

EXISTING PCCP TO NEW HMA PAVEMENT

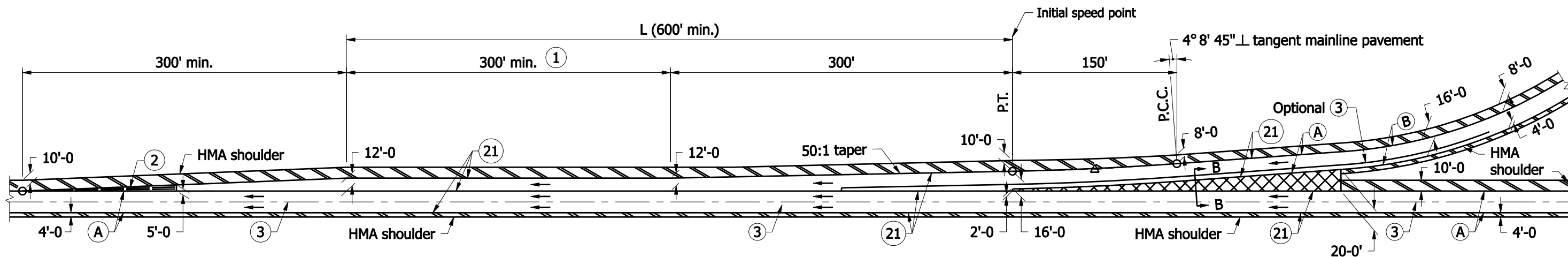
INDIANA DEPARTMENT OF TRANSPORTATION	
PAVEMENT TYPE TRANSITION	
SEPTEMBER 1999	
STANDARD DRAWING NO. E 400-PTRN-01	
	/s/ <i>Anthony L. Uremovich</i> 9-01-99 DESIGN STANDARDS ENGINEER DATE
	/s/ <i>Donald W. Lucas</i> 9-01-99 CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER	

GENERAL NOTES

- ① Required additional length of L above the 600' minimum shall be added to the length of this parallel lane segment. (Example: If required L = 720', then this parallel lane segment length = 420'). See tables on Standard Drawing E 401-REBS-04.
- ② Ear construction type A: 2 lines of #5 bars required (Est. weight = 255 lb). Transverse sawed and sealed joint, in line with pavement contraction joint, shall extend through ear construction. The #5 bars shall be discontinued at such joints. See Detail B-B.
3. See Standard Drawing E 401-REBS-03 for Section B-B.

CURVE DATA

$\Delta = 3^{\circ}00'00''$
 $R = 2864.79'$
 $T = 75.02'$
 $L = 150.0'$
 $E = 0.98'$

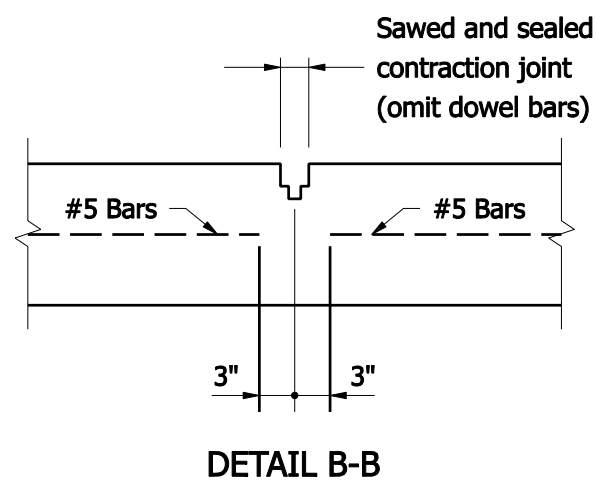


NOTES :

ENTRANCE

LEGEND

- Ⓐ Pavement type and thickness as specified for the mainline.
- Ⓑ Pavement type and thickness as specified for ramps.
- ③ Longitudinal joint
- ②① Longitudinal construction joint
- ▨ HMA shoulder (Thickness of mainline pavement)
- ▩ HMA shoulder (Thickness as specified on Typical Sections)

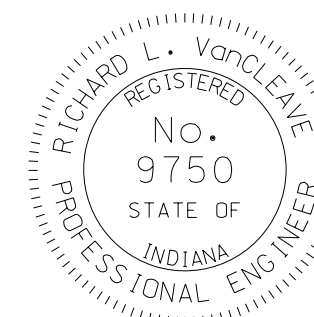


INDIANA DEPARTMENT OF TRANSPORTATION

RAMP ENTRANCE TERMINAL
HMA SHOULDER

SEPTEMBER 2008

STANDARD DRAWING NO. E 401- REBS-01



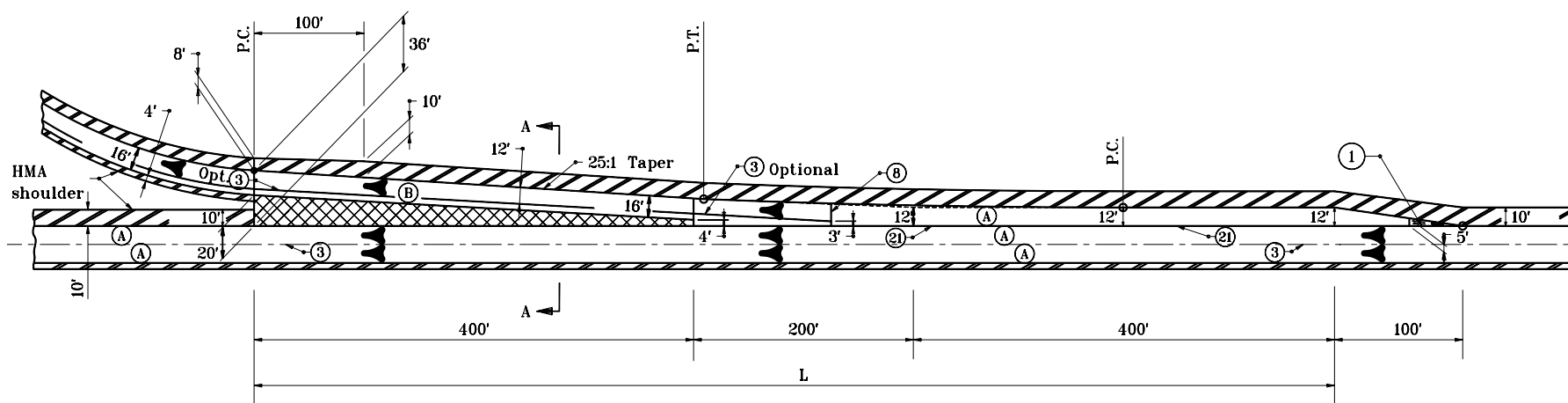
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/02/08
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/02/08
CHIEF HIGHWAY ENGINEER DATE

GENERAL NOTES

- ① Ear construction type A:
2 lines of #5 bars required (Est. wt. = 86 lb).
Transverse sawed and sealed joint, in line with pavement contraction joint, shall extend through ear construction. The #5 bars shall be discontinued at such joints. See Detail B-B on Standard Drawing E 401-REBS-01.
2. See Standard Drawing E 401-REBS-03 for Section A-A.



EXIT

LEGEND

- Ⓐ Pavement type and thickness as specified for the mainline.
- Ⓑ Pavement type and thickness as specified for ramps.
- ③ Longitudinal Joint (Optional where indicated)
- ② Longitudinal Construction Joint
- ▨ HMA Shoulder (Thickness of mainline pavement)
- ▩ HMA Shoulder (Thickness as specified on Typical Sections)

CURVE DATA

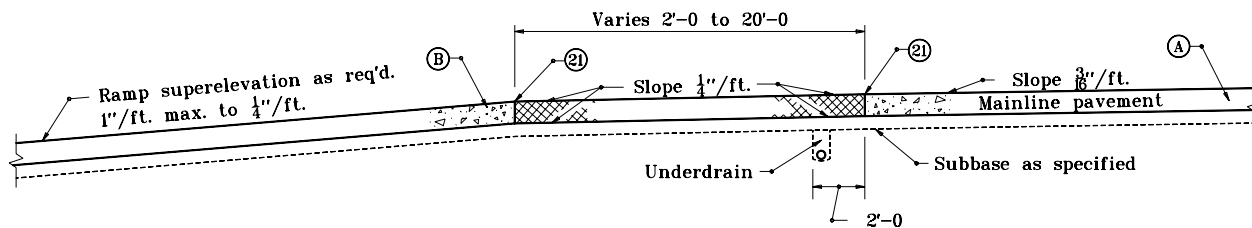
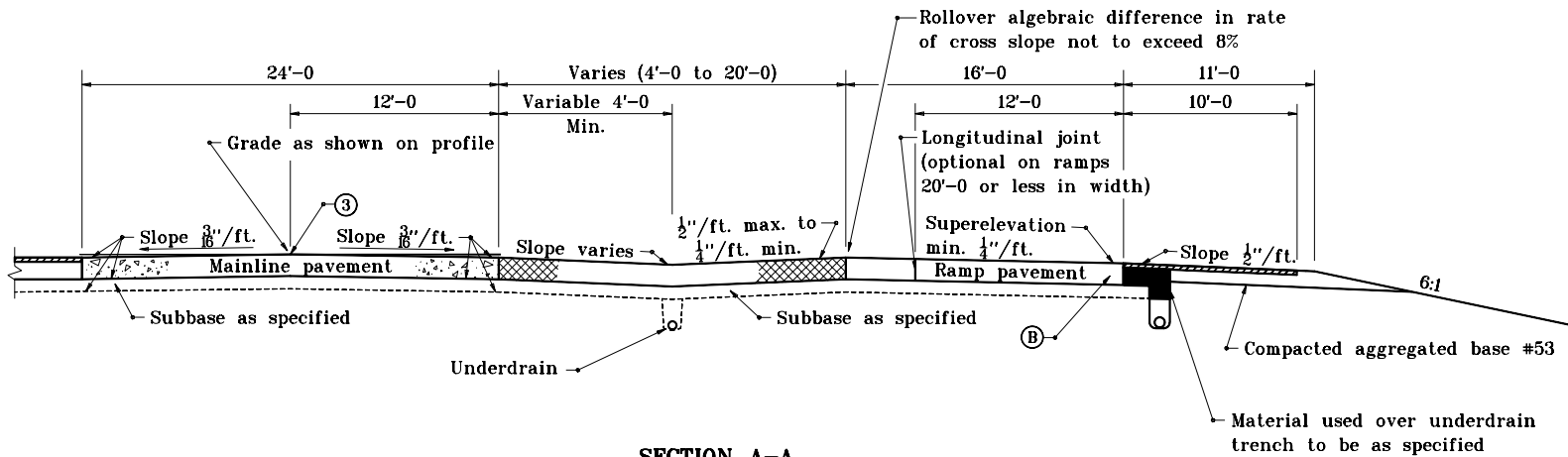
$\Delta = 2^\circ 17' 26''$
 $T = 190.91'$
 $L = 381.76'$
 $E = 1.91'$
 $R = 9549.30'$

