

Pavement Edge Drop-Offs: Treatments for Overlays in Work Zones



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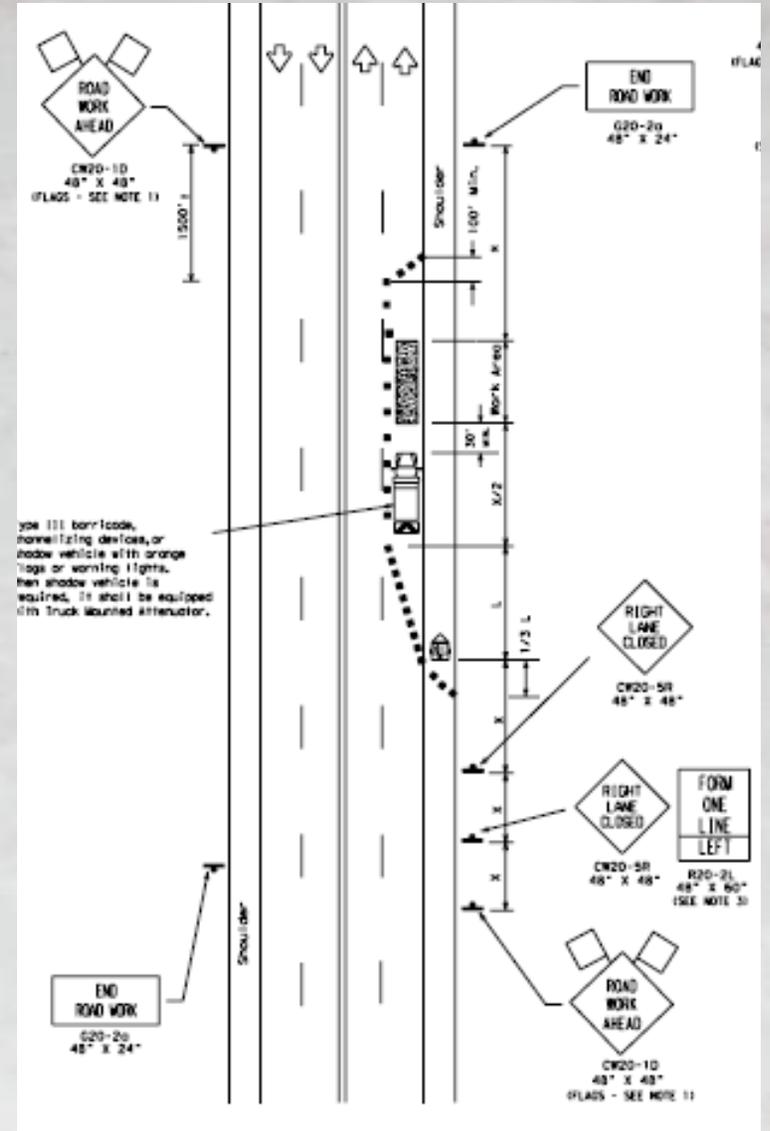
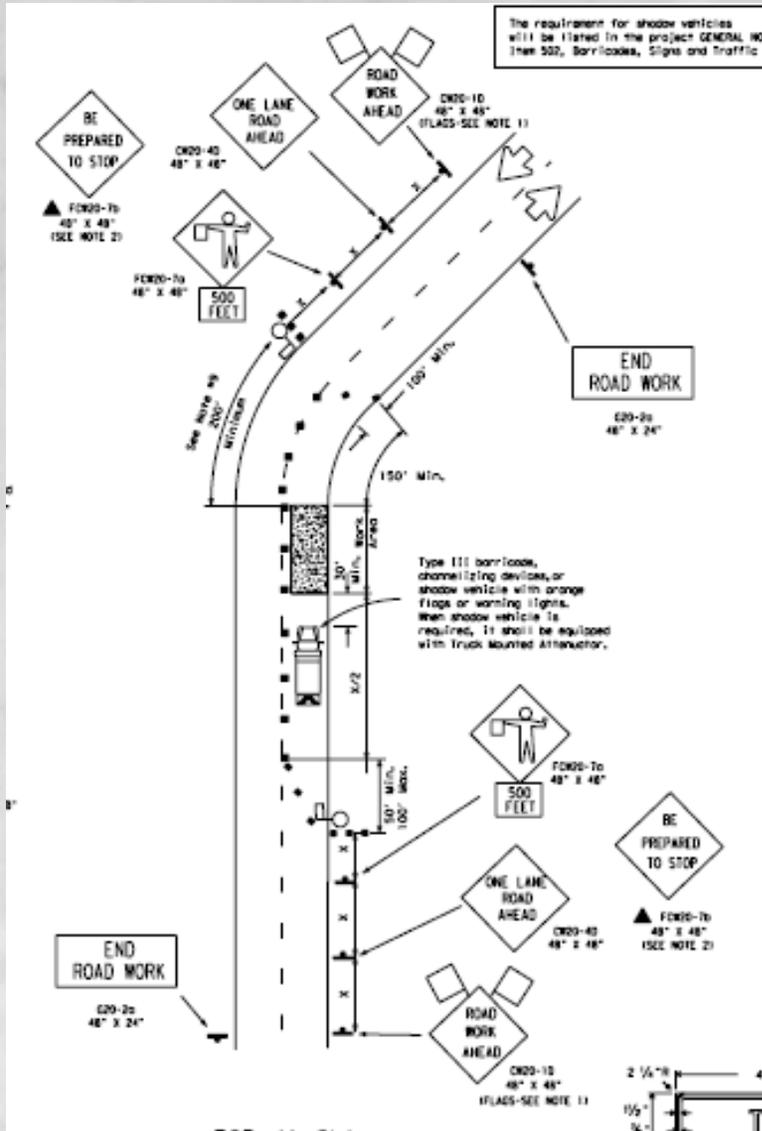
Outline

