PCC Overlay IA 3 in Iowa

Accelerated staging

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IA 3 Overlay

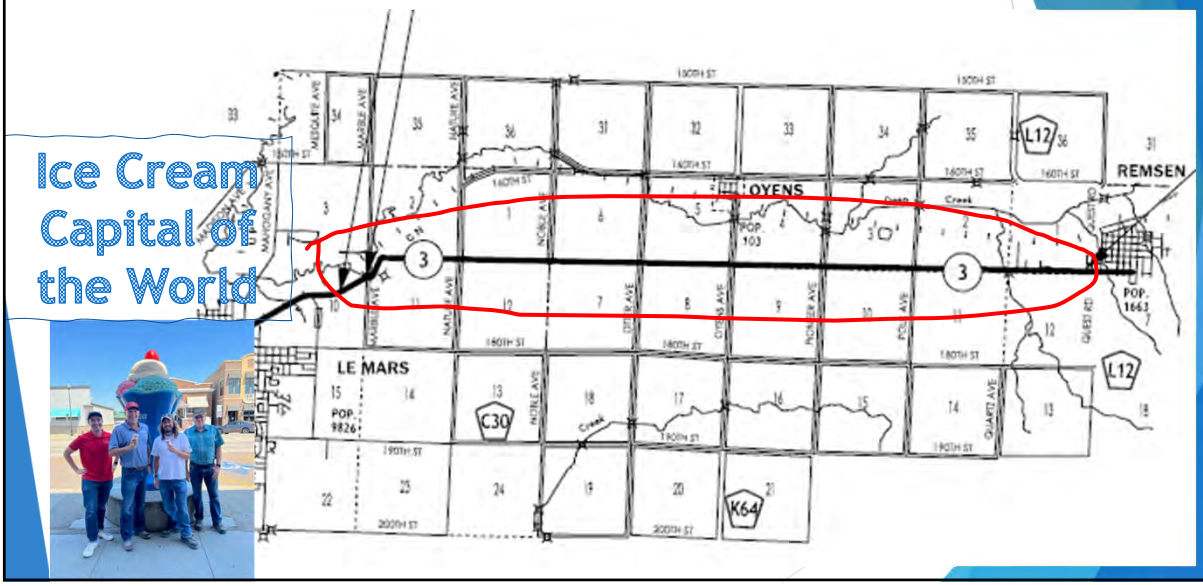
- Concept
- Construction
  - PCC overlay typical (historical)
  - PCC overlay new theory
  - HMA overlay typical
- Materials Data
- Conclusions

What are we trying to research?

- Compare PCC overlay construction times to other overlay schedules.
- Accelerate project schedule while maintaining quality project and increasing safety.

Project Location

Ice Cream Capital of the World



Project typical

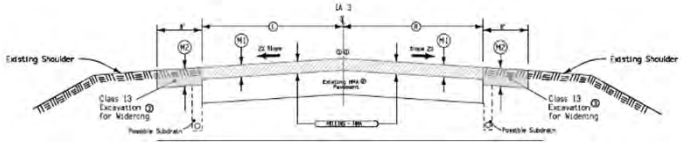
Old DOT Philosophy

- PCC overlay – like a PCC Reconstruction
  - Close the road from end to end for months to allow contractor to do everything safely under closure.
  - Traffic out of distance detoured for most of a summer
  - Local traffic mixing with construction traffic
  - Communicate…

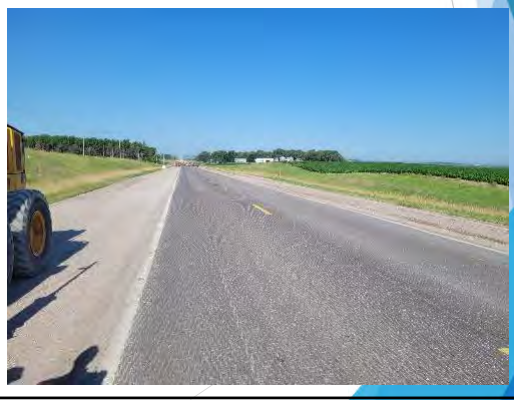
Standard PCC staging plan

DESIGN DATA RURAL		
2023 AADT	3940	V.P.D.
2043 AADT	4040	V.P.D.
20-- DHV	--	V.P.H.
TRUCKS	9	%
Total Design ESALs	--	

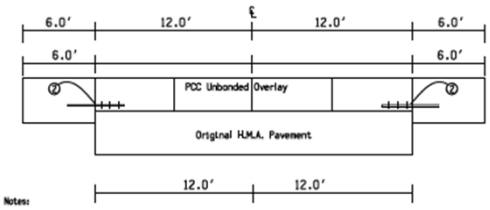
Profile Milling



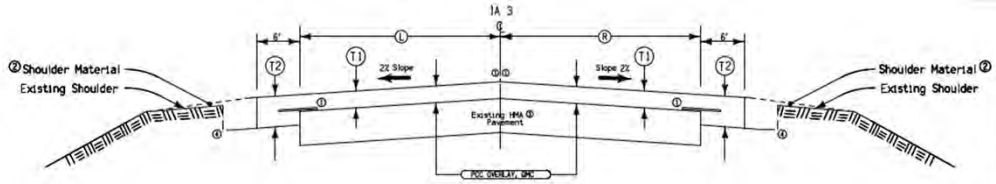
2-inch nominal milling of existing HMA



Design



- Originally designed as 12' x 12' panels with 6' shoulders and macrofibers
- Fibers were removed to save money. Design changed to 6' x 6' panels.



Old DOT philosophy

Close the road for **60 working days (90 calendar days)** to complete all the work associated with the overlay

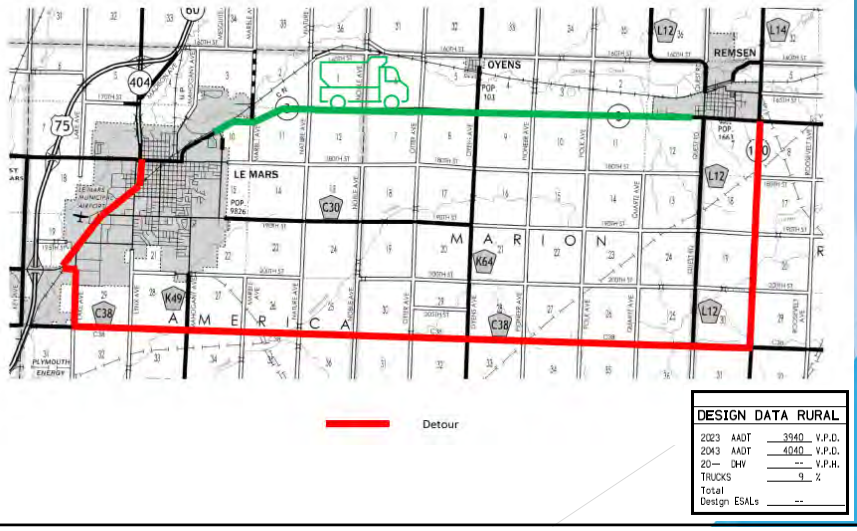
Local Traffic only from end to end of the project the entire duration

LDs for days over contract period

Test DOT Philosophy

- PCC overlay – Accelerated Construction Schedule
  - Allow some work to be done under lane closures and pilot vehicles as appropriate
  - Traffic detoured for the shortest amount of time possible
  - Reduce impacts to local traffic
  - Communicate…

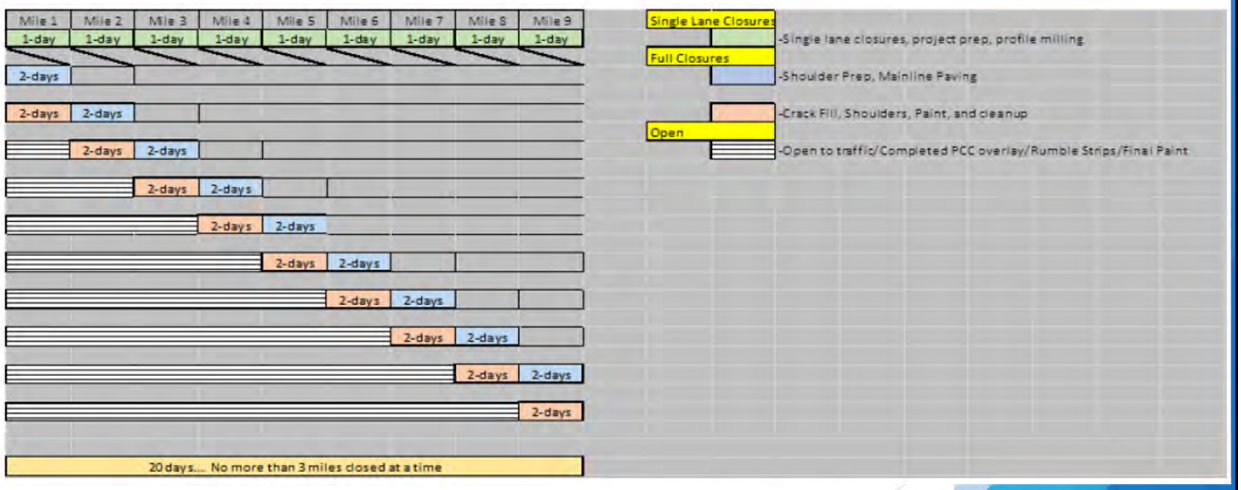
Accelerated staging



Test DOT philosophy

- Close the road for **24 calendar days** to thru traffic
- Maintain traffic up to 1 mile ahead and 1 mile behind paving/finishing operations (3 mile moving closure)
- Keep project finishing details as close as possible to the paving operations
- Heavy incentives/disincentives for time over contract period

Original Placement Concept



Staging notes

108-26A
08-01-08

STAGING NOTES

•General Requirements
The purpose of this project is to demonstrate accelerated construction of PCC Overlays with limited roadway closures and accelerated construction. The intent of the project is to have IA 3 mainline closed for a maximum of 24 calendar days, with no more than 3 miles closed at any one time. Access to homes and businesses must be maintained as much as possible.
To aid in the opening of the pavement to traffic the TTF for allowing traffic the flexural strength requirement will be lowered to 325 psi.
A global detour will be in place for mainline paving. The intent is that traffic will be returned to IA 3 as soon as possible.

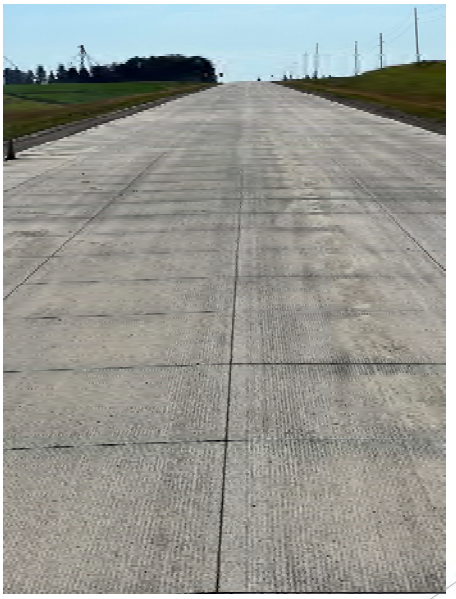
IA 3 Closure and Staging Requirements (Site 01)
Less than 3 miles closed at a time
A work plan must be submitted and approved by the engineer
The work plan shall be submitted 14 days prior the preconstruction meeting.
The work plan must be approved by the engineer 14 days prior to the start of the detour of IA 3.
It must meet the staging requirements
Work items and the sequence of work clearly defined.
Have a schedule that meets the time periods of the contract sites.
A public coordination plan must be included that details public contacts with home and business owners along IA 3 and a plan on how they will access public roads during construction.
Traffic control must be clearly detailed.
Safety measures, pre-project safety meeting and daily safety meetings must be part of the work plan.
Survey for the profile milling shall be done using mobile equipment so as not to expose crews or traffic to disruption and work zones. (Check with industry)
Profile milling can be done prior to the detour of IA 3 and the 3-mile maximum closures for paving.
Work done as part of the 3-mile maximum closure shall include trimming of granular shoulders for PCC Shoulders, PCC Overlay, sawing, crack sealing, temporary painting, paved shoulders and granular shoulders.
Rumbles and final painting can be done after IA 3 is opened to traffic.
The intent is the 3-mile maximum closure shall be a rolling closure, with a new mile being closed as the last mile is being opened.