INDIANA DEPARTMENT OF TRANSPORTATION

RAMP EXIT TERMINAL HMA SHOULDER JANUARY 1999

STANDARD DRAWING NO. E 401-REBS-02

	DETAILS PLACED IN THIS FORMAT	11-15-99
	/s/ Anthony L. Uremovich	11-15-99
	DESIGN STANDARDS ENGINEER	DATE
	/s/ Firooz Zandi	11-15-99
DESIGN STANDARDS ENGINEER	CHIEF HIGHWAY ENGINEER	DATE
	ORIGINALLY APPROVED	1-04-99



LEGEND

- (A) Pavement type and thickness as specified for the mainline.
- (B) Pavement type and thickness as specified for ramps.
- (3) Longitudinal joint
- (21) Longitudinal construction joint
- HMA shoulder (Thickness of mainline pavement)

INDIANA DEPARTMENT OF TRANSPORTATION	
RAMP CROSS SECTIONS	
HMA SHOULDER	
SEPTEMBER 2000	
STANDARD DRAWING NO. E 401-REBS-03	
	/s/ Anthony L. Uremovich 9-01-00 <small>DESIGN STANDARDS ENGINEER DATE</small>
	/s/ Firooz Zandi 9-01-00 <small>CHIEF HIGHWAY ENGINEER DATE</small>
DESIGN STANDARDS ENGINEER	DESIGN STANDARDS ENGINEER

		ACCELERATION LENGTH, L (ft)								
		ENTRANCE CURVE DESIGN SPEED (mph)								
HIGHWAY	STOP CONDITION	15	20	25	30	35	40	45	50	
		INITIAL SPEED (mph)								
DESIGN SPEED (mph)	SPEED REACHED (mph)	0	14	18	22	25	30	36	40	44
30	23	190	—	—	—	—	—	—	—	—
40	31	380	320	250	220	140	—	—	—	—
50	39	760	700	630	580	500	380	160	—	—
60	47	1170	1120	1070	1000	910	800	590	400	170
70	53	1590	1540	1500	1410	1330	1230	1010	830	580

MINIMUM ACCELERATION LENGTHS FOR ENTRANCE TERMINALS
(Flat grades of 2 percent or less)

TABLE A

DESIGN SPEED (mph)	ACCELERATION LANE				
	Ratio of length of grade to length of level for ①				
	Design speed of turning roadway curve (mph)				
	20	30	40	50	ALL SPEEDS
	2.01 to 4 percent upgrade				2.01 to 4 percent downgrade
40	1.3	1.3	—	—	0.7
50	1.3	1.4	1.4	—	0.65
60	1.4	1.5	1.5	1.6	0.6
70	1.5	1.6	1.7	1.8	0.6
	4.01 to 6 percent upgrade				4.01 to 6 percent downgrade
40	1.5	1.5	—	—	0.6
50	1.5	1.7	2.2	—	0.55
60	1.7	1.9	2.2	2.2	0.5
70	2.0	2.2	2.6	3.0	0.5

① Ratio from this table multiplied by length in Table A gives length of speed change lane on grade.

