

Local Aggregate SMA Field Applications

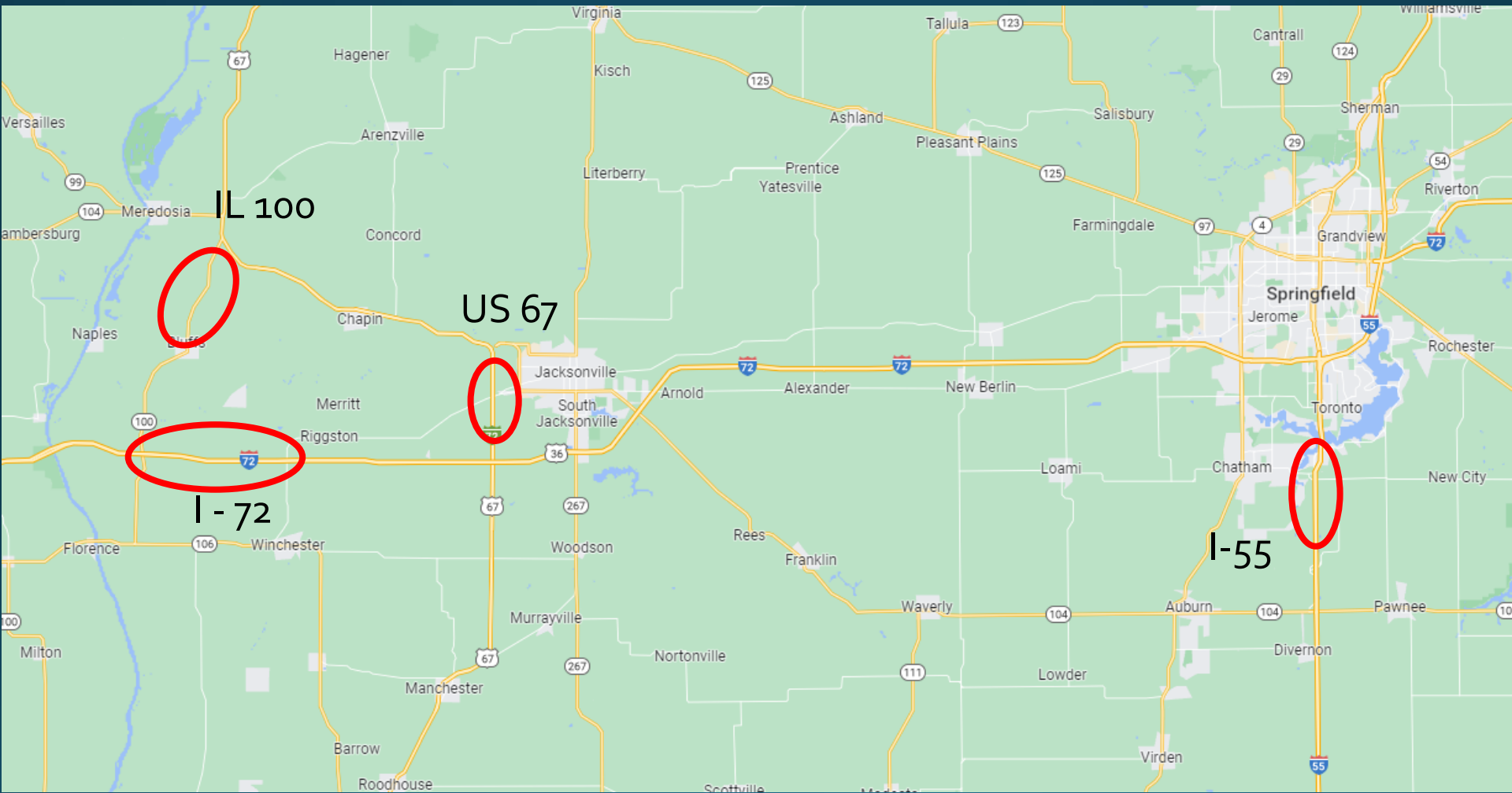


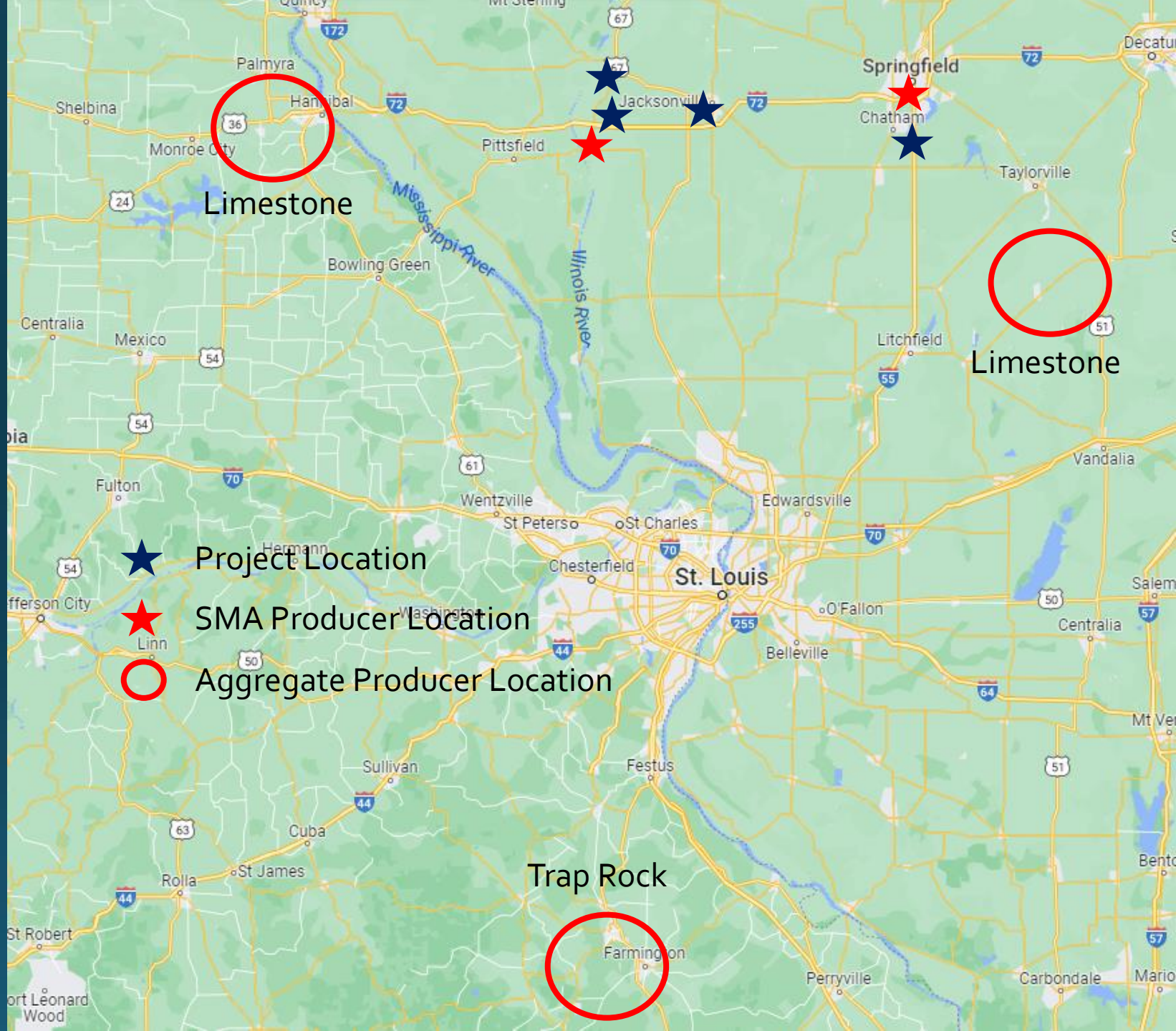
Greg Heckel IDOT District 6

Expanding the Types & Sources of Aggregates Used for SMA Production

- In District 6, a local aggregate means limestone.
- IDOT Specifications currently only allow limestone in N50 SMA mixtures.

N50 SMA Project Locations





Project Location



SMA Producer Location



Aggregate Producer Location

Limestone

Limestone

Trap Rock

Farmington

St. Louis

Springfield

Palmyra

Jacksonville

Chatham

Pittsfield

Taylorville

Litchfield

Wentzville

St. Charles

Edwardsville

St. Peters

Chesterfield

O'Fallon

Belleville

Festus

Sullivan

Cuba

Rolla

St. James

Perryville

Carbondale

Mario

St. Robert

Port Leonard Wood

Project Traffic Information

	IL 100	US 67	I-55	I-72
ESALS (million)	0.8	3.4	32	12.1

Question:

How valid is the 10 million ESAL limit that separates an N50 SMA from an N80 SMA?

IL 100

(2002)