K64 (Site 02)
Maximum of 7-day closure
Plymouth County responsible for detour

Other side roads (Site 03)
No more than 2 consecutive sideroads can be closed at a time
Maximum 7-day closure on any one sideroad

Determining success

- Instrumentation (strain gauges) in overlay
- Traffic study/review (no accidents!)
- Less impact to the community/travelers
- Communication review
- Feedback from DOT inspection staff
- Feedback from homeowners/businesses
- Feedback from County



Key strategies

- Required work plan
- Required Communications plan
- Strict lane closures, no more than 3 miles
- Maturity strength for opening reduced from 500psi to 325psi

CROELL

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P.O. Box 430
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Resident along Hwy 3,

Very shortly we will begin construction on Hwy 3 from Le Mars to Remsen. Surveyors have already been working, setting monuments next to the shoulders, along the road, that will be used during construction. June 20th, we plan to start milling the road using single lane closures. We plan to close 1 lane for a mile at a time, moving through the project. This portion of construction should take 2 weeks to complete. **We ask that you travel cautiously through the road during construction.**

After July 4th weekend the construction of a new 36' concrete road will start. We will pave the full width of the road with 8' shoulders all at once. The project is being built under an accelerated work schedule which means we will be shouldering and opening newly constructed portions daily. We hope to complete all the new Hwy 3 mainline in 21 days.

Immediately after Hwy 3 paving, the intersection of K64 will be reconstructed to match the new roadway. We plan to have K64 closed for 7 days. All the intersecting roads will get new paved intersections also.

As we pave past your residence you will need to access your residence from the shoulder on the same side of the road where you live, and travel to the nearest side road and away from Hwy 3 to detour around. The shoulders should be between 8 and 10' wide so you will not be able to meet any vehicles. Please watch what's coming down the shoulder before traveling in or out. You will not be able to cross the new road at your residence or drive on the new concrete for approximately 30 hours. We may be able to adjust this number but will not know what it is until we start paving and get some test data established. I will do what I can to keep you informed as to what portions of the new road are able to be driven on.

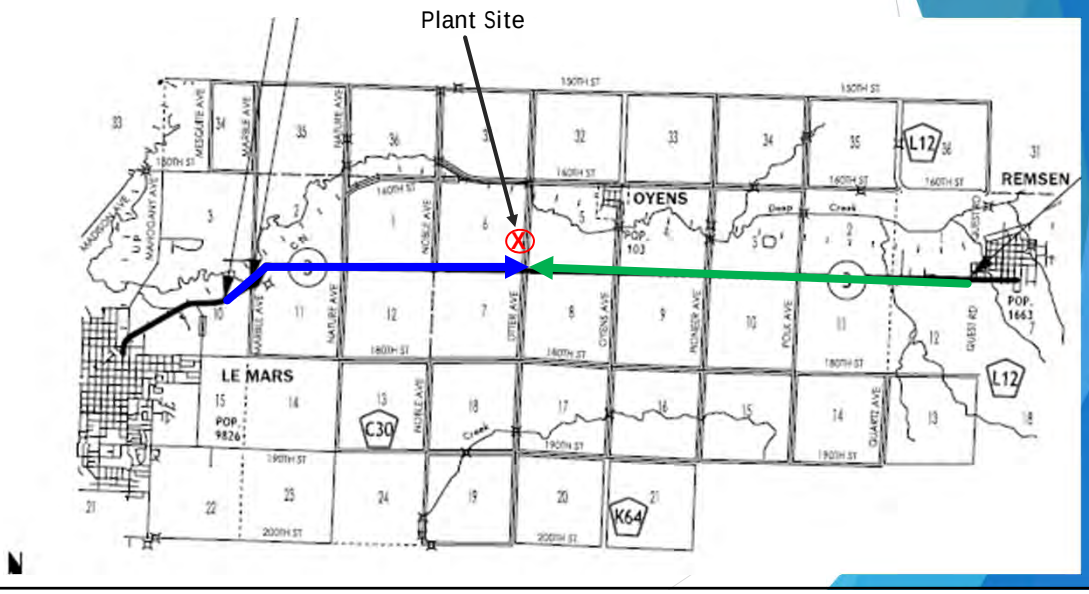
In order to stay in contact with you during this process I ask that **you please send me an email with your name, address and phone number, or a text with your name, address, and email. My email address and cell phone number are below.** I plan on sending out emails to all residents almost daily when we get to concrete paving, to let them know the progress of the project, and where you can and cannot drive. We will build rock ramps at the intersections and at your driveways once we can safely get a dump truck onto the new road. Keep in mind that this is under construction. **Please travel with caution.** Until shoulders get placed there will be a 9" drop off on the edge of the road.

We understand this may be an inconvenience through this process, feel free to contact me with any questions. Thank you.

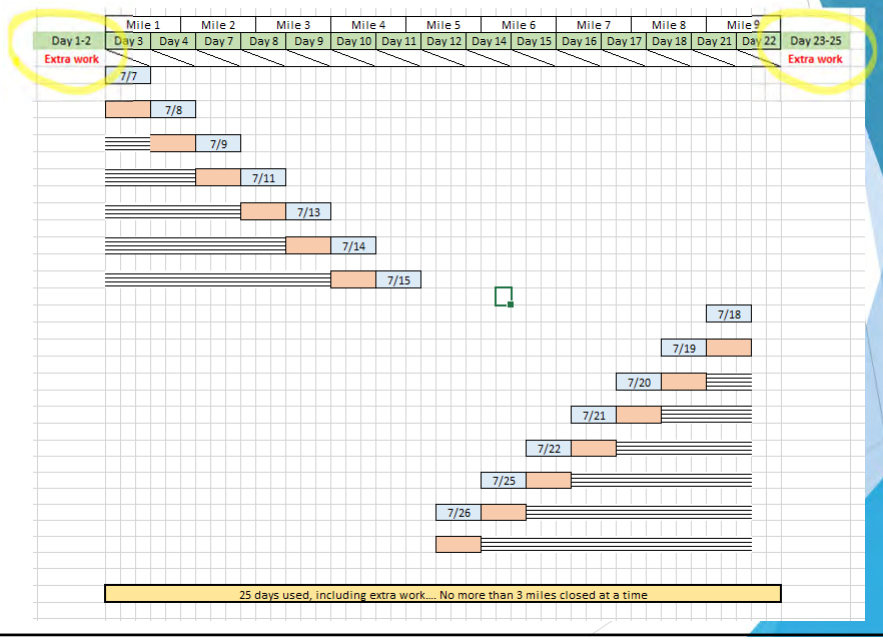
Jason Meihost
Project Manager
2010 Kenwood Avenue
New Hampton, IA 50659
Mobile: 319-530-5760
Jason.meihost@croell.com

Open Communication

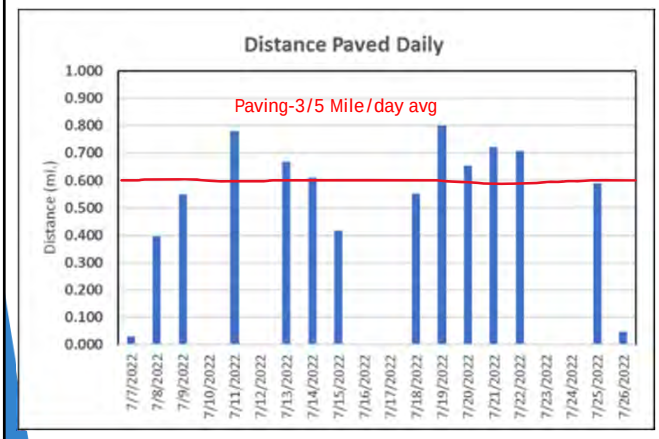
Actual Placement

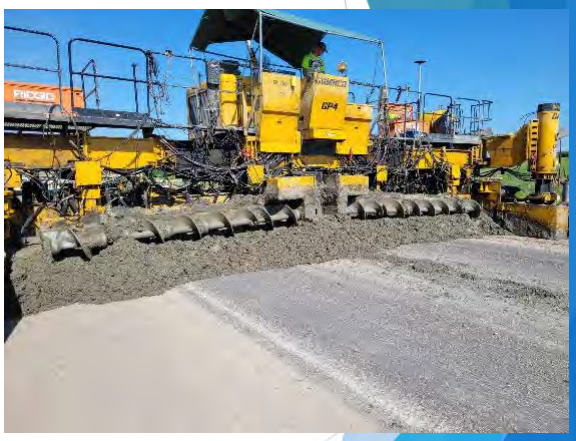


Actual Placement

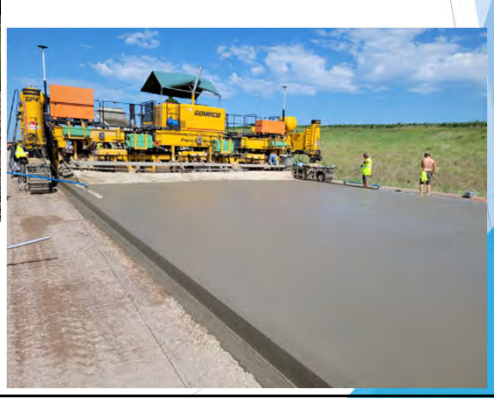


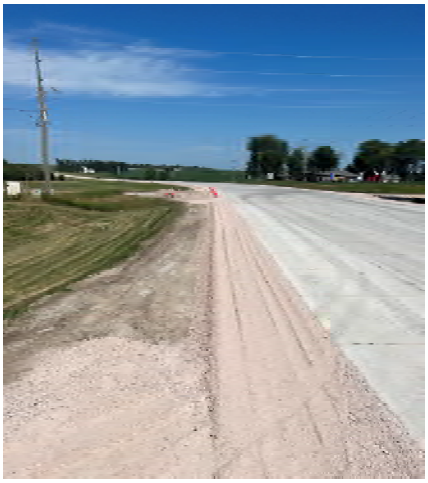
Pavement Placement





Paving Pics





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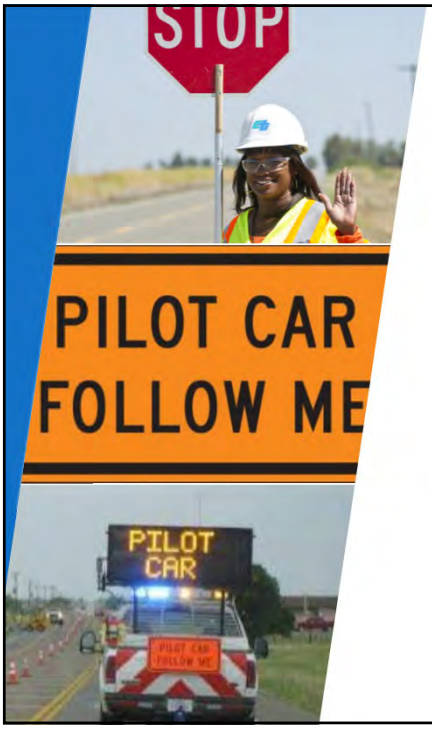
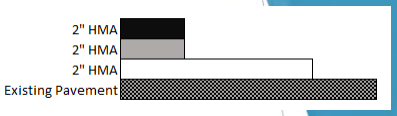
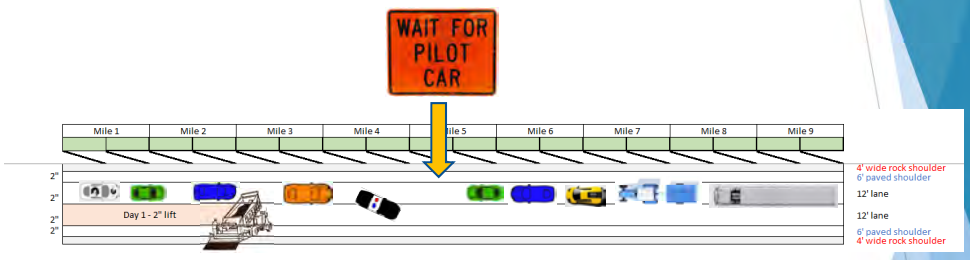


DOT Philosophy for HMA overlays

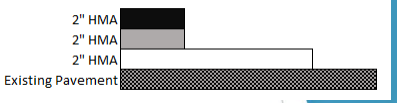
- HMA overlay –
  - Allow for single lane closures
  - Traffic stopped and controlled with flaggers and pilot cars
  - Local traffic mixing with construction traffic
  - Local traffic within inches of construction traffic