RATIO OF LENGTH OF SPEED-CHANGE LANE ON GRADE TO LENGTH OF LEVEL ACCELERATION LANE

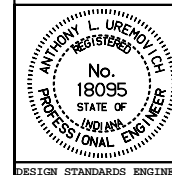
TABLE B

INDIANA DEPARTMENT OF TRANSPORTATION

RAMP TERMINAL TABLES

JUNE 1996

STANDARD DRAWING NO. **E 401-REBS-04**



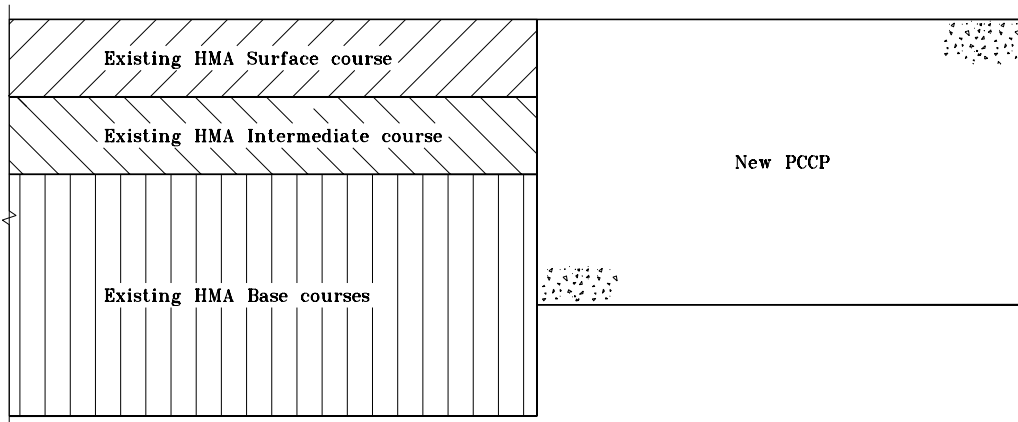
DETAILS PLACED IN THIS FORMAT 11-15-99

/s/ Anthony L. Uremovich 11-15-99
DESIGN STANDARDS ENGINEER DATE

/s/ Firooz Zandi 11-15-99
CHIEF HIGHWAY ENGINEER DATE

DESIGN STANDARDS ENGINEER

ORIGINALLY APPROVED 6-03-96

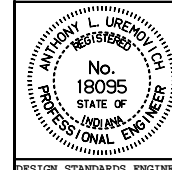


EXISTING HMA PAVEMENT TO NEW PCCP

INDIANA DEPARTMENT OF TRANSPORTATION

**PAVEMENT TYPE
TRANSITION**
SEPTEMBER 1999

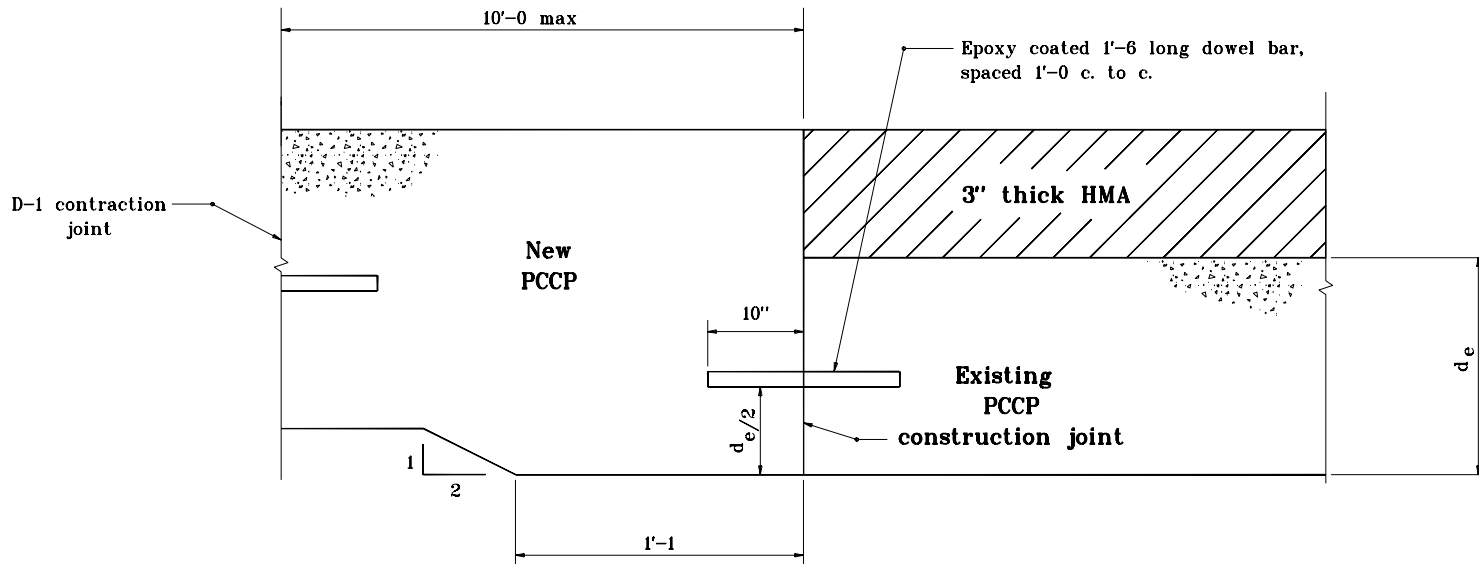
STANDARD DRAWING NO. **E 500-PTRN-01**



/s/ Anthony L. Uremovich 9-01-99
DESIGN STANDARDS ENGINEER DATE

/s/ Donald W. Lucas 9-01-99
CHIEF HIGHWAY ENGINEER DATE

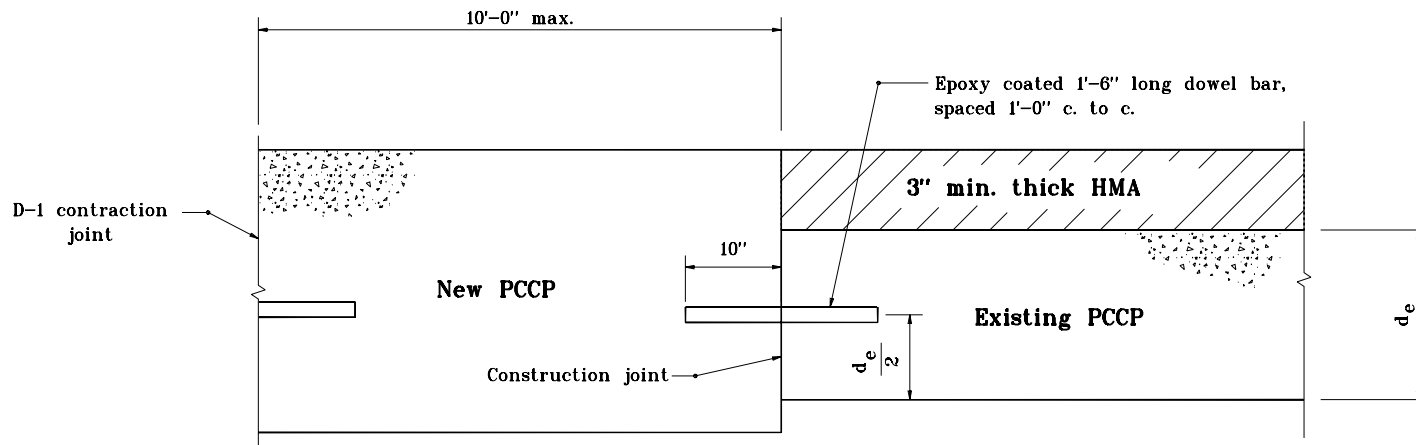
DESIGN STANDARDS ENGINEER



TRANSITION DESIGN WITH THICKENED SLAB

New PCCP Thickness is Less Than
that of 3" Thick HMA + Existing PCCP

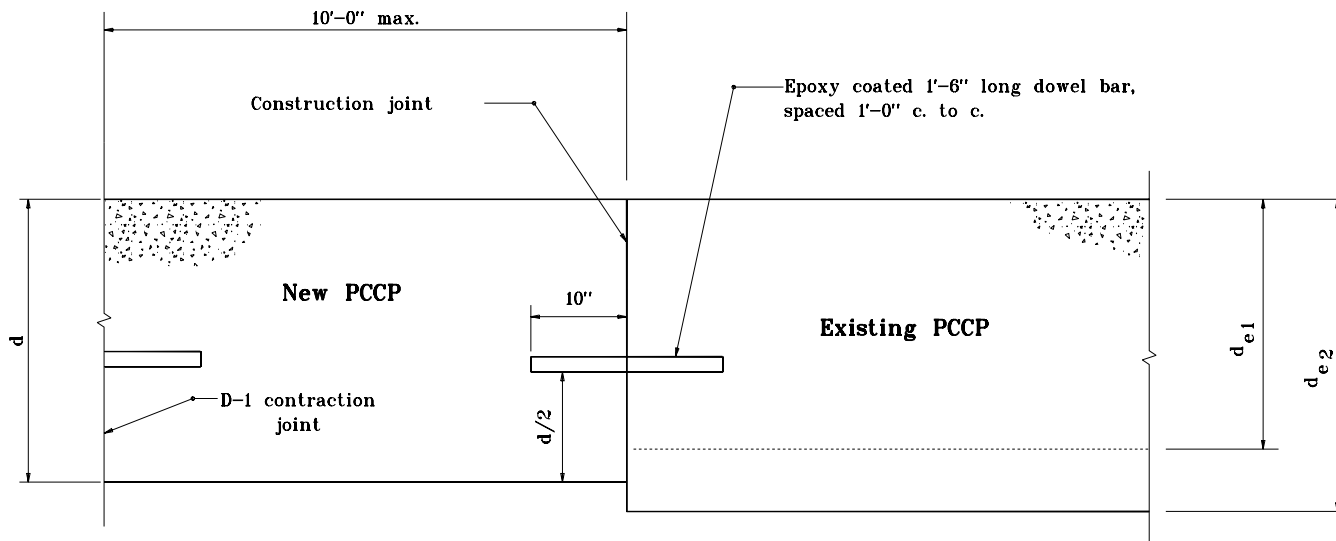
INDIANA DEPARTMENT OF TRANSPORTATION	
PAVEMENT TYPE TRANSITION JANUARY 2000	
STANDARD DRAWING NO. E 500-PTRN-02	
	/s/ Anthony L. Uremovich 1-03-00 DESIGN STANDARDS ENGINEER DATE
	/s/ Firooz Zandi 1-03-00 CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER	



TRANSITION DESIGN

New PCCP Thickness is Greater Than or Equal to That
of 3' Thick HMA + Existing PCCP

INDIANA DEPARTMENT OF TRANSPORTATION	
PAVEMENT TYPE TRANSITION	
SEPTEMBER 1999	
STANDARD DRAWING NO. E 500-PTRN-03	
	/s/ Anthony L. Urenovich 9-01-99 DESIGN STANDARDS ENGINEER DATE
	/s/ Donald W. Lucas 9-01-99 CHIEF HIGHWAY ENGINEER DATE



TRANSITION DESIGN

New PCCP to Existing PCCP

$d > d_{e1}$ (New PCCP Thicker Than Existing)

$d < d_{e2}$ (New PCCP Thinner Than Existing)

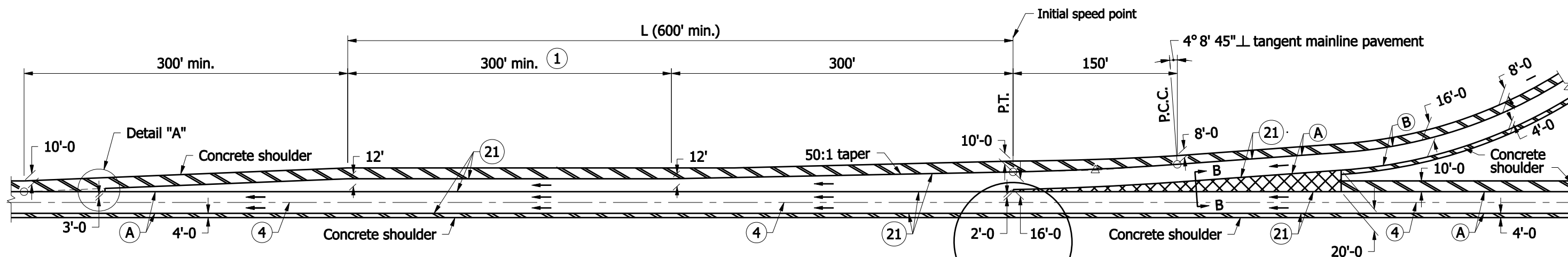
INDIANA DEPARTMENT OF TRANSPORTATION	
PAVEMENT TYPE TRANSITION	
SEPTEMBER 1999	
STANDARD DRAWING NO. E 500-PTRN-04	
	<i>/s/ Anthony L. Urenovich</i> 9-01-99 DESIGN STANDARDS ENGINEER DATE
	<i>/s/ Donald W. Lucas</i> 9-01-99 CHIEF HIGHWAY ENGINEER DATE

GENERAL NOTES

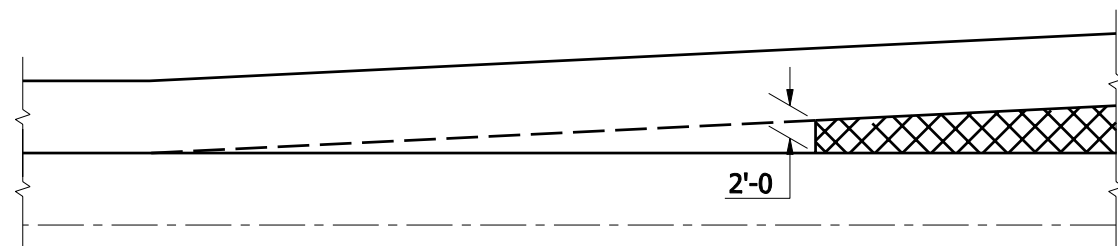
- ① Pavement contraction joints shall be extended through the concrete shoulder in the gore areas.
- ② Shoulder corrugations shall be omitted in this area.
- ③ Any required additional length of L above the 600' minimum shall be added to the length of this parallel lane segment.
(Example: required L = 700' then this parallel lane segment length = 400')
4. See tables on Standard Drawing E 401-REBS-04.
5. See Standard Drawing E 401-REBS-03 for Section B-B.

CURVE DATA

$\Delta = 3^{\circ}00'00''$
 $R = 2864.79'$
 $T = 75.02'$
 $L = 150.0'$
 $E = 0.98'$



ENTRANCE



DETAIL "A"

LEGEND

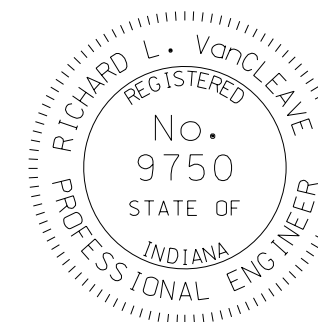
- Ⓐ Pavement type and thickness as specified for the mainline.
- Ⓑ Pavement type and thickness as specified for ramps.
- ④ Longitudinal joint
- Ⓐ Longitudinal construction joint
- ▨ Concrete shoulder (Thickness of mainline pavement)
- ▩ Concrete shoulder (Thickness as specified on Typical Sections)

INDIANA DEPARTMENT OF TRANSPORTATION

**RAMP ENTRANCE TERMINAL
 CONCRETE SHOULDER**

SEPTEMBER 2008

STANDARD DRAWING NO. E 501-RECS-01



DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/02/08
 DESIGN STANDARDS ENGINEER DATE

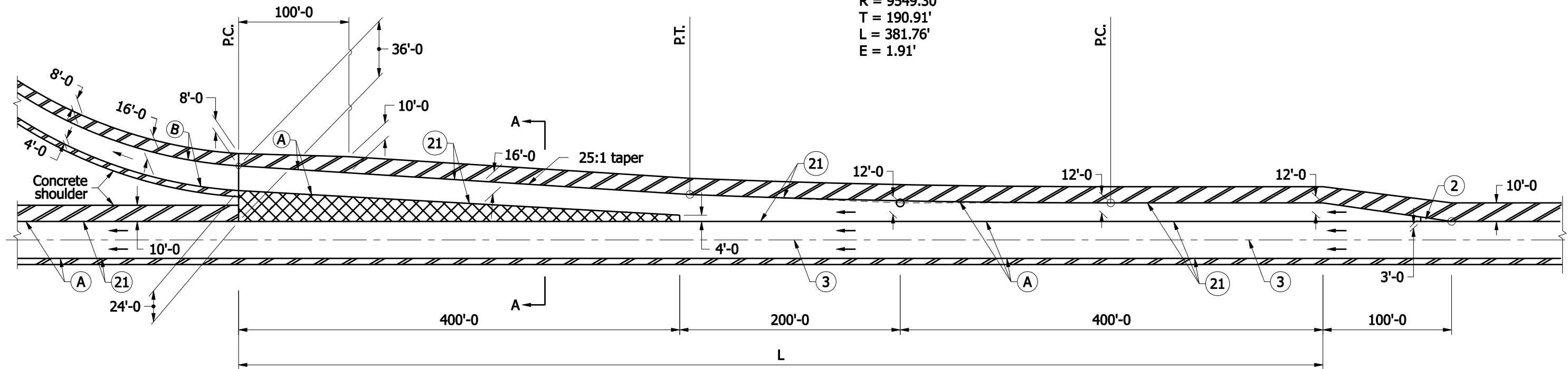
/s/ Mark A. Miller 09/02/08
 CHIEF HIGHWAY ENGINEER DATE

GENERAL NOTES

- ① Pavement contraction joints shall be extended through the concrete shoulder in the gore areas.
- ② Shoulder corrugations shall be omitted in this area.
3. See tables on Standard Drawing E 401-REBS-04.
4. See Standard Drawing E 501-RECS-03 for Section A-A.

