HISTORY OF CONSTRUCTION FOR EXISTING CCR SURFACE IMPOUNDMENT
PLANT CRIST GYPSUM STORAGE AREA
40 CFR 257.73(c)(1)(i)-(xii)

(i) Site Name and Ownership Information:

Site Name:	Plant Crist
Site Location:	Pensacola, Florida
Site Address:	11999 Pate Street Pensacola, FL 32514
Owner:	Gulf Power Company
Owner Address:	1 Energy Place Pensacola, FL 32520
CCR Impoundment Name:	Plant Crist Gypsum Storage Area
NID ID:	N/A

EPA's "Disposal of Coal Combustion Residuals from Electric Utilities" Final Rule (40 C.F.R. Part 257 and Part 261), §257.73(c)(1), requires the owner or operator of an existing CCR surface impoundment to compile a history of construction. To the extent feasible, the following information is provided:

(ii) CCR Unit Location Map:

30°34'06"N, 87°13'58"W
See Location Map in the Appendix

(iii) Purpose of CCR Impoundment: Plant Crist is a 4 unit electric generating facility, all of which are coal fired units. The Plant Crist Gypsum Storage Area is designed to receive and store coal combustion residuals (gypsum) produced during the coal-fired electric generating process at Plant Crist.

(iv) Watershed Description: Plant Crist is located within the White River HUC-12 watershed which has a total area of 38,530 acres. The White River Watershed is located within the Escambia HUC-8 watershed which has a drainage area of 486,017 acres. However, as the impoundment is constructed with a perimeter dike, no run-off from the adjoining watershed enters the impoundment.

(v) Description of physical and engineering properties of CCR impoundment foundation/abutments: The Gypsum Storage Area was constructed with a compacted embankment consisting of native soils (silty sand). The interior embankment walls and pond bottom are covered by an engineered composite liner including 60-mil HDPE underlain by a geosynthetic liner. Borings completed prior to construction indicate the existing soils consist of competent sands, silts and clays, with a predominance of sandy materials. Previously placed fills and other softer natural deposits were removed from the footprint of

the impoundment during the initial phases of grading. The subgrade was thoroughly proofrolled prior to the placement of any fill.

(vi) Summary of Site Preparation and Construction Activities: The Gypsum Storage Area was constructed between 2008 and 2010 and was constructed with compacted silty sands and clayey sands. The Gypsum Storage Area was constructed by excavating to an elevation of 25 ft MSL within the pond area and placing the embankment fill up to about 57 ft MSL, with a 20-foot-wide embankment crest. Embankment soils were compacted to a minimum of 98 percent standard Proctor (ASTM D698) maximum dry density. An engineered composite liner system covers the bottom and entire interior slopes of the Gypsum Storage Area. The Gypsum Storage Area and the Process Sedimentation Pond are divided by an embankment. For purposes of the CCR rule, the Process Sedimentation Pond is not a CCR unit as defined.

(vii) Engineering Diagram:

The following drawings reflecting the construction of the Plant Crist Gypsum Storage Area can be found in the Appendix:

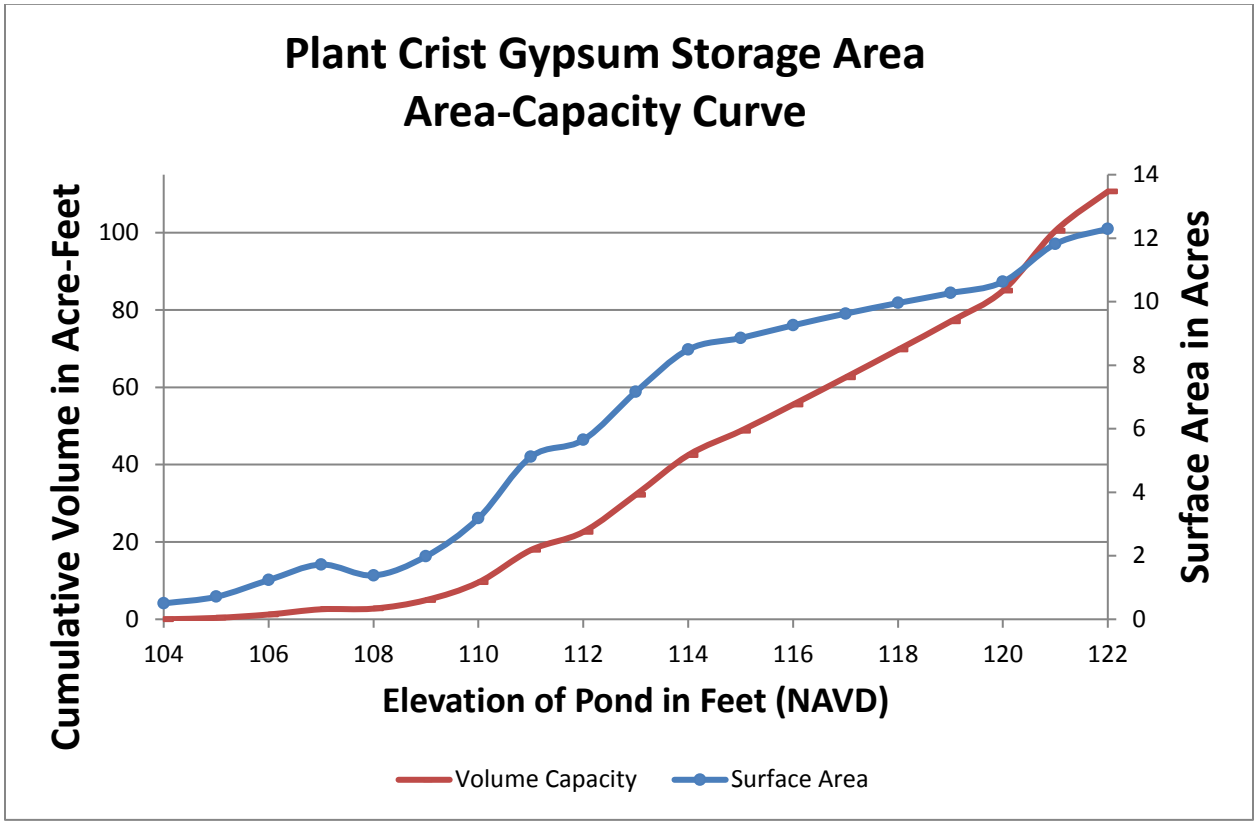
- Aerial Topo View Map
- E4C39034 – FGD Project, Gypsum Storage – Area 1, Site Plan
- E4C39035 – FGD Project, Gypsum Storage – Area 1, Existing Topographic Map and Boring/Piezometer Locations
- E4C39036 – FGD Project, Gypsum Storage – Area 1, Process Ponds Base Grade Plan, Retrofit for BMP Design
- E4C39037 – FGD Project, Gypsum Storage – Area 1, Process Ponds Final Grades & Cell 2 Base Grade Plan
- E4C39038 – FGD Project, Gypsum Storage – Area 1, Cell 2 Stack – Phase 1 Fill EL 117.70 & Cell 1 Base Grade Plan
- E4C39039 – FGD Project, Gypsum Storage – Area 1, Cell 2 Stack – Phase 2 Berm & Cell 1 Stack – Phase 1 Fill EL 123.40
- E4C39040 – FGD Project, Gypsum Storage – Area 1, Cell 2 Stack – Phase 2 Fill EL 138.70 & Cell 1 Stack – Phase 2 Berm
- E4C39041 – FGD Project, Gypsum Storage – Area 1, Cell 2 Stack – Phase 3 Berm & Cell 1 Stack – Phase 2 Fill EL 138.70
- E4C39042 – FGD Project, Gypsum Storage – Area 1, Cell 2 Stack – Phase 3 Fill EL 158.70 & Cell 1 Stack – Phase 3 Berm
- E4C39043 – FGD Project, Gypsum Storage – Area 1, Cell 2 Stack – Phase 4 Berm & Cell 1 Stack – Phase 3 Fill EL 158.70
- E4C39044 – FGD Project, Gypsum Storage – Area 1, Cell 1 Berm – Phase 4 & Cell 2 Stack – Phase 4 Fill EL 173.70
- E4C39045 – FGD Project, Gypsum Storage – Area 1, Cell 1 & 2 Stack, Final Grading Plan
- E4C39046 – FGD Project, Gypsum Storage – Area 1, Section A-A
- E4C39047 – FGD Project, Gypsum Storage – Area 1, Sections B-B & C-C

- E4C39049 – FGD Project, Gypsum Storage – Area 1, Typical Sections and Details
- E4C39050 – FGD Project, Gypsum Storage – Area 1, Decant System & Storm Water Details, Sheet 1
- E4C39051 – FGD Project, Gypsum Storage – Area 1, Decant System & Storm Water Details, Sheet 2
- E4C39053 – FGD Project, Gypsum Storage – Area 1, Decant System & Storm Water Details, Sheet 4
- E4C39054 – FGD Project, Gypsum Storage – Area 1, Decant System & Storm Water Details, Sheet 5
- E4C39061 – FGD Project, Gypsum Storage – Area 1, Decant System & Storm Water Details, Stopblock Riser Details

These drawings reflect the normal pool elevation of about EL 112 ft. (Plant Elevation Datum – 72.69 + MSL), as well as the maximum stack height of the gypsum when full (about 60 ft).

(viii) Description of Instrumentation: There is currently no instrumentation associated with the CCR surface impoundment.

(ix) Area-capacity curves:



(x) Spillway/Diversion design features and capacity calculations: Decant water from the Gypsum Storage Area flows to the Process Sedimentation Pond through either a Decant Riser Structure (located

near the southeast corner of the pond) that serves as the primary spillway or through a 7-ft wide by 5-ft high double-barrel concrete box culvert (located at the north corner of the Gypsum Storage Area) that serves as the auxiliary spillway. Decant water from the Process Sedimentation Pond flows through a series of manhole structures and 30-in diameter HDPE pipes into the Process Return Water Pond.

Assuming no additional discharge, the 100-yr storm (16.1 inches total) will result in a freeboard to the bottom of the overflow culvert invert of 7.8 feet. During peak inflow design flood, the maximum water surface elevation is approximately EL 114.

There is no offsite discharge of water from the Gypsum Storage Area.

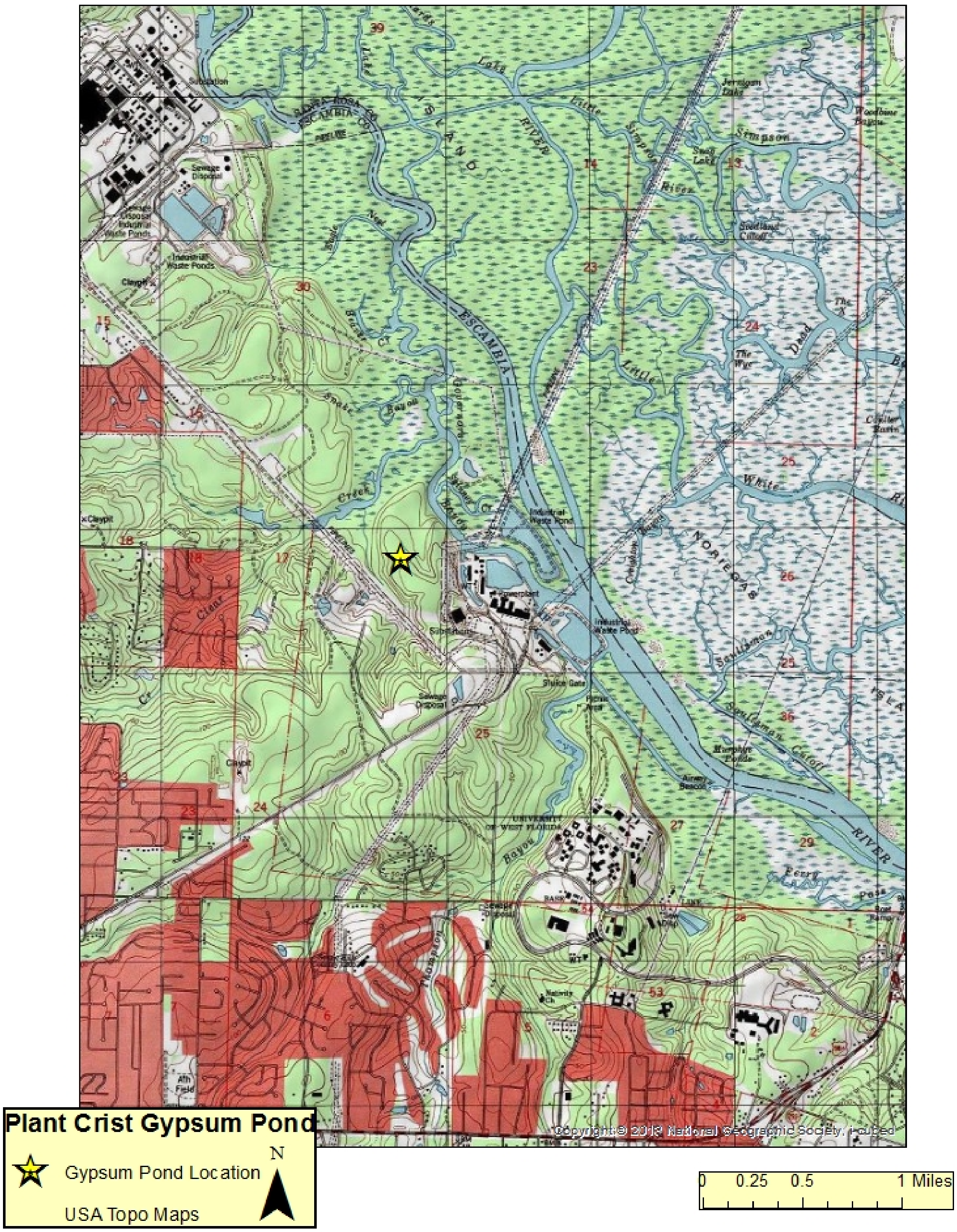
(xi) Provisions for surveillance, maintenance and repair: Inspections of dams and dikes are critical components and are conducted on a regular basis—at least annually by professional dam safety engineers and at least weekly by trained plant personnel. In addition, inspections are performed after unusual events such as storms. The inspections provide assurance that structures are sound and that action is taken, as needed, based on the findings. Safety inspections include observations of such things as pond levels, weather conditions, rainfall since the prior inspection, conditions of slopes and drains, erosion, animal damage, ant hills, alignment of retaining structures and more. Dam safety engineers inspect any maintenance or remediation performed since the previous inspection, check the status of work recommended at prior inspections, ensure that the posting of emergency notification information is up to date and evaluate any items noted during plant personnel inspections.

Construction specifications: The following specification relevant to the construction of the Plant Crist Gypsum Storage Area can be found in the Appendix:

Gypsum Storage Area 1 (Cells 1 and 2) Construction Specifications.

(xii) Known record of structural instability: There are no known instances of structural instability at the CCR unit.

Appendix


Plant Crist Gypsum Pond
Gypsum Pond Location
USA Topo Maps
N
0 0.25 0.5 1 Miles
ESCAMBIA
RIVER
Industrial Waste Pond
Powerplant
Substation
Sewage Disposal
Industrial Waste Ponds
UNIVERSITY OF WEST FLORIDA
Simpson River
Little River
NORIEGAS
Copyright:© 2013 National Geographic Society, i-cubed

GULF POWER COMPANY

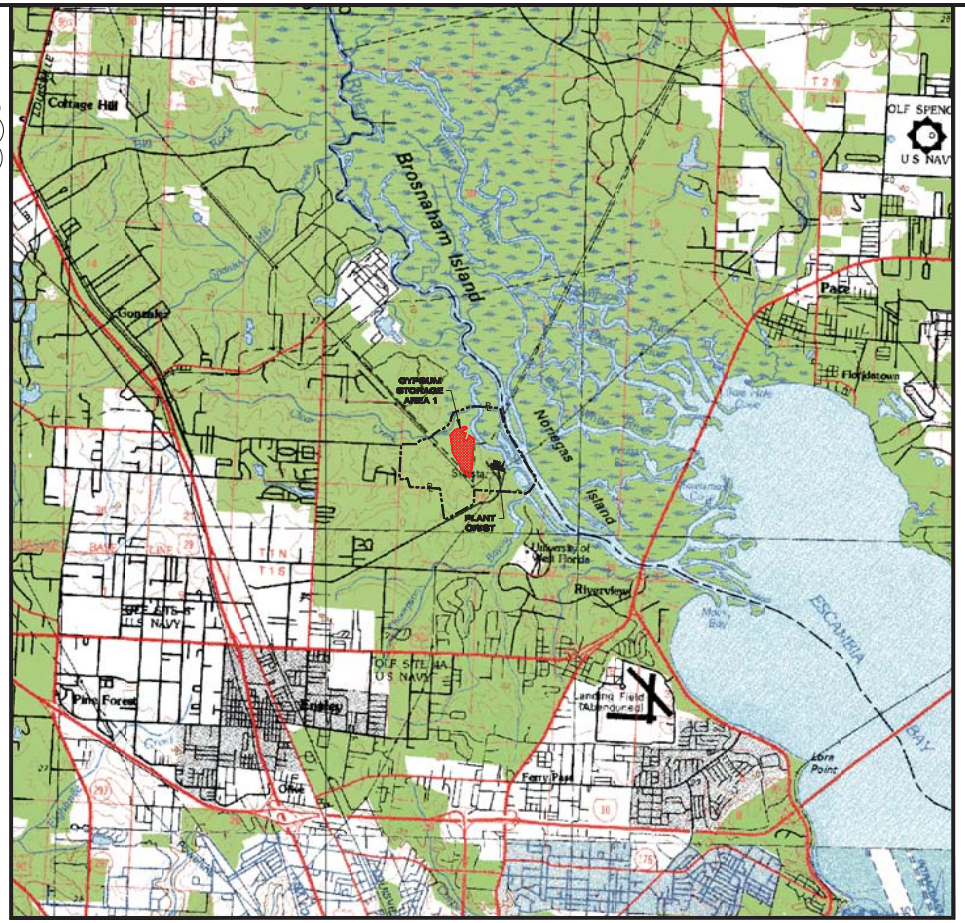
PLANT CRIST FGD PROJECT, GYPSUM STORAGE AREA 1
DESIGN AND OPERATION PLAN
ESCAMBIA COUNTY, FLORIDA

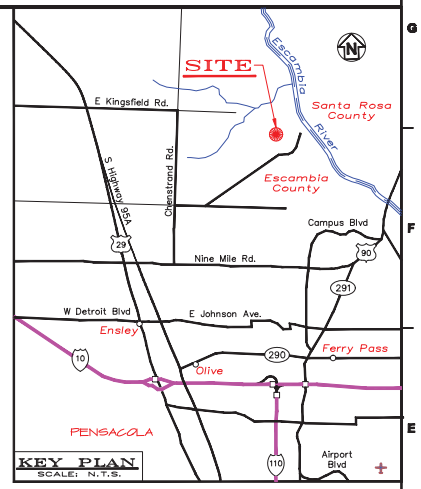
TABLE of CONTENTS

PLANT CRIST

FGD PROJECT - GYPSUM STORAGE FACILITY - AREA 1

2 A





LEGEND:

PROPERTY LINE (APPROXIMATE)

GYPSUM STORAGE AREA 1 SITE BOUNDARY

NOTES:

1. PROPERTY LINE IS APPROXIMATE.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. TOPOGRAPHIC DATA OBTAINED FROM SOUTHERN GIS DIGITAL USGS, PENSACOLA 30 X 60 MINUTE QUADRANGLE.

REFERENCES:

1. GULF POWER COMPANY, D-MISC-2003, REV. 2, AERIAL PHOTO OF PROPERTY LINES.
2. FLOOD INSURANCE RATE MAP, ESCAMBIA COUNTY, FLORIDA, PANEL 305, MAP NUMBER 12033C0305 F, REVISED: FEBRUARY 23, 2000.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

REVISION	DATE	BY	CHKD	ENGR. APPR.	PLANT APPR.	QA APPR.	ENVIRON APPR.	OPERS APPR.
2	7-23-10	CRU	RJB JCP	GRR				JBS
1	11-14-08	CRU	MHL	GRR	GEL	CSS	KLD	CKT
0	9-15-08	JAA	MHL	GRR	GEL	CSS	KLD	CKT

A. ADDED DRAWING, CHANGED REV. NO.'S

THIS DRAWING WAS ISSUED REV. 2 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519

EWO: 4106DE

REVISED DRAWING TITLES, REV. NO.'S

EWO: 4106DE

ISSUED FOR CONSTRUCTION

EWO: 4106DE

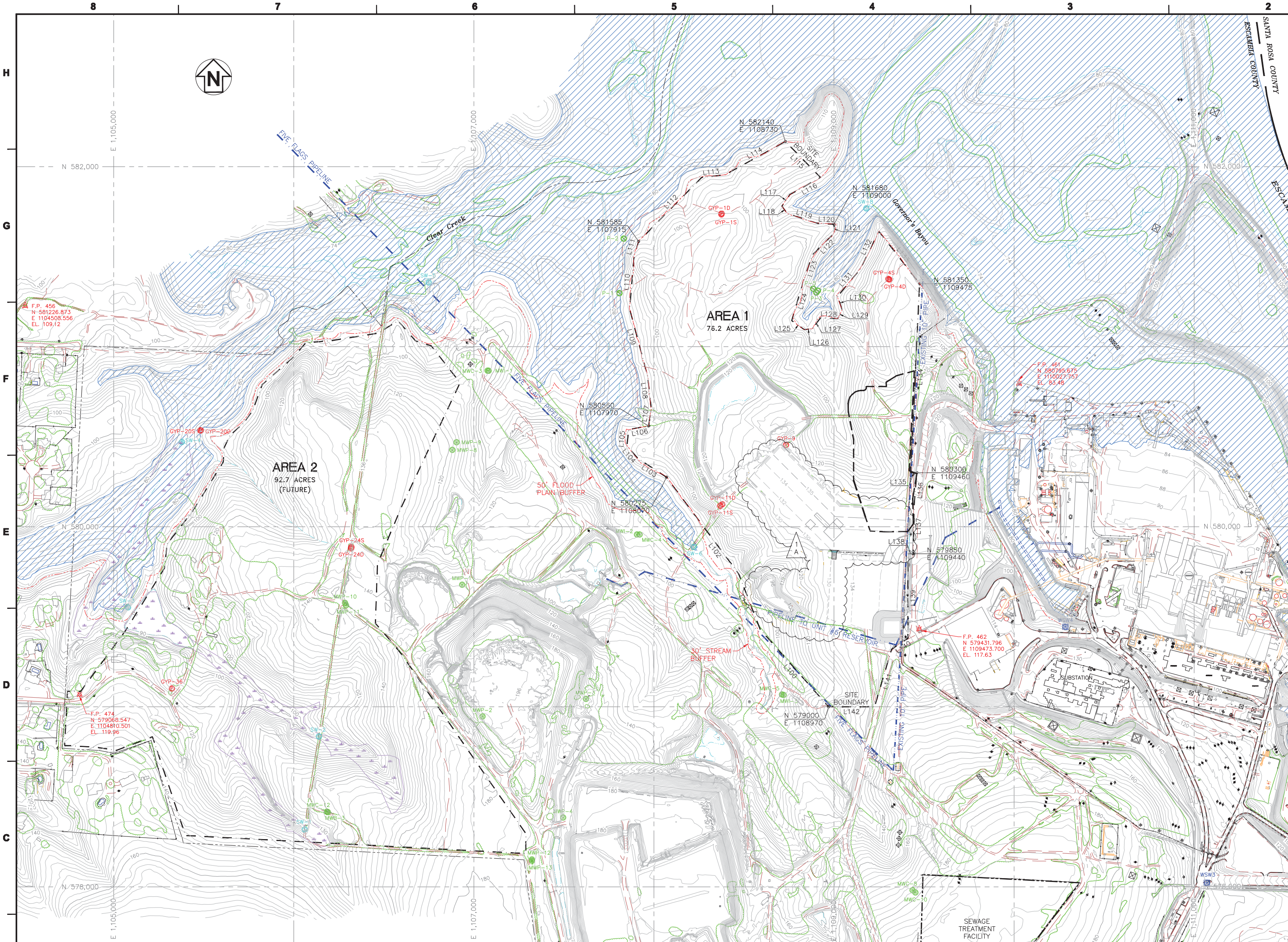
Southern Company Generation
Engineering and Construction Services
FOR

GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE - AREA 1
SITE PLAN

SCALE	PROJ NO.	DRAWING NUMBER	SHEET	REVISION
1"=2000'	510400	E4C39034	1	FINAL 2

ANSI B 44x34 Acad2004



GRAPHIC SCALE

(IN FEET)
1 inch = 200 ft.

Site Boundary Line Table		
Line #	Length	Bearing
L100	573.8467	N41° 28' 03.74"W
L101	332.4154	N21° 09' 40.54"W
L102	668.0007	N36° 47' 02.85"W
L103	191.3766	N56° 43' 30.40"W
L104	92.1954	N40° 36' 04.66"W
L105	90.5539	N6° 20' 24.69"E
L106	111.8034	N79° 41' 42.55"E
L107	96.1769	N8° 58' 21.46"E
L108	181.1077	N6° 20' 24.69"W
L109	388.1044	N14° 55' 53.10"W
L110	296.0574	N4° 50' 38.40"E
L111	83.8153	N17° 21' 14.49"E
L112	498.5228	N44° 35' 37.15"E
L113	130.8625	N83° 25' 05.00"E
L114	382.6879	N61° 05' 26.94"E
L115	279.3296	S44° 16' 29.19"E
L116	194.7434	S60° 48' 09.05"W
L117	78.1073	S34° 41' 42.55"W
L118	50.3084	S35° 50' 37.62"E
L119	178.6757	S72° 04' 19.49"E
L120	90.1388	S86° 49' 12.61"E
L121	50.0000	S0° 00' 00.00"E
L122	169.7056	S45° 00' 00.00"W
L123	153.3786	S19° 01' 32.18"W
L124	229.4014	S16° 27' 36.05"W
L125	86.0233	S54° 27' 44.36"E
L126	45.2769	N83° 39' 35.31"E
L127	75.0000	N36° 52' 11.63"E
L128	95.1315	S86° 59' 13.96"E
L129	55.9017	N26° 33' 54.18"E
L130	79.0569	N18° 26' 05.82"W
L131	195.2562	N39° 48' 20.06"E
L132	234.7871	N26° 33' 54.18"E
L133	367.0490	S37° 48' 23.51"E
L134	1051.1898	S2° 43' 34.72"W
L135	35.0000	N90° 00' 00.00"E
L136	180.6239	S4° 45' 49.11"W
L137	270.0463	S1° 03' 39.28"W
L138	30.0000	N90° 00' 00.00"W
L139	470.0000	S0° 00' 00.00"E
L140	108.1665	S56° 18' 35.76"W
L141	333.8038	S16° 32' 05.42"W
L142	255.0000	N90° 00' 00.00"W

LEGEND:

- EXISTING MONITORING WELL
- WATER SUPPLY WELL
- SURFACE WATER SAMPLING POINT
- PIEZOMETER
- SURVEY CONTROL POINT (FLIGHT PANEL)
- PROTECTED PLANT SPECIES
- UTILITY POLE
- LIGHT POLE
- TOWER
- DROP INLET
- PROPERTY LINE
- SITE BOUNDARY
- CREEK OR STREAM
- EXISTING GROUND CONTOURS
- VEGETATION
- FENCE
- 100 YEAR FLOOD PLAIN
- 50' FLOOD PLAIN BUFFER & 30' STREAM BUFFER
- WETLAND

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
EXISTING SITE TOPOGRAPHIC MAP AND
BORING/PIEZOMETER LOCATIONS

REVISION	DATE	DESCRIPTION	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519 EWO: 4106DE	CRU	RJB / JCP	GRR	X	X	X	JBS
0	7-25-08	ISSUED FOR CONSTRUCTION EWO: 4106DE	JAA	MHL	GRR	BHC	CSS	KLD	CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
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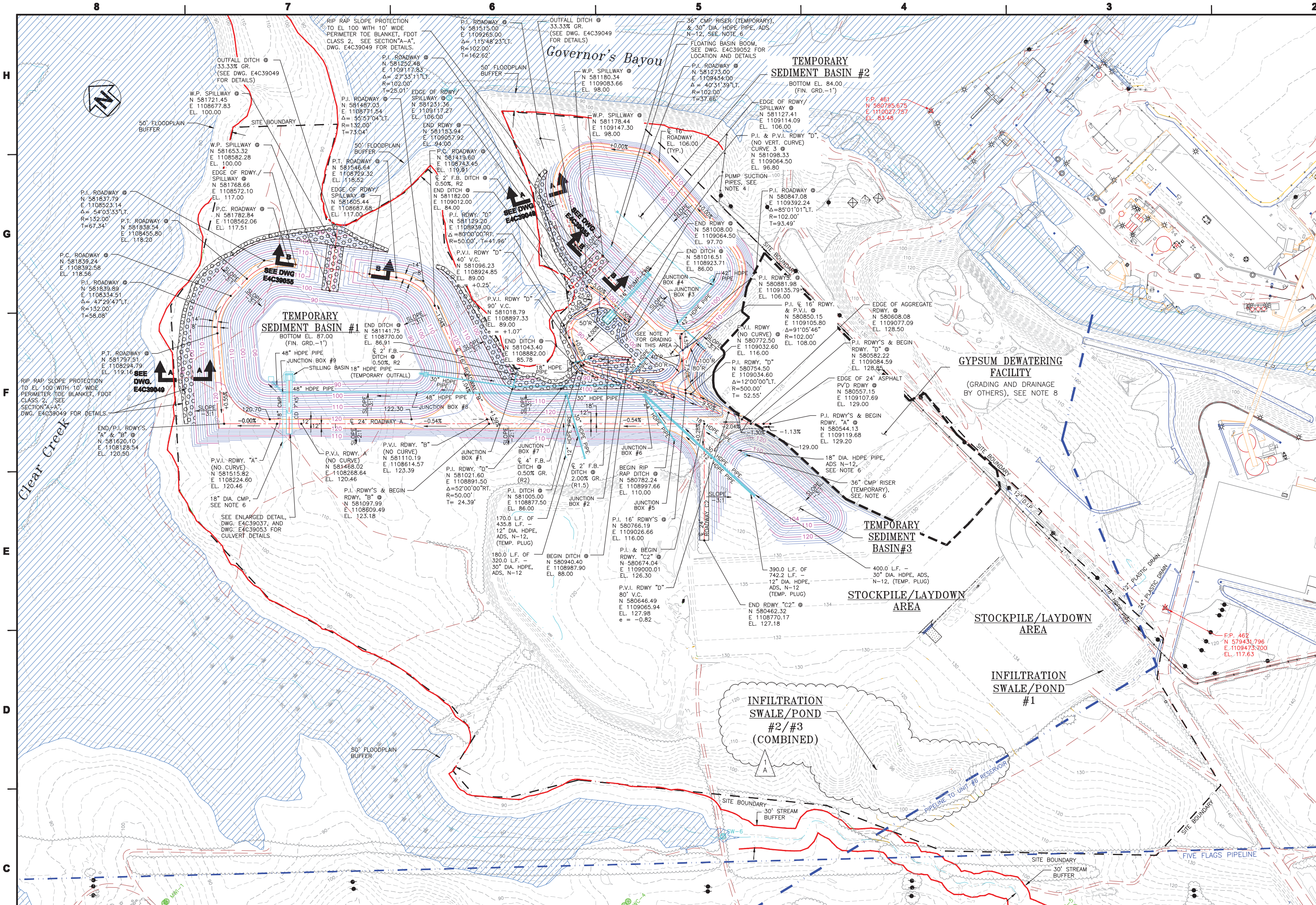
ANSI E: 44x34 Acad2004



LEGEND:

