Pre-Design, Geotechnical Reports, Design Phase

Compaction Design Report

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Report Produced By
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Project Number: CE00127-17
Project Name: Springfield Creek Spillway
Project Owner: USACE

Fill: Bank Section 1
Project Phase: Design-QA
Remarks:

Control Specifications and References

Min % of Max Dry Density	92%
Lab Reference Standard	ASTM D 698 (SP)
Resilient Modulus Method	AASHTO

Compacted Fill Property Requirements

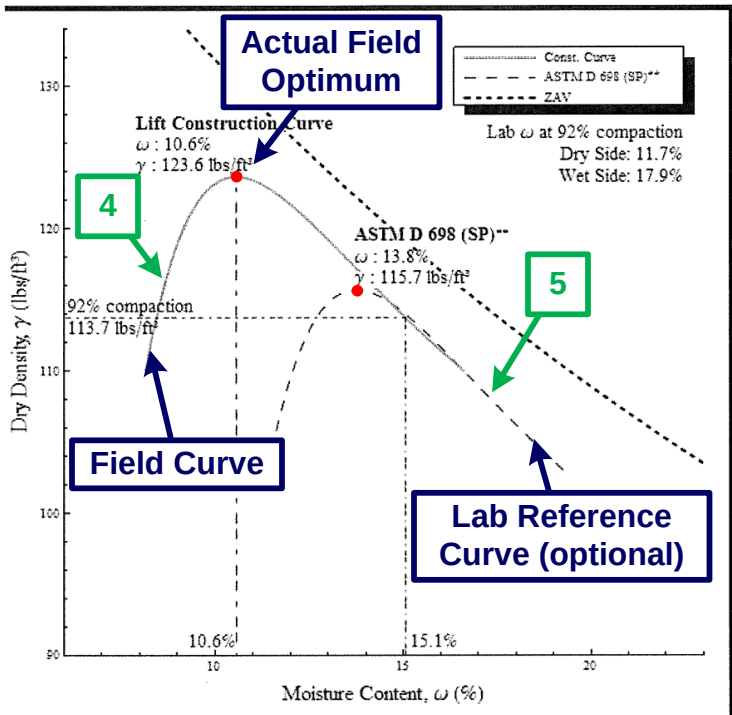
Unconfined Compression Strength	3,100 lbs/ft²
Factor of Safety	1.8

Design Compaction Conditions

Loose Lift Thickness (in)	10	
Compactor	CAT 815	
USCS Classification	CL	Ranges
Specific Gravity	2.68	2.68 - 2.68
Liquid Limit (%)	34	29 - 38
Plasticity Index (%)	19	17 - 25
Plastic Limit (%)	15	
% Fines (Passing #200)	77	64 - 90
% Gravel (Retained #4)	1	0 - 2
% Sand (Passing #4)	22	16 - 25

Lift Properties at 92% Compaction on Construction Curve †

		Dry Side¹	Wet Side¹	Tolerance
ω (%)		8.5	15.1	±1% MC
γ (lbs/ft³)		113.7	113.7	±1.8%
S (%)		48.1	85.8	±3%
e		0.47	0.47	±3%
Na (%)		16.6	4.5	±3%
ω Potential (%)		+9.1	+2.5	±3%
UCS (lbs/ft²)	ASTM D 2166	x	x	±20%
c (lbs/ft²)	ASTM D 2850	x	x	±10%
Ø (°)	ASTM D 2850	x	x	±10%
Free Swell (%)	ASTM D 4546	7.6	2.0	±10%
CBR* (%)	Soaked	1.1	3.6	±10%
CBR* (%)	Unsoaked	35.3	8.2	±10%
Res Mod (lbs/in²)	Soaked	1,650	5,400	±10%
Res Mod (lbs/in²)	Unsoaked	25,002	9,823	±10%



** ASTM D 698 (SP) equivalent, corrected to control relative moisture standard in construction. Graphics powered by Mathematica

Construction Control Specifications

Minimum % of Maximum Dry Density
Construction Curve 92%
ASTM D 698 (SP) 98%

Wet-of-Optimum Moisture Range for 92%
10.6% - 15.1% (±1% MC)

Minimum # of Roller Passes
11 *(Equiv. 6 roundtrip passes, full lift coverage required)*

Compaction curves should be obtained regularly with changes in material index properties and upon change in color or texture for effective construction control.

M-D probe depths should be centered on the center of the compacted lift.

† *c and Φ - Unsaturated triaxial test, total soil parameter. UCS - Unconfined Compressive Strength.*
Measured values include ω, γ, UCS, c, Φ, Free Swell, and CBR (soaked and unsoaked). Calculated values include S, e, Na, ω Potential, and Resilient Modulus (soaked and unsoaked).
Wet side permeability in field not factored in Free Swell test condition.

* *CBR based on field compacted state.*
1 *Properties represent average values.*
x *Strength property values available upon request.*

Soil Sample Date: 12/20/2017
Loc: Fosters Field
Desc: Reddish Brown Lean Clay

Authorization By:_____
Print Name:_____
Date:_____ Firm Reg.#:_____

Version: 2.30 - 7.11

1. **Input:** Required min. % density compaction standard for selected compactor + optional lab curve reference standard (corrected)
2. **Input:** Minimum governing design criteria for fill (can be more than 1 property requirement)
3. **Input:** Assumed or specified compactor - soil - lift combination (soil properties based on known, estimated or required soil property ranges)
4. **Output:** Site-Specific Compaction Curve (SSCC®) in construction, on the site-specific field line-of-optimums, with minimum % density intercepts
5. **Output:** Soil-specific lab curve reference, corrected according to standard dry-unit weight relations and the corresponding lab line-of-optimums (close to line-of-opts in construction, as verified on report)
6. **Output:** Compacted lift properties at minimum % density intercepts (for design)
7. **Output:** Lift-specific compaction controls for full compaction