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SAFETY FACTOR ASSESSMENT – REVISION 01
40 C.F.R. SECTION 257.73(e)
GULF CLEAN ENERGY CENTER GYPSUM STORAGE AREA
FLORIDA POWER & LIGHT COMPANY

The United States Environmental Protection Agency's "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments" Final Rule (40 C.F.R. Part 257, Subpart D), §257.73 requires the owner or operator of an existing CCR surface impoundment to conduct initial and periodic safety factor assessments. The owner or operator of the CCR unit must conduct an assessment and document that the minimum safety factors outlined in §257.73(e)(1)(i) through (iv) for the embankment are achieved.

The Gulf Clean Energy Center (GCEC, formerly Plant Crist) Gypsum Storage Area, located in Pensacola, Florida, is owned and operated by Florida Power & Light Company (FPL). The Gypsum Storage Area is a lined facility and is formed by an engineered perimeter dike. The GCEC Gypsum Storage Area, consisting of a 15.5-acre gypsum storage pond, is currently inactive following the facility ceasing coal-fired operation, and is undergoing engineering design evaluation for closure by removal in accordance with 40 C.F.R. §257.102(c).

The Gypsum Storage Area inflow analysis includes Gypsum Cell 2 , the regulated CCR unit, and the adjacent ponds and associated drainage systems in order to provide accurate tailwater estimates; these adjacent ponds and drainage systems are not regulated under 40 C.F.R. Part 257, Subpart D. The Gypsum Storage Area outlet structure is located at the northeast area of the CCR unit. The current conditions were evaluated for stability under four loading conditions as required by 40 C.F.R. §257.73(e):

- Storage Pool (40 C.F.R. § 257.73(e)(i))
- Surcharge Pool (40 C.F.R. § 257.73(e)(ii))
- Seismic Loading Conditions (40 C.F.R. § 257.73(e)(iii))
- Post-Seismic Liquefaction Conditions (when liquefaction susceptible materials are present; 40 C.F.R. § 257.73(e)(iv)).

Engineering analysis of the Gypsum Storage Area evaluated each loading condition. Stability safety factors were evaluated for each of the loading scenarios using the computer program SLIDE (2018). As required by the federal CCR Rule, a general limit equilibrium (GLE) method (Morgenstern and Price) was used to calculate factors of safety, and the factors of safety were calculated by dividing the resisting forces by the driving forces along the calculated critical slip surface of a given slope.

Stability was evaluated along one critical cross-section (section A-A') of the Gypsum Storage Area Cell 2 as shown in Figure 1. Subsurface stratigraphy at each cross-section was developed based on a combination of historical site data and the properties used in the 2016 Initial Safety Factor Assessment stability analysis. Material properties were developed for the dike, foundation, and impounded materials from this data. The conditions modeled in the stability analyses are reflective of the conditions for the Gypsum Storage Area from 2016 through the date of this submittal.

For the surcharge pool stability analysis scenario, Golder considered the effects of the maximum water pool at the top of the embankment, for conservatism. Calculated factors of safety for stability under seismic conditions were calculated based on the earthquake hazard corresponding to a probability of exceedance of 2% in 50 years

(2,475-year return period). Golder used the Bray and Travasarou displacement-based seismic slope stability screening method (Bray and Travasarou 2009) to evaluate the seismic stability. Based on Golder's review of available subsurface information and experience in similar geologies and corresponding subsurface conditions, subsurface materials underlying this site do not meet criteria for liquefaction hazards.

The table below summarizes the results of the slope stability analyses for the current conditions at the GCEC Gypsum Storage Area, with figures displaying the stability analysis results attached to this demonstration (Attachment 2 – Slope Stability Analysis Results).

Current Conditions Stability Analysis Results			
Analysis Case	Storage Pool	Surcharge Pool	Seismic
Rule Section	§ 257.73(e)(i)	§ 257.73(e)(ii)	§ 257.73(e)(iii)
Target Factor of Safety	1.5	1.4	1.0
Cross-Sections	**Factor of Safety**		
A-A'	2.4	2.3	2.2

For all cases analyzed, the calculated factors of safety are in excess of those required in 40 C.F.R. § 257.73(e)(i) to (iv) of the federal CCR Rule.