1.5 – inch Single Lift Overlay

N₅₀ SMA-12.5 C Surface

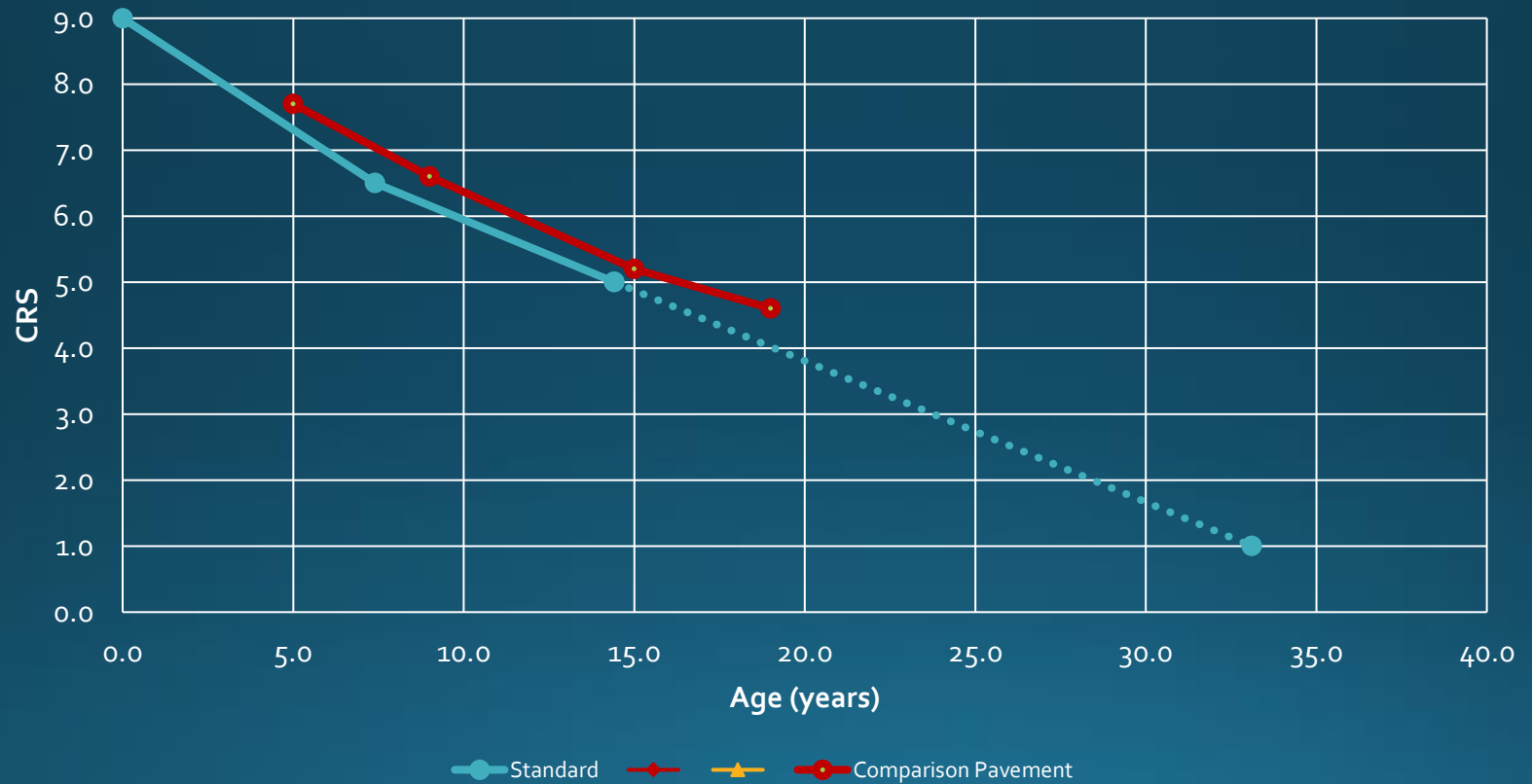
Blend of CM₁₁ and CM₁₆
Limestone

Design 5.9% SBS PG 76-22

No Recycled Content

IL 100 After 20 Years

Non-Interstate 600 Districts 1-g Deterioration Models



IL 100 After 20 Years



Where is the Block Cracking?

