SUBSURFACE DIAGRAM - SECTION A-A
BOTTOM ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT BA 6.4.3.B.2-2



SECTION B-B

LEGEND

D = DEPTH IN FEET

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

▽ = GROUND WATER LEVEL

~~~~ = BOTTOM OF POND (TOP OF BORINGS)

NOTE

1. FOR BORING LOCATION PLAN, SEE SECTION A-A.

GENERALIZED SUBSURFACE DIAGRAM - SECTION B-B.
BOTTOM ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT BA 6.4.3.B.2-3
~~~~

TABLE BA 6.4.3.B.4-1

SUMMARY OF LABORATORY TESTS
BOTTOM ASH POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft^3	Laboratory Permeability (5) cm/sec
Bottom Ash Pond	243	1.5				91	47	20	27	CL	21.8		
		3.0				89	47	19	28	CL	21.7		
		7.5				9	21	N.P.	N.P.	SP-SM	24.6		
	244, 2	4.5				96	69	22	47	CH	97.8 ?		
	3	6.0				97	81	23	58	CH	78.1		
	4	7.5				94	77	23	54	CH	79.2		
	5	9.0				98	69	22	47	CH	63.5		
	6	10.5				97	71	23	48	CH	65.4		
	8	15.0				50	20	17	3	SM-ML	18.2		
	9	20.0				50	19	N.P.(6)	N.P.	SM-ML	18.0		
	245, 2	4.0				93	81	22	59	CH			
	3	5.5				94	74	22	52	CH			
	4	7.0				100	65	21	44	CH			
	6	10.0				98	82	23	59	CH			
	7	15.0				98	-	-	-		63.3		
	246, 2	6.5				95	70	23	47	CH	82.3		
	3	8.0				97	60	21	39	CH	98.2		
	4	9.5				95	85	23	62	CH	40.9		
	5	11.0				?	69	22	47	CH	37.6	78.6	1.3×10^{-8}
	7	15.0				99	64	22	42	CH	32.5		
	8	20.0				100	69	22	47	CH	33.6		
	247, 2	4.0				100	78	21	57	CH	45.0		2.3×10^{-8}
	3	6.0				100	87	24	63	CH	66.0		3.5×10^{-8}
	5	10.0				98	54	20	34	CH	60.8		
	6	15.0				87	70	23	47	CH	30.6		
	7	20.0				98	40	20	20	CH	61.8		

TABLE BA 6.4.3.B.4-1 (Continued)

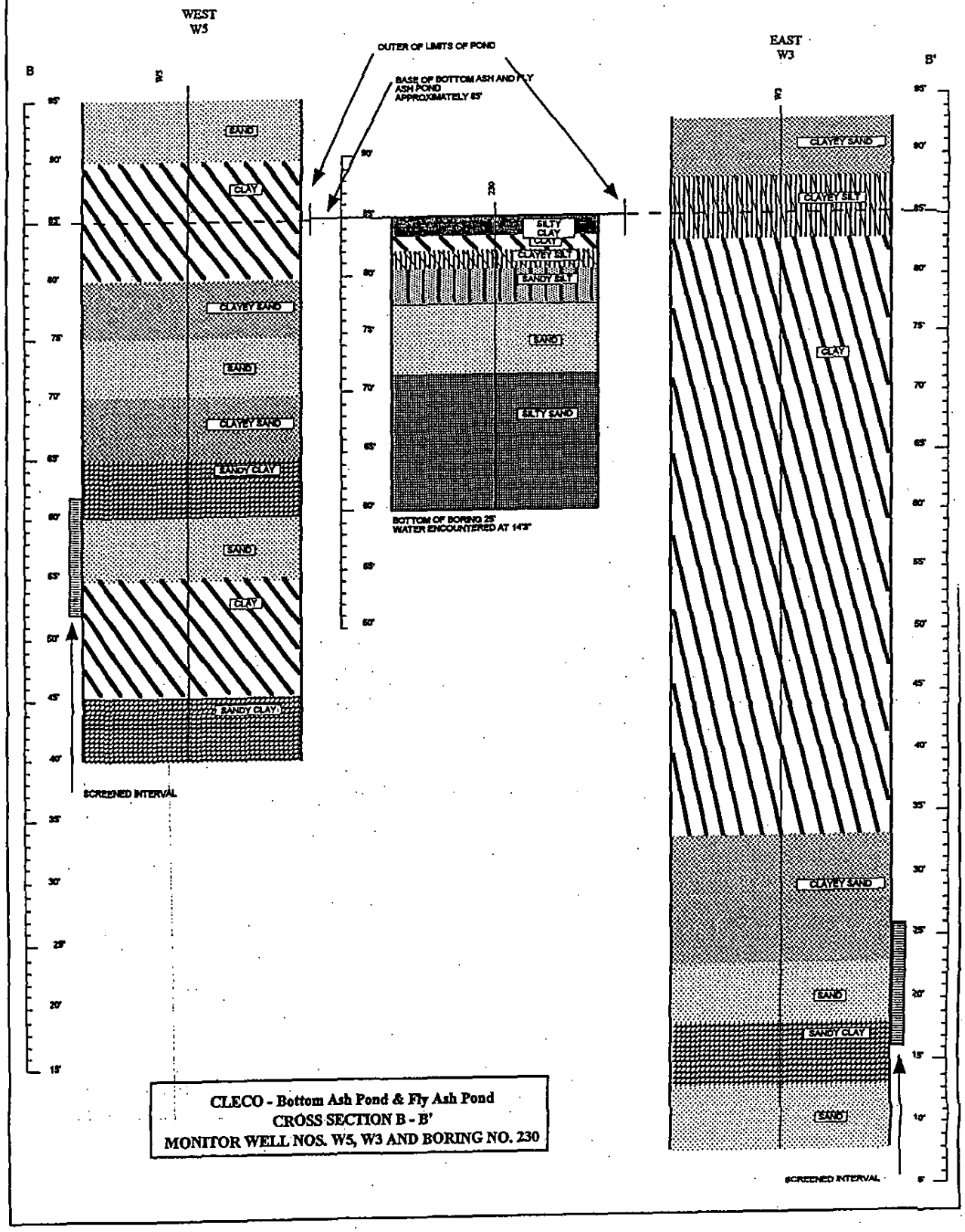
SUMMARY OF LABORATORY TESTS
BOTTOM ASH POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft³	Laboratory Permeability (5) cm/sec
Bottom Ash Pond (CONTD.)	TP-5, 1	1.0	-	-	-	96	60	20	40	CH	28.4		
	2	2.0	-	-	-	96	64	21	43	CH	28.0		
	3	3.0	-	-	-	99	60	21	39	CH	27.6		
	TP-6, 1	1.0	-	-	-	99	65	20	45	CH	24.8		
	2	2.0	-	-	-	99	61	22	39	CH	25.1		
	3	3.0	-	-	-	99	60	21	39	CH	22.4		
	TP-7, 1	1.0	-	-	-	93	58	21	37	CH	26.1		
	2	2.0	-	-	-	99	70	24	46	CH	33.4		
	3	3.0	-	-	-	93	65	22	43	CH	32.8		
													2.1×10^{-8} (A) 1.1×10^{-7} (A)
	230, 2	3.0	100	100	100	100	58	20	38	CH	25.6		
	4	6.0											
	6	9.0											
	8	15.0	-	-	100	66	27	19	8	CL	27.4		
	231, 2	3.0	-	-	-	37	N.P.(6)	N.P.	N.P.	SM	17.7	-	
	4	6.0	-	-	-	15	N.P.	N.P.	N.P.	SM	25.1		
	9	20.0	-	-	-	99	61	20	41	CH	38.9	-	
	232, 1	1.5	-	-	-	100	62	20	42	CH	35.3	-	
	3	4.5	100	100	100	98	58	19	39	CH	36	83	1.1×10^{-6}
	5	7.5	-	-	-	89	29	18	11	CL	24.1	-	

NOTE: A) Two Permeability Tests performed on composite material of all samples from TP-5, TP-6, and TP-7.

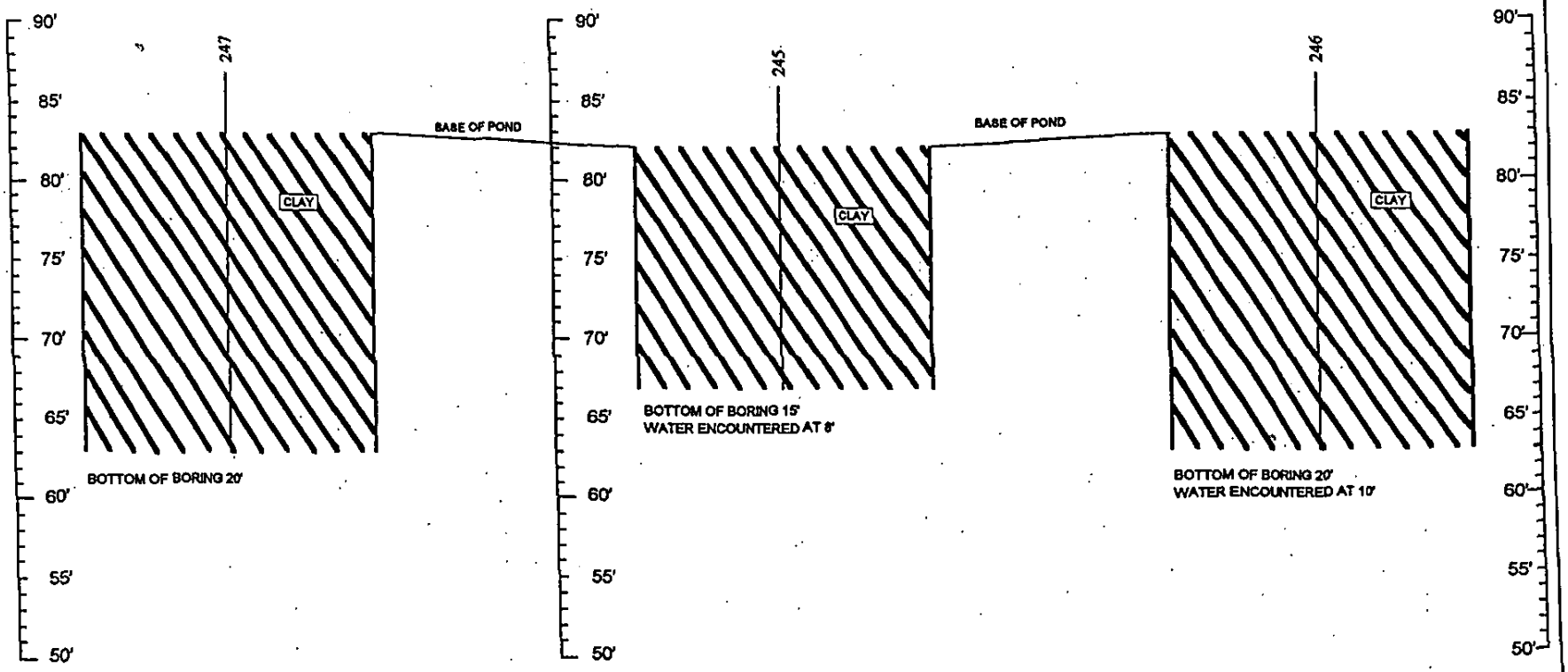
GENERAL NOTES:

(1) Laboratory testing performed by Southwestern Laboratories, Inc., Shreveport, Louisiana
(2) Laboratory Particle-Size Analysis Tests performed in accordance with ASTM D422 and ASTM D1140
(3) Laboratory Atterberg Limit Tests performed in accordance with ASTM D423 and ASTM D424.
(4) Laboratory Water Content Tests of Soils performed in accordance with ASTM D2216. Most of Water Content Tests performed on split-spoon samples.
(5) Laboratory Vertical Permeability Test performed on undisturbed Shelby tube samples unless otherwise



CLECO - Bottom Ash Pond & Fly Ash Pond
CROSS SECTION B - B'
MONITOR WELL NOS. W5, W3 AND BORING NO. 230

CROSS SECTION
C - C'
247, 245, 246

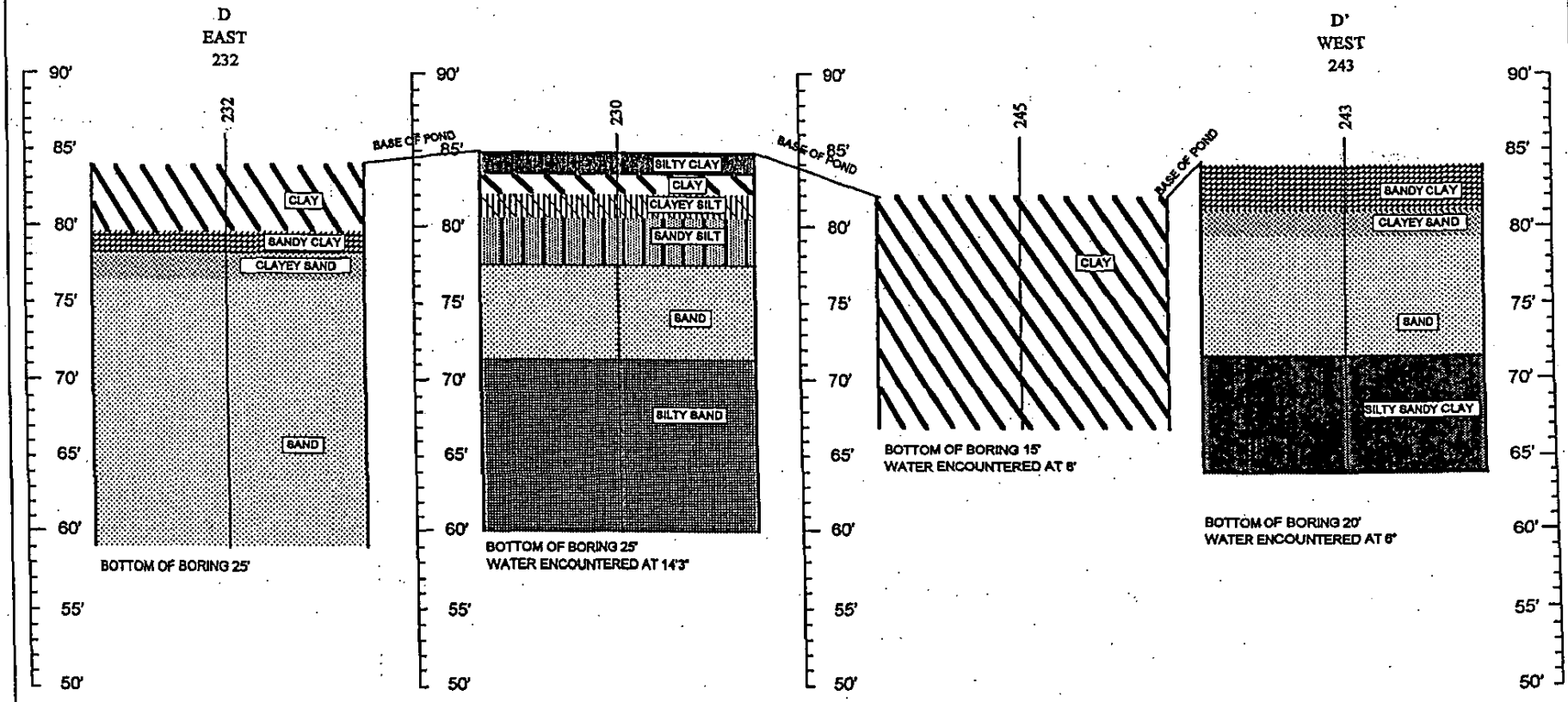


VERTICAL SCALE: 1" = 5'