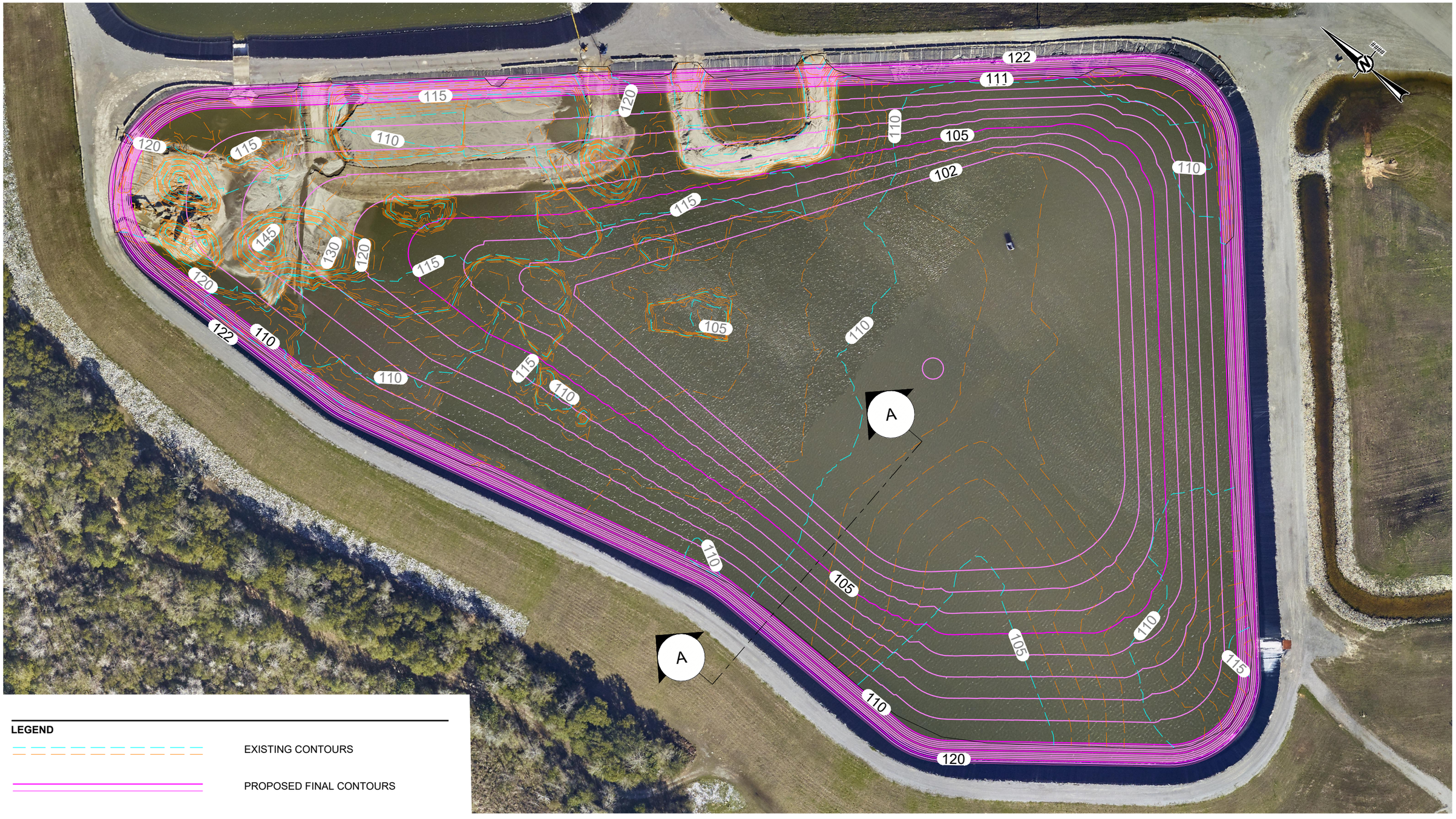
CERTIFICATION

I certify that the safety factor assessment for the Gulf Clean Energy Center Gypsum Storage Area was conducted in accordance with 40 CFR § 257.73(e).

