

## SR 119 Concrete Overlay

### Construction Overview

February 2011

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Project Manager  
Engineering District 12-0



## Background

- The Pennsylvania DOT (PENNDOT) elected to participate in the FHWA/CP Tech Center Program. The following items summarize the overlay implementation process:
  - February 2009 – conducted an overlay workshop and visited potential overlay projects
  - March 2009 – initial site visit report and overlay recommendations report prepared and distributed
  - Second quarter 2009 – continued review and recommendations on plans and specifications
  - June 2009 – A representative of the Overlay Implementation Team attended the pre-bid meeting to provide clarification of potential issues
  - August 6, 2009 – Actual NTP
  - June 26, 2010 – on-site documentation of the overlay construction process and material testing
  - June 30, 2010 – a Concrete Overlay Open House was hosted by PENNDOT



## Five -lane Typical Section

106070 12 26 0119 D 0521 6 611 22.060 42.6 2009/05/12



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## Mountable Curb Typical Section

106010 12 26 0119 B 0530 5 611 14.632 23.5 2009/05/12



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## Project Information

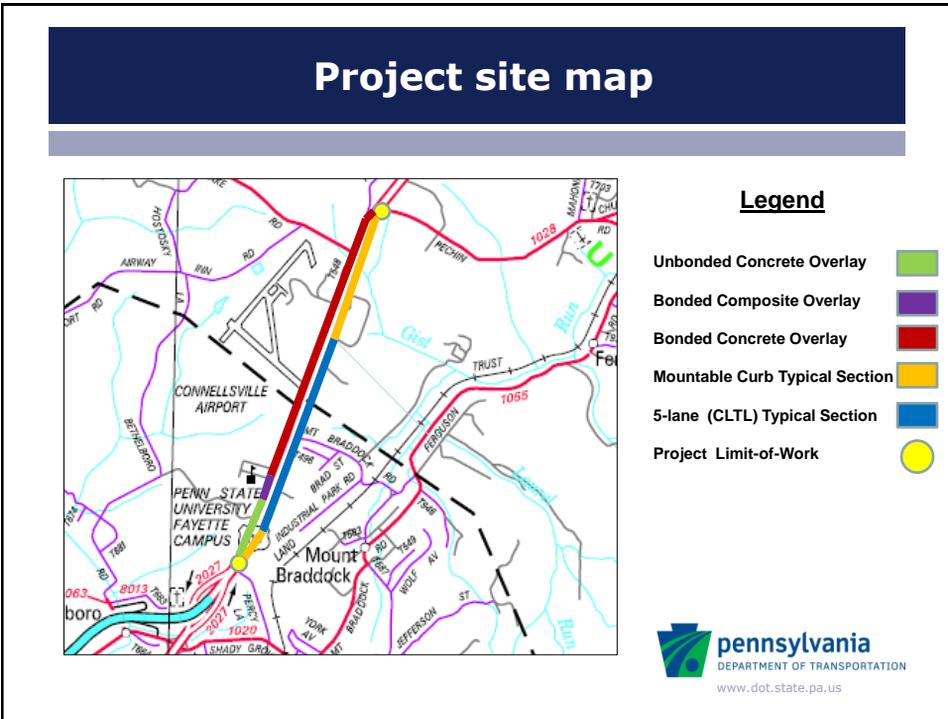
- **Original Contract :** \$4,396,009.42
- **Project Description:** This is an Economic Recovery Project. This project consists of concrete overlay to 2.19 miles of SR 0119. This project includes milling, resurfacing, bituminous shoulders and updating the signing & pavement markings, drainage, guide rail and signal replacements/upgrades and other miscellaneous construction for STATE ROUTE 0119, SECTION 21R, in Fayette COUNTY North Union Township & Dunbar Township from approximately 325' North of Connellsville Street (SR 2027) at segment 0494 offset 0288 to approximately 471' North of Pechin Road (SR 1028) at segment 0550 offset 1187.



## Project Information

- Highway Classification- Urban Principal Arterial
- Design Speed- 50 MPH
- Posted Speed- 45 MPH
- Pavement width- 48 ft to 64 ft (5-lane section)
- Shoulder width- 5 ft to 10 ft
- Project length- 2.2 miles
- 6 Signalized intersections
- ADT- 25,819 (2009) 28,521 (2019)
- Truck percent- 12%
  - Quarry trucks, industrial Park traffic, business that rehabilitates tanks.



