HISTORY OF CONSTRUCTION
BIG BROWN STEAM ELECTRIC STATION
NORTH AND SOUTH BOTTOM ASH PONDS
FREESTONE COUNTY, TEXAS

October 2016

Prepared for:

LUMINANT GENERATION COMPANY, LLC
1601 Bryan Street (EP-27)
Dallas, Texas 75201

Prepared by:

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Round Rock, Texas 78664
Texas Engineering Firm No. 4760

PBW Project No. 5196C

PROFESSIONAL CERTIFICATION

This document and all attachments were prepared by Pastor, Behling & Wheeler, LLC under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete and satisfies the history of construction requirements of Section 257.73(c)(1) of the CCR Rule.

Patrick J. Behling 10/05/16

Patrick J. Behling, P.E.
Principal Engineer
PASTOR, BEHLING & WHEELER, LLC

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1.0 INTRODUCTION

Luminant Generation Company, LLC (Luminant) operates the Big Brown Steam Electric Station (BBSES) located approximately 10 miles northeast of Fairfield, Freestone County, Texas (see Figure 1). The BBSES consists of two coal/lignite-fired units with a combined operating capacity of approximately 1,150 megawatts. Coal Combustion Residuals (CCR) including fly ash, bottom ash and boiler slag are generated as part of BBSES unit operation. The CCRs are transported off-site for beneficial use by third-parties or are beneficially used or disposed of by Luminant at the BBSES.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. The final CCR Rule was published in the Federal Register on April 17, 2015. The effective date of the CCR Rule was October 19, 2015.

The CCR Rule establishes national operating criteria for existing CCR surface impoundments and landfills, including a requirement to compile a history of construction for all CCR impoundments. Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to prepare this history of construction for the CCR impoundments at the BBSES.

1.1 History of Construction Requirements - CCR Surface Impoundments

Section 257.73(c)(1) of the CCR Rule specifies that a history of construction be compiled for each existing diked CCR surface impoundment that: (1) has a dike height of five feet or more and a storage volume of 20 acre-feet or more; or (2) has a dike height of 20 feet or more must perform the following under the CCR Rule. The history of construction must contain, to the extent feasible, the following information:

- 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.
- The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.
- A statement of the purpose for which the CCR unit is being used.

- The name and size in acres of the 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 of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

- At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and 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.

The history of construction must be compiled and placed in the facility operating record no later than October 17, 2016. In accordance with 257.73(c)(2) of the CCR Rule, if there is a significant change to any information compiled in the history of construction for the CCR unit, the owner or operator of the CCR unit must update the relevant information and place it in the facility operating record.

1.2 BBSES Impoundments Subject to History of Construction Requirements

The CCR Rule defines coal combustion residuals such as fly ash, bottom ash, boiler slag, flue gas desulfurization (FGD) materials (gypsum), and related solids generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers. The history of construction requirements of the CCR Rule apply to a surface impoundment that disposes or otherwise

engages in solid waste management of CCRs and either (1) has a dike height of five feet or more and a storage volume of 20 acre-feet or more; or (2) has a dike height of 20 feet or more

The following surface impoundments at the BBSES have been identified as CCR Units subject to the history of construction requirements:

- North Bottom Ash Pond (NBAP); and
- South Bottom Ash Pond (SBAP).

The NBAP and SBAP (collectively "Bottom Ash Ponds" or "BAPs") are located approximately 1,500 feet northwest of the BBSES power plant (Figure 2). The NBAP and SBAP are located immediately adjacent to each other and share an interior earthen embankment. Due to their proximity to each other, the NBAP and SBAP are considered one CCR surface impoundment (identified as the "BAPs) under the CCR Rule.

1.3 Description of Bottom Ash Ponds

A simplified process flow diagram for the BAPs is shown on Figure 3. The BAPs receive recovered overflow from bottom ash dewatering bins and other BBSES process wastewater sources. The ponds also act as a surge basin for storm water runoff from the BBSES ash-water system and periodically receive non-hazardous liquid metal cleaning wastes delivered by truck from other Luminant facilities under a Texas Commission on Environmental Quality (TCEQ) industrial waste permit. Recovered sluice water, process waters and storm water runoff from the BBSES ash-water system are pumped to each pond through a series of above grade pipes on the east end. The BAPs are located partially above and partially below grade and all material that enters the ponds is pumped into the impoundments – there are no gravity discharges to the BAPs.

A 30-inch diameter subsurface water pipe exits the NBAP on the west end and a 42-inch subsurface water pipe exits the SBAP on the west end. These subsurface lines are connected to a below grade valve box immediately west of the SBAP. Piping from the valve box is connected to a low pressure ash water pump station located east of the SBAP. The BAPs do not have an emergency spillway. Decanted water is returned to the power plant for use in the bottom ash system. When sufficient bottom ash has accumulated in the first pond, the bottom ash slurry is diverted to the second pond. Bottom ash in the first pond is then removed and transported via truck to the nearby Luminant mine for placement in Area C or other beneficial use.

The NBAP and the SBAP are each approximately 1,400 feet long by 250 feet wide, with the NBAP slightly larger than the SBAP (TXU, 1991; TUEC, 1998). The BAPs are constructed partially above and partially below grade and are surrounded by engineered earthen embankments that extend approximately 14 to 21 feet above grade. The exterior slopes of the embankments are vegetated with grasses and similar vegetation.

The BAPs were originally constructed in the late 1960s and were relined with a 3-foot thick clay liner in 1989-1990. As-built engineering drawings indicate that the clay liner has a permeability of $<1 \times 10^{-7}$ cm/sec (TXU, 1991; TUEC, 1998).

The bottom of the BAPs is located at approximately 328 feet MSL and the crest elevation of the earthen embankments is approximately 350 feet MSL. The design operating fluid/CCR level in the BAPs is approximately 347 feet MSL (approximately 3 feet below the crest of the perimeter embankments). A digital topographic site plan of the BAPs was created from the as-built engineering drawings for the ponds for use in calculating pond volumes (see Appendix B). Based on this site plan and using a design operating elevation of 347 feet MSL, the design operating capacity of the NBAP is approximately 40,000,000 gallons (123 acre-ft) and the design operating capacity of the SBAP is approximately 39,700,000 gallons (122 acre-ft). The total design operating capacity of the BAPs is approximately 79,700,000 gallons or approximately 245 acre-ft.

The US Army Corps of Engineers (USACE) classifies the relative size of dams based on the height of the dam and the storage capacity of the impounded area behind the dam (USACE, 1979). As shown in the table below, based on the embankment height (14 to 21 feet above grade) and total operating capacity (245 acre-ft) of the BAPs, the BAPs would be categorized as small impoundments using the USACE dam size classification criteria:

USACE Dam Size Classification		
Size Category	**Impoundment Capacity (acre-ft)**	**Impoundment Height (ft)**
Small	50 and < 1,000	25 and < 40
Intermediate	1,000 and < 50,000	40 and < 100
Large	> 50,000	> 100

The BAPs are classified as a low hazard potential impoundment in accordance with the requirements of Section 257.73(a)(2) of the CCR Rule (PBW, 2016a).

2.0 BAP HISTORY OF CONSTRUCTION

The perimeter embankments of the BAPs extend more than five feet above grade (14 to 21 feet above grade) and the total operating capacity of the BAPs is greater than 20 acre-feet (245 acre-feet); consequently, a history of construction for the BAPs is required under Section 257.73(c)(1) of the CCR Rule. The history of construction of the BAPs is as follows:

- Unit Name: North Bottom Ash Pond (NBAP) and South Bottom Ash Pond (SBAP)
- Owner: Big Brown Power Company, LLC
  1601 Bryan Street (EP-27)
  Dallas, Texas 75201
- Operator: Luminant Generation Company, LLC
  1601 Bryan Street (EP-27)
  Dallas, Texas 75201
- TCEQ NOR ID Nos.: NBAP – Unit Number 008
  SBAP – Unit Number 009
- Unit Location: See Figures 1 and 2
- Unit Purpose: Gravity separation of CCR from water
- Watershed: Impoundments only subject to direct precipitation. Total pond area of approximately 19 acres (Dewberry, 2014)
- Foundation: Soils beneath the NBAP and SBAP generally consist of very stiff to hard sandy clays and compact to very dense clayey sands and clayey or silty sand, underlain by compact to very dense silty sand/sand. (Golder, 2012)
- Construction Materials: Liner: Constructed of 3 feet of compacted clay with hydraulic conductivity no greater than $<1X10^{-7}$ cm/sec hydraulic conductivity. Top of liner at Elev. 328. Installed in 1989-1990 (TXU, 1991, TUEC, 1998). Liner geotechnical samples collected when ponds are taken out of service for cleaning/inspection confirm that liner is a minimum of 3 feet of compacted clay with a hydraulic conductivity no greater than $<1X10^{-7}$ cm/sec (QC, 2010a; QC, 2010b, QC, 2014).