2021 CRS Rating is 4.7, which is great for a 20 year-old surface on an old, rural overlaid, widened PCC pavement.

Reflective Transverse & Widening Cracking Will Always Occur Over Time



US 67

Overlay of Jointed PCC
in 2020

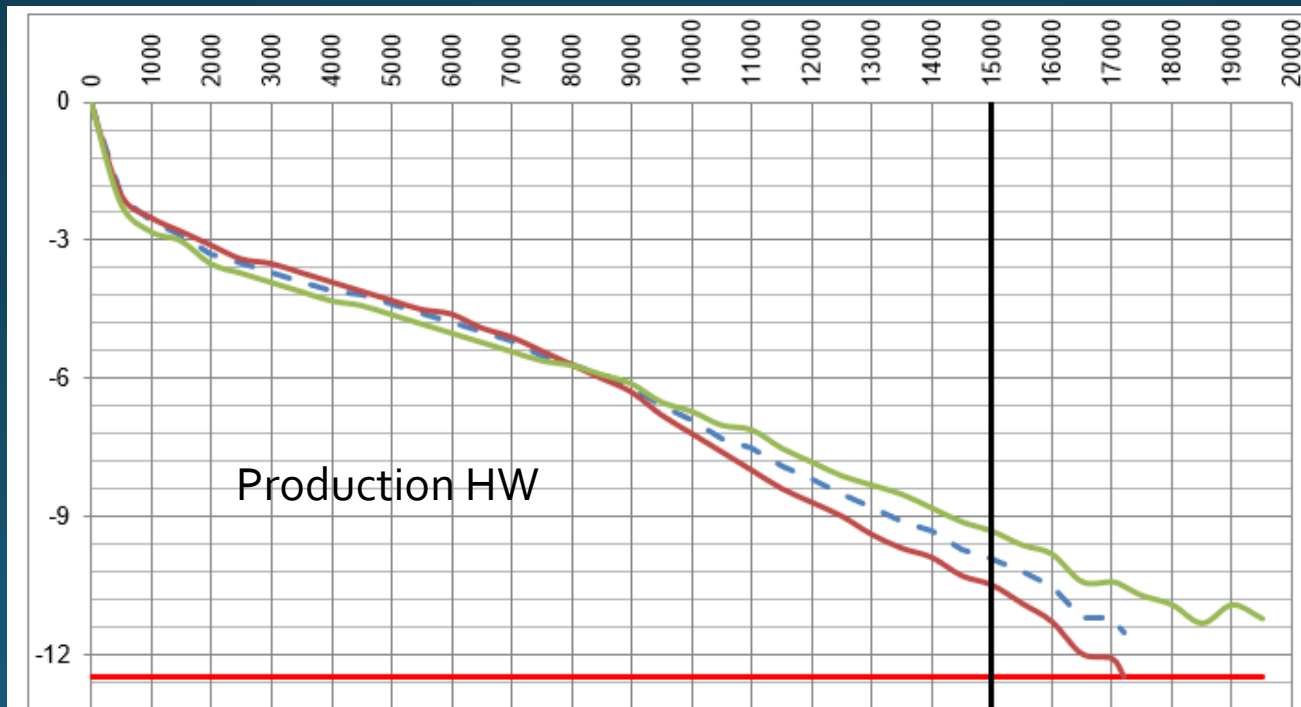
2-inch N50 SMA-12.5
Binder

2-inch N50 SMA-12.5 D
Surface



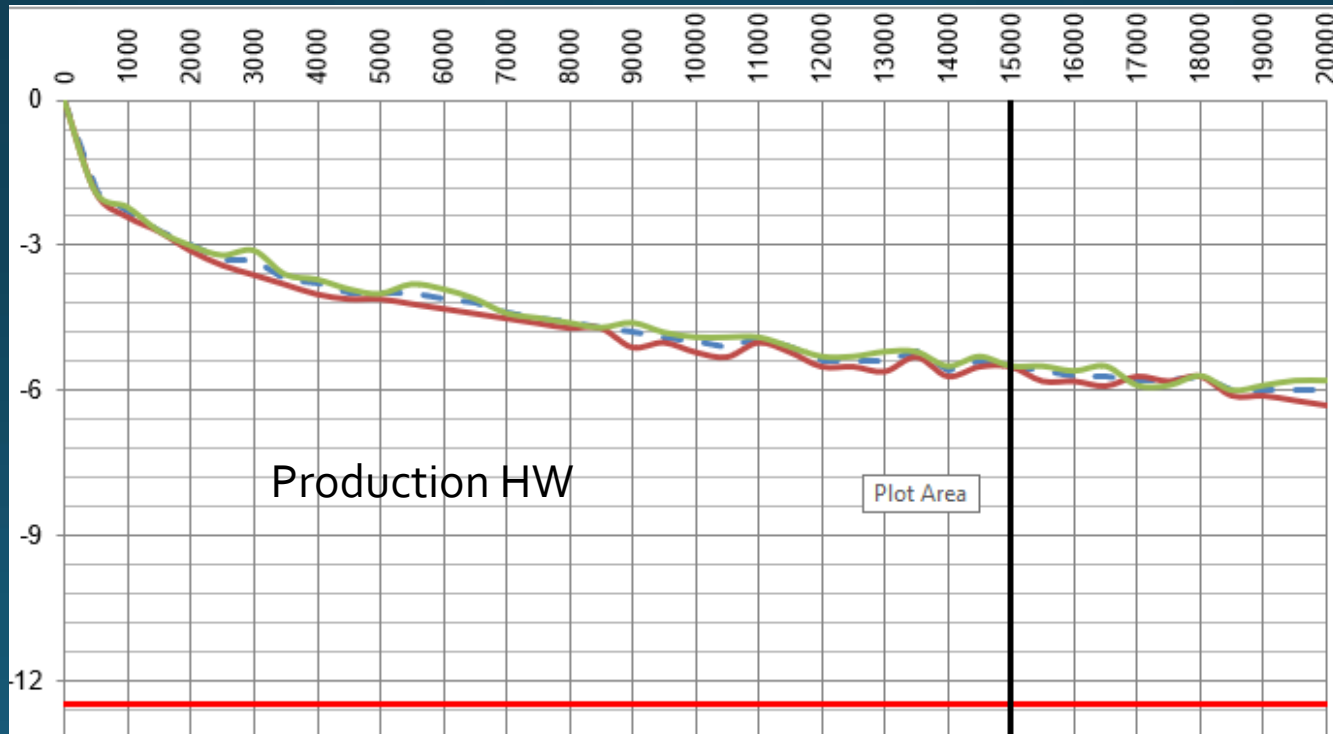
