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South Portland, Maine



Accelerated Concrete Pavement Rubblization and HMA Overlay

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Existing Pavement

- Constructed in 1970's
 - 9" Jointed Plain Concrete Pavement
 - Individual slabs 12' wide, 20' long
 - Slabs placed over 29" of good quality gravel daylighted to inslope
- Visible signs of distress, blow-ups and structural issues associated with Alkali-Silica Reactivity
- Positive test results for ASR (done by UNH)



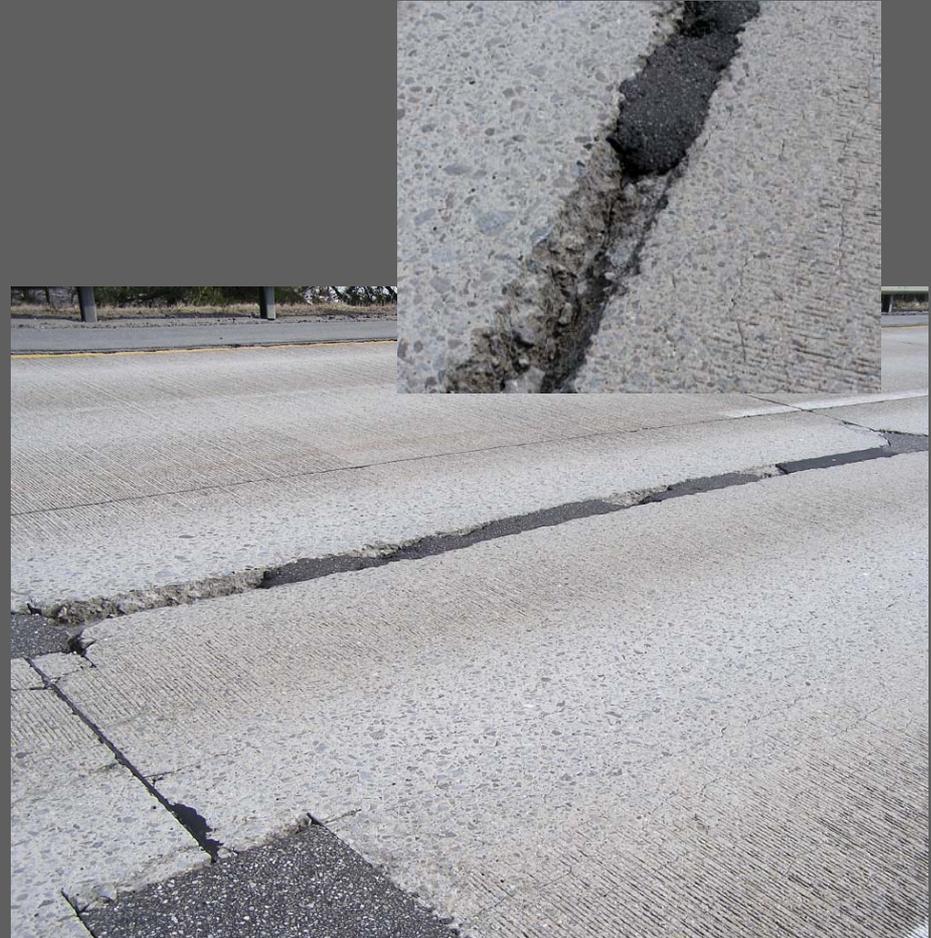
Repairs

- Many repair methods were used to address the deteriorating conditions of the pavement:
 - Thin overlay (NovaChip)
 - Slab replacement
 - Expansion Joints
 - Joint seal
 - Patching
 - Partial Depth Crack Repair
- These repairs were done in preparation for a 4 " overlay



Repairs

- Concrete was deteriorating at quicker rate than anticipated due to ASR
- Repairs not lasting



Repairs

- Funds for rehabilitation became available in November 2007
- A multi-disciplined VE team was assigned to analyze alternatives and make recommendations



Repairs

- Cores cut on longitudinal cracks
- Found that the cracks seen on the surface went through the entire depth of the slab
- Broken slabs → structural failure



Repairs

- Overlay was not a good option since 11,220 slabs would need to be replaced prior to overlay (\$\$\$)
 - Overlay also did not address ASR
 - Pavement functional/service life unknown



Repairs

- Consideration of a full closure of southbound began in February 2008
- Although the deterioration on northbound was more severe, southbound was selected to be rehabilitated first
- Final pavement design and construction method considered the possibility of a full closure



Why a full closure?