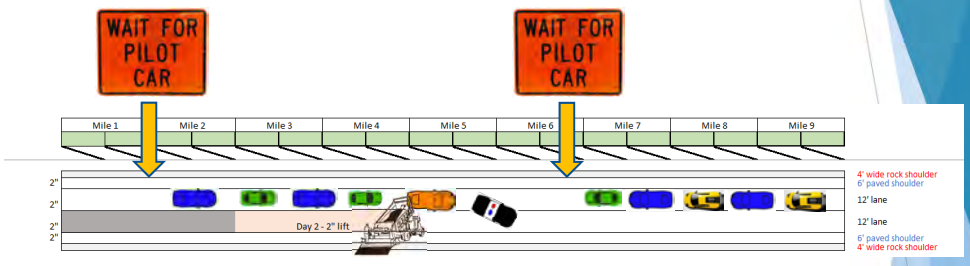
2” Overlay – day 1



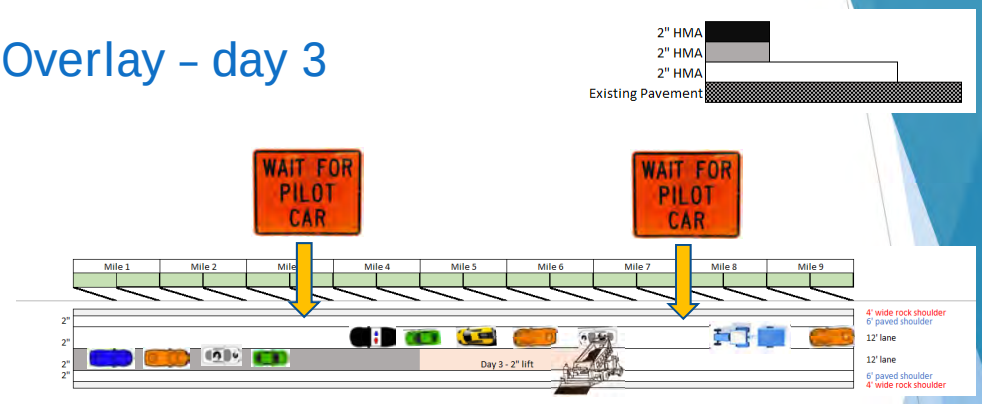


2” Overlay – day 2





2” Overlay – day 3



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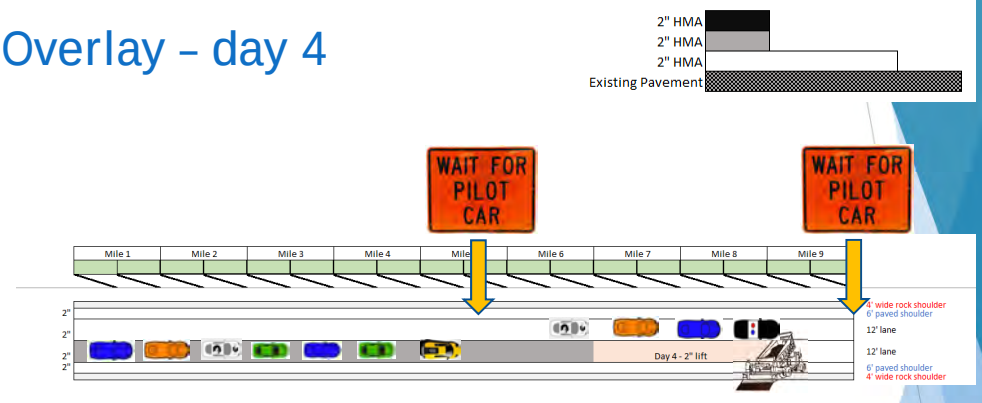

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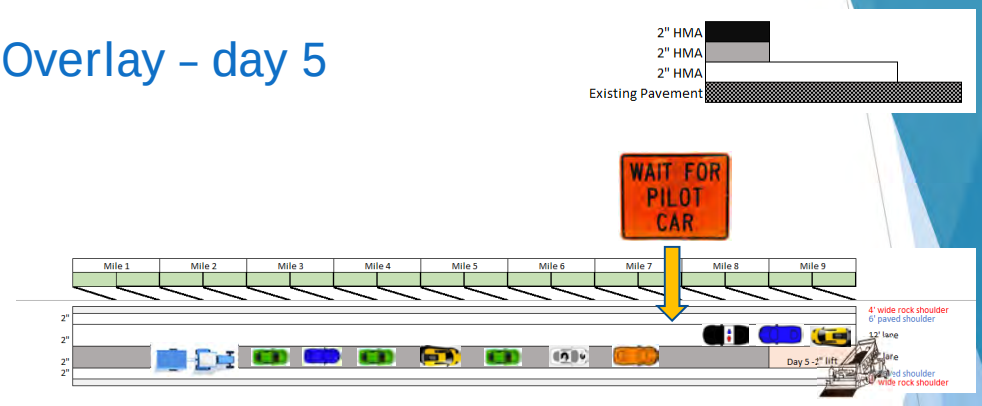

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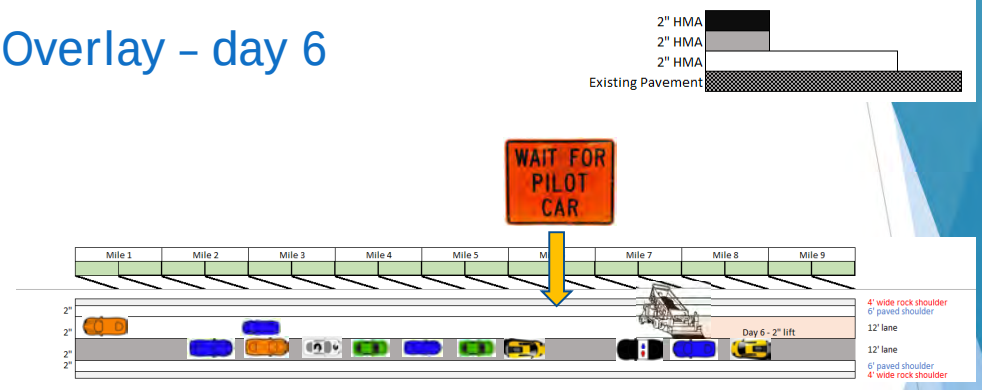

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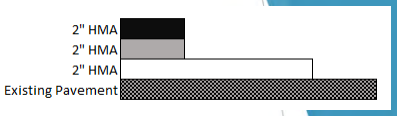

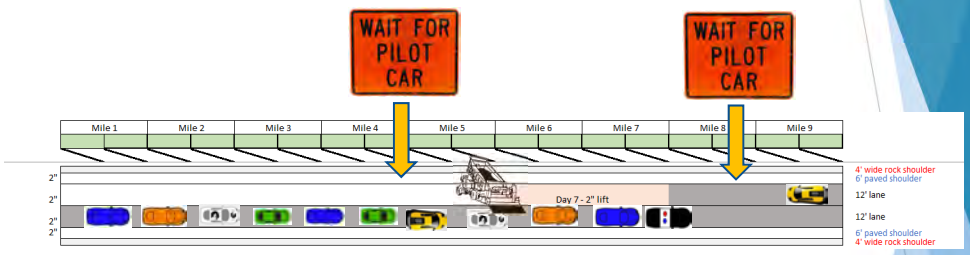

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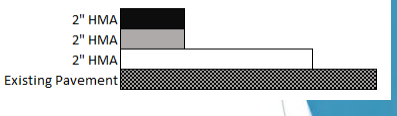

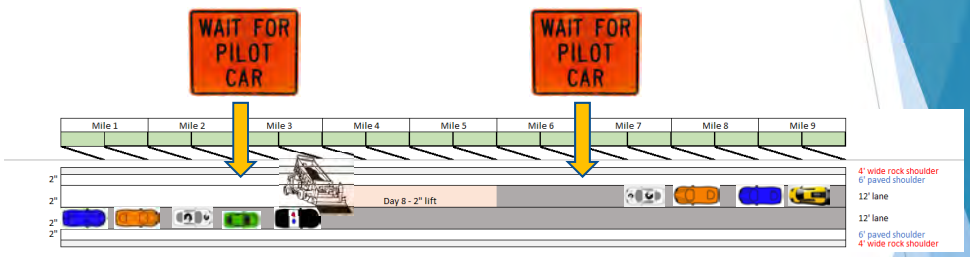

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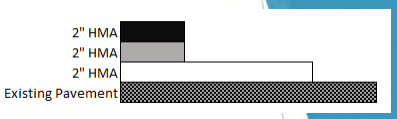

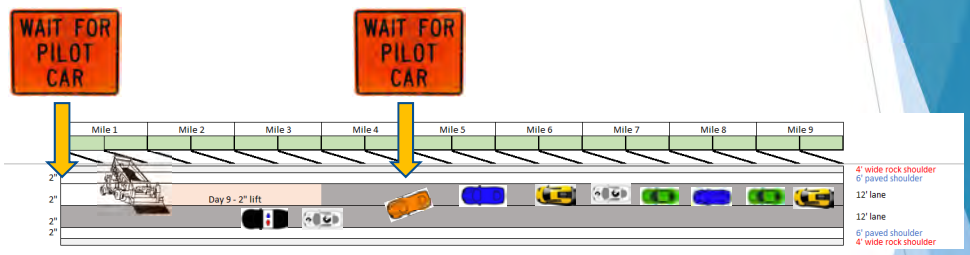

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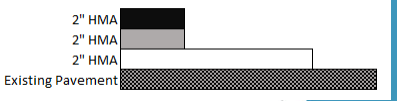

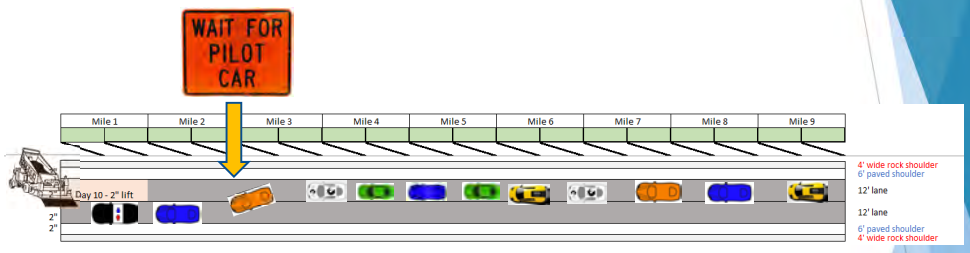

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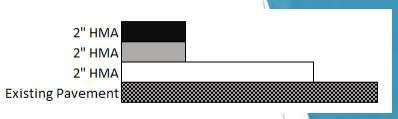

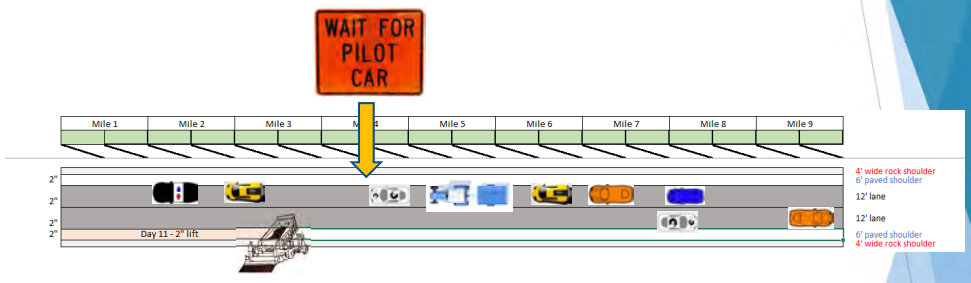

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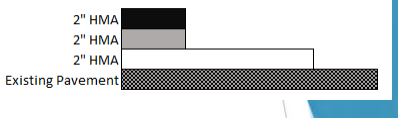