US 67 N₅₀ SMA-12.5 Binder

- Blend of CM14 & CM16 A-Quality Limestone
- Design 5.8% SBS PG70-28 with 10% ABR
- Production Unaged Flexibility Index = 39



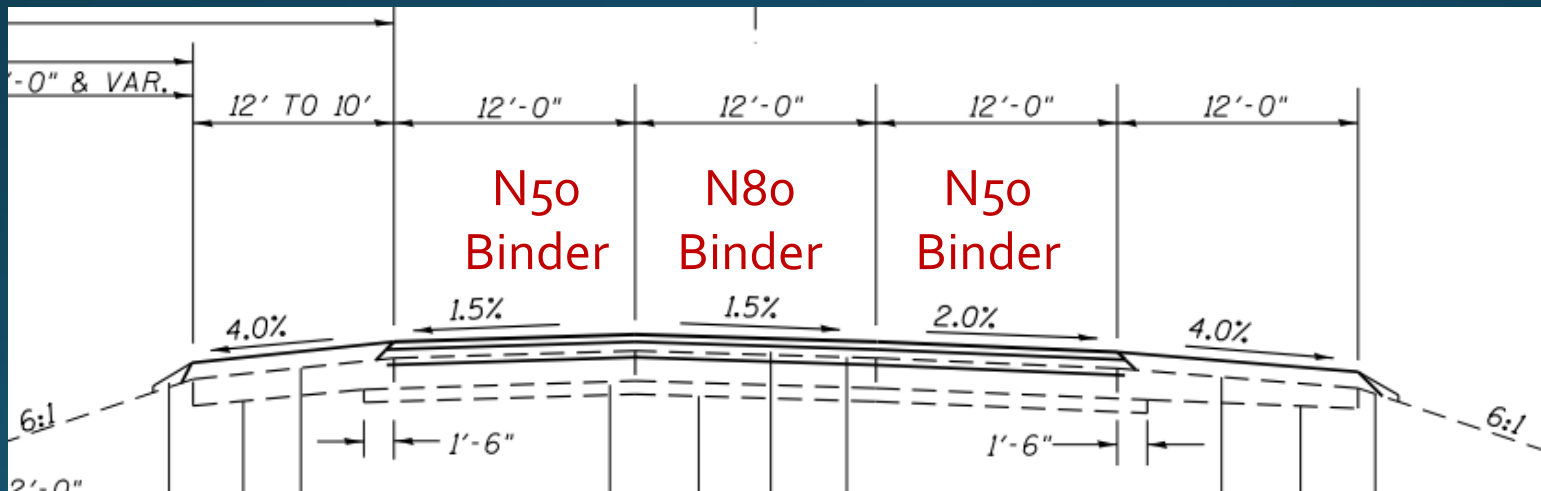
US 67 N50 SMA-12.5 D Surface

- Blend of CM14 & CM16 Trap Rock
- Design 6.3% SBS PG70-28 with 11% ABR
- Production Aged Flexibility Index = 18