- Safety of public and work crews
- Minimizes time – 3 months versus 3 years
- Rubblizing of concrete with one lane open might cause deterioration in the adjacent lane
- The Turnpike and Route 201 are available as alternate routes



Why not have I-295 northbound serve as both northbound and southbound?

- **Safety** *the northbound lanes are not designed for vehicles to travel safely in the southbound direction*
 - The existing 8' shoulder is not sufficient for a breakdown lane
 - Guardrail end-treatments are not designed to handle head-on impacts from vehicles heading south
 - Accelerated concrete deterioration may result in increased safety risks and unplanned closure of the northbound lanes.
 - May cause difficulties for “first responders” at crash sites
 - Increased number of vehicles in one lane increases the risk of crashes



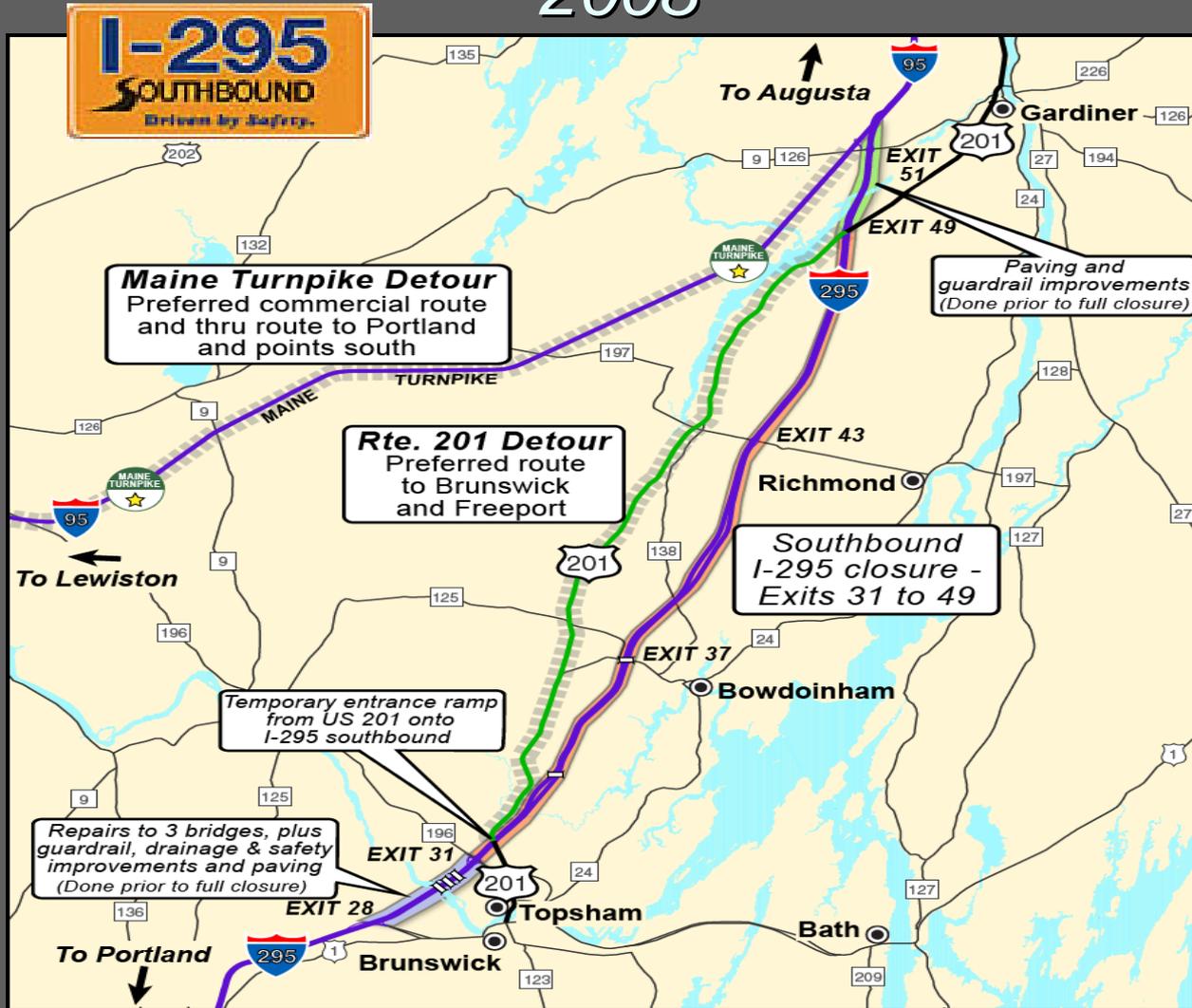
Why not have I-295 northbound serve as both northbound and southbound?