CURVE DATA

$\Delta = 2^{\circ}17'26''$
 $R = 9549.30'$
 $T = 190.91'$
 $L = 381.76'$
 $E = 1.91'$



LEGEND

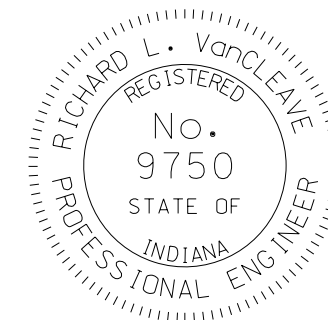
- Ⓐ Pavement type and thickness as specified for the mainline.
- Ⓑ Pavement type and thickness as specified for ramps.
- ③ Longitudinal joint
- ②① Longitudinal construction joint
- ▨ Concrete shoulder (Thickness of mainline pavement)
- ▩ Concrete shoulder (Thickness as specified on Typical Sections)

INDIANA DEPARTMENT OF TRANSPORTATION

RAMP EXIT TERMINAL
 CONCRETE SHOULDER

SEPTEMBER 2008

STANDARD DRAWING NO. E 501- RECS-02



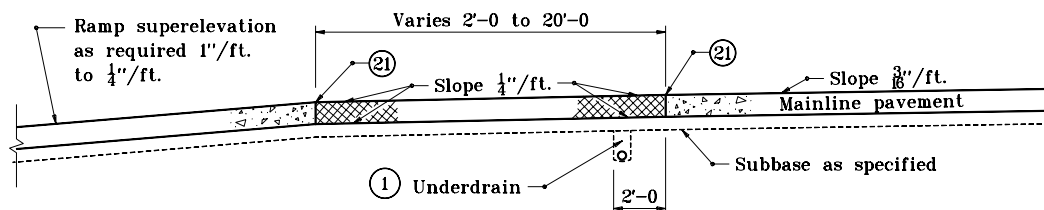
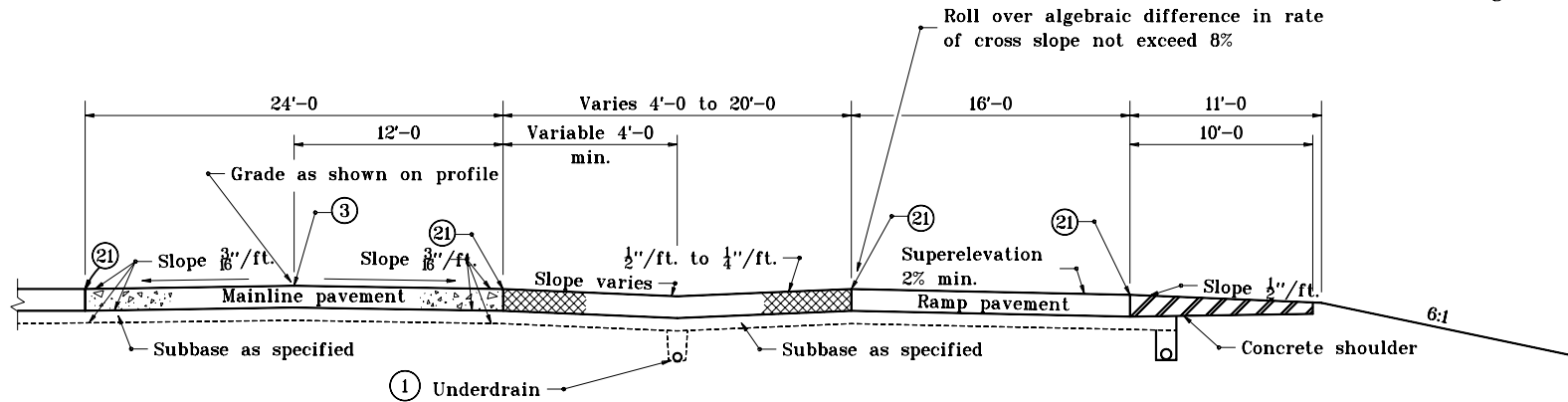
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/02/08
 DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/02/08
 CHIEF HIGHWAY ENGINEER DATE

GENERAL NOTES

- ① For underdrain details see Standard Drawing E 718-UNDR-01.



LEGEND

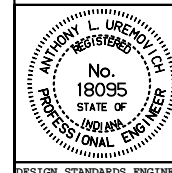
- Ⓐ Pavement type and thickness as specified for the mainline.
- Ⓑ Pavement type and thickness as specified for ramps.
- ③ Longitudinal joint
- ② Longitudinal construction joint
- ▨ Concrete shoulder (Thickness of mainline pavement)
- ▩ Concrete shoulder (Thickness as specified on Typical Sections)

INDIANA DEPARTMENT OF TRANSPORTATION

**RAMP CROSS SECTIONS
CONCRETE SHOULDERS**

JANUARY 1999

STANDARD DRAWING NO. E 501-RECS-03



DETAILS PLACED IN THIS FORMAT 11-15-99

/s/ Anthony L. Uremovich 11-15-99
DESIGN STANDARDS ENGINEER DATE

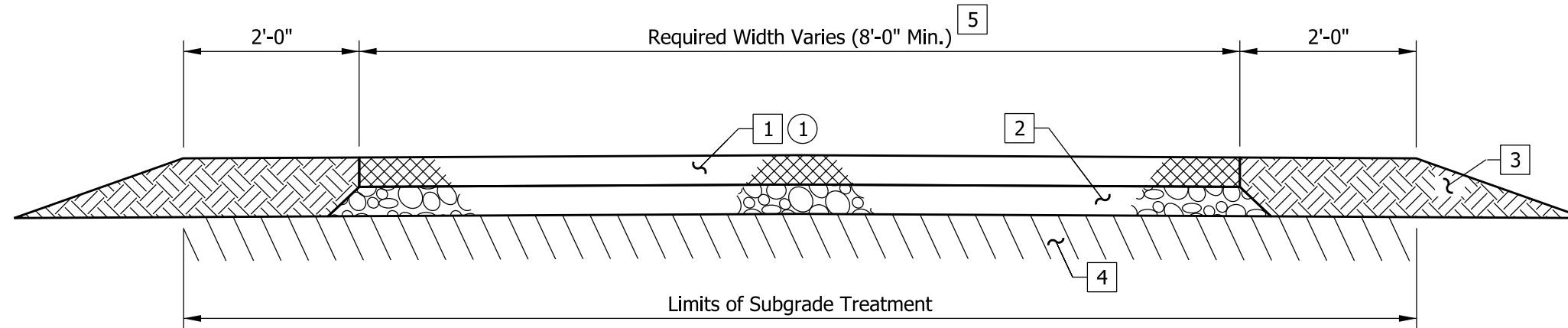
/s/ Firooz Zandi 11-15-99
CHIEF HIGHWAY ENGINEER DATE

DESIGN STANDARDS ENGINEER

ORIGINALLY APPROVED 1-04-99

NOTES:

- ① Transverse joints spaced at 8'-0" without dowels. Saw cut 1/8" wide and 1" deep.
- 2. See Standard Drawing series E 604-NVUF for HMA pavement sections.



LEGEND

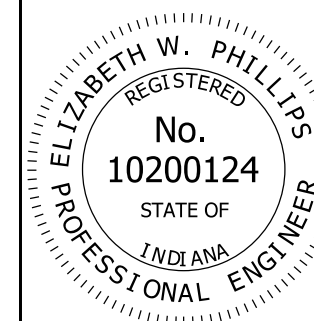
- 1 4" of PCCP
- 2 4" Compacted Aggregate No. 53, Base
- 3 Earth Shoulder
- 4 Subgrade Treatment III, 6" of Soil Compacted to the Density and Moisture Requirement
- 5 Width and Cross Slope as Required

