

## Plans, Maintenance of Traffic and Construction



IOWA STATE UNIVERSITY  
Institute for Transportation

National Concrete Pavement  
Technology Center



## Who is supporting this webinar?

**PCA** Since 1916  
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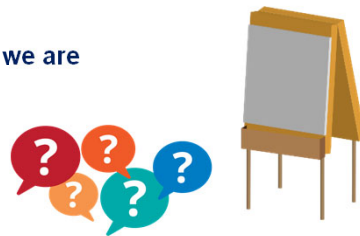
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DOT**

## Introductions

- Peter Taylor, [ptaylor@iastate.edu](mailto:ptaylor@iastate.edu)
- Gary Fick, [Gary@TheTranstecGroup.com](mailto:Gary@TheTranstecGroup.com)
- Brent Burwell, [brentburwell@sbcglobal.net](mailto:brentburwell@sbcglobal.net)
- **Questions are encouraged since we are practicing physical distancing!**




## The Concrete Overlay Webinar Series

- Introduction to Concrete Overlays
- Overview of Concrete Overlays / Existing Pavement Evaluation and Overlay Selection
- Concrete Overlay Design
- Plans, Maintenance of Traffic and Construction**
- Maintenance of Concrete Overlays and Resources Available to you.



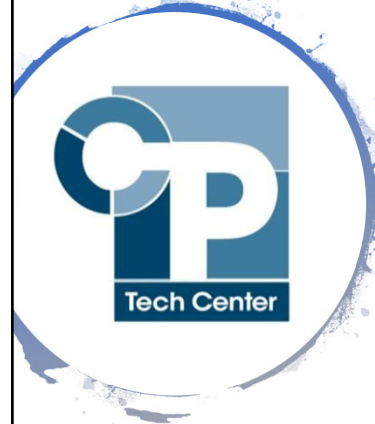
**And throughout - examples of how concrete overlays are performing around the country**



Next Week - May 5<sup>th</sup>  
Concrete Overlays and  
Participate Today in Topic Survey!

<b>Date</b>	<b>Title</b>
May 5	Our last session of the Concrete Overlay Series:
	<b>Maintenance of Concrete Overlays and Resources Available to you</b>
	Steve Tritsch, CP Tech Center
	Matt Zeller, Concrete Paving Association of MN
	Mike Byers, Indiana Chapter - ACPA
<b>Now!</b>	<b>Education Topics Survey</b>
	We have sent a link to a short 3-minute survey on a variety of topics for your consideration. Please help by participating in this survey.
	We re-sent the link during the Session on April 28
	<a href="https://www.surveymonkey.com/r/Webinar-Int-4-2020">https://www.surveymonkey.com/r/Webinar-Int-4-2020</a>

ADA Guidelines for DOT and Municipal Project Planning & Design (Understanding PROWAG)  
How States are Implementing PROWAG for ADA Compliance in Project Design and Construction (with examples)



## Upcoming Webinar Schedule May 12<sup>th</sup> & 19<sup>th</sup>

**May 12** Planning and Design ADA Guidelines for DOT, and Municipalities (Understanding PROWAG 2011)

Every professional engaged in road construction becomes involved in ADA. The May 12 session centers on Planning and Design. Understanding the rules and requirements of PROWAG 2011 will be the stepping off point for this seminar. This seminar is ideal for DOT's, Cities and Municipalities.

**Presenter:** Jesse Jonas, PE  
Mr. Jonas is a Certified ADA Coordinator and is the former ADA Construction & Design Trainer for the Saint Louis County Department of Transportation and Public Works.

**May 19** How are States Implementing PROWAG: An In-depth look at Wisconsin and Missouri's Approaches to ADA Compliance


In this webinar, we share a hands approach of the Planning and Design and turn it towards the Construction part of ADA. Looking at real life projects in both Wisconsin and Missouri.

**Presenters:** Ms. Jackie J. Spoor and Mr. Jesse Jonas, PE

Ms. Jackie J. Spoor is a pavement engineer with the Wisconsin Concrete Pavement Assoc. She has worked on several WisDOT urban reconstruction projects where her knowledge of ADA has been utilized.