DATE: 10/15/99

CLECO - Bottom Ash Pond
CROSS SECTION C - C'
BORING NOS. 247, 245, 246

CROSS SECTION
D - D'
232, 230, 245, 243



VERTICAL SCALE: 1" = 5'

DATE: 10/15/99

CLECO - Fly Ash Pond & Bottom Ash Pond
CROSS SECTION D - D'
BORING NOS. 232, 230, 245, 243

APPENDIX D – DESIGN DOCUMENTS

521.F. FACILITY PLANS AND SPECIFICATIONS

1. CERTIFICATION

Appendix D contains a certification by the person who prepared the permit application in accordance with 33.VII.521.F.1

2. INFORMATION REQUIRED FOR TYPE I AND II FACILITIES

2.a. Topography

Typical cross sections of the above ground structures for the Bottom Ash Pond are shown in Exhibits 16, 17 and 18.

2.b. Levee Construction

Exhibit 12 shows the Bottom Ash Pond with original and final contours. The Bottom Ash Pond is located on both alluvial and terrace deposits. The surface area of the pond is 36 acres at elevation 106. The dikes built for the pond have a slope of 3 horizontal to 1 vertical. Four inches of seeded top soil are placed on the outward portions of the dikes for erosion control. The limits of excavation were controlled by the required design size. The ash pipe corridor is also shown in Exhibit 17 along with the discharge channel to the NPDES discharge point. Cross sections of the bottom ash dikes and other details are shown in Exhibit 16.

The size of the pond was designed to accommodate the bottom ash sludge expected to be generated over the lifetime of Unit 2. It is not planned to monitor the daily quantities put into the Bottom Ash Pond beyond normal plant engineering practice of every few years recording an elevation of the top of the sludge and computing the remaining volume versus projected disposal volumes.

Erosion protection was constructed at the water's edge after approval by the LDEQ in 1992.

2.c. Construction Materials

The levees were constructed from on-site materials. Since additional construction is not anticipated, calculations are not applicable. Erosion protection is concrete fabriform.

3. INFORMATION REQUIRED FOR TYPE I, II, AND III LANDFILLS

3.a. Daily Fill and Cover

This section in not applicable to surface impoundments.

3.b. Cover Material

This section is not applicable to surface impoundments.

521.F (cont'd)

4. PREVENTION OF GROUNDWATER CONTAMINATION

4.a. Representative Cross-Sections

The soil types underlying the Bottom Ash Pond comprised a minimum of 3 feet of compacted clay over silty to clayey sands or very plastic in situ clay (CH). Cross sections of the subsurface conditions are shown in Exhibits 13 and 14.

4.b. Liner System

The ground water table is at least 6 feet below construction grade and the 6 feet of soil between the ground water and the bottom of the pond is a CH material. In the northwestern part of the Bottom Ash Pond and in the surrounding dikes, the minimum thickness of compacted clay is 3 feet. The natural impermeability of the in situ soils and the compacted clay liner form a suitable protective barrier to the ground water.

No leachate collection or treatment facilities are needed for the liquid waste pumped to the Bottom Ash Pond. The design of the facility incorporates an impermeable silty clay liner within the dike and over the western portion (see Exhibit 13 for limits) with a natural silty clay liner along the remaining bottom portion of the pond.

4.c. Leachate Collection and Removal System

A leachate collection and removal system was not included as part of the original design of the facility.

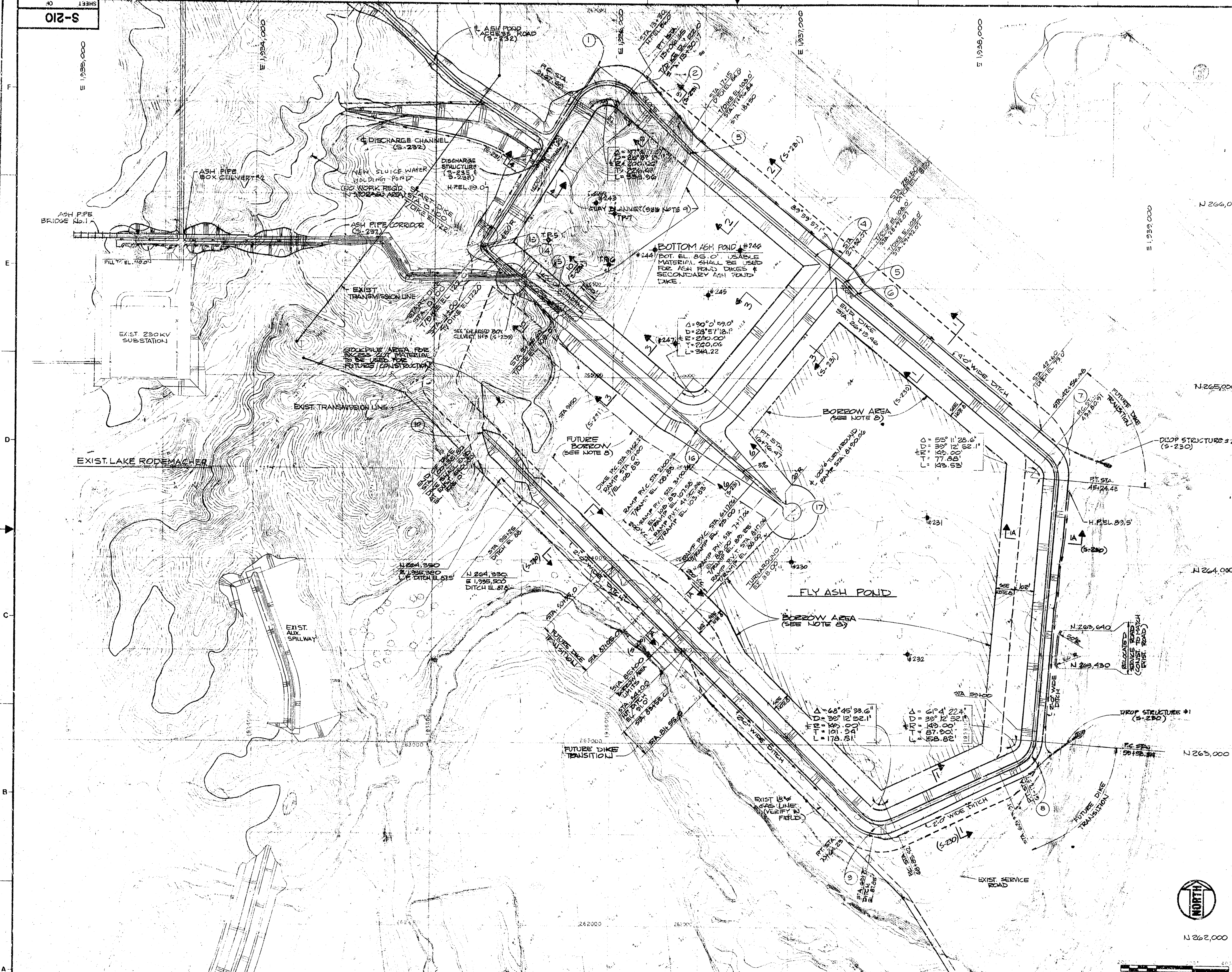
No leachate collection and/or treatment system is planned for the Bottom Ash Pond since it is designed to contain liquids.

5. GROUNDWATER MONITORING

Appendix E contains a comprehensive groundwater monitoring program.

6. GAS COLLECTION AND TREATMENT SYSTEM

A gas collection and treatment system is not provided because surface impoundments do not have a potential to produce any gases.



ASH POND WORK POINTS		
POINT Nº	NORTH	EAST
1	266,719.07	1,935,899.64
2	266,560.56	1,936,092.96
3	266,233.40	1,936,425.74
4	265,602.38	1,937,195.34
5	265,538.98	1,937,272.67
6	265,468.86	1,937,343.98
7	264,538.90	1,938,478.19
8	262,944.03	1,938,351.54
9	262,548.52	1,937,479.11
10	264,700.00	1,935,280.00
13	265,709.07	1,935,262.51
14	265,645.64	1,935,339.82
15	265,349.65	1,935,700.61
16	264,718.16	1,936,470.36
17	264,280.52	1,937,003.82

NOTES

1. FOR GENERAL NOTES SEE DRAWING S-206
2. ALL NEW WORK SHOWN ON THIS DRAWING SHALL BE BY THE GENERAL WORK CONTRACTOR, IN ACCORDANCE WITH SPECIFICATION R-3810 UNLESS NOTED.
3. ——— DENOTES EXISTING ROADS, TRACKS, GRADING, DRAINAGE, ETC.
4. ——— DENOTES NEW ROADS, TRACKS, GRADING, DRAINAGE, ETC.
5. CORNER ℄ RADIUS AT TOP OF DIKES SHALL BE ℄ 65'-0" UNLESS NOTED.
6. FOR GUARDRAIL DETAIL SEE DWG. S-219.
7. THE INSIDE OF THE ASH PONDS SHALL BE CLEARED ONLY.
8. BORROW AREAS INSIDE THE FLY ASH POND UP TO 5 FT. DEEP SHALL BE AT LEAST 100 FT. AWAY FROM THE TOE OF POND DIKES & UP TO 10 FT. DEEP SHALL BE AT LEAST 200 FT. AWAY FROM THE TOE OF POND DIKES.
9. A 3' THICK COMPACTED CLAY BLANKET SHALL BE PLACED OVER EXPOSED GRANULAR SOIL ON THE BOTTOM OF THE BOTTOM ASH POND TO THE APPROX. LIMITS SHOWN ON THIS DRAWING. THE EXTENT OF THE CLAY BLANKET SHALL BE DETERMINED IN THE FIELD BY ENSURING THAT THE EXISTING CLAY HAS A MINIMUM THICKNESS OF 3' (FT).
10.
11.
12. COHESIVE SOIL FOR THE CLAY LINER SHALL BE OBTAINED ON SITE AND SHALL THE FOLLOWING PROPERTIES: MINIMUM PLASTICITY INDEX, PI, OF 15, AND FINES CONTENT (% PASSING THE NUMBER 200 SIEVE) GREATER THAN 60%.
13. CLAY LINING SHALL BE PLACED IN HORIZONTAL LIFTS AND COMPACTED WITH APPROVED SHEEPSFOOT COMPACTION EQUIPMENT.

REFERENCE DRAWINGS

S-206	SITE PLAN - GENERAL ARRANGEMENT SHEET-1
S-219	ENTRANCE ROAD - SECTIONS & DETAILS
S-230	ASH POND AREA - SECTIONS & DETAILS SHEET-1
S-231	ASH POND AREA - SECTIONS & DETAILS SHEET 2
S-232	ASH POND ACCESS ROAD - PLAN, PROFILE & SECTIONS
S-233	CULVERT SCHEDULE
S-235	BOTTOM ASH POND DISCHARGE PIPE - PLAN & DETAILS
S-236	ASH PIPE CORRIDOR - DETAILS SHEET-1
S-237	ASH PIPE CORRIDOR - PLAN & PROFILE
S-238	BOTTOM ASH POND DISCHARGE STRUCTURE-PLAN & DETAILS

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	04-01-78	[signature]			FOR BIDS - SPEC R-3810	X
B	04-14-78	[signature]			FOR BIDS - SPEC. R-3810 ADDENDUM 1	X
C	05-17-78	[signature]			FOR BIDS - SPEC. R-3810 ADDENDUM 2	X
D	02-16-79	[signature]	[signature]	[signature]	FOR CONSTRUCTION SPEC R-3810	X
E	07-24-79	[signature]	[signature]	R.E. Torp-Smith	FLY ASH DIKE & DITCH STA 45+24.43 TO STA 59+00 REL. FOR CONST., RELOCATE 6-21, HOLD CONST. OF DROP STRUCT. #1, REV. DITCH & BORROW AREA; SPEC R-3810	X
F	01-22-80	[signature]	[signature]	R.E. Torp-Smith	REMOVED HOLD ON ASH POND DIKE CONSTRUCTION; SPEC R-3810	X
G	4-9-80	[signature]	[signature]	R.E. Torp-Smith	FOR CONSTRUCTION, DROP STRUCTURES #1 & #2. SPEC. R-3810	X

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
H	06-10-80	[signature]	[signature]	R.E. Torp-Smith	REVISED ASH PIPE CORRIDOR FOR CONSTRUCTION, SPEC. Nº R-3810.	✓
J		[signature]			RECORD DWG. - FOR PERMIT APPLICATION	✓
J	02-03-82	[signature]	[signature]	R.E. Torp-Smith	RECORD DWG.	

