



I-85/I-95 PCC Rehabilitation Projects

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I-85 Anderson County

- Constructed 1963
 - 9 inches Jointed Plain Concrete
 - 25 foot joint spacing w/o load transfer
 - Asphalt shoulders
- First rehabilitation 1978
 - Patching
 - Unsuccessful pressure grouting

I-85 Anderson County

- Second rehabilitation 1991
 - Patching
 - Resealing
 - Grinding
 - Edge drains added
- By 1996, distress was at very high levels
 - High percentage broken slabs
 - Severe faulting

I-85 Anderson County

- 1998 - Funding shortage, decided to rubblize northbound lane only
 - 2004 ADT = 53,000, 35% trucks
 - Assumed rubblized structural coefficient = 0.30
 - Overlay thickness = 8 inches

I-85 Anderson County

- Staging plan:
 - Rubblize driving lane
 - Overlay driving lane with 200 psy AC Binder
 - Rubblize passing lane
 - Overlay passing lane with 200 psy AC Binder
 - Alternate overlays until 600 psy AC Binder and 200 psy AC Surface

I-85 Anderson County

- Staging plan (continued):
 - Maximum elevation difference between lanes not to exceed 2 inches
 - Pave only during weekdays, not at night or weekend

I-85 Anderson County

- Staging plan (continued):
 - Big question - How long can traffic run on first lift of asphalt?
 - Pavement Design recommendation - 48 hours
 - FHWA recommendation - 24 hours
 - Staging plan - 10 days
 - Actual single lift life
 - 8 hours

I-85 Anderson County

- Massive problems:
 - No traffic without two lifts on rubblized PCC
 - Extended lane closures
 - Post-rubblized deflections in excess of 100 mils
 - Overlay increased from 8 to 12 inches
 - Reconstruction between bridges
 - 6 mile traffic jams, numerous complaints
 - Chain collision accident with multiple fatalities

I-85 Anderson County

- Outcome:
 - SCDOT changed rehabilitation policy
 - No daytime lane closures when volume exceeds 800 vph (later modified to 1200 vph)
 - Typical closure restrictions: No closures between 6 AM and 8 PM
 - Creates severe difficulties for concrete pavement rehabilitation projects

I-85 Anderson County

- What to do for the southbound lane?
 - Condition was also very poor
 - No suitable detour available
 - Nighttime patching estimated to take over 2 years
 - Uncomfortable with structural capacity of rubblized section

I-85 Anderson County

- What to do for the southbound lane?
 - Traffic volumes justified widening from four to six lanes
 - Decided to do unbonded overlay

I-85 Anderson County

- Project let February 13, 2001
- A+B bid prices
- Low bidder – Lane Construction
 - A = \$60,945,869.20
 - B = \$4,117,500.00
 - Total = \$65,063,369.20

(Bid tab online at

www.dot.state.sc.us/doing/bidtabulations.html,

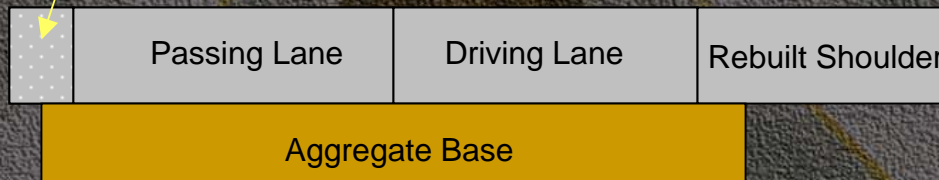
2/13/01 Letting, File 04.117B)

I-85 Anderson County

- Staging plan:
 - Very complex, required 27 pages to describe
 - First Step: Remove 10-foot asphalt shoulder and replace with 8 inches PCC at night.
 - No tie bars, dowels, or sealant. Joints matched to mainline.