- EXISTING MONITORING WELL
- PROPOSED MONITORING WELL
- WATER SUPPLY WELL
- SURFACE WATER SAMPLING POINT
- PIEZOMETER
- SURVEY CONTROL POINT (FLIGHT PANEL)
- PROTECTED PLANT SPECIES
- UTILITY POLE
- LIGHT POLE
- TOWER
- DROP INLET
- PROPERTY LINE
- SITE BOUNDARY
- CREEK OR STREAM
- EXISTING GROUND CONTOURS
- PROPOSED GRADING CONTOURS
- FENCE
- 100 YEAR FLOOD PLAIN
- 50' FLOOD PLAIN BUFFER & 30' STREAM BUFFER
- RIP RAP SURFACING

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. SEE DRAWING E4C39054 FOR LAYOUT OF PIPES AND STRUCTURES FOR DECANT AND STORM WATER SYSTEMS.
5. BASE GRADES SHOWN ARE FOR RETROFITTING THE PROCESS PONDS AS TEMPORARY SEDIMENT BASINS FOR THE EROSION CONTROL BMP. ROADS AND SLOPES ON INSIDE OF PONDS ARE TO BE INITIALLY CONSTRUCTED AT FINISH GRADE MINUS 2'-0" AND THE POND BOTTOMS AT FINISH GRADE MINUS 1'-0".
6. SEE EROSION CONTROL PLANS FOR INFORMATION ON TEMPORARY SEDIMENT BASINS AND ASSOCIATED RISERS, PIPES, ETC...
7. SEE DRAWING E4C39052 FOR LAYOUT AND GRADING DETAILS OF TRANSFORMER PAD.
8. GYPSUM DEWATERING FACILITY LAYOUT, GRADING AND DRAINAGE DESIGN BY OTHERS (INCLUDING RETAINING WALL). SEE BLACK AND VEATCH DWGS.: 145832-CSX-S3001, S3005, S3050, S3401, S3450, S3900, AND S3901.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100 ft.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE FACILITY – AREA 1
PROCESS PONDS BASE GRADE PLAN
RETROFIT FOR BMP DESIGN

REVISION	DATE	DESCRIPTION	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519 EWO: 4106DE	CRU	RJB/JCP	GRR				JBS
0	9-15-08	ISSUED FOR CONSTRUCTION EWO: 4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
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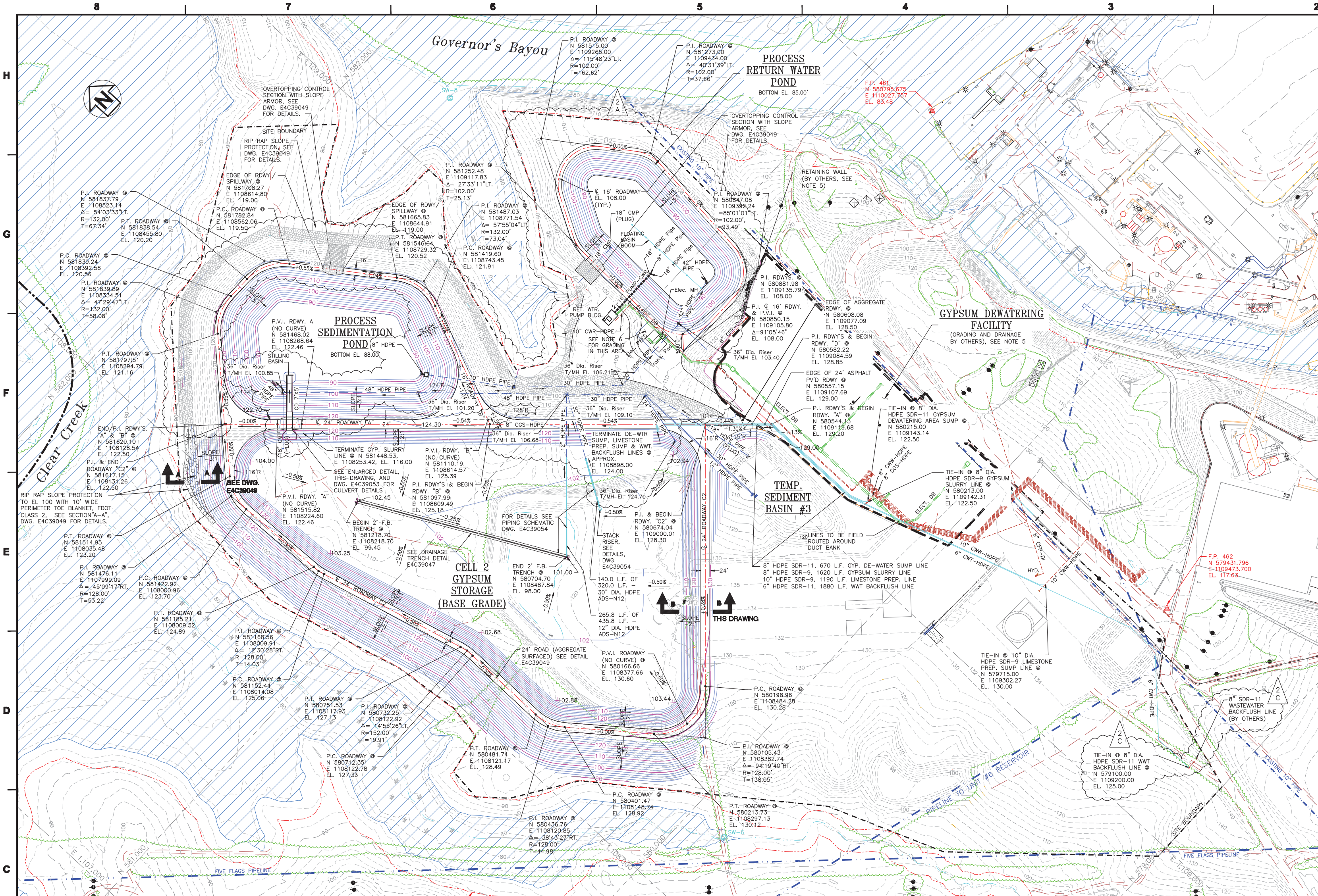
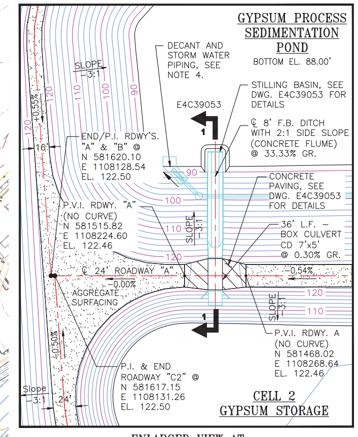
ANSI E: 44x34 Acad2004

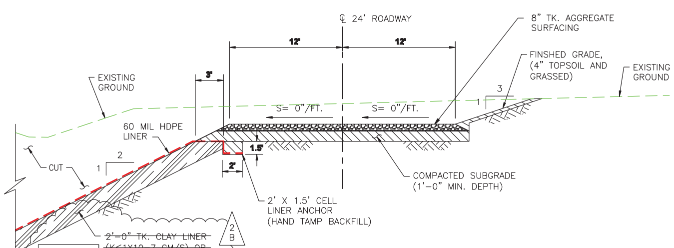
Quality Record





ENLARGED VIEW AT BOX CULVERT (CD 7'X5')

SCALE: 1"= 50'



SECTION B-B
24' ROADWAY (AGGREGATE SURFACED)

N.T.S.

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. SEE DRAWING E4C39054 FOR LAYOUT OF PIPES AND STRUCTURES FOR DECANT AND STORM WATER SYSTEMS.
5. GYPSUM DEWATERING FACILITY LAYOUT, GRADING AND DRAINAGE DESIGN BY OTHERS (INCLUDING RETAINING WALL). SEE BLACK AND VEATCH DWGS.: 145832-CSX-S3001, S3005, S3050, S3401, S3450, S3900, AND S3901.
6. SEE DRAWING E4C39052 FOR LAYOUT AND GRADING DETAILS OF TRANSFORMER PAD.
7. GRADES SHOWN IN THE PONDS AND CELL #1 ARE ELEVATIONS AT THE HDPE LINER. CONTRACTOR TO EXCAVATE AN ADDITIONAL 2'-0" IF PLACING THE 2 FOOT THICK CLAY LINER IN LIEU OF THE GCL (GEOSYNTHETIC CLAY LINER).
8. FOR LEGEND SEE DRAWING E4C39036.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
PROCESS PONDS FINAL GRADES &
CELL 2 BASE GRADE PLAN

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D						
2	7-23-10	THIS DRAWING WAS ISSUED REV. 2 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB JCP	GRR					JBS
2	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO B. REVISED TO SHOW GCL FOR AS-BUILT C. REVISED PIPE SIZE	4106DE	CRU	RJB JCP	GRR					JBS
1	7-22-09	REMOVED HOLD – REVISED TIE-INS, ADDED PIPE LENGTHS	4106DE	CRU	GRR	GRR	GEL	CSS	KLD	CKT	
0	9-15-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT	

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'S	REV
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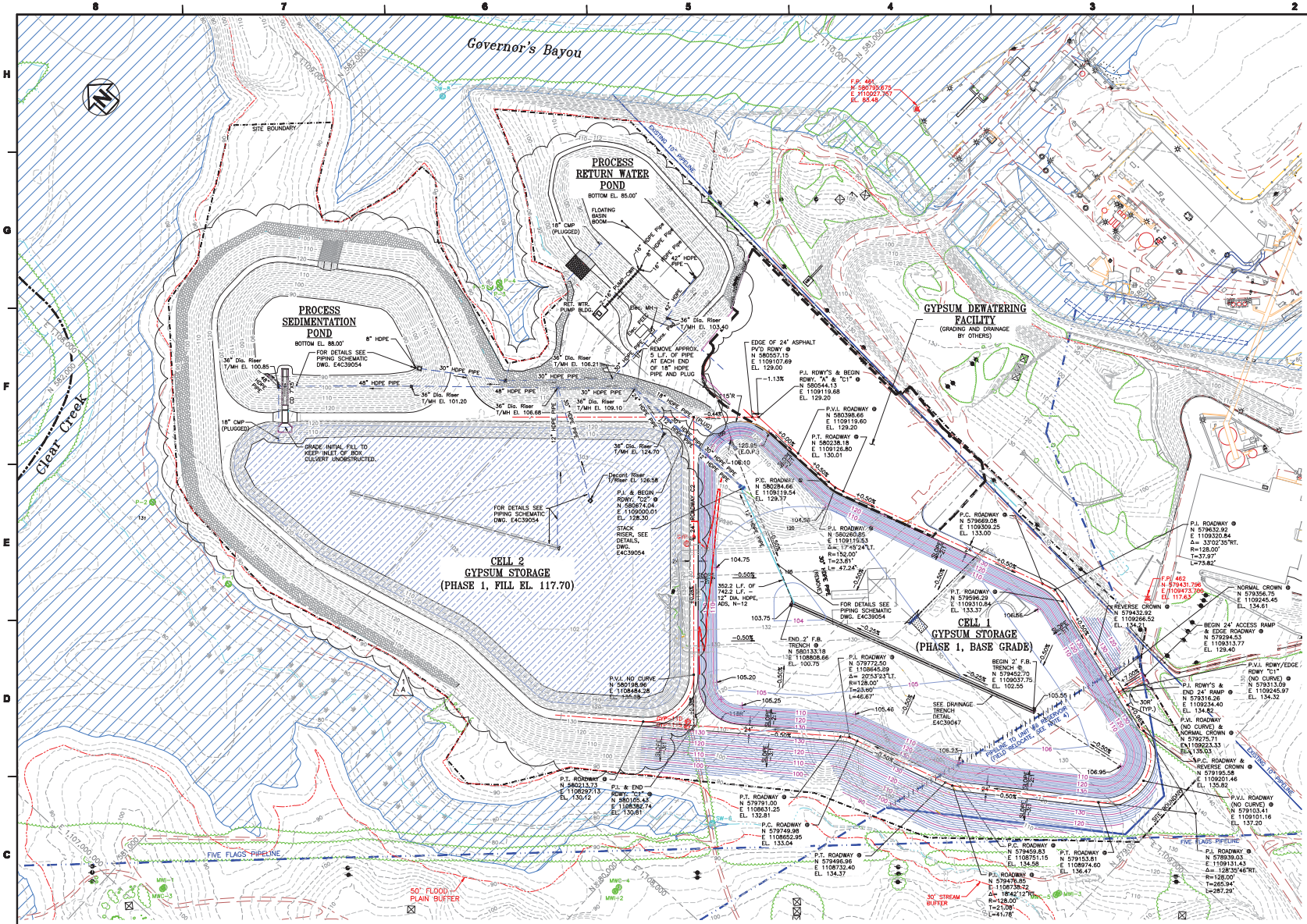
ANSI E: 44x34 Acad2004



NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. LOCATION OF PIPELINE TO UNIT #6 RESERVOIR AS SHOWN IS APPROXIMATE. FIELD VERIFY AND RELOCATE PORTION AROUND SOUTHEAST CORNER OF CELL #1.
5. FOR LEGEND SEE DRAWING E4C39036.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

REVISION	DATE	DRAWN	CHECKED	ENGR. APPR.	PLANT APPR.	QA APPR.	ENVIRON. APPR.	DESIGN MGR.
1	7-23-10	CRU	RJB / JCP	GRR				JBS
0	9-15-08	JAA	MHL	GRR	GEL	CSS	KLD	CKT

REVISED TO INCLUDE AS-BUILT CONDITIONS
A. REVISED EXIST. TOPO
THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519
EWO: 4106DE

ISSUED FOR CONSTRUCTION
EWO: 4106DE

Southern Company Generation
Engineering and Construction Services
FOR

GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 2 STACK – PHASE 1 FILL EL. 117.70
& CELL 1 BASE GRADE PLAN

SCALE	PROJ. NO.	DRAWING NUMBER	SHEET	REV
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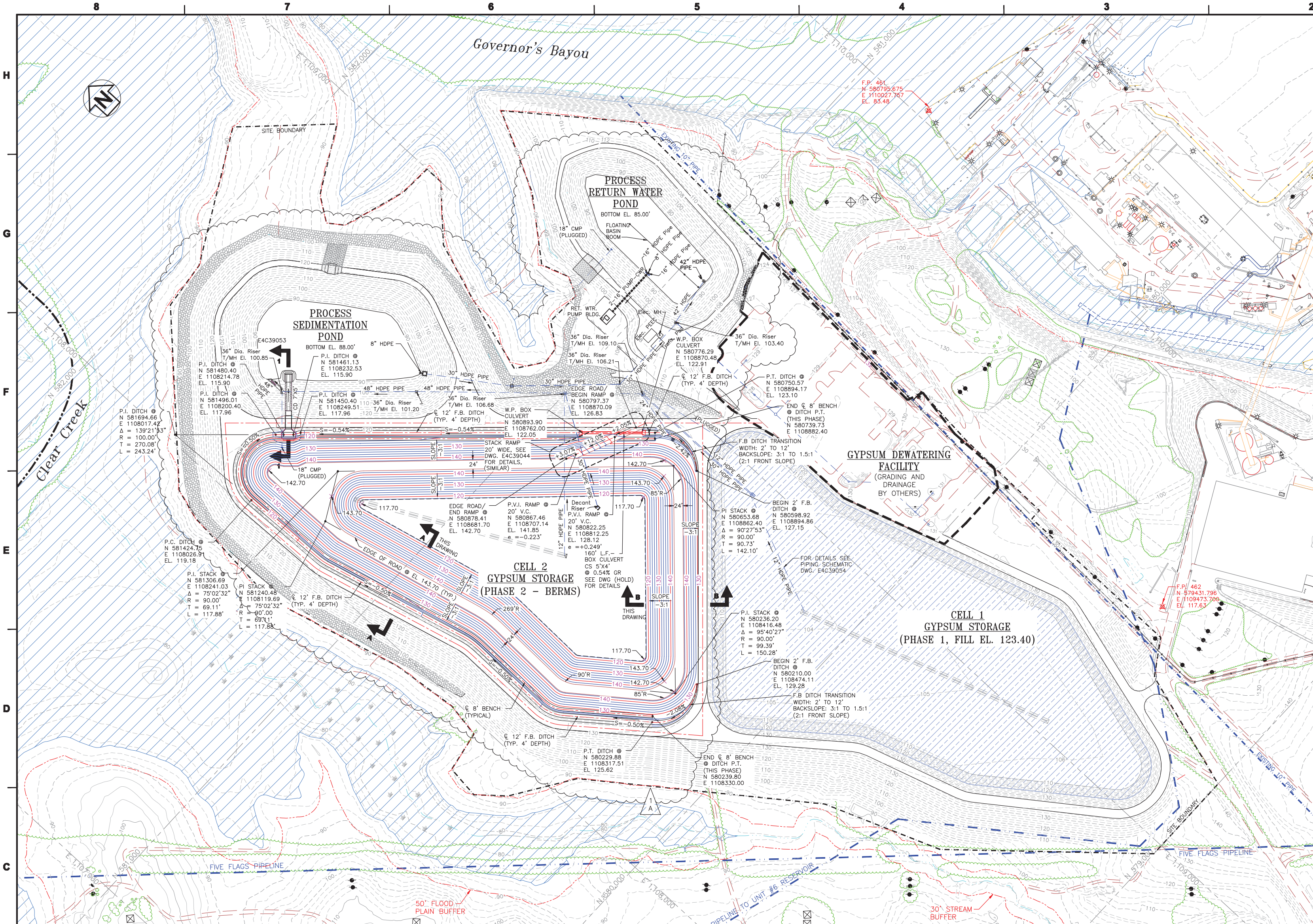
ANSI B 44x34 Acad2004



Governor's Bayou
Clear Creek
PROCESS RETURN WATER POND
BOTTOM EL. 85.00'
PROCESS SEDIMENTATION POND
BOTTOM EL. 88.00'
CELL 2 GYPSUM STORAGE (PHASE 2 - BERMS)
CELL 1 GYPSUM STORAGE (PHASE 1, FILL EL. 123.40)
GYPSUM DEWATERING FACILITY (GRADING AND DRAINAGE BY OTHERS)
SITE BOUNDARY
FIVE FLAGS PIPELINE
50' FLOOD PLAIN BUFFER
30' STREAM BUFFER
PIPELINE TO UNIT #6 RESERVOIR

GRAPHIC SCALE

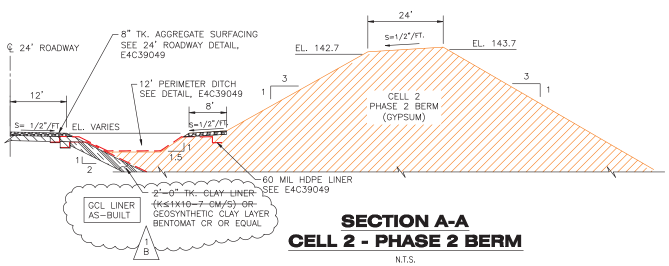
(IN FEET)
1 inch = 100 ft.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.

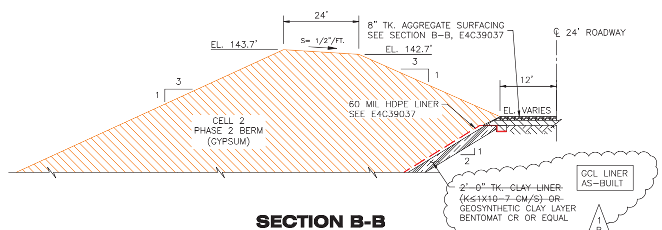
REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.



℄ 24' ROADWAY
8" TK. AGGREGATE SURFACING SEE 24' ROADWAY DETAIL, E4C39049
12' PERIMETER DITCH SEE DETAIL, E4C39049
EL. 142.7
EL. 143.7
CELL 2 PHASE 2 BERM (GYPSUM)
60 MIL HDPE LINER SEE E4C39049
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
GCL LINER AS-BUILT

SECTION A-A
CELL 2 - PHASE 2 BERM
N.T.S.



SECTION B-B
CELL 2 - PHASE 2 BERM
N.T.S.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

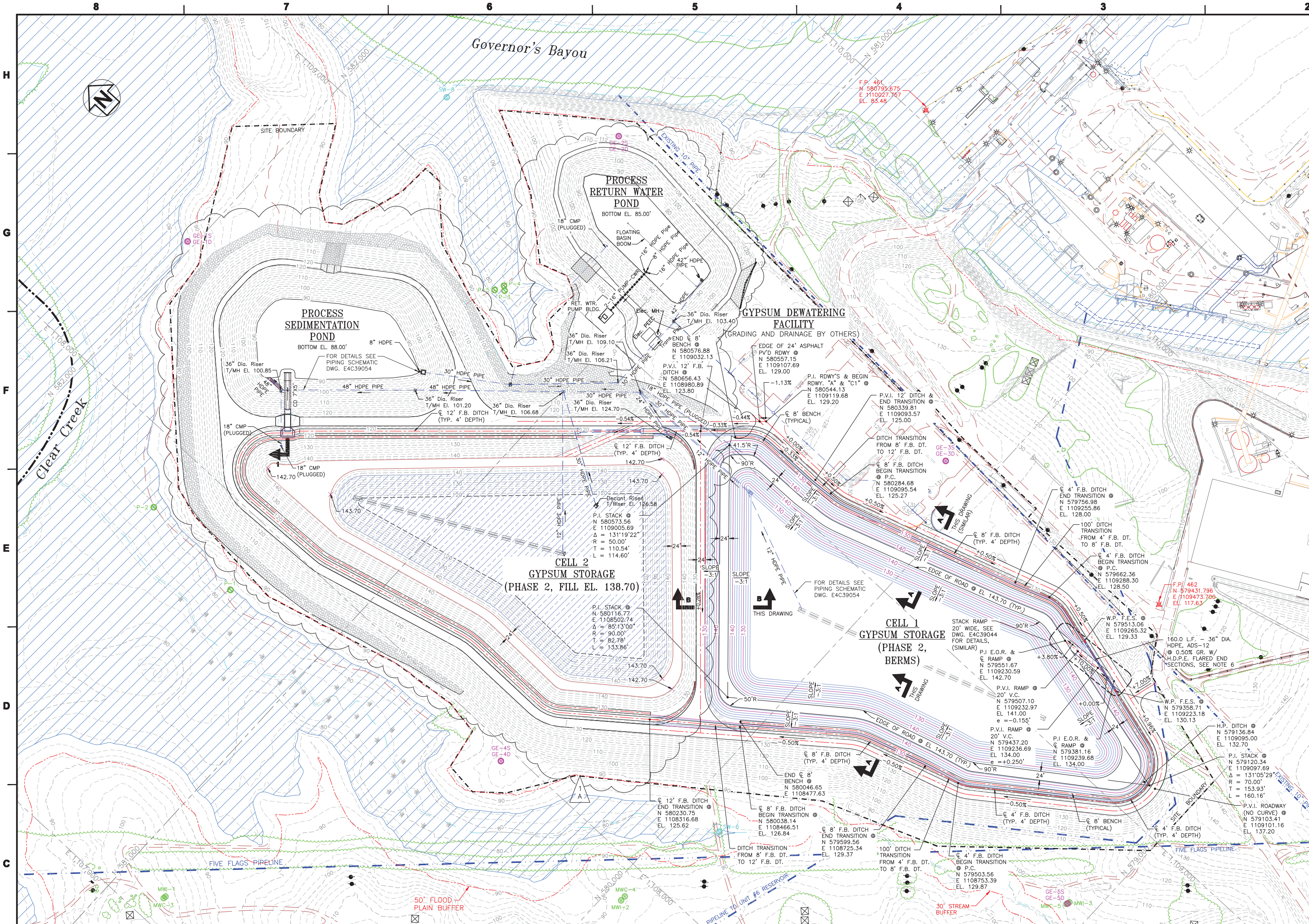
GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 2 STACK – PHASE 2 BERM &
CELL 1 STACK – PHASE 1 FILL EL. 123.40

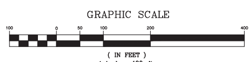
REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I&C APPR	MECH APPR	DISC MGR
1	7-23-10	THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB JCP	GRR				
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO B. REVISED TO SHOW GCL FOR AS-BUILT	4106DE	CRU	RJB JCP	GRR				JBS
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT

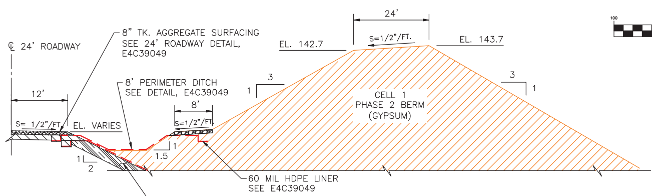
SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39039	1	FINAL	1

ANSI E: 44x34 Acad2004



Governor's Bayou
Clear Creek
SITE BOUNDARY
PROCESS RETURN WATER POND
BOTTOM EL. 85.00'
PROCESS SEDIMENTATION POND
BOTTOM EL. 88.00'
GYPSUM DEWATERING FACILITY
(GRADING AND DRAINAGE BY OTHERS)
CELL 2
GYPSUM STORAGE
(PHASE 2, FILL EL. 138.70)
CELL 1
GYPSUM STORAGE
(PHASE 2, BERMS)
EDGE OF ROAD EL 143.70 (TYP.)
FIVE FLAGS PIPELINE
50' FLOOD PLAIN BUFFER
30' STREAM BUFFER
PIPELINE TO UNIT #6 RESERVOIR
EXISTING 10" PIPE
THIS DRAWING

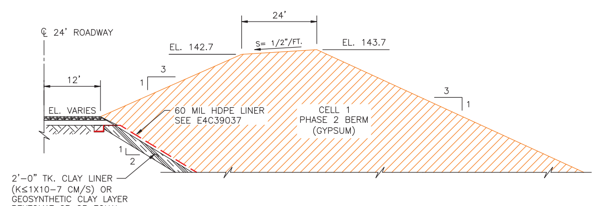




℄ 24' ROADWAY
8" TK. AGGREGATE SURFACING SEE 24' ROADWAY DETAIL, E4C39049
8" PERIMETER DITCH SEE DETAIL, E4C39049
24'
S=1/2"/FT.
EL. 142.7
EL. 143.7
12'
8'
EL. VARIES
CELL 1 PHASE 2 BERM (GYPSUM)
60 MIL HDPE LINER SEE E4C39049
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL

SECTION A-A
CELL 1 - PHASE 2 BERM

N.T.S.



SECTION B-B
CELL 1 - PHASE 2 BERM

N.T.S.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.
6. THE 36" DIAMETER HDPE PIPE AND HDPE END SECTIONS (TYPE ADS OR APPROVED EQUAL) SHOULD BE LAID IN THE PERIMETER DITCH AFTER THE HDPE 60 MIL LINER HAS BE PLACED ALONG WITH A PROTECTIVE GEOTEXTILE (US 380NW OR APPROVED EQUAL) PLACED BETWEEN LINER AND PIPE/BACKFILL MATERIAL). THE DITCH IS THEN TO BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH EARTHWORK SPECIFICATIONS TO FINAL GRADE.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

GULF POWER COMPANY

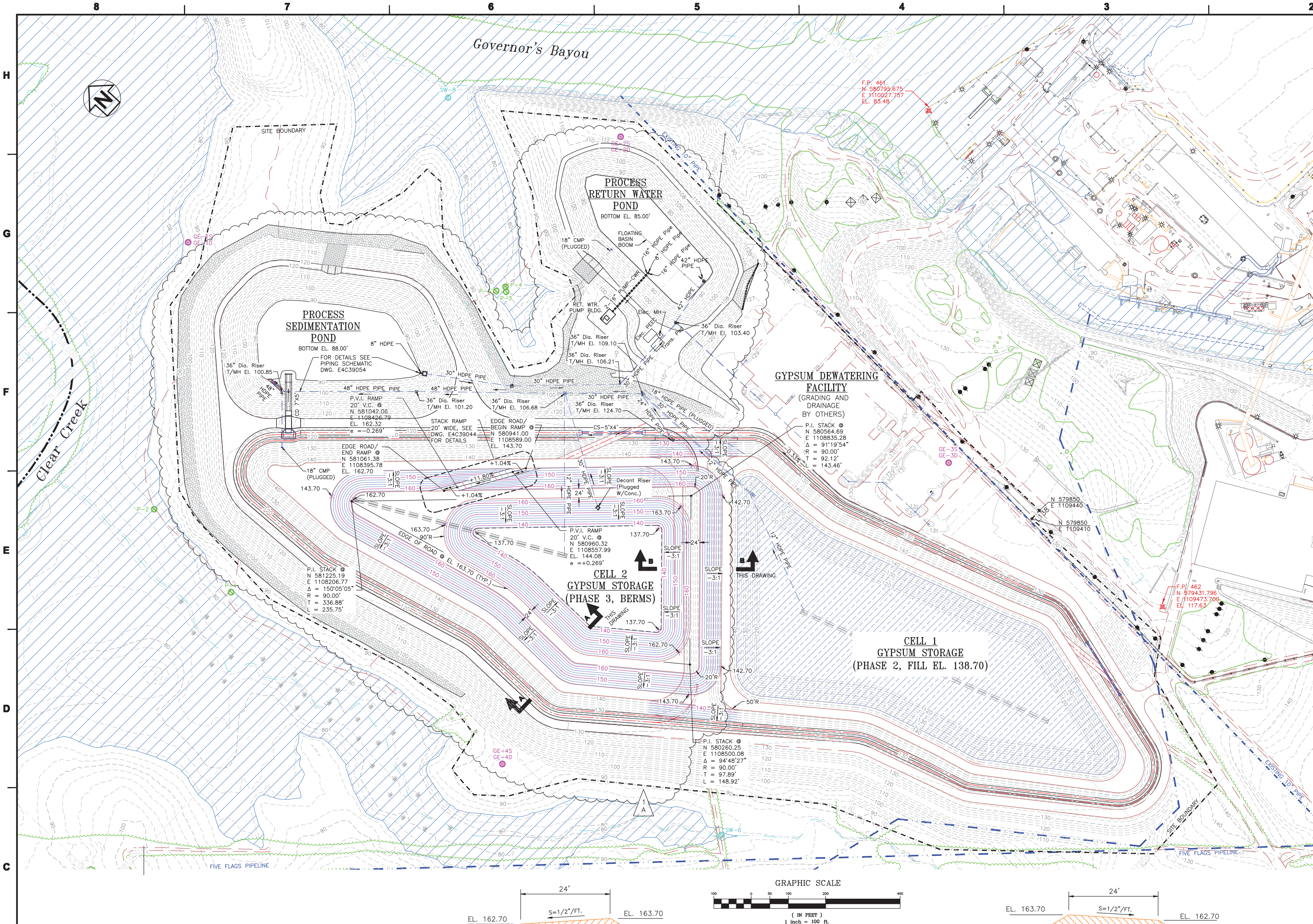
PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 2 STACK – PHASE 2 FILL EL. 138.70
& CELL 1 STACK – PHASE 2 BERM

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO. THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB/JCP	GRR				JBS
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT

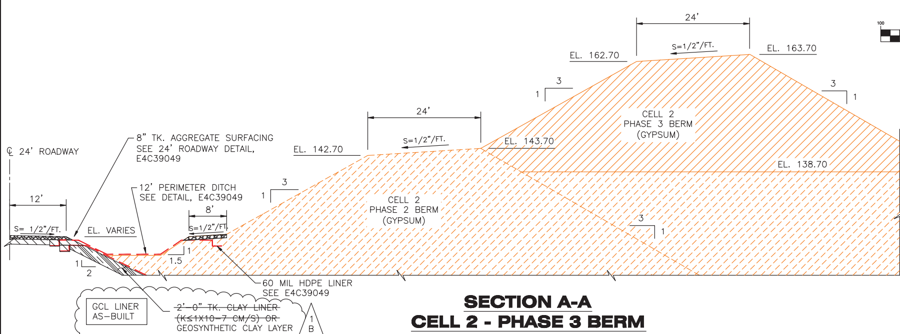
SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39040	1	FINAL	1

ANSI E: 44x34 Acad2004

Quality Record

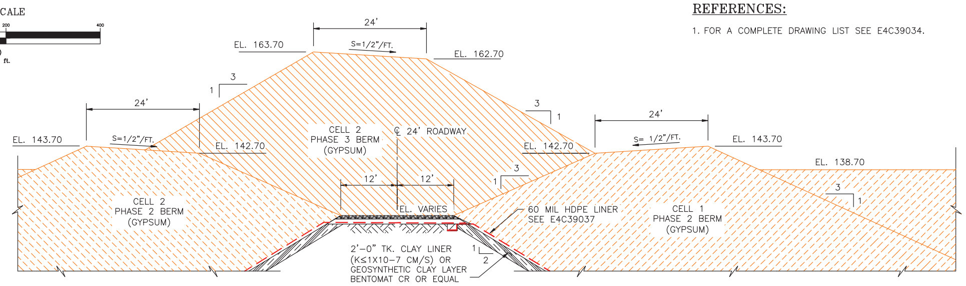


Governor's Bayou
Clear Creek
SITE BOUNDARY
PROCESS RETURN WATER POND
BOTTOM EL. 85.00'
PROCESS SEDIMENTATION POND
BOTTOM EL. 88.00'
GYPSUM DEWATERING FACILITY
(GRADING AND DRAINAGE BY OTHERS)
CELL 2
GYPSUM STORAGE
(PHASE 3, BERMS)
CELL 1
GYPSUM STORAGE
(PHASE 2, FILL EL. 138.70)
FIVE FLAGS PIPELINE
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.



