VTRC
Virginia Transportation Research Council

We bring innovation to transportation.

Where Are We Headed with Pavement Recycling?

I-64 Widening, Segment II

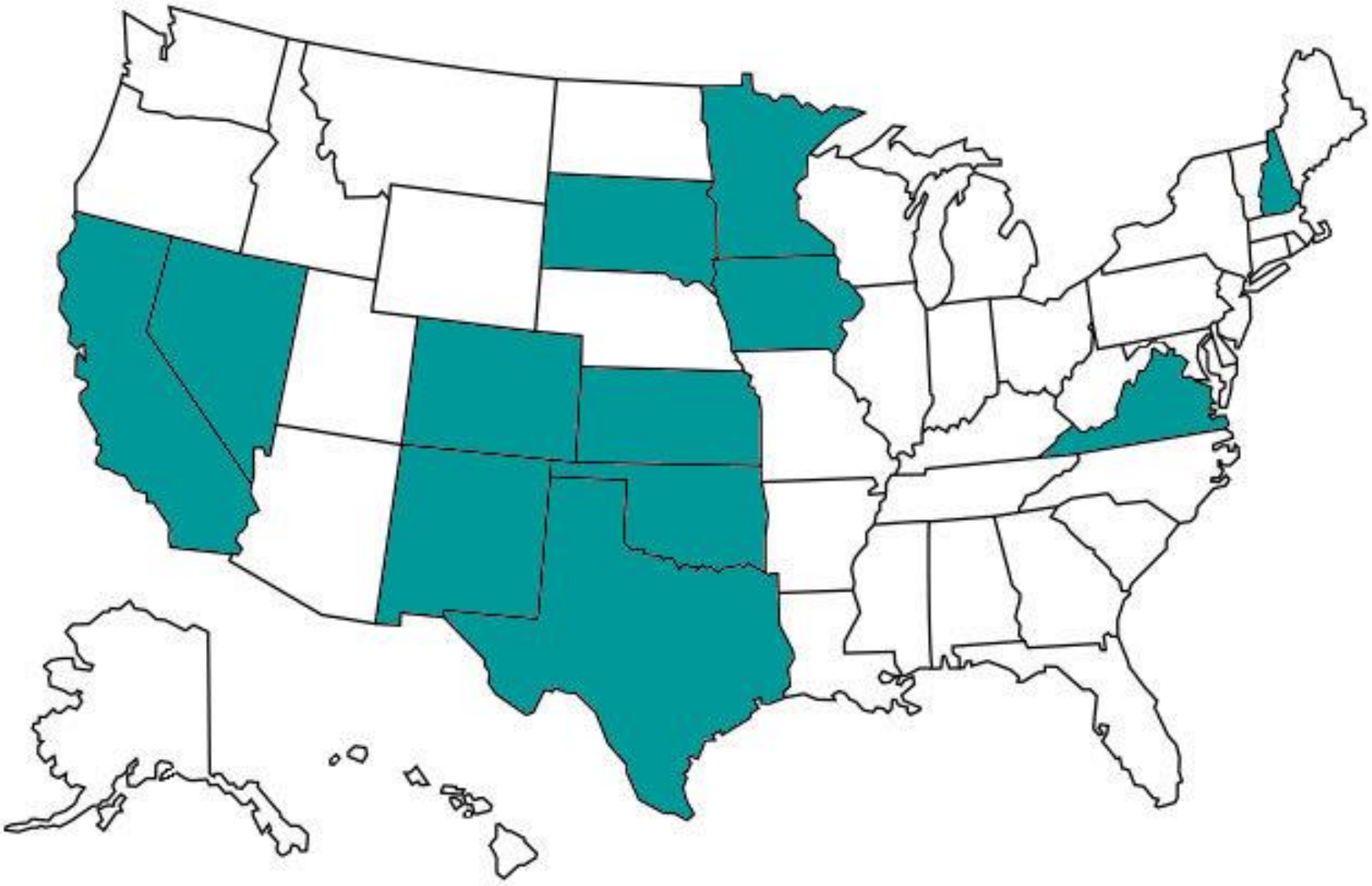
Brian Diefenderfer, PhD, PE
Associate Principal Research Scientist