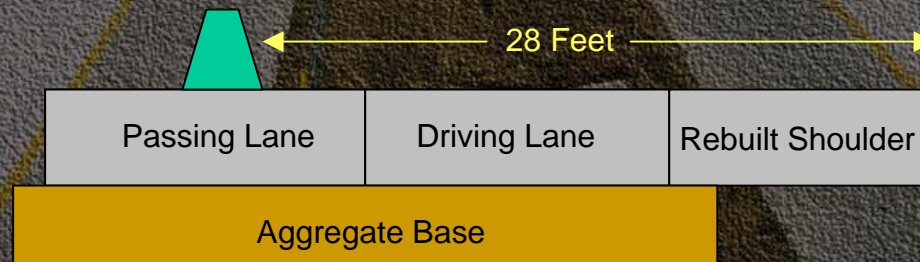
I-85 Anderson County

Shoulder



I-85 Anderson County

- Staging plan:
 - Shift traffic right by 8 feet, place temporary barrier wall in original passing lane.

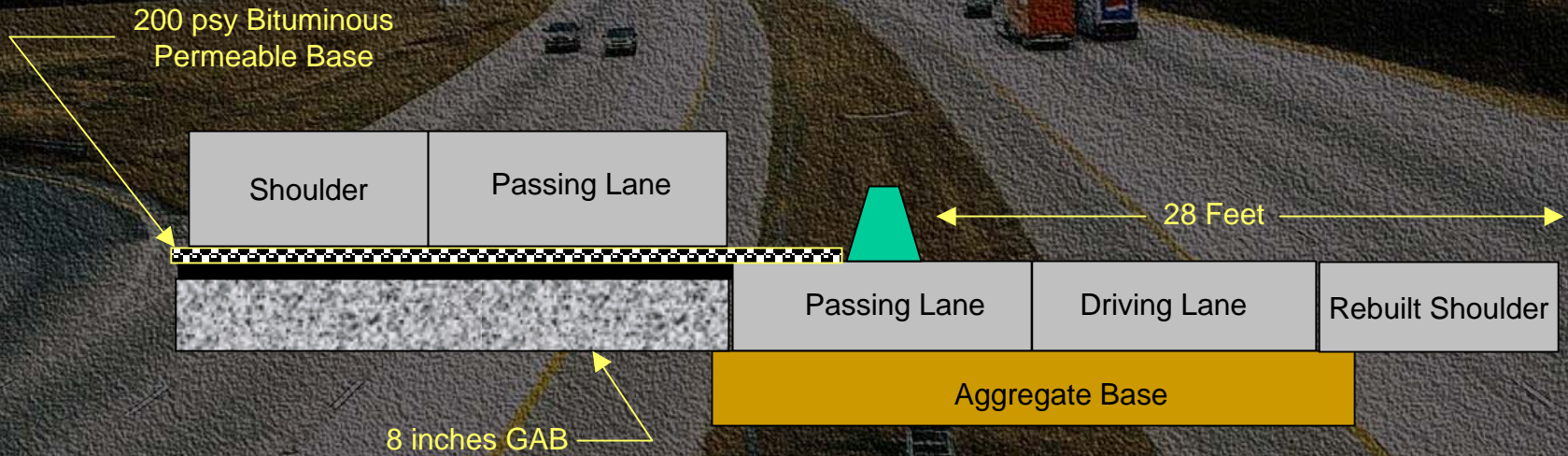




I-85 Anderson County

- Staging plan:
 - Construct pavement and base in median :
 - 12 inches Plain Jointed PCC
 - 2 inches Bituminous Permeable Base
 - 2 inches AC Surface
 - 8 inches Graded Aggregate Base
 - Edge drain
 - Construct new asphalt lane in northbound median and diversion lane across median.