EL. 162.70
EL. 163.70
EL. 142.70
EL. 143.70
EL. 138.70
24' ROADWAY
8" TK. AGGREGATE SURFACING SEE 24' ROADWAY DETAIL, E4C39049
12' PERIMETER DITCH SEE DETAIL, E4C39049
CELL 2 PHASE 3 BERM (GYPSUM)
CELL 2 PHASE 2 BERM (GYPSUM)
60 MIL HDPE LINER SEE E4C39049
GCL LINER AS-BUILT
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL

SECTION A-A
CELL 2 - PHASE 3 BERM
N.T.S.



SECTION B-B
CELL 2 - PHASE 3 BERM
N.T.S.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

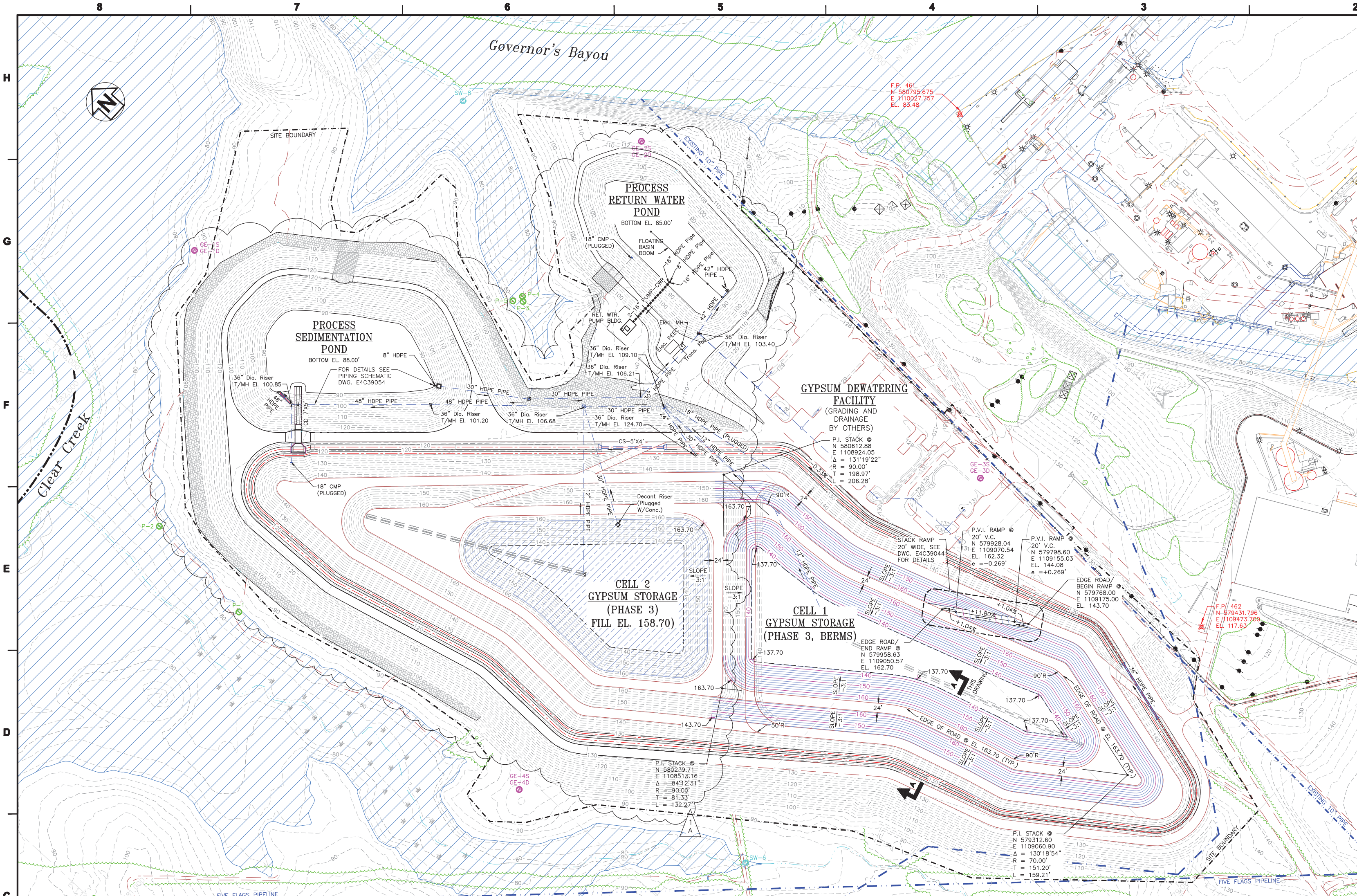
Southern Company Generation Engineering and Construction Services
FOR
GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 2 STACK – PHASE 3 BERM &
CELL 1 STACK – PHASE 2 FILL EL. 138.70

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB / JCP	GRR				JBS
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO B. REVISED TO SHOW GCL FOR AS-BUILT	4106DE	CRU	RJB / JCP	GRR				JBS
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT

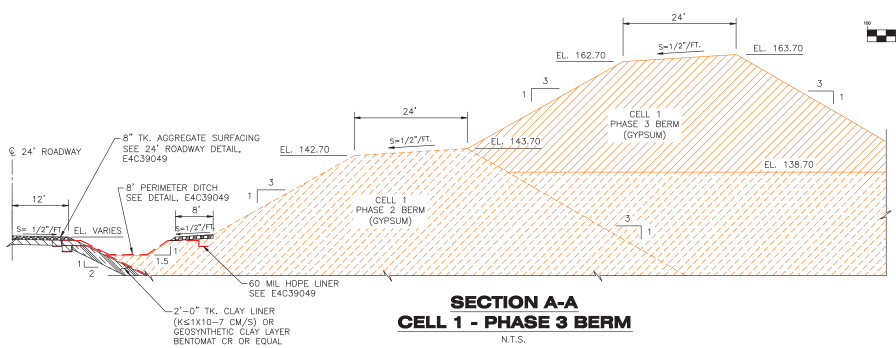
SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39041	1	FINAL	1

ANSI E: 44x34 Acad2004


Governor's Bayou
Clear Creek
SITE BOUNDARY
PROCESS RETURN WATER POND
BOTTOM EL. 85.00'
PROCESS SEDIMENTATION POND
BOTTOM EL. 88.00'
GYPSUM DEWATERING FACILITY
(GRADING AND DRAINAGE BY OTHERS)
CELL 2 GYPSUM STORAGE (PHASE 3) FILL EL. 158.70)
CELL 1 GYPSUM STORAGE (PHASE 3, BERMS)
FIVE FLAGS PIPELINE
EXISTING 10" PIPE

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.


℄ 24' ROADWAY
8" TK. AGGREGATE SURFACING SEE 24' ROADWAY DETAIL, E4C39049
8' PERIMETER DITCH SEE DETAIL, E4C39049
EL. 142.70
EL. 162.70
EL. 163.70
EL. 143.70
EL. 138.70
EL. VARIES
S=1/2"/FT.
CELL 1 PHASE 3 BERM (GYPSUM)
CELL 1 PHASE 2 BERM (GYPSUM)
60 MIL HDPE LINER SEE E4C39049
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL

SECTION A-A
CELL 1 - PHASE 3 BERM
N.T.S.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

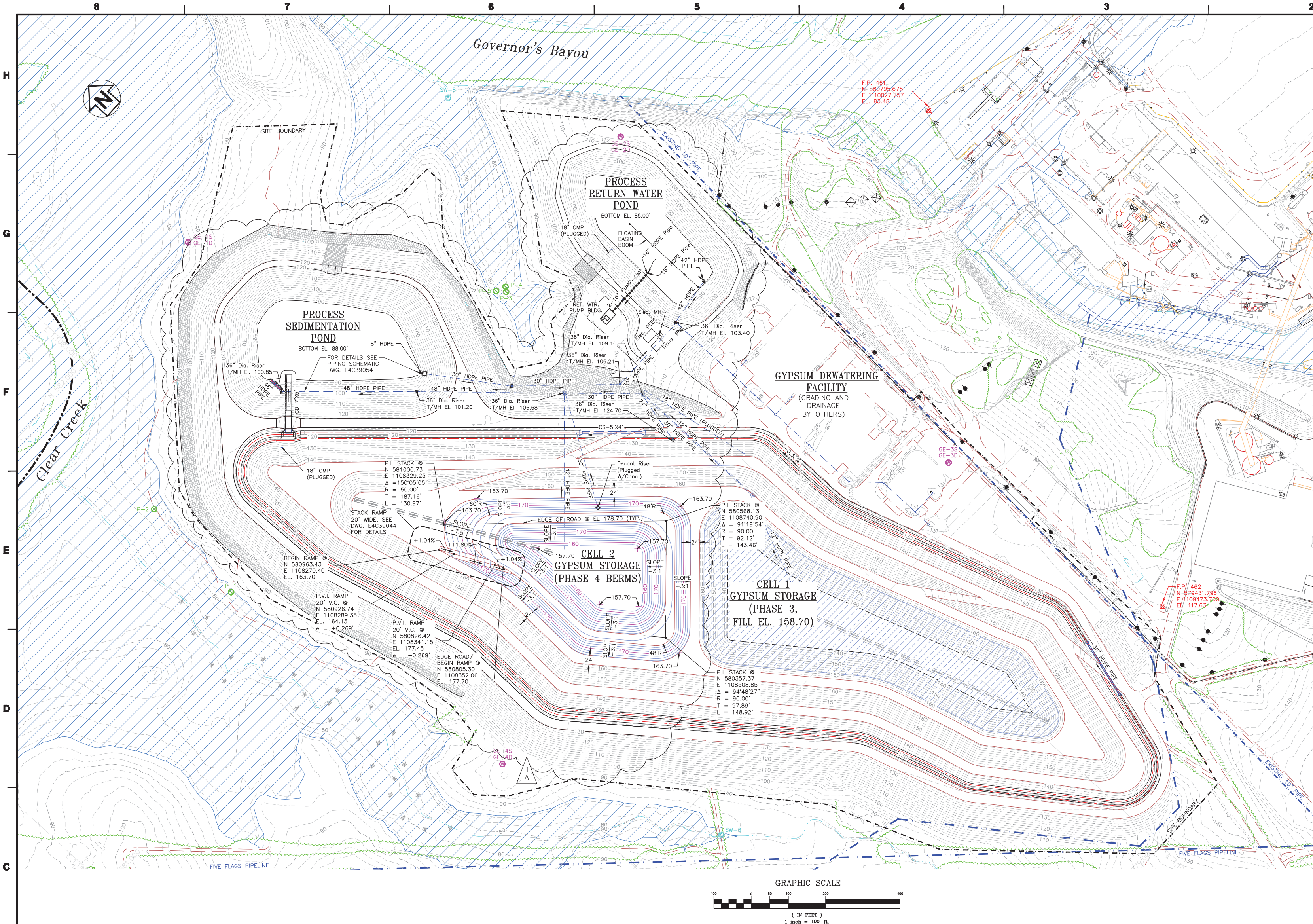
GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 2 STACK – PHASE 3 FILL EL. 158.70
& CELL 1 STACK – PHASE 3 BERM

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO — THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB/JCP	GRR				JBS
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39042	1	FINAL	1

ANSI E: 44x34 Acad2004



NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

REVISION	DATE	DESCRIPTION
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO. THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519. EWO: 4106DE. CRU, RJB/JCP, GRR, JBS
0	11-14-08	ISSUED FOR CONSTRUCTION. EWO: 4106DE. JAA, MHL, GRR, GEL, CSS, KLD, CKT

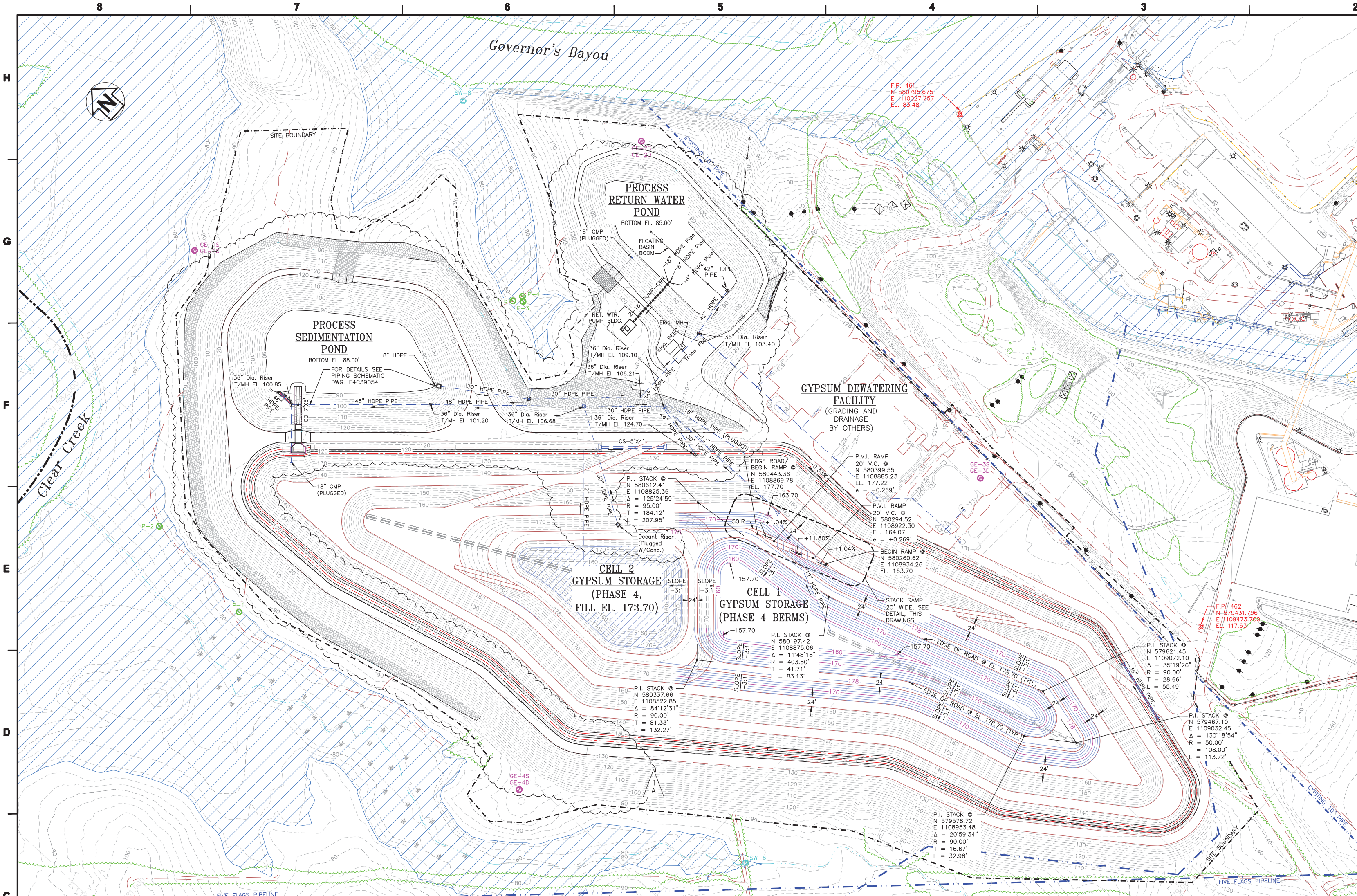
Southern Company Generation Engineering and Construction Services FOR

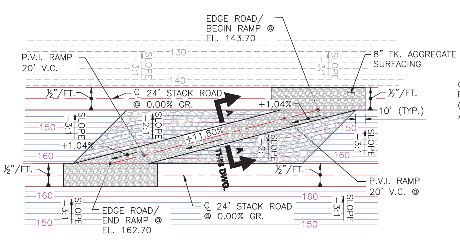
GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 2 STACK – PHASE 4 BERM &
CELL 1 STACK – PHASE 3 FILL EL. 158.70

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39043	1	FINAL	1

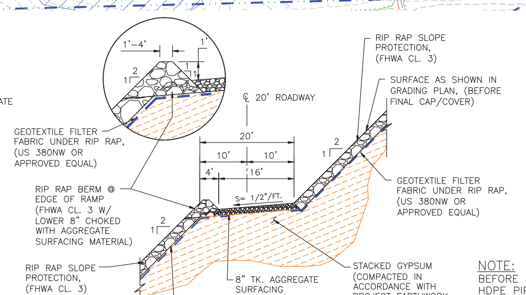
ANSI E: 44x34 Acad2004


Governor's Bayou
Clear Creek
SITE BOUNDARY
PROCESS RETURN WATER POND
BOTTOM EL. 85.00'
PROCESS SEDIMENTATION POND
BOTTOM EL. 88.00'
GYPSUM DEWATERING FACILITY
(GRADING AND DRAINAGE BY OTHERS)
CELL 2 GYPSUM STORAGE
(PHASE 4, FILL EL. 173.70)
CELL 1 GYPSUM STORAGE
(PHASE 4 BERMS)
FIVE FLAGS PIPELINE



TYPICAL STACK RAMP

CELL#2 RAMP EL. 143.70 TO 162.70 SHOWN (OTHERS SIMILAR)
N.T.S.


20' ROADWAY
RIP RAP SLOPE PROTECTION, (FHWA CL. 3)
SURFACE AS SHOWN IN GRADING PLAN, (BEFORE FINAL CAP/COVER)
GEOTEXTILE FILTER FABRIC UNDER RIP RAP, (US 380NW OR APPROVED EQUAL)
RIP RAP BERM @ EDGE OF RAMP (FHWA CL. 3 W/ LOWER 8" CHOKED WITH AGGREGATE SURFACING MATERIAL)
8" TK. AGGREGATE SURFACING
STACKED GYPSUM (COMPACTED IN ACCORDANCE WITH PROJECT EARTHWORK SPECIFICATIONS)

SECTION A-A

N.T.S.

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

NOTE:
BEFORE PLACING BACKFILL MATERIAL AND HDPE PIPE IN PERIMETER DITCH AT THE RAMP LOCATED NEAR THE SOUTHEAST END OF CELL #1, A PROTECTIVE GEOTEXTILE FABRIC (US 380NW OR APPROVED EQUAL) SHOULD FIRST BE PLACED ABOVE THE 60 MIL. LINER.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

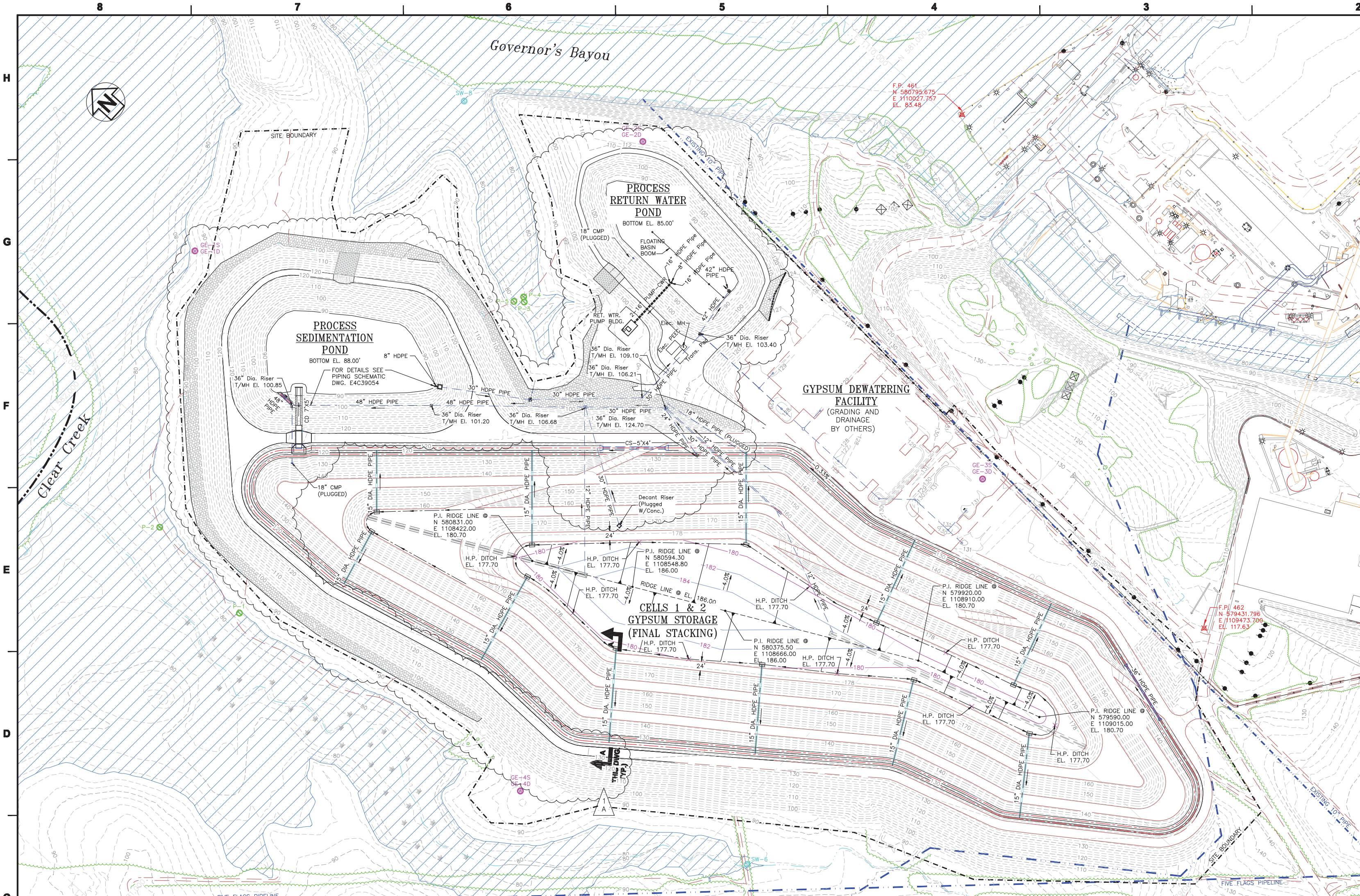
Southern Company Generation Engineering and Construction Services FOR
GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 1 BERM – PHASE 4 &
CELL 2 STACK – PHASE 4 FILL EL. 173.70

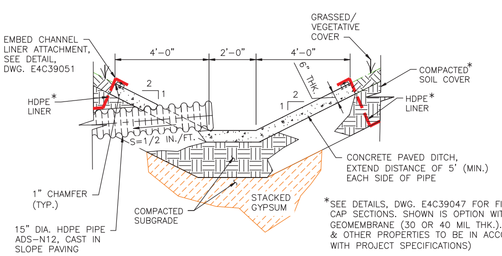
REVISION	DATE	DESCRIPTION	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519 EWO: 4106DE	CRU	RJB/JCP	GRR				JBS
0	11-14-08	ISSUED FOR CONSTRUCTION EWO: 4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39044	1	FINAL	1

ANSI E: 44x34 Acad2004



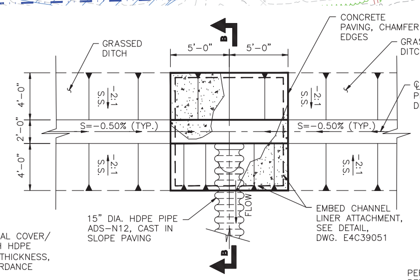
Governor's Bayou
Clear Creek
SITE BOUNDARY
PROCESS RETURN WATER POND
BOTTOM EL. 85.00'
PROCESS SEDIMENTATION POND
BOTTOM EL. 88.00'
FOR DETAILS SEE PIPING SCHEMATIC DWG. E4C39054
GYPSUM DEWATERING FACILITY
(GRADING AND DRAINAGE BY OTHERS)
CELLS 1 & 2
GYPSUM STORAGE
(FINAL STACKING)
RET. WTR. PUMP BLDG.
36" Dia. Riser T/MH El. 100.85
36" Dia. Riser T/MH El. 101.20
36" Dia. Riser T/MH El. 106.68
36" Dia. Riser T/MH El. 124.70
36" Dia. Riser T/MH El. 109.10
36" Dia. Riser T/MH El. 106.21
36" Dia. Riser T/MH El. 103.40
18" CMP (PLUGGED)
Decant Riser (Plugged W/Conc.)
P.I. RIDGE LINE N 580831.00 E 1108422.00 EL. 180.70
P.I. RIDGE LINE N 580594.30 E 1108548.80 EL. 186.00
P.I. RIDGE LINE N 580375.50 E 1108666.00 EL. 186.00
P.I. RIDGE LINE N 579920.00 E 1108910.00 EL. 180.70
P.I. RIDGE LINE N 579590.00 E 1109015.00 EL. 180.70
H.P. DITCH EL. 177.70
F.P. 461 N 580795.675 E 1110027.757 EL. 83.48
F.P. 462 N 579431.796 E 1109473.700 EL. 117.63
EXISTING 10" PIPE
FIVE FLAGS PIPELINE
15" DIA. HDPE PIPE



EMBED CHANNEL LINER ATTACHMENT, SEE DETAIL, DWG. E4C39051
GRASSED/ VEGETATIVE COVER
4'-0"
2'-0"
4'-0"
COMPACTED* SOIL COVER
HDPE* LINER
HDPE LINER
S=1/2 IN./FT.
CONCRETE PAVED DITCH, EXTEND DISTANCE OF 5' (MIN.)
1" CHAMFER (TYP.)
COMPACTED SUBGRADE
STACKED GYPSUM
15" DIA. HDPE PIPE ADS-N12, CAST IN SLOPE PAVING
*SEE DETAILS, DWG. E4C39047 FOR FINAL COVER/ CAP SECTIONS. SHOWN IS OPTION WITH HDPE GEOMEMBRANE (30 OR 40 MIL THK.). THICKNESS, & OTHER PROPERTIES TO BE IN ACCORDANCE WITH PROJECT SPECIFICATIONS)

SECTION B-B

N.T.S.

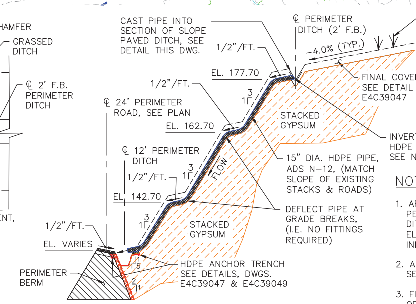


PLAN

N.T.S.

DITCH SECTION AT PIPE INLET

N.T.S.



CAST PIPE INTO SECTION OF SLOPE PAVED DITCH, SEE DETAIL THIS DWG.
℄ PERIMETER DITCH (2' F.B.)
GRASSED/ VEGETATIVE COVER
-4.0% (TYP.)
EL. 177.70
FINAL COVER/CAP, SEE DETAIL DWG. E4C39047
℄ 24' PERIMETER ROAD, SEE PLAN
EL. 162.70
STACKED GYPSUM
INVERT EL. 15" DIA. HDPE PIPE, VARIES SEE NOTES BELOW
℄ 12' PERIMETER DITCH
15" DIA. HDPE PIPE, ADS N-12, (MATCH SLOPE OF EXISTING STACKS & ROADS)
EL. 142.70
DEFLECT PIPE AT GRADE BREAKS, (I.E. NO FITTINGS REQUIRED)
EL. VARIES
PERIMETER BERM
HDPE ANCHOR TRENCH SEE DETAILS, DWGS. E4C39047 & E4C39049
FLOW

SECTION A-A

DOWNDRAIN PIPE

N.T.S.

NOTES:

1. APPROXIMATE ALIGNMENTS/LOCATIONS OF THE PERIMETER DITCHES ARE SHOWN ON PLAN ABOVE. DITCHES TO RUN AT 0.50% GRADE FROM H.P. ELEVATIONS SHOWN TO SET DITCH LOW POINTS/PIPE INLET ELEVATIONS.
2. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT AND SECURE TO PREVENT SEPERATION DURING USE.
3. FINAL COVER/CAP TO BE THAT SELECTED FROM THE OPTIONS SHOWN IN THE DETAILS ON DWG. E4C39047.

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

NOTES:

1. PLANT CRIST MAY 2006 AERIAL TOPO ADJUSTED TO PLANT ELEV. DATUM (72.69' + MSL), REVISED 12-20-06 TO INCLUDE GPC SURVEYED AREA.
2. GRID IS FLORIDA STATE PLANE, NAD83, NORTH ZONE.
3. AERIAL TOPO REVISED 10-29-07 TO INCLUDE STACK RISER WINDING FACILITY GRADING.
4. FOR LEGEND SEE DRAWING E4C39036.
5. ELEVATIONS SHOWN ON THIS DRAWING DO NOT INCLUDE THE FINAL COVER/CAP.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE – AREA 1
CELL 1 & 2 STACK
FINAL GRADING PLAN

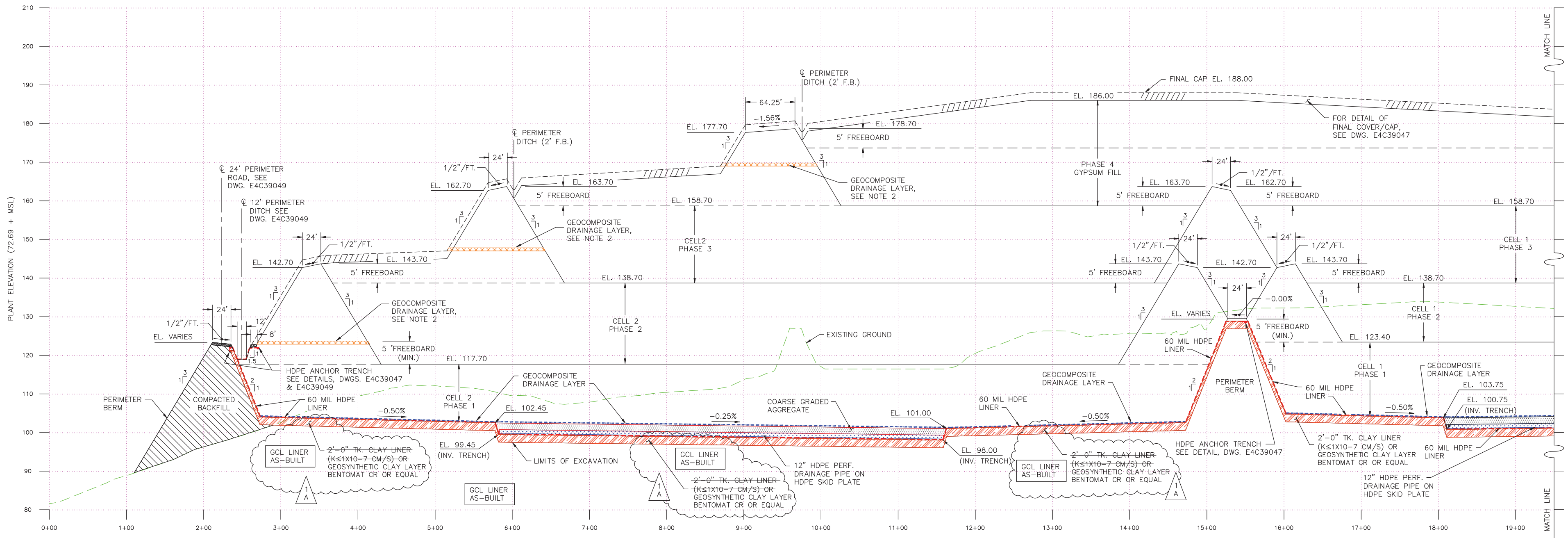
REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED EXIST. TOPO THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB JCP
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL

Rev. 1 approvals: GRR, JBS. Rev. 0 approvals: GRR, GEL, CSS, KLD, CKT.