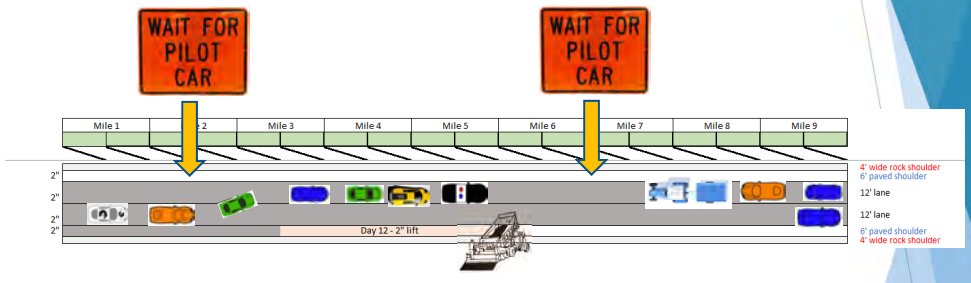

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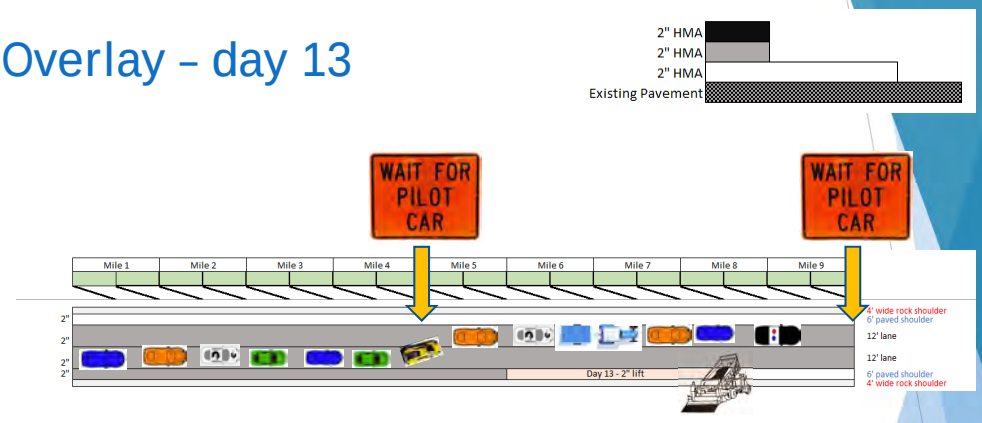

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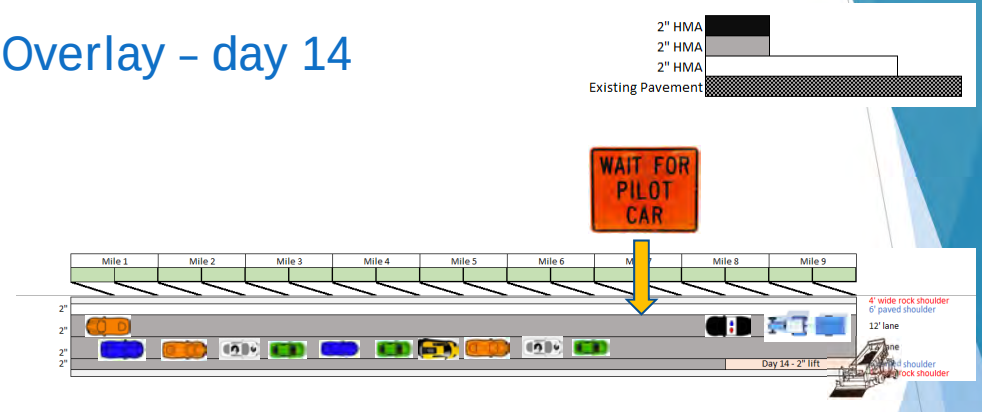

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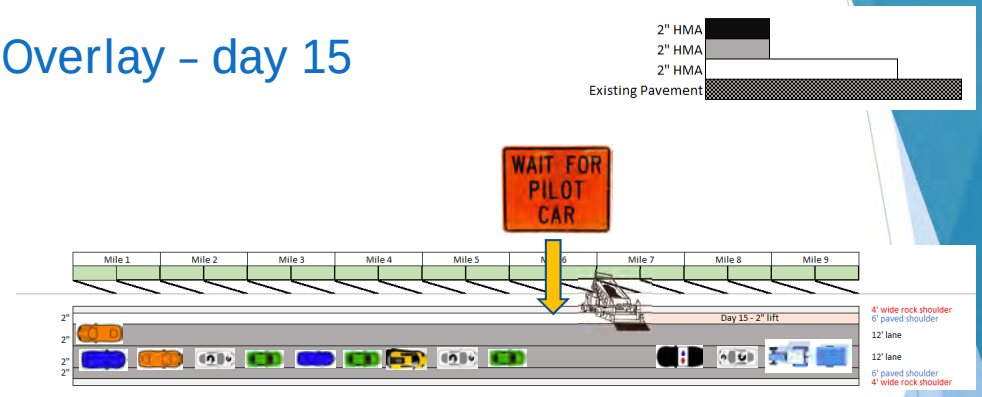

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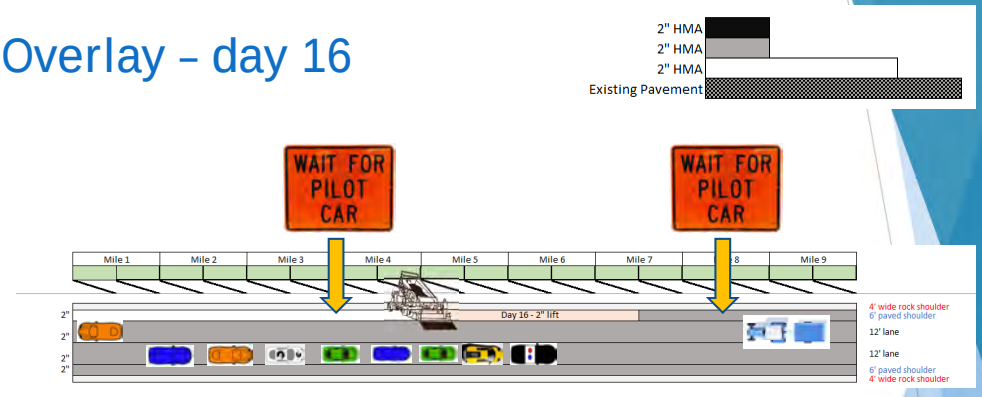

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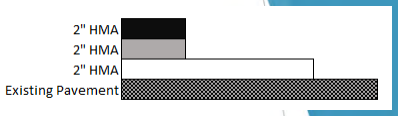

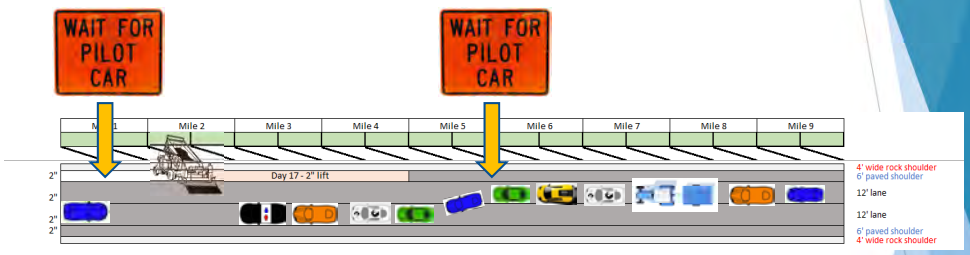

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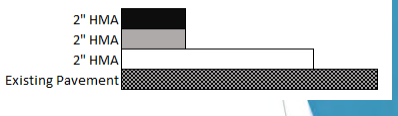
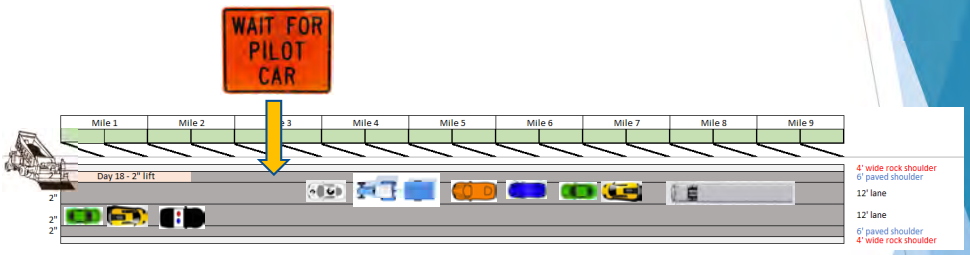
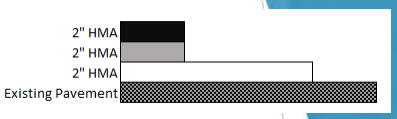
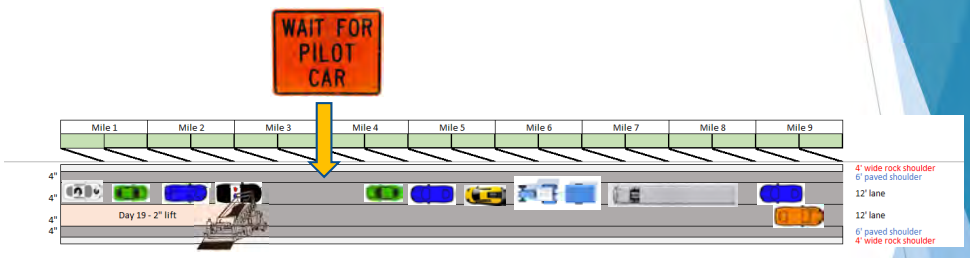