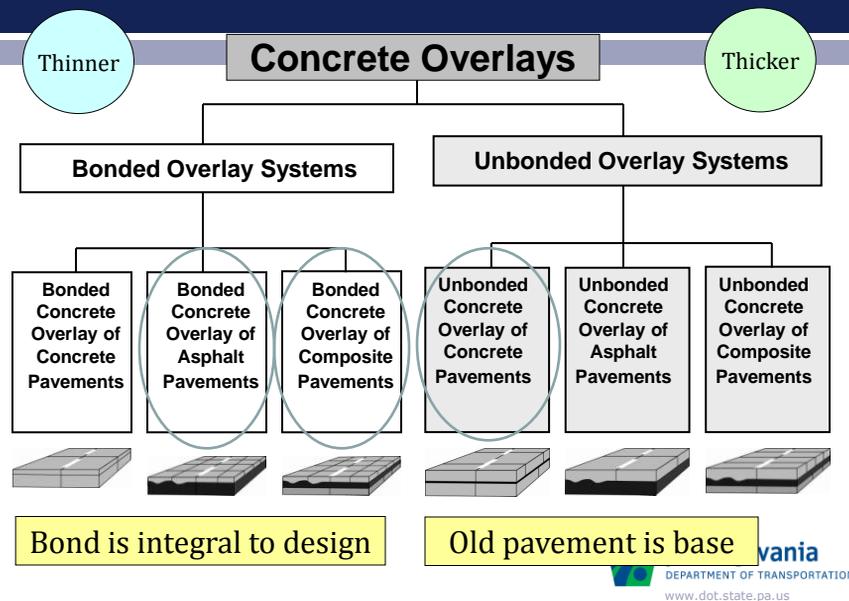


## Scope-of-Work

- Six inch concrete overlay
  - 1100 LF unbonded section
  - 10,500 LF bonded section (includes composite section)
- Bituminous milling
- Bituminous resurfacing
- Bituminous shoulders- entire length
- Drainage adjustments
- Traffic signal upgrades
  - 2 complete replacements
  - 4 hardware upgrades
- Signing, paving markings and delineation, guiderail

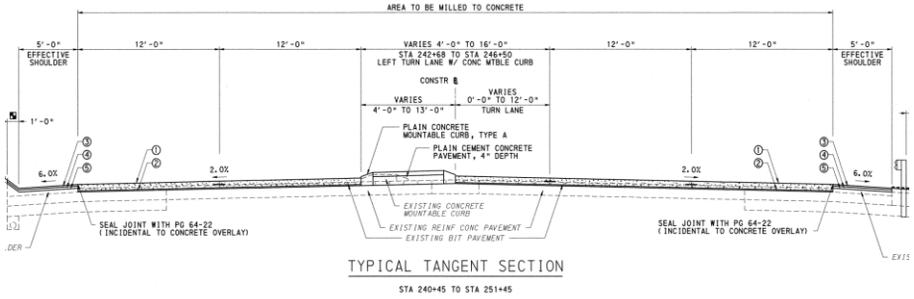


## Concrete Overlay Systems

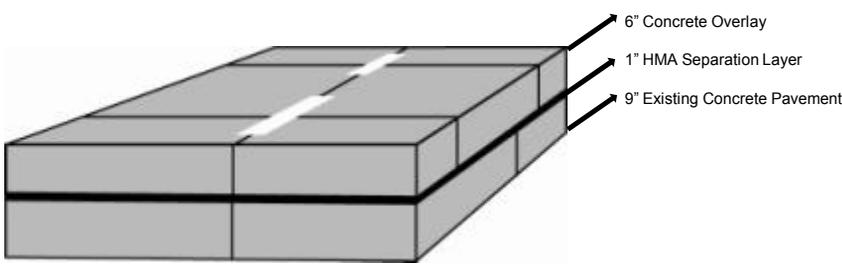


### Typical View Unbonded Overlay Section

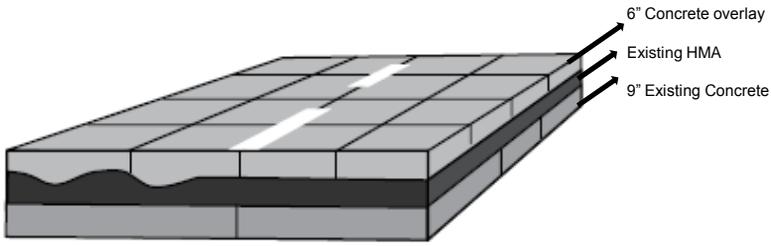
- 1100 LF section of unbonded concrete overlay
- 6" of concrete on 1" bituminous leveling on 9" existing concrete