Mr. Jonas is a Certified ADA Coordinator and is the former ADA Construction & Design Trainer for the Saint Louis County Department of Transportation and Public Works.

This ADA Webinar Series is offering Professional Development Hours (PDH's)



THANK YOU FOR PARTICIPATING

Participate Today in Topic Survey!

<https://www.surveymonkey.com/r/Webinar-Int-4-2020>

## Today's Learning Objectives

Upon completion of this webinar, attendees will be able to:

- Identify typical vertical constraints that require design solutions for mitigation.
- Consideration of balancing maintenance of traffic and its impact on construction cost and schedule.
- Understanding of approaches for reducing the width of the construction zone required for concrete overlays.
- Identification of key inspection items related to concrete paving.

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# CONCRETE OVERLAY PLANS, MAINTENANCE OF TRAFFIC (MOT) AND CONSTRUCTION

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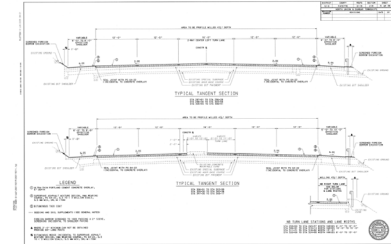


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## Plan Development for Concrete Overlays

- For agencies that are inexperienced with the design of concrete overlays, the approach should be similar to that of designing an asphalt overlay
- The location, geometrics and maintenance of traffic requirements should dictate the level of design detail that is required in the plans

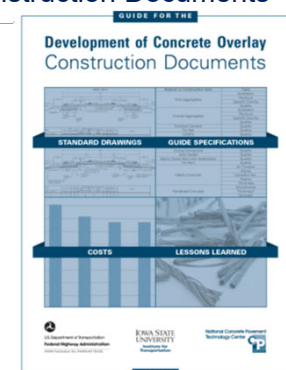


## Learning Objectives

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- Identification of key inspection items related to concrete paving.

## Development of Concrete Overlay Construction Documents

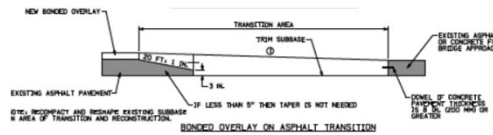
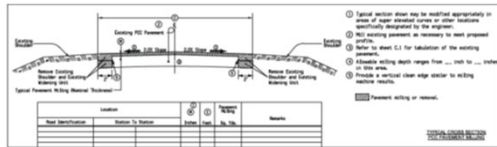
- Contents
  - Developing a Concrete Overlay Project
  - Sample Construction Drawings
  - Guide Specification
  - Costs
  - Design Lessons Learned



[https://intrans.iastate.edu/app/uploads/2018/09/overlay\\_construction\\_doc\\_dev\\_guide\\_w\\_cvr.pdf](https://intrans.iastate.edu/app/uploads/2018/09/overlay_construction_doc_dev_guide_w_cvr.pdf)

## Development of Concrete Overlay Construction Documents

### • Example Plan Sheets and Details



[https://intrans.iastate.edu/app/uploads/2018/09/overlay\\_construction\\_doc\\_dev\\_guide\\_w\\_cvr.pdf](https://intrans.iastate.edu/app/uploads/2018/09/overlay_construction_doc_dev_guide_w_cvr.pdf)

## Identify and Quantify Constraints

- Vertical and horizontal constraints need to be identified during the pavement evaluation

- Existing structures
- Overhead clearances – overpasses, signs and utilities
- Barrier rails
- Existing cross-slope variability and new cross-slope requirements
- Drainage structures
- Existing foreslopes
- Intersections, driveways and field entrances



## Traffic Management- Concrete Overlays

Traffic management for concrete overlay projects is no more challenging than for any other paving project, particularly under traffic, as long as straightforward practices are followed:



## Work Zone Cost Effectiveness

- Traffic strategies can significantly affect project costs
- Traffic control costs and construction costs should be balanced against the impact to the public
- Many urban intersections have been overlaid with concrete utilizing only weekend work hours
- Agency sets the criteria regarding staging, contractor proposes staging that meets criteria