- **Time and Money** - *necessary road improvements add time and money to build the crossovers, improve guardrails and reconstruct shoulders*
 - New on and off ramps need to be constructed
 - Shoulders would need to be reconstructed
 - Funneling the current volume of traffic from two lanes into one lane would create back-ups in both directions
- **Predictability**
 - Motorists will seek alternate routes causing a “free-for-all” on 201 & other local roads



I-295 Southbound Rehabilitation Project

2008



Can the Turnpike and 201 handle the increase in traffic?

- I-295 southbound used by 13,500 vehicles daily during the peak of summer
- Try to push 50% onto Turnpike including commercial trucks
- Motorists headed to Portland and south will use Turnpike
- Traffic plan modified as needed



Route 201 Traffic Plan

- MaineDOT “patrol” will assist motorists with vehicle problems and report “hot spots”
- Make Route 201 look and feel like a work zone
 - Improvements made to Route 197 Intersection
 - Installing flashing lights at the intersections of Route 125 and at Route 138
 - Street lighting at major intersections
 - Work zone speed limits – fines doubled
 - Install radar speed signs
 - Temporary ramp constructed in Topsham



How can we make this work?

■ **Aggressive Communications Campaign**

- Communication Advisory Panel – Reps from tourism, Freeport Merchants, truckers, Maine Turnpike Authority
- Work with major employers, news media, paid media

■ **Ongoing Dialogue**

- Route 201 residents
- Municipalities
- First Responders Group

■ **Flexibility**

- Adjust traffic plan as necessary
- Plentiful signage and message boards
- 24/7 On-Site Availability
- “Roving” MaineDOT vehicle with water/gasoline/roadside assistance
- E-mail alerts





I-295 Southbound

Pavement Design - Southbound

- Design had to meet or exceed performance criteria for 20+ years (Garvee funding requirement)
- MEPDG used for structural design
 - Performance based design method
- The final approved pavement design:
 - 8" HMA
 - 3" milled off existing concrete pavement
 - 6" Rubblized concrete
 - 29" existing gravel
- Includes 1" additional HMA
 - Factor of Safety for unknowns
 - Reduced risk for Garvee Bond funding



Pavement Design- Southbound

1 ½ " -12.5 mm Surface Course (PG 70-28)

1 ½ " -12.5 mm Intermediate Course (PG 70-28)

2 ½ " - 19.0 mm Base Course (PG 64-28)

2 ½ " - 19.0 mm HMA - Asphalt Rich Base (PG 64-28)

6 " Rubblized Concrete

29 " existing Base Gravel



Pavement Design -Southbound

- Design team recommended rubblization of concrete pavement - rubblization would destroy the pavement and stop ASR
- New process for MaineDOT
- Information from other State DOT's with experience in rubblization used to develop the specification:
 - NYSDOT
 - IDOT
 - PennDOT
 - WisDOT



Bidding and Award – I-295 S

- Project out to bid April 2, 2008
- Bid opening April 23, 2008
- Awarded to Pike Industries April 24, 2008
- Construction began May 2008
- Full Closure began June 16, 2008
- Opened to traffic by August 31, 2008 deadline



Construction-I 295 Southbound

- Prior to full closure:
 - Overlay of section between Brunswick and Topsham
 - Rehabilitated 2 bridges
 - Construct a temporary on-ramp
 - Completion deadline - June 15, 2008



Construction - Topsham On-Ramp



Construction-I 295 Southbound

- Full Closure – began June 16, 2008
- 18 mile section between Topsham and Gardiner
- Scope included:
 - Milling
 - Slab removal
 - Weep drain installation
 - Rubblization
 - HMA paving
 - Fill a “dip” area
 - In-slope work
 - 5 bridge deck rehabs
 - Guardrail installation
 - Rumble strips
 - Striping