STATE OF LOUISIANA
GLEN A. CHAUVIN
REG. No. 14747
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

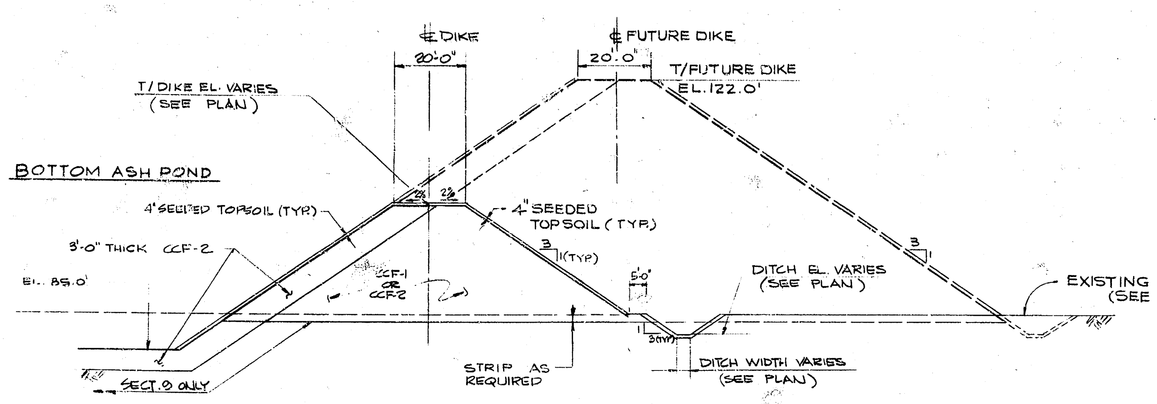
SCALE: 1" = 200'
PROJECT NUMBER: 4676-03

SITE PLAN
GENERAL ARRANGEMENT SHEET 2
RODEMACHER POWER STATION UNIT 2
CENTRAL LOUISIANA ELECTRIC CO., INC.
BOYCE, LOUISIANA

SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO. S-210
REV. J
SHEET OF

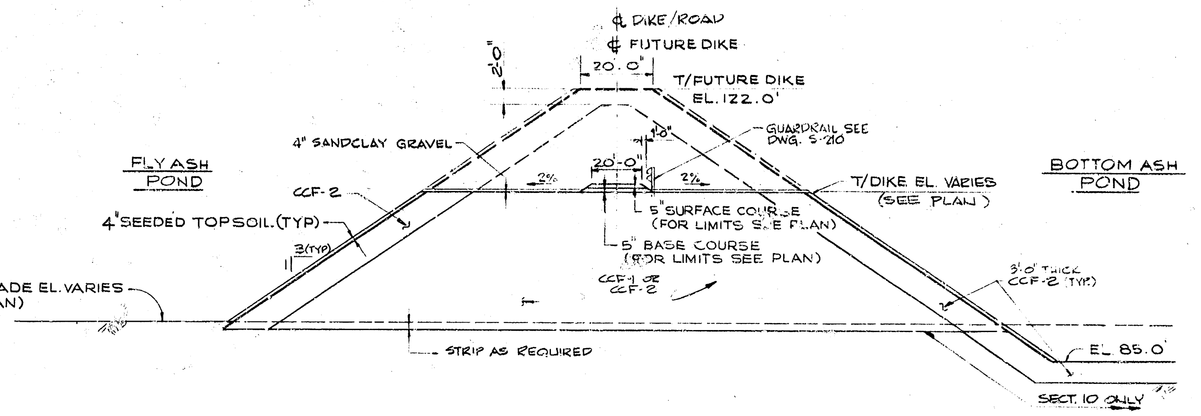
S-210



SECTION 2 AS NOTED (S-210) STA 18+50 TO STA 27+92.07

SECTION 9 AS NOTED (S-210) STA 11+00 TO STA 18+50

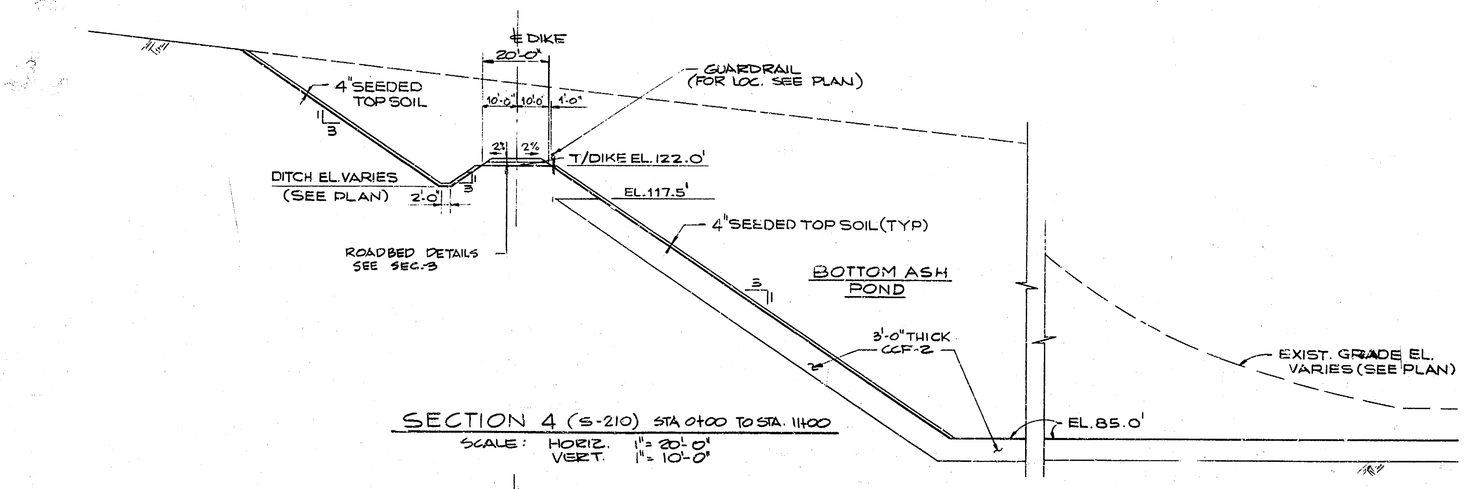
SCALE: HORIZ. 1" = 20'-0"
VERT. 1" = 10'-0"



SECTION 3 (S-210) CENTER DIKE STA 9+50 TO STA. 26+19.96

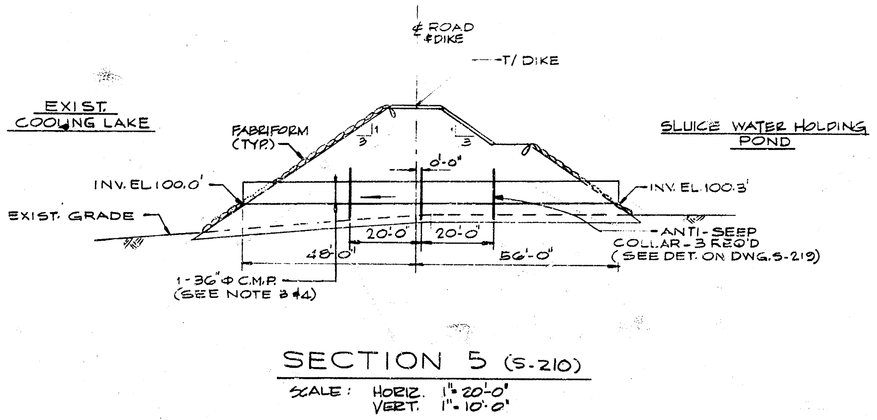
SECTION 10 AS NOTED (S-210) CENTER DIKE STA. 0+00 TO STA 9+50

SCALE: HORIZ. 1" = 20'-0"
VERT 1" = 10'-0"



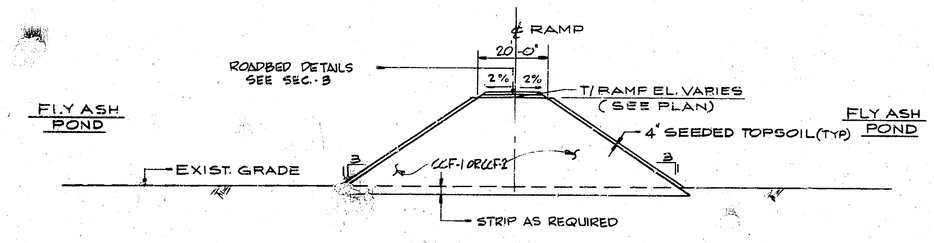
SECTION 4 (S-210) STA 0+00 TO STA. 11+00

SCALE: HORIZ. 1" = 20'-0"
VERT. 1" = 10'-0"



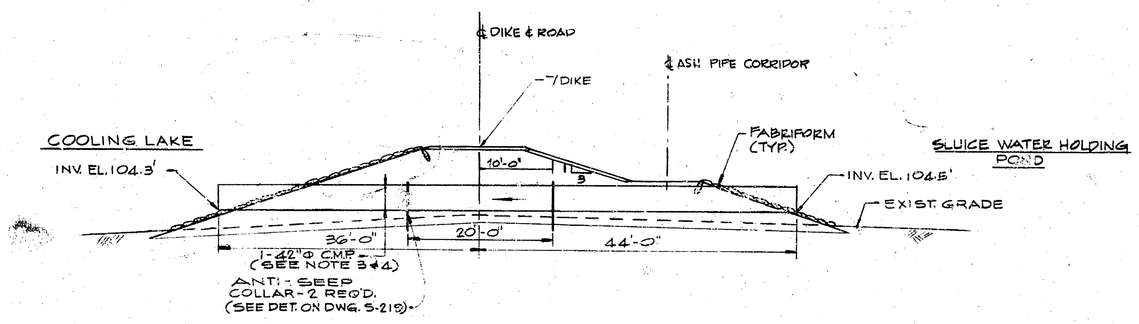
SECTION 5 (S-210)

SCALE: HORIZ. 1" = 20'-0"
VERT. 1" = 10'-0"



SECTION 6 (S-210) RAMP STA 0+00 TO STA 8+17

SCALE: HORIZ. 1" = 20'-0"
VERT. 1" = 10'-0"



SECTION 7 (S-210)

SCALE: 1" = 10'-0"

GRAPHIC SCALE
SCALE: 1" = 5'-0"

GRAPHIC SCALE
SCALE: 1" = 10'-0"

GRAPHIC SCALE
SCALE: 1" = 20'-0"

NOTES

1. FOR GENERAL NOTES SEE DRAWING S-206.
2. ALL NEW WORK SHOWN ON THIS DRAWING SHALL BE BY THE GENERAL WORK CONTRACTOR IN ACCORDANCE WITH SPECIFICATION R-3810 UNLESS NOTED
3. THE 36" & 42" ℄ CMP INCLUDING ALL FITTINGS AND COUPLING BANDS SHALL BE ASBESTOS BONDED AND PROVIDED WITH MANUFACTURERS STANDARD DOUBLE BITUMINOUS COATING WITH MINIMUM THICKNESS OF 0.05 INCHES (50 MILS) EACH FACE.
4. ALL PIPE JOINTS SHALL BE GASKETED ARMCO HUGGER BAND COUPLER TYPE-ARMCO NO. 1005165-A OR APPROVED EQUAL.

REFERENCE DRAWINGS

S-206	SITE PLAN - GENERAL ARRANGEMENT SHEET 1
S-210	SITE PLAN - GENERAL ARRANGEMENT SHEET 2
S-219	ENTRANCE ROAD - SECTIONS & DETAILS
S-237	ASH PIPE CORRIDOR - PLAN & PROFILE
S-239	ASH PIPE CORRIDOR - SECTIONS

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	04-01-78	[illegible]			FOR BIDS - SPEC. R-3810	
B	04-14-78	[illegible]			FOR BIDS - SPEC. R-3810 ADDENDUM 1	
C	01-22-80	[illegible]	[illegible]	[illegible]	GENERAL REVISION, FOR ASH POND DIKE CONSTRUCTION, SPEC. R-3810.	X
D	9-10-80	[illegible]	[illegible]	[illegible]	REVISED HOLD, SPEC. R-3810.	X
E	4-27-81	[illegible]	[illegible]	R. E. Jolly-Smith	REVISED SECTION 4, SPEC. R-3810.	X
F	02-03-82	[illegible]	Shinkhatt	R. E. Jolly-Smith	RECOID DRAWING, PERMIT APPLICATION	
					RECOID DRAWING	