## Paving

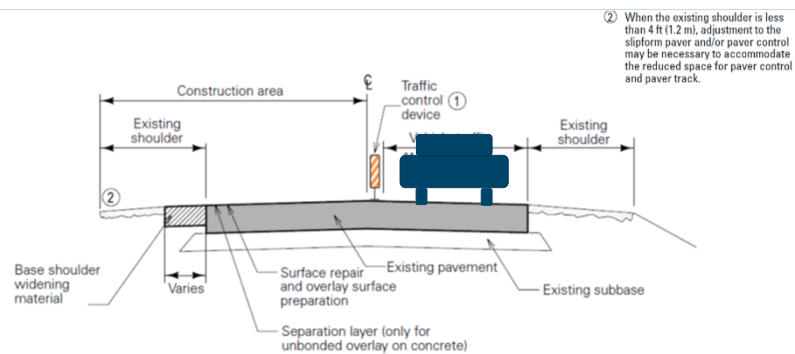
- Maintenance of traffic
  - Depends on concrete overlay thickness
    - If edge drop-off criteria is exceeded, then MOT is just like full depth PCC reconstruction
    - Otherwise, similar to MOT for asphalt projects
  - Options include:
    - Construction adjacent to traffic (lane at a time)
    - Positive separation or cones
    - Pilot car operation for two lane roadways
    - Crossovers and construct full width
    - Staged intersections or full closure with accelerated opening (48 to 72 hr)
- *All concrete overlays are accelerated construction!*



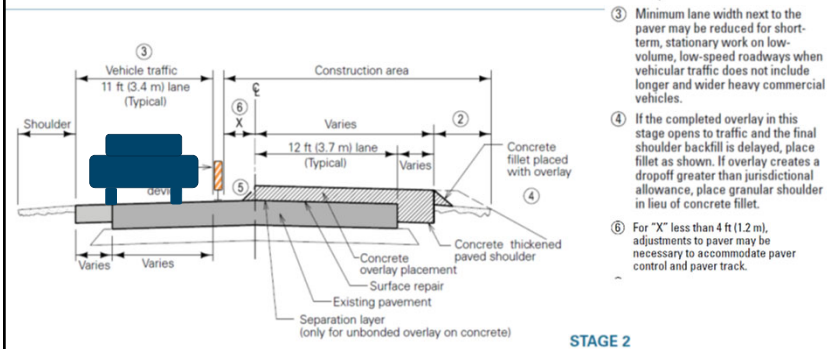
## Single Lane Paving With Through Traffic



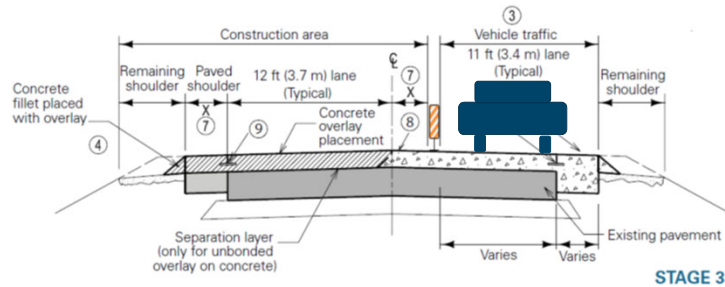
## Design for 2 Lane Overlay Under Traffic



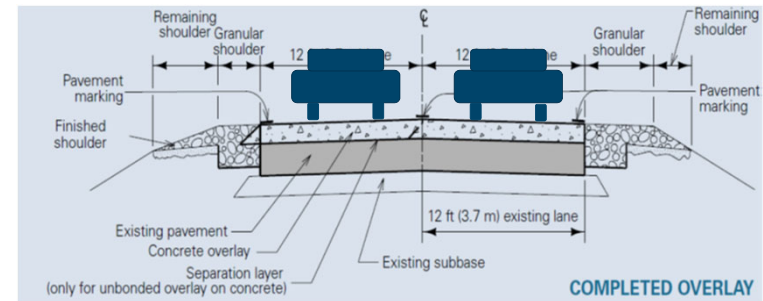
## Design for 2 Lane Overlay Under Traffic