I-85 Anderson County

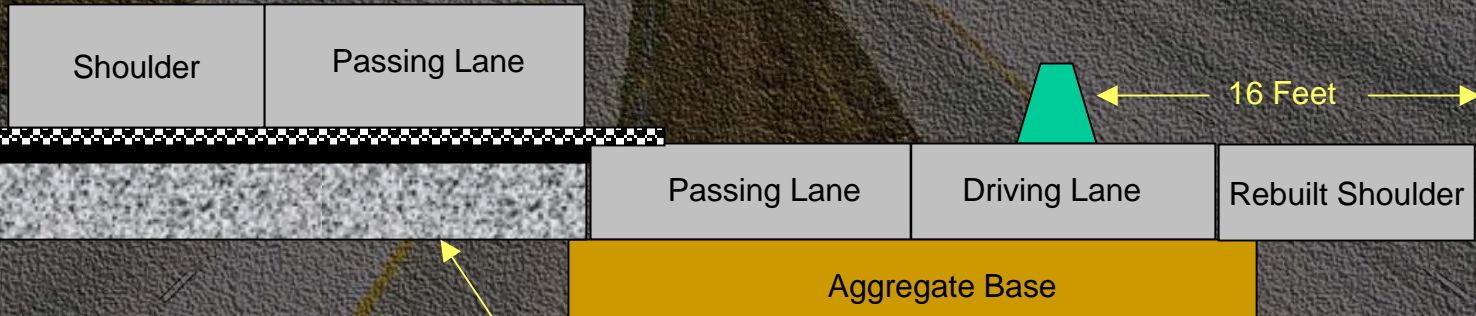


I-85 Anderson County

- Staging plan:
 - Move temporary barrier wall to center of old driving lane in southbound lane. Shift one lane of traffic to new pavement, one lane to northbound lane.