  Dikes: Constructed of clayey sand. Typical interior (wet side) slope of 2.5H:1V and minimum exterior (dry side) slope of 2H:1V. Crest elevation of dike approximately Elev. 350 (Golder, 2012). Installed in 1960s and upgraded in 1989-1990 (TXU, 1991, TUEC, 1998).
- Design Characteristics: See as-built engineering drawings in Appendix A (1991, TUEC, 1998)
- Instrumentation: Staff Gauges (Manual)

- Normal Operating Pool: Elev. 347 ft MSL
- Design Operating Capacity: NBAP – 40,000,000 gallons (123 acre-ft)
  SBAP – 39,700,000 gallons (122 acre-ft)
- Area Capacity Curves: See Appendix C
- Spillways/Diversions: None
- Inspection/Maintenance: Weekly and annual inspections performed (PBW, 2016b; Luminant 2015b; Alston, 2014). Liner geotechnical samples collected when ponds are taken out of service for cleaning/inspection (QC, 2010a; QC, 2010b; QC, 2014).
- Structural Instability: No evidence of structural instability (Golder, 2012)

3.0 REFERENCES

Alston, Carol, P.E., 2014. *Critical Impoundment Inspection Report For Big Brown SES*. July 9.

Dewberry Consultants, LLC (Dewberrry), 2014. *Final Coal Combustion Residue Impoundment Round 12 - Dam Assessment Report, Big Brown Steam Electric Station Bottom Ash Pond, Fairfield, Texas*, EP-09W001727, March.

Golder Associates, Inc. (Golder), 2012. *Ash Pond Slope Stability Investigation Report, Big Brown Power Plant, Freestone County, Texas*. Revised December.

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Pastor, Behling & Wheeler, LLC (PBW), 2016b. Annual CCR Unit Inspection Report - Big Brown Steam Electric Station, North and South Bottom Ash Ponds and Ash Disposal Area II, Freestone County, Texas. January 14.

Quality Consultants (QC), 2010a. Field Inspection Report – Luminant Big Brown South Bottom Ash Pond, February 1.

QC, 2010b. Field Inspection Report – Luminant Big Brown North Bottom Ash Pond, September 22.

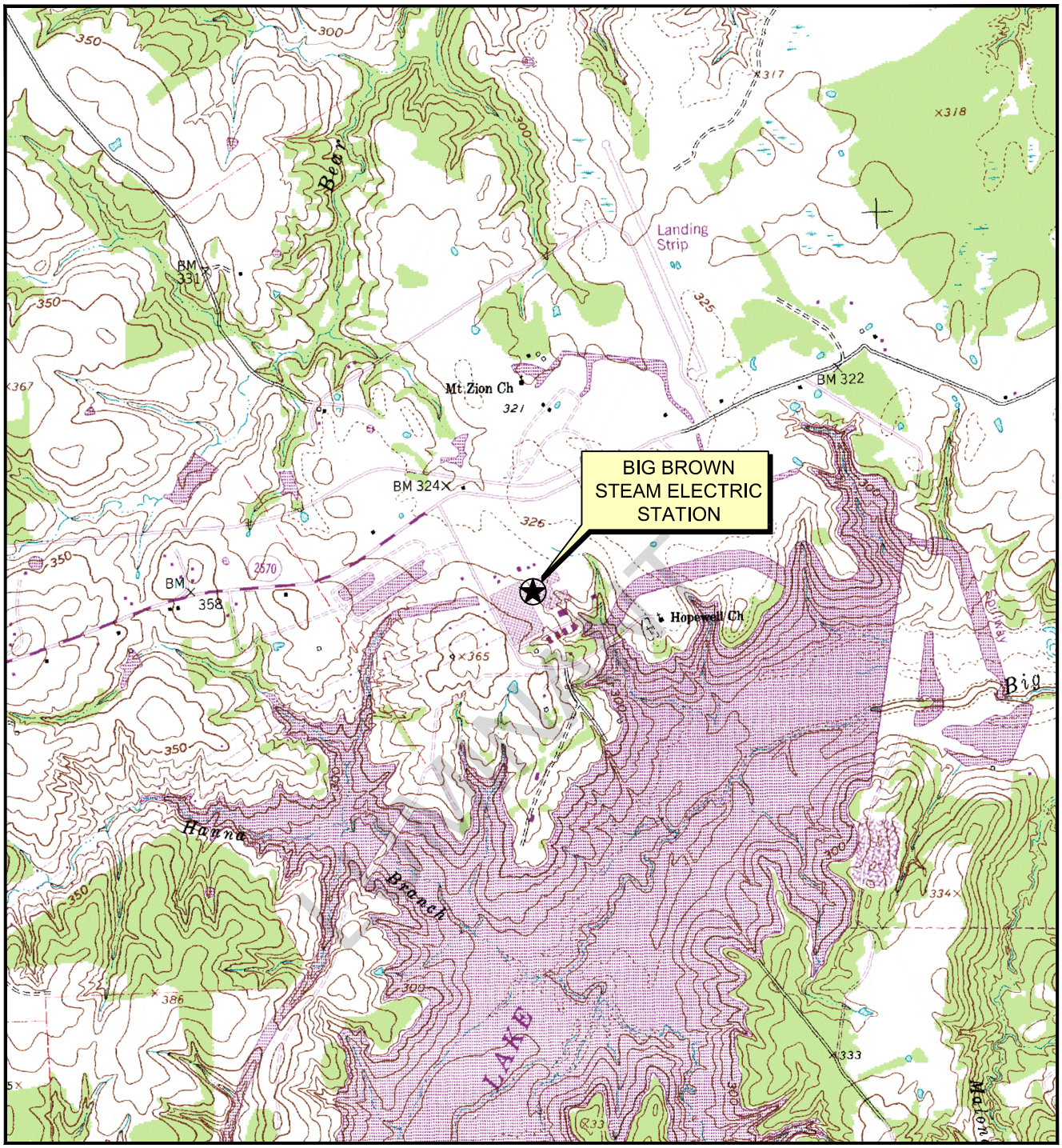
QC, 2014. Field Inspection Report – Luminant Big Brown South Bottom Ash Pond, March 24.

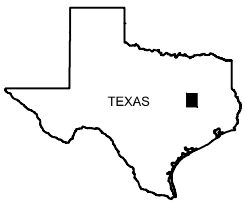
Texas Utilities Electric Company (TUEC), 1998. *Application for Permit to Receive and Process Non-Hazardous Solid Waste, Big Brown Steam Electric Station, Freestone County, Texas*. February.

TXU Electric Company (TXU), 1991. As-Built Engineering Drawings 119-1134-301-01, 119-1134-301-02, and 119-1134-301-03, Big Brown Steam Electric Station – Bottom Ash Ponds, February 8.

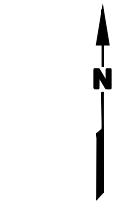
United States Army Corps of Engineers (USACE), 1979. *Recommended Guidelines for Safety Inspections of Dams*, ER 1110-2-106, September 26.

Figures





QUADRANGLE LOCATION



Scale in Feet

0 1000 2000

SOURCE:
Base map from www.tnris.gov, Young, TX 7.5 min. USGS quadrangle dated 1961, revised 1982.