INDIANA DEPARTMENT OF TRANSPORTATION

NON-MOTORIZED VEHICLE USE FACILITY
PCCP PAVEMENT SECTION

SEPTEMBER 2015

STANDARD DRAWING NO. E 502-NVUF-01

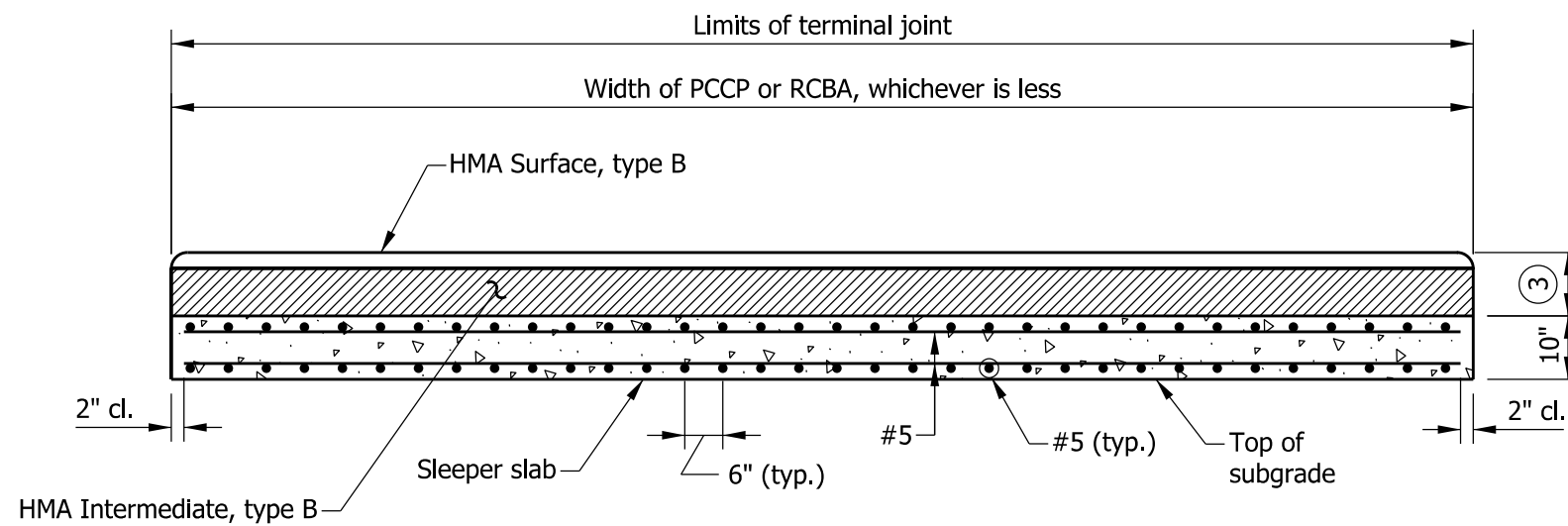
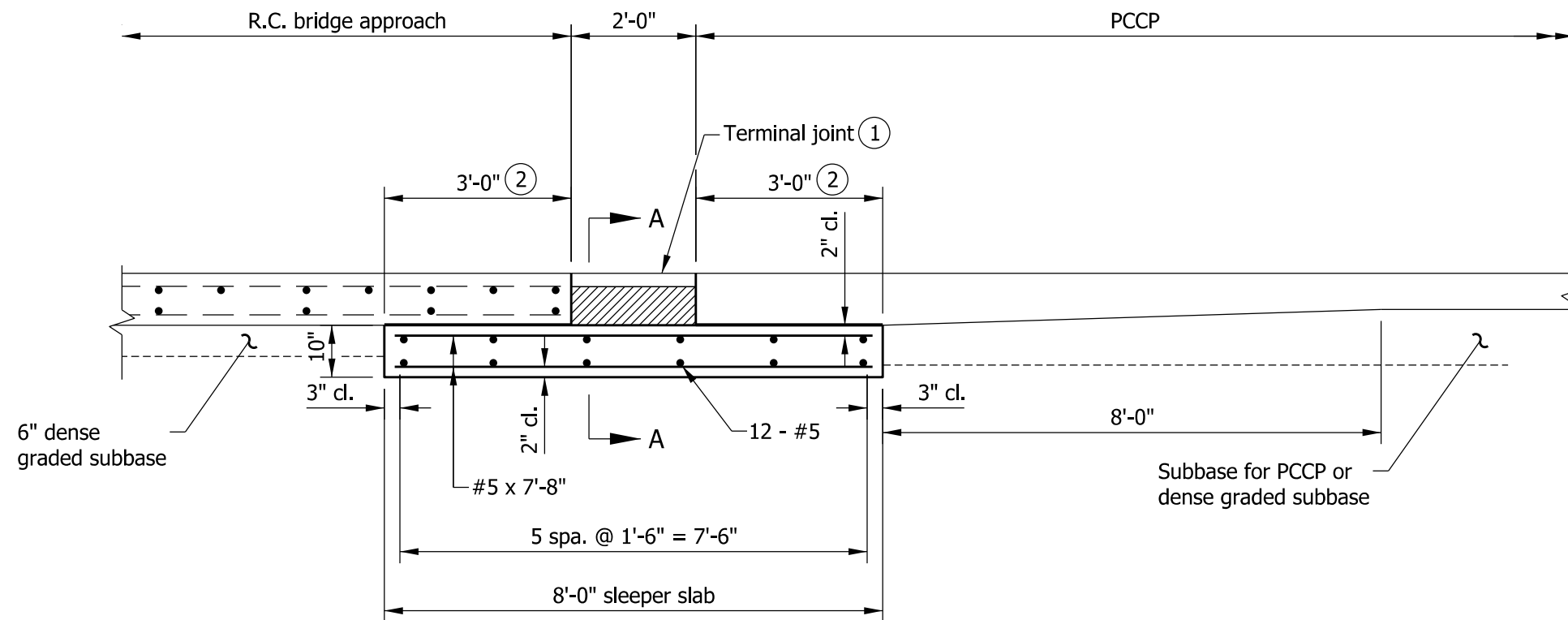


/s/ Elizabeth W. Phillips 03/09/15
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 03/09/15
CHIEF ENGINEER DATE

NOTES

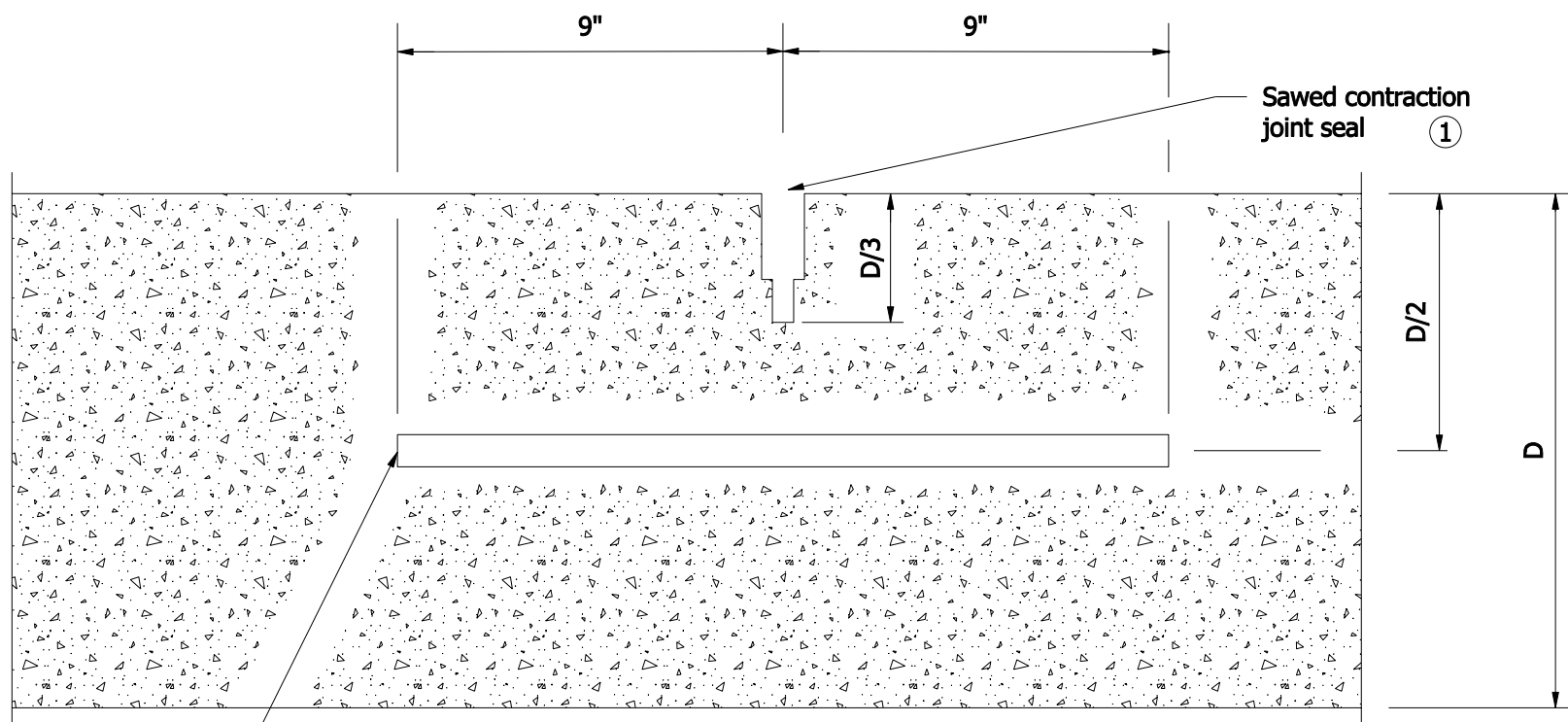
- ① Terminal joint elevation shall match elevation of adjacent PCCP and RCBA.
- ② Limits of polyethylene bond breaker.
- ③ RCBA thickness.



SECTION A-A

INDIANA DEPARTMENT OF TRANSPORTATION	
REINFORCED CONCRETE BRIDGE APPROACH TERMINAL JOINT FOR USE WITH PCCP SEPTEMBER 2012	
STANDARD DRAWING NO. E 503-BATJ-01	
	/s/ <i>Richard L. VanCleave</i> 09/04/12 SUPERVISOR, ROADWAY STANDARDS DATE
	/s/ <i>Mark A. Miller</i> 09/04/12 CHIEF ENGINEER DATE

DOWEL BAR SIZES	
Pavement Thickness, D	Dowel Bar Diameter
Less than 9"	1"
9" through 12"	1 1/4"
Greater than 12"	1 1/2"



Epoxy coated dowel bars at 1'-0" c/c, at 6" min. from edge of PCCP
(See table for dowel bar diameter)