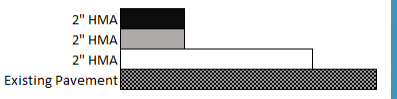


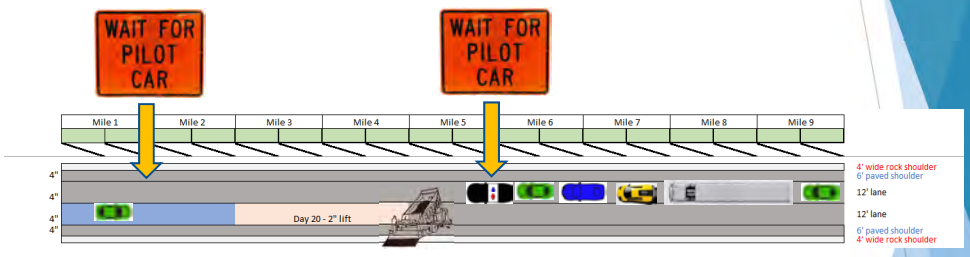
2” Overlay – day 19



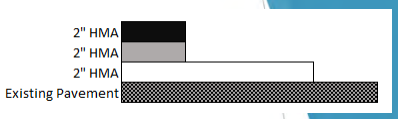


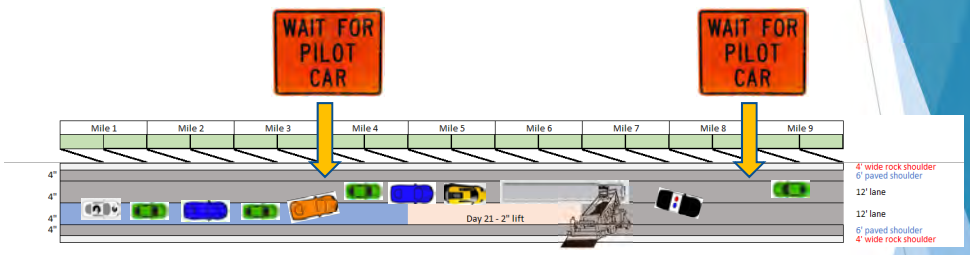
2” Overlay – day 20



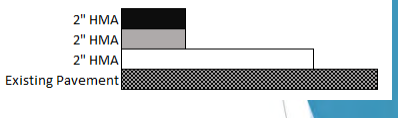


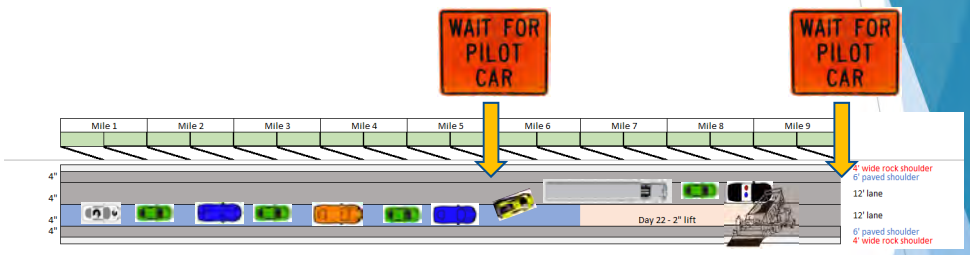
2” Overlay – day 21



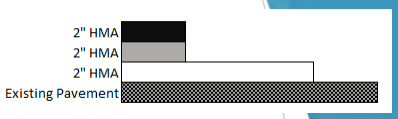


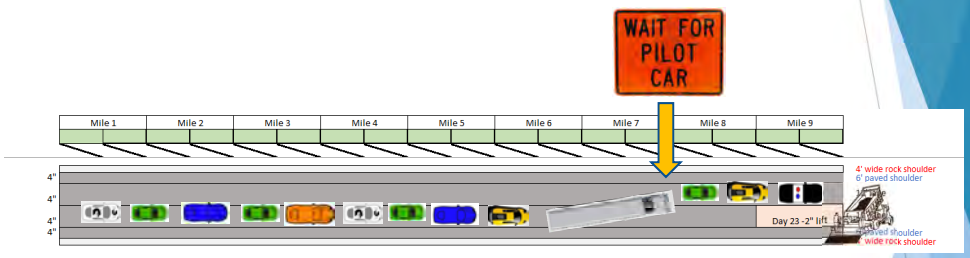
2” Overlay – day 22



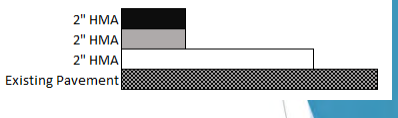


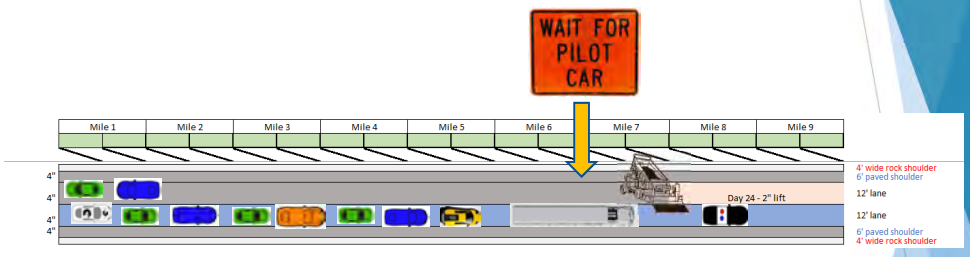
2” Overlay – day 23



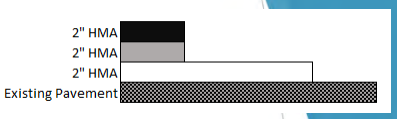


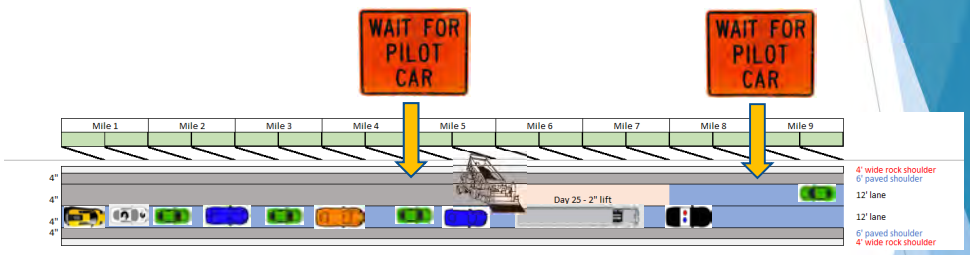
2” Overlay – day 24



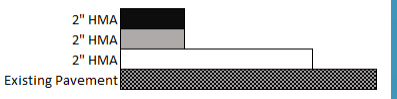


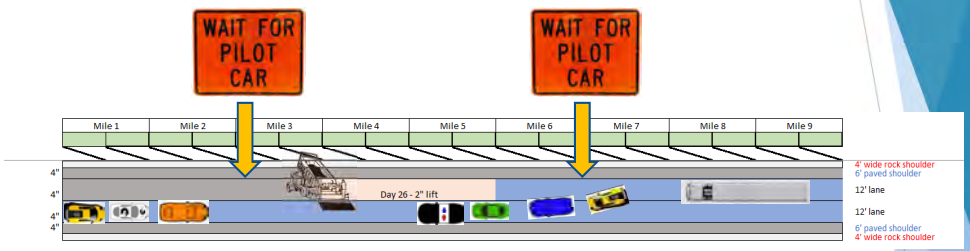
2” Overlay – day 25



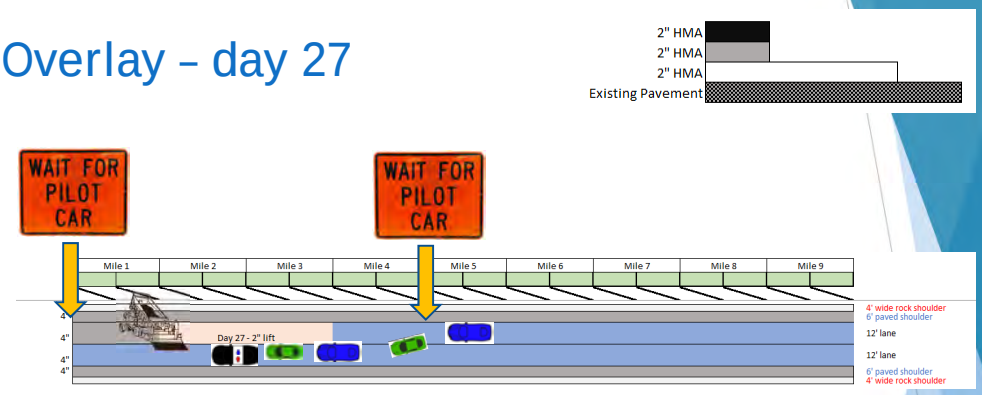


2” Overlay – day 26

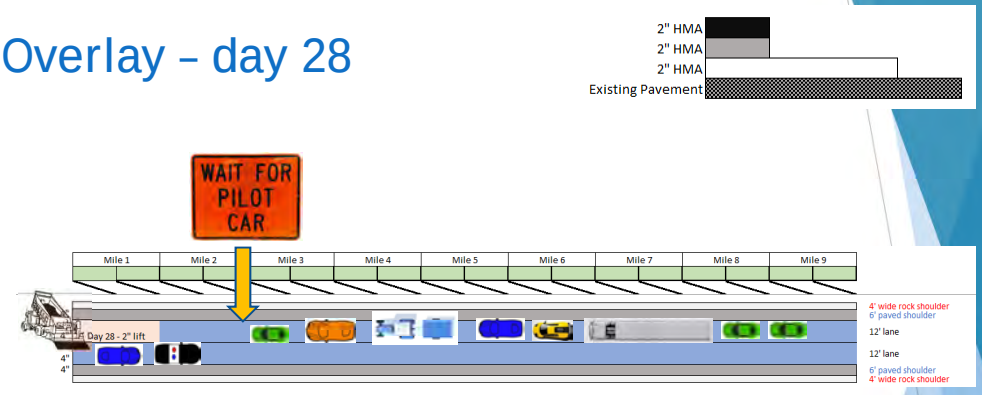




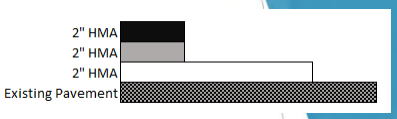
2” Overlay – day 27

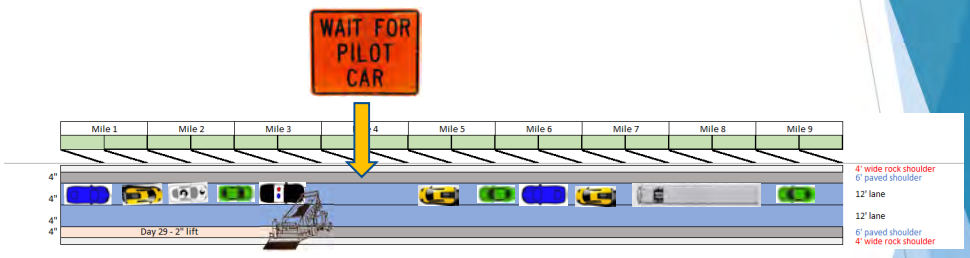


2” Overlay – day 28

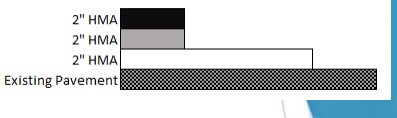


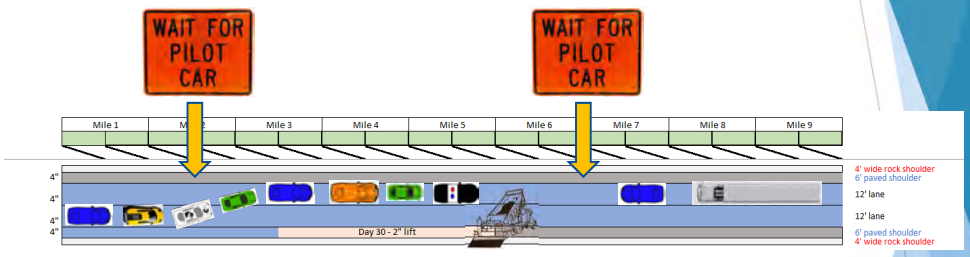
2” Overlay – day 29



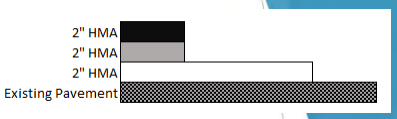


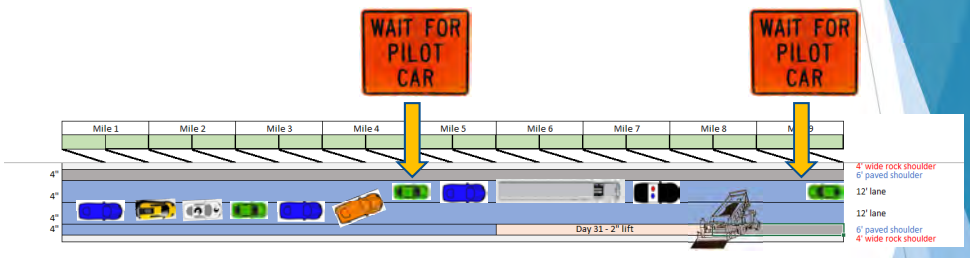
2” Overlay – day 30



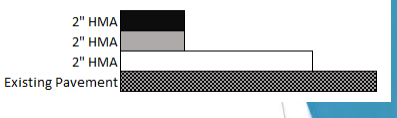


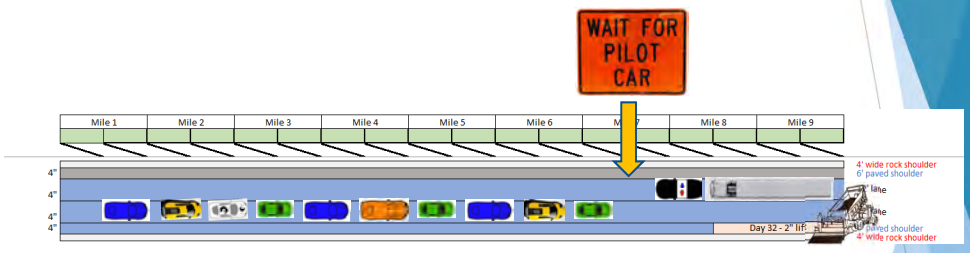
2” Overlay – day 31



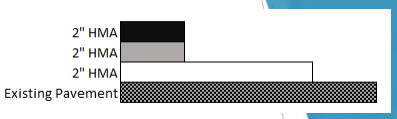


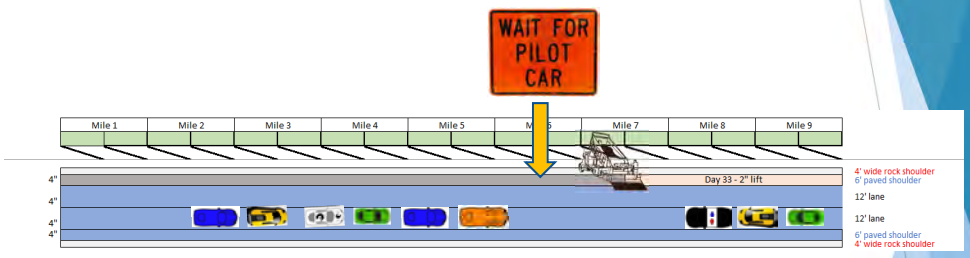
2” Overlay – day 32



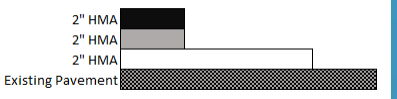