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM

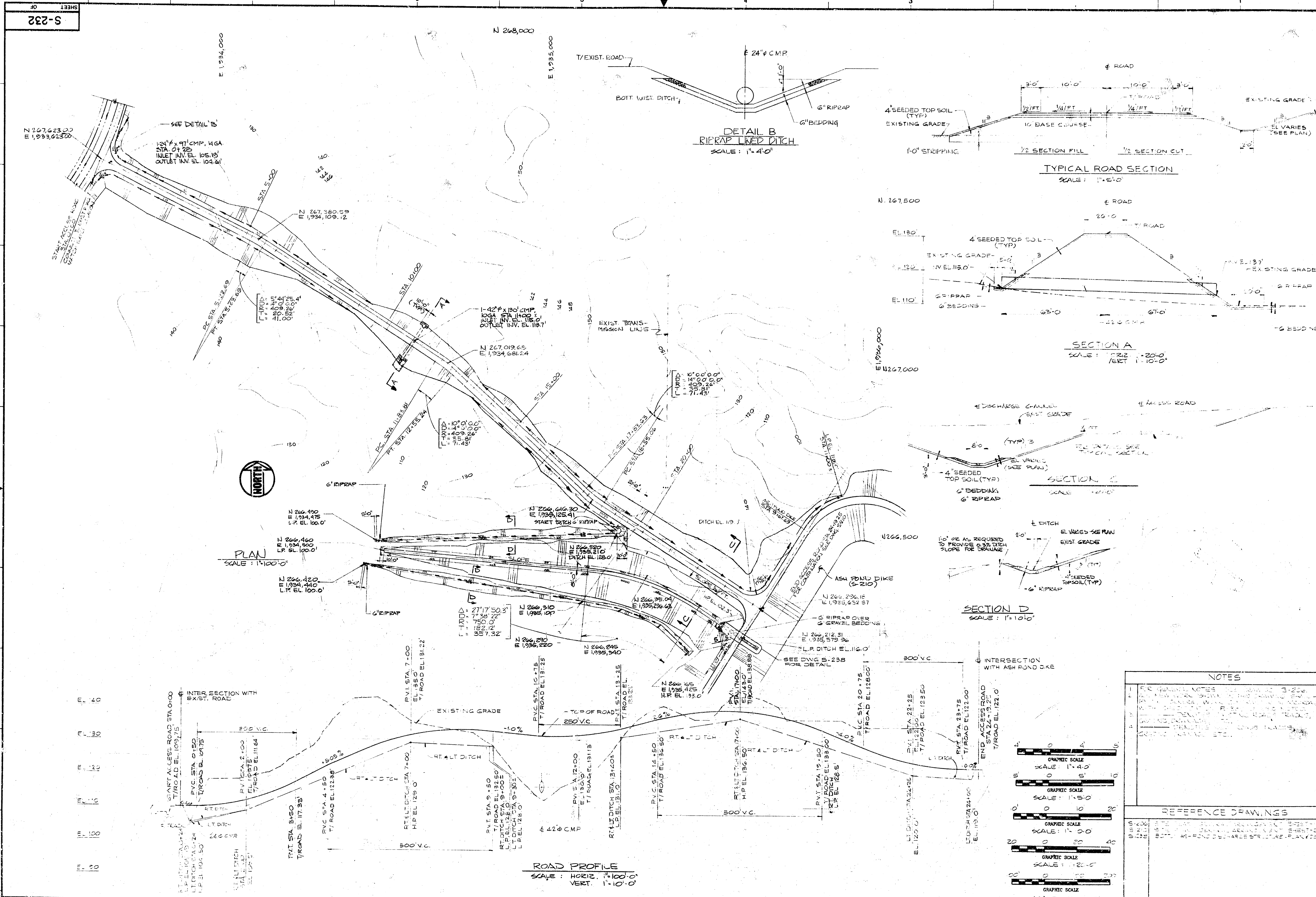
STATE OF LOUISIANA — GLEN [illegible]

SCALE	
AS NOTED	
PROJECT NUMBER	
4676-02	

ASH POND AREA
SECTIONS & DETAILS SHEET 2
RODEMACHER POWER STATION UNIT 2
CENTRAL LOUISIANA ELECTRIC CO., INC.
BOYCE, LOUISIANA

SARGENT & LUNDY ENGINEERS CHICAGO

DRAWING NO.	REV.
S-231	F
SHEET	OF



DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	04-01-78				FOR BIDS - SPEC R-3810	
B	04-14-78				GENERAL REVISION FOR BIDS - SPEC R-3810 ADDENDUM 1	
C	05-17-78				FOR BIDS - SPEC R-3810 ADDENDUM 2	
C	08-16-78				FOR CONSTRUCTION - SPEC R-3810	
D	08-22-79				ADD RIPRAP & BEDDING IN DISCHARGE CHANNEL; SIDE INTERCEPTOR DITCHES; SPEC R-3810	
E	02-02-81				ADDED DITCH ELEVATION	X

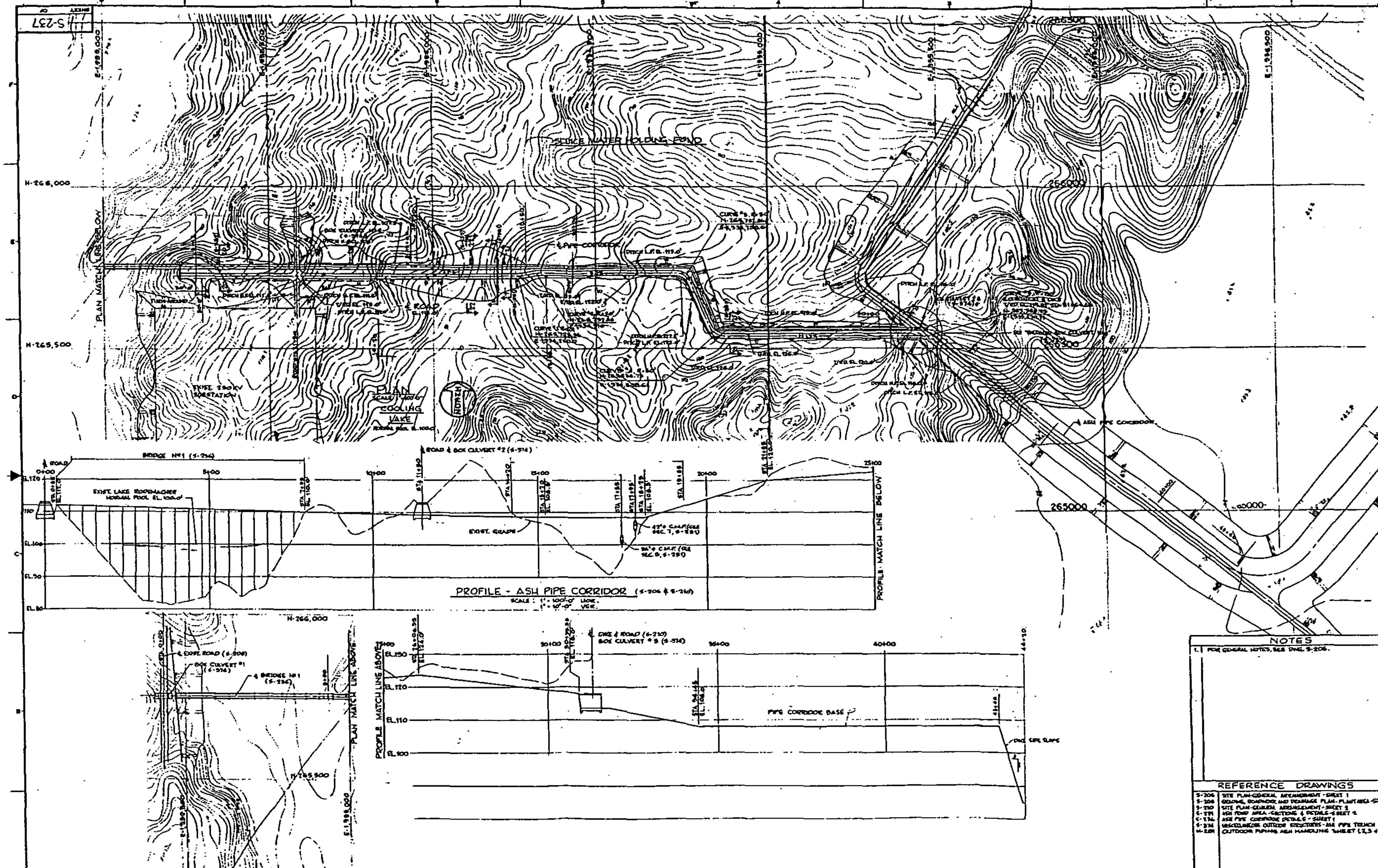
STATE OF LOUISIANA
GLEN A. CHAUVIN
REG. No. 14747
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

SCALE: AS NOTED
PROJECT NUMBER: 4676-03

ASH POND ACCESS ROAD
PLAN, PROFILE & SECTION
RODEMACHER POWER STATION UNIT 2
CENTRAL LOUISIANA ELECTRIC CO., INC.
BOYCE, LOUISIANA

SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO. S-232
REV. E
SHEET OF



NOTES

1. FOR GENERAL NOTES, SEE DWG. S-206.

REFERENCE DRAWINGS

S-206	SITE PLAN-GENERAL ARRANGEMENT - SHEET 1
S-208	GRADING, ROADWORK AND DRAINAGE PLAN - PLANT AREA - SHT 2
S-210	SITE PLAN-GENERAL ARRANGEMENT - SHEET 3
S-235	ASH POND AREA - SECTIONS & DETAILS - SHEET 2
S-236	ASH PIPE CORRIDOR DETAILS - SHEET 1
S-374	MISCELLANEOUS OUTDOOR STRUCTURES - ASH PIPE TRENCH
M-201	OUTDOOR PIPING ASH HANDLING SHEET 1,2,3 & 4

DRAWING RELEASE RECORD

REV	SPEC. NO.	DATE	DRAWN	CHECKED	ENGR. APPROVAL	DESCRIPTION
D	R-3610	6-10-80				FOR ASH PIPE CORRIDOR CONSTRUCTION. REDRAWN.
E	R-3610	10-22-80				REVISED COORDINATES OF CURVES #3 & #4.
F	R-3610	01-07-81				ADDED SECTIONS 20, 21 & 22.
G						RECORD DRAWING, PERMIT APPLICATION.

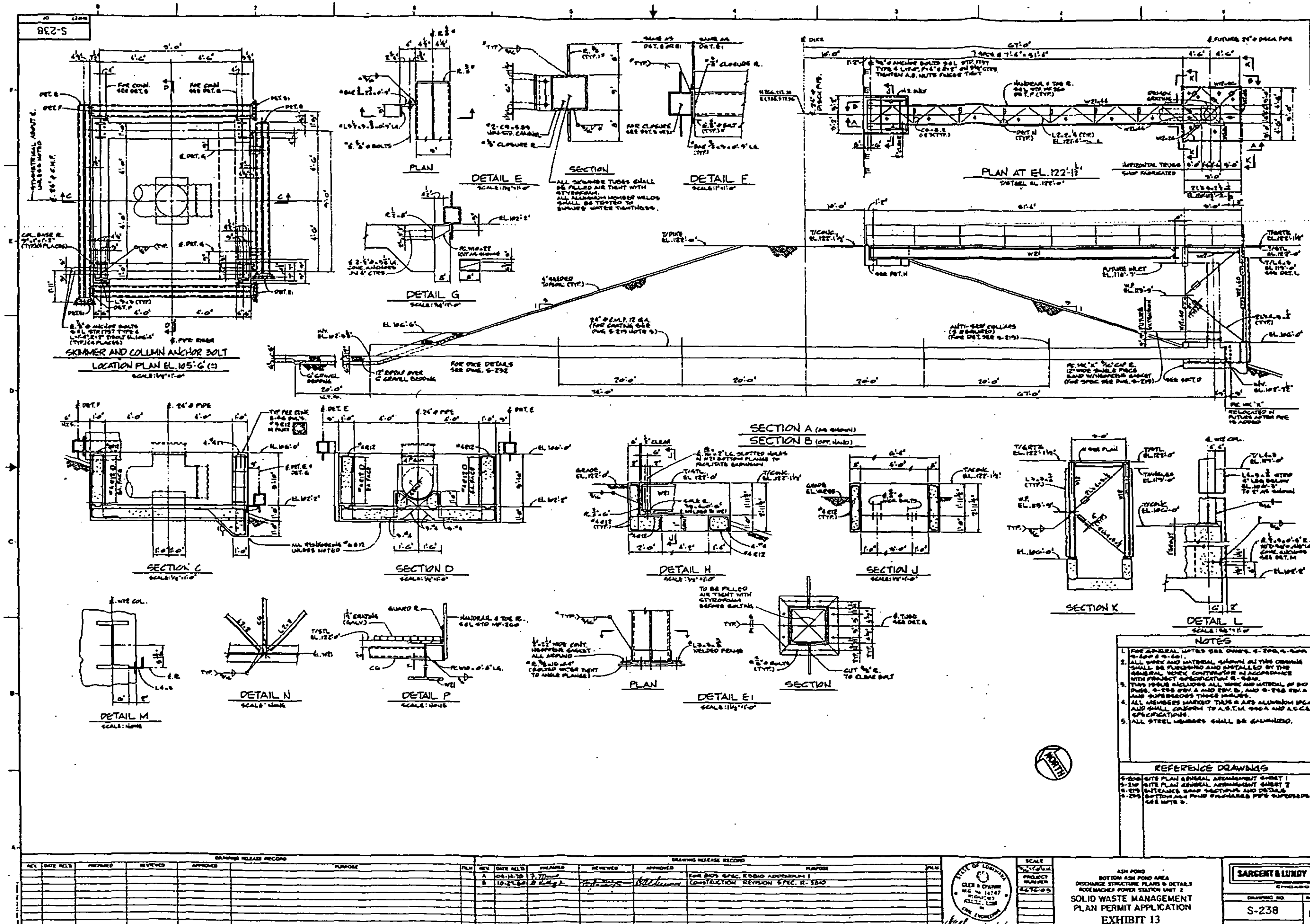
SCALE: 1" = 100'-0"
PROJECT NUMBER: 1676-05

ASH PIPE CORRIDOR
PLAN & PROFILE

RODEMACHER POWER STATION
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT 12