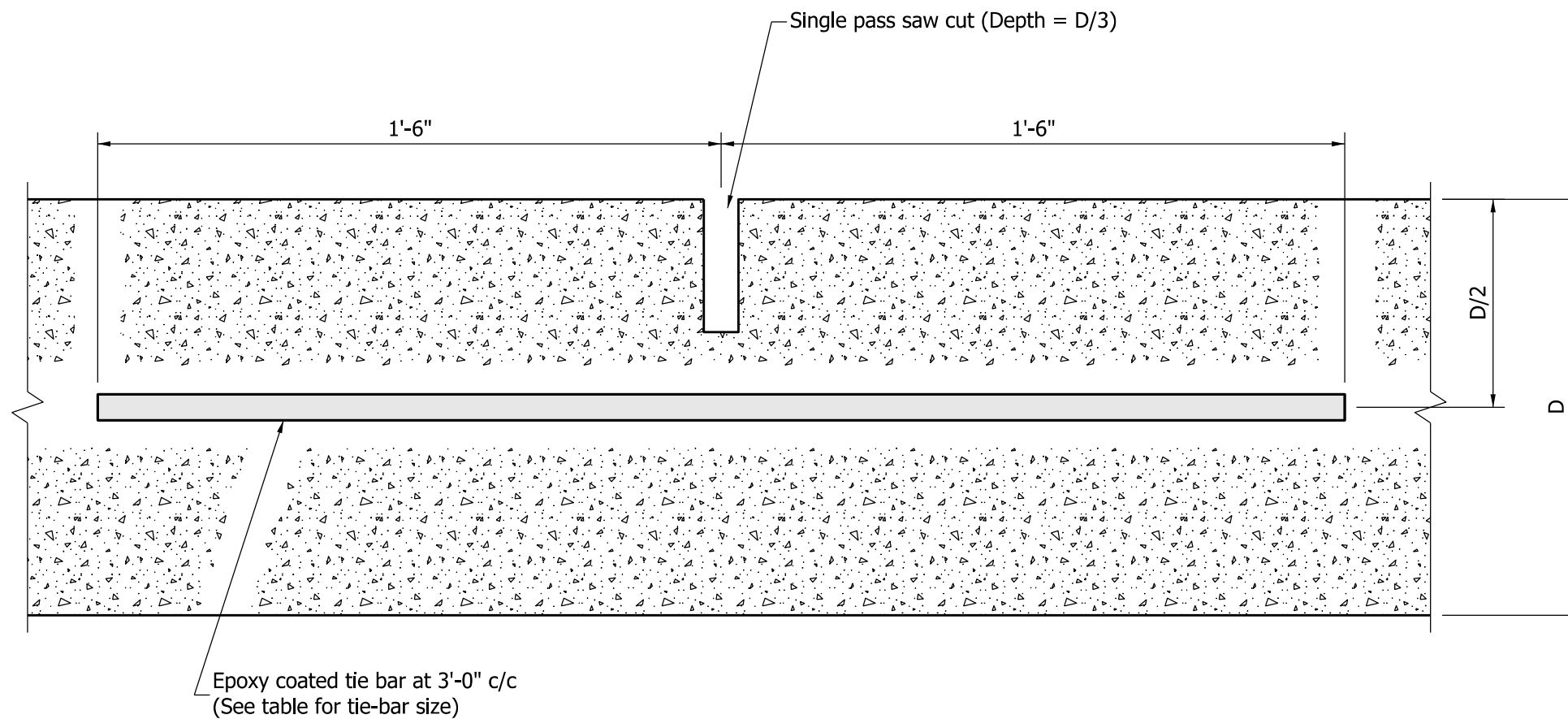
LONGITUDINAL SECTION THROUGH PCCP

NOTES:

① For Type D-1 contraction joint sealant options, see Standard Drawing E 503-CCPJ-06.

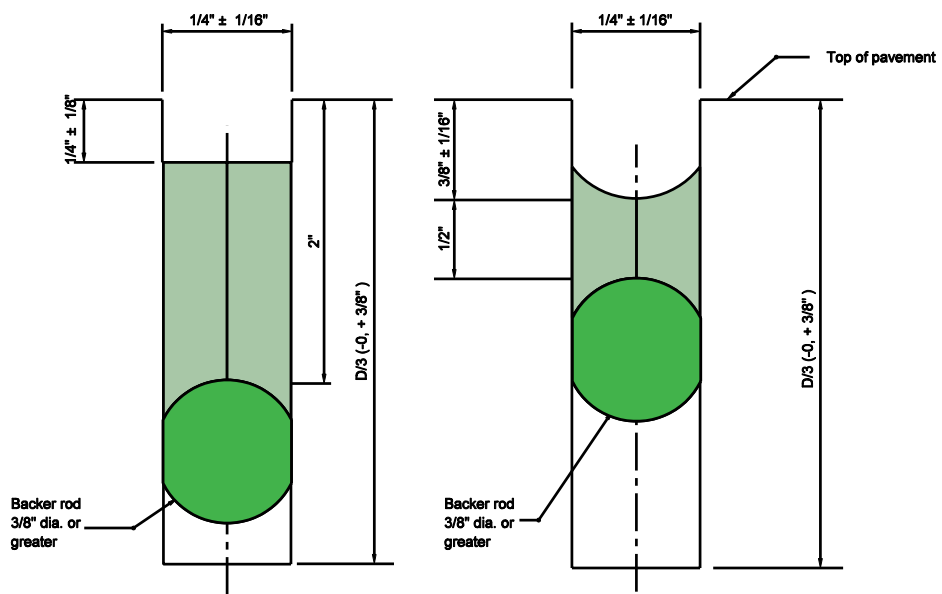
INDIANA DEPARTMENT OF TRANSPORTATION	
TYPE D-1 CONTRACTION JOINT	
SEPTEMBER 2007	
STANDARD DRAWING NO. E 503-CCPJ-01	
	<i>/s/ Richard L. VanCleave</i> 9/4/07 <small>DESIGN STANDARDS ENGINEER DATE</small>
	<i>/s/ Mark A. Miller</i> 9/4/07 <small>CHIEF HIGHWAY ENGINEER DATE</small>
<small>DESIGN STANDARDS ENGINEER</small>	

TIE-BAR SIZES FOR LONGITUDINAL JOINT	
Pavement Thickness, D	Tie-Bar Size
Less than or equal to 9"	#5
Greater than 9"	#6



TRANSVERSE SECTION THROUGH PCCP

INDIANA DEPARTMENT OF TRANSPORTATION	
LONGITUDINAL JOINT	
SEPTEMBER 2012	
STANDARD DRAWING NO.	E 503-CCPJ-02
	<i>/s/ Richard L. VanCleave</i> 09/04/12 SUPERVISOR, ROADWAY STANDARDS DATE
	<i>/s/ Mark A. Miller</i> 09/04/12 CHIEF ENGINEER DATE



HOT Poured JOINT SEALANT

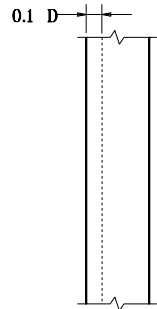
SILICONE JOINT SEALANT

SAWED LONGITUDINAL JOINT SEALANT OPTIONS

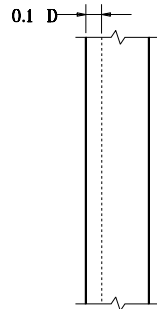
INDIANA DEPARTMENT OF TRANSPORTATION	
LONGITUDINAL JOINT	
MARCH 2004	
STANDARD DRAWING NO. E 503-CCPJ-03	
	<i>/s/ Richard L. VanCleave</i> 3-0-04 DESIGN STANDARDS ENGINEER DATE
	<i>/s/ Richard K. Smutzer</i> 3-0-04 CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER	

NOTES

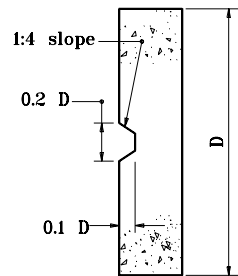
1. See Standard Drawings E 503-CCPJ-01, -02, and -03 for sawed construction joint sealant options.



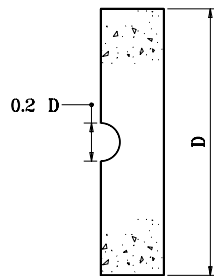
PLAN



PLAN



ELEVATION



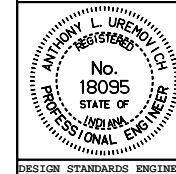
ELEVATION

INDIANA DEPARTMENT OF TRANSPORTATION

**LONGITUDINAL
KEYWAY JOINT**

SEPTEMBER 1999

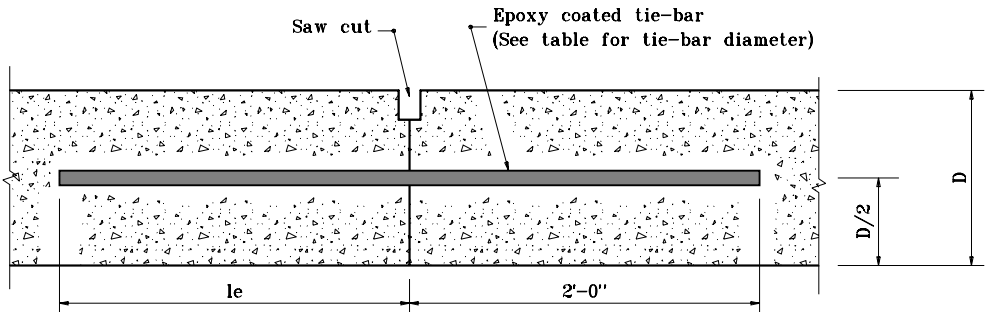
STANDARD DRAWING NO. **E 503-CCPJ-04**



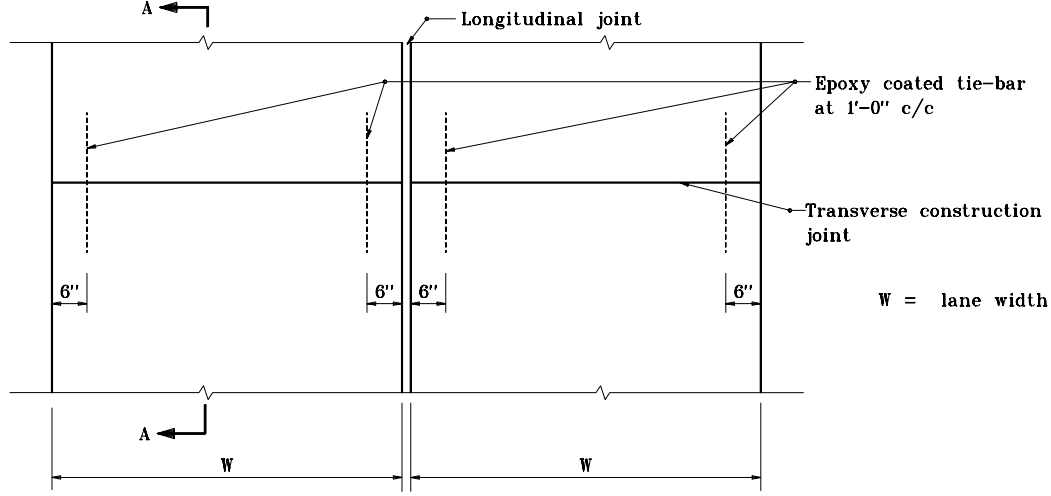
/s/ Anthony L. Urenovich 9-01-99
DESIGN STANDARDS ENGINEER DATE

