Innovations in Full Depth Reconstruction of Interstate Roadways in Arizona

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Winter of 2022/2023

Winter of 2022/2023

- Abnormally wet winter with many days of snow accumulation
- 14,327 labor hours used 20 snow plows on I-40 between Ash Fork and Joseph City to clear road

Winter of 2022/2023

- This weather took a toll on older highway pavements
- Older sections of I-40 and I-17 experienced significant failures with major pothole development

Introduction

Two reconstruction projects to be discussed

- Southbound I-17, County Line to McConnell
- I-40, Cataract Lake to Parks
- Several challenges to project estimation and construction were encountered

I-17 Southbound

- Rehabilitation of 29 miles south from Flagstaff to the Coconino County Line
- Existing roadway is primarily PCCP pavement with friction course overlay
- New pavement would be PCCP with 1.5 inch leveling course of AC

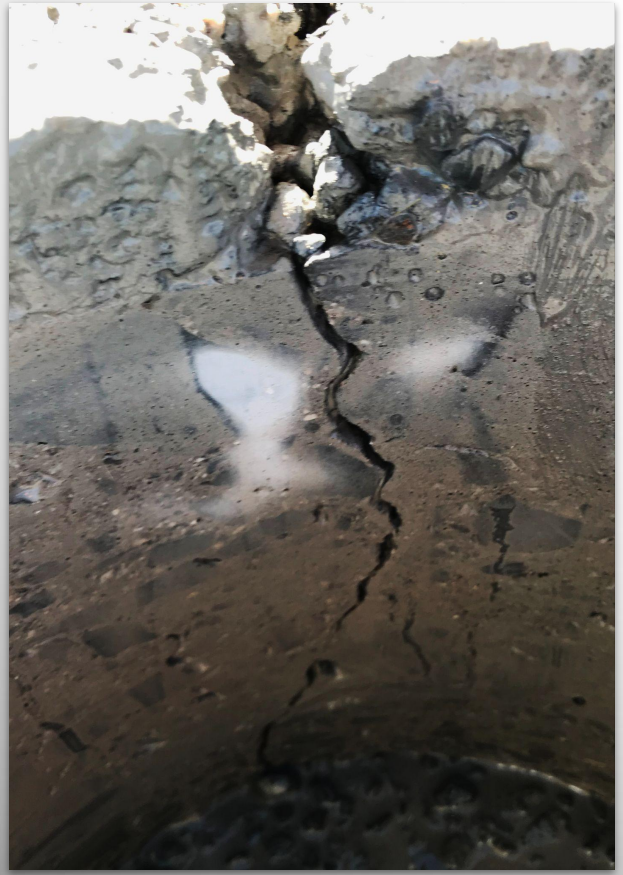
I-17 Pavement in 2020

Became much worse during last winter

Taking a peak at the PCCP slabs in 2020

Pieces of concrete pulled out with a rock pick

Pavement Core in failed pavement area



Full depth cracking of PCCP slabs was observed in many locations.

Southbound I-17

- Scoping Challenge: amount of PCCP that would have to be replaced during construction
- Standard pavement coring and crack mapping was conducted
- GPR Survey of about 54 lane-miles of highway was completed in April of 2020

Mobile GPR Survey

Photo provided by Infrasense

Innovations in subsurface investigation

Excessive water content within the base course materials was suspected to be an issue contributing the the roadway failures.