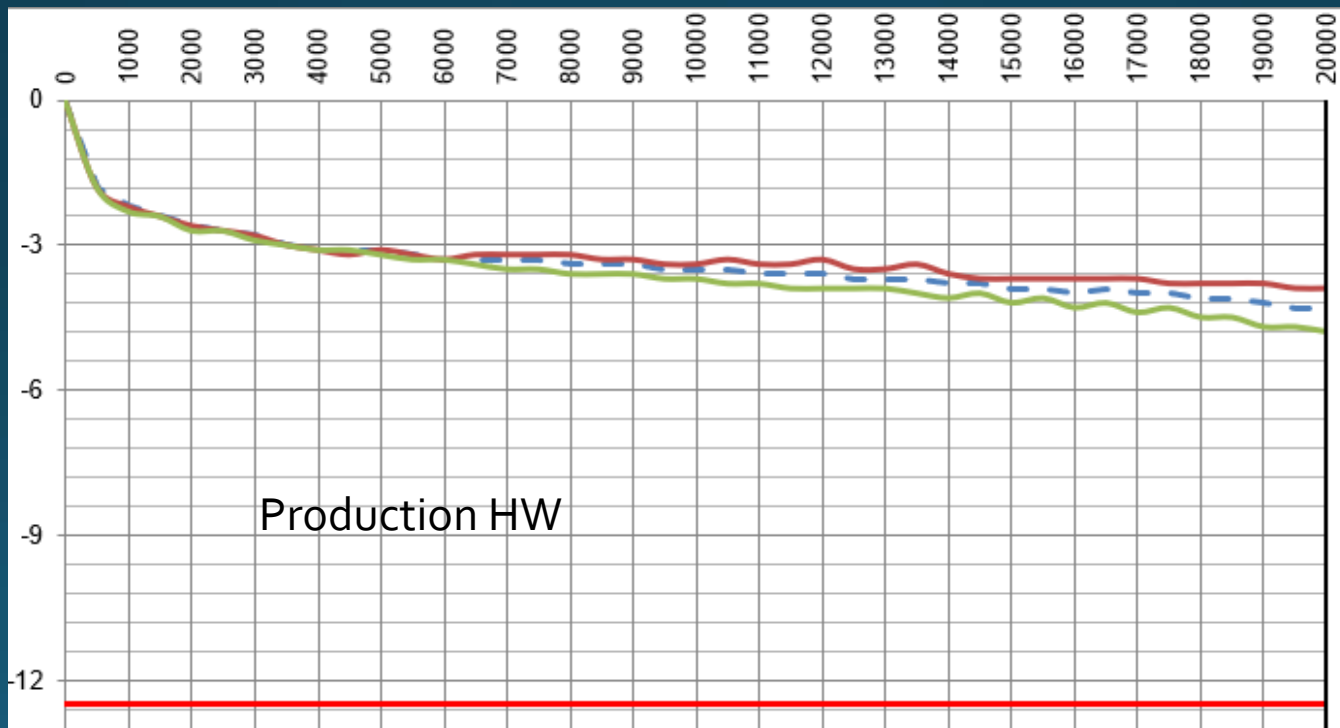
I-55

- 2020
- Remove Existing HMA & Replace with SMA on CRCP
- 2-inch SMA-12.5 Binder
- 2-inch N80 SMA-12.5 E Surface



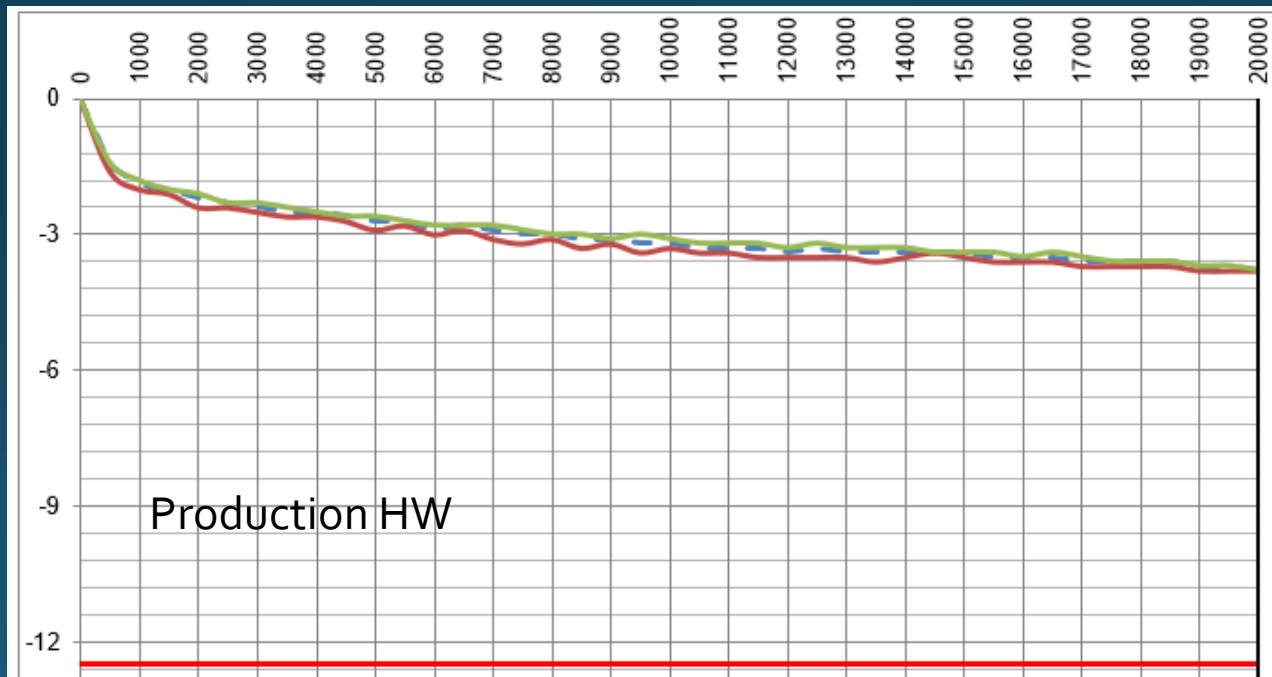
I-55 N50 SMA-12.5 Binder

- Blend of CM14 & CM16 A-Quality Limestone
- Design 6.2% SBS PG76-22 with 8% ABR
- Production Flexibility Index = 6 Resample = 15 ★



I-55 N80 SMA-12.5 Binder & Surface

- Blend of CM 13, CM14, & CM16 Trap Rock
- Design 6.2% SBS PG76-22 with 9% ABR
- Production Flexibility Index: Unaged = 22 / Aged = 8