### Unbonded Overlay with 1" Separation Layer



## Composite Overlay



6" Concrete overlay  
Existing HMA  
9" Existing Concrete



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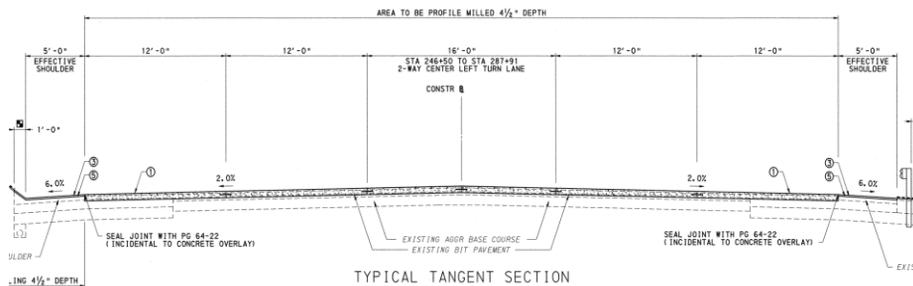
## Core from Composite section



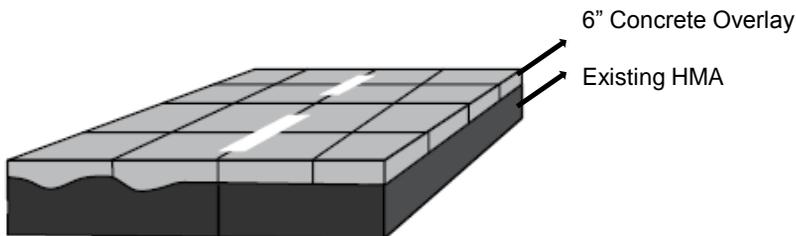
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## Typical View Bonded Overlay

- 10,500 LF section of bonded concrete overlay
- 6" of concrete on 12-15" of existing bituminous pavement



## Bonded Overlay



## Core from bonded section



## Construction Phase- Sequence of Operations

- Phase 1- Traffic on outside lanes next to shoulder
  - Mill pavement on inside 40 ft
  - Place concrete overlay
  - Entire length
- Phase 2- Traffic on completed inside lanes
  - Mill pavement on outside 12 ft and shoulder
  - Place concrete overlay
  - Pave bituminous shoulders
  - Entire length







## Construction- Phase 1- Spray cure



## Construction Phase- Mobile research lab

- National Concrete Pavement Technology Center
- Gary Fick
- Additional informational material testing

## Mobile concrete research lab



## Construction Phase- Site-specific challenges

- Business access
- Drainage of Phase 1 sag vertical curves
- Mountable curb issues
- Joint specifics
- Shoulder edge failure

## Construction Phase- Site-specific challenges

- Revised sequence of operations
- Approved use of accelerated concrete
- Minimized time length of detours where possible



## Construction Phase- Site-specific challenges

- Drainage of Phase 1 sag vertical curves
  - Resulted from trapped water against 4 ½" pvt edge
  - Concerned with night-time off-peak hours of travel
  - "Vermeer cut" trenches across travel lanes at specific locations