Many areas of I-17 displayed water accumulation

GPR Indicating Voids and Moisture

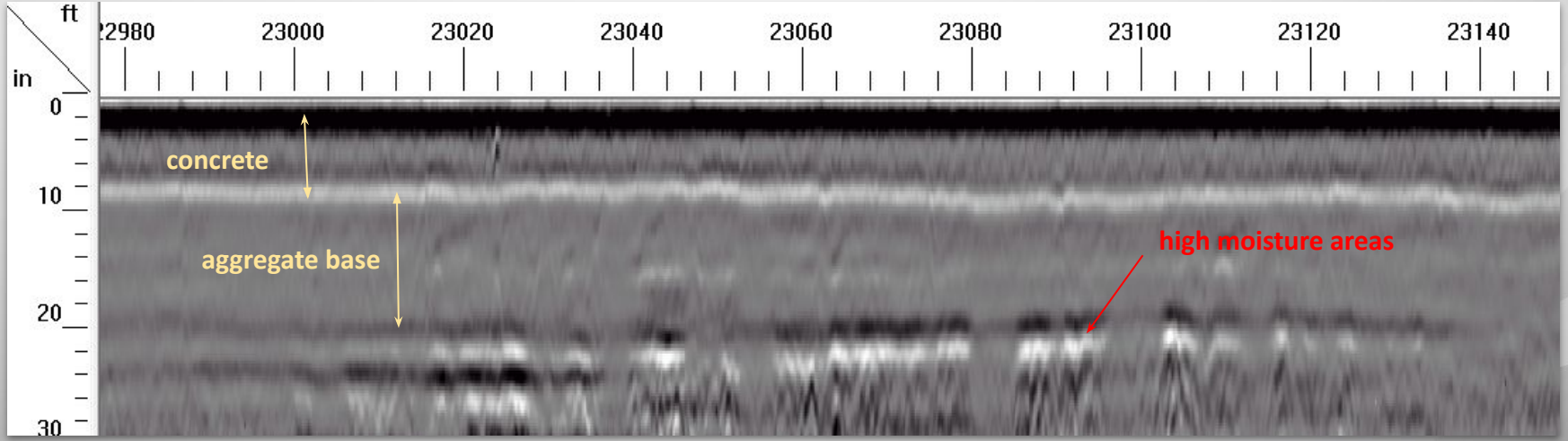


Image provided by
Infrasense

Innovations in subsurface investigation

Pavement deterioration mapping of both lanes was developed based on GPR data.

Concrete deterioration mapping

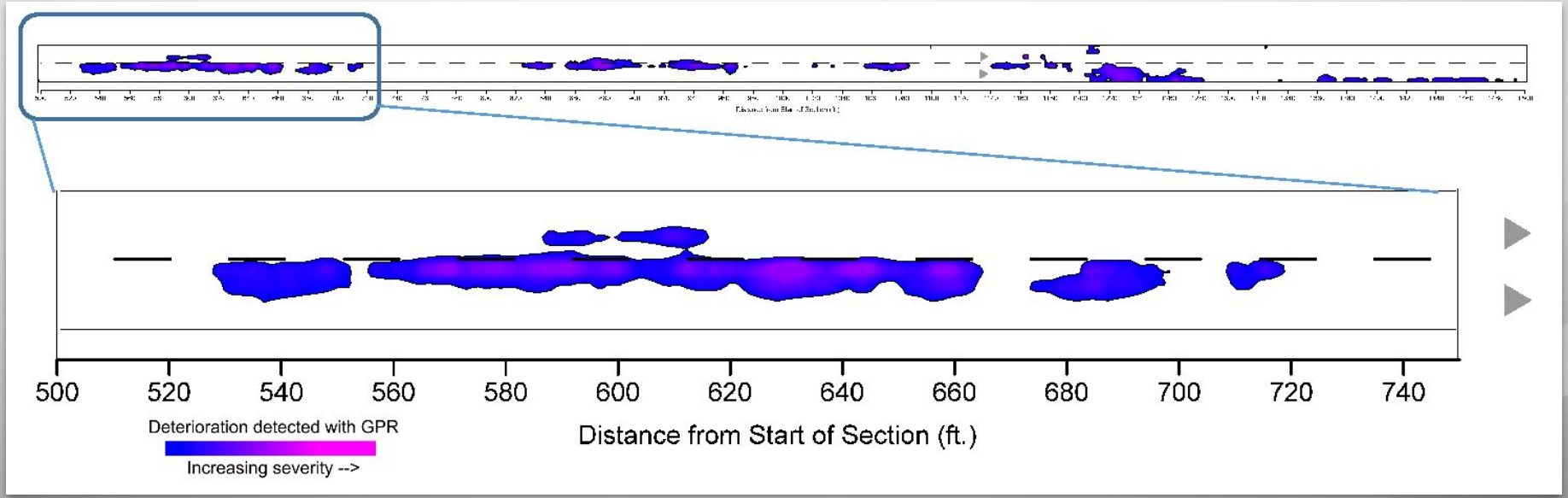


Image provided by
Infrasense

I-17 Southbound

- Construction began in the mid-2022 and continued this past construction season.
- Full depth reconstruction areas used CTB beneath the replaced PCCP pavement.
- Project costs are anticipated to exceed the construction estimate by about 5%.

I-17 Southbound nearly completed this fall

I-40, Cataract Lake to Parks

- Section of I-40 was constructed in about 1967
- Scoped as a pavement rehabilitation project
- 17 miles of full depth pavement reconstruction
- Began at Williams and extended to Parks, Arizona

Full depth failures east of Williams, 2017

I-40, Cataract Lake to Parks

- Several areas of pavement showed signs of full depth failure during the winter of 2016/2017
- Project used cement to stabilize the existing cinter base materials
- Project was completed in 2018

Cement was blended into the existing cinder base to improve base stability and strength.

Cataract Lake to Parks today

- Five winters have passed since construction began.
- The pavement within the limits of this project currently shows no signs of distress.

I-40 today, east of Williams today

I-40 today, near Parks

Lessons Learned, I-17

- Not everything goes according to plan.
- GPR evaluation of pavement condition seemed to be reasonably accurate however some extra work for the contractor was identified.
- I-17 SB project originally budgeted $45 Mil. for construction, anticipated overrun of about 5%.

Lessons Learned, Cataract Lake

- I-40 Cataract Lake project has performed well.
- The roadway surface currently shows insignificant signs of wear or distress.
- Cement treatment of base materials has proven to be a cost effective method for base improvement.

Questions?