## Design for 2 Lane Overlay Under Traffic



## Design for 2 Lane Overlay Under Traffic



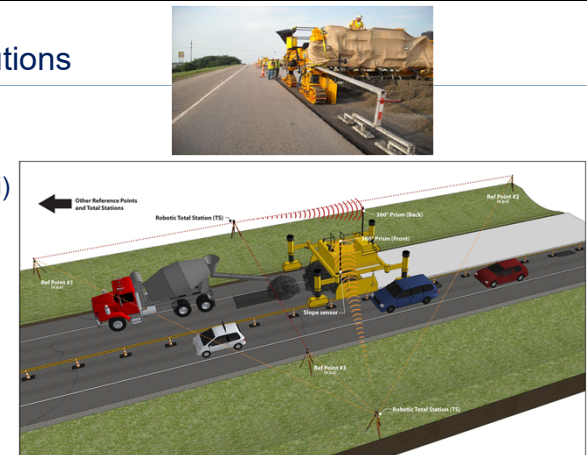
## Reducing Clearances

- Do not specify a particular piece of equipment or method ...
- Define the maximum allowable clearance zone
  - Traffic
  - Traffic control devices
  - Construction equipment and workers
- Allow the contractor to innovate with their equipment and processes



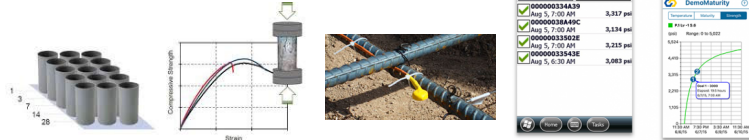
## Clearance Solutions

- Adaptation
  - Moving string (ski)
- Innovation
  - Stringless paving



## Concrete Overlays Accelerated Construction

- Eliminates exposing subgrade to the weather
- Production is typically (or should be) limited by the capacity to saw joints in a timely manner
- Lane rental and A+B bidding with incentives can be used to motivate accelerated opening
- Normal concrete mixtures can and should be used (Maturity is an answer for opening!)



## Concrete Overlay Construction and Inspection

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## Pre-Paving

- Milling the existing pavement
  - Remove distortions of 2" or more
  - Reduce high spots to insure minimum overlay thickness
  - Match adjacent lanes
  - Enhance bond
  - Minimize vertical grade changes
  - Restore profile
- Bonded on asphalt or composite must maintain a minimum of 3" sound asphalt after milling



Pre-Paving Activity



## Pre-Paving

- Stringline
- Stringless – 3D models for existing/milled surface and concrete overlay
- Profiles optimized to balance
  - Thickness
  - Volume
  - Smoothness



## Placing and Spreading Concrete

- Wet the existing surface - no standing water
- Distribute concrete evenly
- Avoid segregation => effects permeability, strength and shrinkage



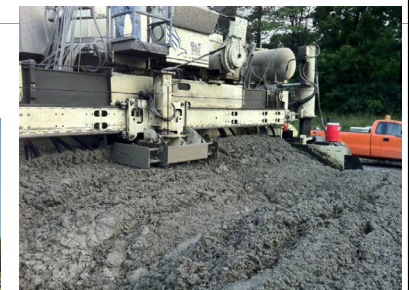
## Spreading Concrete

- Continuous supply of concrete to the paver
- Consistent head => smoothness



## Spreading Concrete

- Maintain a consistent head
- too much?
- too little?



### Key Inspection Items

- Existing pavement properly wetted
- Look for segregation and/or improperly mixed concrete
- Note times/locations when concrete head is at the extremes



### Slipform Paver Functions

- Consolidation
- Shaping
- Surface finish
- Pavement smoothness



### Consolidation

- Match vibrator frequency to workability and paver speed
- Use of a vibrator monitor



### Over-Vibration

- Vibrator Trails
- Segregation



## Shaping/Extrusion

- Extrusion pan – trueness and cross-slope/crown
- Adjust overbuild to form neat edges



## Paving

- Maintain a consistent speed
- Slow down or stop?