I-72

Overlay of CRCP in 2021

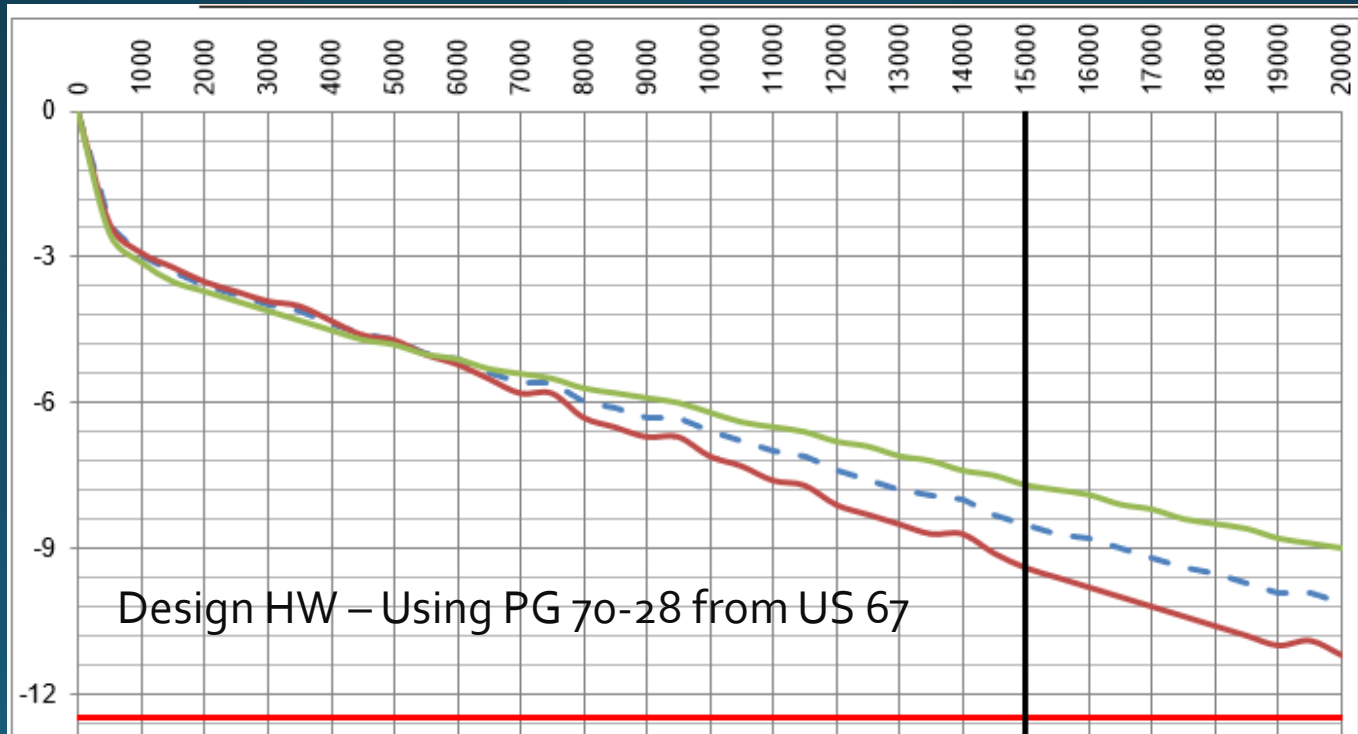
2-inch N50 SMA-12.5
Binder

2-inch N50 SMA-12.5 D
Surface

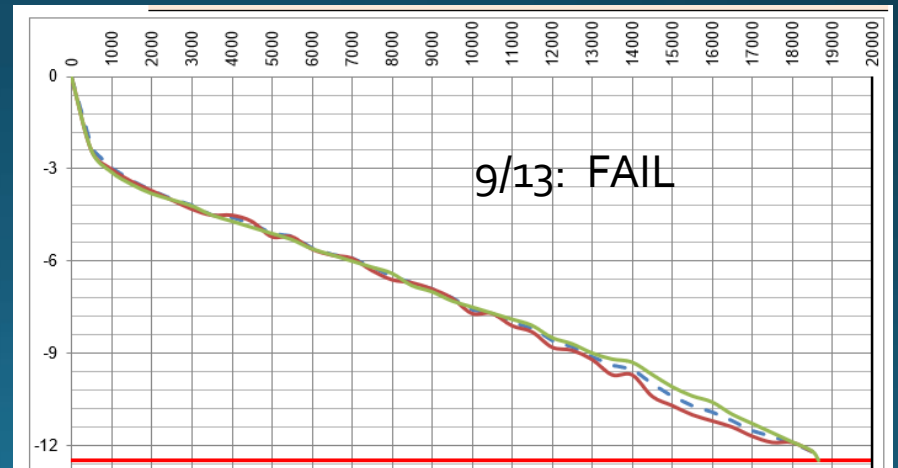
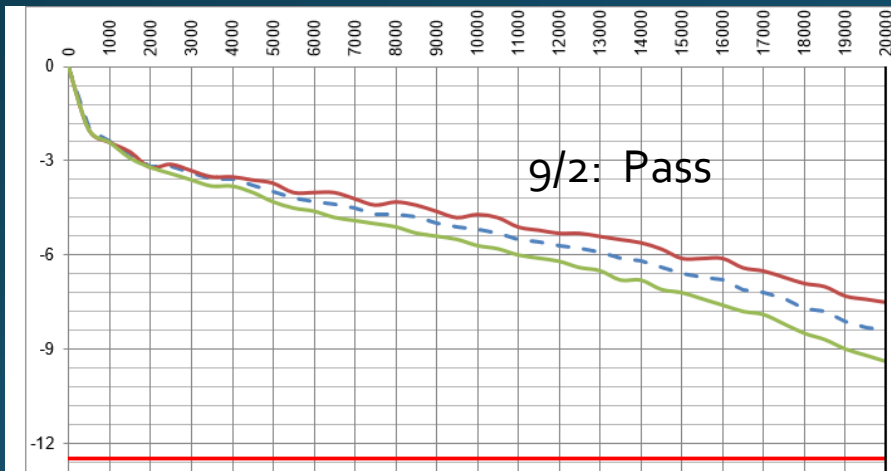
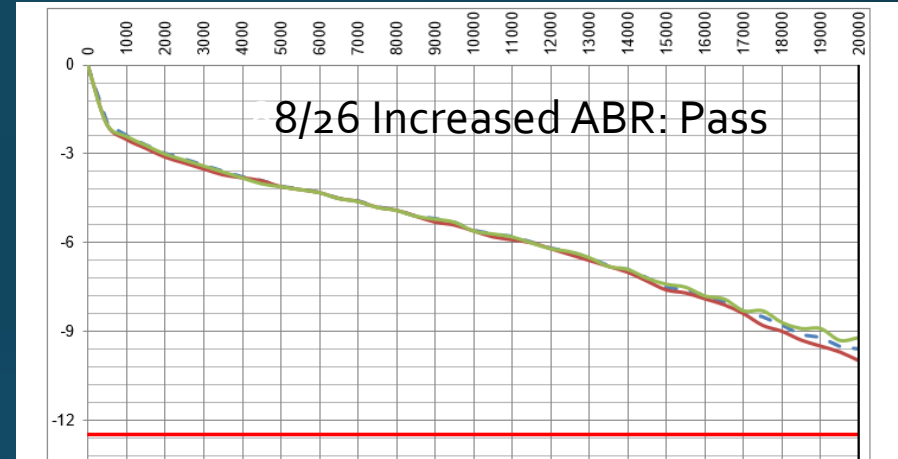
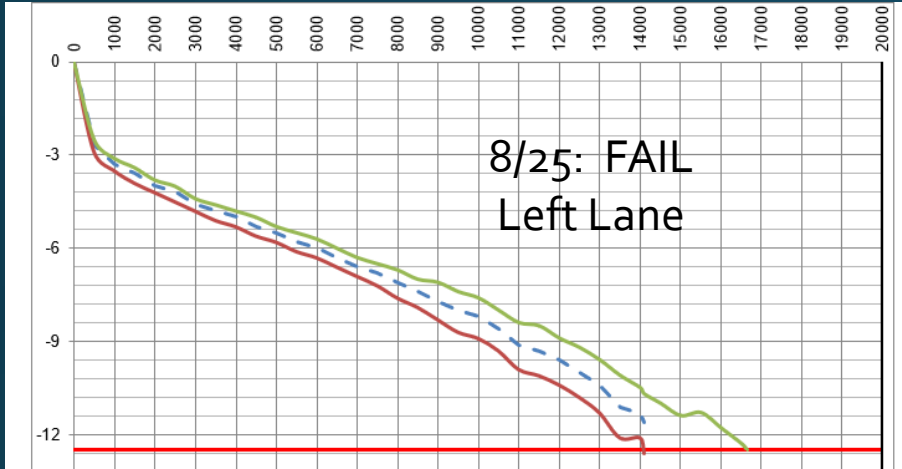