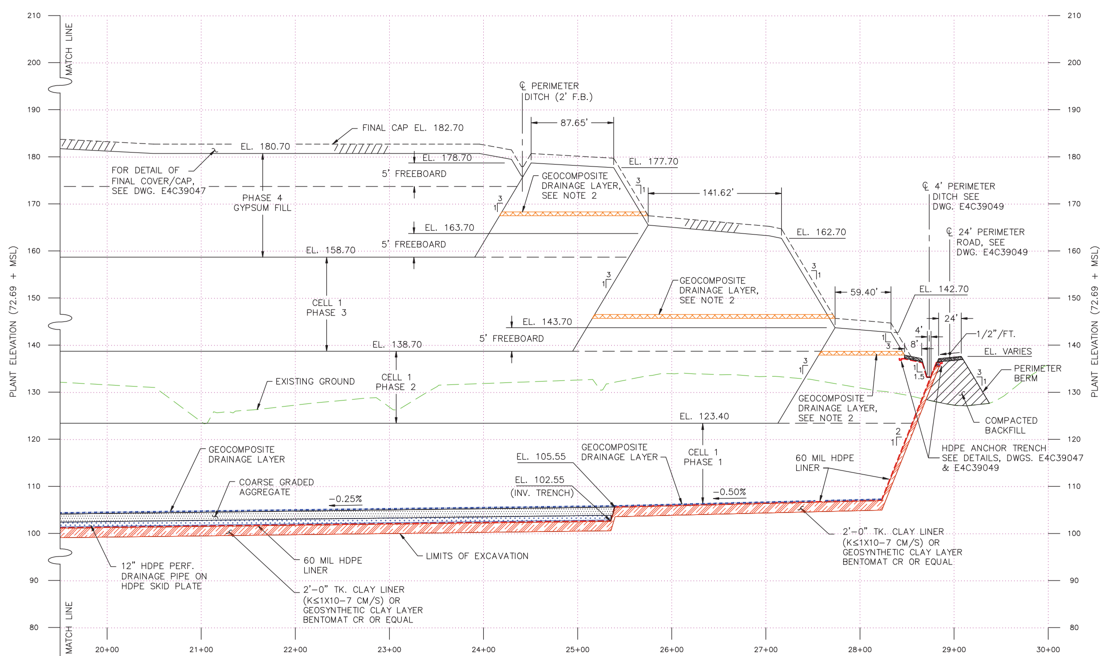
SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
1"=100'	510400	E4C39045	1	FINAL	1

ANSI E: 44x34

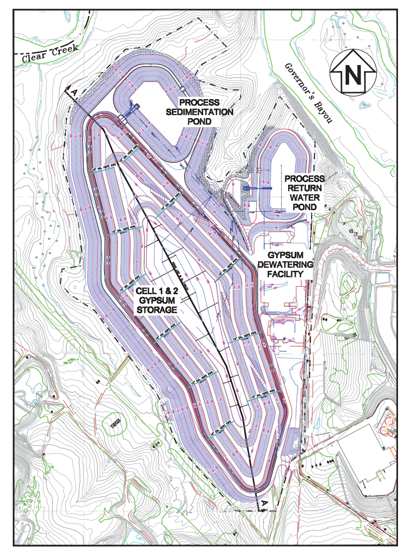
Acad2004


PLANT ELEVATION (72.69 + MSL)
MATCH LINE
℄ PERIMETER DITCH (2' F.B.)
FINAL CAP EL. 188.00
EL. 186.00
FOR DETAIL OF FINAL COVER/CAP, SEE DWG. E4C39047
PHASE 4 GYPSUM FILL
EL. 177.70
EL. 178.70
5' FREEBOARD
GEOCOMPOSITE DRAINAGE LAYER, SEE NOTE 2
℄ 24' PERIMETER ROAD, SEE DWG. E4C39049
℄ 12' PERIMETER DITCH SEE DWG. E4C39049
EL. 162.70
EL. 163.70
EL. 158.70
CELL2 PHASE 3
EL. 142.70
EL. 143.70
EL. 138.70
CELL 2 PHASE 2
CELL 1 PHASE 3
CELL 1 PHASE 2
CELL 1 PHASE 1
CELL 2 PHASE 1
EL. 117.70
EL. 123.40
EL. VARIES
HDPE ANCHOR TRENCH SEE DETAILS, DWGS. E4C39047 & E4C39049
EXISTING GROUND
PERIMETER BERM
COMPACTED BACKFILL
60 MIL HDPE LINER
GCL LINER AS-BUILT
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
EL. 99.45 (INV. TRENCH)
EL. 102.45
LIMITS OF EXCAVATION
COARSE GRADED AGGREGATE
12" HDPE PERF. DRAINAGE PIPE ON HDPE SKID PLATE
EL. 101.00
EL. 98.00 (INV. TRENCH)
HDPE ANCHOR TRENCH SEE DETAIL, DWG. E4C39047
EL. 103.75
EL. 100.75 (INV. TRENCH)
5 'FREEBOARD (MIN.)

SECTION A-A
SCALE: HORIZ. 1"=50', VERT. 1"=10'


FINAL CAP EL. 182.70
EL. 180.70
EL. 178.70
EL. 177.70
FOR DETAIL OF FINAL COVER/CAP, SEE DWG. E4C39047
PHASE 4 GYPSUM FILL
℄ PERIMETER DITCH (2' F.B.)
GEOCOMPOSITE DRAINAGE LAYER, SEE NOTE 2
EL. 163.70
EL. 162.70
EL. 158.70
CELL 1 PHASE 3
EL. 143.70
EL. 142.70
EL. 138.70
℄ 4' PERIMETER DITCH SEE DWG. E4C39049
℄ 24' PERIMETER ROAD, SEE DWG. E4C39049
EXISTING GROUND
CELL 1 PHASE 2
PERIMETER BERM
COMPACTED BACKFILL
EL. 123.40
HDPE ANCHOR TRENCH SEE DETAILS, DWGS. E4C39047 & E4C39049
EL. 105.55
EL. 102.55 (INV. TRENCH)
CELL 1 PHASE 1
60 MIL HDPE LINER
COARSE GRADED AGGREGATE
LIMITS OF EXCAVATION
12" HDPE PERF. DRAINAGE PIPE ON HDPE SKID PLATE
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL

SECTION A-A
SCALE: HORIZ. 1"=50', VERT. 1"=10'



KEY PLAN
NOT TO SCALE

NOTES:

1. MAXIMUM EXCAVATION ELEVATIONS FOR CELL 1 AND CELL 2 ARE 20'± ABOVE THE POTENTIOMETRIC SURFACE RECORDED FROM JULY THROUGH DECEMBER, 2006. FOR FURTHER INFORMATION SEE THE PLANT CRIST GYPSUM STORAGE AREAS 1 AND 2 GROUNDWATER MONITORING PLAN, JUNE 2007.
2. DURING DECANTING OPERATIONS, ACCUMULATED GYPSUM SHOULD BE PULLED UP AROUND THE PERIMETER OF THE CELL UNTIL THE BASE OF THE NEXT OUTER DIKE WALL IS CONSTRUCTED UP TO THE ELEVATION INDICATED FOR PLACEMENT OF THE GEOCOMPOSITE DRAINAGE LAYER. SEE PROJECT TECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION ON GEOCOMPOSITE DRAINAGE MATERIAL.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

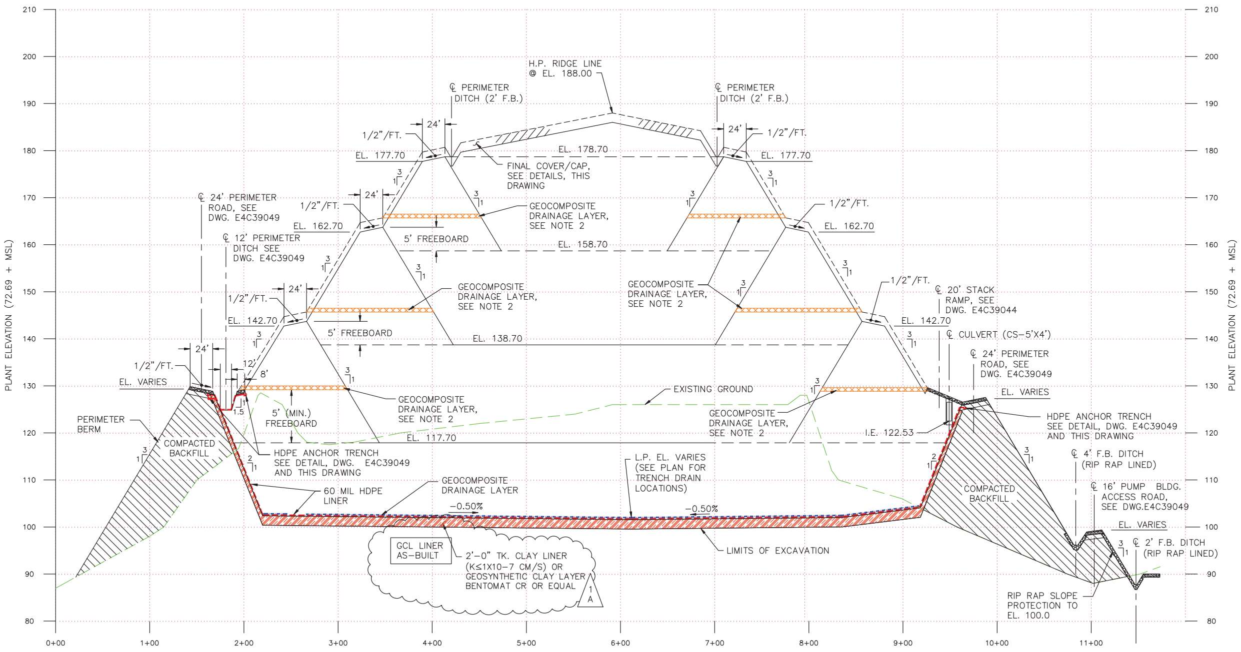
For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR
GULF POWER COMPANY
PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE - AREA 1
SECTION A-A

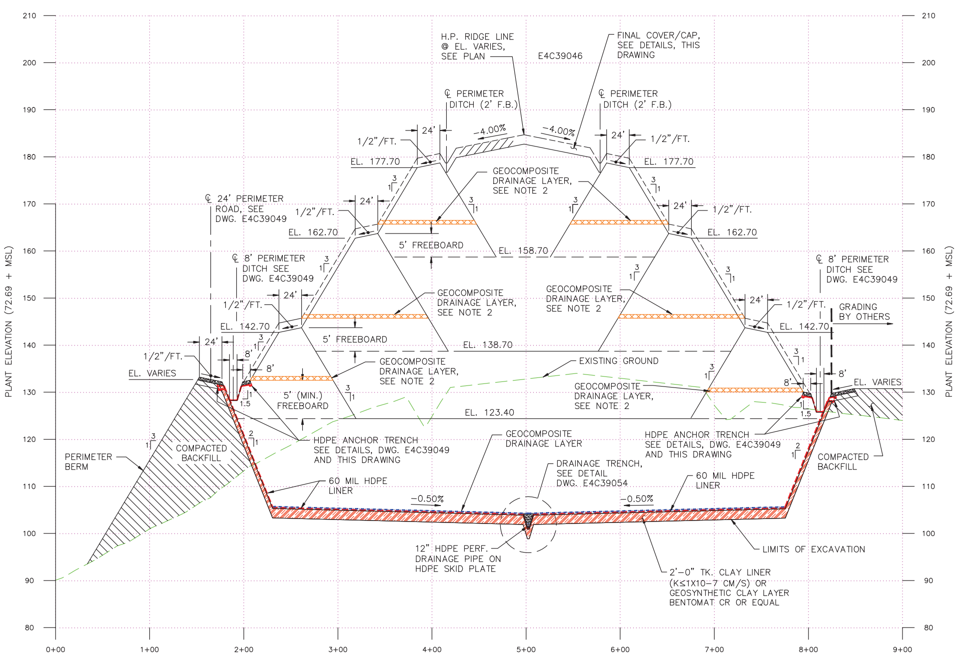
REVISION	DATE	DESCRIPTION	EWO	BY
1	7-23-10	THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU RJB JCP GRR JBS
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED TO SHOW GCL FOR AS-BUILT IN CELL #2	4106DE	CRU RJB JCP GRR JBS
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA MHL GRR GEL CSS KLD CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CON'T	REV
AS SHOWN	510400	E4C39046	1	FINAL	1

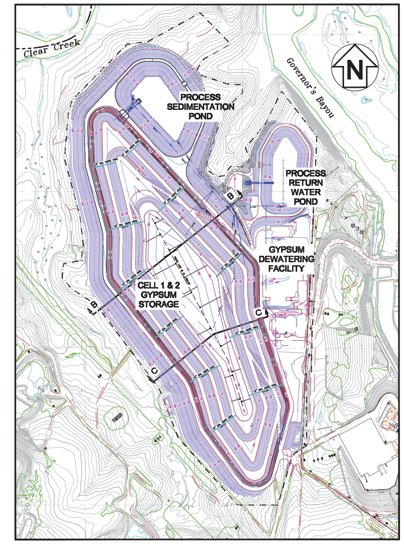
ANSI E: 44x34 Acad2004


H.P. RIDGE LINE @ EL. 188.00
℄ PERIMETER DITCH (2' F.B.)
EL. 177.70
EL. 178.70
FINAL COVER/CAP, SEE DETAILS, THIS DRAWING
GEOCOMPOSITE DRAINAGE LAYER, SEE NOTE 2
5' FREEBOARD
EL. 162.70
EL. 158.70
℄ 24' PERIMETER ROAD, SEE DWG. E4C39049
℄ 12' PERIMETER DITCH SEE DWG. E4C39049
EL. 142.70
EL. 138.70
℄ 20' STACK RAMP, SEE DWG. E4C39044
℄ CULVERT (CS-5'X4')
℄ 24' PERIMETER ROAD, SEE DWG. E4C39049
EXISTING GROUND
EL. VARIES
PERIMETER BERM
COMPACTED BACKFILL
5' (MIN.) FREEBOARD
HDPE ANCHOR TRENCH SEE DETAIL, DWG. E4C39049 AND THIS DRAWING
EL. 117.70
I.E. 122.53
℄ 4' F.B. DITCH (RIP RAP LINED)
60 MIL HDPE LINER
GEOCOMPOSITE DRAINAGE LAYER
L.P. EL. VARIES (SEE PLAN FOR TRENCH DRAIN LOCATIONS)
℄ 16' PUMP BLDG. ACCESS ROAD, SEE DWG.E4C39049
GCL LINER AS-BUILT
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
LIMITS OF EXCAVATION
℄ 2' F.B. DITCH (RIP RAP LINED)
RIP RAP SLOPE PROTECTION TO EL. 100.0
PLANT ELEVATION (72.69 + MSL)

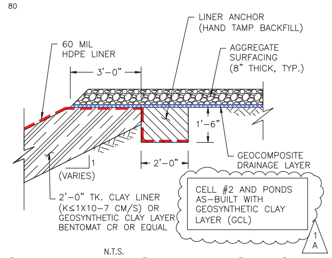
SECTION B-B
SCALE: HORIZ. 1"=50', VERT. 1"=10'


H.P. RIDGE LINE @ EL. VARIES, SEE PLAN E4C39046
FINAL COVER/CAP, SEE DETAILS, THIS DRAWING
℄ PERIMETER DITCH (2' F.B.)
EL. 177.70
GEOCOMPOSITE DRAINAGE LAYER, SEE NOTE 2
℄ 24' PERIMETER ROAD, SEE DWG. E4C39049
EL. 162.70
EL. 158.70
5' FREEBOARD
℄ 8' PERIMETER DITCH SEE DWG. E4C39049
EL. 142.70
EL. 138.70
GRADING BY OTHERS
EXISTING GROUND
EL. VARIES
5' (MIN.) FREEBOARD
EL. 123.40
PERIMETER BERM
COMPACTED BACKFILL
HDPE ANCHOR TRENCH SEE DETAILS, DWG. E4C39049 AND THIS DRAWING
GEOCOMPOSITE DRAINAGE LAYER
DRAINAGE TRENCH, SEE DETAIL DWG. E4C39054
60 MIL HDPE LINER
12" HDPE PERF. DRAINAGE PIPE ON HDPE SKID PLATE
LIMITS OF EXCAVATION
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
PLANT ELEVATION (72.69 + MSL)

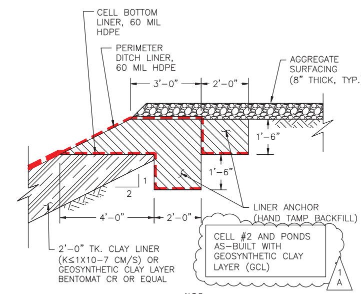
SECTION C-C
SCALE: HORIZ. 1"=50', VERT. 1"=10'



KEY PLAN
NOT TO SCALE

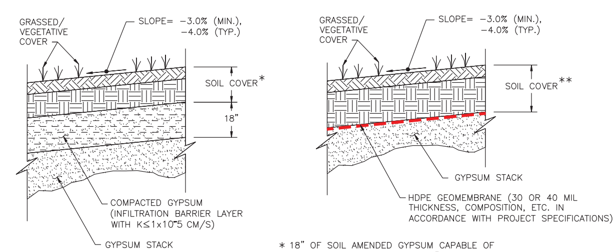

60 MIL HDPE LINER
LINER ANCHOR (HAND TAMP BACKFILL)
AGGREGATE SURFACING (8" THICK, TYP.)
3'-0"
1'-6"
2'-0"
GEOCOMPOSITE DRAINAGE LAYER
(VARIES)
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
CELL #2 AND PONDS AS-BUILT WITH GEOSYNTHETIC CLAY LAYER (GCL)

N.T.S.
ANCHOR AT 8' BENCH AND PONDS


CELL BOTTOM LINER, 60 MIL HDPE
PERIMETER DITCH LINER, 60 MIL HDPE
AGGREGATE SURFACING (8" THICK, TYP.)
3'-0"
2'-0"
1'-6"
4'-0"
LINER ANCHOR (HAND TAMP BACKFILL)
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
CELL #2 AND PONDS AS-BUILT WITH GEOSYNTHETIC CLAY LAYER (GCL)

N.T.S.
ANCHORS AT PERIMETER ROAD/DITCH

TYPICAL LINER ANCHORS
N.T.S.


GRASSED/ VEGETATIVE COVER
SLOPE= -3.0% (MIN.), -4.0% (TYP.)
SOIL COVER*
18"
COMPACTED GYPSUM (INFILTRATION BARRIER LAYER WITH K≤1x10-5 CM/S)
GYPSUM STACK
GRASSED/ VEGETATIVE COVER
SLOPE= -3.0% (MIN.), -4.0% (TYP.)
SOIL COVER**
GYPSUM STACK
HDPE GEOMEMBRANE (30 OR 40 MIL THICKNESS, COMPOSITION, ETC. IN ACCORDANCE WITH PROJECT SPECIFICATIONS)

* 18" OF SOIL AMENDED GYPSUM CAPABLE OF SUPPORTING VEGETATION OR 12" COMPACTED SOIL WITH 6" (MIN.) OF TOPSOIL.

** 24" OF SOIL AMENDED GYPSUM CAPABLE OF SUPPORTING VEGETATION OR 18" COMPACTED SOIL WITH 6" (MIN.) OF TOPSOIL.

NOTE: FINAL COVER/CAP SELECTED FROM THE ABOVE DETAILS SHALL BE AS SELECTED BY THE PURCHASER.

FINAL COVER SECTIONS
REF. DWGS. E4C39046, THIS DWG., E4C39048,
N.T.S.

NOTES:

1. MAXIMUM EXCAVATION ELEVATIONS FOR CELL 1 AND CELL 2 ARE 20'± ABOVE THE POTENTIOMETRIC SURFACE RECORDED FROM JULY THROUGH DECEMBER, 2006. FOR FURTHER INFORMATION SEE THE PLANT CRIST GYPSUM STORAGE AREAS 1 AND 2 GROUNDWATER MONITORING PLAN, JUNE 2007.
2. DURING DECANTING OPERATIONS, ACCUMULATED GYPSUM SHOULD BE PULLED UP AROUND THE PERIMETER OF THE CELL UNTIL THE BASE OF THE NEXT OUTER DIKE WALL IS CONSTRUCTED UP TO THE ELEVATION INDICATED FOR PLACEMENT OF THE GEOCOMPOSITE DRAINAGE LAYER. SEE PROJECT TECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION ON GEOCOMPOSITE DRAINAGE MATERIAL.

REFERENCES:

1. FOR A COMPLETE DRAWING LIST SEE E4C39034.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR

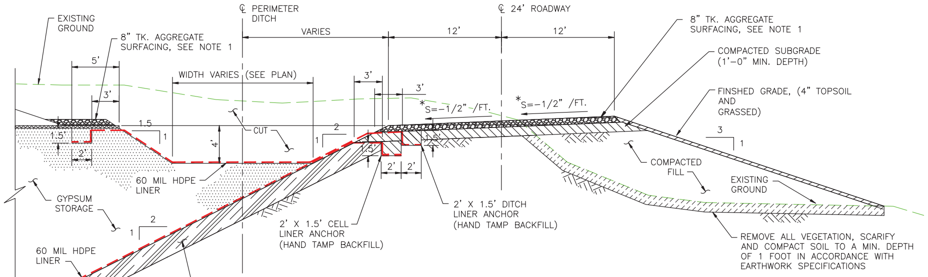
GULF POWER COMPANY

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE - AREA 1
SECTIONS B-B & C-C

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR						DISC BSR
1	7-23-10	THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB JCP	GRR						JBS
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED TO SHOW GCL FOR AS-BUILT IN CELL #2 AND PONDS	4106DE	CRU	RJB JCP	GRR						JBS
0	11-14-08	ISSUED FOR CONSTRUCTION	4106DE	JAA	MHL	GRR	GEL	CSS	KLD	CKT		

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
AS SHOWN	510400	E4C39047	1	FINAL	1

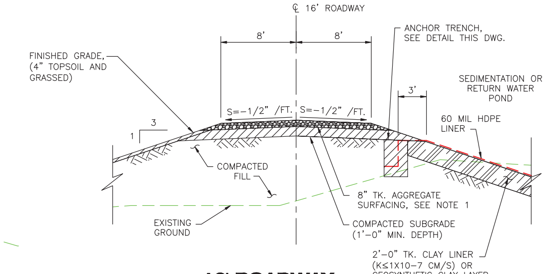
ANSI E: 44x34 Acad2004



EXISTING GROUND
℄ PERIMETER DITCH
℄ 24' ROADWAY
8" TK. AGGREGATE SURFACING, SEE NOTE 1
VARIES
12'
12'
5'
3'
WIDTH VARIES (SEE PLAN)
3'
3'
S=-1/2" /FT.
S=-1/2" /FT.
CUT
60 MIL HDPE LINER
GYPSUM STORAGE
60 MIL HDPE LINER
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL
2' X 1.5' CELL LINER ANCHOR (HAND TAMP BACKFILL)
2' X 1.5' DITCH LINER ANCHOR (HAND TAMP BACKFILL)
COMPACTED SUBGRADE (1'-0" MIN. DEPTH)
FINSHED GRADE, (4" TOPSOIL AND GRASSED)
COMPACTED FILL
EXISTING GROUND
REMOVE ALL VEGETATION, SCARIFY AND COMPACT SOIL TO A MIN. DEPTH OF 1 FOOT IN ACCORDANCE WITH EARTHWORK SPECIFICATIONS
* SLOPE PERIMETER ROADWAY TO INSIDE DITCH, TYPICAL ALL LOCATIONS

24' ROADWAY (AGGREGATE SURFACED)

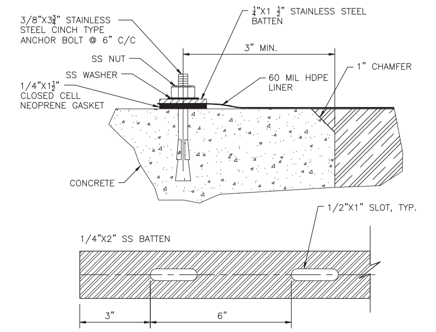
REF. DWGS. E4C39037 & E4C39038
N.T.S.



℄ 16' ROADWAY
8'
8'
ANCHOR TRENCH, SEE DETAIL THIS DWG.
FINISHED GRADE, (4" TOPSOIL AND GRASSED)
SEDIMENTATION OR RETURN WATER POND
S=-1/2" /FT.
S=-1/2" /FT.
3'
60 MIL HDPE LINER
COMPACTED FILL
EXISTING GROUND
8" TK. AGGREGATE SURFACING, SEE NOTE 1
COMPACTED SUBGRADE (1'-0" MIN. DEPTH)
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL

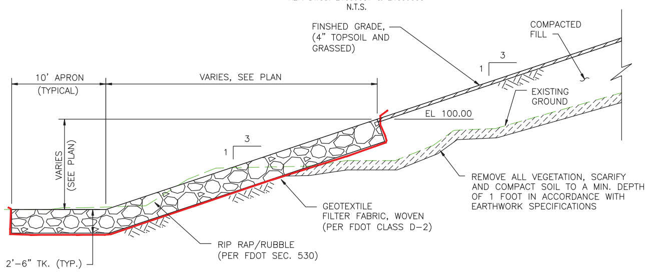
16' ROADWAY (AGGREGATE SURFACED)

REF. DWG. E4C39037
N.T.S.



STEEL BATTEN & CONCRETE ANCHOR LINER ATTACHMENT

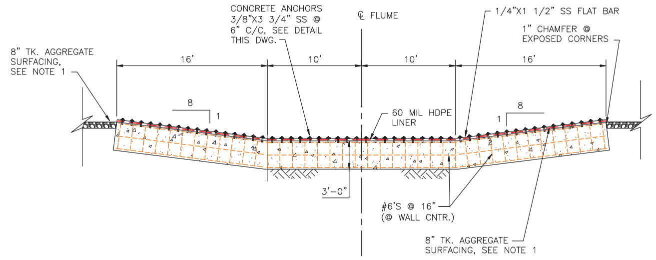
N.T.S.



FINSHED GRADE, (4" TOPSOIL AND GRASSED)
COMPACTED FILL
10' APRON (TYPICAL)
VARIES, SEE PLAN
EXISTING GROUND
EL 100.00
VARIES (SEE PLAN)
REMOVE ALL VEGETATION, SCARIFY AND COMPACT SOIL TO A MIN. DEPTH OF 1 FOOT IN ACCORDANCE WITH EARTHWORK SPECIFICATIONS
GEOTEXTILE FILTER FABRIC, WOVEN (PER FDOT CLASS D-2)
RIP RAP/RUBBLE (PER FDOT SEC. 530)
2'-6" TK. (TYP.)

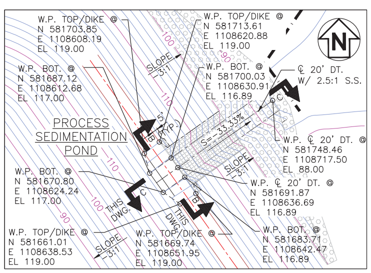
SECTION A-A (RIP RAP SLOPE PROTECTION)

REF. DWG. E4C39036
N.T.S.



SECTION D-D

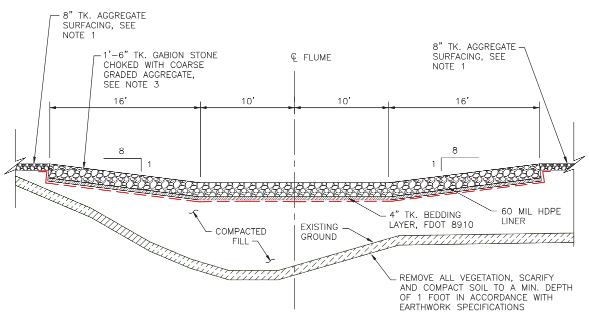
N.T.S.



W.P. TOP/DIKE N 581703.85 E 1108608.19 EL 119.00
W.P. TOP/DIKE N 581713.61 E 1108620.88 EL 119.00
W.P. BOT. N 581687.12 E 1108612.68 EL 117.00
W.P. BOT. N 581700.03 E 1108630.91 EL 116.89
W.P. ℄ 20' DT. W/ 2.5:1 S.S.
PROCESS SEDIMENTATION POND
S=-33.33%
W.P. ℄ 20' DT. N 581748.46 E 1108717.50 EL 88.00
W.P. BOT. N 581670.80 E 1108624.24 EL 117.00
W.P. ℄ 20' DT. N 581691.87 E 1108636.69 EL 116.89
W.P. TOP/DIKE N 581661.01 E 1108638.53 EL 119.00
W.P. TOP/DIKE N 581669.74 E 1108651.95 EL 119.00
W.P. BOT. N 581683.71 E 1108642.47 EL 116.89
THIS DWG.
SLOPE 3:1

PLAN SEDIMENTATION POND

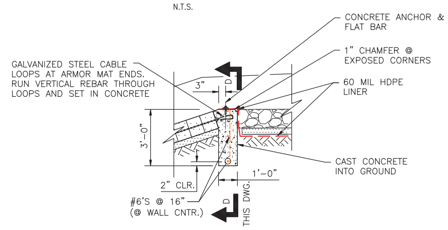
N.T.S.



8" TK. AGGREGATE SURFACING, SEE NOTE 1
1'-6" TK. GABION STONE CHOKED WITH COARSE GRADED AGGREGATE, SEE NOTE 3
℄ FLUME
8" TK. AGGREGATE SURFACING, SEE NOTE 1
16'
10'
10'
16'
COMPACTED FILL
EXISTING GROUND
4" TK. BEDDING LAYER, FDOT 8910
60 MIL HDPE LINER
REMOVE ALL VEGETATION, SCARIFY AND COMPACT SOIL TO A MIN. DEPTH OF 1 FOOT IN ACCORDANCE WITH EARTHWORK SPECIFICATIONS

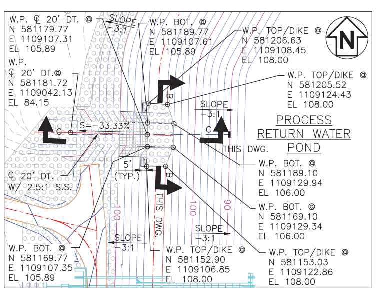
SECTION B-B

REF. DWGS. E4C39037 & THIS DWG.
N.T.S.



ARMOR ANCHOR OPTION 1

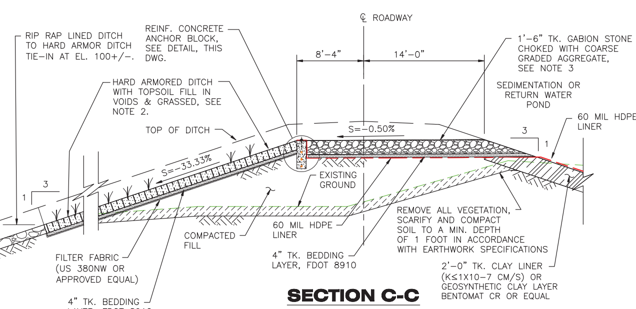
N.T.S.