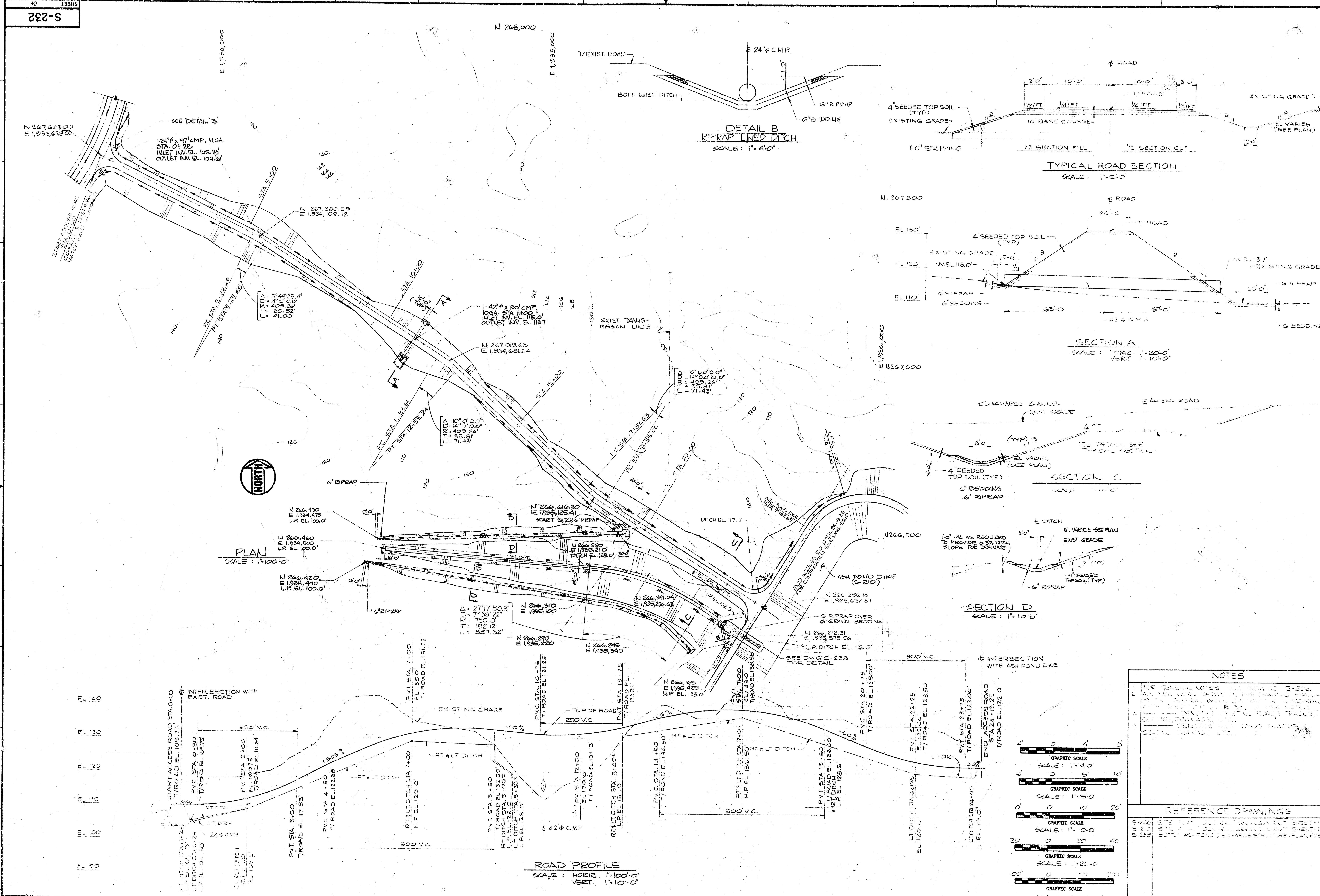
SARGENT & LUNDY ENGINEERS CHICAGO

DRAWING NO. S-237 REV. G



S-238
SKIMMER AND COLUMN ANCHOR BOLT
LOCATION PLAN EL. 105'-6' (±)
PLAN
DETAIL E
SECTION
DETAIL F
DETAIL G
PLAN AT EL. 122'-1½'
SECTION A
SECTION B
SECTION C
SECTION D
DETAIL H
SECTION J
SECTION K
DETAIL L
DETAIL M
DETAIL N
DETAIL P
PLAN
DETAIL E1
SECTION
NOTES
REFERENCE DRAWINGS
ASH POND
BOTTOM ASH POND AREA
DISCHARGE STRUCTURE PLANS & DETAILS
RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT 13
SARGENT & LUNDY
CHICAGO
S-238
B
YF

APPENDIX E – DIVERSION DESIGN FEATURES



SCALE	AS NOTED
PROJECT NUMBER	4676-03

ASH POND ACCESS ROAD
PLAN, PROFILE & SECTION
RODEMACHER POWER STATION UNIT 2
CENTRAL LOUISIANA ELECTRIC CO. INC.
BOYCE, LOUISIANA

SARGENT & LUNDY ENGINEERS CHICAGO

DRAWING NO. S-232 REV. E

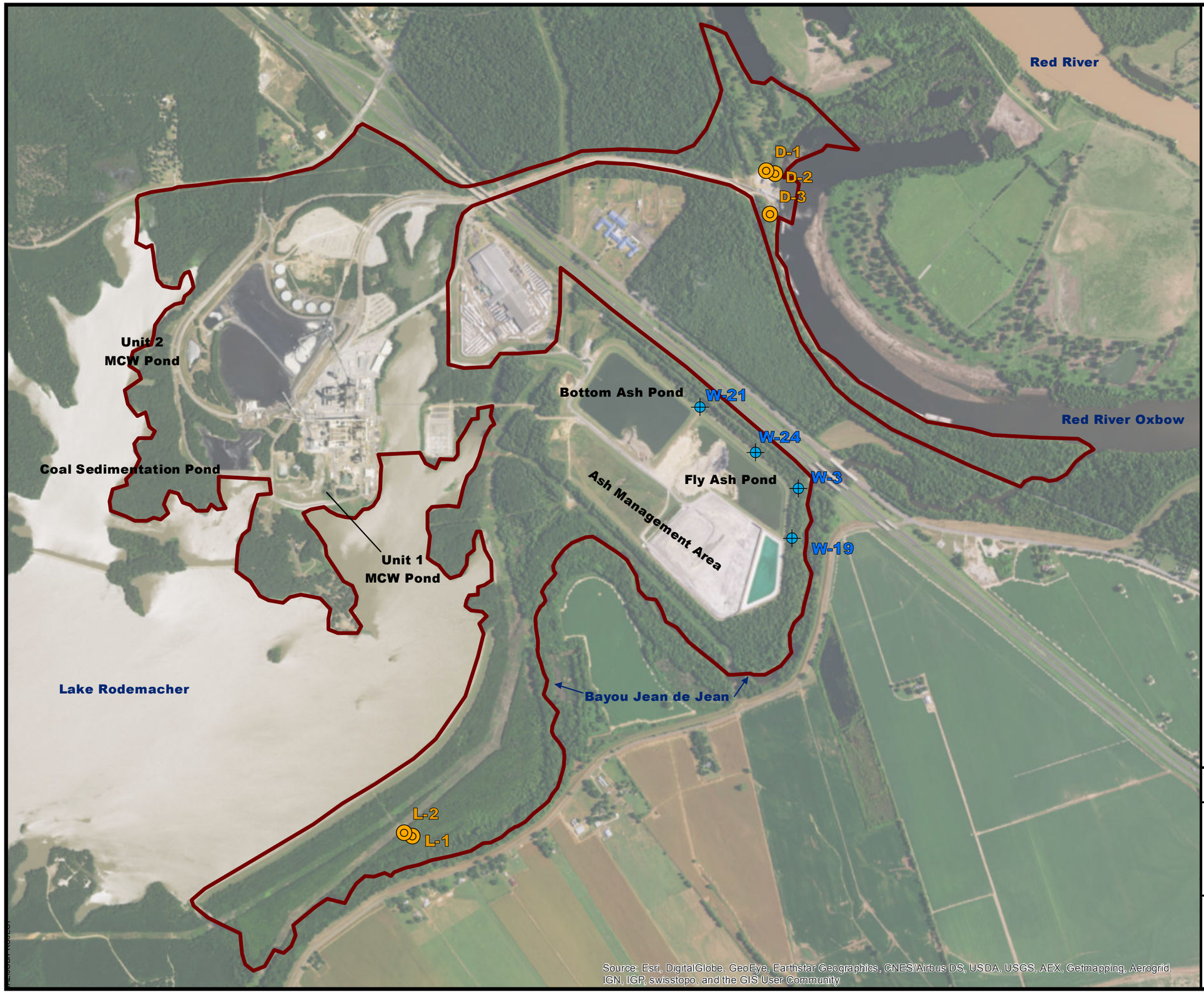
SHEET OF

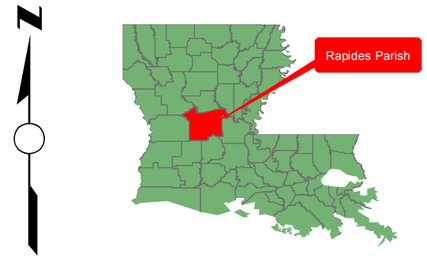
STATE OF LOUISIANA GLEN A. CHAUVIN REG. No. 14747 REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	04-01-78	[signature]			FOR BIDS - SPEC R-3810	
B	04-14-78	[signature]			GENERAL REVISION FOR BIDS - SPEC R-3810 ADDENDUM 1	
C	05-17-78	[signature]			FOR BIDS - SPEC R-3810 ADDENDUM 2	
C	08-16-78	[signature]	[signature]	[signature]	FOR CONSTRUCTION - SPEC R-3810	
D	08-22-79	[signature]	[signature]	[signature]	ADD RIPRAP & BEDDING IN DISCHARGE CHANNEL; SIDE INTERCEPTOR DITCHES SPEC R-3810	
E	02-02-81	[signature]	[signature]	[signature]	ADDED DITCH ELEVATION	X

APPENDIX F – INSTRUMENTATION





Legend

- CCR Rule Compliance Wells
- CCR Rule Background Wells
- Secured Property Boundary