I-85 Anderson County

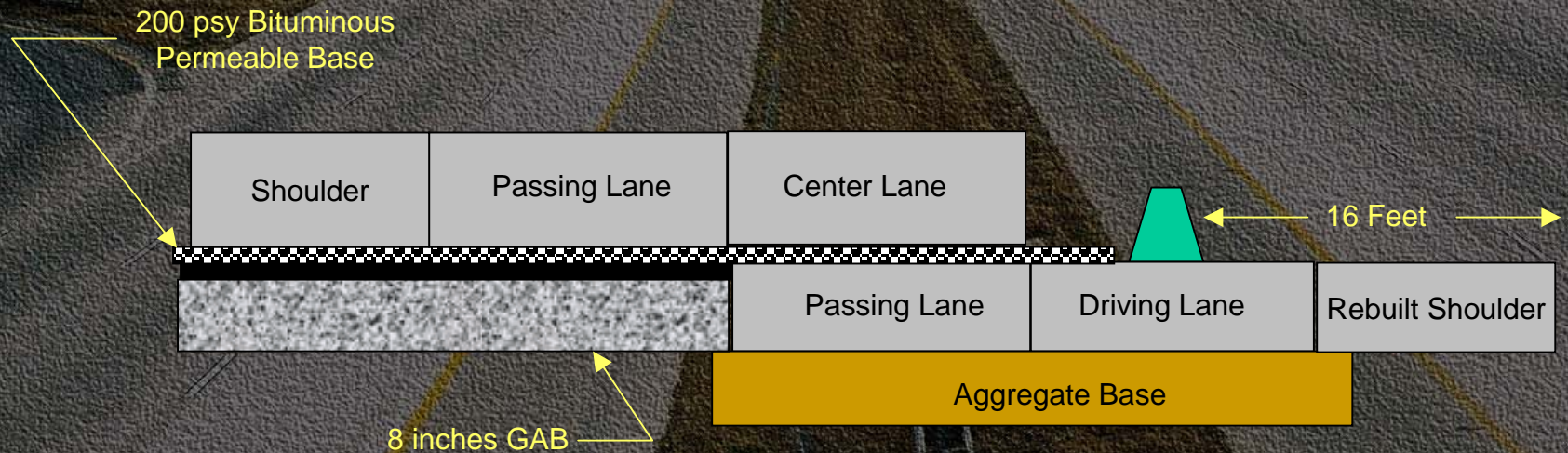
200 psy Bituminous Permeable Base



8 inches GAB

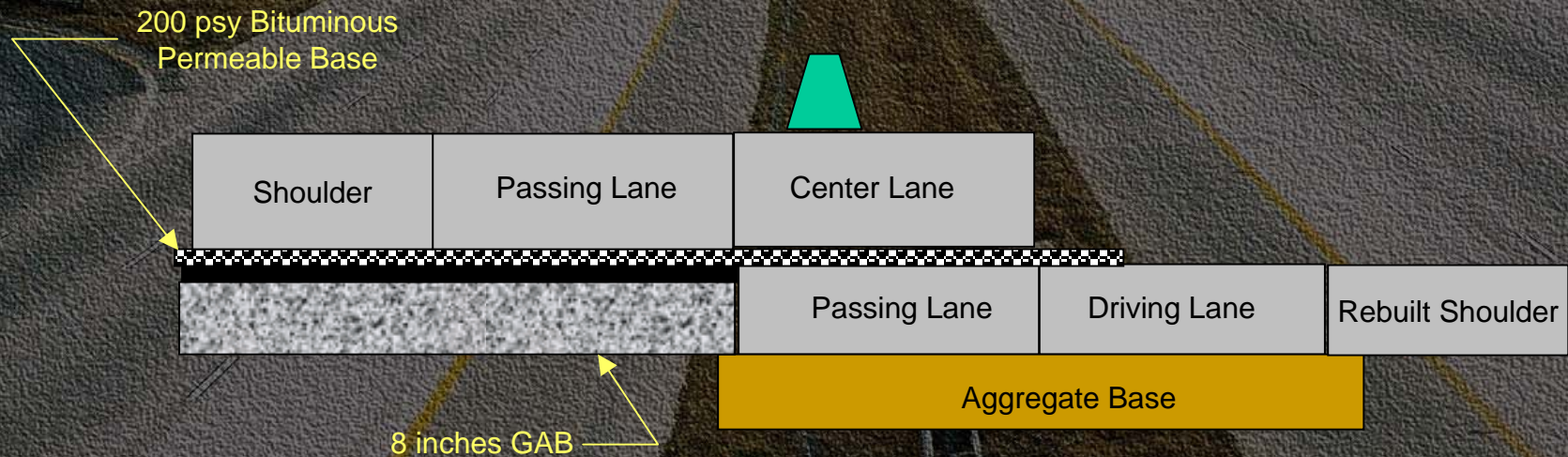
I-85 Anderson County

- Construct new center lane over existing passing lane



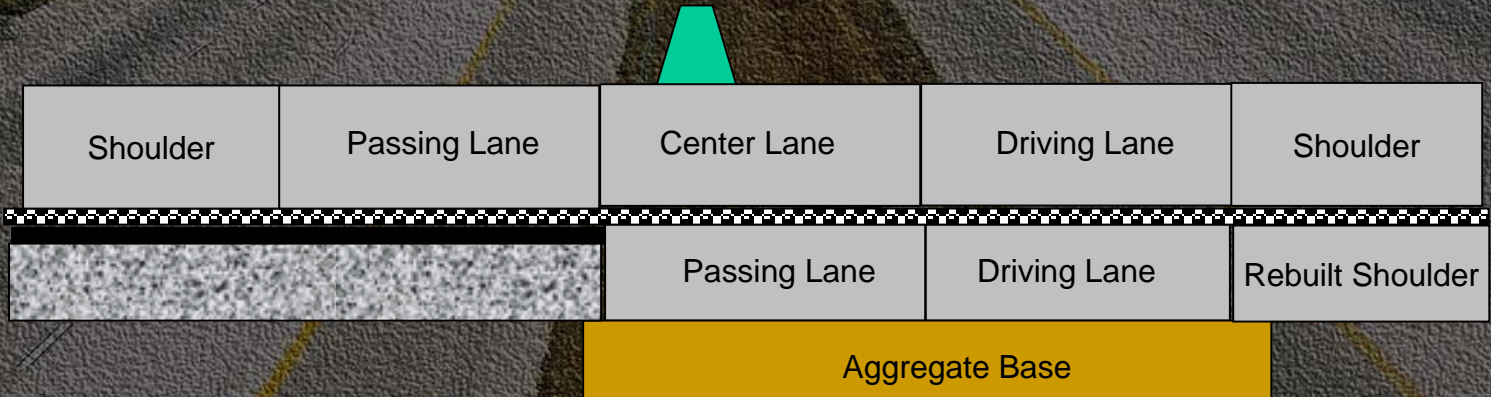
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- Move single lane from old pavement to new pavement