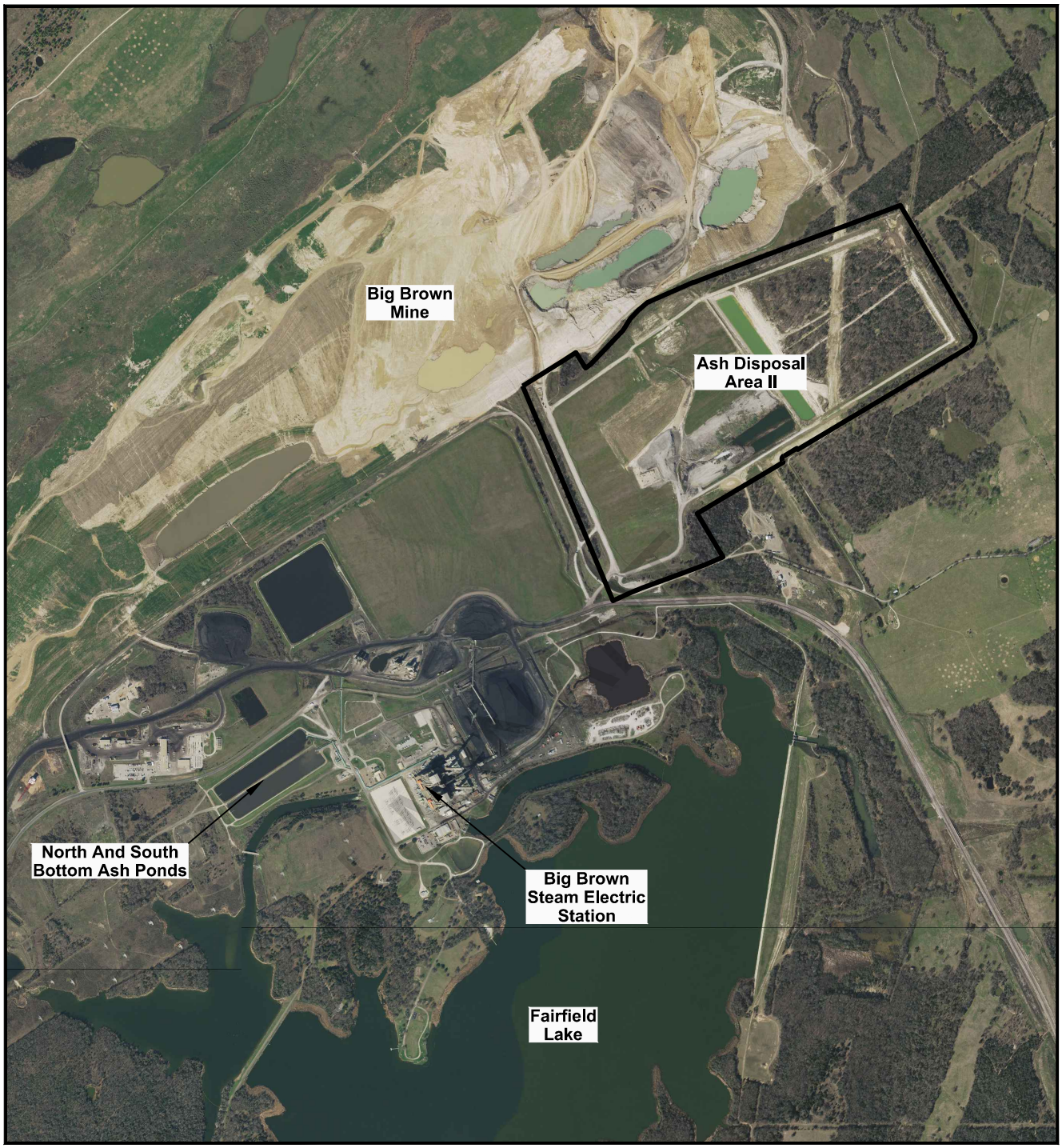
LUMINANT GENERATION COMPANY, LLC
BIG BROWN STEAM ELECTRIC STATION

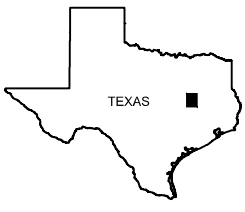
Figure 1

SITE LOCATION MAP

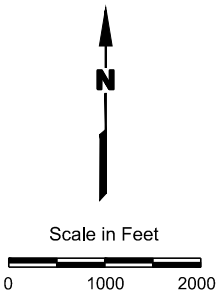
PROJECT: 5196C	BY: ADJ	REVISIONS
DATE: AUG., 2016	CHECKED: RBL/PJB	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS





PHOTOGRAPH LOCATION



SOURCE:
Imagery from www.tnris.gov, Young, aerial photographs, 2015.

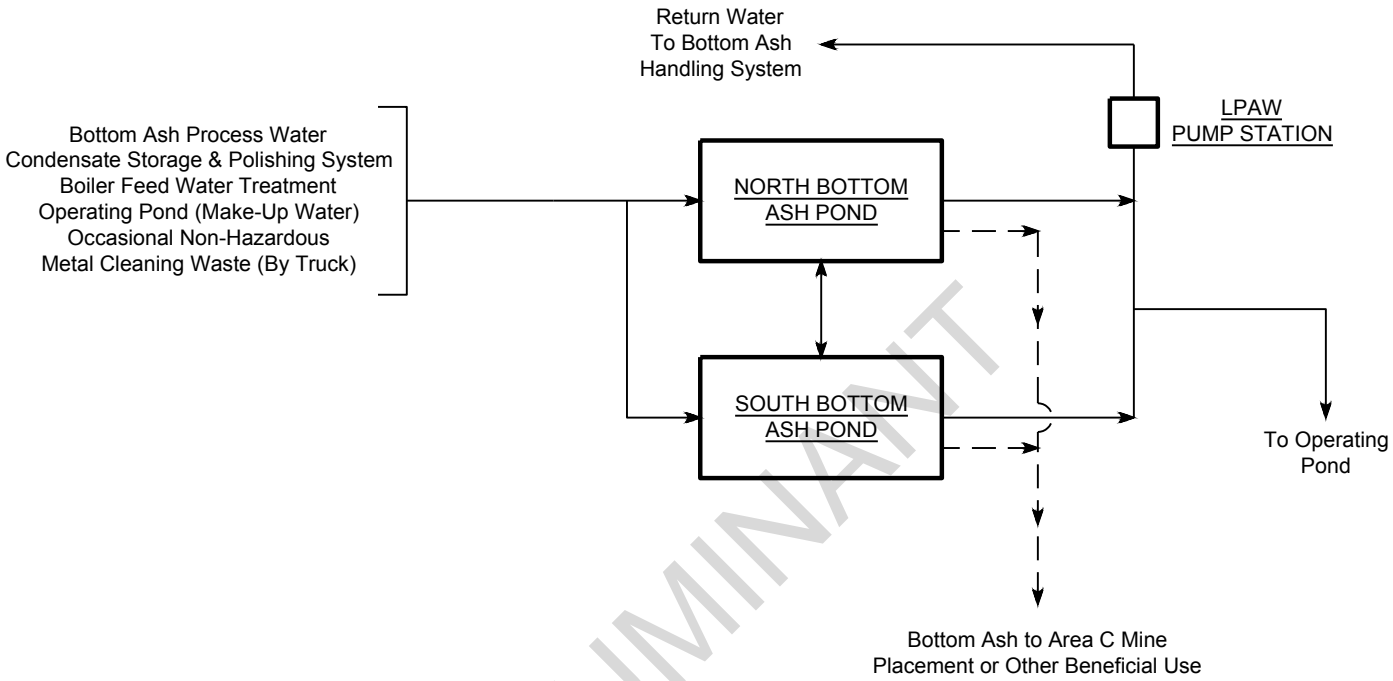
LUMINANT GENERATION COMPANY, LLC
BIG BROWN STEAM ELECTRIC STATION

Figure 2

SITE VICINITY MAP

PROJECT: 5196C	BY: ADJ	REVISIONS
DATE: OCT., 2016	CHECKED: RBL/PJB	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS



EXPLANATION

Water

Solids

LUMINANT GENERATION COMPANY, LLC

BIG BROWN STEAM ELECTRIC STATION

Figure 3

SIMPLIFIED CCR SURFACE IMPOUNDMENT FLOW DIAGRAM

PROJECT: 5196C	BY: ADJ	REVISIONS
DATE: SEP, 2016	CHECKED: PJB	

PASTOR, BEHLING & WHEELER, LLC

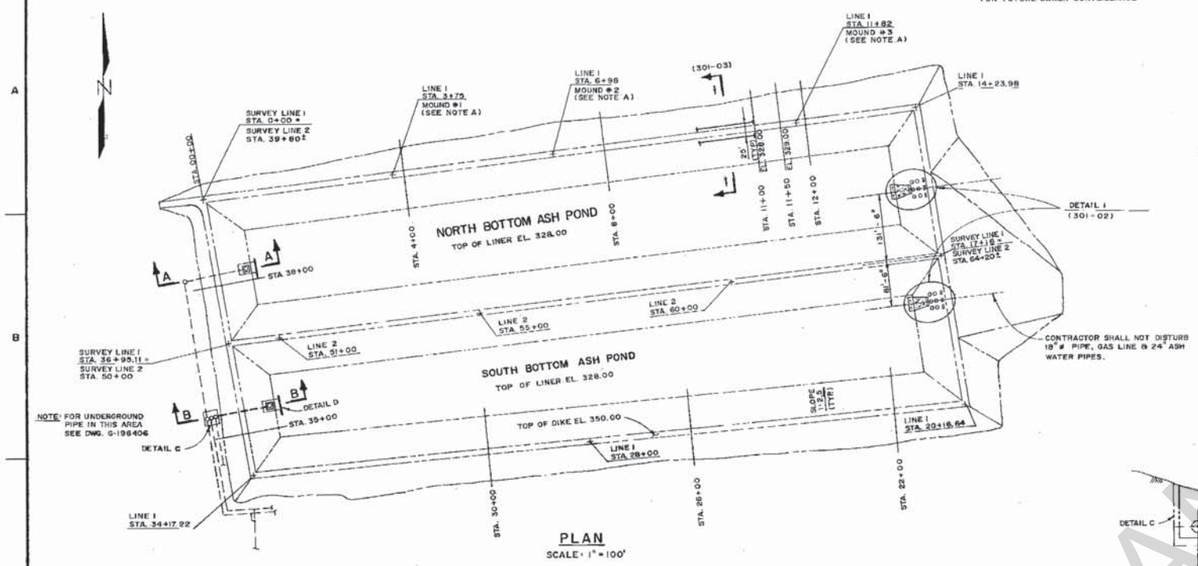
CONSULTING ENGINEERS AND SCIENTISTS

Appendix A

Bottom Ash Pond As-Built Engineering Drawings

119-1134-301-01

NOTE A: LOCATION OF MOUNDS NOTED FOR FUTURE OWNER SURVEILLANCE



PLAN
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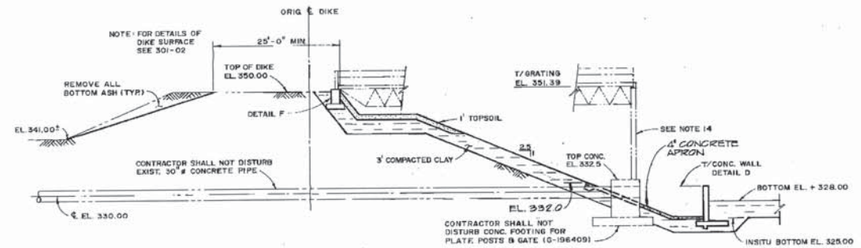

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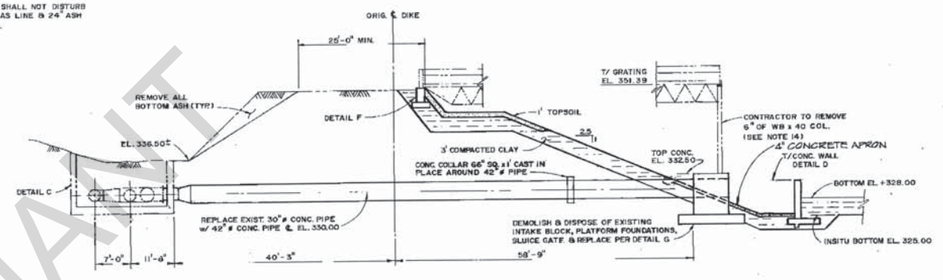

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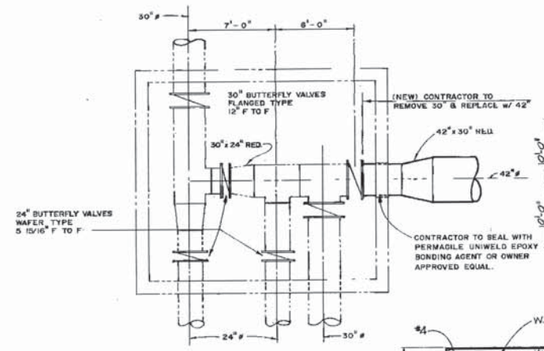
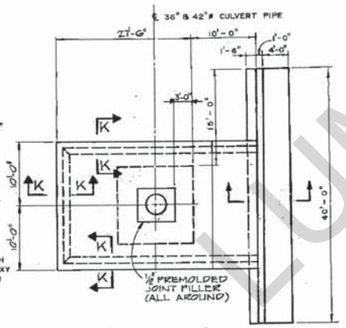


DETAIL C
SCALE: 1/4" = 1'-0"



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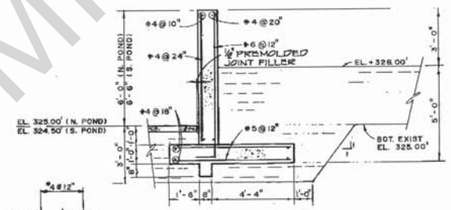

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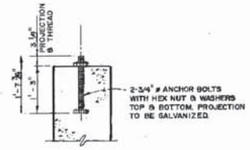
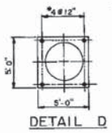
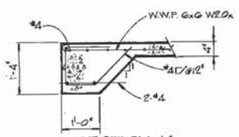


ANCHOR BOLT DETAIL E
SCALE: 3/4" = 1'-0"



DETAIL D



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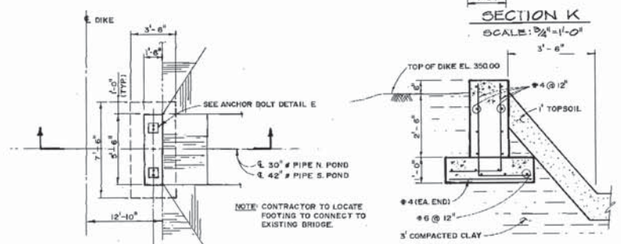

PLAN

SECTION
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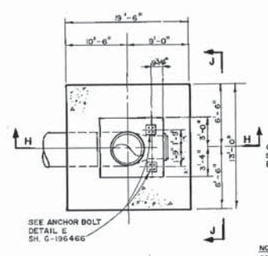

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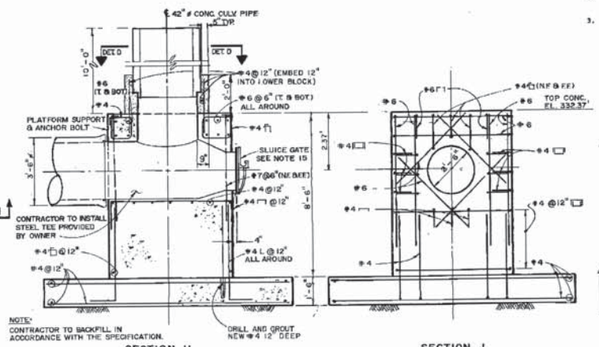


SECTION H
SCALE: 3/8" = 1'-0"

SECTION J
SCALE: 3/8" = 1'-0"

DETAIL F

DETAIL G

GENERAL NOTES:

1. ALL WORK SHOWN ON THESE DRAWINGS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION NO. 119-1134-A UNLESS NOTED.
2. ALL DIKE MODIFICATIONS AND CLAY LINERS TO BE COMPACTED TO 95% MAXIMUM DENSITY PER ASTM D-698 AND WATER CONTENT PER SPECIFICATION. EACH LAYER TO BE SCARIFIED A MINIMUM OF 2 INCHES PRIOR TO PLACEMENT OF THE FOLLOWING LIFT.
3. ALL BOTTOM ASH MATERIAL SHALL BE DISPOSED OF IN THE ASH DISPOSAL AREA 2 CELL 1. (SEE SKETCH 119-1196).
4. COMPACTED CLAY SHALL HAVE A PERMEABILITY < 1×10^{-7} CM/SEC, % PASSING NO. 200 SIEVE > 30, LIQUID LIMIT > 30, AND PLASTICITY INDEX > 13 PER SPECIFICATIONS.
5. FLEXIBLE BASE SHALL BE SIX INCHES THICK AND SHALL BE PLACED IN ACCORDANCE WITH TEXAS HIGHWAY DEPARTMENT ITEM 249. MATERIALS SHALL CONFORM TO REQUIREMENTS FOR CRUSHED STONE TYPE A, GRADE 2, AND SHALL BE COMPACTED TO 98% DENSITY PER TEX. 113E.
6. ALL BACKFILL SHALL BE DONE IN ACCORDANCE WITH SPECIFICATIONS.
7. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. CONCRETE MATERIAL AND PLACEMENT SHALL CONFORM TO SPECIFICATION. ALL REINFORCING SHALL BE A615 OR 60 DEFORMED BARS.
8. ALL GRATING SHALL BE 1-1/4x3/16x1-3/16 C/C GALVANIZED BAR GRATING.
9. STATION CROSS SECTIONS PER DRAWING 119-1134-301-03 ARE TO BE COMPLETED PER SECTION A - TYPICAL FINISHED CROSS SECTION.
10. ALL STEEL SHALL BE A36 GRADE AND SHALL BE INSTALLED IN ACCORDANCE WITH AISC. ALL STEEL (EXCLUDING CONCRETE REINFORCING) SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
11. ALL BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.
12. 42 INCH DIAMETER RCP REPLACEMENT IS TO BE SUPPLIED BY SPECIFICATION NO. 119-1134 B CONTRACTOR.
13. CONTRACTOR SHALL NOT DISTURB EXISTING 30 INCH DIAMETER RCP, BLOCK AND STRUCTURE FOUNDATIONS IN NORTH POND. CONTRACTOR TO REPLACE EXISTING 30 INCH RCP WITH 42 INCH DIAMETER RCP, INTAKE BLOCK AND STRUCTURE FOUNDATIONS, SLUICE GATE AND STAND PIPE IN SOUTH POND.
14. NOTES FOR REMOVAL AND REINSTALLATION OF BRIDGE AT ASH PONDS.
    a. CONTRACTOR TO REMOVE AND REINSTALL STRUCTURES AS REQUIRED TO INSTALL LINERS.
    b. CONTRACTOR TO PROVIDE NEW ANCHOR BOLTS PER ANCHOR BOLT DETAIL FOR NEW CONCRETE FOUNDATIONS.
    c. CONTRACTOR TO REPLACE ANY MISSING BOLTS WITH ASTM A-307 BOLTS PER DRAWING.
    d. FIELD WELDING SHALL BE AVOIDED.
    e. GRATING TO BE FASTENED WITH GALVANIZED STEEL CLIPS AND FASTENERS. CONTRACTOR TO SUPPLY ADDITIONAL CLIPS IF NECESSARY.
    f. TOUCH UP OF GALVANIZING SHALL BE APPLIED AS NEEDED AFTER FIELD INSTALLATION.
15. CONTRACTOR SHALL REMOVE AND REPLACE SLUICE GATE WITH OWNER FURNISHED SLUICE GATE.

DEFINITION OF CONTRACTORS

1. CONTRACTOR PER SPECIFICATION NO. 119-1134 A IS GENERAL WORK CONTRACTOR.
2. CONTRACTOR PER SPECIFICATION NO. 119-1134 B IS PIPE SUPPLIER.
3. CONTRACTOR PER SPECIFICATION NO. 119-1134 C IS PLANT SUPERVISED LABOR.

Design Drawings:

119-1134-301-01 Rev. 0
119-1134-301-02 Rev. 0
119-1134-301-03 Rev. 0
Sketch 119-1196 Rev. 0

Reference Drawings:

G196406 Rev. 6
G196409 Rev. 3
G196466 Rev. 2

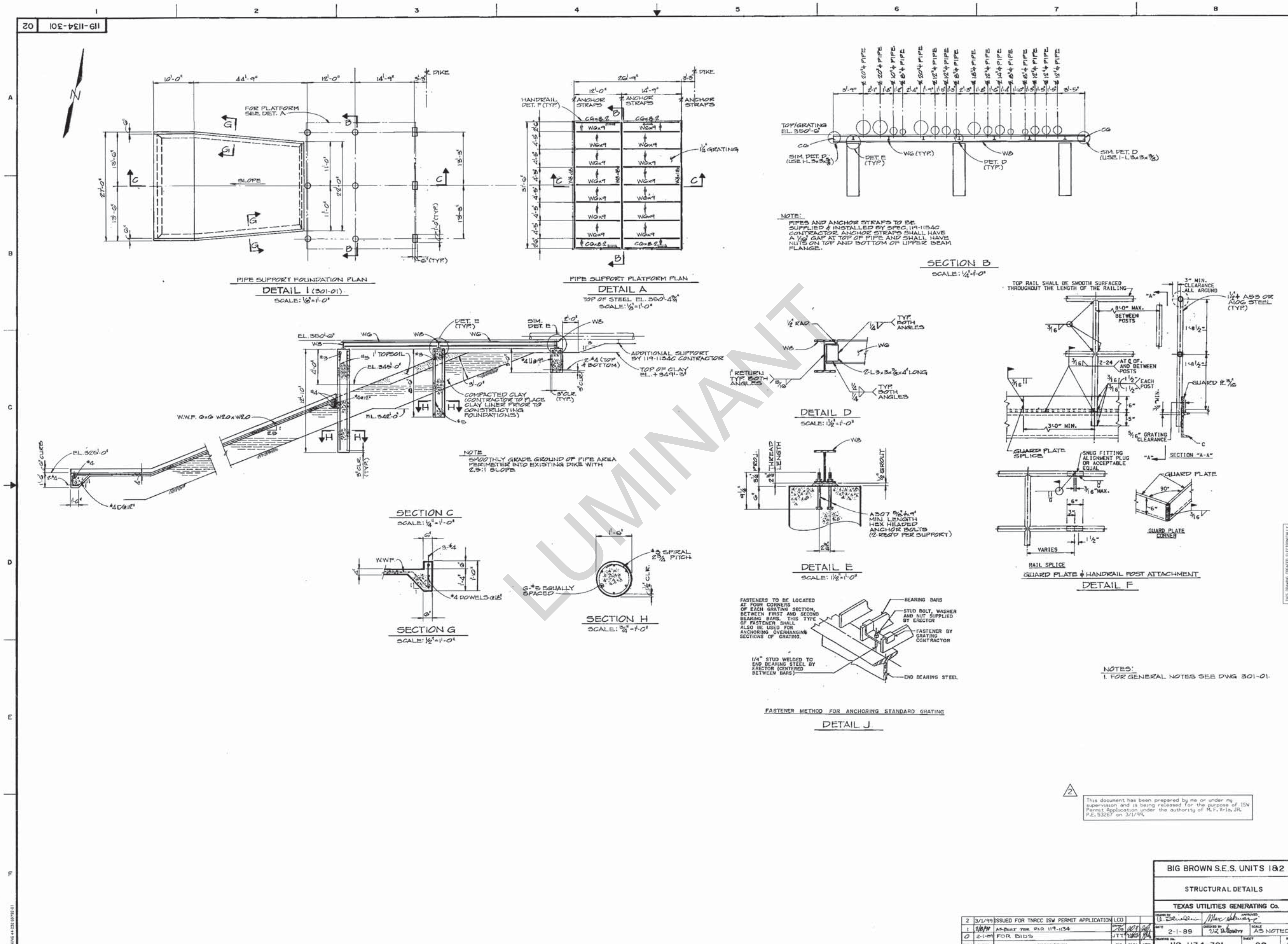
THIS DRAWING CREATED ELECTRONICALLY

This document has been prepared by me or under my supervision and is being released for the purpose of ISW Permit Application under the authority of M.F. Vela, JR. P.E. 53267 on 3/1/99.