W.P. ℄ 20' DT. N 581179.77 E 1109107.31 EL 105.89
W.P. BOT. N 581189.77 E 1109107.61 EL 105.89
W.P. TOP/DIKE N 581206.63 E 1109108.45 EL 108.00
W.P. ℄ 20' DT. N 581181.72 E 1109042.13 EL 84.15
W.P. TOP/DIKE N 581205.52 E 1109124.43 EL 108.00
S=-33.33%
PROCESS RETURN WATER POND
W.P. ℄ 20' DT. W/ 2.5:1 S.S.
W.P. BOT. N 581189.10 E 1109129.94 EL 106.00
W.P. BOT. N 581169.10 E 1109129.34 EL 106.00
W.P. BOT. N 581169.77 E 1109107.35 EL 105.89
W.P. TOP/DIKE N 581152.90 E 1109106.85 EL 108.00
W.P. TOP/DIKE N 581153.03 E 1109122.86 EL 108.00
THIS DWG.
SLOPE 3:1

PLAN RETURN WATER POND

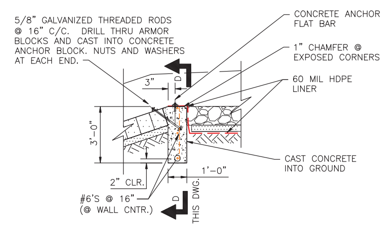
N.T.S.



℄ ROADWAY
RIP RAP LINED DITCH TO HARD ARMOR DITCH TIE-IN AT EL. 100+/-.
REINF. CONCRETE ANCHOR BLOCK, SEE DETAIL, THIS DWG.
8'-4"
14'-0"
1'-6" TK. GABION STONE CHOKED WITH COARSE GRADED AGGREGATE, SEE NOTE 3
HARD ARMORED DITCH WITH TOPSOIL FILL IN VOIDS & GRASSED, SEE NOTE 2.
SEDIMENTATION OR RETURN WATER POND
TOP OF DITCH
S=-0.50%
S=-33.33%
60 MIL HDPE LINER
EXISTING GROUND
FILTER FABRIC (US 380NW OR APPROVED EQUAL)
COMPACTED FILL
60 MIL HDPE LINER
4" TK. BEDDING LAYER, FDOT 8910
4" TK. BEDDING LAYER, FDOT 8910
REMOVE ALL VEGETATION, SCARIFY AND COMPACT SOIL TO A MIN. DEPTH OF 1 FOOT IN ACCORDANCE WITH EARTHWORK SPECIFICATIONS
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S) OR GEOSYNTHETIC CLAY LAYER BENTOMAT CR OR EQUAL

SECTION C-C

REF. DWGS. E4C39037 & THIS DWG.
N.T.S.



5/8" GALVANIZED THREADED RODS @ 16" C/C. DRILL THRU ARMOR BLOCKS AND CAST INTO CONCRETE ANCHOR BLOCK. NUTS AND WASHERS AT EACH END.
CONCRETE ANCHOR & FLAT BAR
1" CHAMFER @ EXPOSED CORNERS
60 MIL HDPE LINER
CAST CONCRETE INTO GROUND
3'-0"
2" CLR.
1'-0"
#6'S @ 16" (@ WALL CNTR.)
THIS DWG.

ARMOR ANCHOR OPTION 2

N.T.S.

CONCRETE ANCHOR BLOCK

POND OVERTOPPING CONTROL SECTIONS

REF. DWG. E4C39037
N.T.S.

NOTES:

1. AGGREGATE SURFACING SHALL BE COARSE GRADED AGGREGATE BASE MEETING REQUIREMENTS OF FDOT'S "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", SECTION 204-2. PLACEMENT AND COMPACTION SHALL BE IN ACCORDANCE WITH PROJECT SITE WORK SPECIFICATION.
2. HARD ARMOR LINING TO BE AN OPEN CELL ARTCULATING BLOCK SYSTEM (ABS) THREADED WITH GALVANIZED STEEL CABLES. ABS SYSTEM SHOULD BE SIMILAR TO SHORETEC'S SHOREBLOK SD SERIES OR AN APPROVED EQUAL. INSTALLATION AND ANCHORING OF MATS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.
3. PLACE GABION STONES ON PREPARED BEDDING. STONE SIZE SHOULD BE 4" TO 8" IN DIAMETER. CHOKE-IN GRADED AGGREGATE BASE MATERIAL AS LISTED IN FDOT SPECIFICATION SECTION 204-2.

GENERAL PROJECT NOTES:

1. GRADES SHOWN IN THE PLANS ARE FINAL SURFACE ELEVATIONS. CONTRACTOR SHALL EXCAVATE BEYOND THESE ELEVATIONS TO PLACE CLAY LINER (2'-0"), RIP RAP, CRUSHED AGGREGATE AND OTHER SURFACE TREATMENTS AND SHALL COMPACT AS NECESSARY TO FINAL GRADE ELEVATION. NOTE THAT GRADES SHOWN ON EROSION CONTROL PHASE 1 DRAWING ARE MINUS 2'-0" AND ARE FOR THE RETROFIT OF THE PROCESS PONDS AS BMP TEMPORARY SEDIMENT BASINS.
2. CONTRACTOR TO VERIFY LOCATION AND ELEVATIONS OF ALL UNDERGROUND UTILITIES WITHIN THE SITE BOUNDARY PRIOR TO CONSTRUCTION.
3. STORM PIPE SHALL BE ADS N-12 (OR APPROVED EQUAL) UNLESS NOTED OTHERWISE ON THE PLANS AND SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
4. ALL HDPE SDR-32.5, ADS N-12, AND CMP PIPE TO BE PLACED IN TRENCHES WITH FLOWABLE FILL USING HOLD DOWN STRAPS AS NEEDED TO PREVENT FLOTATION ASSURING CORRECT GRADES/ELEVATIONS. FLOWABLE FILL SHALL EXTEND A MINIMUM OF 1'-0" IN ALL DIRECTIONS FROM THE OUTSIDE WALL OF PIPE. FLOWABLE FILL SHALL CONSIST OF THE FOLLOWING MIX:

   2000 LBS OF CLASS "F" FLY ASH
   150 LBS OF CEMENT
   200 LBS OF CONCRETE SAND
   87 GALLONS OF WATER (POTABLE)

   ALL FLOWABLE FILL TO SET 72 HOURS PRIOR TO PLACING THE COMPACTED SOIL BACKFILL ABOVE.
5. ALL EXCAVATION, TRENCHING AND PIPE LAYING OPERATIONS SHALL BE IN STRICT ACCORDANCE WITH OSHA REGULATIONS. CONTRACTOR TO PROVIDE SHORING WHERE NECESSARY AND SHALL BE RESPONSIBLE FOR OBTAINING ANY ENGINEERING DESIGN OF SUCH MEASURES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PLANNING AND OPERATION OF ANY NECESSARY DEWATERING, SURFACE WATER RUNNOFF CONTROL (DIVERSIONS) AND DRAINAGE FROM EXCAVATIONS. COST OF EQUIPMENT AND LABOR ASSOCIATED WITH SUCH OPERATIONS SHALL BE CONSIDERED A SUBSIDIARY OBLIGATION OF EARTHWORK REQUIREMENTS.
7. CELL DIKES, CELL ACCESS RAMPS, AND GENERAL FILL AREAS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROJECT TECHNICAL SPECIFICATIONS FOR EARTHWORK. 02220 OF SPECIFICATION 145832.71.0204.
8. EARTH FILL MATERIAL SHALL BE OBTAINED FROM APPROVED BORROW AREAS OR FROM SOURCES APPROVED BY THE PURCHASER.
9. ALL EARTHWORK CONSTRUCTION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS. THE CONTRACTOR SHALL ESTABLISH ALL THE NECESSARY BENCHMARKS AND BASE LINES REQUIRED FOR THE WORK.
10. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING HIS OWN STANDARD QUALITY CONTROL AND QUALITY ASSURANCE PROGRAM OR PRACTICES AND SHALL INSTITUTE ANY ADDITIONAL CONTROLS OR PROCEDURES IN ACCORDANCE WITH PROVEN INDUSTRY PRACTICE TO ASSUME COMPLIANCE WITH THESE DRAWINGS AND THE PROJECT SPECIFICATIONS.
11. CONTRACTOR SHALL FLAG AND PROTECT EXISTING ABOVE GROUND UTILITY APPURTENANCES AND GROUNDWATER MONITORING WELLS. REPAIR OF DAMAGE SHALL BE AT CONTRACTOR'S EXPENSE.

HIGH DENSITY POLYETHYLENE (HDPE) LINER

1. LINER FOR GYPSUM CELLS, SEDIMENTATION POND AND RETURN WATER POND SHALL BE GSE'S 60 MIL HDPE LINER TEXTURED ON BOTH SIDES MEETING THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS.
2. THE HDPE LINER SHALL BE STORED, HANDLED AND INSTALLED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND AS PER MANUFACTURER'S GUIDELINES AND INSTRUCTIONS.
3. HDPE LINER SHALL BE PLACED ON A 2'-0" THICK CLAY LAYER (OR GEOSYNTHETIC CLAY LINER-GCL) FREE OF ROCK AND OTHER DEBRI WHICH COULD PUNCTURE LINER. IN AREAS WHERE LINER IS TO BE PLACED DIRECTLY ABOVE OR BELOW AGGREGATE MATERIAL, A NON-WOVEN GEOTEXTILE (GEOTEX 1601 OR US FABRICS US 380NW OR APPROVED EQUAL) SHALL BE PLACED BETWEEN THE LINER AND AGGREGATE.
4. THE GEOTEXTILE FABRIC SHALL NOT BE ANCHORED, GLUED, OR FASTENED IN ANY MANNER TO THE HDPE LINER.
5. AT NO TIME SHALL TRACKING EQUIPMENT DRIVE DIRECTLY ON GEOTEXTILE FABRIC OR THE HDPE LINER.

2'-0" THICK CLAY LINER & GCL OPTION

1. NOTE-GCL SHALL BE PLACED AT TOP OF 2'-0" CLAY LINER AS SHOWN ON DETAILS.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation Engineering and Construction Services FOR
Gulf Power Company

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE-AREA 1
TYPICAL SECTIONS AND DETAILS

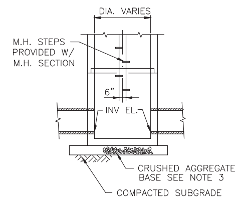
REVISION	DATE	DESCRIPTION	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS. A. ADDED NOTE. THIS DRAWING WAS ISSUED REV. 1 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519. EWO: 4106DE	CRU	RJB/JCP	GRR				JBS
0	9-15-08	ISSUED FOR CONSTRUCTION. EWO: 4106DE	CRU	MHL	GRR	BHC	CSS	KLD	CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	510400	E4C39049	1	FINAL	1

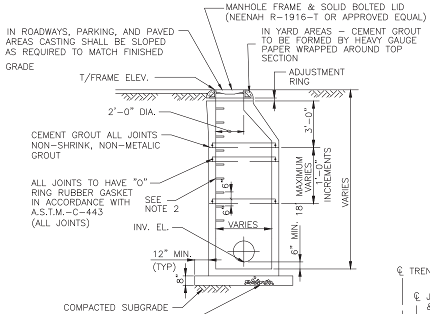
ANSI E: 44x34   Acad2007

Quality Record

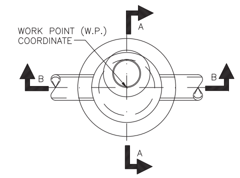
** FOR MANHOLES WITH INVERT ELEVATIONS AND PIPE DIAMETERS WHICH PRODUCE DIMENSIONS 1'-0" OR LESS FROM THE BOTTOM OF THE CONE SECTION TO THE TOP OF PIPE, USE "PRECAST SHALLOW MANHOLE" DETAIL THIS DRAWING



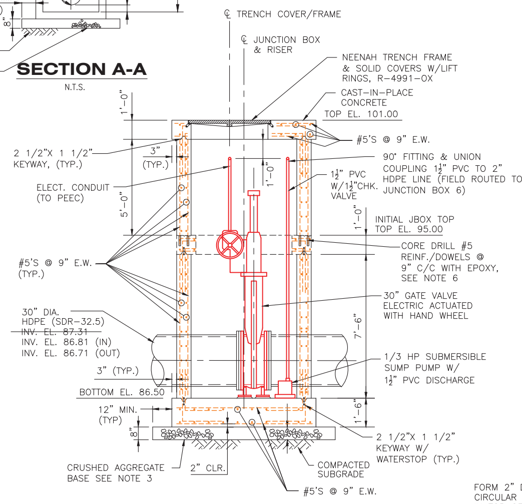
SECTION B-B
N.T.S.



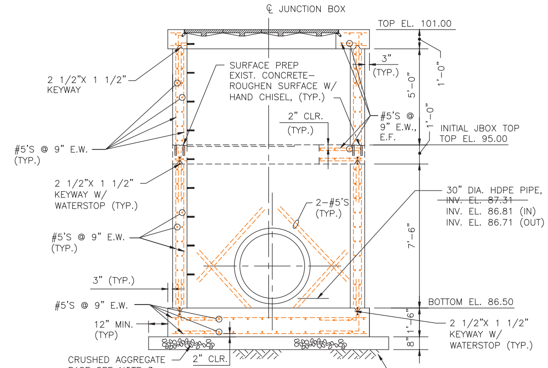
SECTION A-A
N.T.S.



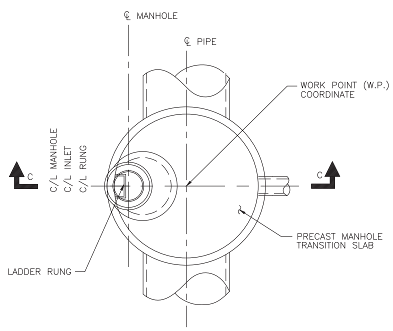
PRECAST MANHOLE PLAN DETAIL -1
N.T.S.



SECTION F-F
N.T.S.



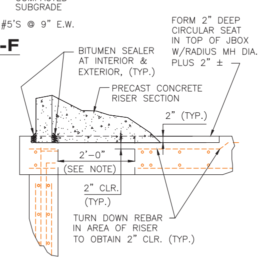
SECTION G-G
N.T.S.



PRECAST MANHOLE PLAN DETAIL -2
N.T.S.

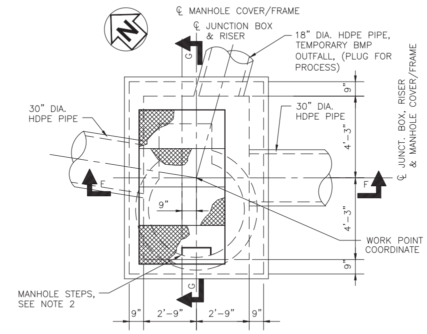
MANHOLE & JUNCTION BOX NOTES:

1. EXTEND MANHOLE TOP 3" ABOVE FINISH GRADE WHEN MANHOLES ARE NOT EXPOSED TO VEHICULAR TRAFFIC. IN ROADWAYS PARKING AND PAVED AREAS CASTINGS SHALL BE SLOPED AS REQUIRED TO MATCH FINISH GRADE EXCEPT WHERE NOTED IN PLAN.
2. MANHOLE STEPS SHALL BE CAST INTO MANHOLE SECTIONS BY THE MANUFACTURER AND SHALL CONFORM TO O.S.H.A. REGULATIONS.
3. PLAIN CONCRETE MAY BE USED IN LIEU OF AGGREGATE BASE
4. FORMED CONCRETE INVERTS ARE NOT REQUIRED FOR STORM WATER MANHOLES.
5. THE CONTRACTOR SHALL ENSURE THAT ALL EXCAVATION WORK IS IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (O.S.H.A.) CONSTRUCTION STANDARDS FOR EXCAVATIONS, 29 CFR PART 1926, SUBPART P AND ANY APPLICABLE STATE OR LOCAL REGULATIONS.
6. DRILL 3/4"ø X 8" DEEP HOLES AND SET #5 DOWELS W/HILTI HY150 MAX ADHESIVE.



NOTE: OPN'G REQ'D TO MATCH RISER DIA. AT JBOX #1, FOR VALVE INSTALLATION/MAINTENANCE

RISER SEATING DETAIL
N.T.S.
PRE-CAST RISER TO CAST-IN-PLACE JUNCTION BOX



CAST-IN-PLACE JUNCTION BOX 1
N.T.S.

CONCRETE NOTES:

GENERAL:

1. MATERIALS AND WORKMANSHIP ALONG WITH ANY FIELD DESIGN CHANGES, SHALL BE IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND SPECIFICATIONS UNLESS NOTED OTHERWISE IN THE PLANS.
   - ACI-315 MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES
   - ACI-318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
   - ACI-347R RECOMMENDED PRACTICE FOR CONCRETE FORMWORK
   - CRSI RECOMMENDED PRACTICE FOR PLACING REINFORCING STEEL
2. ALL CAST-IN-PLACE CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI IN 28 DAYS UNLESS NOTED OTHERWISE IN THE PLANS.
3. PROVIDE A MINIMUM COVER OF 3" FOR ALL REINFORCING STEEL.
4. ALL EXPOSED EXTERNAL CORNERS OF CONCRETE (INCLUDING CONCRETE COVERED BY HDPE LINER) SHALL BE CHAMFERED 1".
5. CONCRETE FLUMES AND SLABS SHALL HAVE A STEEL TROWEL FINISH.
6. ALL READY-MIX CONCRETE SHALL BE OBTAINED FROM AN APPROVED SUPPLIER AND SHALL BE PLACED WITHIN 1 1/2 HOURS OF MIX TIME.
7. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60.
8. THE TEMPORARY CONCRETE WALL AT JUNCTION BOX #6 MUST BE REMOVED AS PART OF THE SCOPE OF WORK FOR THE CONSTRUCTION OF CELL 1. THE 30" ø HDPE PIPE AND 12" ø HDPE PIPE MUST BE SLIP LINED PRIOR TO PLACING DRAIN PIPES IN SERVICE AND ALSO PRIOR TO INSTALLATION OF THE HDPE LINER IN ORDER TO PROVIDE ACCESS TO THE BOTTOM OF THE DECANT STRUCTURE AND FRENCH DRAIN.

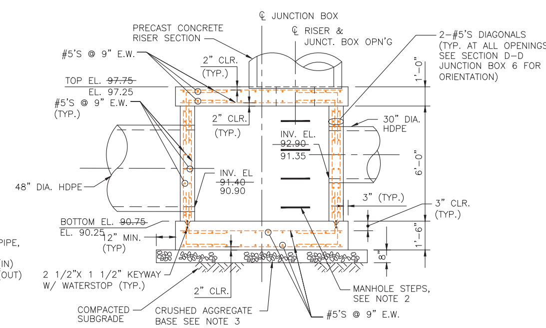
5A

CONCRETE LINING SYSTEM:

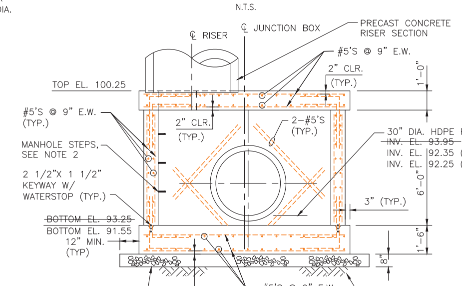
1. ALL CONCRETE SURFACES WHICH SHALL BE IN CONTACT WITH GYPSUM SLURRY OR DECANT OVER AN EXTENDED PERIOD OF TIME SHALL BE THOROUGHLY COATED WITH CHEMPRUF 2410 LINING SYSTEM BY ATLAS MINERALS & CHEMICALS, INC. OR AN APPROVED EQUAL.
2. THE LINING SYSTEM MATERIALS SHALL BE STORED, HANDLED, AND APPLIED AS PER MANUFACTURER'S GUIDELINES AND INSTRUCTIONS.
3. THE LINING SYSTEM SHALL BE APPLIED BY A CONTRACTOR KNOWLEDGEABLE AND EXPERIENCED WITH THE PRODUCT.

METAL SURFACE COATINGS/PAINT:

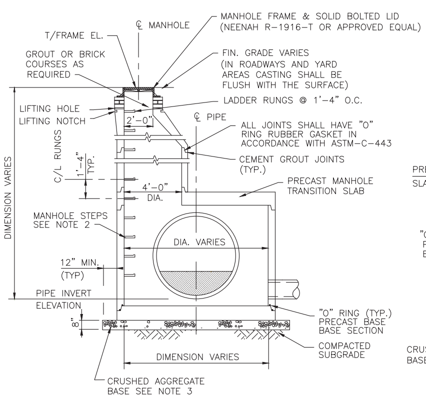
1. ALL METAL SURFACES WHICH SHALL BE IN CONTACT WITH GYPSUM SLURRY OR DECANT OVER AN EXTENDED PERIOD OF TIME SHALL BE COATED BY THE MANUFACTURER WITH A CORROSION INHIBITIVE PAINT PROVEN EFFECTIVE AS A BARRIER TO THE GYPSUM PRODUCT (CALCIUM SULFATE DIHYDRATE) WITH THE EXCEPTION OF STAINLESS STEEL AND ALUMINUM WHICH DO NOT REQUIRE COATING. GALVANIZED STEEL SHOULD NOT BE SUBSTITUTED FOR MATERIAL SHOWN ON THE PLANS. GALVANIZED BOLTS, FITTINGS, ETC... WHERE INDICATED IN THE PLANS SHOULD NOT BE COATED.
2. PRODUCTS WITHOUT MANUFACTURER APPLIED PROTECTANT SHALL BE THOROUGHLY COATED AS DESCRIBED BELOW IN ACCORDANCE WITH SCS/GULF POWER PAINT/COATING SPECIFICATIONS. PAINT COLOR SHALL BE AS DIRECTED BY GULF POWER.
   - PRIME COAT: SHERWIN-WILLIAMS ZINC-CLAD II, ETHYL SILICATE, INORGANIC, ZINC-RICH COATING AT 2 TO 3 MILS DFT
   - MIDDLE COAT: SHERWIN-WILLIAMS MACROPOXY 646, EPOXY MASTIC AT 5 TO 7 MILS DFT
   - FINISH COAT: SHERWIN-WILLIAMS ACROLON 218 HS ACRYLIC POLYURETHANE, POLYURETHANE ENAMEL AT 2 MILS DFT
3. ALL SURFACES TO RECEIVE COATINGS SHALL BE THOROUGHLY PREPARED FOLLOWING MANUFACTURER'S GUIDELINES AND SCS/GULF POWER SPECIFICATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL FEDERAL, STATE, AND LOCAL RULES AND REGULATIONS PERTAINING TO THE STORAGE/TRANSPORT AND APPLICATION OF PAINTS, COATINGS, SOLVENTS, ETC... INCLUDING THE DEPARTMENT OF LABOR'S OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION'S (OSHA'S) CURRENT REGULATIONS.
4. CONTRACTOR SHALL PROTECT VALVE STEMS AND OTHER SURFACES FROM OVERSPRAY.



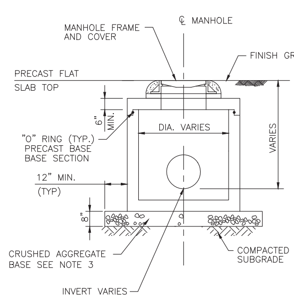
SECTION E-E
N.T.S.



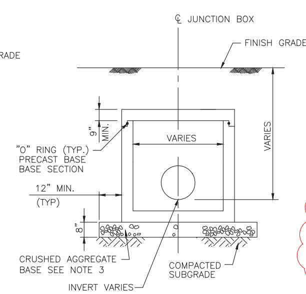
SECTION D-D



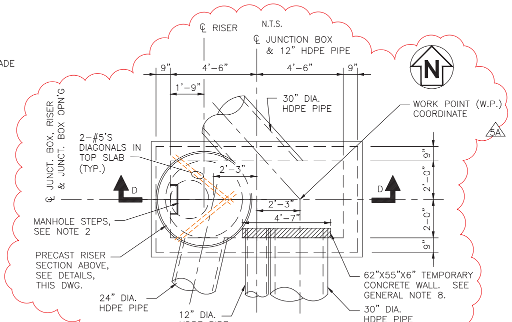
SECTION C-C
N.T.S.



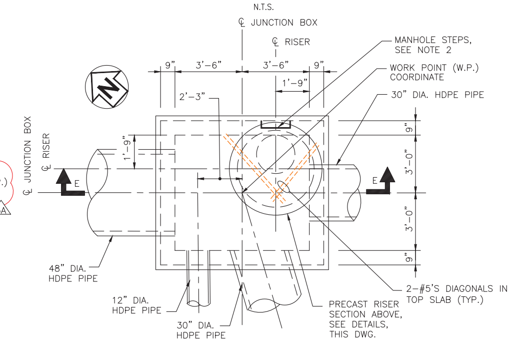
PRECAST SHALLOW MANHOLE
N.T.S.



PRECAST JUNCTION BOX
N.T.S.



CAST-IN-PLACE JUNCTION BOX 6
N.T.S.



CAST-IN-PLACE JUNCTION BOX 7
N.T.S.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
5	2-8-12	A. ADDED TEMPORARY CONCRETE WALL AND ADDED GENERAL NOTE #8.	4106DE	JWM	RCB	GRR				TMU
4	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED ELEVATIONS	4106DE	CRU	RJB JCP	GRR				JBS
3	11-16-09	REVISED JUNCTION BOX, RISER VALVE ACTUATOR & MANHOLE COVER AND FRAME. ADDED SUMP PUMP	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	TMU
2	3-16-09	A,B,C – REVISED JUNCTION BOX AND RISER ELEVATIONS & DIMENSIONS D – ADDED RISER SEATING DETAIL	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT
1	11-11-08	REMOVED HOLD	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT
0	9-15-08	ISSUED FOR CONSTRUCTION	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT

Southern Company Generation Engineering and Construction Services FOR

Gulf Power Company

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE-AREA 1
DECANT SYSTEM & STORM WATER DETAILS
SHEET 1

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	510400	E4C39050	1	FINAL	5

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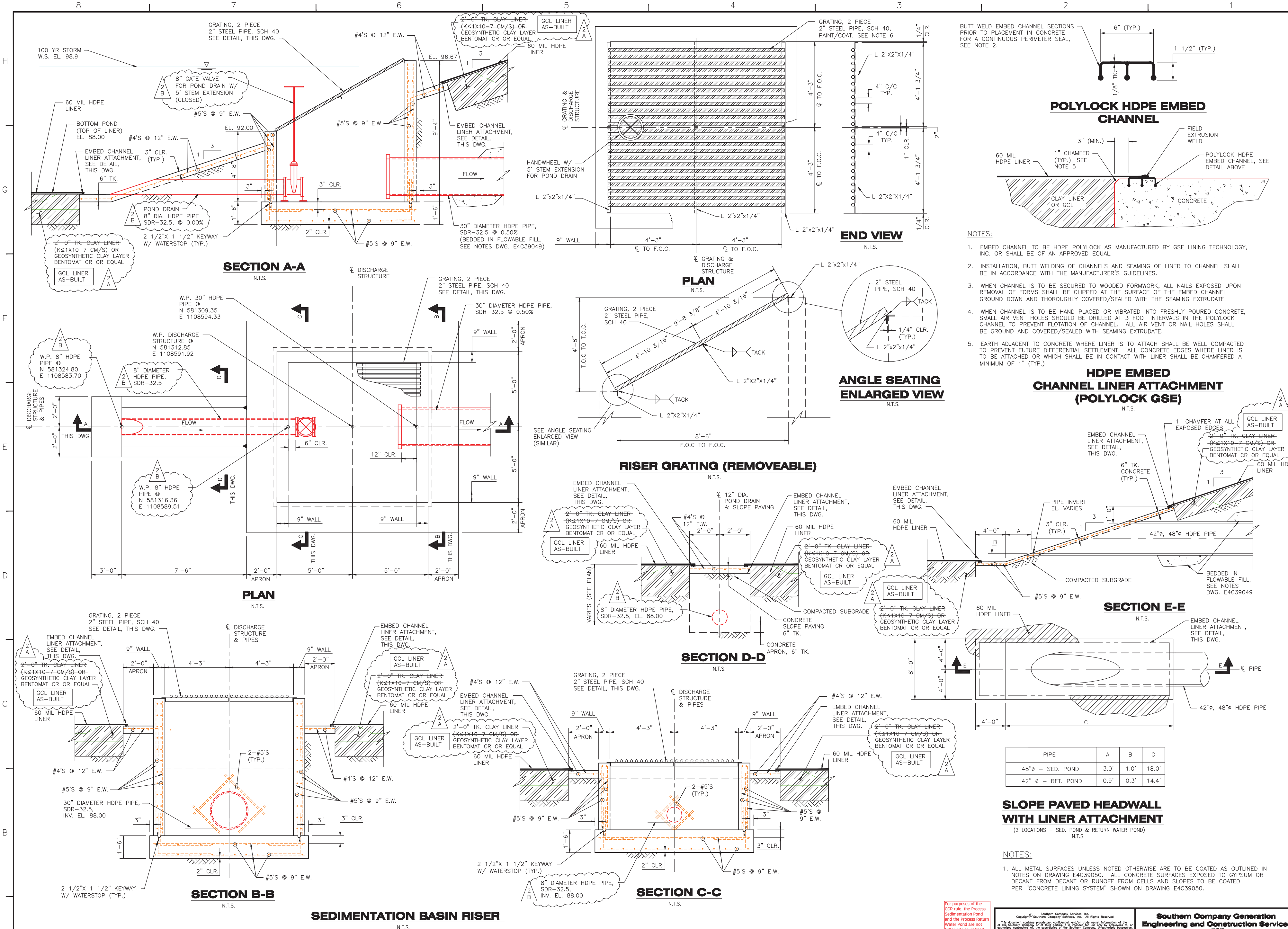


NOTES:

1. EMBED CHANNEL TO BE HDPE POLYLOCK AS MANUFACTURED BY GSE LINING TECHNOLOGY, INC. OR SHALL BE OF AN APPROVED EQUAL.
2. INSTALLATION, BUTT WELDING OF CHANNELS AND SEAMING OF LINER TO CHANNEL SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.
3. WHEN CHANNEL IS TO BE SECURED TO WOODED FORMWORK, ALL NAILS EXPOSED UPON REMOVAL OF FORMS SHALL BE CLIPPED AT THE SURFACE OF THE EMBED CHANNEL GROUND DOWN AND THOROUGHLY COVERED/SEALED WITH THE SEAMING EXTRUDATE.
4. WHEN CHANNEL IS TO BE HAND PLACED OR VIBRATED INTO FRESHLY POURED CONCRETE, SMALL AIR VENT HOLES SHOULD BE DRILLED AT 3 FOOT INTERVALS IN THE POLYLOCK CHANNEL TO PREVENT FLOTATION OF CHANNEL. ALL AIR VENT OR NAIL HOLES SHALL BE GROUND AND COVERED/SEALED WITH SEAMING EXTRUDATE.
5. EARTH ADJACENT TO CONCRETE WHERE LINER IS TO ATTACH SHALL BE WELL COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLEMENT. ALL CONCRETE EDGES WHERE LINER IS TO BE ATTACHED OR WHICH SHALL BE IN CONTACT WITH LINER SHALL BE CHAMFERED A MINIMUM OF 1" (TYP.)

PIPE	A	B	C
48"ø – SED. POND	3.0'	1.0'	18.0'
42" ø – RET. POND	0.9'	0.3'	14.4'

NOTES:

1. ALL METAL SURFACES UNLESS NOTED OTHERWISE ARE TO BE COATED AS OUTLINED IN NOTES ON DRAWING E4C39050. ALL CONCRETE SURFACES EXPOSED TO GYPSUM OR DECANT FROM DECANT OR RUNOFF FROM CELLS AND SLOPES TO BE COATED PER "CONCRETE LINING SYSTEM" SHOWN ON DRAWING E4C39050.