## Hand Finishing

- Identify bumps and dips – overlap straightedge by 1/2
- Correct bumps and dips
- Fill surface voids
- Avoid over-finishing



## Hand Finishing

- Visually inspect the pavement edge and surface for proper consolidation
- Some voids are preferable to slurry



## Appropriate Actions

- Adjust vibrator frequency
- Carefully adjust paver speed
- Refine mixture proportions
- Stop paving if the edge keeps falling



## Texturing

- Micro texture - drag
- Macro texture - tining



## Curing

- Before surface evaporation occurs
- Complete coverage



## Appropriate Actions

- Keep rake tines clean and straight
- Don't delay curing operations waiting for texture to be perfect
- Adjust curing operations for dry and/or windy weather conditions
- Clean/adjust nozzles for uniform coverage



## Key Inspection Items

- Uniformity of texture
- Complete coverage of cure



## Special Sawing Facts for Concrete Overlays

- Quantity of saw cuts is increased for thinner overlays
- Longitudinal cuts are as critical as transverse
- Increased base friction
- Base movement issues
- Base temperature control
- Mix temperature control – set times



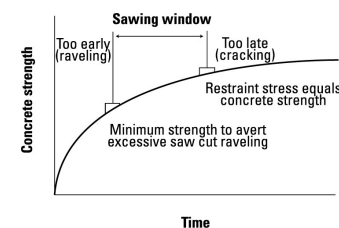
## Sawing

- Specify the saw cut depth
- Require adequate number of saws and blades
- Production rates should consider sawing requirements?
  - Example 2,500 CY per day
    - 10" thick x 24' wide with 12'x15' slabs = 8,746 lf of sawcut
    - 6" thick x 24' wide with 6'x6' slabs = 39,378 lf of sawcut



## The Sawing Window

- Saw in the window
- Timing is critical
- Monitor depth of cut ( $T/3$ )



a) No raveling—sawed later in the window

b) Moderate raveling—sawed early in the window

c) Unacceptable raveling—sawed too early

Figure 8-23. Close-up of different degrees of raveling caused by joint sawing (ACPA)

### Key Inspection Items

- Specified sawing depth and width
- Appropriate saw blades
- Ample saw blades on-hand



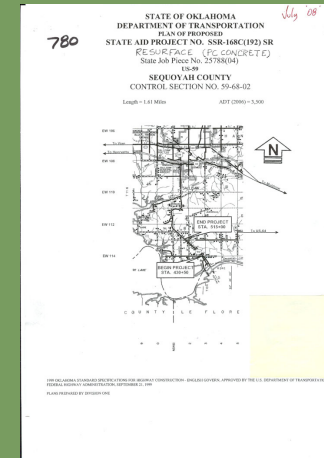
### Appropriate Actions

- Adjust mix to control set time
- Change saw timing to match weather conditions



### Examples from Oklahoma

# Simplified Plan Sheets for Concrete Overlays



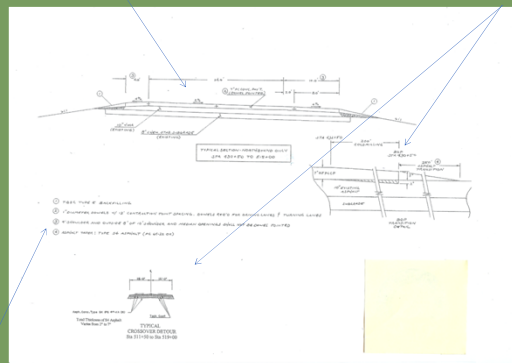
Title Page

- Project No
- Description
- Highway No
- County
- Location Map

Page 1

Typical Section

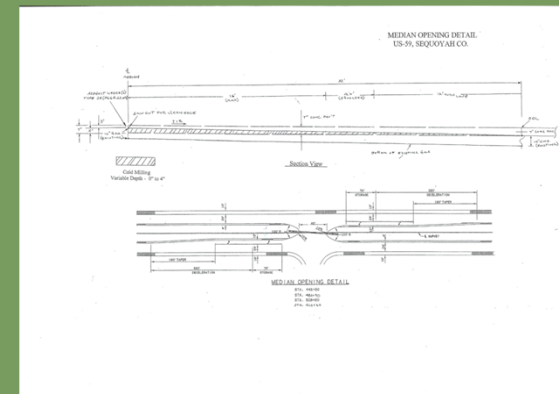
Details



Plan Notes

Page 2

More Details



Page 3

## ENGINEER'S ESTIMATE

NAME OF ROAD: US-99  
SURFACE CODE:  
SURFACE CODE:  
COUNTRY: Singapore  
TYPE OF IMPROVEMENT: P.C. Concrete Pavement Overlay

PROJECT NO: 509-10991921 SR  
JOB PRICE NO: 2578954  
CONST. SECT. NO: 99-99-02  
Contract Sublet/Release No.