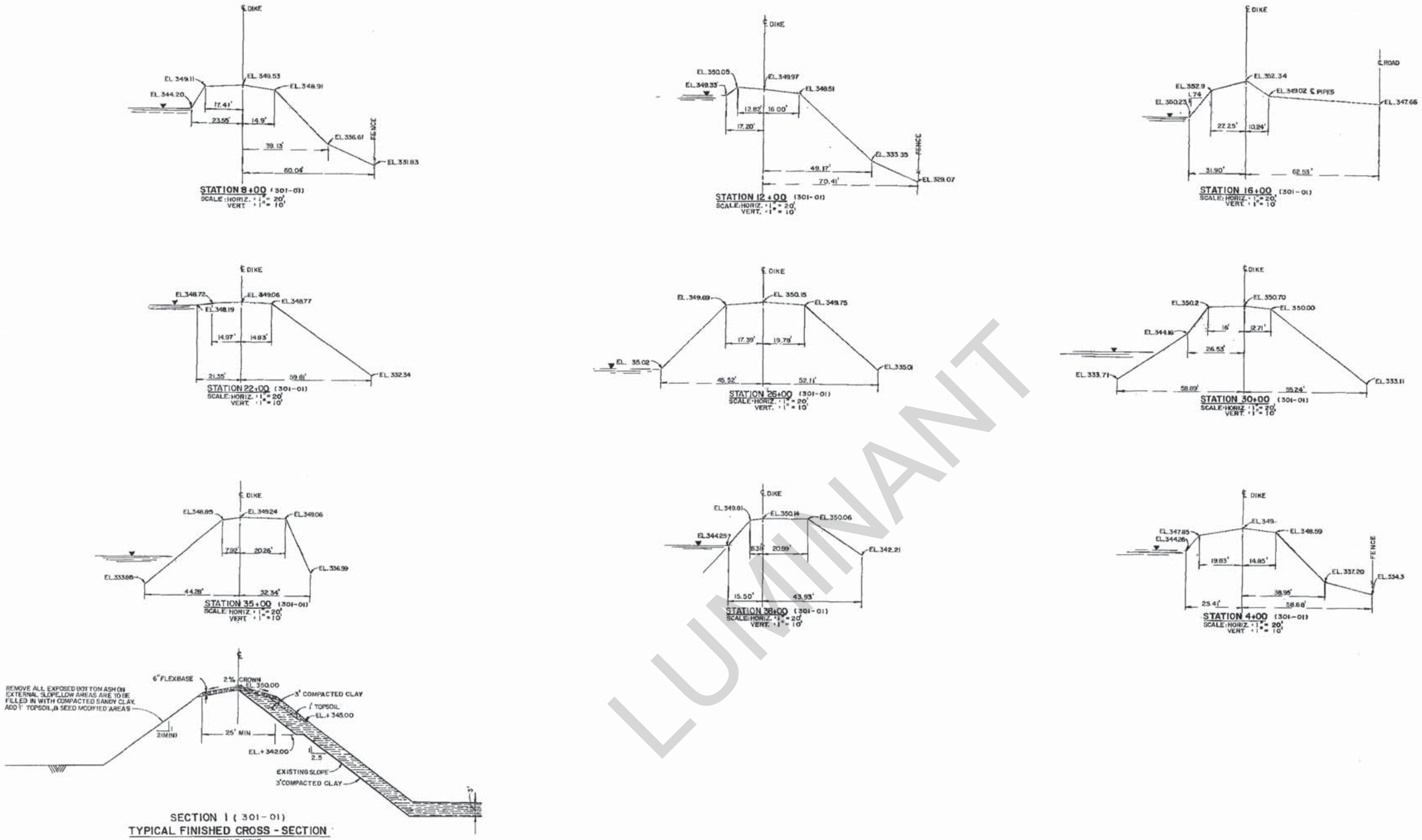
REV.	DATE	DESCRIPTION	BY	CHK	APP
3	3/1/99	ISSUED FOR TNRCC ISW PERMIT APPLICATION	LCO		
2	2/8/94	AS-BUILT PER P.O. 119-1134	JTT	[illegible]	
1	2-9-89	ADDED CONCRETE APRON	JTT	[illegible]	
0	2-1-89	FOR BIDS	JTT	[illegible]	

BIG BROWN S.E.S. - UNIT 1 & 2
BOTTOM ASH POND
GENERAL PLAN & FOUNDATION LAYOUT
TEXAS UTILITIES GENERATING Co.

DRAWN BY JTT | APPROVED | DATE 2-1-89 | CHECKED | SCALE AS NOTED
DRAWING NO. 119-1134-301 | SHEET 01 | REV 3



119-1134-301 02
PIPE SUPPORT FOUNDATION PLAN
DETAIL 1 (301-01)
SCALE: 1/8"=1'-0"
PIPE SUPPORT PLATFORM PLAN
DETAIL A
TOP OF STEEL EL. 350'-4 3/4"
SCALE: 1/8"=1'-0"
SECTION B
SCALE: 1/4"=1'-0"
NOTE:
PIPES AND ANCHOR STRAPS TO BE SUPPLIED & INSTALLED BY SPEC. 119-1134C CONTRACTOR. ANCHOR STRAPS SHALL HAVE A 1/16" GAP AT TOP OF PIPE AND SHALL HAVE NUTS ON TOP AND BOTTOM OF UPPER BEAM FLANGE.
COMPACTED CLAY (CONTRACTOR TO PLACE CLAY LINER PRIOR TO CONSTRUCTING FOUNDATIONS)
ADDITIONAL SUPPORT BY 119-1134C CONTRACTOR
NOTE
SMOOTHLY GRADE GROUND OF PIPE AREA PERIMETER INTO EXISTING DIKE WITH 2.5:1 SLOPE
SECTION C
SCALE: 1/4"=1'-0"
SECTION G
SCALE: 1/2"=1'-0"
SECTION H
SCALE: 3/4"=1'-0"
DETAIL D
SCALE: 1 1/2"=1'-0"
DETAIL E
SCALE: 1 1/2"=1'-0"
A307 5/8"ϕx9" MIN. LENGTH HEX HEADED ANCHOR BOLTS (2-REQ'D PER SUPPORT)
TOP RAIL SHALL BE SMOOTH SURFACED THROUGHOUT THE LENGTH OF THE RAILING
GUARD PLATE & HANDRAIL POST ATTACHMENT
DETAIL F
FASTENERS TO BE LOCATED AT FOUR CORNERS OF EACH GRATING SECTION, BETWEEN FIRST AND SECOND BEARING BARS. THIS TYPE OF FASTENER SHALL ALSO BE USED FOR ANCHORING OVERHANGING SECTIONS OF GRATING.
1/4" STUD WELDED TO END BEARING STEEL BY ERECTOR (CENTERED BETWEEN BARS)
FASTENER METHOD FOR ANCHORING STANDARD GRATING
DETAIL J
NOTES:
1. FOR GENERAL NOTES SEE DWG 301-01.
This document has been prepared by me or under my supervision and is being released for the purpose of ISW Permit Application under the authority of M.F. Vela, JR. P.E. 53267 on 3/1/99.
2 | 3/1/99 | ISSUED FOR TNRCC ISW PERMIT APPLICATION
1 | AS-BUILT PER P.O. 119-1134
0 | 2-1-89 | FOR BIDS
REV. DATE DESCRIPTION BY CHK APP
BIG BROWN S.E.S. UNITS 1&2
STRUCTURAL DETAILS
TEXAS UTILITIES GENERATING Co.
2-1-89
AS NOTED
119-1134-301 02 2



NOTES:

1. FOR GENERAL NOTES SEE DWG. 301-01

2 — This document has been prepared by me or under my supervision and is being released for the purpose of ISW Permit Application under the authority of M.F. Vrla, JR. P.E. 53267 on 3/1/99.

REV.	DATE	DESCRIPTION	BY	CHK.	APP.
3	040909	ADDED LUMINANT LOGO	JMS	RBW	RBW
2	3/1/99	ISSUED FOR TNRCC ISW PERMIT APPLICATION	LCO		
1	2/6/91	AS-BUILT PER P.I.O. 119-1134			
0	2-1-89	FOR BIDS	JTT		