Construction - Weep Drains

- Constructed “weepers” for assurance that no water would be trapped under pavement during rubblization process



Construction - Rubblization

- First milled 3" off existing pavement and placed on shoulders as new recycled aggregate
- By milling, we were able to:
 - Eliminate hauling in new material to build up shoulder to new elevation
 - Reduce impacts to the slopes
 - avoid environmental impacts at the toe of slope



Construction - Rubblization

- Resonant Breaker Rubblizer specified
 - Specification included criteria for
 - Particle size
 - 6" minus for bottom layer
 - 2" minus at surface
 - Grading
 - Compaction
 - Surface tolerance
 - Steel – must be debonded, exposed removed
 - Crack sealant removal
 - Patch removal



Construction - Rubblization

■ Test pits

- Gradation check
- De-bonding check
- Every 2500' per lane



Construction - Slab Removal

- Some slabs were removed because of:
 - Pavement deterioration
 - Clearance requirements under overpasses
 - Used 9" HMA in these areas



Construction - Filling settlement in Richmond



Construction – HMA –Asphalt Rich Base

- Used to reduce reflective cracking potential from stiff rubblized concrete
 - 19.0 mm mix
 - 2 ½ " thick
 - PGAB 64-28
 - PGAB target - 5.5%
 - Air Void target - 2.5%
 - 50 gyrations



Construction – HMA Base Course

- 19.0 mm mix
- 2 ½ " thick
- PGAB 64-28
- 75 gyrations



Construction - HMA Surface and Intermediate Course

- Polymer Modified
 - 1 ½ " lift - surface
 - 1 ½ " lift - intermediate
 - 12.5 mm mix
 - PGAB 70-28
 - 75 gyrations
- RAP not permitted in mix
- Material transfer vehicle specified



I-295 Southbound opens on schedule!!!





I-295 Northbound

I-295 Northbound

- Same pavement structure design, construction method, materials as southbound
- Design phase focused on the best possible closure options including:
 - Use Rte. 201 for the northbound detour
 - Use Rte. 201 for southbound traffic, run northbound traffic on I-129 southbound



Closure options - NB on Rte. 201

- Close Northbound
- Using the Rte. 201 detour for northbound traffic required building a new off-ramp onto Rte. 201
 - Location not good because of:
 - Environmental impacts
 - Grade changes between I-295 and Rte. 201 requiring lots of fill and real estate
 - Left turn movement from ramp onto Rte. 201 conflicted with local traffic
 - Backups on I-295 probable due to traffic volumes