ADT: LESS THAN 1000:  
1800 TO 4500: XXX  
5000 OR MORE:

NEW SURFACE WIDTH: 30' (20' Rwy with a 4' & 10' Shoulder)

LOCATION: Begin approximately 0.9 miles N. of the Arkansas River and extend N. approximately 1.61 miles.

ROADWAY SECTION: (7" P.C. Dowel Jointed Concrete Pavement @ 28" Wide) 1.5 ft/s (See typical for details)

ITEM	ITEM	UNIT	QUANTITY	PRICE	AMOUNT
259	0123 Metal Grading	STA	4.00		
230(A)	2696 Solid Soil Sealing	SY	3000.00		
433(A)	0235 Traffic Road Surface Course - Type E	TON	2225.00		
487	0260 Tank Coat	GAL	800.00		
417 (S)	4880 High Lines, Type (PS) (H) (S) (S)	TON	130.00		
417 (S)	4880 High Lines, Type (PS) (H) (S) (S)	TON	130.00		
419(A)	5115 (P.C.) Concrete Pavement (Permanent)	SY	12.00		
419(A)	5115 (P.C.) Concrete Pavement (Permanent)	SY	12.00		
417 (P)	5130 (P.C.) Concrete Pavement (Permanent)	SY	26.00		
417 (P)	6008 (P.C.) Concrete Pavement	SY	8.00		
417	642 Cold Milling Bituminous Pavement	SY	5,400.00		
619(B)	4126 Removal of Asphalt Pavement	SY	2,800.00		
619(B)	0024 Gravel Pavement	LF	1,000.00		
689(A)	8812 Traffic Signs (Photo) (F) (W) (S)	LF	22,000.00		
689(A)	8812 Traffic Signs (Photo) (F) (W) (S)	LF	22,000.00		
689(A)	8812 Traffic Signs (Photo) (F) (W) (S)	LF	1,000.00		
689(A)	8805 Construction Traffic Control	L33M	1.00		
			<b>TOTAL QUANTITY</b>		

### Pay Item List

#### PAY QUANTITY NOTES

Asphalt Concrete Type S4 (PG 64-220R) and Tack Coat quantities are estimated for seven (7) driveways/retains, four (4) center of median wedges, one (1) transition at the BOP from new concrete pavement to existing asphalt and the crossover sta. 511+50 to 519+00.

Tack coat is estimated at 0.05 gallons per square yard of residual asphalt. Type, grade and rate of application of asphalt tack coat shall be in a manner approved by the engineer.

Asphalt concrete type "54" is estimated at 112 pounds per square yard, one inch thick.

Asphalt concrete type "B4" is estimated at 112 pounds per square yard, one inch thick.

A full width expansion joint (See Standard Drawings) shall be placed at the far north terminus of the new (7") dowel jointed concrete pavement. All cost associated with this expansion joint shall be included in the unit price bid for other items of work.

Cold Milling is intended to provide adequate finish grades at the four (4) median openings and one (1) transition at the BOP while maintaining the concrete pavement thickness of seven (7") inches. See Details.

Sawing Pavement, Removal of Asphalt Pavement, Machine Grading and Solid Slab Soil are for the removal and restoring the median grades of the existing crossover at the south end of the project. Once the area has been graded to the engineer's satisfaction, the Slab Soil will serve as erosion control. NOTE: Existing asphalt crossing is approximately ten (10') inches thick.

Price bid for Solid Slab Sod shall include sufficient water for adequate growth as approved by the engineer, and 430 pounds of 10-20-10 fertilizer.