Luminant

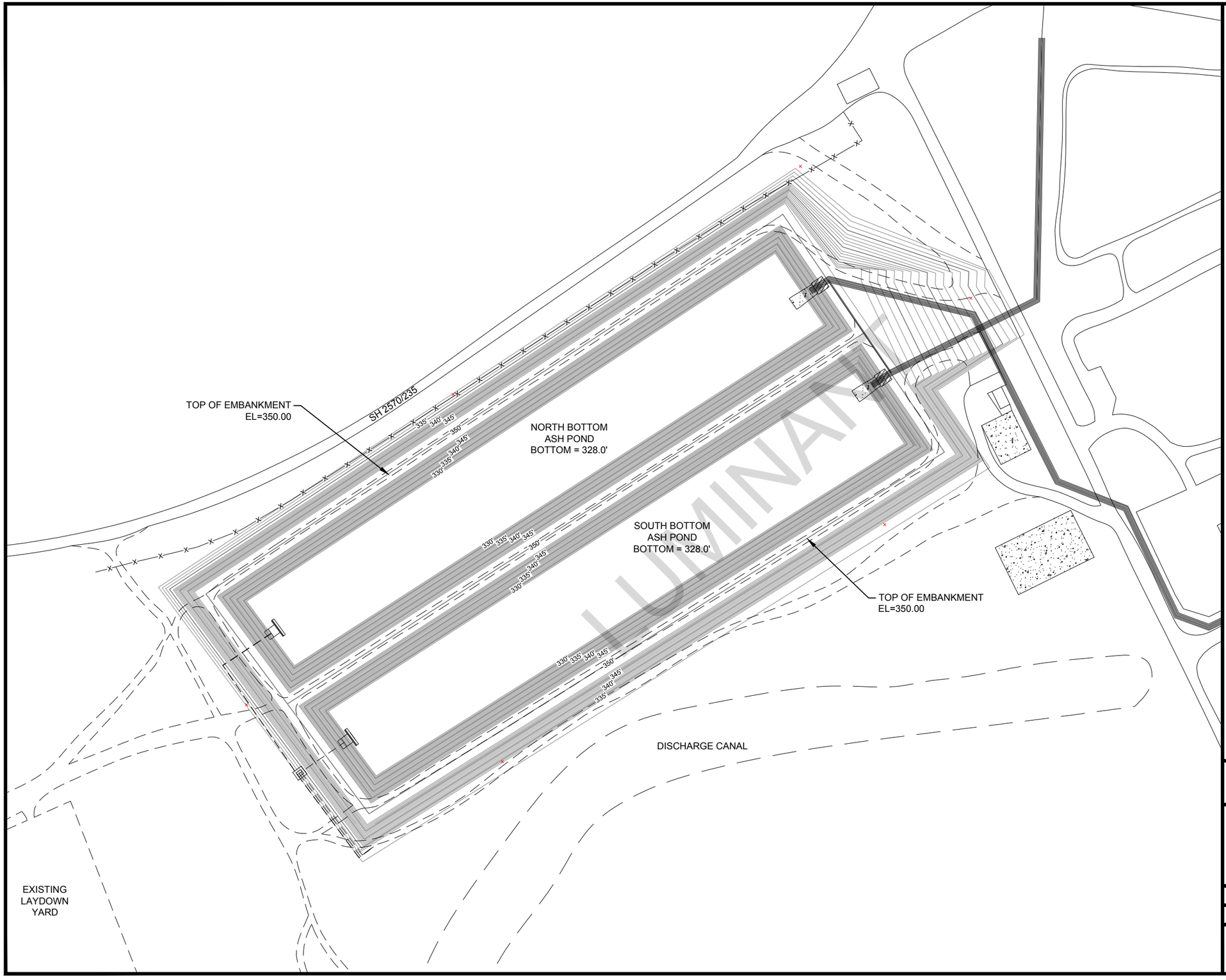
BIG BROWN S.E.S. UNITS 1, 2 & 3

BOTTOM ASH POND

DRAWN BY	WLR
DATE	2-1-89
SCALE	AS NOTED
DRAWING No.	119-1134-301
SHEET	03
REV.	3

Appendix B

Bottom Ash Pond Existing Site Plan



EXPLANATION

Existing Grade Contour
1 ft Interval

Existing Grade Contour
5 ft Interval

N

Scale in Feet
0 100 200

LUMINANT GENERATION COMPANY, LLC
BIG BROWN STEAM ELECTRIC STATION

Appendix B

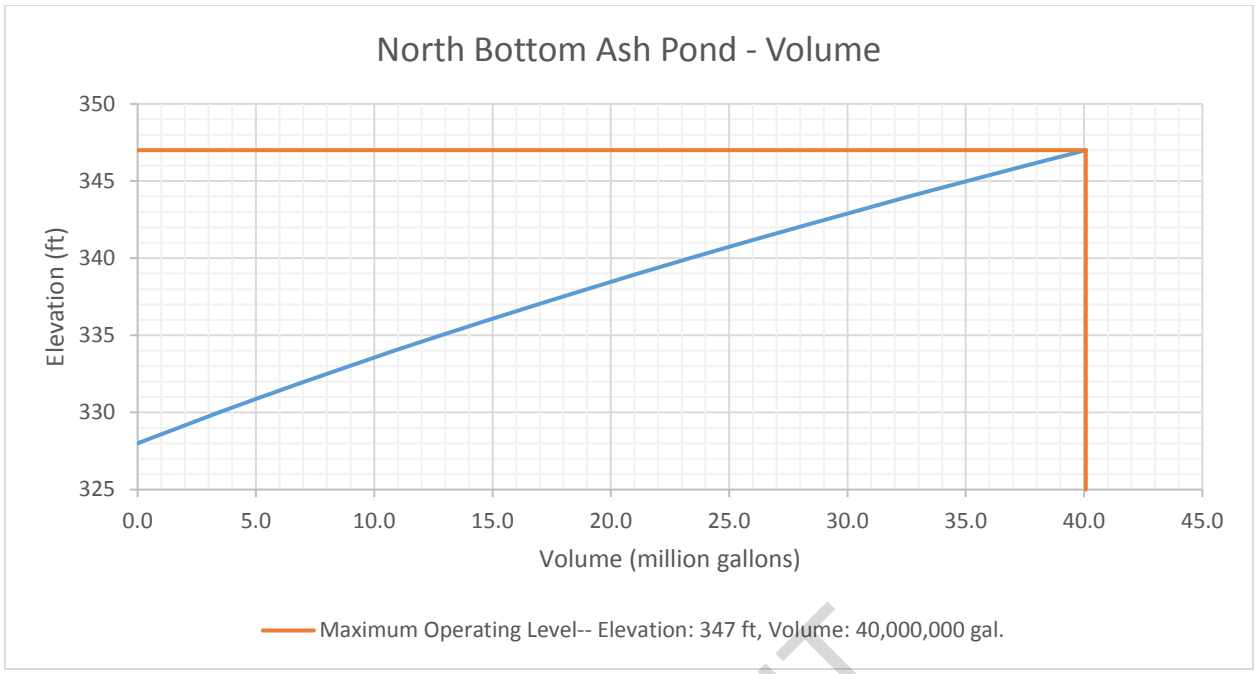
BOTTOM ASH PONDS
EXISTING SITE PLAN

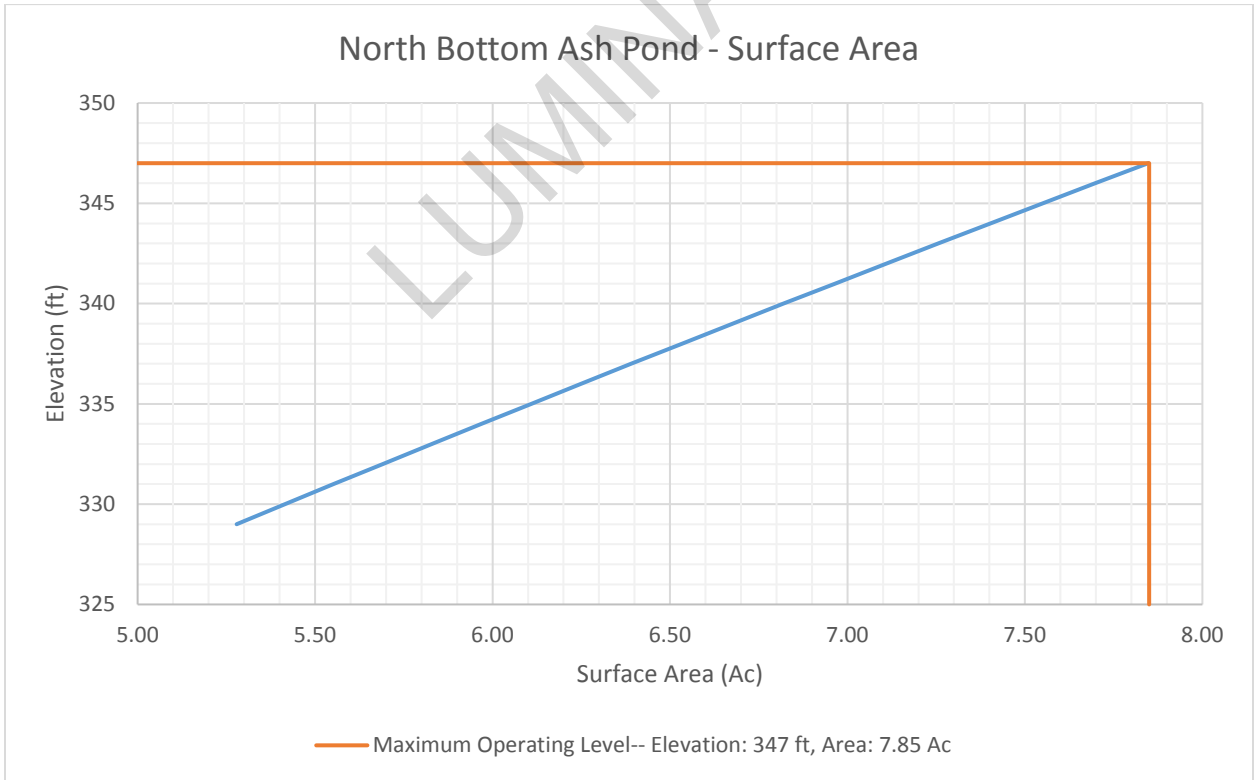
PROJECT: 5196C	BY: ADJ	REVISIONS
DATE: OCT., 2016	CHECKED: RBL/PJB	