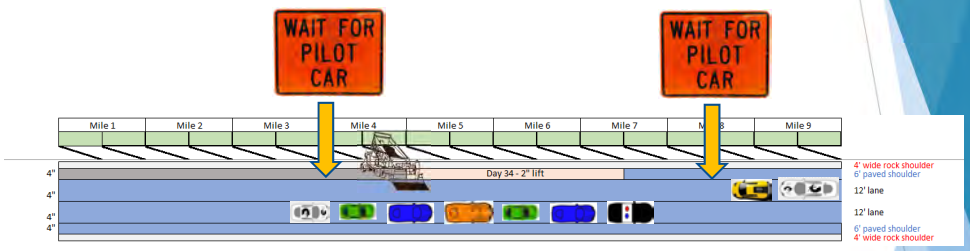
2” Overlay – day 33



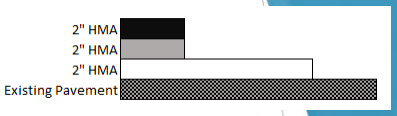


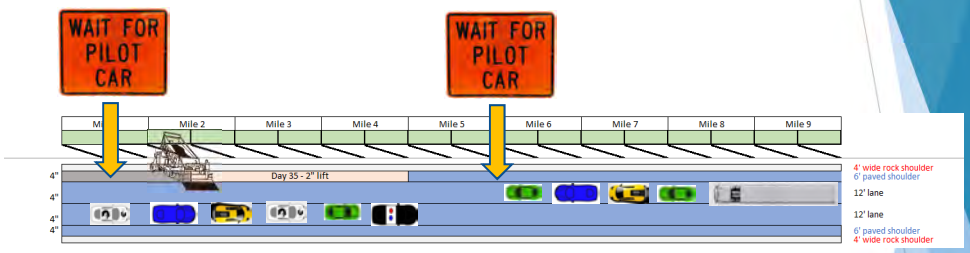
2” Overlay – day 34



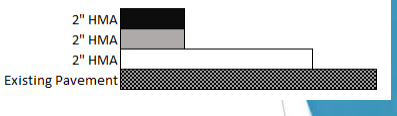


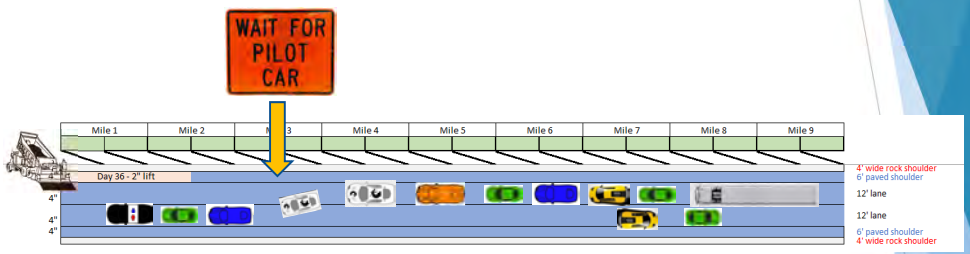
2” Overlay – day 35



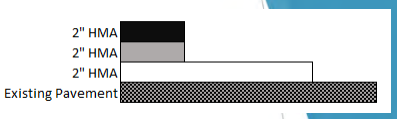


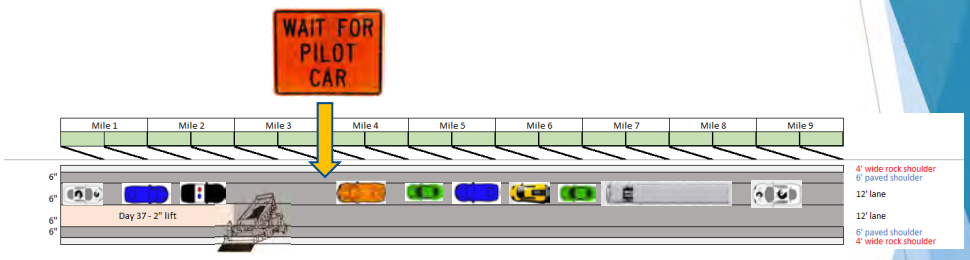
2” Overlay – day 36



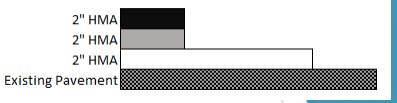


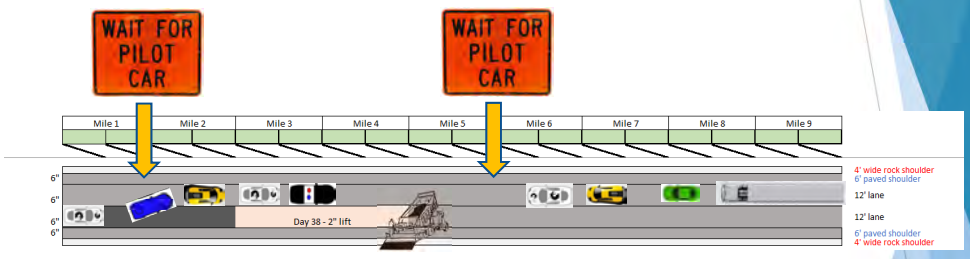
2” Overlay – day 37



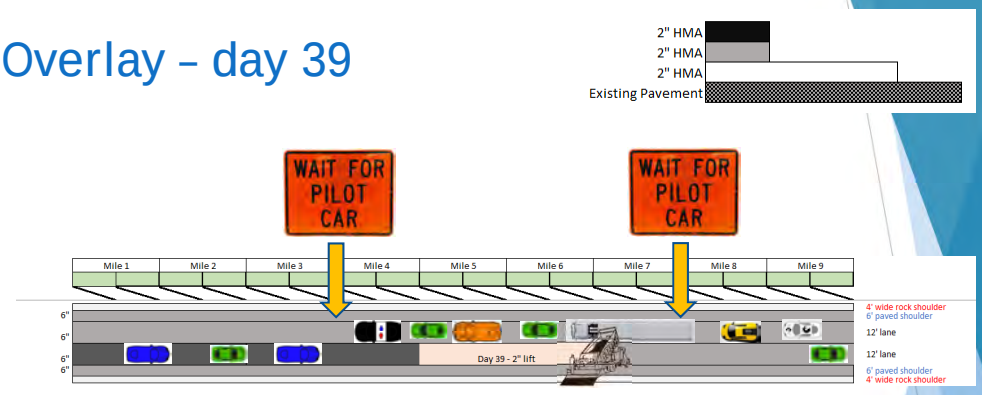


2” Overlay – day 38

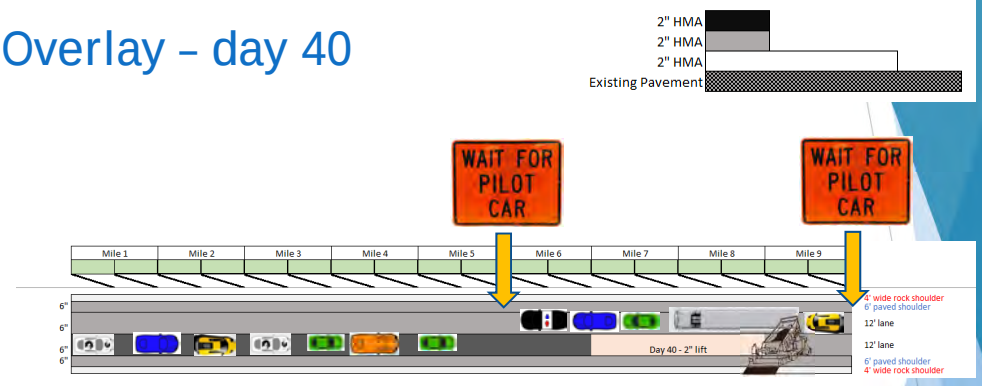




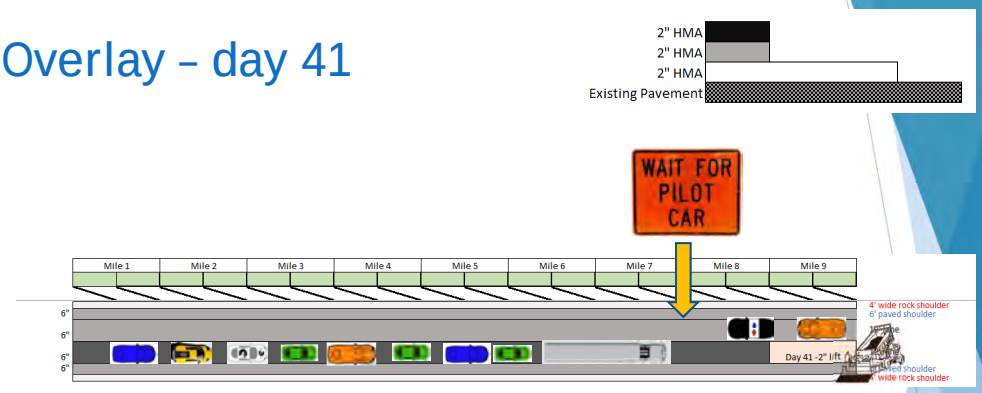
2” Overlay – day 39



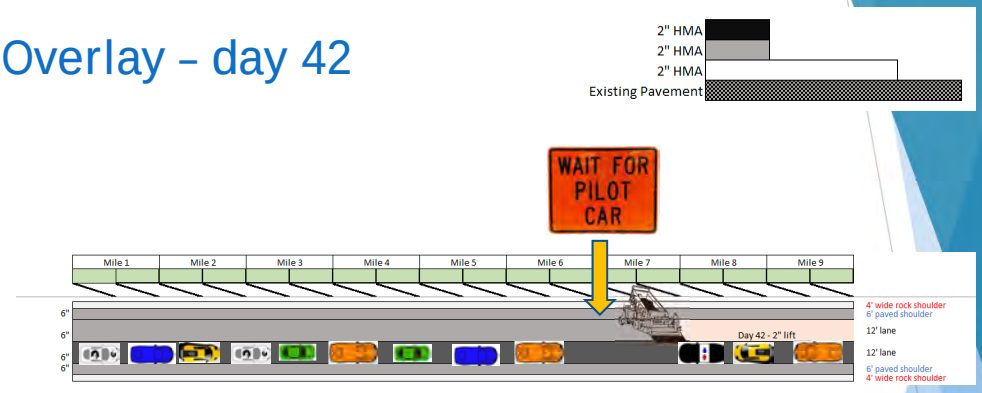
2” Overlay – day 40



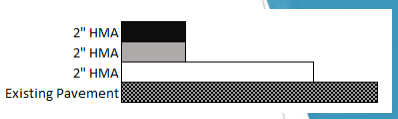
2” Overlay – day 41

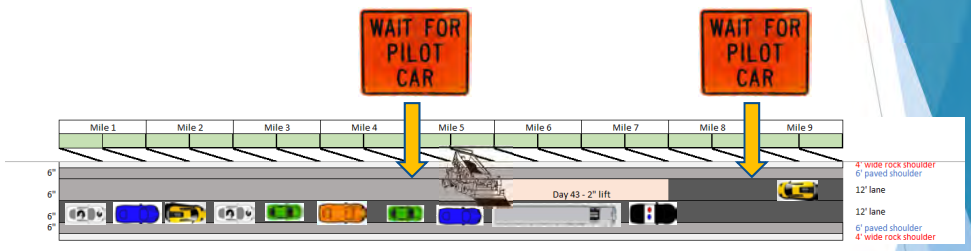


2” Overlay – day 42

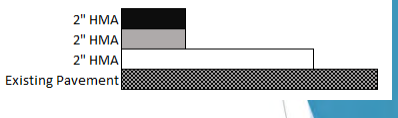


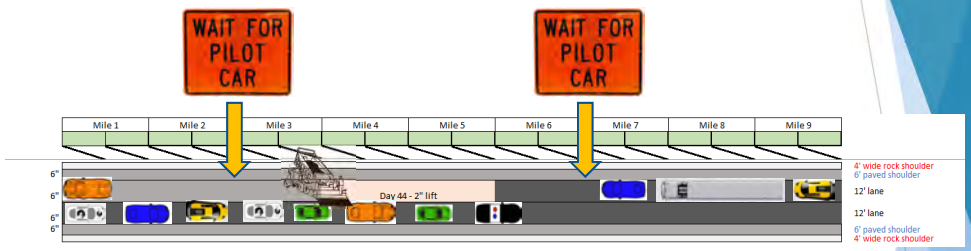
2” Overlay – day 43



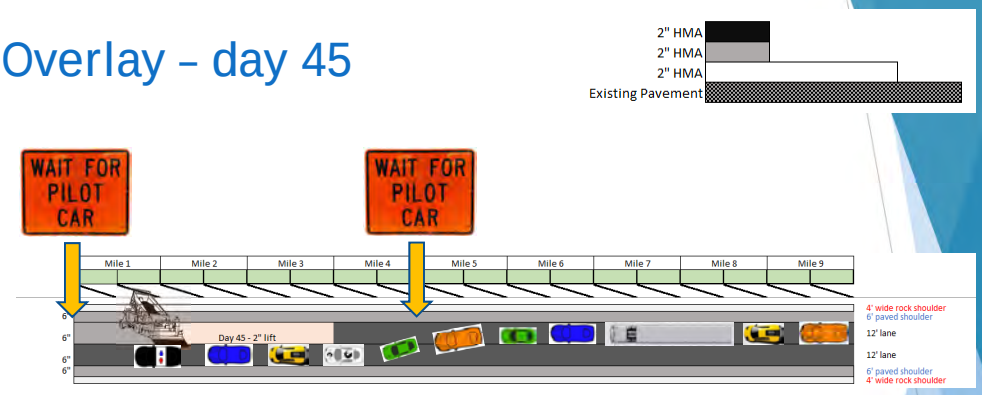


2” Overlay – day 44

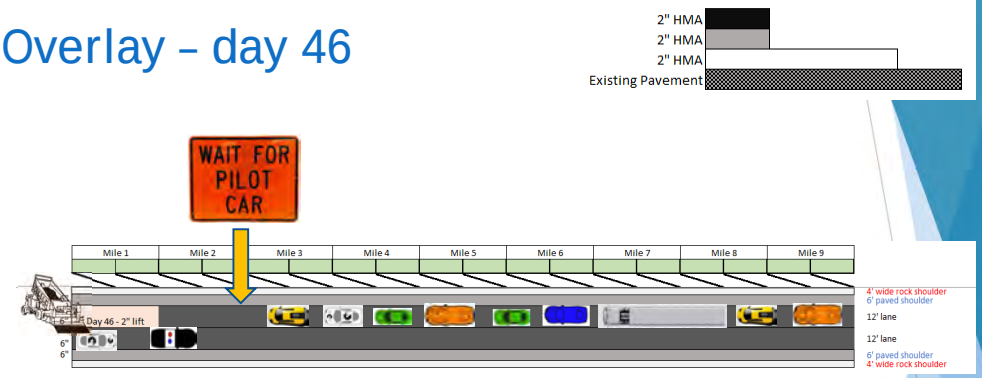




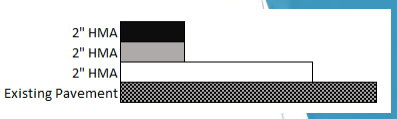
2” Overlay – day 45

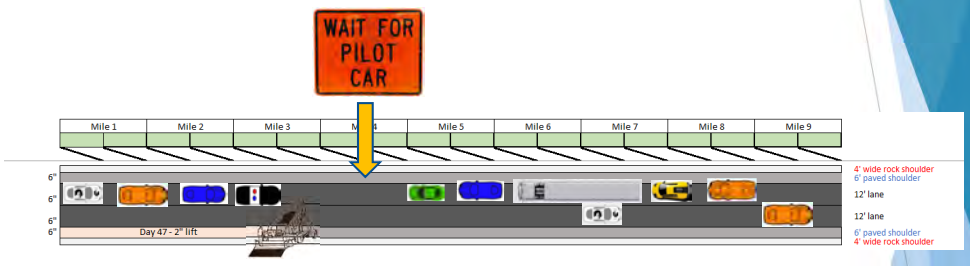


2” Overlay – day 46

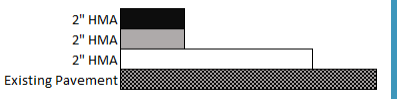


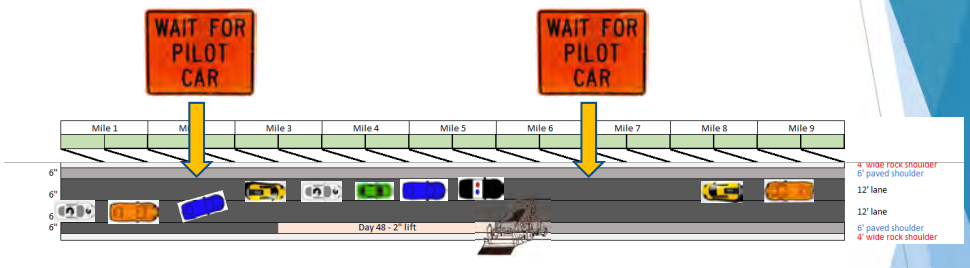
2” Overlay – day 47



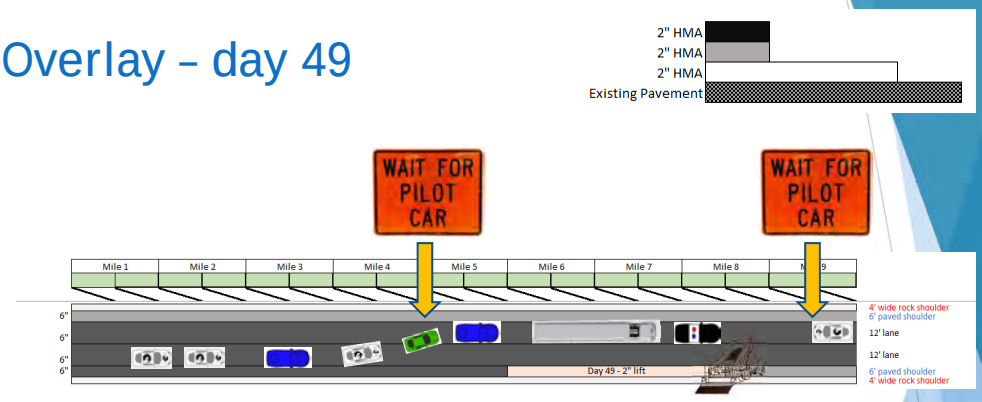


2” Overlay – day 48

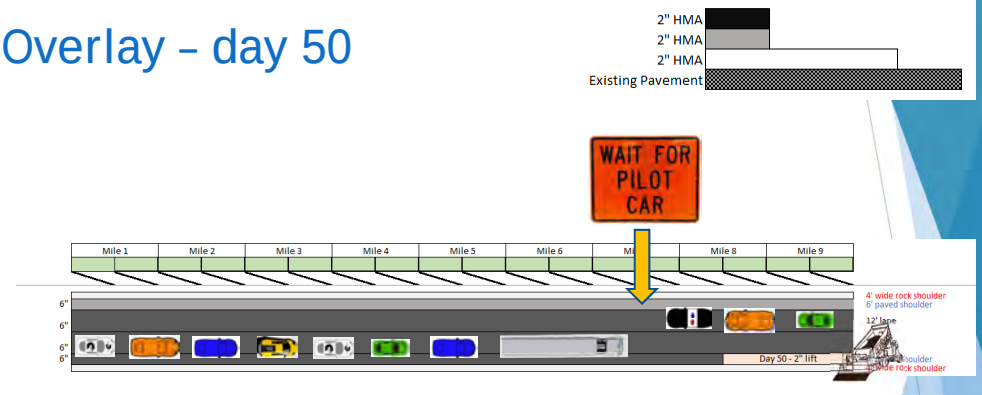