Construction Traffic Control will be installed in a manner approved by the Engineer, in accordance with Chapter VI of the Manual of Uniform Traffic Control Devices, current edition and applicable ODOT Standard Drawings. The contractor shall provide a proposed traffic control plan for approval by the Engineer prior to beginning work. Payment for this item shall be a lump sum in full for the installation, maintenance, relocation and subsequent removal of all required temporary traffic control devices and temporary pavement markings required for completion of the project. All signs, barricades and channelizing devices which are drawn with other Type 'A' or Type 'C' lights in project bid Description shall have their own item description.

## CONSTRUCTION / TRAFFIC NOTES

All construction and materials shall be in accordance with the 1999 Oklahoma Standard Specifications for Highway Construction, approved by the U.S. Department of Transportation, Federal Highway Administration, September 2, 1999.

This project shall be constructed with the northbound lanes closed to highway traffic. Existing barricades shall remain in place during construction. Access to driveways along the east side shall be maintained during construction. After construction is completed the existing barricades shall be picked up by state forces.

It is the intent of this project to switch the northbound traffic from the southbound lanes onto the complete northbound lanes. The crossover at the north end of the project will then return the northbound traffic back to the existing highway in a two-lane, two-way. There is an adjacent active project at the north end of this project: NY-031N0212, 17670(05). Refer to Specification 105.07, *Cooperation Between Contractors*.

## Pay Quantity Notes

## Construction Notes

## CONSTRUCTION / TRAFFIC NOTES CONTINUED

All major patching of the present surface, in preparation for resurfacing operations, shall be performed by State Forces.

The Contractor shall temporarily relocate permanent traffic control devices to accommodate construction operations. Devices shall be maintained and replaced in their original position promptly after operations permit. Any damage to existing signs, guardrail, headwall, curbs, delineators, or other highway appurtenances shall be repaired or replaced by the contractor at his expense and as approved by the Engineer.

Upon completion of the project all construction signs will be replaced by State Forces. State Forces shall lay the existing construction signs/poles down and the contractor will be responsible for picking them up. The contractor shall provide at least two (2) weeks advanced notification as to when the signs require replacement.

Staking shall not be a pay item. Measurements and grade control necessary to complete project in a successful manner shall be included in other items of work.

Mobilization shall not be a new item. Cost to be included in other items of work.

Time charges shall begin when work begins or on the work order effective date, whichever occurs first and shall continue until completion of the work.

Substantial Completion is defined when all asphalt concrete has been placed, the shouldering operations completed and all permanent plastic striping installed to the satisfaction of the Engineer.

YES		NO	
_____	X		Project crosses or otherwise involves railroad right-of-way and facilities.
_____	X		Additional right-of-way and/or utility relocations are necessary.
<b>Applicable Standards</b>			
TC314-1-00E			TC332-1-00E
TC32-1-00E			TC333-1-00E
TC33-1-00E			TC385-1-00E
TC34-1-00E			CSGD-4-02E
TC35-1-00E			LECS-3-01E
TC36-1-00E			LTU-3-00E
TC37-1-00E			PM44-1-00E
TC38-1-00E			PM55-1-00E
TC39-1-00E			PM56-1-00E
TC310-1-00E			RS1-2-02E
TC311-1-00E			RS2-2-02E

More  
Construction Notes

## List of Standards

## Overlay Projects

### County Road Kingfisher Co

Multiple layers HMA/Chip seal  
Widened with Aggregate Base  
5' UBOA  
Alternate Bid 5" vs 5"  
Concrete Option Won



### US 287 Cimarron Co

Two Lane Facility  
6,500 ADT  
60% Trucks  
8" UBCOA  
Built Under Traffic  
Constructed 2007



### SE 15<sup>th</sup> St Del City

Existing 7" PCCP  
Past HMA Overlay  
Removed HMA  
Full Depth Patching  
Stitched Longitudinal Cracks  
3" Bonded Concrete Overlay  
Constructed 2006



## US 59 Sequoyah Co

HMA Section < One Year Old

Needed Quick Fix

Designed Field Division

Plan Set 7 Sheets

16 Pay Items



## US 69 Pittsburg Co

Designed by Field Division

Simplified Plan Sheets

Inside Lane 4"

Outside Lane 6"

Widened Outside Lane to 14'

Est 25 million ESAL's so far

Constructed 2001