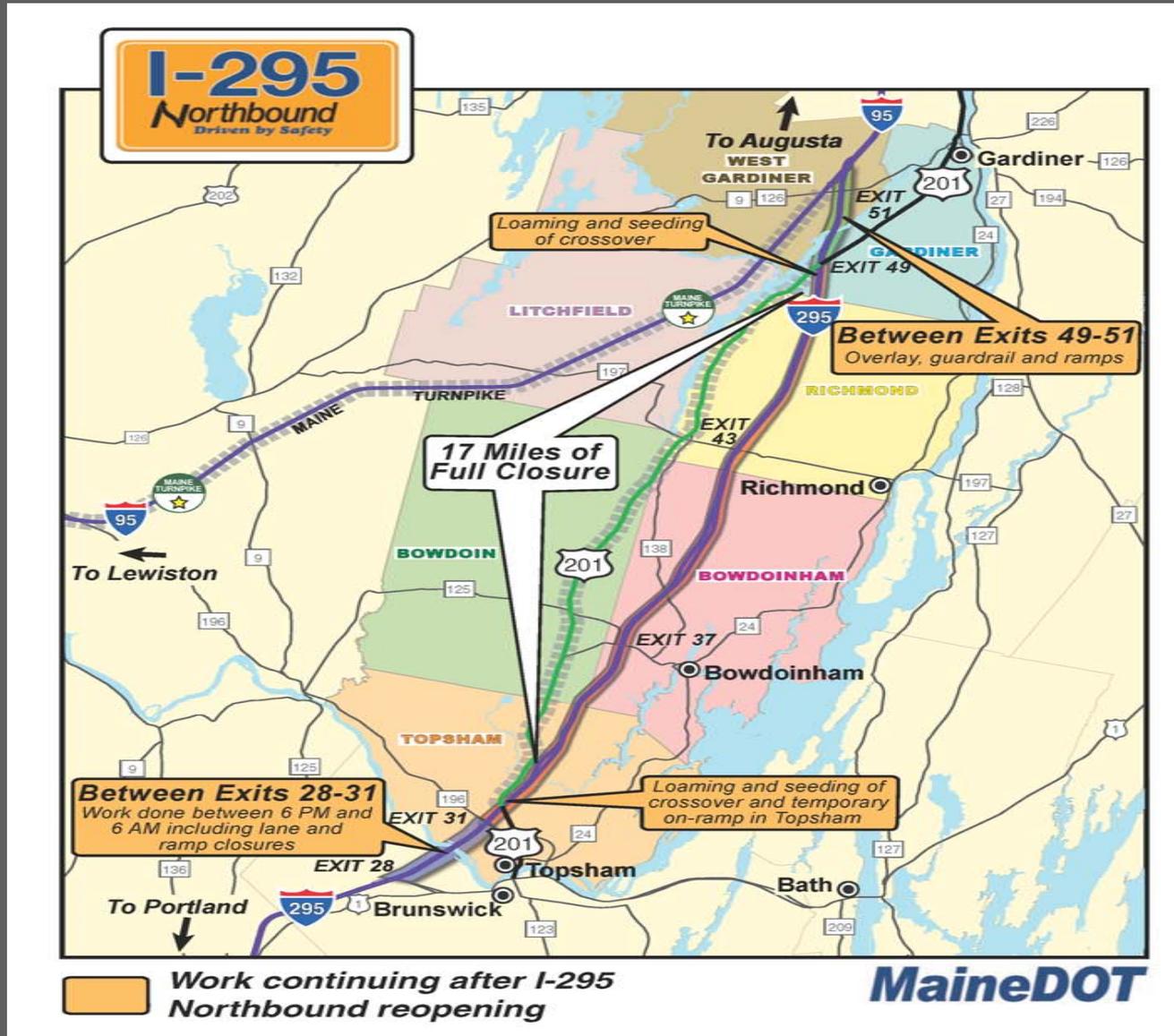


Closure options - SB on Rte. 201, NB on I-295 S

- Close Northbound
- Detour used for I-295 S project (Rte. 201) would be used for southbound traffic
- Northbound traffic routed to I-295 S
 - I-295 S would need guardrail and sign changes
 - Ramps would be modified to allow traffic off – no on traffic
 - Crossovers would need to be constructed in Topsham and Gardiner
- This closure option was considered the safest and therefore selected for this project



I-295 Northbound Rehabilitation Project 2009



Bidding and Award

- Project out to bid - Feb. 4, 2009
- Bid opening - Feb. 25, 2009
- Awarded to Pike Industries - March 3, 2009
- Construction began - April 2, 2009
- Full Closure began - June 16, 2009



Construction - Northbound

- Prior to full closure:
 - Overlay of section between Brunswick and Topsham
 - 2 bridges rehabs
 - Construct 2 temporary crossovers
 - Modifications to 2 ramps
 - Completion deadline - June 15, 2008



Construction - Northbound

- Full Closure – began June 16, 2009
- 17 mile section between Topsham and Gardiner
- Scope includes:
 - Milling
 - Slab removal (under overpasses)
 - Rubblization
 - HMA paving
 - Fill a “Richmond settlement” area
 - In-slope work
 - 5 bridge deck rehabs
 - Guardrail installation
 - Rumble strips
 - Striping



Construction - Crossovers

Topsham



Gardiner



Construction

- Portable Plant
 - Significantly reduced hauling



Construction- Record rainfall 20"+ of rain in June, July, August 2009



Construction - Track Dryer



Construction - Longitudinal Joint

- Asphalt rubber joint sealer specified to adhere adjoining HMA materials together
- Used in the 12.5 mm polymer modified intermediate and surface course if not paved in echelon
- Infrared technology used to heat previously placed HMA prior to placement of adjoining HMA



I-295 Northbound opens ahead of schedule!!!



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Thanks!!

Questions ???????