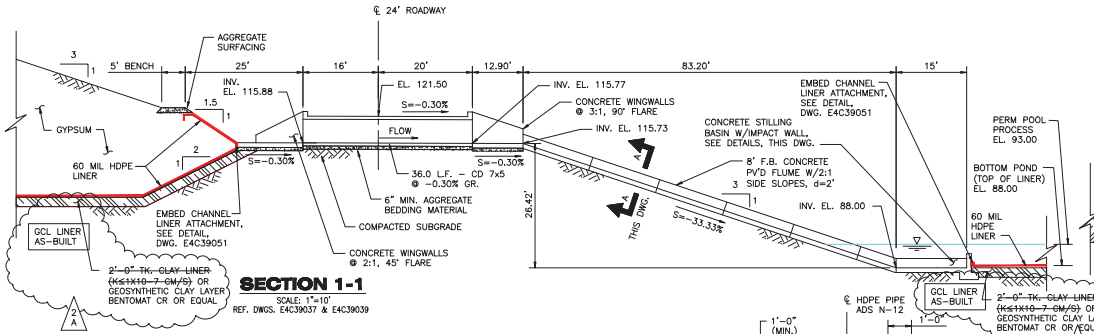
REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D						
2	7-23-10	THIS DRAWING WAS ISSUED REV. 2 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB/JCP	GRR					JBS
2	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. ADDED GCL LINER AS-BUILT NOTE B. REVISED PIPE DIAMETER	4106DE	CRU	RJB/JCP	GRR					JBS
1	11-14-08	REVISED STEEL GALV. TO COATED. ADDED COATINGS AND FLOWABLE FILL NOTES	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT	
0	9-15-08	ISSUED FOR CONSTRUCTION	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT	

Southern Company Generation Engineering and Construction Services
FOR
Gulf Power Company

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE-AREA 1
DECANT SYSTEM & STORM WATER DETAILS
SHEET 2

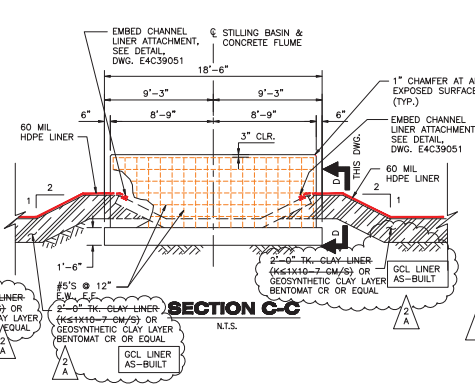
SCALE: AS NOTED | PROJ. I.D.: 510400 | DRAWING NUMBER: E4C39051 | SHEET: 1 | CONT'D: FINAL | REV: 2

ANSI E: 44x34 Acad2007



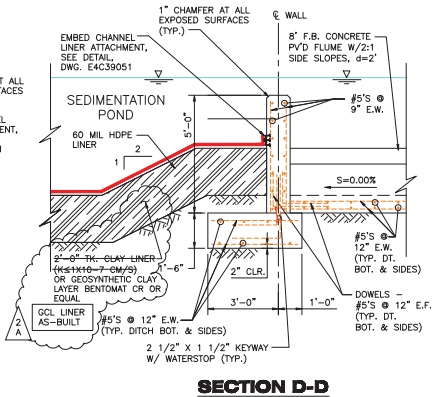
SECTION 1-1

SCALE: 1"=10'
REF. DWGS. E4C39037 & E4C39039



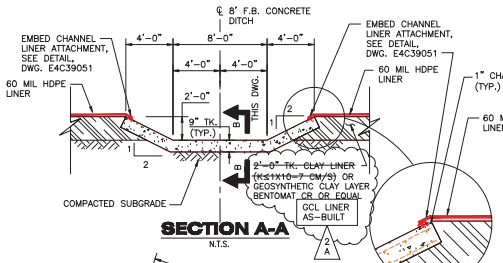
SECTION C-C

N.T.S.



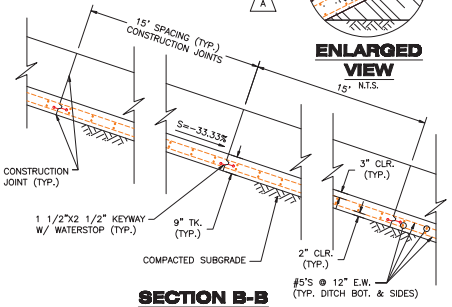
SECTION D-D

N.T.S.



SECTION A-A

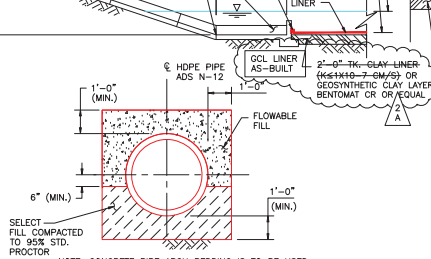
N.T.S.



ENLARGED VIEW

SECTION B-B

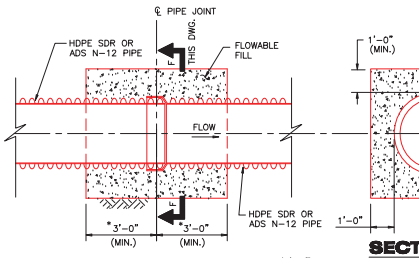
N.T.S.



NOTE: CONCRETE PIPE ARCH BEDDING IS TO BE USED AS AN ALTERNATE FOR THE PLACEMENT OF THE PIPES UNDER THE CELLS FOR PHASE 1. ALL PHASE 2 PIPES SHALL BE FULLY ENCASED IN FLOWABLE FILL.

CONCRETE PIPE ARCH

N.T.S.



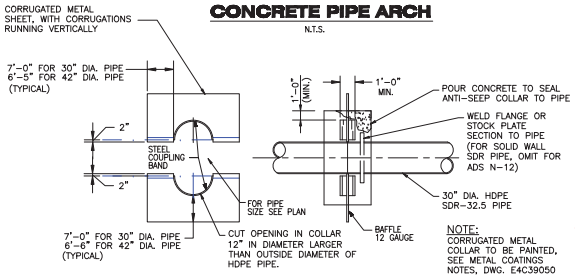
NOTE: FLOWABLE FILL PIPE ENCASEMENT LENGTHS SHOWN (3'-0") ARE FOR THE ENCASEMENT OF PIPE AT ALL PIPE JOINTS. ADDITIONAL LENGTHS OF PIPE ENCASEMENT SHALL BE REQUIRED FOR THOSE PIPES INDICATED ON DRAWING E4C39054. SEE DRAWING E4C39049 FOR FLOWABLE FILL NOTES.

SECTION F-F

N.T.S.

FLOWABLE FILL PIPE ENCASEMENT

N.T.S.

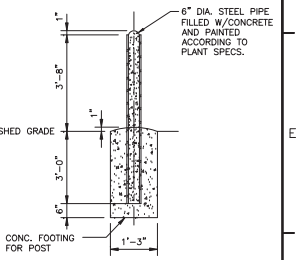


NOTE: CORRUGATED METAL COLLAR TO BE PAINTED, SEE METAL COATINGS NOTES, DWG. E4C39050

FRONT ELEVATION SIDE ELEVATION

ANTI-SEEP COLLAR (HDPE PIPE APPLICATION)

N.T.S.

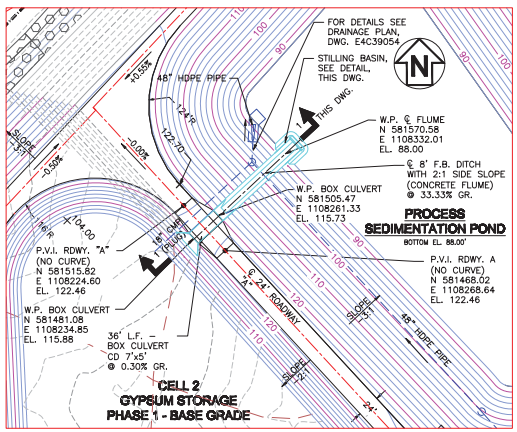


BOLLARD DETAIL

N.T.S.

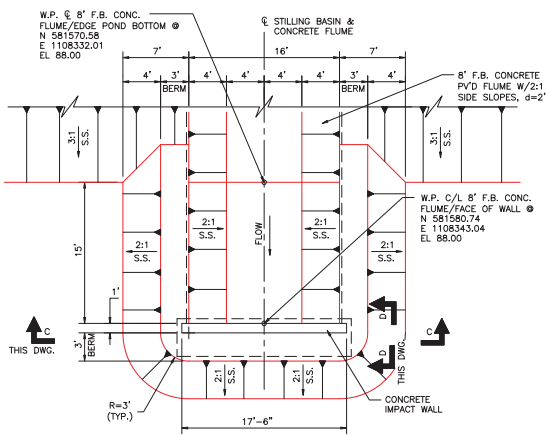
LEVEL TRANSMITTER NOTES

1. CONTRACTOR TO PROVIDE 12"-150# 316 STAINLESS STEEL TOP FLANGE WITH A 3/4" HOLE IN THE CENTER FOR THE TRANSMITTER CONNECTION.
2. ALL MATERIAL EXCEPT THE TRANSMITTER AND GUIDED WAVE PROBE IS BY CONTRACTOR.
3. CONTRACTOR TO INSTALL PROTECTIVE SCREEN AT OUTLET OF 12" HDPE PIPE IN RETURN WATER POND (SEE DWG. E4C39052).
4. CONTRACTOR TO PROVIDE PURCHASER THE PROBE DEPTH "A" UPON COMPLETION OF CONSTRUCTION FOR PURCHASE OF PROBE BASED UPON THIS MEASUREMENT.
5. INSTALL ONE STAINLESS STEEL WASHER BETWEEN THE UPPER AND LOWER FLANGES AROUND EACH BOLT. NO GASKET IS TO BE INSTALLED BETWEEN THE FLANGES (TO PREVENT PRESSURIZATION OF THE PIPE AS WATER LEVEL INCREASES.)



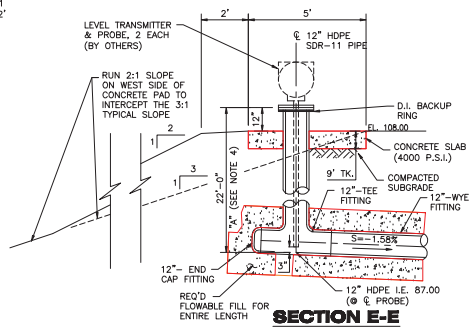
PLAN

SCALE: 1" = 5'



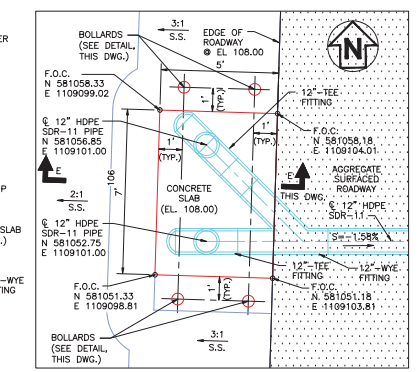
STILLING BASIN

SCALE: 1" = 5'



SECTION E-E

N.T.S.



LEVEL CONTROLS PAD

SCALE: 1" = 2'
(DWG. E4C39052)

SEDIMENTATION POND INLET STRUCTURE & FLUME

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

REVISION	DATE	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
REVISED TO INCLUDE AS-BUILT CONDITIONS A REVISED TO SHOW GCL FOR AS-BUILT THIS DRAWING WAS ISSUED REV. 2 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519 EWO: 4106DE	2 7-23-10	CRU	RJB JCP	GRR				JBS
A REMOVED HOLD B ADDED FLOWABLE FILL ENCASEMENT DETAIL C ADDED ANTI-SEEP COLLAR DETAIL D REV. ELEVATIONS EWO: 4106DE	1 5-04-09	CRU	MHL	GRR				CKT
ISSUED FOR CONSTRUCTION EWO: 4106DE	0 9-15-08	CRU	MHL	GRR	GEL	CSS	KLD	CKT

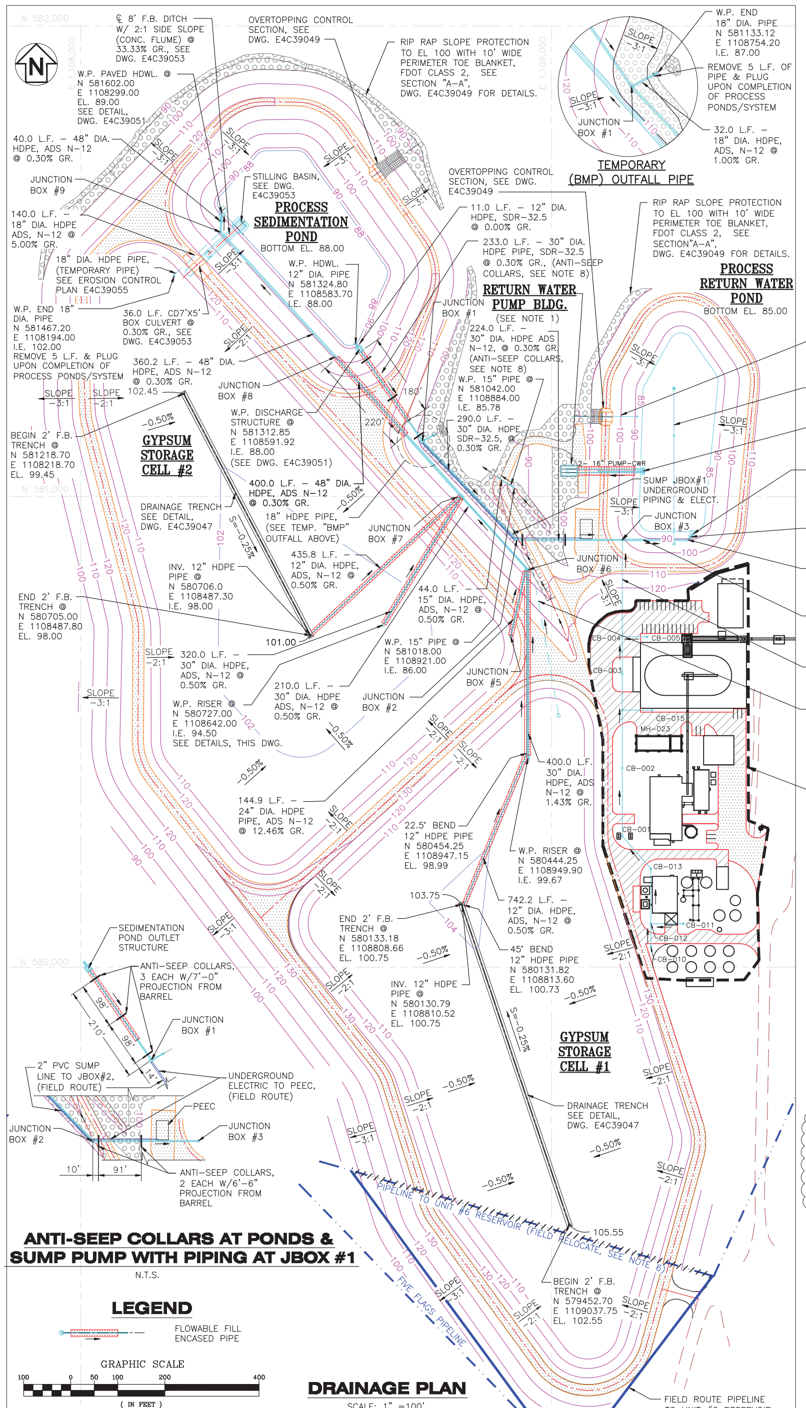
Southern Company Generation Engineering and Construction Services
FOR

Gulf Power Company

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE-AREA 1
DECANT SYSTEM & STORM WATER DETAILS
SHEET 4

SCALE	PROJ LG.	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	510400	E4C39053	1	FINAL	2

ANSI E 44x34 Acad2007



ANTI-SEEP COLLARS AT PONDS & SUMP PUMP WITH PIPING AT JBOX #1

N.T.S.

LEGEND

FLOWABLE FILL ENCASED PIPE

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

DRAINAGE PLAN

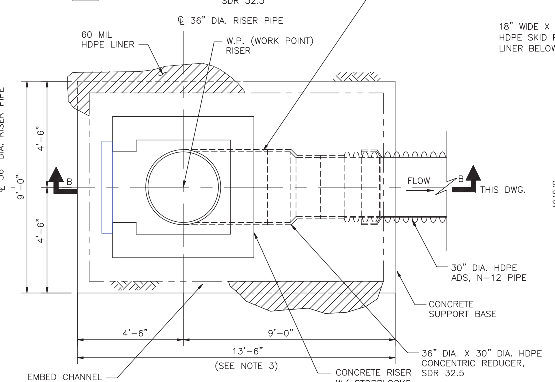
SCALE: 1" =100'

DRAINAGE STRUCTURE SCHEDULE

DRAINAGE STRUCTURE NUMBER	COORDINATE WORK POINT	STRUCTURE TYPE TOP ELEVATION	INVERT EL. NORTH	SOUTH	EAST	WEST	STRUCTURE NOTES
JUNCTION BOX 1	N 581118.00 E 1108726.00	CAST-IN-PLACE EL. 95.00 CAST-IN-PLACE EL. 101.00	18" HDPE ~~INV.EL. 87.31~~ (PLUGGED)		30" HDPE INV.EL. ~~87.31~~ INV.EL. 86.71	30" HDPE INV.EL. ~~87.31~~ INV.EL. 86.81	SEE SPECIAL JUNCTION BOX DETAIL, DWG. E4C39050 (18" HDPE PIPE FOR BMP PHASE. PLUG PIPE PRIOR TO BEGINNING DECANT OPERATIONS AND INSTALL 30" GATE VALVE W/ ELECTRIC ACTUATOR & SUMP PUMP)
JUNCTION BOX 2	N 580908.00 E 1108926.00	5' DIA. PRECAST EL. ~~98.00~~ EL. 106.21			30" HDPE INV.EL. ~~86.44~~ INV.EL. 85.93	30" HDPE INV.EL. ~~86.44~~ INV.EL. 86.03	SEE PRECAST MANHOLE DETAIL, DWG. E4C39050
JUNCTION BOX 3	N 580908.00 E 1109150.00	6' DIA. PRECAST EL. ~~103.50~~ EL. 103.40		24" HDPE INV.EL. ~~97.00~~ INV.EL. 97.17	42" HDPE INV.EL. ~~85.77~~ INV.EL. 85.75	30" HDPE INV.EL. ~~85.77~~ INV.EL. 85.80	SEE PRECAST MANHOLE DETAIL, DWG. E4C39050, FOR CONTINUATION OF 24" HDPE FROM DEWATERING FACILITY, SEE B&V DWG. 145832-CSX-S3001
JUNCTION BOX 4	N 580908.00 E 1109290.00	6' DIA. PRECAST EL. 103.50	42" HDPE INV.EL. 85.35		42" HDPE INV.EL. 85.35		SEE PRECAST MANHOLE DETAIL, DWG. E4C39050
JUNCTION BOX 5	N 580703.00 E 1108913.00	4' DIA. PRECAST EL. ~~127.5~~ EL. 124.7	24" HDPE INV.EL. 113.00				SEE PRECAST MANHOLE DETAIL, DWG. E4C39050, DECANT SIPHON MANHOLE
JUNCTION BOX 6	N 580844.25 E 1108949.90	CAST-IN-PLACE EL. 100.25 PRECAST SECT. EL. ~~107.00~~ EL. 109.10	30" HDPE INV.EL. ~~93.95~~ INV.EL. 92.25	30" HDPE INV.EL. ~~93.95~~ 24" HDPE INV.EL. 94.94 12" HDPE INV.EL. 97.04	INV.EL. 92.35		SEE SPECIAL JUNCTION BOX DETAIL, DWG. E4C39050
JUNCTION BOX 7	N 581000.00 E 1108809.00	CAST-IN-PLACE EL. ~~106.00~~ EL. 106.68	48" HDPE INV.EL. ~~91.40~~ INV.EL. 90.90	30" HDPE INV.EL. ~~92.90~~ INV.EL. 91.35	30" HDPE INV.EL. ~~92.90~~ INV.EL. 91.35	12" HDPE INV.EL. 95.82	SEE SPECIAL JUNCTION BOX DETAIL, DWG. E4C39050
JUNCTION BOX 8	N 581297.00 E 1108541.00	6' DIA. PRECAST EL. ~~102.00~~ EL. 101.20	48" HDPE INV.EL. ~~90.20~~ INV.EL. 89.60	48" HDPE INV.EL. ~~90.20~~ INV.EL. 89.70			SEE PRECAST MANHOLE DETAIL , DWG. E4C39050
JUNCTION BOX 9	N 581562.00 E 1108297.00	7' DIA. PRECAST EL. ~~102.00~~ EL. 100.85	48" HDPE INV.EL. ~~89.12~~ INV.EL. 87.92	48" HDPE INV.EL. ~~89.12~~ INV.EL. 88.02		18" HDPE (TEMPORARY) ~~INV.EL. 95.00~~ (PLUGGED)	SEE PRECAST MANHOLE DETAIL, DWG. E4C39050

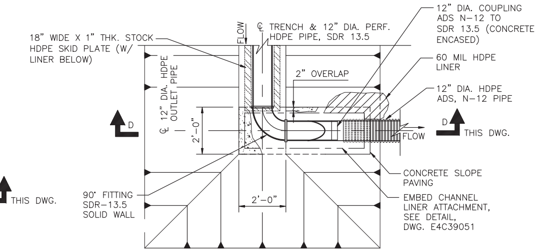
NOTES:

1. SEE DWG. E4C39052 FOR RETURN WATER INTAKE STRUCTURE DETAILS. SEE DWGS. E4C39062, E4C39063 & E4C39064 FOR RETURN WATER PUMP BUILDING STRUCTURAL LAYOUT AND DETAILS. RETURN WATER PUMPS AND DISCHARGE PIPING BY BLACK & VEATCH.
2. GYPSUM DEWATERING FACILITY GRADING AND DRAINAGE BY OTHERS. SEE BLACK & VEATCH DWGS. 145832-CSX-S3001, -S3005, -3050, -3401, -S3450, -S3900, AND -S3901.
3. DIMENSIONS OF CONCRETE BASE FOR DECANT RISER SHALL BE INCREASED AS NECESSARY TO ALLOW COMPLETE FITTING TO FITTING MAKE-UP OF RISER/REDUCER/MATERIALS COUPLING TO BE ENCASED IN CONCRETE WITH A MINIMUM OF 6" OF CLEARANCE FROM COUPLING TO FACE OF CONCRETE.
4. SEE DRAWING E4C39050 FOR CONCRETE NOTES AND DETAILS OF JUNCTION BOXES AND MANHOLES.
5. HDPE PIPE SHOWN ON THE PLAN SHALL BE ENCASED WITH FLOWABLE FILL FOR STRUCTURAL PURPOSES WHERE INDICATED. ALL HDPE PIPE SHOWN ON THE PLANS (EXCLUDING PIPE LABELED TEMPORARY) SHALL HAVE JOINTS FULLY ENCASED IN FLOWABLE FILL AS SHOWN ON DRAWING E4C39053. SEE DRAWING E4C39049 FOR FLOWABLE FILL NOTES.
6. LOCATION OF PIPELINE TO UNIT #6 RESERVOIR AS SHOWN IS APPROXIMATE. FIELD VERIFY AND RELOCATE PORTION AROUND SOUTHEAST CORNER OF CELL #1.
7. THIS DRAWING TO BE WORKED TOGETHER WITH DRAWING E4C39061 FOR THE CONSTRUCTION OF THE RISERS FOR CELLS #1 AND #2.
8. SEEPAGE COLLARS SHALL BE REQUIRED FOR THOSE PIPES WHERE SHOWN ON THE PLAN. SEE DRAWING E4C39053 FOR DETAILS.
9. PERFORATED PIPE IN TRENCH SHOULD HAVE AASHTO CLASS 1 PERFORATIONS – 3 ROWS OF PERFORATIONS EQUAL SPACED AT 120 DEGREES (A TOTAL OF 6 PER FOOT OF PIPE). ORIENT WITH TWO BOTTOM PERFORATIONS OFFSET 60 DEGREES FROM CENTERLINE OF BOTTOM OF PIPE.



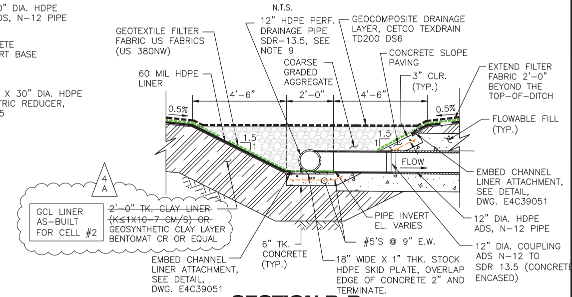
PLAN

N.T.S.



PLAN

N.T.S.

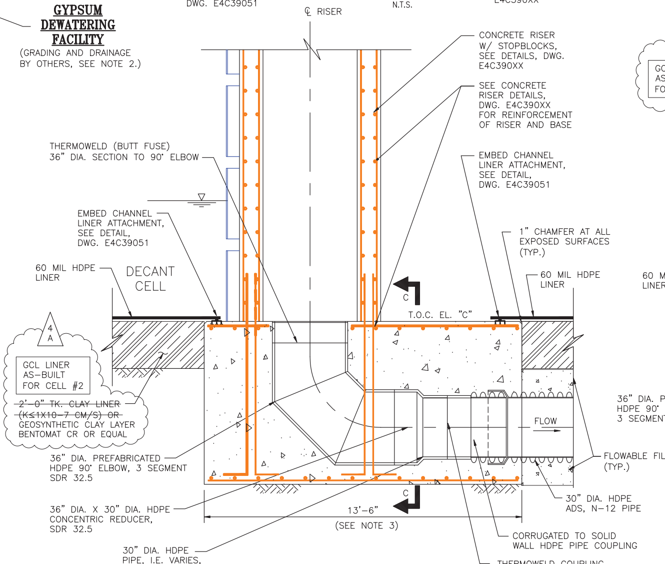


SECTION D-D

N.T.S.

DRAINAGE TRENCH OUTLET

N.T.S.

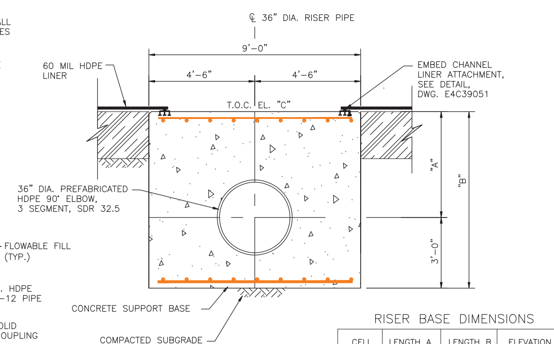


SECTION B-B

N.T.S.

DECANT PIPE CONCRETE RISER BASE (GYPSUM CELL DECANT SYSTEM)

N.T.S.



SECTION C-C

N.T.S.

RISER BASE DIMENSIONS

CELL	LENGTH A	LENGTH B	ELEVATION "C"
1	4'-6"	7'-6"	105.42
2	5'-11"	8'-11"	101.67

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
4	7-23-10	THIS DRAWING WAS ISSUED REV. 4 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	RJB/JCP	GRR				JBS
4	7-23-10	REVISED TO INCLUDE AS-BUILT CONDITIONS A. REVISED TO SHOW GCL USED FOR CELL #2 B. REVISED ELEVATIONS	4106DE	CRU	RJB/JCP	GRR				JBS
3	12-11-09	A ADDED JBOX#1 SUMP LINES B REVISED JBOX#1 RISER TO CAST-IN-PLACE C CHANGED GATE VALVE TO ELECTRIC ACTUATOR & ADDED SUMP PUMP	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	TMU
2	6-19-09	A REVISED RISER B REVISED PERFORATED UNDERDRAIN PIPE C REVISED NOTE	4106DE	CRU	MHL	GRR				CKT
1	5-04-09	A REVISED NOTE B REVISED FLOWABLE FILL & ADDED SEEPAGE COLLARS C REVISED TOP/JUNCTION BOX ELEVATIONS	4106DE	CRU	MHL	GRR				CKT
0	9-15-08	ISSUED FOR CONSTRUCTION	4106DE	CRU	MHL	GRR	GEL	CSS	KLD	CKT

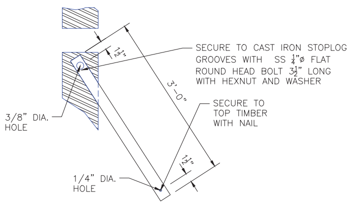
Southern Company Generation Engineering and Construction Services FOR

Gulf Power Company

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE-AREA 1
DECANT SYSTEM & STORM WATER DETAILS
SHEET 5

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	510400	E4C39054	1	FINAL	4

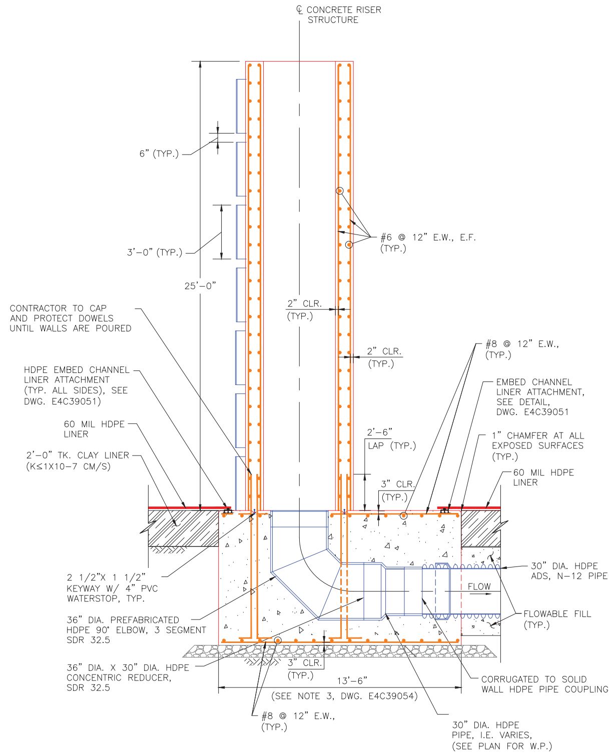
ANSI E: 44x34 Acad2007



LOCKING FLAT BAR STOCK DETAIL

N.T.S.

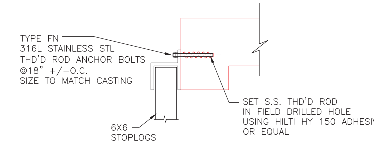
NOTE:
TO PREVENT FLOTATION OF STOPLOGS, USE LOCKING FLAT BAR STOCK AS SHOWN (2 SETS REQUIRED FOR ALTERNATING PLACEMENT). ALSO SHIM STOPLOGS AGAINST GROOVES TO PREVENT MOVEMENT AND JOIN STOPLOGS TO EACH OTHER AS NEEDED...I.E. AT THE 6" GAPS BETWEEN CAST IRON GROOVES



℄ CONCRETE RISER STRUCTURE
6" (TYP.)
3'-0" (TYP.)
25'-0"
#6 @ 12" E.W., E.F. (TYP.)
2" CLR. (TYP.)
CONTRACTOR TO CAP AND PROTECT DOWELS UNTIL WALLS ARE POURED
HDPE EMBED CHANNEL LINER ATTACHMENT (TYP. ALL SIDES), SEE DWG. E4C39051)
60 MIL HDPE LINER
2'-0" TK. CLAY LINER (K≤1X10-7 CM/S)
2" CLR. (TYP.)
#8 @ 12" E.W., (TYP.)
EMBED CHANNEL LINER ATTACHMENT, SEE DETAIL, DWG. E4C39051
1" CHAMFER AT ALL EXPOSED SURFACES (TYP.)
2'-6" LAP (TYP.)
3" CLR. (TYP.)
60 MIL HDPE LINER
2 1/2"X 1 1/2" KEYWAY W/ 4" PVC WATERSTOP, TYP.
30" DIA. HDPE ADS, N-12 PIPE
FLOW
FLOWABLE FILL (TYP.)
36" DIA. PREFABRICATED HDPE 90° ELBOW, 3 SEGMENT SDR 32.5
36" DIA. X 30" DIA. HDPE CONCENTRIC REDUCER, SDR 32.5
3" CLR. (TYP.)
13'-6"
(SEE NOTE 3, DWG. E4C39054)
CORRUGATED TO SOLID WALL HDPE PIPE COUPLING
#8 @ 12" E.W., (TYP.)
30" DIA. HDPE PIPE, I.E. VARIES, (SEE PLAN FOR W.P.)