Kevin S. Brown, P.E.

Florida Licensed Professional Engineer No. 57819

Golder Associates Inc.



LEGEND

EXISTING CONTOURS

PROPOSED FINAL CONTOURS

REFERENCES

1. SITE TOPOGRAPHY PROVIDED BY JACKSON SURVEYING ON DECEMBER 2020.
2. AERIAL IMAGE PROVIDED BY SOUTHERN RESOURCES MAPPING CORPORATION, DATED JANUARY 20, 2020.

0 50 100
1" = 100' FEET

CLIENT Gulf Power

CONSULTANT GOLDER MEMBER OF WSP

YYYY-MM-DD	2021/10/14
DESIGNED	CPP
PREPARED	CRP
REVIEWED	SS
APPROVED	KSB

PROJECT
GCEC GYPSUM STORAGE AREA SAFETY FACTOR ASSESSMENT

TITLE
GCEC GYPSUM STORAGE AREA CRITICAL CROSS-SECTION PLAN VIEW

PROJECT NO. 21482735

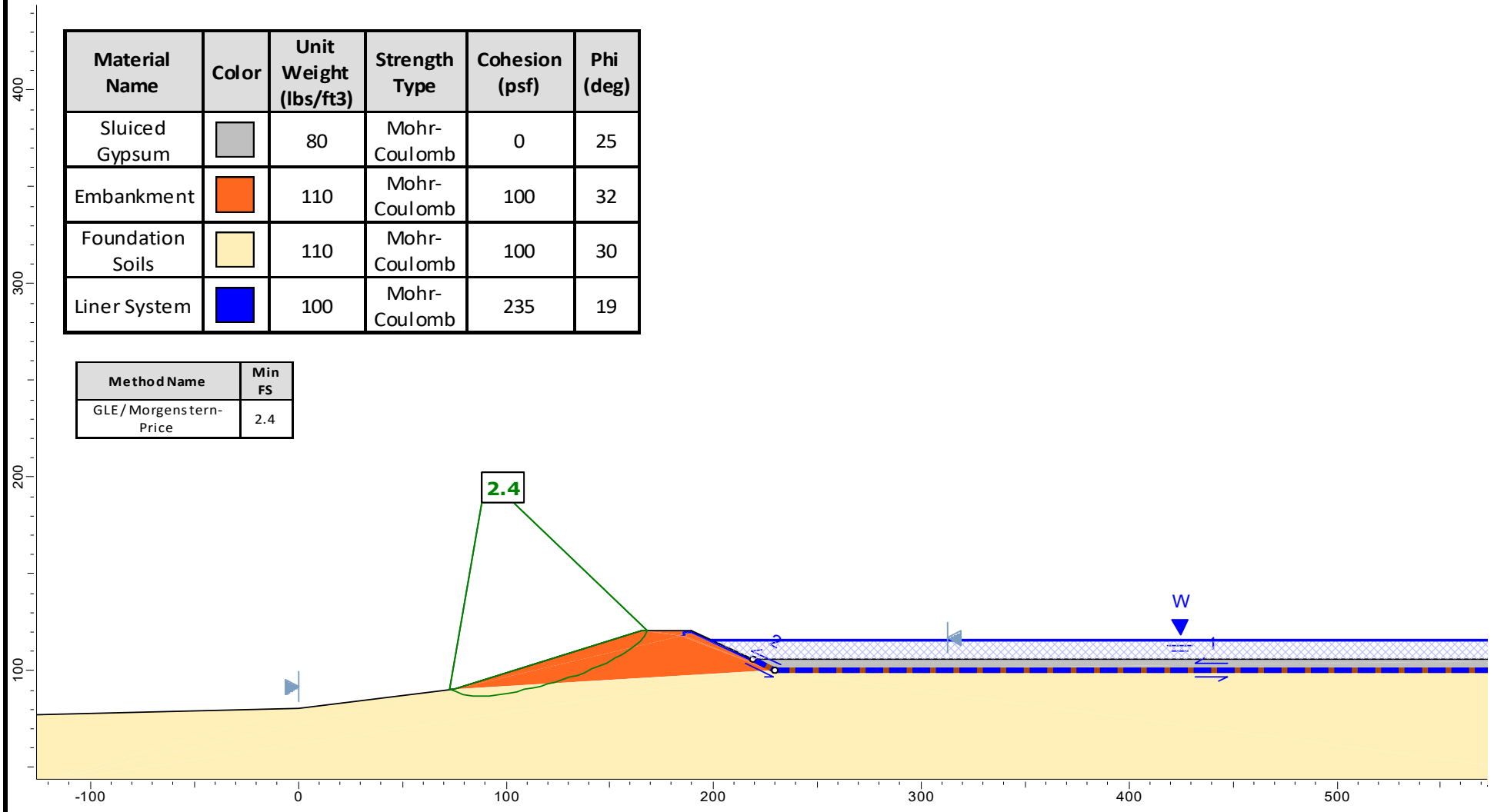
REV. 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Path: \\atlanta\cadd\Gulf Power\Plant Crist\20146895 Gypsum Pond Closure\Memo Jan 2021\Production\ | File Name: Gypsum Critical Cross-Section Plan.dwg | Last Edited By: cpria Date: 2021-10-13 Time:5:33:17 PM | Printed By: CRPria Date: 2021-10-13 Time:5:33:49 PM