Feet
0 500 1,000 2,000 3,000

CLECO Power LLC

Brame Energy Center

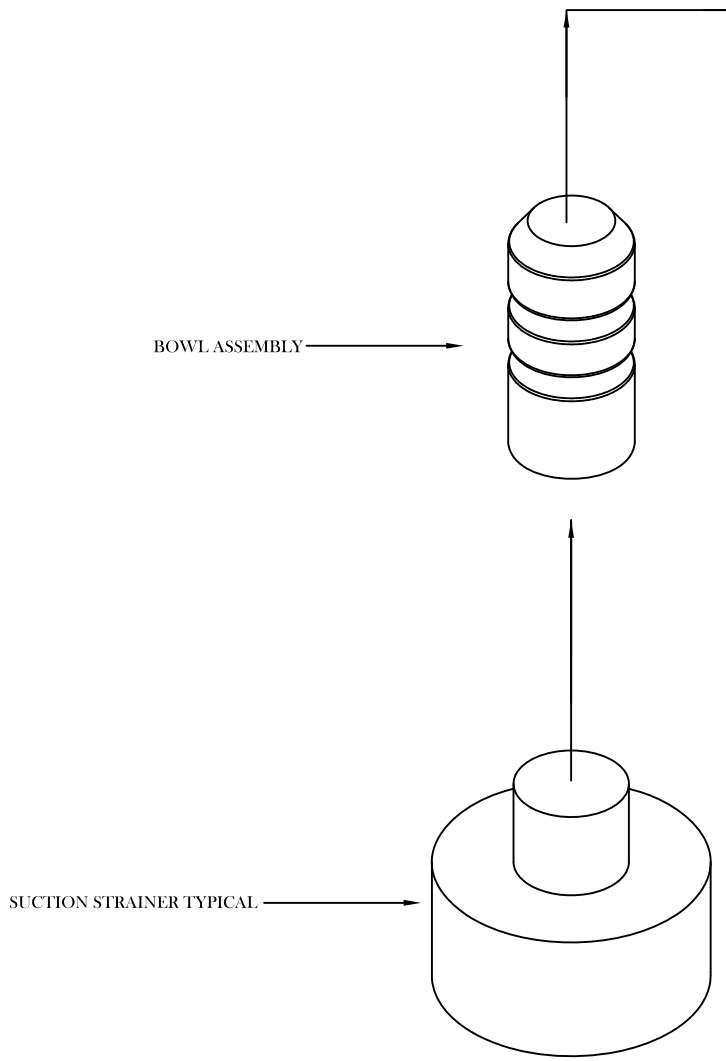
CCR Rule
Monitoring Well Location Map

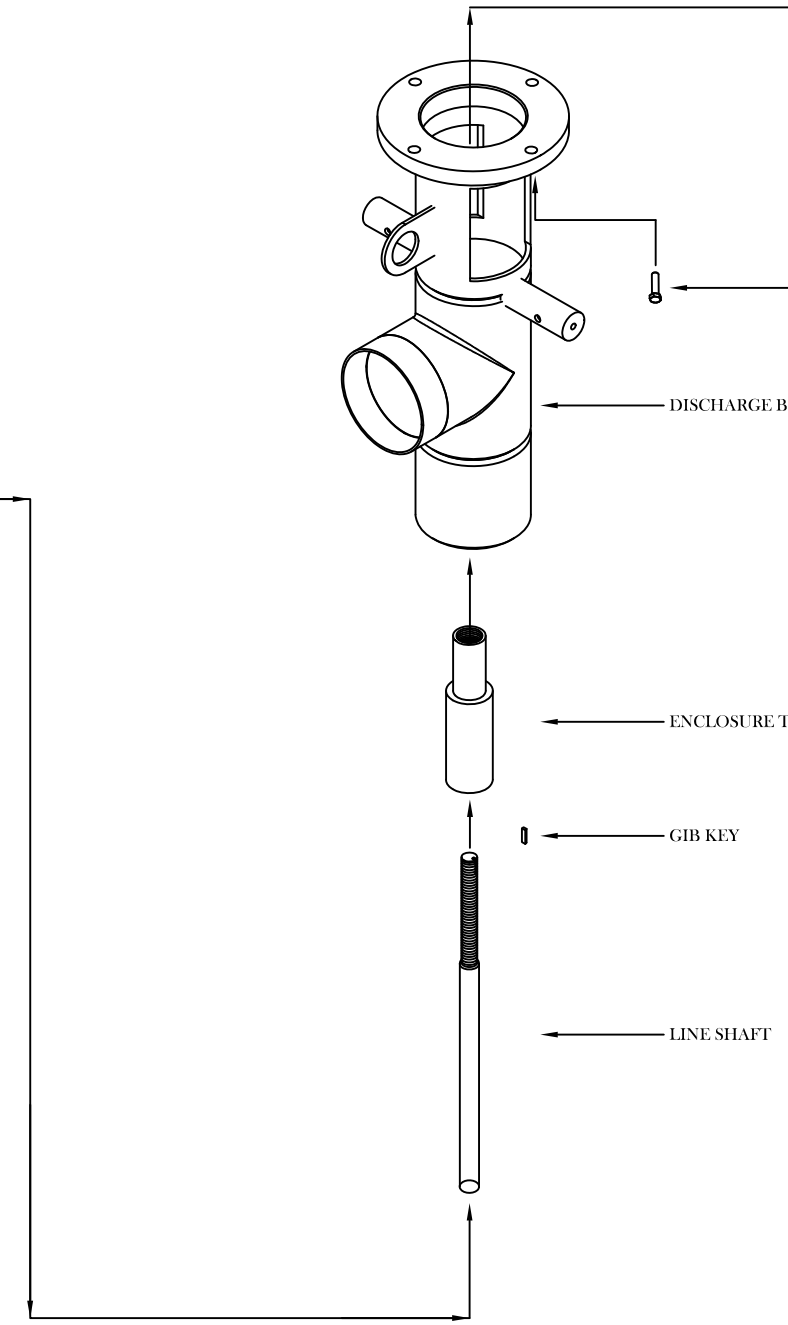
Rapides Parish, Louisiana

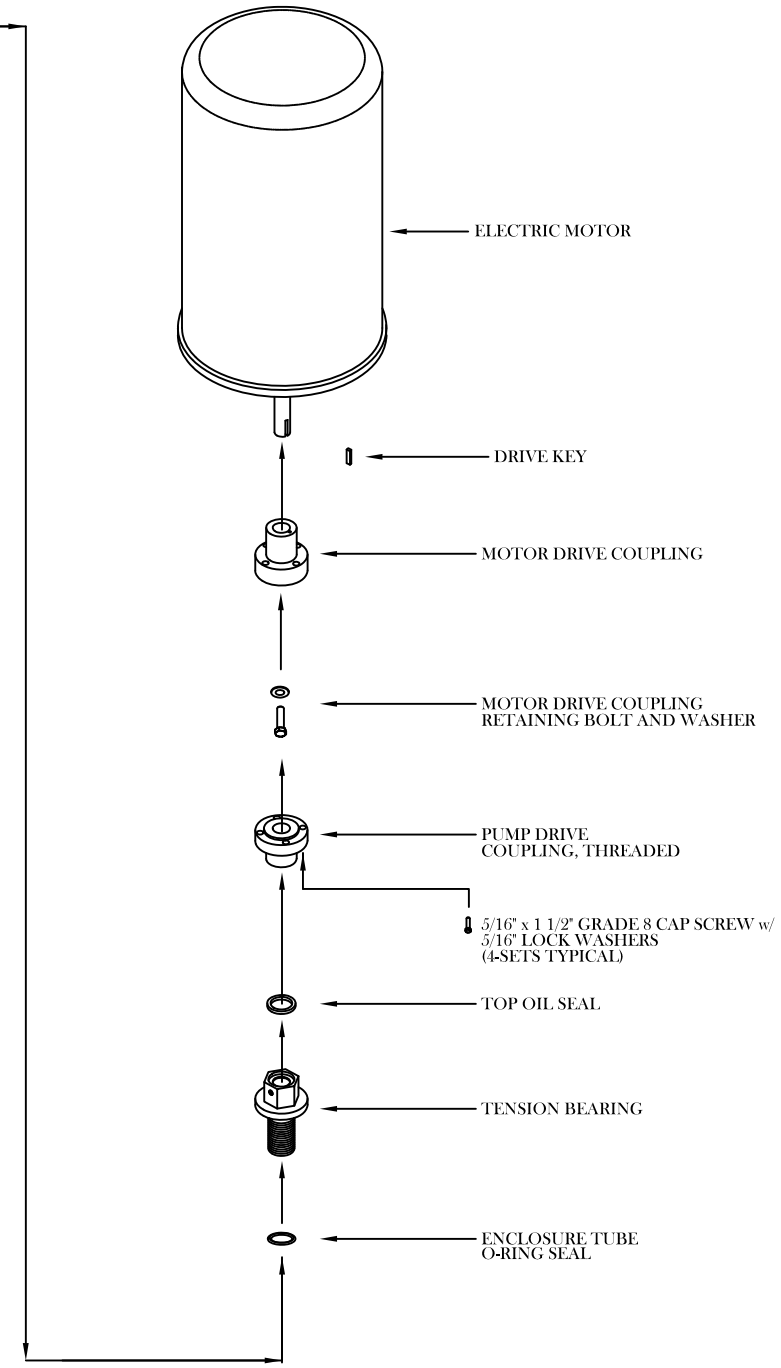
E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	JP
Checked:	RS
Approved:	JM
Date:	10/4/16
Dwg. No.:	01-16-0160-A003

Figure 2







D.S.E., INC.
PROJECT SOLUTIONS
28886 MCR 23
SNYDER, CO 80750
PHONE: (970) 542-0041
FAX: (970) 867-4705

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	DPS	08/02/06
REVISED	DPS	02/22/06
ENG APPR.		
MFG APPR.		
Q.A.		

COMMENTS:

CANFIELD CUSTOM PUMPS

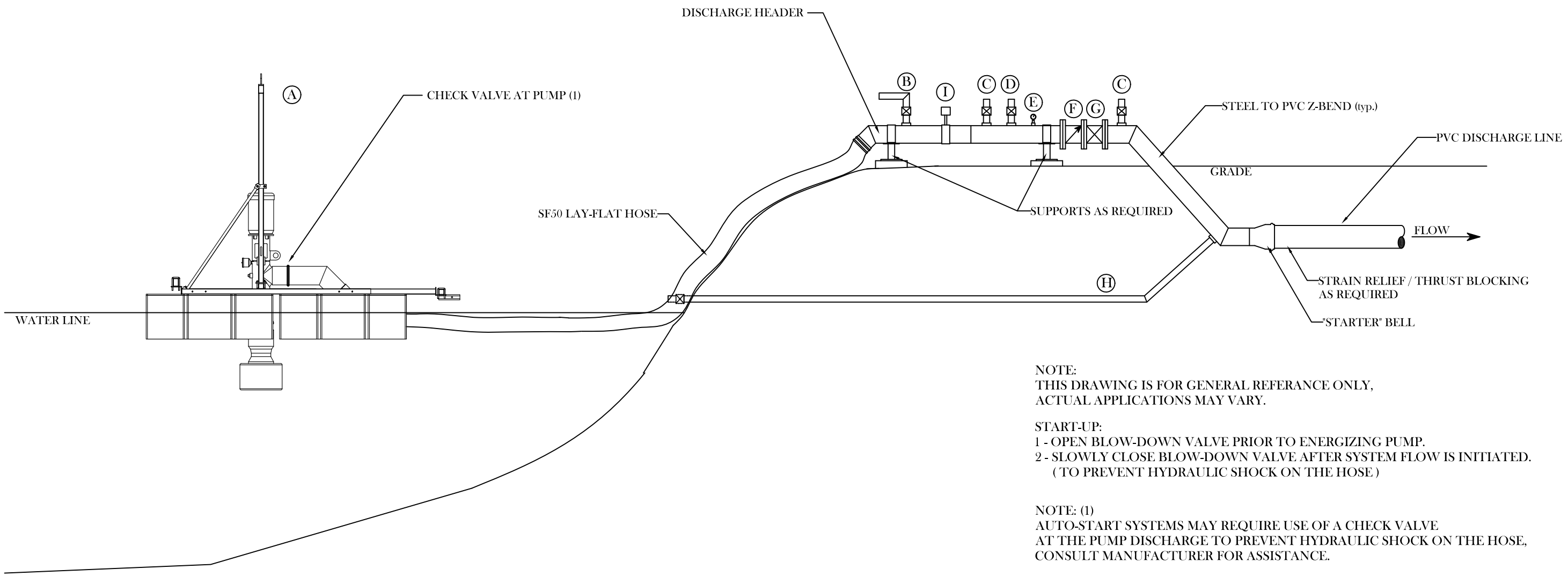
TITLE:
GENERAL PUMP ASSEMBLY DETAIL

SIZE	DWG. NO.	REV
B	ASSEMBLY-004-06	2

SCALE: NONE	WEIGHT:	SHEET 1 OF 1

TYPICAL TURBI-FLOAT AGRICULTURAL INSTALLATION

	DESCRIPTION
A	TURBI-FLOAT PUMP
B	MANUAL BLOW-DOWN / RELIEF VALVE ASSY.
C	AIR RELEASE VALVE - VACUUM BREAKER
D	PRESSURE RELIEF VALVE - OPTIONAL
E	PRESSURE GAUGE
F	CHECK VALVE
G	ISOLATION VALVE
H	OPTIONAL DRAIN LINE w\ VALVE
I	OPTIONAL FLOW METER



NOTE:
THIS DRAWING IS FOR GENERAL REFERANCE ONLY,
ACTUAL APPLICATIONS MAY VARY.

START-UP:
1 - OPEN BLOW-DOWN VALVE PRIOR TO ENERGIZING PUMP.
2 - SLOWLY CLOSE BLOW-DOWN VALVE AFTER SYSTEM FLOW IS INITIATED.
(TO PREVENT HYDRAULIC SHOCK ON THE HOSE)

NOTE: (1)
AUTO-START SYSTEMS MAY REQUIRE USE OF A CHECK VALVE
AT THE PUMP DISCHARGE TO PREVENT HYDRAULIC SHOCK ON THE HOSE,
CONSULT MANUFACTURER FOR ASSISTANCE.

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	DPS	07/21/07
REVISED	DPS	01/15/09
ENG APPR.		
MFG APPR.		
Q.A.		

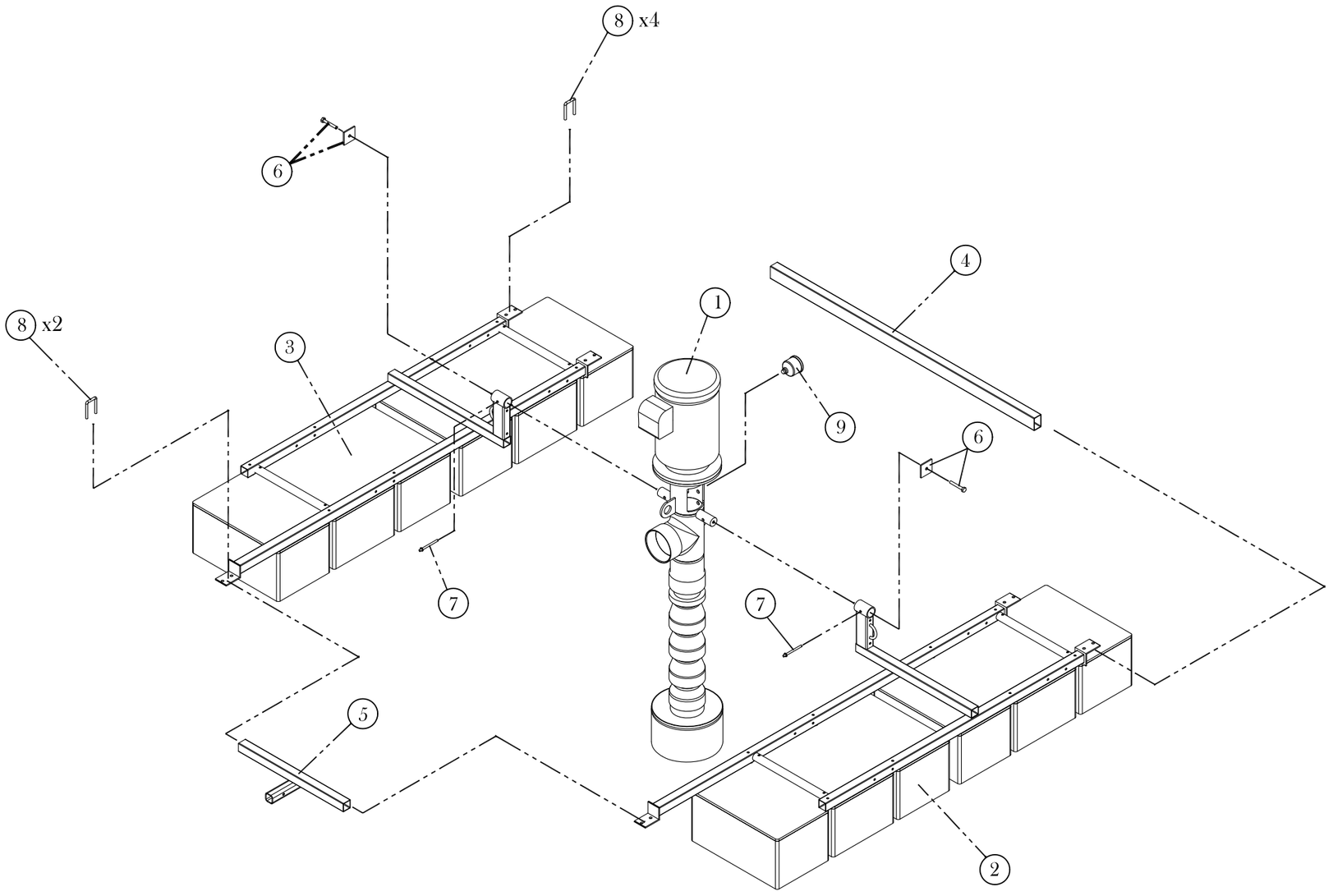
COMMENTS:

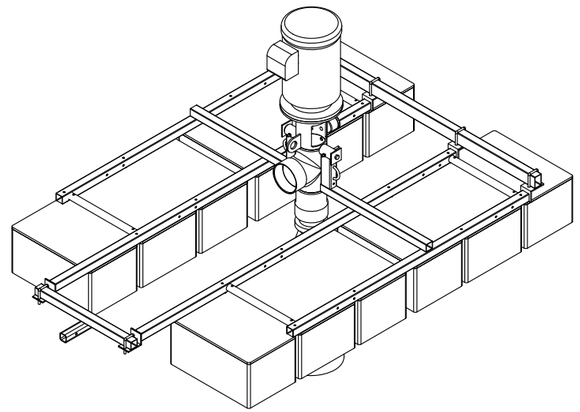
CANFIELD CUSTOM PUMPS

TITLE:
TYPICAL TURBI-FLOAT
AGRICULTURAL INSTALLATION

SIZE	DWG. NO.	REV
B	TF-AG-INSTALL-07	1

SCALE: N.T.S. | WEIGHT: | SHEET 1 OF 1





ASSEMBLY PROCEDURE
STEP 1

ISOMETRIC VIEW

KEY

1. PUMP ASSEMBLY
2. LEFT FLOAT ASSEMBLY
3. RIGHT FLOAT ASSEMBLY
4. REAR BRACE
5. YOKE ASSEMBLY
6. BOLT w/ RETAINER
7. RETAINING PIN
8. U-BOLT & NUT
9. GREASE CUP

D.S.E., INC.
PROJECT SOLUTIONS
28886 MCR 23
SNYDER, CO 80750
PHONE: (970) 542-0041
FAX: (970) 867-4705

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

FINISH

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	DPS	04/07/07
REV DATE		04/07/07
ENG APPR.		
MFG APPR.		
Q.A.		