October 4, 2016

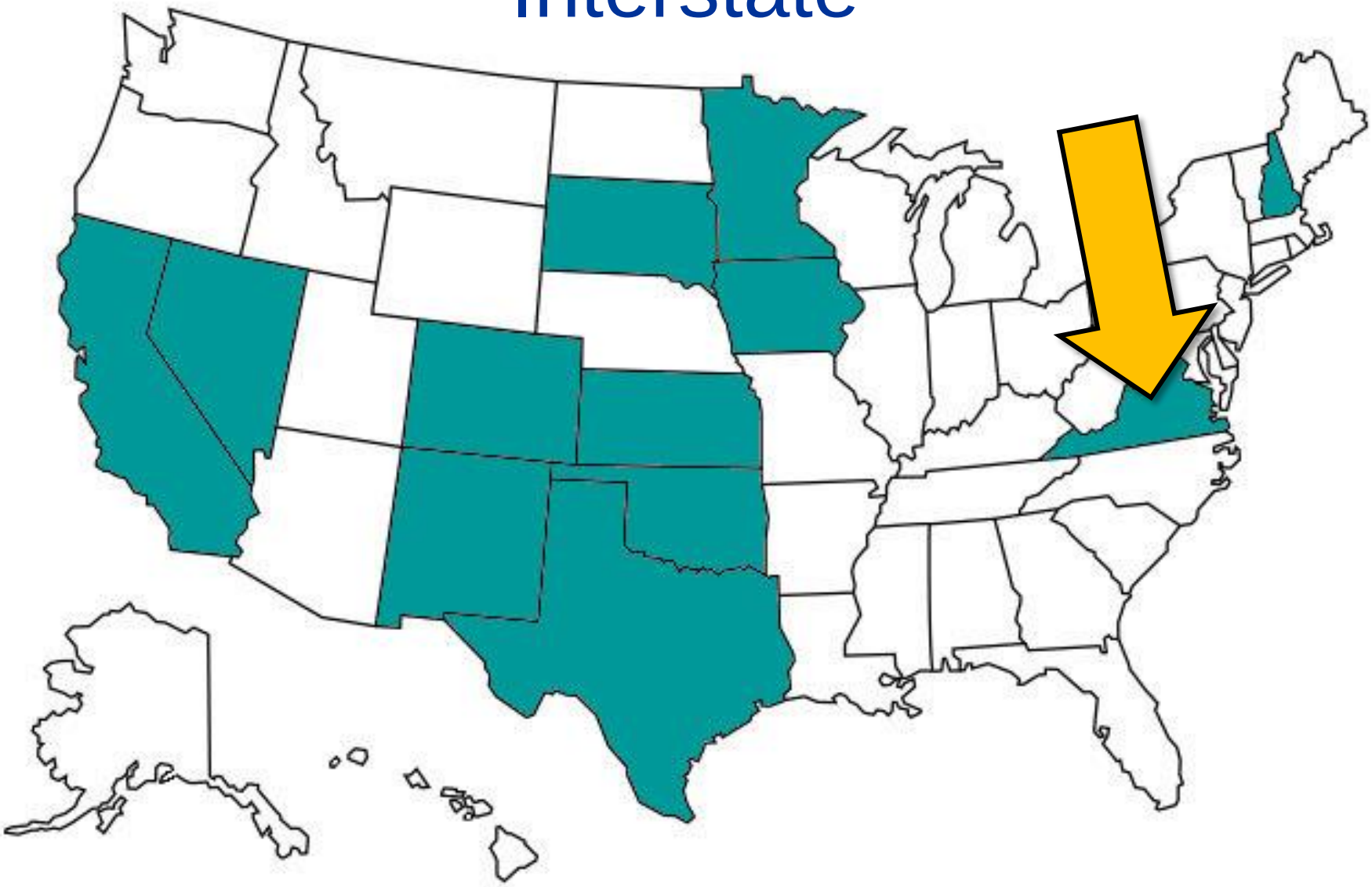
Acknowledgements

- Hampton Roads Materials
- Hampton Roads Project Management
- Alternative Project Delivery Division
- CO Materials Division

Recycling on the Interstate



Multi-Process Recycling on the Interstate



Scope

242
247
Colonial Pkwy
York Terrace
Busch Gardens
Williamsburg
Yorktown Naval
Weapons Station
Naval
Weapons
Station
Lackey
Grove
James River
Newport
News Park
Oakland Industrial Park
York River
143
60
64
17
637
650