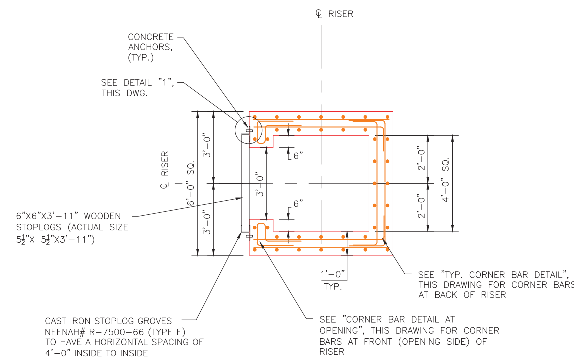
SECTION A-A

N.T.S.



DETAIL "1"

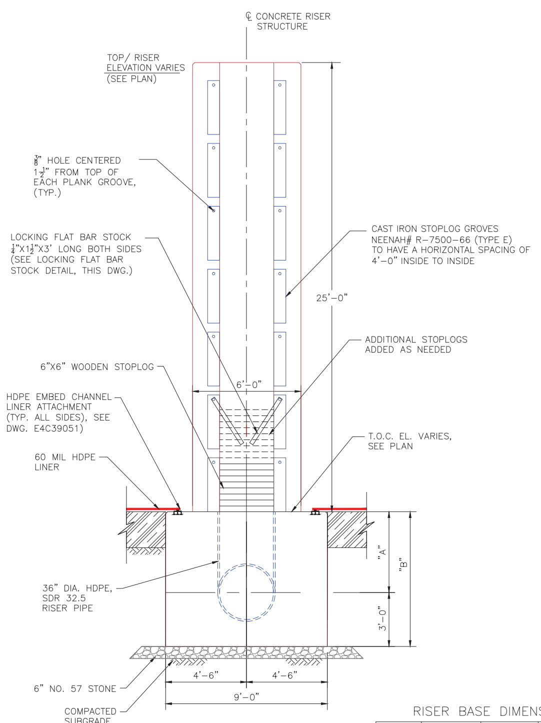
N.T.S.



℄ RISER
CONCRETE ANCHORS, (TYP.)
SEE DETAIL "1", THIS DWG.
℄ RISER
6'-0" SQ.
3'-0"
3'-0"
3'-0"
6"
6"
2'-0"
2'-0"
4'-0" SQ.
6"X6"X3'-11" WOODEN STOPLOGS (ACTUAL SIZE 5 1/2"X 5 1/2"X3'-11")
1'-0" TYP.
SEE "TYP. CORNER BAR DETAIL", THIS DRAWING FOR CORNER BARS AT BACK OF RISER
CAST IRON STOPLOG GROOVES NEENAH# R-7500-66 (TYPE E) TO HAVE A HORIZONTAL SPACING OF 4'-0" INSIDE TO INSIDE
SEE "CORNER BAR DETAIL AT OPENING", THIS DRAWING FOR CORNER BARS AT FRONT (OPENING SIDE) OF RISER

RISER PLAN

N.T.S.



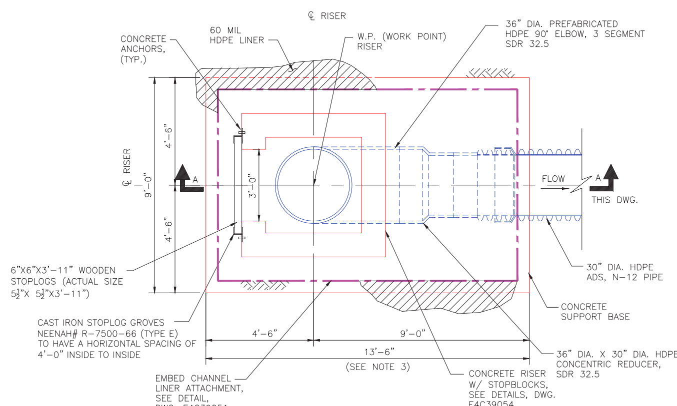
℄ CONCRETE RISER STRUCTURE
TOP/ RISER ELEVATION VARIES (SEE PLAN)
5/8" HOLE CENTERED 1 1/2" FROM TOP OF EACH PLANK GROOVE, (TYP.)
LOCKING FLAT BAR STOCK 1/4"X1 1/2"X3' LONG BOTH SIDES (SEE LOCKING FLAT BAR STOCK DETAIL, THIS DWG.)
CAST IRON STOPLOG GROVES NEENAH# R-7500-66 (TYPE E) TO HAVE A HORIZONTAL SPACING OF 4'-0" INSIDE TO INSIDE
25'-0"
ADDITIONAL STOPLOGS ADDED AS NEEDED
6"X6" WOODEN STOPLOG
6'-0"
HDPE EMBED CHANNEL LINER ATTACHMENT (TYP. ALL SIDES), SEE DWG. E4C39051)
60 MIL HDPE LINER
T.O.C. EL. VARIES, SEE PLAN
"A"
"B"
3'-0"
36" DIA. HDPE, SDR 32.5 RISER PIPE
4'-6"
4'-6"
9'-0"
6" NO. 57 STONE
COMPACTED SUBGRADE

RISER ELEVATION

N.T.S.

RISER BASE DIMENSIONS

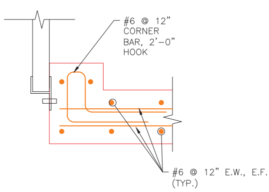
CELL	LENGTH A	LENGTH B	ELEVATION "C"
1	4'-6"	7'-6"	105.42
2	5'-11"	8'-11"	101.67



℄ RISER
60 MIL HDPE LINER
W.P. (WORK POINT) RISER
36" DIA. PREFABRICATED HDPE 90° ELBOW, 3 SEGMENT SDR 32.5
CONCRETE ANCHORS, (TYP.)
℄ RISER
9'-0"
4'-6"
4'-6"
3'-0"
A
FLOW
A
THIS DWG.
6"X6"X3'-11" WOODEN STOPLOGS (ACTUAL SIZE 5 1/2"X 5 1/2"X3'-11")
30" DIA. HDPE ADS, N-12 PIPE
CONCRETE SUPPORT BASE
CAST IRON STOPLOG GROVES NEENAH# R-7500-66 (TYPE E) TO HAVE A HORIZONTAL SPACING OF 4'-0" INSIDE TO INSIDE
4'-6"
9'-0"
13'-6"
(SEE NOTE 3)
36" DIA. X 30" DIA. HDPE CONCENTRIC REDUCER, SDR 32.5
EMBED CHANNEL LINER ATTACHMENT, SEE DETAIL, DWG. E4C39051
CONCRETE RISER W/ STOPBLOCKS, SEE DETAILS, DWG. E4C39054

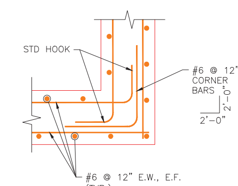
RISER STRUCTURE PLAN

N.T.S.



CORNER BAR DETAIL AT OPENING

N.T.S.



TYP. CORNER BAR DETAIL

N.T.S.

NOTES:

1. FOR DESCRIPTION AND CLASSIFICATION OF GENERAL STRUCTURAL FILL, SELECT STRUCTURAL FILL, AND CLAY LINER MATERIAL, SEE TECHNICAL SPECIFICATIONS.
2. ALL CONCRETE AND METAL THAT WILL BE IN CONTACT WITH GYPSUM AND/OR GYPSUM SLURRY WATER SHALL BE COATED WITH CHEMPRUF 2410 LINING SYSTEM BY ATLAS MINERALS AND CHEMICALS, INC. OR AN APPROVED EQUAL. SEE DRAWING E4C39050 FOR ADDITIONAL INFORMATION.
5. THIS DRAWING TO BE WORKED TOGETHER WITH DRAWING E4C39054 FOR THE CONSTRUCTION OF THE RISER STRUCTURE ASSEMBLIES FOR CELLS #1 AND #2.

For purposes of the CCR rule, the Process Sedimentation Pond and the Process Return Water Pond are not CCR units as defined.

Southern Company Generation
Engineering and Construction Services
FOR
Gulf Power Company

PLANT CRIST UNITS 4-7
FGD PROJECT
GYPSUM STORAGE-AREA 1
DECANT SYSTEM & STORM WATER DETAILS
STOPBLOCK RISER DETAILS

REVISION	DATE	DESCRIPTION	EWO	BY	CHK'D	CIVIL APPR	ELECT APPR	I/C APPR	MECH APPR	DISC MGR
1	12-22-10	ISSUED FOR DOCUMENTUM UPDATE OF REVISION VERSION	4106DE	CRU	RJB JCP	GRR				JBS
0	6-19-09	ISSUED FOR CONSTRUCTION. THIS DRAWING WAS ISSUED REV. 0 BEARING PROFESSIONAL ENGINEER SEAL OF JAMES C. PEGUES, FL. LICENSE NO. 52519	4106DE	CRU	MHL	GRR				CKT

SCALE	PROJ I.D.	DRAWING NUMBER	SHEET	CONT'D	REV
AS NOTED	510400	E4C39061	1	FINAL	1

ANSI E: 44x34 Acad2007

SOUTHERN COMPANY GENERATION
ENGINEERING AND CONSTRUCTION SERVICES

TECHNICAL SPECIFICATIONS

FOR THE

CONSTRUCTION OF CELLS 1 AND 2 AND THE SEDIMENTATION AND RETURN WATER PONDS

OF THE

GYPSUM STORAGE AREA 1

AT

PLANT CRIST

GULF POWER COMPANY

Prepared By: Terri H. Hartsfield Date: 2/20/2009

Reviewed By:

Name – Discipline	Initials	Date
A. James C. Pegues – ES&EE	JCP	2/20/2009
B. Curtis R. Upchurch – Civil Design	CRU	2/20/2009

Approved By: John B. Smith, Jr. Civil Supervisor Date: 2/20/2009

REVISIONS

NO.	DESCRIPTION	BY	REVIEWED	APPROVED	DATE
0	Issued for Construction	THH	JCP/CRU	JBS	2/20/2009

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS FOR THE CONSTRUCTION OF CELLS 1 AND 2 AND THE SEDIMENTATION AND RETURN WATER PONDS OF THE GYPSUM STORAGE AREA 1 AT PLANT CRIST GULF POWER COMPANY

1.0 GENERAL

Plant Crist is an electric fossil fueled plant located in Escambia County, Florida, north of the City of Pensacola. This Specification and associated documents covers the site development for Cells 1 and 2 for the Plant Crist Gypsum Storage Area.

1.1 GENERAL INFORMATION

1.1.1 These Specifications, all related attachments and associated documents cover the furnishing of all materials (unless otherwise noted), labor, supervision, equipment, and tools required for the construction of the Gypsum Storage Area Cells 1 and 2 and associated sedimentation and return water ponds at Plant Crist. The technical and construction requirements, including Notes, Specifications, and design data continue on the Drawings. The Drawings and Notes are an integral part of these Specifications

1.1.2 The provisions of these Specifications shall govern unless otherwise specified in the contract documents. In case of conflicting requirements, the contract documents shall govern. Discrepancies between the Drawings and the Specifications shall be brought to the attention of the Purchaser for resolution before the performance of the work. In the case of discrepancies between the scale dimensions on the Drawings and the dimensions the written dimensions shall govern.

1.1.3 The Contractor shall ensure that all work is performed in accordance with the Occupational Safety and Health Act of 1970 and other Standards and Codes listed herein (latest revision).

1.1.4 The Owner will file for NPDES Construction storm water discharge permit for stand-alone construction projects under FL 0002275. The Contractor shall ensure that a signed copy of that Notice of Intent and accompanying Erosion and Sediment Control Plan are on hand at the site during execution of the work,

and shall adhere to all requirements of the Plan. The Contractor shall be responsible for obtaining any other necessary permits, except as noted, for conducting the work covered by this Specification.

1.1.5 All land disturbing activities shall conform to the minimum requirements for conservation and engineering practices established by The Florida Development Manual: A Guide to Sound Land and Water Management

1.1.6 The Contractor shall receive, unload, haul to site, handle, store, place, and secure all materials and equipment. Any security measures taken for the protection of the Contractor's equipment shall be at his expense.

1.1.7 The Contractor shall furnish and keep in good working condition at all times sufficient equipment of the proper design and capacity to do all work described under these Specifications and in accordance with the established schedule.

1.1.8 The Contractor shall furnish appropriate equipment for minimizing fugitive dust.

1.1.9 The Contractor shall comply with all applicable state and county regulations concerning hazardous material disposal and burning operations, if allowed by the Purchaser. The Contractor shall have the responsibility for obtaining any necessary permits for these activities.

1.1.10 All earthwork, including ramps and access roads, done for the convenience of the Contractor shall be done at his expense. Such work will be restored to its original elevation at the Contractor's expense if the Purchaser so desires.

1.1.11 The Contractor shall install, at his expense, any drainage piping required because of the Contractor's mode of operation including his ramps and roads.

1.1.12 The Contractor shall provide traffic control during roadway related construction activities and material deliveries. This shall be coordinated with other activities ongoing at the plant. If within active and congested areas around the plant, traffic control shall include flag persons, barriers, and other control aids to provide for the safe routing of traffic in the affected area.

1.2 CERTIFICATION AND WARRANTIES

1.2.1 The site development of Cells 1 and 2 must be certified as being in compliance with or exceeding the construction procedures and criteria stated herein and depicted in the design and construction drawings. This certification shall be performed by a professional engineer registered to practice in the State of Florida and submitted to the Owner for submission to the Florida Department of Environmental Protection upon completion of all construction activities and prior to accepting gypsum. This Certification will be provided by the

Contractor.

1.2.2 The Installer of the liner materials will provide the Owner, as part of the project documents, a specific written warranty. This document will warrant the installation of the liner material.

1.2.3 The Installer of the liner materials will certify in writing that the installed material meets the requirements of the project and the specification and that, under normal conditions, the installation workmanship is warranted for one year.

1.2.4 The Contractor shall provide the Purchaser with Qualification Statements from the Manufacturer of the geocomposite clay liner documenting the minimum requirements of Section 2.7.2 of these Specifications.

1.2.5 The Contractor shall provide the Purchaser with Qualification Statements from the Manufacturer of the geocomposite drainage material documenting the minimum requirements of Section 5.3 of these Specifications.

1.2.6 The drainage material warranty shall be in writing and cover both the quality of the materials and the workmanship required to produce the geocomposite drainage material.

1.3 APPLICABLE DOCUMENTS

1.3.1 Drawings – Reference the Drawings for Drawing List.

1.3.2 The following Codes, Standards, Specifications, Publications, and/or Regulations shall be made part of these Specifications and will become part of the contract entered into for performance of the work covered herein. The latest edition in effect at the time of the contract shall apply. Other codes and standards shall be incorporated as referenced in this document. The omission of any Codes and/or Standards from this list does not relieve the Contractor of his responsibility to follow the latest revision of all applicable codes and standards for conducting the work.

Occupational Safety and Health Administration

- Occupational Safety and Health Act of 1970

ASTM International

- ASTM D 422 – Standard Test Method for Particle-Size Analysis of Soils

- ASTM D 698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort
- ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil In - Place by the Sand Cone Method
- ASTM D 2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D 2434 - Standard Test Method for Permeability of Granular Soils (Constant Head)
- ASTM D 2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 2488 - Description and Identification of Soils (Visual-Manual Procedure)
- ASTM D 6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil – Aggregate In Place by Nuclear Methods
- ASTM D 2937 - Standard Test Method for Density of Soil In Place by the Drive Cylinder Method
- ASTM D 4643 - Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
- ASTM D 4959 - Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method
- ASTM D 1587 - Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
- ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D 4716 Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- ASTM D 1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique
- ASTM D 1603 - Standard Test Method for Carbon Black in Olefin

Plastics

- ASTM D 5035 Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
- ASTM D 5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
- ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
- ASTM D 5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles
- ASTM D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile
- ASTM D 4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
- Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites

Other

Corps of Engineers EM-LST, Appendix VII, Falling-Head Permeability Test

Codes specific to the local county

Florida Department of Environmental Protection regulations

Environmental Protection Agency (EPA) regulations

2.0 EARTHWORK

2.1 SITE CONDITIONS

2.1.1 The Contractor shall visit the site and acquaint himself with site conditions, utility locations, and the proposed scope of work.

2.1.2 Soil test borings and cone penetrometer tests have been performed in conjunction with the installation of temporary piezometers, groundwater monitoring wells, and the *Hydrogeological and Geotechnical Investigation Report* study. Logs of these investigation methods are available for inspection by the Contractor. The results of soil laboratory testing on bulk samples from the excavation area are also available to the Contractor.

2.1.3 All field testing, measurements, and associated laboratory testing performed by the Purchaser have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions. The Purchaser assumes no responsibility for the accuracy of the investigations, the resulting data, or the interpretation; nor does the Purchaser guarantee that the materials and conditions will not vary from those indicated by the investigations. In addition, the Purchaser will not be responsible for any deduction, interpretation, or conclusion drawn by the Contractor.

2.2 LINES AND GRADES

The project shall be constructed to the elevations, lines, grades and cross sections shown on applicable drawings. The Owner reserves the right to increase the foundation widths, change the embankment slopes, and to make such other changes in the embankment sections as conditions indicate are necessary for the construction of a safe and permanent structure. The Contractor shall be compensated for changes in plan and/or sections resulting in changes in quantities of materials.

2.3 CLEARING, GRUBBING, AND STRIPPING

2.3.1 Prior to any clearing or grubbing operations, adequate erosion control measures should be in place. At a minimum, The Florida Development Manual: A Guide to Sound Land and Water Management guidelines should be followed. In addition, any details in the Gypsum Storage – Area 1, Sedimentation and Erosion Control Plan should be followed.

2.3.2 Vegetated areas within the construction footprint shall be cleared, grubbed, and stripped of any vegetation, organic matter and/or any other debris. Stripped topsoil shall be stockpiled at a location on the site to be designated by the

Project Construction Manager.

2.3.3 The grubbed area shall be harrowed and raked with a tractor-mounted root rake to collect all small material previously overlooked. The tractor shall be of adequate size to achieve a minimum of four (4) inches penetration of the root rake teeth. The root rake teeth shall not be more than twelve (12) inches apart.

2.3.4 Trees, stumps, and brush cleared from the above areas shall be disposed of by burning or mulching, if allowed by Owner, or by removal from the site. All burning shall be done in accordance with the Escambia County and State of Florida Regulations. Burn pits shall be located outside of the construction area, borrow area, outside of future cell construction areas, and off right-of-ways.

2.3.5 Burning operations, if permitted by Owner, shall be conducted only in previously cleared areas and away from standing timber, structures, or other flammable materials outside the footprint of construction. Materials to be burned shall be properly stacked, by dozers, in piles sufficiently large enough to facilitate the complete burning of all the materials in the pile. The Contractor shall be subject to all public laws governing such burning operations and shall be responsible for any damage to life or property as a result of burning either on the Owner's property or the property of others. Fires shall not be started unless tractors are available in the immediate vicinity to check the spread of fire outside the cleared area. Fires shall be guarded at all times and shall be under constant attendance until they have burned out or have been extinguished.

2.3.6 Grubbing and stripping shall be limited to 10 feet outside the limits of any cut or fill slopes.

2.3.7 Spoil material shall be disposed of only in areas to be designated by the Owner. The Contractor shall slope the spoil area for drainage and provide a perennial stand of vegetation.

2.3.8 Adequate erosion control measures shall be installed around the spoil and stockpile areas, in accordance with details given in the Erosion and Sediment Control Plan or The Florida Development Manual: A Guide to Sound Land and Water Management guidelines to prevent soil sediments from leaving the site.

2.4 SUBGRADE PREPARATION

2.4.1 Soils excavated from the site are generally suitable for fill material. Foundation preparation for the cells shall consist of the following sequence of steps:

2.4.2 Prepare and place erosion and sediment control measures, as necessary.

2.4.3 Excavate existing overburden soils to the excavation limits indicated on the drawings. Material suitable for topsoil and material to be used as the 2-foot clay

liner material shall be stockpiled separately.

2.4.4 Proof-roll the entire cell subgrade utilizing loaded, off-road trucks with a gross machine weight, including payload, that will impart approximately 7600 psf subgrade loading over a minimum tire width of 2 feet. Any unsuitable materials and/or conditions shall be removed and replaced with compacted earth fill. Prior to receiving earth fill, the foundation area shall be scarified by harrowing or other suitable means.

2.4.5 Any areas failing proof-roll shall be undercut and replaced with structural soil fill and re-rolled.

2.4.6 No fill shall be placed on any part of the subgrade until such areas have been proof rolled and approved by the Purchaser.

2.4.7 Work flow shall be planned such that the first fill lift is placed soon after subgrade compaction to minimize subgrade exposure to inclement weather.

2.4.8 The Contractor shall be required to prepare the base and interior dike slopes, including the sedimentation ponds, for installation of the HDPE liner surface as shown on the Drawings. All surfaces to be lined shall be smooth, free of all foreign and organic material, sharp objects, stones greater than ½-inch in diameter, or debris of any kind. These surfaces shall provide a firm, unyielding foundation with no sharp changes or abrupt breaks in grade.

2.5 GENERAL STRUCTURAL EARTH FILL

2.5.1 Compacted dike material shall consist of the clayey sands (SC), sandy silts (ML), and silty sands (SM) from the excavation of the borrow area and shall be placed and compacted in accordance with these Specifications and Drawings.

2.5.2 Pipe penetrations shall be encapsulated in flowable as shown on the Drawings.

2.5.3 No particle greater in size than 3 inches shall be used as dike fill.

2.5.4 No earth fill shall be placed on any part of the dike foundation until such areas have been inspected and approved by the Project Construction Manager.

2.5.5 Earth fill shall be placed in uniform layers of 8 to 10 inches, nominal thickness, loose measurement. The fill material shall be placed one foot beyond the full width of the dike on each side. Each layer shall be kept level with the necessary grading equipment. Upon completion of compaction, fill slopes shall be cut back to the final slope. Particular care must be used to obtain the required compaction along the edges of the dike.

2.5.6 Quality control testing shall be performed on all earth fill in accordance with

this Specification. No earth fill layer may be placed until the Project Construction Manager has verified that the underlying layer has met the compaction and/or moisture requirements.

2.5.7 If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layers, it shall be loosened by harrowing, or as directed by the Project Construction Manger, before the succeeding layer is placed.

2.5.8 During the dumping and spreading processes, the Contractor shall maintain at all times a force of men adequate for removal of roots and debris from all earth fill materials and all stones greater than 3-inch maximum dimension.

2.5.9 Earth fill material for the dike shall be compacted to a minimum 95% maximum dry density, as determined by the Standard Proctor compaction test (ASTM D698). The moisture content of the earth fill at the time of placement shall be between -1% and +2% of the optimum moisture obtained by Standard Proctor compaction test. The Contractor shall strive to place the earth fill material on the wet side of optimum.

2.5.10 When moisture content is too low, the moisture content shall be adjusted to within the above specification prior to compaction. Moisture adjustment shall be by sprinkling and disking sufficiently to bring the moisture content within the specified range. Sprinkling and disking of the layer shall be done after deposition, but before compaction.

2.5.11 If the moisture content is too high, the Contractor will be permitted to stockpile and disk the earth fill material to promote drying to bring it back within the allowable moisture range. This drying must be done prior to placement.

2.5.12 Earth fill which cannot be compacted with roller equipment because of inadequate clearances shall be spread in 4-inch layers and compacted with power tampers to the extent required by the specifications for embankment material.

2.5.13 The Contractor will be required to remove any compacted material that does not comply with the compaction and/or moisture requirements and replace the compacted earth fill to comply with these Specifications at his own expense.

2.5.14 Excavations required for density and moisture tests shall be repaired by scarifying the walls of the excavation, backfilling, and compacting the fill material to the criteria specified in this Section.

2.5.15 At least one Proctor compaction check plug shall be produced for each type of soil being placed during the day to insure that the correct reference Proctor curves are being used for compaction check.

2.5.16 If the construction of the dike is interrupted, the Contractor shall be required to shape and smooth the last layer of earth fill material placed on the fill to provide a surface that will shed as much water as possible during the interruption. When the work is resumed, the Contractor shall be required to level, scarify and compact the last layer of earth fill material before placing additional layers.

2.5.17 Dike slopes shall be grassed upon reaching final grade in accordance with the Vegetation Schedule.

2.6 COMPACTED CLAY LINER

2.6.1 A compacted clay liner shall be installed as the upper two feet of earth fill underlying the HDPE liner. The clay liner shall be placed and compacted in accordance with these Specifications and Drawings.

2.6.2 Compacted clay liner material shall have a in-place permeability equal to or less than 1×10^{-7} cm/sec, shall have a maximum clod size of 2 inches, and shall be free of organics or other debris.

2.6.3 Prior to placement of the clay liner, the borrow material shall be sampled to verify the soil characteristics. A minimum of three soil samples of clay shall be obtained for laboratory testing from the borrow area actively being utilized for the clay liner placement. Laboratory testing on the soil samples shall include the Standard Proctor density (ASTM D 698), permeability by constant head (ASTM D 2434) or falling head test, grain size distribution and hydrometer analysis (ASTM D 422), Atterberg Limits (ASTM D 4318) and in-place moisture (ASTM D 2216). The density and in-place moisture data should be used to make adjustments in the moisture level of the clay prior to and during placement of the material.

2.6.4 Clay liner material shall be placed in uniform layers of 8 inches, nominal thickness, loose measurement. Each layer shall be kept level with the necessary grading equipment. Upon completion of compaction, fill slopes shall be cut back to the final slope.

2.6.5 Quality control testing shall be performed on the liner in accordance with this Specification. No clay liner layer may be placed until the Project Construction Manager has verified that the underlying layer has met the compaction, permeability, and/or moisture requirements.

2.6.6 If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layers, it shall be loosened by harrowing, or as directed by the Project Construction Manger, before the succeeding layer is placed.

2.6.7 Clay liner material shall be compacted to a minimum 95% maximum dry

density, as determined by the Standard Proctor compaction test (ASTM D698), or to the percent compaction required to achieve the specified permeability, whichever is greater. The moisture content of the clay liner at the time of placement shall be wet of optimum as determined by the Standard Proctor compaction test.

2.6.8 When moisture content is too low, the moisture content shall be adjusted to within the above specification prior to compaction. Moisture adjustment shall be by sprinkling and disking sufficiently to bring the moisture content within the specified range. Sprinkling and disking of the layer shall be done after deposition, but before compaction.

2.6.9 If the moisture content is too high, the Contractor will be permitted to stockpile and disk the liner material to promote drying to bring it back within the allowable moisture range. This drying must be done prior to placement.

2.6.10 Liner material which cannot be compacted with roller equipment because of inadequate clearances shall be spread in 4-inch layers and compacted with power tampers to the extent required by the specifications in this Section.

2.6.11 The Contractor will be required to remove any compacted material that does not comply with the compaction, moisture, and/or permeability requirements and replace the compacted earth fill to comply with these Specifications at his own expense.

2.6.12 Excavations required for density and moisture tests shall be repaired by scarifying the walls of the excavation, backfilling, and compacting the fill material to the criteria specified in this Section.

2.6.13 At least one Proctor compaction check plug shall be produced for each type of soil being placed during the day to insure that the correct reference Proctor curves are being used for compaction check.

2.6.14 If the construction of the soil liner is interrupted, the Contractor shall be required to shape and smooth the last layer of earth fill material placed on the fill to provide a surface that will shed as much water as possible during the interruption. When the work is resumed, the Contractor shall be required to level, scarify and compact the last layer of liner material before placing additional layers.

2.6.15 The Contractor shall be required to repair erosion features, desiccation cracks, and other defects in the clay liner. All soils and sediments that have been transported onto the active clay liner placement areas from storm runoff shall be removed or graded away from the clay liner. All repairs to the liner shall be completed prior to the subsequent lift of clay material placed.

2.7 ALTERNATE GEOCOMPOSITE CLAY LINER (GCL)

2.7.1 General

2.7.1.1 As an alternative to a 2-foot compacted clay liner a geosynthetic clay liner (GCL) may be used as a secondary liner in conjunction with and the HDPE liner. The GCL shall be placed on the bottom and slopes of Cells 1 and 2 and the sedimentation and return water ponds, underlying the HDPE. A reinforced GCL shall be used on slopes of 3H to 1V, or greater. A non-reinforced GCL may be used on the flatter bottom slopes of the facilities.

2.7.1.2 The GCL shall be placed in accordance with the following Sections, the manufacturer's recommendations, and the details indicated on drawings.

2.7.1.3 The Contractor shall provide panel placement and liner connection details to the Purchaser fourteen (14) days prior to the start of liner installation.

2.7.1.4 The Contractor shall furnish the GCL manufacturer's Quality Assurance/Quality Control (QA/QC) certifications to verify that the materials supplied for the project are in accordance with the product's specifications.

2.7.2 Manufacturer's Qualifications

2.7.2.1 The manufacturer of the geosynthetic clay liner (GCL) must have produced at least 10 million square feet of product, with at least 8 million square feet installed.

2.7.2.2 The GCL Installer must either have installed at least 1 million square feet of product, **or** must provide to the Engineer satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the respective geosynthetic will be installed in a competent, professional manner.

2.7.2.3 The Contractor shall provide a third-party inspector for construction quality assurance (CQA) of the GCL installation. The inspector shall be an individual or company who is independent from the manufacturer and installer, who shall be responsible for monitoring and documenting activities related to the CQA of the GCL, throughout installation. The inspector shall have provided CQA services for the installation of the proposed or similar products for at least 5 completed projects totaling not less than 1 million square feet. The inspector should be an engineer registered to practice in the state of Florida or a NICET – certified geosynthetics installation technician. The Contractor shall provide the Purchaser with a statement of qualifications (SOQ) for the inspector prior to starting work.

2.7.2.4 A Manufacturer's Representative shall be on site during the initial phase of the GCL installation to provide assistance to the Contractor.

2.7.3 Material

2.7.3.1 The GCL to be used on slopes of 3H to 1V or greater shall be a CETCO reinforced Bentomat CR (comparable to a Bentomat SDN with a polymer additive) or equal material, approved by the Purchaser.

2.7.3.2 The reinforced GCL and its components shall have the following properties:

REINFORCED GCL			
Material Property	**Test Method**	**Test Frequency**	**Required Values**
Bentonite Properties			
Bentonite Swell Index[1]	ASTM D 5890	1 per 115,000 lbs	24 mL/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 115,000 lbs	18 mL max.
Moisture Content[1]	ASTM D 4643	1 per 115,000 lbs	12% max
Finished GCL Properties			
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2	0.75 lb/ft^3 min
GCL Grab Strength[3]	ASTM D 6768	200,000 ft^2	30 lbs/in MARV
GCL Peel Strength[3]	ASTM D 6496	40,000 ft^2	2.5 lbs/in min
GCL Index Flux[4]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$ max
GCL Hydraulic Conductivty[4]	ASTM D 5887	Weekly	5×10^{-9} cm/sec max
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321 ASTM D 6243	Periodically	500 psf typical
Roll Dimensions			
Width x Length	Typical	Every Roll	14 ft x 150 ft min

Notes

1 Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

2 Bentonite mass/area reported at 0 percent moisture content.

3 All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request, tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

[4] Index flux and permeability testing with deaired distilled/deionized water at 80 psi (551kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of $5x10^{-9}$ cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

[5] Peak values measured at 200 psf (10 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

2.7.3.3 The GCL to be used on the bottom slopes of the ponds and cells shall be a CETCO non-reinforced Bentomat CR (equivalent to Bentomat 200R with a polymer additive) or equal material, approved by the Purchaser.

2.7.3.4 The non-reinforced GCL and its components shall have the following properties:

NON-REINFORCED GCL			
Material Property	**Test Method**	**Test Frequency**	**Required Values**
Bentonite Properties			
Bentonite Swell Index[1]	ASTM D 5890	1 per 115,000 lbs	24 mL/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 115,000 lbs	18 mL max.
Finished GCL Properties			
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2	0.75 lb/ft^3 min
GCL Grab Strength[3]	ASTM D 6768	200,000 ft^2	40 lbs/in MARV
GCL Index Flux[4]	ASTM D 5887	Weekly	1 x 10^{-8} m^3/m^2/sec max
GCL Hydraulic Conductivty[4]	ASTM D 5887	Weekly	5 x 10^{-9} cm/sec max
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321 ASTM D 6243	Periodically	100 psf typical

Notes

[1] Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

[2] Bentonite mass/area reported at 0 percent moisture content.