/s/ Donald W. Lucas 9-01-99
CHIEF HIGHWAY ENGINEER DATE

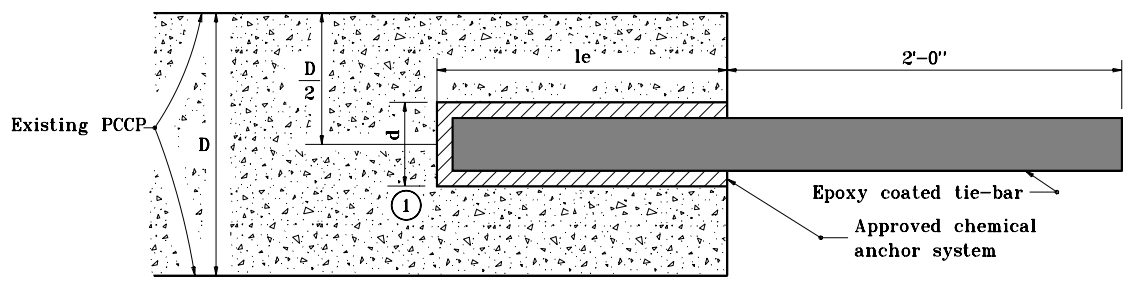
DESIGN STANDARDS ENGINEER



SECTION A-A



PLAN



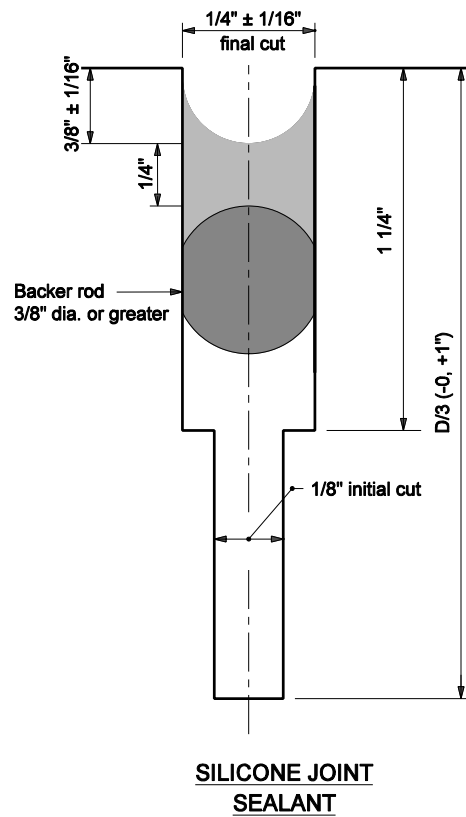
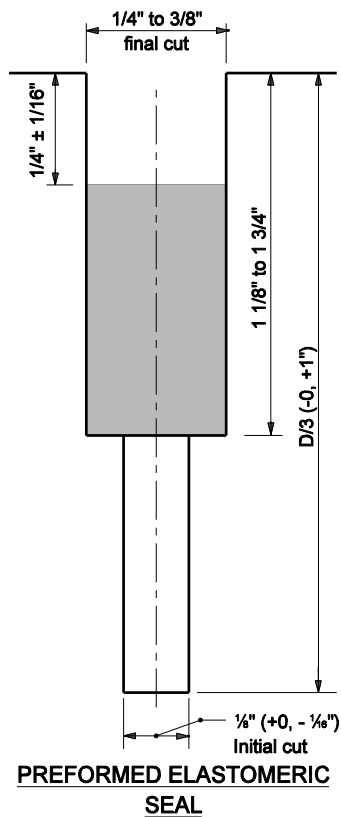
RETROFIT CONSTRUCTION TIE-BAR EMBEDMENT DETAIL

NOTES

- ① Diameter of drilled hole d shall be in accordance with the chemical anchor system manufacturer's instructions.

TIE-BAR SIZES FOR TRANSVERSE CONSTRUCTION JOINT		
Pavement Thickness, D	Tie Bar Size	Min. le
Less than 9"	#5	1'-0"
9" through 12"	#8	1'-8"
Greater than 12"	#10	2'-0"

INDIANA DEPARTMENT OF TRANSPORTATION	
TRANSVERSE CONSTRUCTION JOINT	
SEPTEMBER 1999	
STANDARD DRAWING NO. E 503-CCPJ-05	
	/s/ Anthony L. Urenovich 9-01-99 DESIGN STANDARDS ENGINEER DATE
	/s/ Donald W. Lucas 9-01-99 CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER	



TYPE D-1 SAWED CONTRACTION JOINT SEALANT OPTIONS

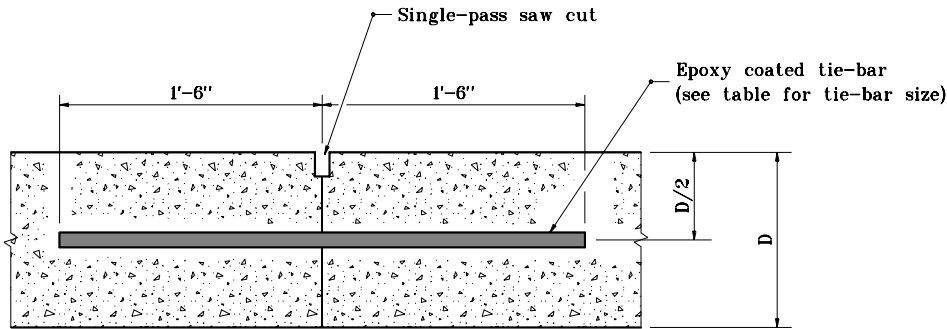
NOTES

1. Transverse joints shall be constructed perpendicular to the centerline with a maximum spacing of 18'-0" unless otherwise specified.
2. The configuration of the preformed elastomeric joint seal shall be a 9/16" to 5/8" wide seal with at least a five cell internal design. The seal height shall be 9/16" to 13/16" in uncompressed stage.
3. For transverse construction joints, the initial saw cut may be eliminated.

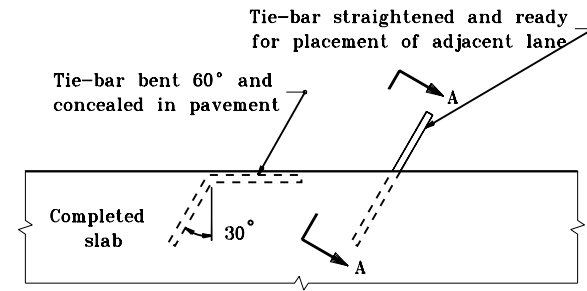
INDIANA DEPARTMENT OF TRANSPORTATION	
TRANSVERSE JOINT SEALS	
MARCH 2005	
STANDARD DRAWING NO. E 503-CCPJ-06	
	/s/ Richard L. VanCleave 3-01-05 DESIGN STANDARDS ENGINEER DATE
	/s/ Richard K. Smutzer 3-01-05 CHIEF HIGHWAY ENGINEER DATE

TIE-BAR SIZES FOR LONGITUDINAL CONSTRUCTION JOINT

Pavement Thickness, D	Tie-Bar Size	Spacing
Less than 9"	#5	3'-0" c/c
9" through 12"	#6	3'-0" c/c
Greater than 12"	#6	2'-0" c/c
	or #7	3'-0" c/c



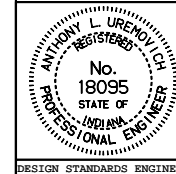
SECTION A-A



PLAN VIEW

**METHOD OF PLACING TIE-BAR
FOR LONGITUDINAL CONSTRUCTION JOINT**

INDIANA DEPARTMENT OF TRANSPORTATION
**LONGITUDINAL CONSTRUCTION
 JOINT**
 SEPTEMBER 1999
 STANDARD DRAWING NO. **E 503-CCPJ-07**



/s/ Anthony L. Urenovich 9-01-99
 DESIGN STANDARDS ENGINEER DATE

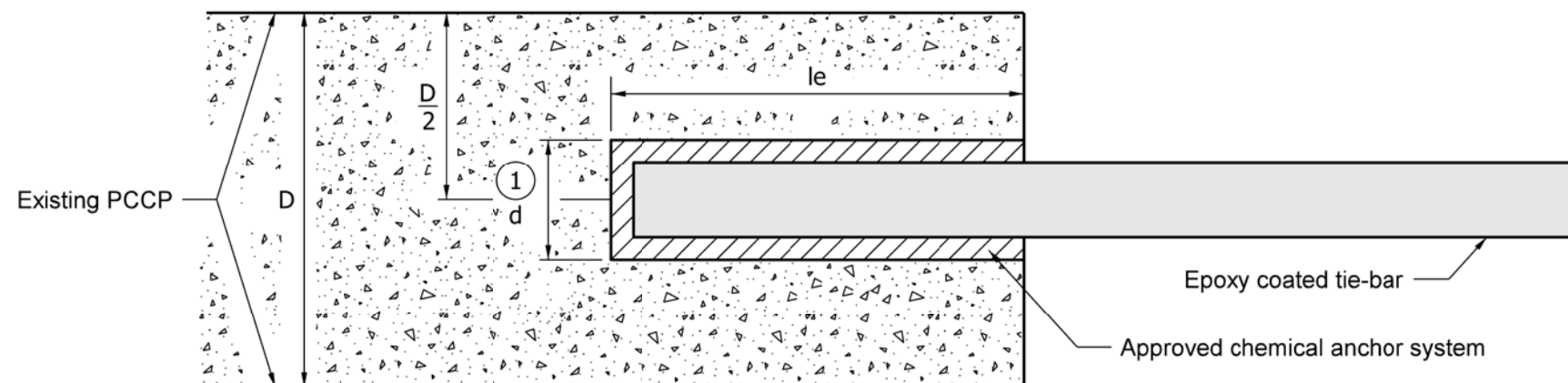
/s/ Donald W. Lucas 9-01-99
 CHIEF HIGHWAY ENGINEER DATE

DESIGN STANDARDS ENGINEER

NOTES:

- ① Diameter of drilled hole (d) shall be in accordance with the chemical anchor system manufacturer's instructions.