I-72 N50 SMA-12.5 Binder

- Blend of CM14 & CM16 A-Quality Limestone
- Design 5.8% SBS PG76-28 with 10% ABR
- Production Flexibility Index = 40



I-72 N50 Binder Production HW



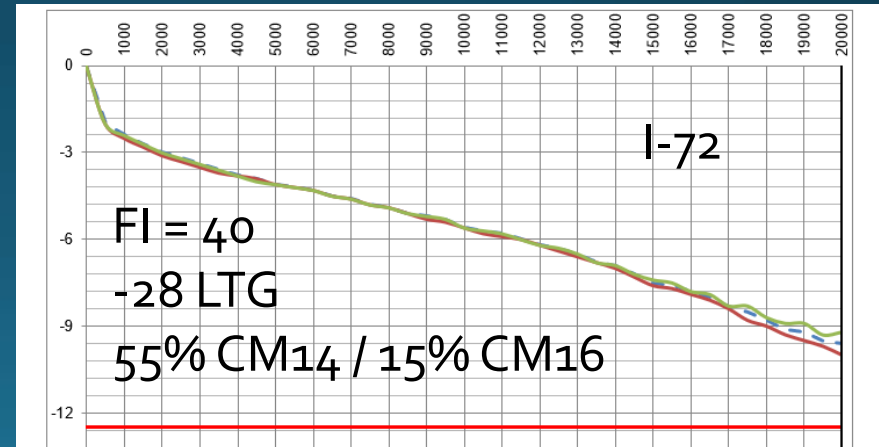
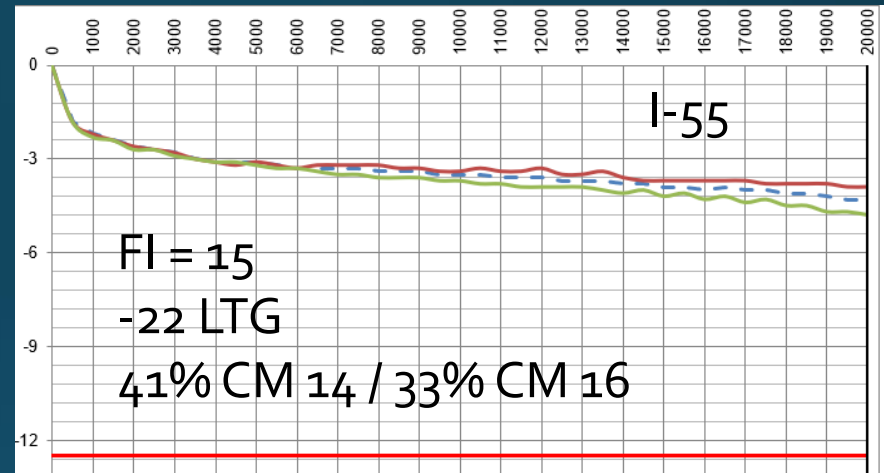
Production PG Grade Verified Multiple Times

I-55 & I-72 N50 Binder Performance

Production FI?
 AC Low Temp Grade?
 Mix Design CA Blends?
 Aggregate Properties?