[3] All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request, tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

[4] Index flux and permeability testing with deaired distilled/deionized water at 80 psi (551kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of $5x10^{-9}$

cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

[5] Peak values measured at 200 psf (10 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

2.7.4 Labeling and Packaging

2.7.4.1 Prior to shipment, the GCL manufacturer shall label each roll, identifying the product identification information (Manufacturer's name and address, brand product code), lot number, roll number, roll length, width and weight.

2.7.4.2 The GCL shall be wound around a rigid core whose diameter is sufficient to facilitate handling. The core is not necessarily intended to support the roll for lifting but should be sufficiently strong to prevent collapse during transit.

2.7.4.3 All rolls shall be labeled and bagged in packaging that is resistant to photodegradation by ultraviolet (UV) light.

2.7.5 Shipping, Handling, and Storage

2.7.5.1 The manufacturer assumes responsibility for initial loading the GCL. Shipping will be the responsibility of the party paying the freight. Unloading, on-site handling and storage of the GCL are the responsibility of the Contractor, Installer or other designated party.

2.7.5.2 A visual inspection of each roll should be made during unloading to identify if any packaging has been damaged. Rolls with damaged packaging should be marked and set aside for further inspection. The packaging should be repaired prior to being placed in storage.

2.7.5.3 The party responsible for unloading the GCL should contact the Manufacturer prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment.

2.7.5.4 Storage of the GCL rolls shall be the responsibility of the Installer. A dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry and well drained.

2.7.5.5 Rolls should be stored in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks. Rolls should be stacked at a height no higher than that at which the lifting apparatus can be safely handled (typically no higher than four feet).

2.7.5.6 All stored GCL materials and the accessory bentonite must be covered with a plastic sheet or tarpaulin until their installation.

2.7.5.7 The integrity and legibility of the labels shall be preserved during storage.

2.7.5.8 The Contractor shall provide panel placement and liner connection details to the Purchaser fourteen (14) days prior to the start of liner installation.

2.7.5.9 The Contractor shall furnish the GCL manufacturer's Quality Assurance/Quality Control (QA/QC) certifications upon shipment to verify that the materials supplied for the project are in accordance with the product's specifications.

2.7.6 Surface Preparation

2.7.6.1 Any surface upon which the GCL is installed shall be prepared and compacted in accordance with the project specifications and drawings. The finished surface shall be smooth, firm, and unyielding, without abrupt elevation changes, voids, cracks, ice, or standing water. The surface shall be free of vegetation, debris, sticks, sharp rocks, and any other foreign matter that could damage the GCL.

2.7.6.2 Immediately prior to GCL deployment, the subgrade shall be finish-graded to fill in all voids or cracks and then smooth-rolled to provide the best practicable surface for the GCL. At completion of this activity, no wheel ruts, footprints or other irregularities shall exist in the subgrade. Furthermore, all protrusions extending more than one-half inch (12 mm) from the surface shall be either removed, crushed or pushed into the surface with a smooth-drum compactor.

2.7.6.3 The Contractor shall submit certificates of subgrade acceptance, signed by the Contractor and the Purchaser's Representative, for each area prepared for GCL placement.

2.7.6.4 It shall be the Contractor's responsibility thereafter to indicate to the Purchaser any change in the condition of the subgrade that could cause the subgrade to be out of compliance with any of the requirements listed in this Section.

2.7.6.5 At the top of sloped areas of the job site, an anchor trench for the GCL shall be excavated. The trench shall be excavated and approved by the Purchaser's Representative prior to GCL placement. No loose soil shall be allowed at the bottom of the trench and no sharp corners or protrusions shall exist anywhere within the trench.

2.7.7 GCL Placement

2.7.7.1 GCL rolls should be delivered to the working area of the site in their original packaging. Immediately prior to deployment, the packaging should be carefully removed without damaging the GCL.

2.7.7.2 Equipment which could damage the GCL shall not be allowed to travel directly on it. If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement continues.

2.7.7.3 Care must be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL.

2.7.7.4 The GCL panels shall be placed parallel to the direction of the slope. All GCL panels should lie flat on the underlying surface, with no wrinkles or fold, especially at the exposed edges of the panels.

2.7.7.5 Only as much GCL shall be deployed as can be covered at the end of the working day with soil, a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material. The Purchaser's Representative and GCL supplier should be consulted for specific guidance if premature hydration occurs.

2.7.8 Anchorage

As directed by the project drawings and specifications, the end of the GCL roll shall be placed in an anchor trench at the top of the slope. When utilizing an anchor trench design, the front edge of the trench should be rounded so as to eliminate any sharp corners. Loose soil should be removed from the floor of the trench. The GCL should cover the entire trench floor and the rear trench wall.

2.7.9 Seaming

2.7.9.1 The GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Supplemental bentonite is required for reinforced GCL.

2.7.9.2 The minimum dimension of the longitudinal overlap should be 6 inches (150 mm). End-of-roll overlapped seams should be similarly constructed, but the minimum overlap should measure 24 inches (600 mm).

2.7.9.3 Seams at the ends of the panels should be constructed such that they are

shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone.

2.7.9.4 Unless GCL contains bentonite grooves to facilitate seaming without additional bentonite, bentonite-enhanced seams are constructed between the overlapping adjacent panels described above. The underlying edge of the longitudinal overlap is exposed and then a continuous bead of granular sodium bentonite is applied along a zone defined by the edge of the underlying panel and the 6-inch (150 mm) line. A similar bead of granular sodium bentonite is applied at the end-of-roll overlap. The granular bentonite shall be applied at a minimum application rate of one quarter pound per lineal foot (0.4 kg/m).

2.7.10 Damage Repair

2.7.10.1 Any GCL that is damaged during delivery or handling operations and cannot be used in the liner installation shall be replaced by the Contractor at no additional cost to the Purchaser.

2.7.10.2 Any GCL that is damaged during installation, to include placement and compaction of the protection soil cover and topsoil, and the Purchaser determines the GCL will not perform for the liner system, then the affected installed GCL shall be replaced by the Contractor at no additional cost to the Purchaser.

2.7.10.3 If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area. The patch shall be obtained from a new GCL roll and shall be cut to size such that a minimum overlap of 12 inches (300 mm) is achieved around all of the damaged area. Granular bentonite or bentonite mastic should be applied around the damaged area prior to placement of the patch. It may be desirable to use an adhesive to affix the patch in place so that it is not displaced during cover placement.

2.7.11 Submittals

2.7.11.1 The Contractor shall provide to the Purchaser Qualification Statements from the GCL Manufacturer, Installer, and CQA Inspector documenting the minimum requirements of Sections 2.7.2, 2.7.5, and 2.7.6 of these Specifications.

2.7.11.2 The Contractor shall provide to Purchaser the plan for placement of the GCL panels over the area of installation fourteen days prior to the start of liner installation.

2.7.11.3 Upon each shipment, the Contractor shall furnish the GCL manufacturer's Quality Assurance/Quality Control (QA/QC) roll certifications, signed by a responsible party employed by the GCL manufacturer, to verify that the materials supplied for the project are in accordance with the requirements of this specification. The certifications shall reference the lot and roll number as well as the manufacturer's name, and address.

2.7.11.4 The certifications shall include 1) the Certificates of Analysis for the bentonite clay used in GCL production demonstrating compliance with the parameters swell index and fluid loss, and, 2) Manufacturer's test data for finished GCL product(s) of bentonite mass/area, GL tensile strength, and GCL peel strength (reinforced GCL only) demonstrating compliance with the index. Manufacturer's test data for finished GCL product(s) including GCL index flux, permeability, and hydrated internal shear strength data demonstrating compliance with the performance parameters shall be made available upon request by the Purchaser.

2.7.11.4 As installation proceeds, the Contractor shall submit certificates of subgrade acceptance, signed by the Contractor and CQA Inspector for each area that is covered by the GCL.

2.7.12 Testing

Upon request by the Purchaser, the Contractor shall provide samples of the GCL delivered to the site for testing by an independent laboratory. This testing will be the responsibility of the Purchaser.

2.8 EARTHWORK EQUIPMENT

2.8.1 The Earthwork Contractor shall be responsible for providing all earthwork equipment necessary to perform the work set forth in these Specifications. The Contractor shall be responsible for maintaining the equipment during the contract period. Any delays in work activities due to equipment maintenance must be reported to the Project Construction Manager for determination of impacts on the schedule.

2.8.2 The Contractor shall be responsible for the cleaning of haul vehicles. The Contractor shall wash down the wheels, outside body, cab, undercarriage, etc. of all haul vehicles to prevent spreading material during transit of the equipment out of the boundary of the working area.

2.8.3 All of the Contractor's equipment shall be operated in a safe, careful manner in accordance with these Specifications.

2.9 QUALITY CONTROL TESTING

2.9.1 Field density and moisture content testing shall be performed by the Contractor to verify that compaction requirements have been achieved. In-place field density testing of the compacted soil shall be preformed in accordance with the procedure ASTM D 1556, the sand cone method. Test results reports should include both the moisture content and dry density, along with other data such as location, elevation, Proctor curve used for comparison, etc.

2.9.2 Testing procedures of in-place density and moisture content by nuclear methods is described in ASTM D 6938. The procedure may be used provided: 1) acceptable correlation with sand cone density test results can be obtained according to the guidelines of Section 7, "Calibration", of ASTM D 6938, and 2) the initial correlation results are reviewed and use of the nuclear device is approved by the Project Construction Manager. In addition, it shall be required that the testing agency or representative have the necessary licenses to operate a nuclear energy source, and to take all safety precautions per Section 6 of ASTM D 6938.

2.9.3 In the event of repeated failures, or water content and density test values plotting far from the Proctor curves used for comparison in computing percent compaction, it shall be the option of the Project Construction Manager to require one or two point Proctor checks (on the dry side of optimum) to verify that the proper Proctor curve is being referenced. If not, a new Proctor curve determined by a five-point test shall be required. The Contractor shall sample and perform the five-point testing, all at the Contractor's expense.

2.9.4 If the compaction requirements for a lift have not been achieved, the Purchaser's Representative shall direct the Contractor to either rework the lift to obtain the compaction requirements or remove and replace with a new lift for compaction, all at the Contractor's expense.

2.9.5 The in-place density testing frequency for the soil shall be one test for each 20,000 square feet of lift area or portion thereof for each lift, with a minimum of one test performed for each 200 lineal feet of dike per lift as measured parallel to the dike axis.

2.9.6 Laboratory confirmation testing for the compacted embankment fill shall be performed to record the in-place shear strength properties of the fill and to verify that the permeability of the compacted fill surrounding the flowable fill is equal to or less than that specified in these Specifications. The confirmation testing shall consist of obtaining duplicate, undisturbed samples of the compacted fill for laboratory confirmation of field density, moisture content, shear strength (by consolidated-undrained triaxial method with pore-pressure measurements) and hydraulic conductivity of field compacted material. The undisturbed samples shall be obtained by pushing a thin walled drive cylinder

into the compacted fill at a frequency of one (1) tube per 400 lineal feet of dike for every 10 vertical feet of fill.

2.9.7 Laboratory confirmation testing for the compacted clay liner material placed in the upper two (2) feet below the final grade shall be performed to verify that the permeability of the compacted liner is equal to or less than 1×10^{-7} cm/sec using either the falling head or back pressure permeability test. The confirmation testing shall consist of obtaining undisturbed samples of the compacted fill for laboratory confirmation of field density, moisture content, and hydraulic conductivity of field compacted material. The undisturbed samples shall be obtained by pushing a thin walled drive cylinder into the compacted liner at a frequency of one (1) tube per 8,000 cu. yd. of liner material or one (1) tube per 2 ft. lift per acre and one (1) tube per lift per 800 linear feet of side slope.

2.9.8 The drive tubes used to collect the undisturbed samples shall be cleaned and paraffin sealed to preserve the moisture content and delivered to the independent soil testing laboratory. The location, lift, and depth below the surface should be recorded with each sample. The undisturbed samples shall be stored and handled in such a manner as to prevent damage to the sample from freezing, transporting or other means. After the undisturbed samples are taken, the holes shall be filled with bentonite (powder, chips, or pellets) to maintain the integrity of the fill.

2.9.9 The results of all permeability tests by the testing laboratory shall be reported to the Owner's Engineer. If any permeability test result is higher than the minimum required value of 1×10^{-7} cm/sec, the Contractor shall rework or replace a section or entire lift of the clay layer being constructed, at the Contractor's expense. All reworked or replaced sections of clay liner shall be retested and meet the minimum permeability requirements.

3.0 DRAINAGE DITCHES, CHANNELS AND SLOPES

3.1 GENERAL

3.1.1 All drainage channels and perimeter drainage ditches shall be excavated to the lines, grades, cross-sections, and elevations indicated on the Drawings. The waterways shall be free of bank projections or other irregularities which will impede normal flow.

3.1.2 All earth removed and not used in construction shall be disposed of so that it will not interfere with the functioning of the waterway.

3.1.3 The perimeter drainage ditch for the future gypsum raise located on the inside crest of the dike shall be lined with a 60 mil high density polyethylene (HDPE)

liner as shown on the Drawings.

4.0 HIGH DENSITY POLYETHYLENE (HDPE) LINER

The HDPE material has been supplied by the Purchaser. Any additional HDPE material needed to complete the work shall be supplied by the Contractor and be of the same type as already on-site.

4.1 QUALIFICATIONS OF CONTRACTOR WORK ACTIVITIES

The installation contractor provided by the Contractor shall be the manufacturer or a dealer trained to install the manufacturer's geomembrane. Installation shall be performed under the constant direction of a field installation supervisor who shall remain on site and be responsible, throughout the liner installation, for liner layout, seaming, testing, repairs, and all other activities by the Installer. The field installation supervisor shall have installed or supervised the installation of a minimum of 2,000,000 square feet of polyethylene geomembrane. Seaming shall be performed under the direction of a master seamer (who may also be the field installation supervisor) who has seamed a minimum of 2,000,000 square feet of polyethylene geomembrane, using the same type of seaming apparatus specified for this project. The field installation supervisor and/or master seamer shall be present whenever seaming is performed.

4.2 GEOMEMBRANE INSTALLATION

4.2.1 The Contractor shall inspect the subgrade preparation prior to liner installation. The subgrade shall be compacted in accordance with the project specifications. Weak or compressible areas which cannot be satisfactorily compacted should be removed and replaced with properly compacted fill. All surfaces to be lined shall be smooth, free of all foreign and organic material, sharp objects, or debris of any kind. The subgrade shall provide a firm, unyielding foundation with no sharp changes or abrupt breaks in grade. Standing water or excessive moisture shall not be allowed.

4.2.2 The Contractor, on a daily basis, shall approve the surface on which the geomembrane will be installed. After the supporting surface has been approved, it shall be the Contractor's responsibility to indicate to the Purchaser any changes to its condition that may require repair work.

4.2.3 The Contractor shall certify in writing that the subgrade on which the geomembrane is to be installed is acceptable. This shall be done prior to

commencing work.

4.2.4 The installation of the geomembrane shall be in accordance with the manufacturer's recommendations. The Contractor shall submit a panel layout drawing and a detailed, written procedure for the Purchaser's review.

4.2.5 All seams and non-seam areas of the geomembrane shall be inspected by an inspector provided by the Contractor for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection.

4.2.6 The anchor trench shall be excavated to the line, grade, and width shown on the project construction drawings, prior to liner system placement. Slightly rounded corners shall be provided in the trench to avoid sharp bends in the geomembrane.

4.2.7 The Contractor is responsible for ensuring that the geomembrane is handled and installed in such a manner that it is not damaged.

4.2.8 The rolls shall be deployed using a spreader bar assembly attached to a loader bucket or by other methods approved by the Purchaser. The installer shall be responsible for the following:

- Equipment or tools shall not damage the geomembrane during handling, transportation and deployment.
- Personnel working on the geomembrane shall not smoke or wear damaging shoes.
- The method used to unroll the panels shall not cause scratches or crimps in the geomembrane and shall not damage the supporting soil.
- Adequate loading (e.g., sand bags or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind (in case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels).
- Geomembrane deployment shall proceed between ambient temperatures of 32° F and 104° F. Placement can proceed below 32° F only after it has been verified by the inspector that the material can be seamed according to the specification. Geomembrane placement shall not be done during any precipitation, in the presence of excessive moisture (e.g., fog, rain, dew) or in the presence of excessive winds, as determined by the installation supervisor.

4.3 FIELD SEAMING

4.3.1 Field seams shall be made in accordance with the manufacturer's recommendations. The Contractor shall submit the proposed seaming procedures for the Purchaser's review.

4.3.2 Approved seaming processes are fusion and extrusion welding. On side slopes, seams shall be oriented in the general direction of maximum slope, i.e., oriented down, not across the slope. In corners and odd-shaped geometric locations, the number of field seams shall be minimized.

4.3.3 No base T-seam shall be closer than 5 feet from the toe of the slope. Seams shall be aligned with the least possible number of wrinkles and "fishmouths". If a fishmouth or wrinkle is found, it shall be relieved and cap-stripped.

4.3.4 Geomembrane panels must have a finished minimum overlap of 4 inches for fusion welding and 6 inches for extrusion welding.

4.3.5 Cleaning solvents may not be used unless the product is approved by the liner manufacturer.

4.4 FIELD TEST SEAMS

4.4.1 Field test seams shall be made in accordance with the manufacturer's recommendations. The Contractor shall submit the proposed testing procedures for the Purchaser's review.

4.4.2 Field test seams shall be conducted on the liner to verify that seaming conditions are satisfactory. Test seams shall be conducted at the beginning of each seaming period and at least once every 4 hours, for each seaming apparatus and personnel used that day.

4.4.3 All test seams shall be made in contact with the subgrade. Welding rod used for extrusion welding shall have the same properties as the resin used to manufacture the geomembrane. The Contractor shall provide QC certificates for the welding rods.

4.4.4 The Installer shall non-destructively test all field seams over their full length using either Vacuum Box Testing or Air Pressure Testing (for double fusion seams only).

4.5 DESTRUCTIVE SEAM TESTING

4.5.1 Destructive seam testing should be minimized to preserve the integrity of the liner. The Contractor shall provide the Purchaser with one destructive test

sample once per 500 feet of seam length from a location specified by the inspector.

4.5.2 Sampling Procedure

In order to obtain test results prior to completion of liner installation, samples shall be cut by the Installer as the seaming progresses. The Installer shall also record the date, location, and pass or fail description. All holes in the geomembrane resulting from obtaining the seam samples shall be immediately patched and vacuum tested.

4.5.3 Size and Disposition of Samples

The samples shall be 12 inches wide by 36 inches long with the seam centered lengthwise. The sample shall be cut into three equal-length pieces, one to be given to the Inspector, one to be given to the Purchaser, and one to the Installer.

4.5.4 Field Laboratory Testing

The inspector shall test ten 1-inch wide specimens from his sample, 5 specimens for shear strength and five for peel strength.

4.5.5 Independent Laboratory Testing

The Purchaser, at his discretion and expense, may send seam samples to a laboratory for testing. The test method and procedures to be used by the independent laboratory shall be the same as used in field testing.

4.5.6 Procedures for Destructive Test Failure

The following procedures shall apply whenever a sample fails the field destructive test:

- The Installer shall cap strip the seam between the failed location and any passed test locations.

- The Installer can retrace the welding path to an intermediate location (usually 10 feet from the location of the failed test), and take a sample for an additional field test. If this test passes, then the seam shall be cap stripped between that location and the original failed location. If the test fails, then the process is repeated.

- Over the length of seam failure, the Installer shall either cut out the old seam, reposition the panel and reseam, or add a cap strip.

4.5.7 Each suspect location in seam and non-seam areas shall be non-destructively tested as appropriate in the presence of the inspector. Each location that fails the non-destructive testing shall be marked by the Inspector, and repaired accordingly.

4.5.8 Repair Procedures

- Defective seams shall be cap stripped or replaced.
- Small holes shall be repaired by extrusion welding a bead of extrudate over the hole. If the hole is larger than 1/4 inch, it shall be patched.
- Tears shall be repaired by patching. If the tear is on a slope or an area susceptible to stress and has a sharp end it must be rounded prior to patching.
- Blisters, large cuts and undispersed raw materials shall be repaired by patches.
- Patches shall be completed by extrusion welding. The weld area shall be ground no more than 10 minutes prior to welding. No more than 10% of the thickness shall be removed by grinding. Welding shall commence where the grinding started and must overlap the previous seam by at least 2 inches. Reseaming over an existing seam without regrinding shall not be permitted. The welding shall restart by grinding the existing seam and rewelding a new seam.
- Patches shall be round or oval in shape, made of the same geomembrane, and extend a minimum of 6 inches beyond the edge of defects.

4.5.9 Verification of Repairs

Each repair shall be non-destructively tested. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved.

The Inspector shall keep daily documentation of all non-destructive and destructive testing. This documentation shall identify all seams that initially failed the test and include evidence that these seams were repaired and successfully retested.

4.6 BACKFILLING OF ANCHOR TRENCH

4.6.1 The anchor trench shall be backfilled by the Contractor. Trench backfill material shall be placed in accordance with the Manufacturer's recommendations.

4.6.2 Care shall be taken when backfilling the trenches to prevent any damage to the geomembrane. If damage occurs, it shall be repaired prior to backfilling.

4.7 GEOMEMBRANE ACCEPTANCE

The Installer shall retain all ownership and responsibility for the geomembrane until accepted by the Purchaser. Final acceptance is when all of the following conditions are met:

- Installation is finished
- Verification of the adequacy of all field seams and repairs, including associated testing, is complete.

5.0 GEOCOMPOSITE DRAINAGE

5.1 GENERAL

This specification sets forth a set of minimum physical, mechanical and chemical properties that must be met or exceeded by the drainage material being manufactured.

5.2 SUBMITTALS

5.2.1 Submittals with Bid Document

- Quality Control (QC) Program and Manual, or descriptive documentation.
- A list documenting no less than 10 completed facilities/projects totaling a minimum of 3,000,000 square feet of geocomposite drainage material supplied. Each entry in this list should specify the name and purpose of the lined facility, its location and date of installation, the name of the owner, the project manager, the designer (if any) and the installer, as well as the name and telephone number of the contact at the facility who can discuss the project. In addition, the geomembrane thickness and total square footage of the installation surface for each facility shall be

included.

5.2.2 Submittals after Contract Award, Prior to Geocomposite Delivery

A. Raw Materials

- Certification that all resin used in the manufacture of the drainage net for this job meets the specifications.
- Copy of the quality control certificates issued by the resin supplier.
- Certification that the geomembrane meets the specifications.

B. Quality Control Records

The quality control records of geocomposite drainage material inspection and testing shall be compiled by the Manufacturer's Quality Control Inspector and provided to the Purchaser prior to delivery of the geocomposite. All records shall be forwarded to the Purchaser's permanent file to be retained as a permanent record of the project.

5.3 MATERIAL

5.3.1 The geocomposite shall consist of one layer of HDPE drainage net overlain by one layer of geotextile to create a single sided geocomposite. The drainage layer shall be GSE Fabrinet UF, single sided, with 10 oz. fabric, or approved equal.

5.3.2 The drainage net manufacturer shall have successfully manufactured 5,000,000 square feet of polyethylene drainage net. The drainage net shall be manufactured of polyethylene resin in the United States by extruding two sets of polyethylene strands to form a three dimensional structure to provide planar flow and shall be compounded and manufactured specifically for the intended application.

5.3.3 The geotextile shall be a non-woven needle punched polyethylene manufactured in the United States specifically for the intended application.

5.3.4 The minimum average properties of the drainage layer shall be as follows:

Drainage Net Properties	**Test Method**	**Units**	**Value**
Thickness	ASTM D 5199	mil	200
Mass Per Unit Area	ASTM D 5261	lb/ft^2	0.162
Polymer Density, min.	ASTM D 1505	g/cc	0.94

Carbon Black Content, min.	ASTM D 1603	%	2
Tensile Strength	ASTM D 5035	lbs/inch	45
Transmissivity	ASTM D 4716	gal/min ft	4.8
Transmissivity	ASTM D 4716	m^2/sec	1×10^{-3}

Geotextile Properties	**Test Method**	**Units**	**Value**
Weight	ASTM D 5261	oz/yd^2	6
Grab Tensile	ASTM D 4632	lbs	160
Tear Strength	ASTM D 4533	lbs	65
Puncture	ASTM D 4833	lbs	90
Permittivity	ASTM D 4491	Sec^{-1}	1.3
AOS	ASTM D 4751	US Sieve	70 sieve
US Stability	ASTM D 4355	% retained (500 hr)	70

Geocomposite Properties	**Test Method**	**Units**	**Value**
Transmissivity	ASTM D 4716	gal/min ft	0.4
Transmissivity	ASTM D 4716	m^2/sec	0.8×10^{-4}
Peel Adhesion	ASTM D 7005	lbs/in	1

Roll Width	13.5 feet (min)

The above property values are the minimum acceptable average test results for any roll based on the specified test method..

Drainage Net Properties	**Test**	**Units**	**Typical Value**
Thickness	ASTM D 5199	mil	300
Carbon Black Content, min.	ASTM D 1603 mod.	%	2
Density, min.	ASTM D 1505	g/cc	0.94
Tensile Strength	ASTM D 5035	lbs/inch	75
Transmissivity	ASTM D 4716	gal/min/ft	14.5
Transmissivity	ASTM D 4716	m^2/sec	3×10^{-3}
Geotextile			
Mass Per Unit Area	ASTM D 5261	oz/yd^2	10
The above property values are the minimum acceptable average test results for any roll based on the specified test method.			

5.4 INSTALLATION

5.4.1 The material shall be deployed in such a manner as to continually keep the geocomposite sheet in sufficient tension to reduce folds and wrinkles.

5.4.2 In the presence of high wind, all material shall be weighted with sandbags or the equivalent.

5.4.3 The geocomposite shall be cut using a hook blade. If the material is being cut in place, special care must be taken to protect the underlying HDPE liner.

5.4.4 The material shall be placed in conjunction with all drainage pipes as shown on the Drawings.

5.4.5 Care shall be taken not to entrap stones or excessive dust that could damage the geocomposite, or generate clogging of the drains or filters.

5.4.6 The material may be seamed by overlapping and tying the geonet with ties and overlapping the geotextile by either thermal bonding or sewing.

5.4.7 When overlapping the rolls side to side, the geonet shall be overlapped a minimum of 4 inches and tied. Tying shall be every 5 feet to 10 feet across the bottom of the panel and every 5 feet along the length of the geonet panel. The geocomposite in the drainage ditch shall be tied at one foot intervals.

5.4.8 When connecting geocomposite rolls end to end, the geonet shall be overlapped a minimum of one foot and tied every 12 inches across the roll. The geotextiles shall be overlapped and thermal bonded or sewn.

5.4.9 Tying of the geonet will be with plastic fasteners as recommended by the Manufacturer. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed.

5.4.10 If the geocomposite is damaged and the tear or hole is less than 3 feet by 3 feet, the roll shall be cut and a butt joint placed. If the geonet is undamaged and the geotextile is damaged, a patch of geotextile shall be placed and shall be thermally bonded a minimum of 12 inches in all directions.

6.0 RISERS, DRAINAGE STRUCTURES AND INLET/OUTLET PROTECTION

6.1 GENERAL

6.1.1 Riser and discharge pipes shall be of size and specifications as indicated in the Drawings.

6.1.2 Unless approved by the Project Construction Manager, all pipes penetrating the dike structure shall be encased in a minimum of 12 inches of flowable fill above and below and 18 inches of flowable fill on the sides. The main drainage pipe shall be encased in flowable fill its entire length as shown on the Drawings. Flowable fill shall meet the specifications shown on the Drawings.

6.1.3 Hold down straps shall be used on the pipe while placing the flowable fill.

6.1.4 The compacted fill material shall meet the requirements of this Specification and shall be placed in accordance with the same. It shall be clean soil, free of roots, vegetation, rocks greater than 3 inches maximum dimension, or other objectionable material. If machine placement and compaction is not feasible, the fill material shall be placed in 4-inch lifts and hand compacted under and around the pipe to at least the same density as the adjacent fill material.

7.0 VEGETATION

7.1 GENERAL

7.1.1 A layer of topsoil 4-inches to 6-inches in final thickness shall be placed on all areas to be grassed. All disturbed areas not covered with liner material, as shown on the Drawings, shall be grassed. Topsoil shall be free of subsoil, clay, weeds, roots, and impurities. Hydroseeding methods may be used.

7.1.2 The Contractor shall produce a satisfactory stand of perennial grass in accordance with the vegetation schedule below. If it is necessary to repeat any or all the work, including plowing, fertilizing, watering, mulching and seeding, the Contractor shall repeat these operations until a satisfactory stand is obtained at no additional cost to the Purchaser.

7.1.3 Final stabilization shall be defined as follows: all soil disturbing activities at the site have been completed, and that for unpaved areas and areas not covered by permanent structures, 100% of the soil surface is uniformly covered in permanent vegetation with a density of 70% or greater, or equivalent permanent stabilization measures (such as the use of rip rap, gabions, permanent mulches or geotextiles) have been employed.

7.1.4 After placement of the topsoil, the area to be vegetated shall be fertilized and limed, then seeded with a perennial grass as indicated in the vegetation schedule shown below or in Table 1.66A of the The Florida Development Manual: A Guide to Sound Land and Water Management:

Vegetation Schedule

Variety	Seeding Rates Per Acre	Seeding Dates
Bahiagrass (Pensacola, Argentine, Paraguay)	40-60 lbs	Feb. 15 – Aug. 15
Bahiagrass with Bermudagrass, hulled	40-60 lbs 8-12 lbs	Feb. 15 – Aug. 15
Sericea Lespedeza, scarified Sericea Lespedeza, unhulled	40 – 50 lbs 75 lbs	Jan. 1 – July 15 July 15 – Jan. 1
Sericea Lespedeza, scarified or	40 – 50 lbs	

Sericea Lespedeza, unhulled with	75 lbs	
Bahiagrass	15 lbs	Feb 15 – Aug. 15
Tall Fescue	20 lbs	Oct. 1 – Nov. 15
Weeping Lovegrass	3 lbs	Feb 15 – Aug. 15

In the absence of soil test data, the following fertilization rates shall be used:

Vegetation	N-P-K	Fertilizer Rates Per Acre
Grass Alone	8-24-24	400 lbs
Grass-Legume Mixture	8-24-24	400 lbs
Legume Alone	0-20-20	500 lbs

7.1.5 Measures shall be taken to prevent erosion of the topsoil layer and vegetation until a full vegetative growth has been obtained. The Contractor shall make daily inspections of the seeded areas and repair all eroded areas to the satisfaction of the Purchaser.

7.1.6 After seeding, an erosion control biodegradable straw blanket shall be installed on the exterior slopes of the dikes and any areas that have slopes of 3:1 or greater. This material shall be a BioNet S150BN Double Net Straw Blanket by North American Green, or approved equal. The blanket shall be installed per manufacturer's installation instructions. However, the blanket shall be tacked as necessary to the ground to withstand the upward growth of grass and to permit the establishment of grass through the blanket. Failure to accomplish this will require that the effected area be re-grassed and redone to the satisfaction of the Project Construction Manager.

7.1.7 Graded areas that are to be grassed, which have slopes less than 3:1, shall be mulched with straw or other suitable material.

7.1.8 Water required to promote a satisfactory growth shall be furnished by the Purchaser and applied by the Contractor.

8.0 RECORDS

8.1.1 The quality control records of inspection and testing shall be compiled by the Contractor's Quality Control Inspector and provided to the Purchaser upon completion of the Project. Furthermore, copies of the daily inspection records and field quality control records shall be provided to the Purchaser on a weekly basis. All records shall be forwarded to the Plant's permanent file to be retained as a record of the project.