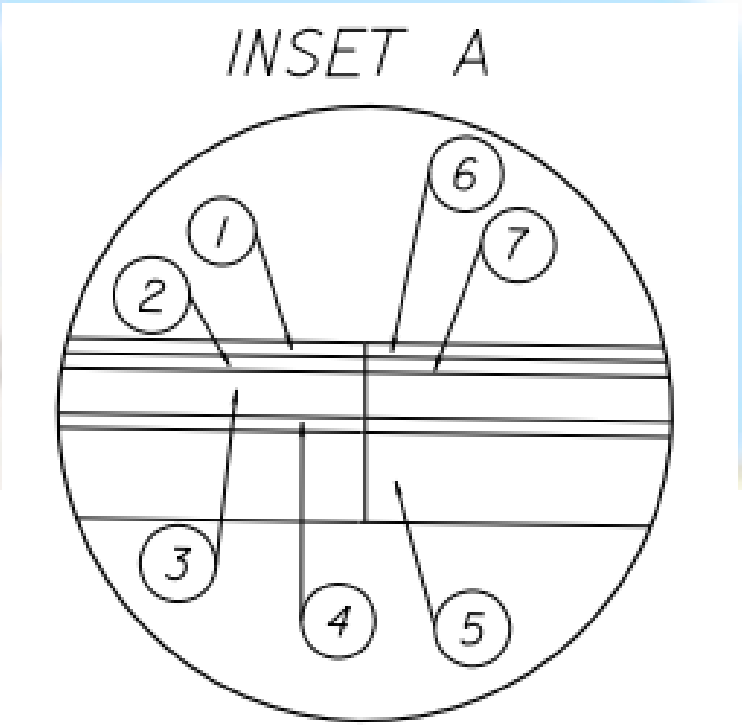
Scope

- I-64
  - Newport News, James City, and York Counties
- 7.08 miles, both directions
  - Add a travel lane and a 12ft shoulder to the inside
  - Reconstruct existing lanes and outside shoulder
  - $189.7 Million
- Traffic
  - 3,000+ trucks per day (per direction)

Scope

- Construct new travel lane and 12ft shoulder
  - Prepare subgrade
  - CTA foundation
  - CCPR base
  - Asphalt surface layers
- Reconstruct existing lanes
  - Remove existing concrete
  - FDR foundation
  - CCPR base
  - Asphalt surface layers

Scope

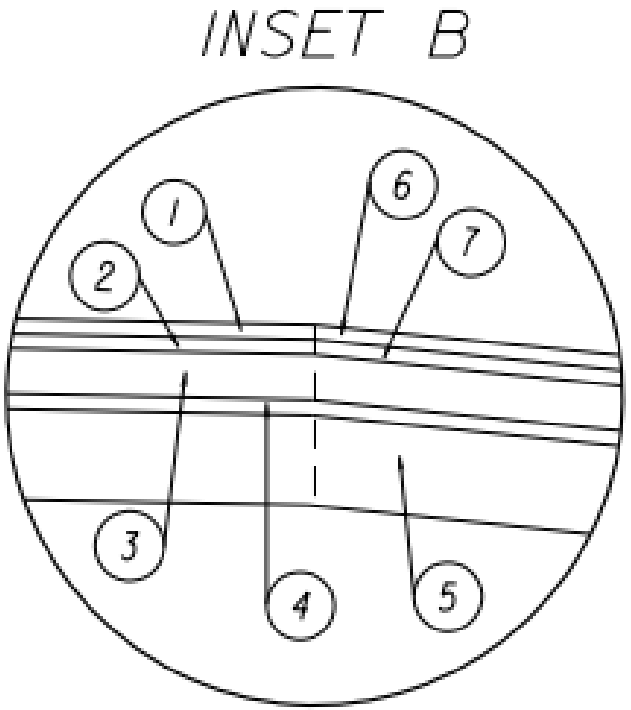


PAVEMENT DESIGN (NEW ROADWAY)

1. 2" Asphalt Concrete, SMA-12.5 PG76-22
2. 2" Asphalt Concrete, SMA-19.0 PG76-22
3. 6" Cold Central Plant Recycling Material (CCPRM)
4. 2" Open Graded Drainage Layer - Asphalt or Cement Stabilized
5. 12" Cement Treated Crushed Concrete or Cement Treated Recycled Asphalt Pavemnt (RAP)
6. 2" Asphalt Concrete, SM-12.5D
7. 2" Asphalt Concrete, IM-19.0A