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sluiced Gypsum		80	Mohr-Coulomb	0	25
Embankment		110	Mohr-Coulomb	100	32
Foundation Soils		110	Mohr-Coulomb	100	30
Liner System		100	Mohr-Coulomb	235	19

Method Name	Min FS
GLE/Morgenstern-Price	2.4



GOLDER

SCALE	AS SHOWN
DATE	Oct 2021
MADE BY	SSS
CAD	CRP
CHECK	WRP
REVIEW	KSB

PROJECT: **GCEC Gypsum Storage Area Safety Factor Assessment**

TITLE: **Section A-A'**
Long-Term Maximum Storage Pool - Static Scenario

FILE: STABILITY

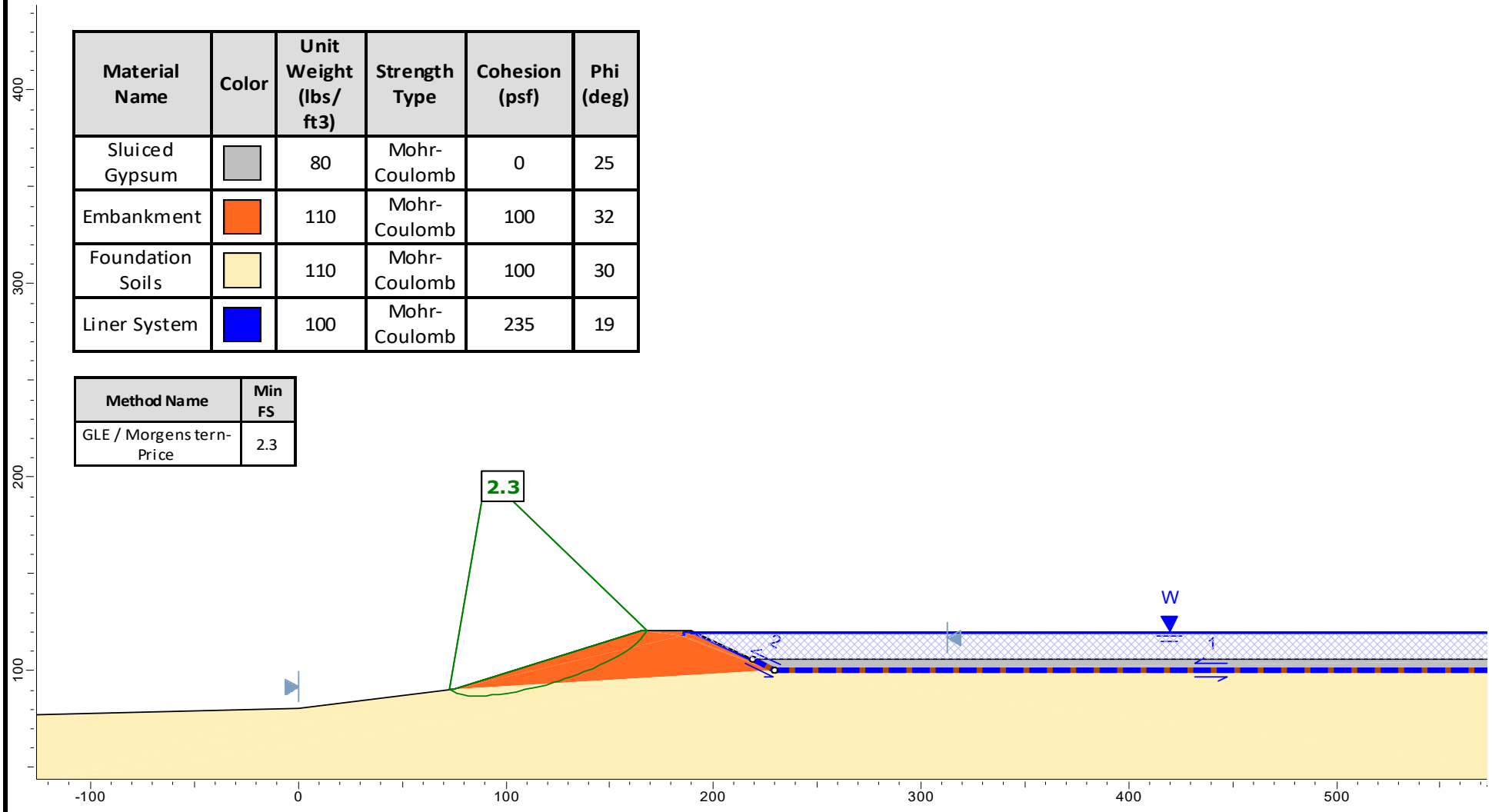
PROJECT No. 21482735 REV.

CLIENT: **FLORIDA POWER & LIGHT COMPANY**

FIGURE: **1**

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sluiced Gypsum		80	Mohr-Coulomb	0	25
Embankment		110	Mohr-Coulomb	100	32
Foundation Soils		110	Mohr-Coulomb	100	30
Liner System		100	Mohr-Coulomb	235	19