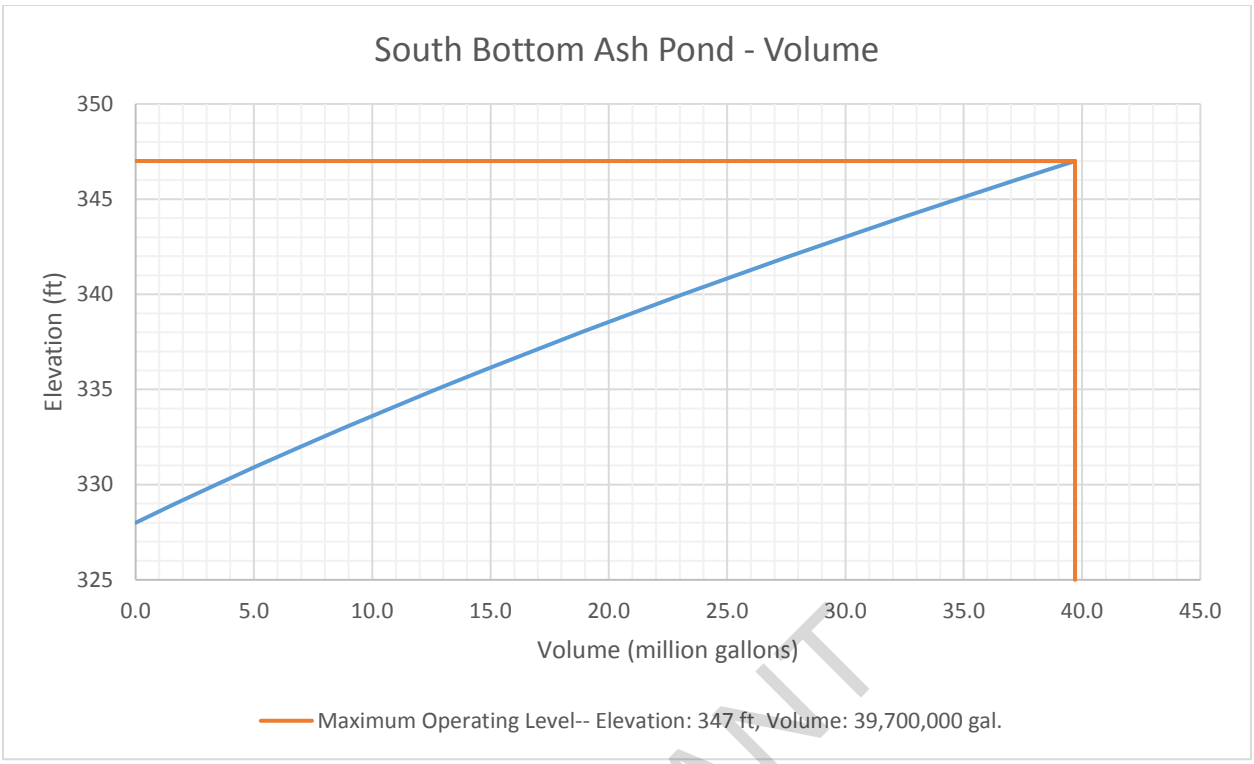
PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

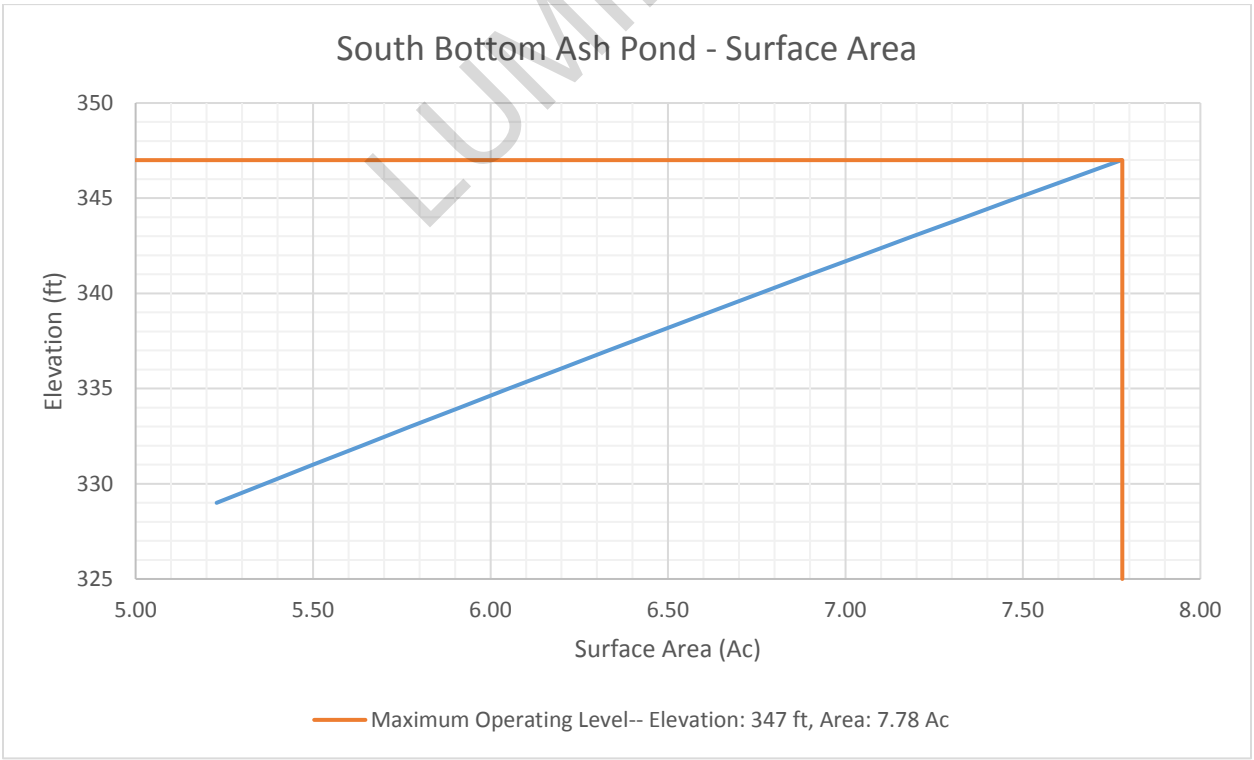
Appendix C

Bottom Ash Pond Area-Capacity Curves


North Bottom Ash Pond - Volume
Elevation (ft)
350
345
340
335
330
325
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Volume (million gallons)
Maximum Operating Level-- Elevation: 347 ft, Volume: 40,000,000 gal.


North Bottom Ash Pond - Surface Area
Elevation (ft)
350
345
340
335
330
325
5.00
5.50
6.00
6.50
7.00
7.50
8.00
Surface Area (Ac)
Maximum Operating Level-- Elevation: 347 ft, Area: 7.85 Ac


South Bottom Ash Pond - Volume
350
345
340
335
330
325
Elevation (ft)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Volume (million gallons)
Maximum Operating Level-- Elevation: 347 ft, Volume: 39,700,000 gal.


South Bottom Ash Pond - Surface Area
350
345
340
335
330
325
Elevation (ft)
5.00
5.50
6.00
6.50
7.00
7.50
8.00
Surface Area (Ac)
Maximum Operating Level-- Elevation: 347 ft, Area: 7.78 Ac