



Roads Rethought™


Full-depth Reclamation (FDR)

Overview

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Agenda

- Asphaltic Full-depth Reclamation (FDR) Overview – 5 min
- I-10 Projects Overview – 5 min
- Project Details – 15 min
- Summary/Questions – 5 min



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Types of Asphaltic Full-depth Reclamation

- Asphalt Emulsion FDR (Focus)**
 - Meters in asphalt emulsion
 - Typically 130°-180°F.
 - Added Water
 - Other additives (cement) if necessary
- Foamed Asphalt FDR**
 - Meters in hot AC and water simultaneously to produce foaming action
 - Typically above 300°F.
 - Cement (for fines)

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I-10 Projects Overview

- Project 1: I-10 Near Balmorhea, TX**
 - Odessa TXDOT District (Owner)
 - Kiewit Corporation (Contractor)
 - 315,000sy Asphalt Emulsion FDR
 - October 1 – November 18, 2015
- Project 2: I-10 Near Ozona, TX**
 - San Angelo TXDOT District (Owner)
 - Kiewit Corporation (Contractor)
 - Emergency Project
 - One-week turnaround on mix design
 - 138,000sy Asphalt Emulsion FDR
 - August 22 – September 10, 2016




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I-10 Project “1” Specification and Mix Design

TXDOT SS 3003 Material/Emulsion Performance Criteria and Mix Design

Property	Test Procedure	Criteria
Min indirect tensile strength (ITS), psi	Tex-205-F	50
Min unconfined compressive strength (UCS), psi	Tex-117-E, Part II	150
Min retained UCS, psi	Tex-117-F2	80%

- Air dry specimens at 77 ±5°F for 72 hr before testing.
- Average of three specimens subjected to 10-day capillary moisture absorption before conducting UCS (similar to Tex-117-E, Part I, or Tex-121-E, Part I), without oven drying.

Test	Method	Min	Max
Residue from distillation, %	AASHTO T 59	60	-
Oil soluble by distillation, %	AASHTO T 59	-	0.5
Solub Test, %	AASHTO T 59	-	0.1
Penetration, 25°C, dmm	AASHTO T 49	55	95



Emulsion Treatment (Road Mix) - Design Report
 2016, Revised October 20, 2016
 Prepared by: Shane McDade
 Checked by: [Name]
 Approved by: [Name]

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I-10 Project “2” Specification and Mix Design

Draft TXDOT Emulsion FDR Specification Performance/Emulsion Criteria and Design Summary

- A challenge is asphaltic characteristics beyond strength

Material Property	Test Method	Minimum/Maximum
Distillation Residue	AASHTO T 59	60
Oil Soluble by Distillation, % by vol	AASHTO T 59	0.5
Solub Test, %	AASHTO T 59	0.1
Penetration, 25°C, dmm	AASHTO T 49	55

Mixture Property	Test Method	Minimum Requirement
Indirect Tensile Strength (ITS), psi	Provided by Engineer	50
Minimum Unconfined Compressive Strength (UCS), psi	Provided by Engineer	150
Retention (UCS), %	Tex-117-F2, Part II	120

Criteria	CS-18	Criteria
Tensile Strength (ITS) @ 25 deg. C (72 hr. Cure) (Tex-205-F)	49.6	50
Retained Tensile Strength (24-hour soak after curing) (Tex-205-F)	65.3	30
Retained Unconfined Compressive Strength (UCS) (Tex-117-F2)	125	120

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Field QC/QA

- Field QC/QA Vital to Success
 - TXDOT Ramping up Requirements
 - First Day of Production Not Enough
 - Cost
- Suggestions
 - Density
 - Modified Proctor
 - Moisture
- Troubleshooting
 - Vary Moisture
 - Vary Emulsion
 - Vary Speed
 - Re-design




Water

- As Important as Other Additives
 - Miscibility and coating
 - Tempting to cut corners
 - Metered at same time as emulsion preferred
 - **LOWERING WATER CONTENT WILL NOT MAKE THE MATERIAL CURE FASTER (to a point...)**



Summary/Questions

- Mix Design Performance Criteria
 - Combination of Dry/Retained UCS and IDT
 - Minimum actual strengths, not ratios
 - TXDOT tending toward retained on IDT
 - Expand asphalt's role going forward
- Field QC/QA
 - More is better (within reason)
- Water
 - Extremely Important, Often Overlooked
- Engineered Emulsions
 - Worth a Look



Supplemental

- TXDOT FWD Testing (Emulsion)
 - US 83 (Ochiltree County, 2013)
 - I-10 (Reeves County, 2015)
 - SH 115 (Winkler County, 2016)
 - 1-10 (Crocket County, 2017, Scheduled)
- Foamed FWD Available by Request

Supplemental

- TXDOT Foamed Asphalt Spec is SS3017