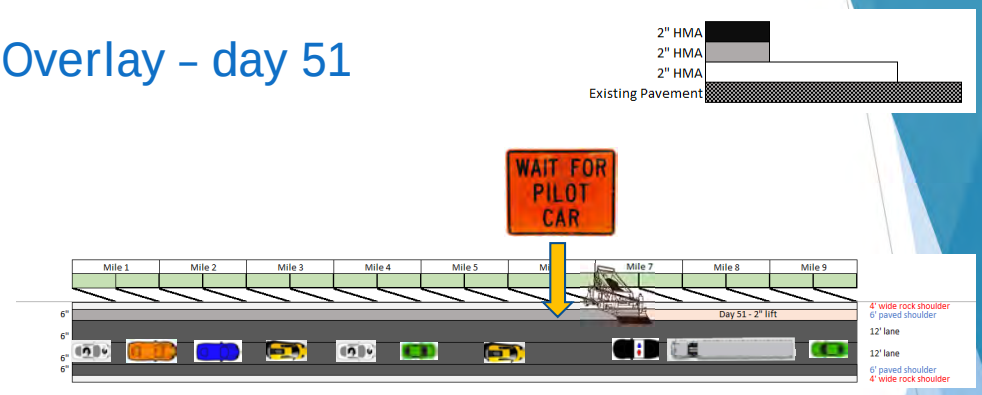
2” Overlay – day 49



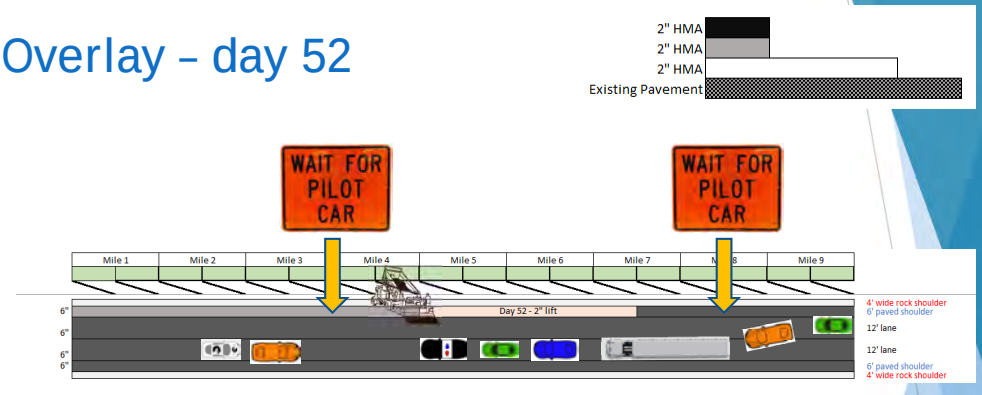
2” Overlay – day 50



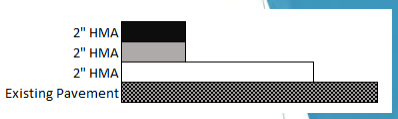
2” Overlay – day 51

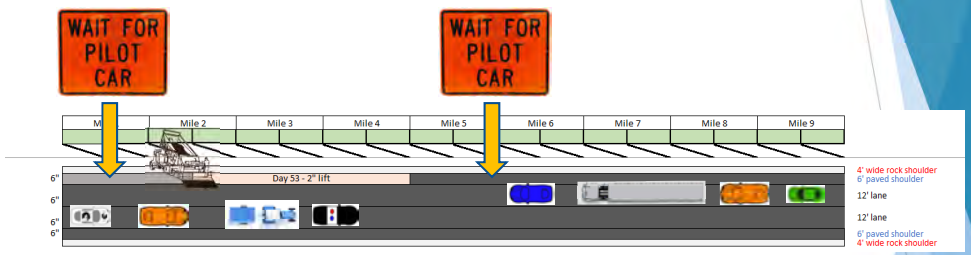


2” Overlay – day 52

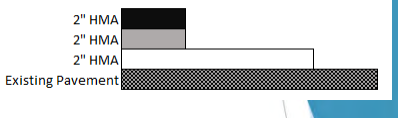


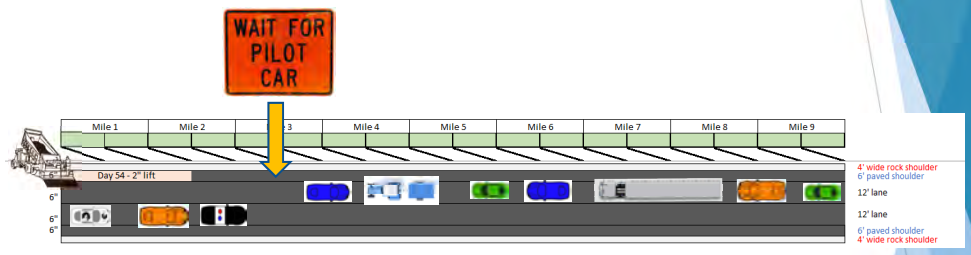
2” Overlay – day 53



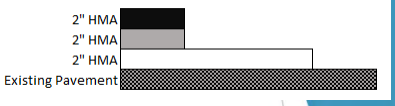


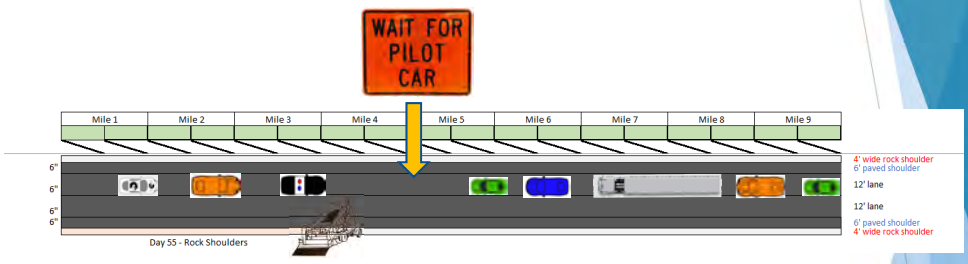
2” Overlay – day 54



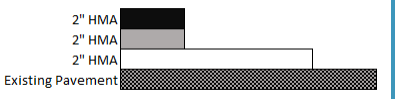


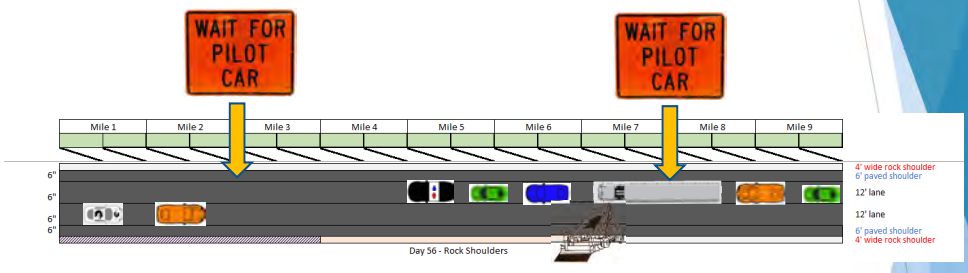
Rock Shoulders– day 55



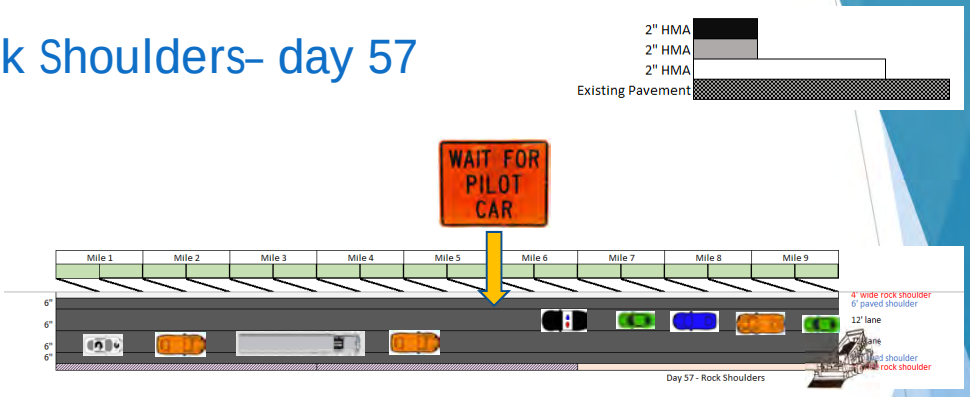


Rock Shoulders– day 56

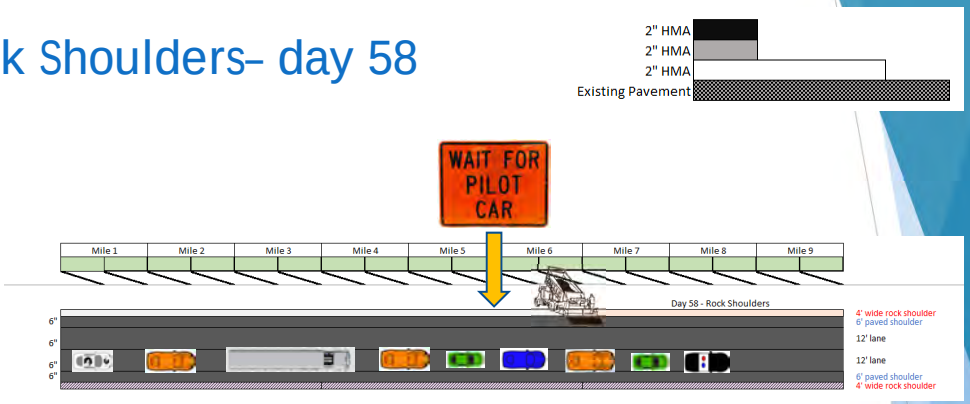




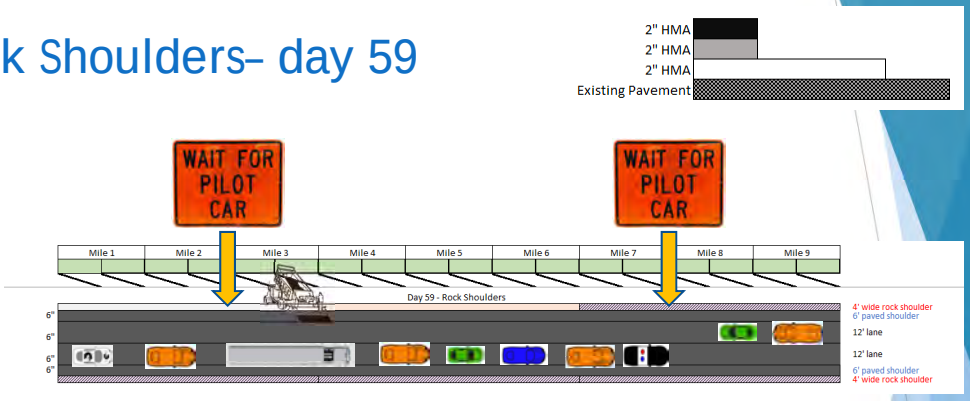
Rock Shoulders– day 57



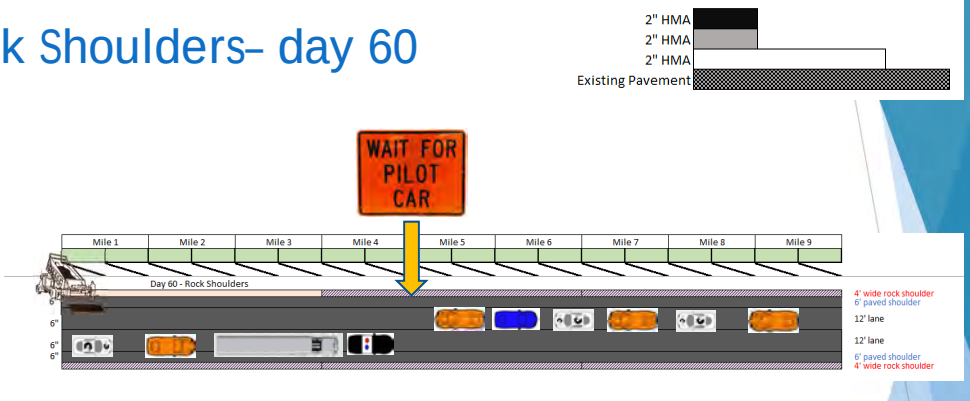
Rock Shoulders– day 58



Rock Shoulders– day 59



Rock Shoulders– day 60



Comparison times – Does it work?

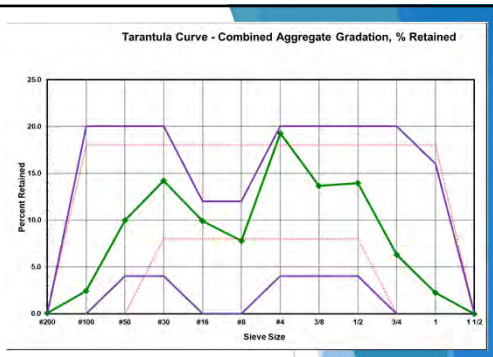
- Conventional HMA Overlay – 60 days of work – Roughly 90 calendar days – Traffic single lane
- Conventional PCC Overlay - 60 days of work – Roughly 90 calendar days – Traffic Detoured
- Accelerated PCC Overlay – 25 days of work = 25 calendar days – Thru traffic detoured with minimal closures

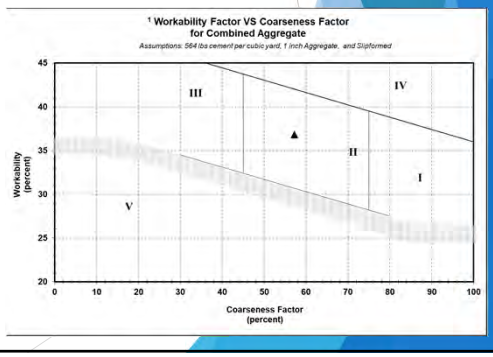
How did we get it done

Mix Design

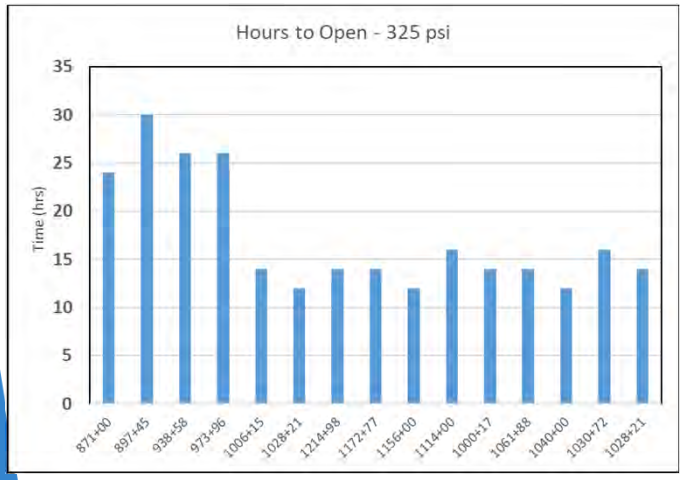
Material	lb/cy
Cement	448
Fly ash	112
Water	224
Coarse Gravel Agg	1413