Method Name	Min FS
GLE / Morgenstern-Price	2.3

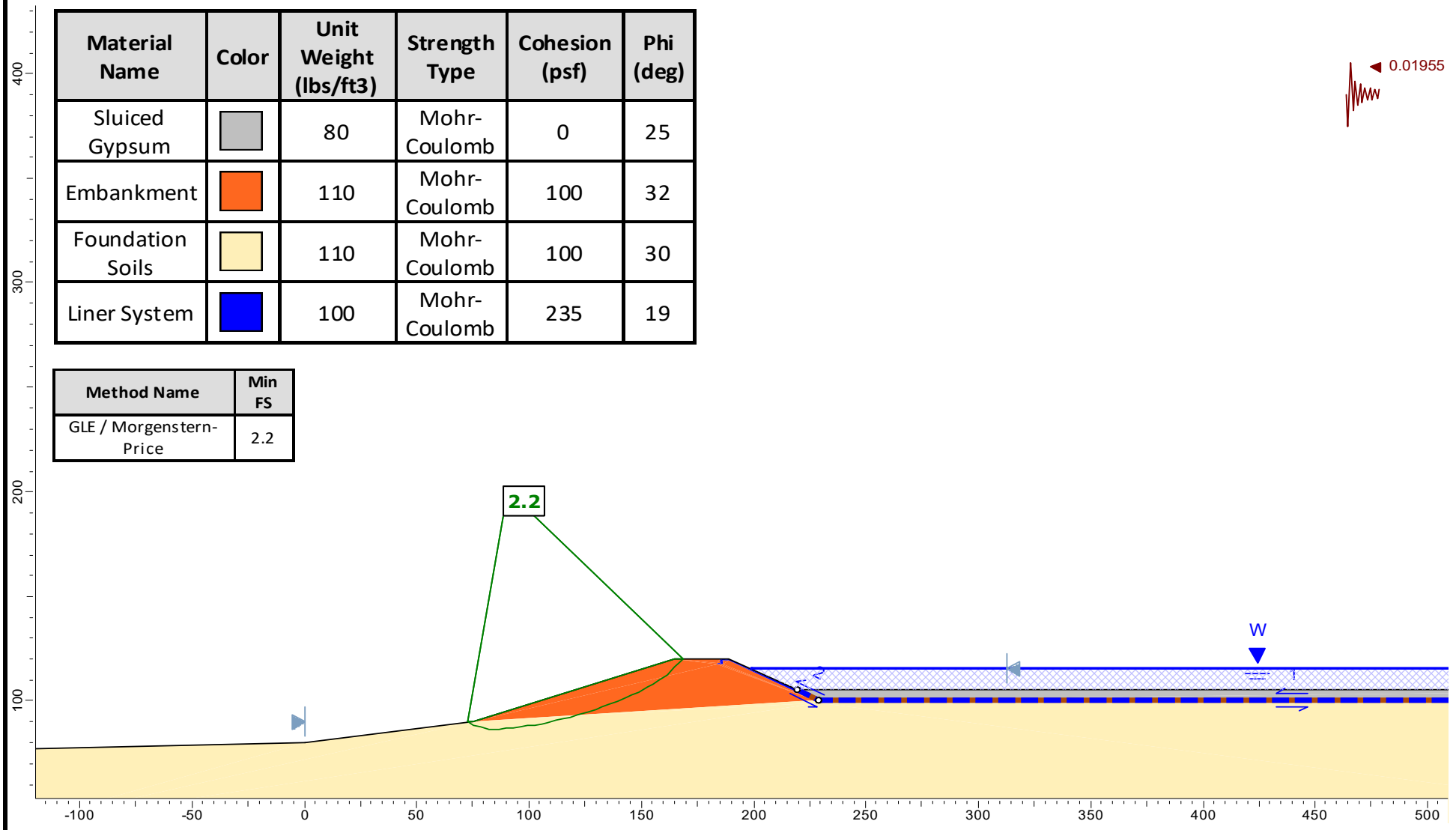


GOLDER

SCALE	AS SHOWN	PROJECT	GCEC Gypsum Storage Area Safety Factor Assessment
DATE	Oct 2021	TITLE	Section A-A' Maximum Surcharge Pool - Static Scenario
MADE BY	SSS		
CAD	CRP		
FILE	STABILITY	CHECK	WRP
PROJECT No.	21482735	REV.	REVIEW KSB
CLIENT	FLORIDA POWER & LIGHT COMPANY	FIGURE	2

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sluiced Gypsum		80	Mohr-Coulomb	0	25
Embankment		110	Mohr-Coulomb	100	32
Foundation Soils		110	Mohr-Coulomb	100	30
Liner System		100	Mohr-Coulomb	235	19

Method Name	Min FS
GLE / Morgenstern-Price	2.2



GOLDER	SCALE	AS SHOWN	PROJECT: GCEC Gypsum Storage Area Safety Factor Assessment
	DATE	Oct 2021	TITLE: Section A-A' Maximum Storage Pool - Seismic Scenario
	MADE BY	SSS	
	CAD	CRP	
FILE: STABILITY	CHECK	WRP	CLIENT: FLORIDA POWER & LIGHT COMPANY
PROJECT No. 21482735 REV.	REVIEW	KSB	FIGURE 3