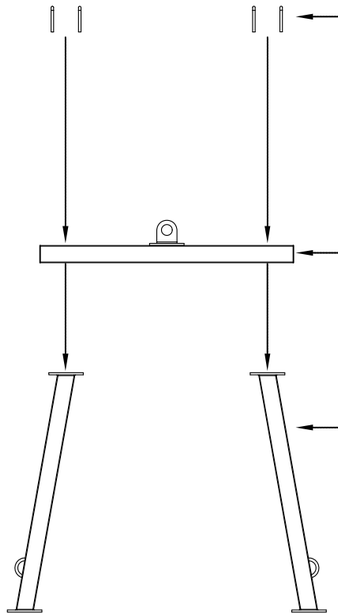
COMMENTS:

CANFIELD CUSTOM PUMPS

TITLE:
GENERAL TURBI-FLOAT
ASSEMBLY DETAIL

SIZE	DWG. NO.	REV
B	ASSEMBLY-001-07	0

SCALE: NONE | WEIGHT: | SHEET 1 OF 3

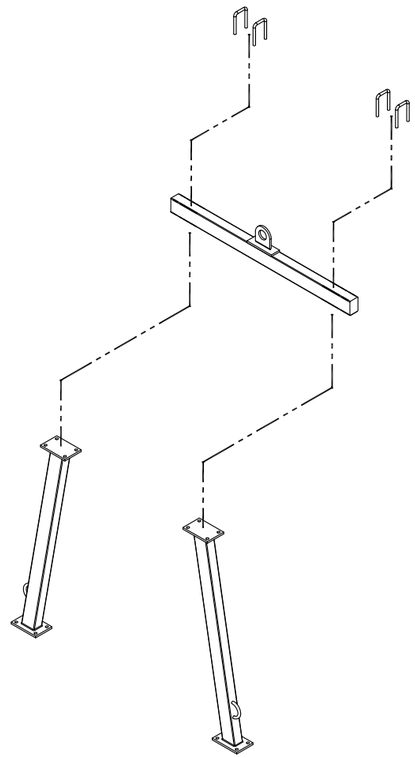


STEP 3:
INSERT U-BOLTS AND BOLT
THE TOP LEG TO BOTTOM LEGS.
ASSEMBLY IS NOW READY TO BE INSTALLED,
AS SHOWN IN THE GENERAL TURBI-FLOAT
ASSEMBLY DETAIL - STEP 2

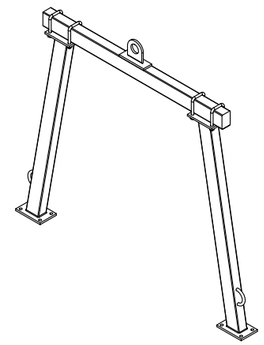
STEP 2:
SLIDE TOP LEG INTO
POSITION ABOVE THE BOTTOM LEGS.
CHECK MEASUREMENT AS SHOWN BELOW.

STEP 1:
LAY BOTTOM LEGS OUT
ON A FLAT SURFACE
AS SHOWN.

FINAL ASSEMBLY



ASSEMBLY LAYOUT
ISOMETRIC VIEW



REVISED
CENTER FRAME SUPPORT
FINAL ASSEMBLY
ISOMETRIC VIEW

D.S.E., INC.
PROJECT SOLUTIONS
28886 MCR 23
SNYDER, CO 80750
PHONE: (970) 542-0041
FAX: (970) 867-4705

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	DPS	07/29/07
REV DATE		-/-/-
ENG APPR.		
MFG APPR.		
Q.A.		

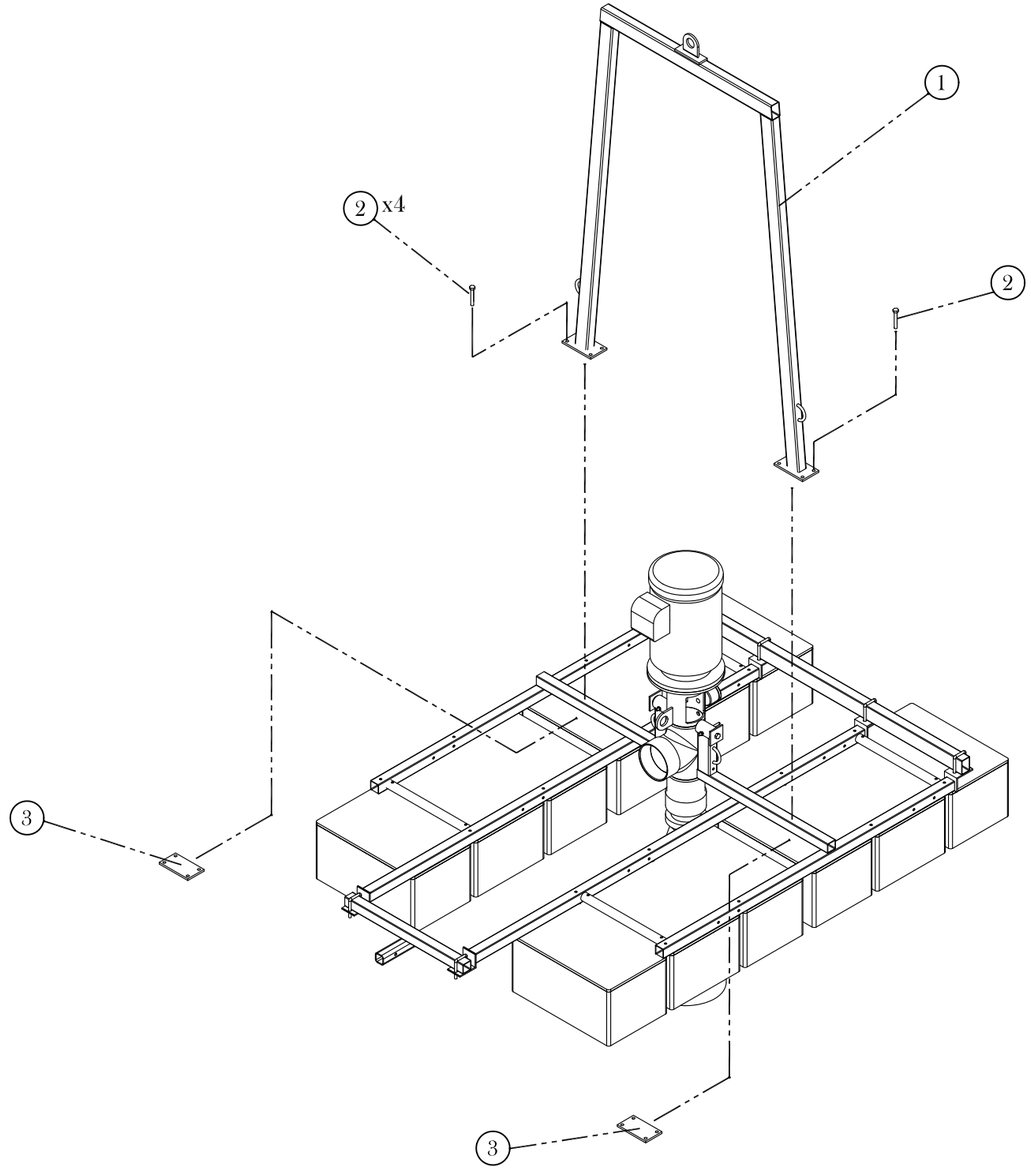
COMMENTS:

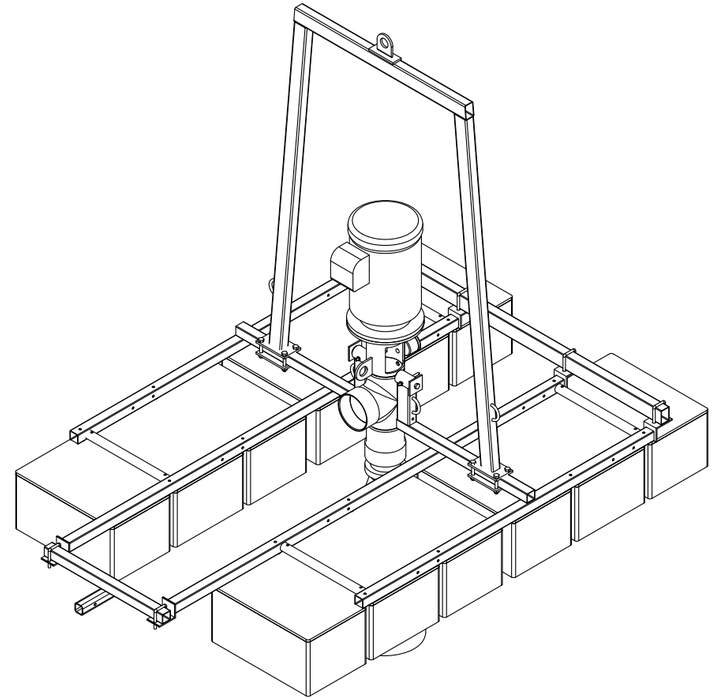
CANFIELD CUSTOM PUMPS

TITLE: REVISED
CENTER FRAME SUPPORT
ASSEMBLY DETAIL

SIZE	DWG. NO.	REV
B	ASSEMBLY-004-07	0

SCALE: NONE	WEIGHT:	SHEET 1 OF 1





ASSEMBLY PROCEDURE
STEP 2

ISOMETRIC VIEW

KEY

1 —— CENTER FRAME SUPPORT
2 —— BOLT w/ NUT
3 —— BOLT PLATE

D.S.E., INC.
PROJECT SOLUTIONS
28886 MCR 23
SNYDER, CO 80750
PHONE: (970) 542-0041
FAX: (970) 867-4705

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

FINISH

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	DPS	04/07/07
REV DATE		04/07/07
ENG APPR.		
MFG APPR.		
Q.A.		

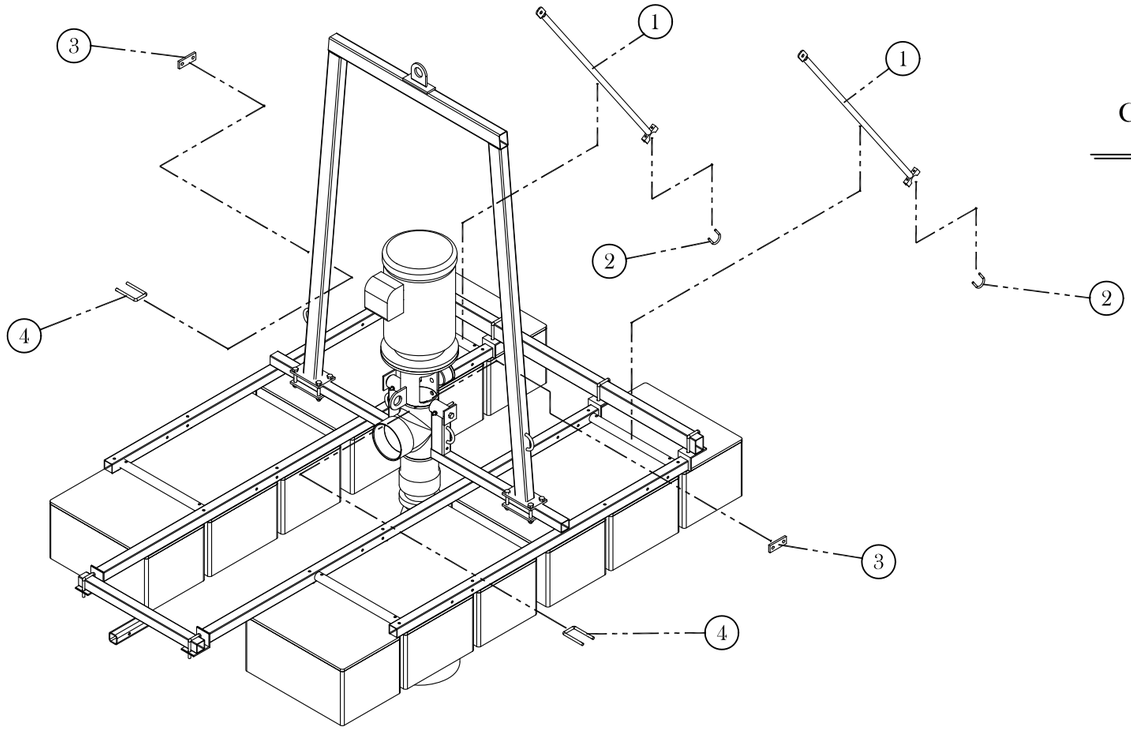
COMMENTS:

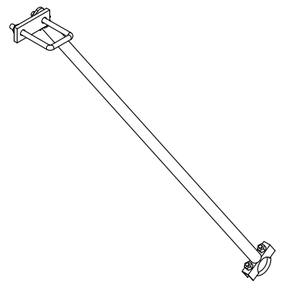
CANFIELD CUSTOM PUMPS

TITLE:
GENERAL TURBI-FLOAT
ASSEMBLY DETAIL

SIZE	DWG. NO.	REV
B	ASSEMBLY-002-07	0

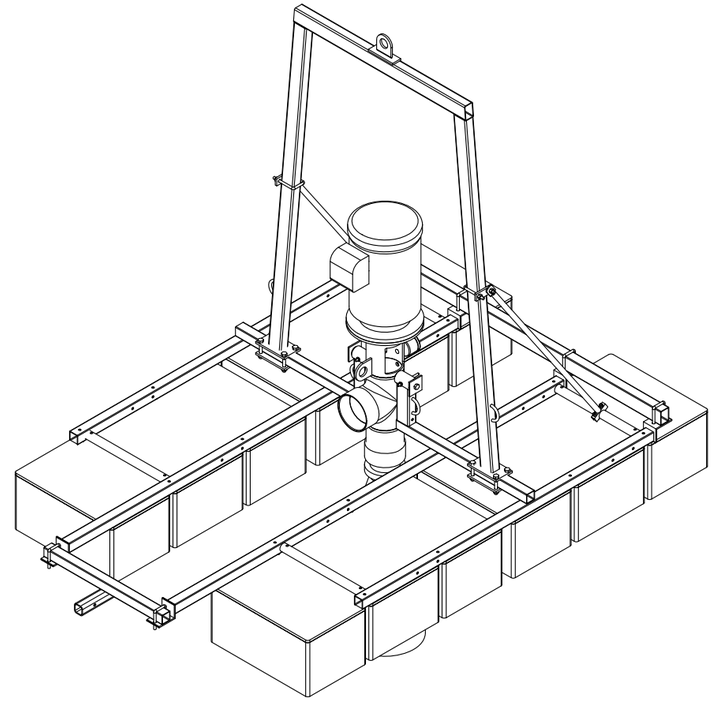
SCALE: NONE	WEIGHT:	SHEET 2 OF 3





COMPLETED BRACE ASSEMBLY

ISOMETRIC VIEW



ASSEMBLY PROCEDURE STEP 3

ISOMETRIC VIEW

KEY

1. REAR BRACE ASSEMBLY
2. MUFFLER U-BOLT w/ NUT
3. BOLT PLATE
4. U-BOLT w/ NUT

D.S.E., INC.
PROJECT SOLUTIONS
28886 MCR 23
SNYDER, CO 80750
PHONE: (970) 542-0041
FAX: (970) 867-4705

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

FINISH

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	DPS	04/07/07
REV DATE		04/07/07
ENG APPR.		
MFG APPR.		
Q.A.		

COMMENTS:

CANFIELD CUSTOM PUMPS

TITLE:

GENERAL TURBI-FLOAT ASSEMBLY DETAIL

SIZE	DWG. NO.	REV
B	ASSEMBLY-003-07	0

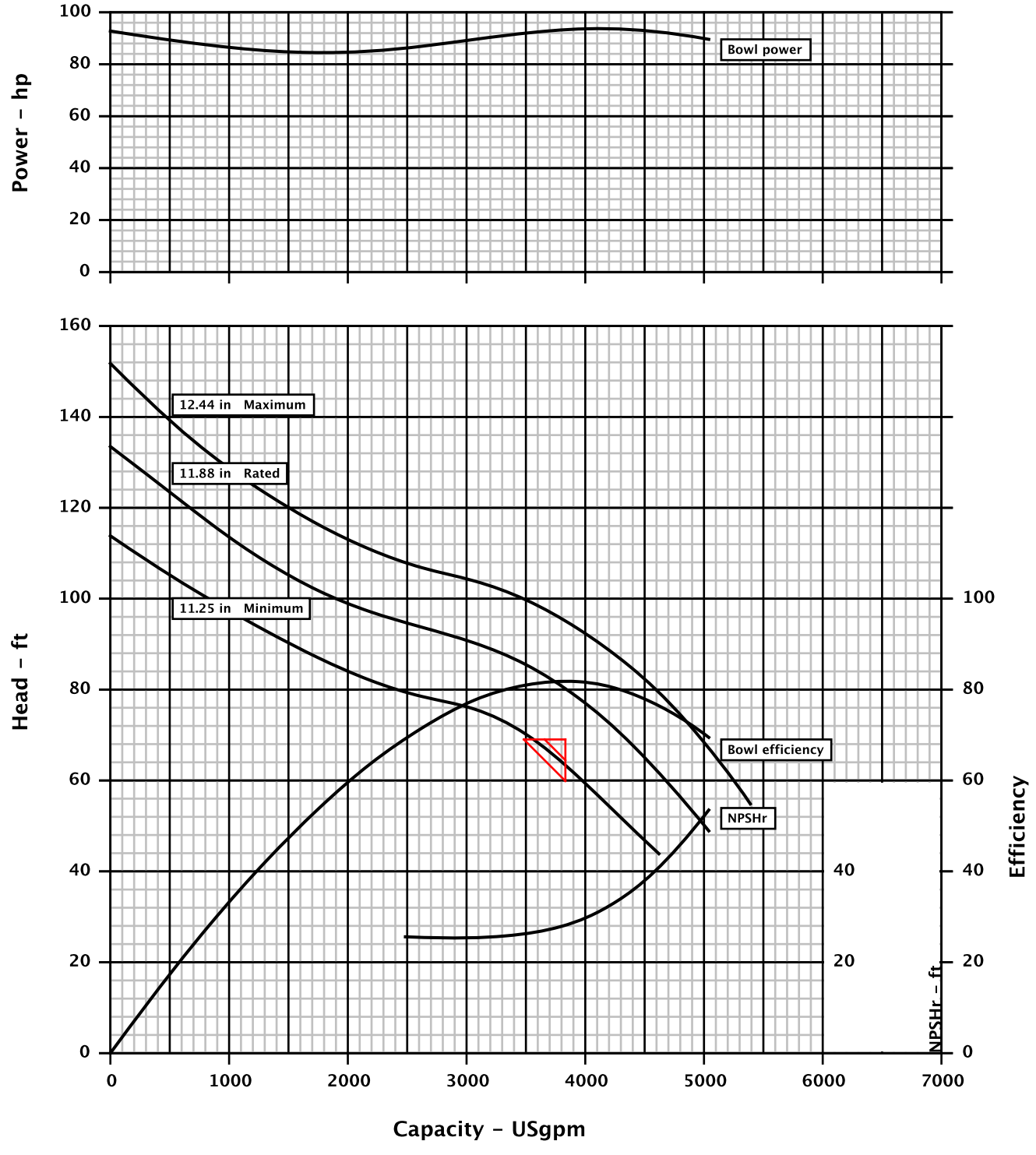
SCALE: NONE	WEIGHT:	SHEET 3 OF 3

Pump size & type	: 16ENH
Based on curve no.	: EC-1822
Number of stages	: 1

Customer	: Canfield Drilling	Capacity	: 3841.0 USgpm
Item number	: -	Head	: 69.00 ft
Service	:	Specific gravity	: 1.000
Flowserve reference	: Default 0.1	Pump speed	: 1770 rpm
Date	: February 13, 2014	Test tolerance	: Hydraulic Institute Level A

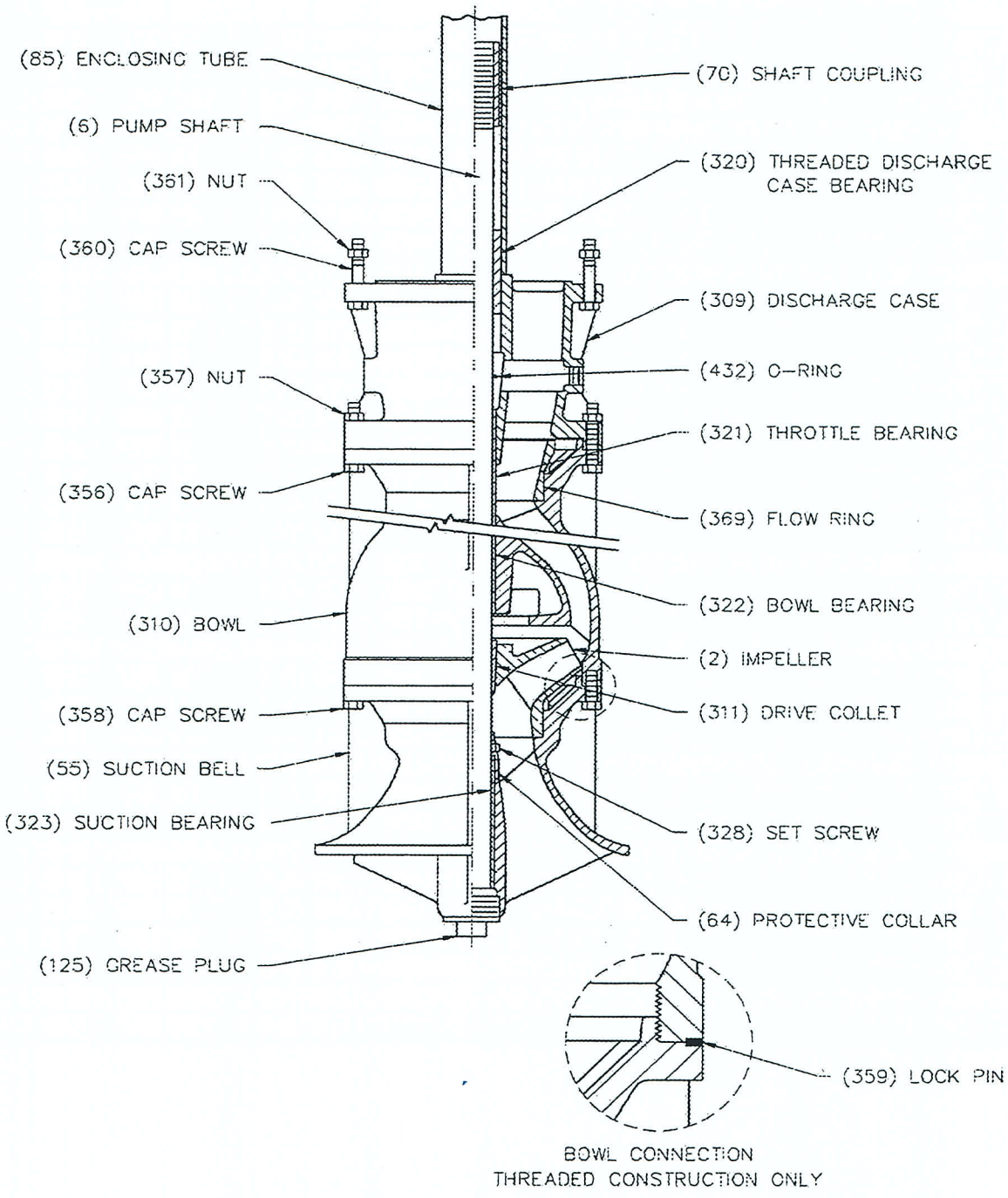
CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS; CAPACITY, HEAD, AND EFFICIENCY.

Bowl performance shown below is corrected for materials, viscosity and construction.



Bowl head of 72.89 ft corresponds with 69.0 ft head at discharge flange adjusted for elevation and friction losses.

BOWL ENCLOSED DESIGN FLANGED CONSTRUCTION
OIL LUBE



01-Apr-2001
NEW SHEET

FLOWSERVE

BOWL COMPONENTS
16EN BOWL

PART NO.	REF. NO.	DESCRIPTION	LIST PRICE	MATERIAL	WEIGHT
		The Following to be Used With Type W Head			
~	103	Lineshaft or Reducer Bearing, LH - To Match Bowl Oil Tube to Column Oil Tube	~	Brz	~
82189671	85	Bowl Oil Tube, 3-1/2 x 9-1/2, LH	$125.00	Stl	10
82175696	320	Lineshaft Bearing, 2-3/16 x 3-1/2, LH	110.00	Brz	9.5
82189739	432	O-Ring, 2-3/16	0.25	Rub	~
82491655	309	Flow Adapter 15/16 x 10 Thd	850.00	C I	~
81813172	309	Flow Adapter 15/16 x 12 Thd	900.00	C I	~
82491804	309	Flow Adapter 15/16 x 10 Flg	850.00	C I	~
81813222	309	Flow Adapter 15/16 x 12 Flg	900.00	C I	~
82080920	320	Brg Thd Disc-CS 3-1/2 x 2-3/16 ID LH	250.00	Brz	~
81813016	309	Case Disc 15/16 x 10 Thd LH	1,000.00	C I	~
81812901	309	Case Disc 15/16 x 12 Thd LH	1,050.00	C I	~
81812851	309	Case Disc 15/16 x 14 Thd LH	1,150.00	C I	~
81813123	309	Case Disc 15/16 x 10 Flg LH	1,000.00	C I	~
81813016	309	Case Disc 15/16 x 12 Flg LH	1,000.00	C I	~
82007139	369	Flow Ring 16EN 10" Column	250.00	C I	~
82007105	369	Flow Ring 16EN 12" Column	250.00	C I	~
81782468	321	Bearing Sleeve / Throttle 2-3/16 x 2-7/8 x 10-1/2 LG	215.00	Brz	~
81855215	310	Bowl Intermediate 16EN	1,150.00	C I	~
82491812	322	Bearing Sleeve 2-3/16 x 2-7/8 x 4-1/2 LG	53.00	Brz	~
82007865	2	Impeller 16ENL full Diameter	1,000.00	Brz	~
82007873	2	Impeller 16ENH full Diameter	1,000.00	Brz	~
82006933	311	Collet Drive for 2-3/16 Shaft	27.00	Stl	~
82006909	64	Sand Collar for 2-3/16 Shaft	109.00	Brz	~
95231379	328	Set Screw for Sand Collar	0.10	SS	~
81855876	313	Case Suction 16EN x 12 Thd	1,050.00	C I	~
81855330	55	Bell Suction 16EN	1,050.00	C I	~
82491820	323	Bearing Sleeve 2-3/16 x 2-7/8 x 8 LG	122.00	Brz	~
95249645	125	Grease Plug 2-1/2 NPT	1.25	M I	~
95251872	358	Screw Cap Hex Head 5/8 x 1-3/4 (12 x # of stages + 12)	1.25	SS	~

All Prices FOB Hastings, Ne and Subject to Change Without Notice

BURNS McDONNELL

CREATE AMAZING.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
O 816-333-9400
F 816-333-3690
www.burnsmcd.com