PAVEMENT THICKNESS, D	LONGITUDINAL CONSTRUCTION JOINT Retrofit Tie-bars at 3'-0" c/c	
	TIE-BAR SIZE	MIN. LENGTH OF EMBEDMENT, l_e
Less than or equal to 9"	#5	1'-0"
Greater than 9"	#6	1'-0"

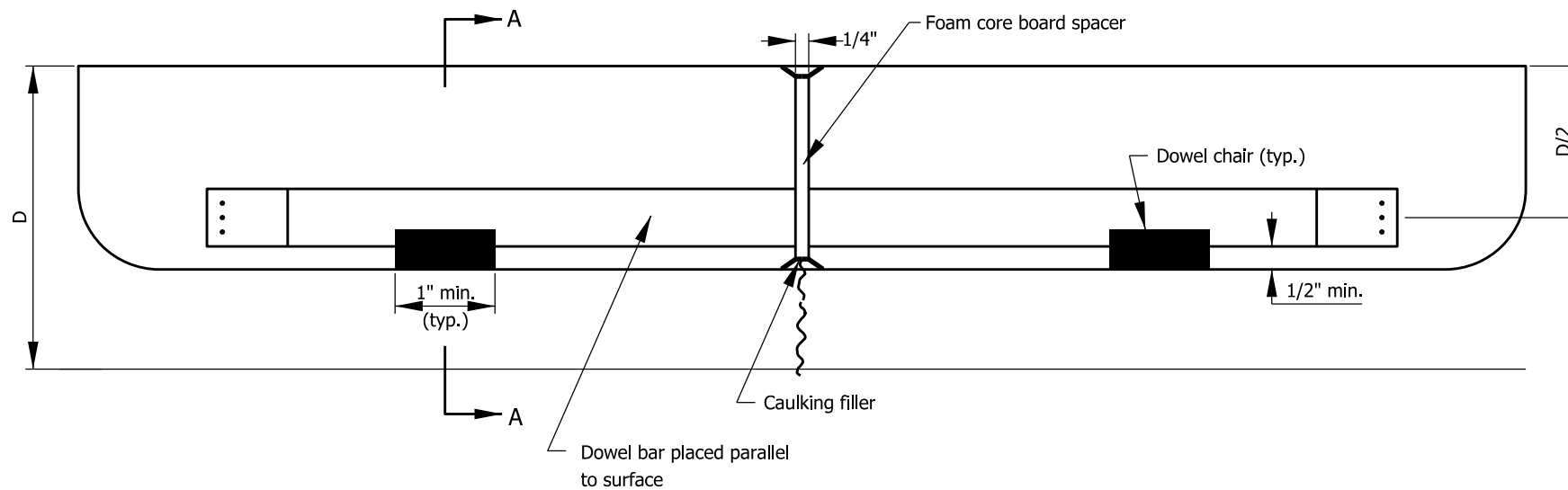
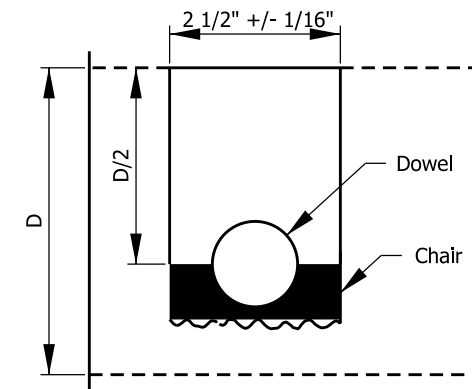
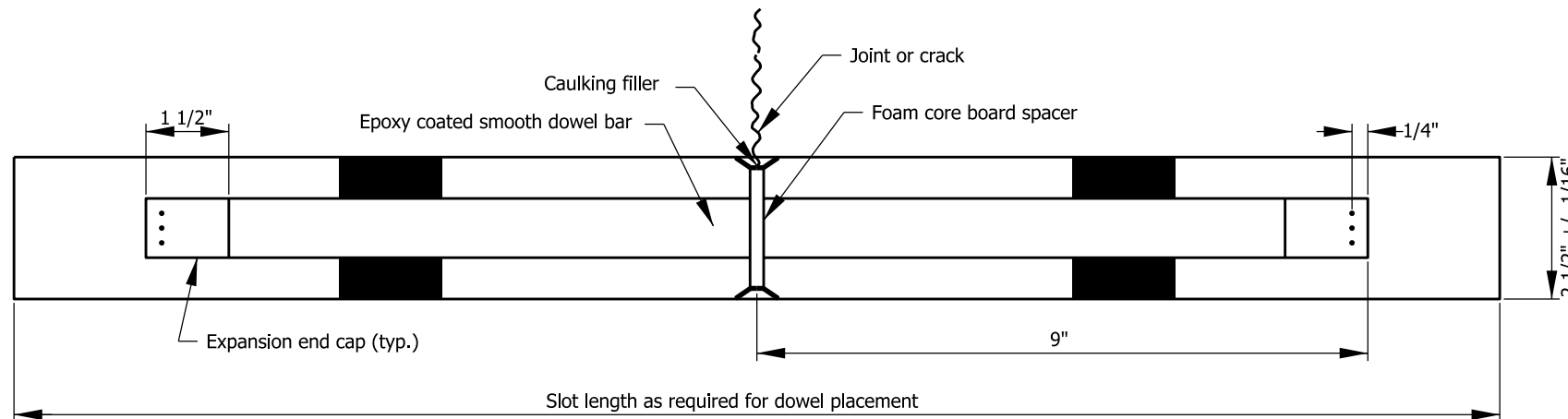


RETROFIT CONSTRUCTION TIE-BAR EMBEDMENT DETAIL

INDIANA DEPARTMENT OF TRANSPORTATION	
LONGITUDINAL CONSTRUCTION JOINT	
SEPTEMBER 2011	
STANDARD DRAWING NO.	E 503-CCPJ-08
	<i>/s/ Richard L. VanCleave</i> 09/01/11 DESIGN STANDARDS ENGINEER DATE
	<i>/s/ Mark A. Miller</i> 09/01/11 CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER	

NOTES:

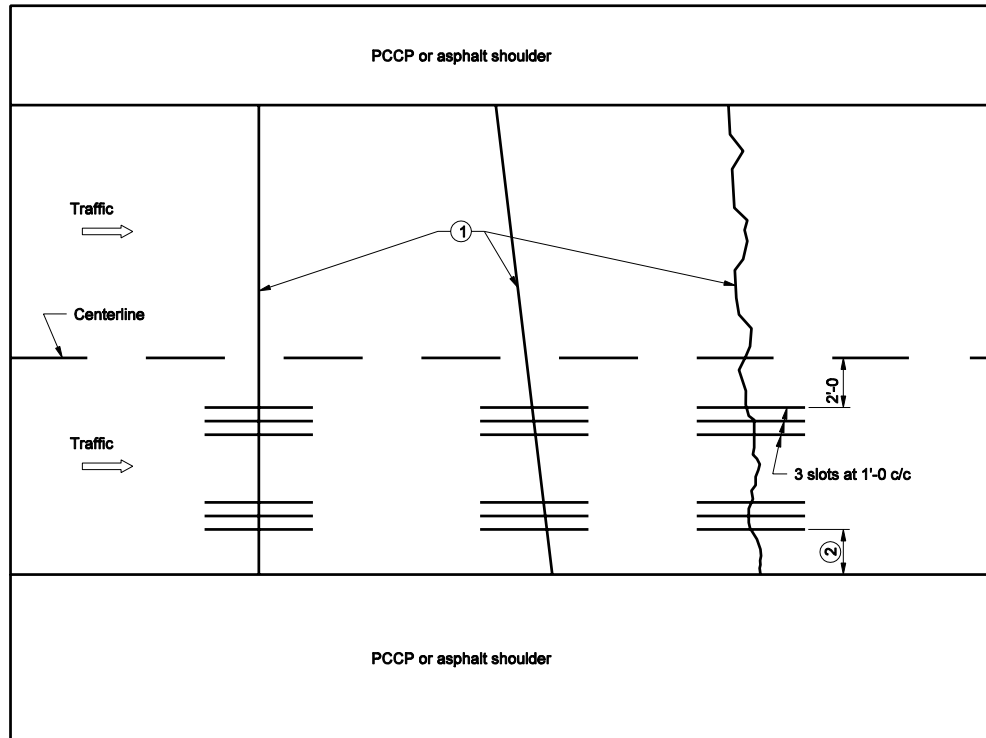
1. For dowel slot layout requirements, see Standard Drawing E 507-RLTC-02.



DOWEL SLOT DETAILS

DOWEL BAR SIZES	
Pavement Thickness D	Minimum Dowel Bar Diameter
Less than 12"	1 1/4"
Greater than or equal to 12"	1 1/2"

INDIANA DEPARTMENT OF TRANSPORTATION	
RETROFIT LOAD TRANSFER FOR PCCP	
SEPTEMBER 2004	
STANDARD DRAWING NO.	E 507-RLTC-01
	/s/ <i>Richard L. VanCleave</i> 09/01/04 DESIGN STANDARDS ENGINEER DATE
	/s/ <i>Richard K. Smutzer</i> 09/01/04 CHIEF ENGINEER DATE



NOTES:

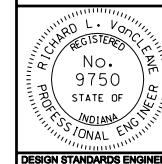
- ① PCCP retrofit load transfer may be utilized at perpendicular joints, skewed joints, or at random cracks.
- ② If lane width is 12 ft, use 3' offset. If lane width is 14 ft, use 4' offset.
3. Dowel slots shall be constructed parallel to pavement centerline.

INDIANA DEPARTMENT OF TRANSPORTATION

**RETROFIT LOAD
TRANSFER FOR LOAD**

SEPTEMBER 2004

STANDARD DRAWING NO. E 507-RLTC-02



/s/ Richard L. VanCleave 9-01-04
DESIGN STANDARDS ENGINEER DATE

/s/ Richard K. Smutzer 9-01-04
CHIEF HIGHWAY ENGINEER DATE

DESIGN STANDARDS ENGINEER