Shoulder only

Scope



PAVEMENT DESIGN (RECONSTRUCTED F

1. 2" Asphalt Concrete SMA-12.5 PG76-22
2. 2" Asphalt Concrete SMA-19.0 PG76-22
3. 6" Cold Central Plant Recycling Material (CCPRM)
4. 2" Open Graded Drainage Layer - Asphalt or Cement Stabilized
5. 12" Full Depth Reclamation (FDR) Existing Aggregate and Stabilized Subgrade
6. 2" Asphalt Concrete, SM-12.5D
7. 2" Asphalt Concrete Type IM-19.0A

} Shoulder only

Full-Depth Reclamation

FDR

- Bound and unbound materials are combined with a stabilizing agent(s) to create a foundation
- Typically 4 to 12 inches thick

- I-64 Segment II
  - FDR layer is 12 inches thick
  - XXX was proposed as the stabilizing agent

Cold Central-Plant Recycling

CCPR

- Milled or stockpiled RAP is combined with a recycling agent (and possibly a chemical additive) to create an asphalt base layer
- Typically 2 to 6 inches thick
  - Multiple lifts can be placed for thicker sections

- I-64 Segment II
  - CCPR layer is 6 inches thick
  - XXX is planned as the recycling agent

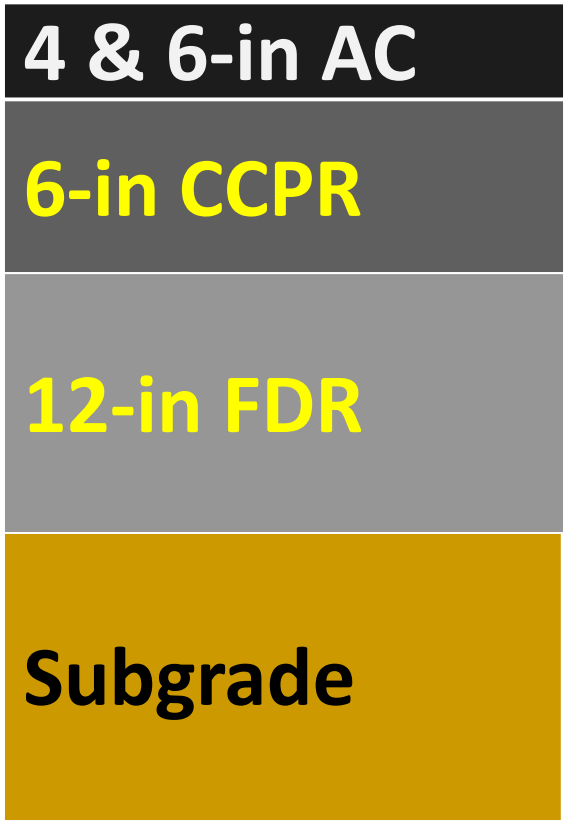
Preconstruction Activities

- Mix design and QC plan
- 2 quality workshops
  - One well in advance of work (September 2016)
  - One closer to start of recycling work (Fall 2017?)
- Trial sections

Performance Examples of Similar Sections

I-81, Augusta County, 2011

- Right lane
- Summer 2016
  - 10 million ESALs
  - 0.10 inches rutting
  - IRI 44 inches per mile