Intermediate Pea Gravel	378
Fine Agg	1339

- Supposed to get Type IL, Type I/II supplied
- Class C fly ash 20%



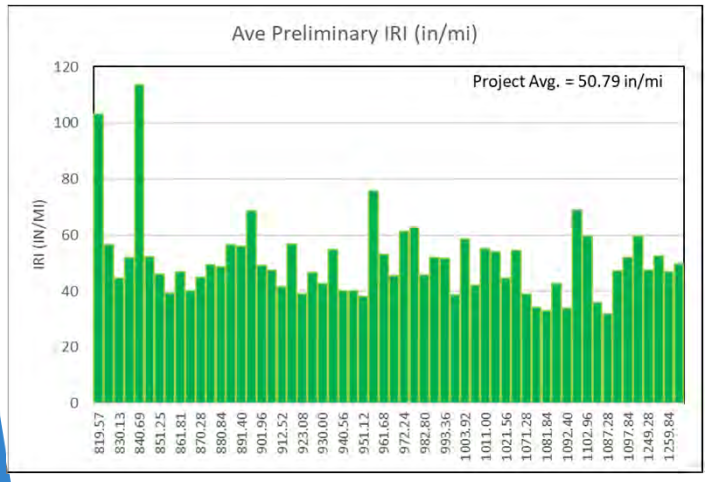


Time for Opening to Traffic



- Initially using higher dosage of retarder
  - Opening TTF =1102 °C-hr
  - 24-30 hours to open
- Switched to hydration stabilizer
  - Opening TTF =575 °C-hr
  - 13-16 hours to open
- 150 psi for sealing equipment

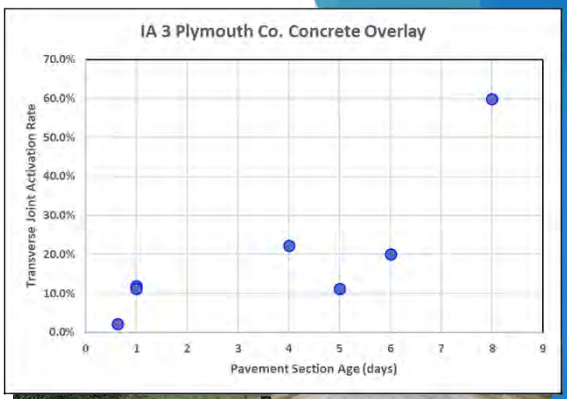
Smoothness



- Beginning of project had mix issues, required diamond grinding
- Average preliminary IRI for project was 50.79 in/mi

MIRA Testing – Joint Activation

- Early Joints likely to be wider
- Generally, every other joint activated
  - Occasionally every 6ft.
- 12 x 12 ft. panels okay



Under Slab

- Strain sensors under slab
- Loaded truck at 24 and 48 hrs.
- Results somewhat noisy data
  - Sensors?
- Very minimal strain at bottom of slab
- *Thanks* to MNDOT Tom Burnham for equipment

Conclusions

- Concept worked well
  - Issues with material supply
- 28 days allowed and opened in 25 days – Much faster than traditional HMA or PCC overlay options
- 12 x 12 ft panels viable option
- Very good way to reduce traffic impacts while increasing safety
- Get in/get out

How-to manual

- Find a great candidate project PCC overlay
- Design a concrete overlay
- Write spec requirements for contractor to schedule project tightly
- Enjoy your new PCC overlay for years to come!

Questions