## Drainage slot across travel lane



## Water retention

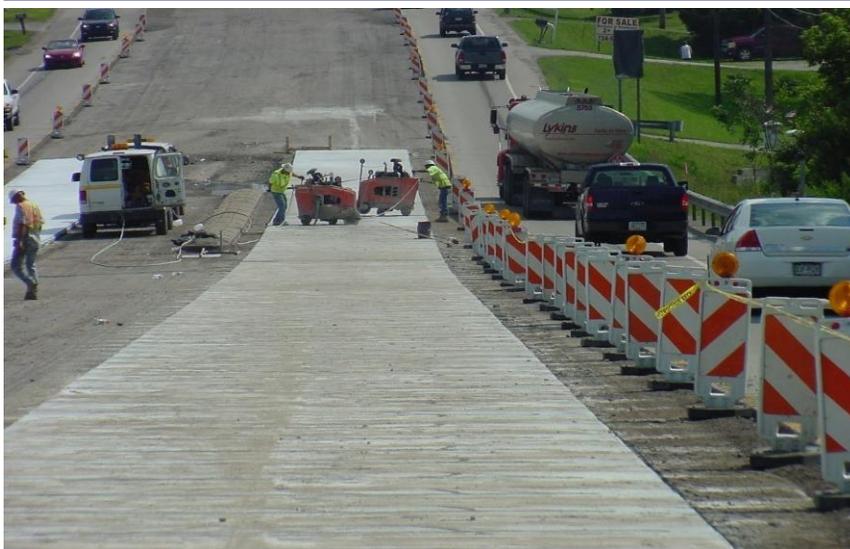


## Construction Phase- Site-specific challenges

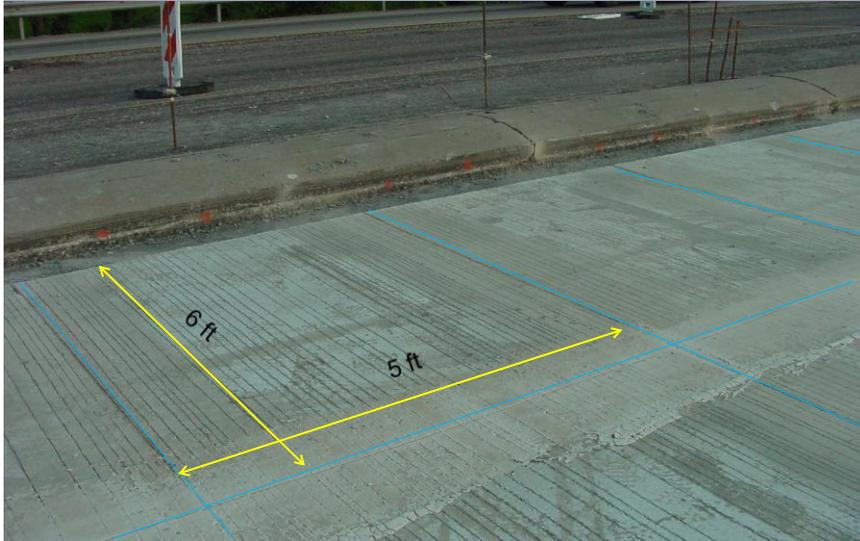
- Mountable curb issues
  - Cost and condition
  - Less than desirable longitudinal joint spacing
  - Lateral inlet adjustments
  - Revised lateral joint spacing



## Construction- Phase 1- Sawcut operation



### Lateral joint spacing to match curb joints



### Joint spacing





## Construction Phase- Site-specific challenges

- Shoulder edge failure
  - Traffic on joint for Phase 1 caused deterioration
  - Effect on Phase 2 concrete placement
  - Additional width of travel lane concrete



## Unraveled shoulder joint



## Construction Phase- Suggested Best Practices

- Use of maturity meters to determine saw cutting "wait time"
- Use of SOFF saws to reduce "wait time"
- Requirement for paver to have ability to record vibrations/minute and speed
- Use of software to record the evaporation rate of concrete



## Future design considerations

- Remove and replace mountable curb and islands
- Additional survey item with V/H control
- Profile milling- including shoulders
- Elimination of tie bars
- Longitudinal tining
- Self Leveling Silicone and/or Rubberized Joint Sealing material



## Consistent grid spacing



## Construction Phase- Concerns

- Underlying HMA layers after milling is a potential for debonding.
- Cracking at edges of inlets due to reduced width

## Project Photo with Center turn lane



## Project Photo Center Turn Lane



## Acknowledgements



DEPARTMENT OF TRANSPORTATION  
UNITED STATES OF AMERICA

National Concrete Pavement  
Technology Center



Tech Center



**GOLDEN  
TRIANGLE  
CONSTRUCTION**  
GENERAL CONTRACTORS



**ACPA**  
PENNSYLVANIA CHAPTER



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## QUESTIONS ?





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