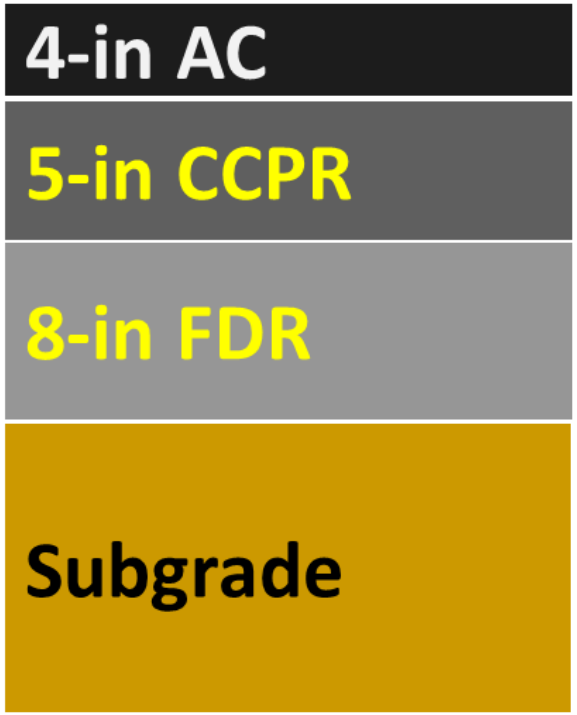


Segment II, 13 years to 10 million ESALs

Performance Examples of Similar Sections

NCAT Test Track, 2012

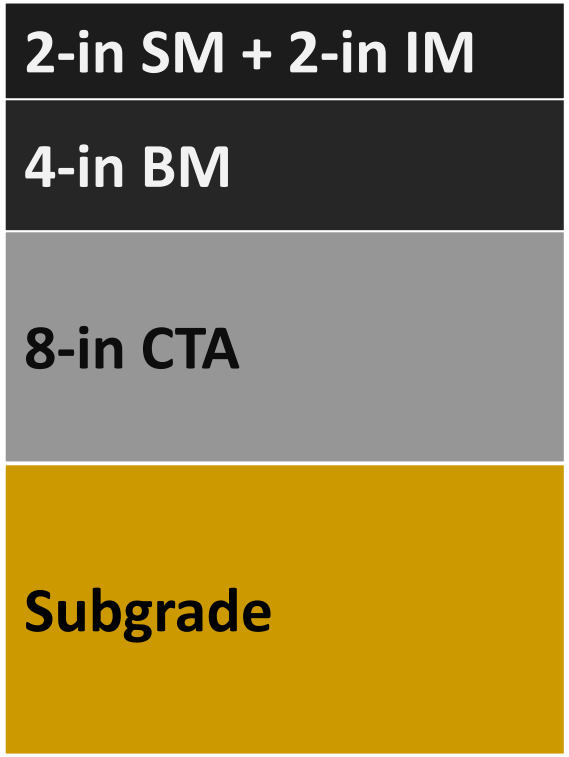
- Section S12
- Fall 2016
  - 15 million ESALs
  - 0.2 inches rutting



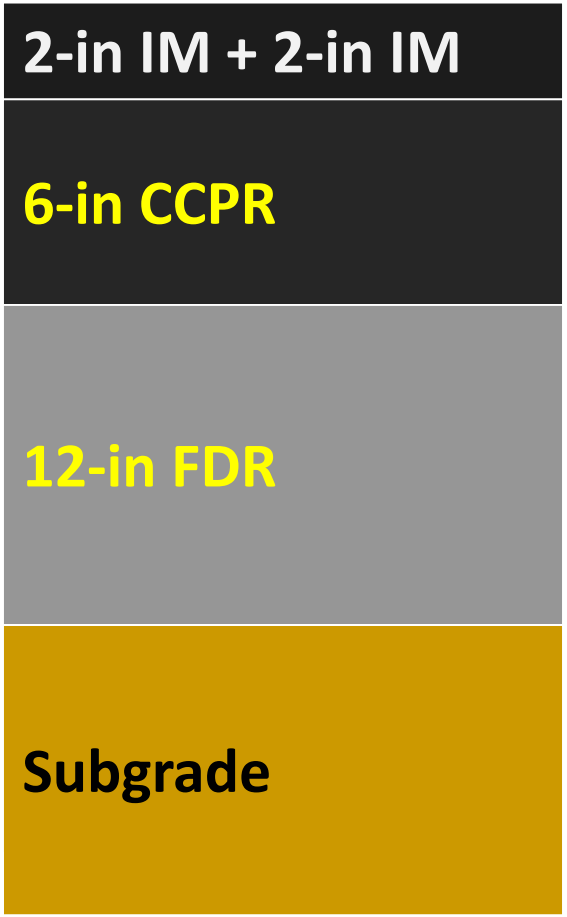
Segment II, 19 years to 15 million ESALs

Segment II, Alternative Sections

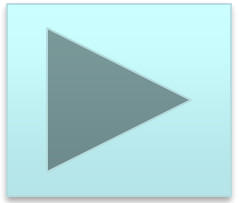
$71 / SY



$45 / SY



Same structural value
36% lower cost

Potential Cost Savings

- Segment II
  - 7.08 miles x 3 lanes x 2 shoulders
  - 168,000 tons of CCPR
  - Cost savings using recycling > $10 million
    - as awarded
- Segment III?
  - 7.6 miles x 3 lanes x 2 shoulders
  - 180,000+ tons of CCPR?
  - Cost savings could exceed $12-14 million