I-85 Anderson County

Construct remaining pavement



I-85 Anderson County

- Other pavement details
 - 15 foot joint spacing
 - 1.5 inch dowel bars
 - Full-depth tied concrete shoulder
 - Neoprene joints seals

I-85 Anderson County

- Other issues:
 - Had to jack overpasses to allow for 14-inch change in grade.
 - Had to close ramps at one interchange temporarily to reconstruct.
 - Ride met specifications, but was not satisfactorily smooth. Decided to diamond grind entire project.
 - Had to remove neoprene joints and reseal after grinding

I-85 Anderson County

- Other issues:
 - Pace of construction very hard on inspection personnel.
 - Resident Construction Engineer chose to retire during project.
 - Lead inspector got 2 months of compensatory time.
 - Cost of temporary barrier was over \$6 million.

I-85 Anderson County

- Improvements over original design:
 - 12-inch versus 9-inch slab
 - 15-foot versus 25-foot slabs
 - Dowels versus aggregate interlock at joints
 - Tied PCC versus asphalt shoulders
 - Positive drainage versus bathtub with erodible base.



I-95 Florence County

- From I-20 to SC Route 327
- Approximately 13 miles
- Constructed 1964-1967
 - 10” Plain Jointed PCC
 - 5” Cement Stabilized Sand-Clay Base
 - 25’ Joint Spacing
 - No positive load transfer

I-95 Florence County

- 2004 ADT = 48,400 ADT, 20% trucks
- One previous CPR in 1984 with tied PCC shoulders.
- By 2001, was highly distressed with over 50% of slabs in northbound driving lane requiring repair.
- Severe faulting.
- Base erosion issues.

I-95 Florence County

- Originally planned to do widening and unbonded overlay in the same manner as I-85 Anderson.
- Geometric/ROW/Bridge issues would not allow major change in grade.
- Decision made to widen and reconstruct existing pavement.

I-95 Florence County

- Removed existing 10” PCC.
- Repaired base with new cement treatment where necessary.
- New pavement over existing base:
 - 11” Plain Jointed PCC (15’ joint spacing)
 - 2” Asphalt Surface
 - 8” Graded Aggregate Base (new lanes)
- Traffic control/staging similar to I-85.

I-95 Florence County

- Project let May 2002
 - Low Bid: \$64,169,002.17
 - Awarded to Lane Construction Co.
 - 635,980 sy of PCC Pavement @ \$30/sy
 - \$3.7 million for barrier wall
 - \$2.0 million for traffic control
- Work began July 8, 2002
- Project accepted May 5, 2004

I-95 Florence County

- New features:
 - PCC flexural strength requirement raised from 550 psi to 650 psi at 14 days to reduce pavement thickness by one inch.
 - Allowed the use of old PCC as coarse aggregate for new PCC.
 - Allowed the use of automatic dowel bar inserter in lieu of chairs.
 - Required diamond grinding of new surface for better rideability.