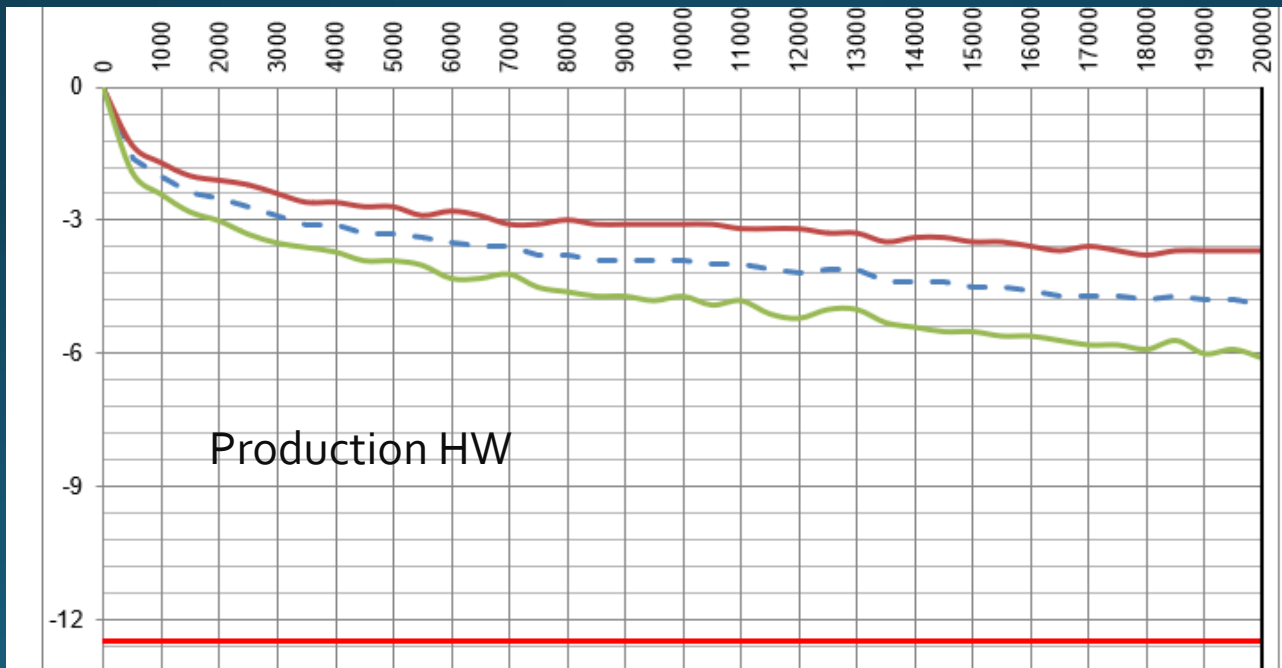
I-72 Limestone	25.7% LA Abrasion Loss
I-55 Limestone	22.7% LA Abrasion Loss

	3 - 1	5 - 1
I-72 Limestone	15.0%	0.5%
I-55 Limestone	15.5%	2.3%



I-72 N50 SMA-12.5 D Surface

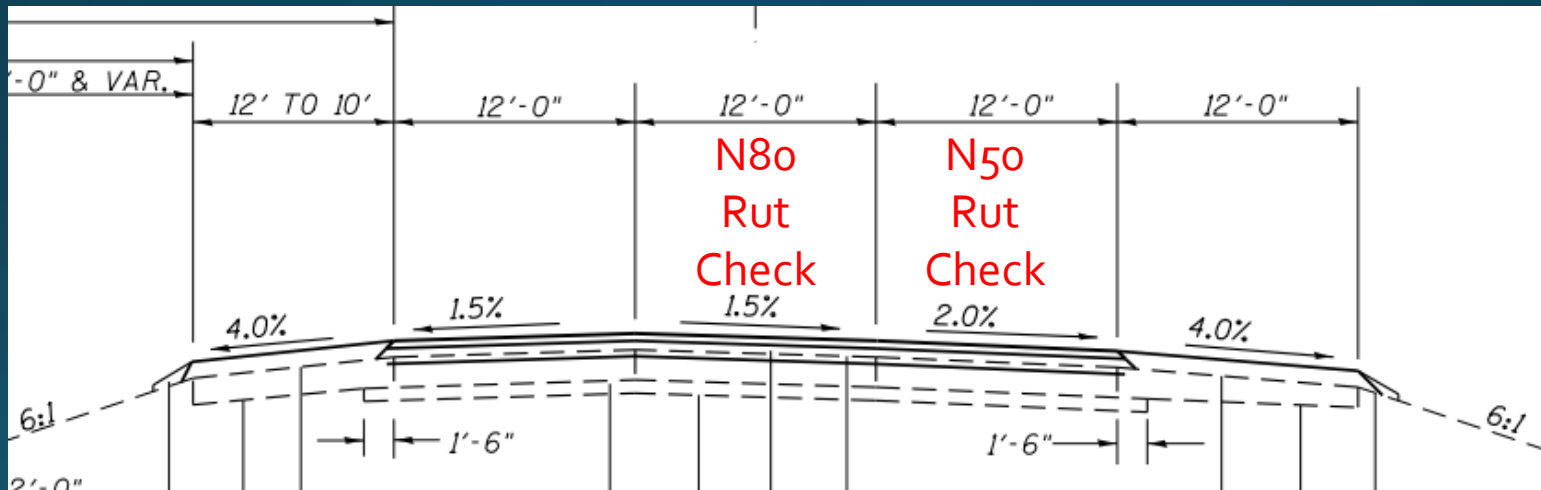
- Blend of CM13, CM14, & CM16 Trap Rock
- Design 6.3% SBS PG76-28 with 11% ABR
- Production Flexibility Index: Unaged = 40 Aged = 18



Evaluating Field Performance

US 67 and I-72: Rutting Measurements By the Data Collection Vehicle as Part of CRS Ratings

I-55: Annual Rutting Measurements by Bureau of Research



District 6 Challenges

- Limestone sources are not normally producing aggregate for SMAs.
- Current friction aggregate requirements restricting the use of limestone in surface mixes at higher traffic volumes.
- Traffic management or project constraints sometimes require a binder and surface lift to be placed on the same night of paving.

Summary

- SMA Mixtures clearly demonstrate performance advantages and are worthy of expanded use.
- The ICT Research Team will provide valuable information for a wider variety of local sources statewide.
- It is too early to determine if N50 SMA carbonate crushed stone binder mixtures are appropriate for high ESAL applications.
- D6 will be continuing to explore options for using N50 SMAs with our local limestone.

Questions?

Thanks To:

District 6 HMA, Lab, and Aggregate Technicians

Central Bureau of Materials

United Contractors Midwest and their QC staff