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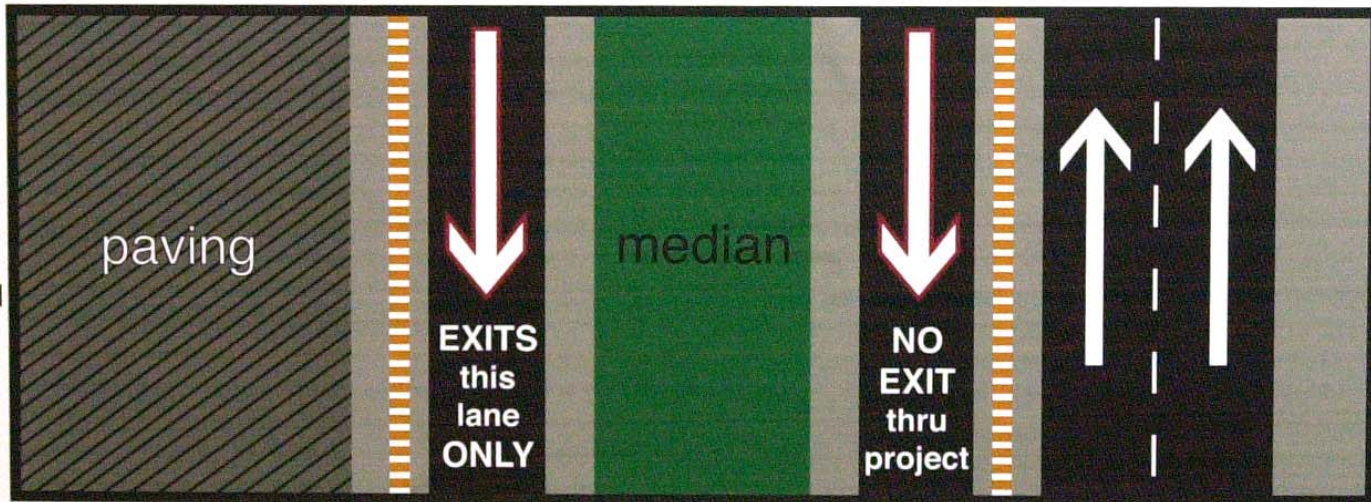
SC 327



Southbound
LOCAL & THRU
Traffic

Southbound
EXPRESS LANE

↓
Southbound



↑
Northbound



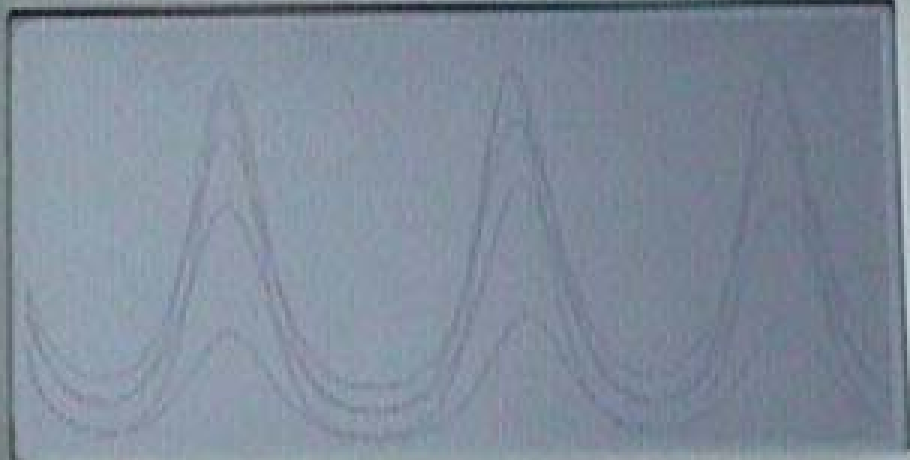
I-20





CASIO

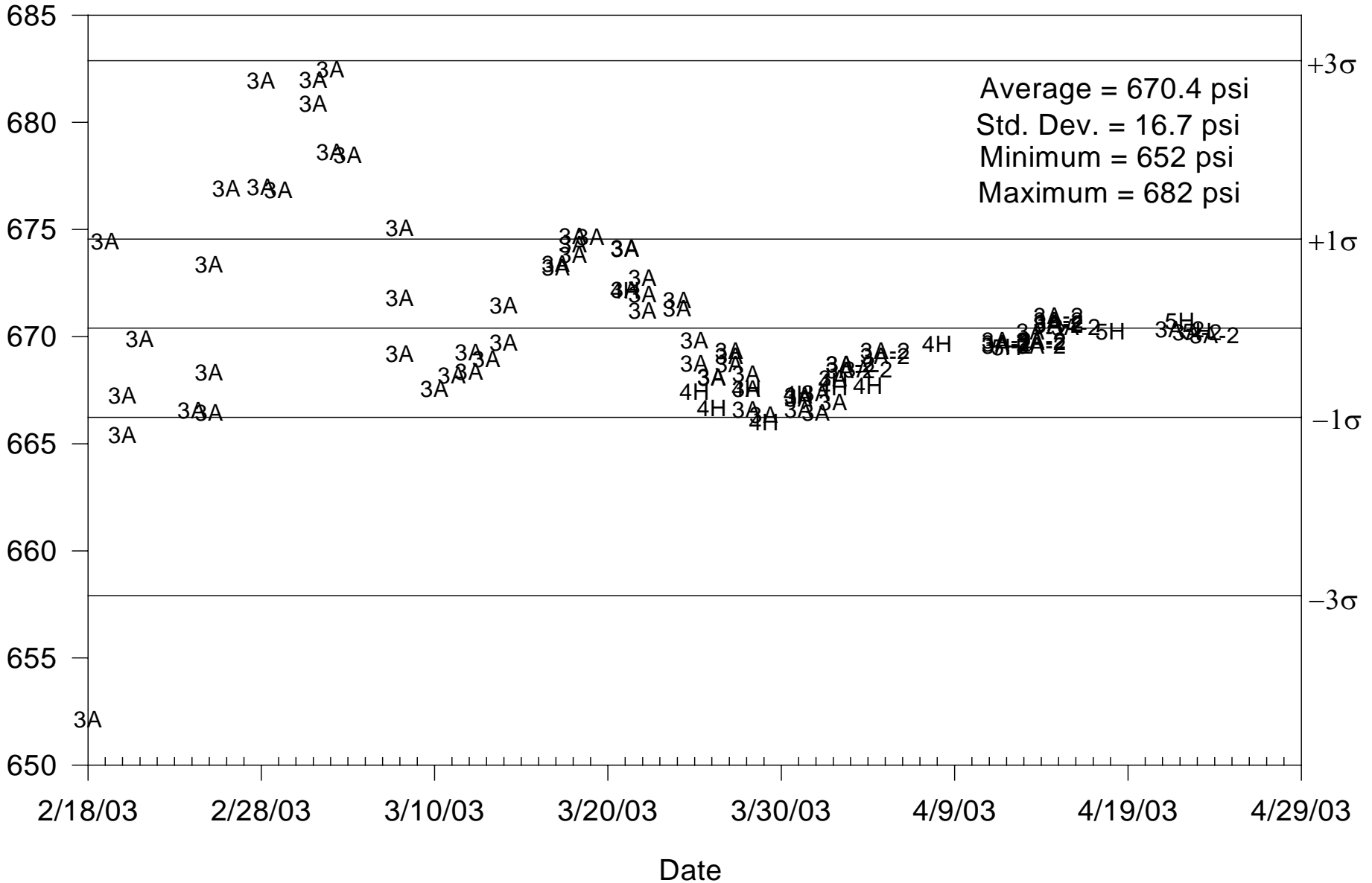
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1	4	7
2	5	8
3	6	9
↵	Frac	-





Phase I Concrete Breaks - I-95 Florence

Strength versus Time



Problems?

- Some contamination was encountered early from joint sealant, backer road, and wood



Problems?

- Motorists were crossing median from express lane to exit.
- Existing base was very saturated; more repairs required than estimated.
- One portion of median was constructed with muck from original project, had to be undercut more than expected.
- Mainline traffic flowed well, but some backups were encountered at interchanges.

Questions?