- **Background**
 - **Edge Drop-off Guidance**
 - **Construction**
 - **Project Examples**
- 

Work Zone Safety – HMA Overlays



Typical Work Zone Traffic Control



Worksheet for Edge Condition Treatment Types

<http://www.dot.state.tx.us/insddot/orgchart/cmd/cserve/standard/toc.htm> (Traffic Standards)

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DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

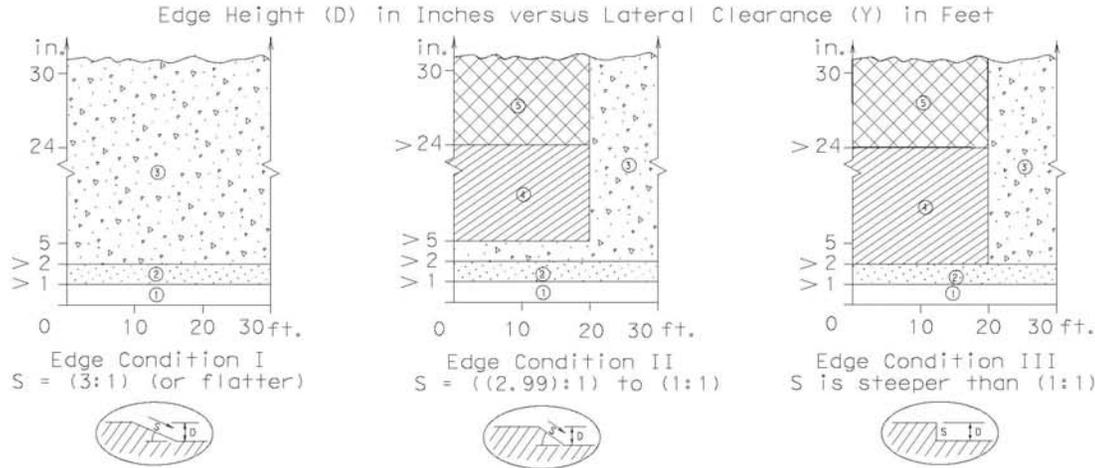
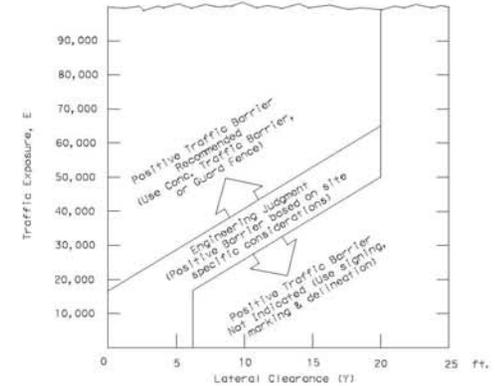


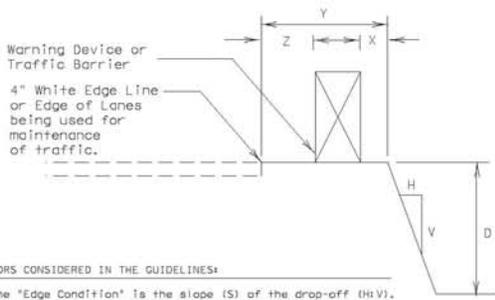
FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 ([Pattern])



- $E = ADT \times T$
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition and, T is the duration time in years of the dropoff condition.
- Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.
- An approved end treatment should be provided for any positive barrier and located within a lateral offset of 20 feet from the edge of the travel lane.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs extend parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Zone	Treatment Types Guidelines:
①	No treatment.
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check Indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.



FACTORS CONSIDERED IN THE GUIDELINES:

- The "Edge Condition" is the slope (S) of the drop-off (H/V). The "Edge Height" is the depth of the drop-off "D".
- Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
- In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.
- The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.
- If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 signs), or 2) provide an edge slope such as Edge Condition I.

Edge Condition Notes:

- Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.
- Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exceeds 24 inches, the possibility for rollover is greater in most vehicles.
- Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles. If not properly treated, for example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.
- Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

Engineer's Seal

Date _____

Texas Department of Transportation

WORKSHEET FOR EDGE CONDITION TREATMENT TYPES

01-01-01 August 2000
 01-01-01 August 2000
 01-01-01 August 2000

REVISED BY: []
 DATE: []
 BY: []

DATE: [] TIME: []
 BY: []

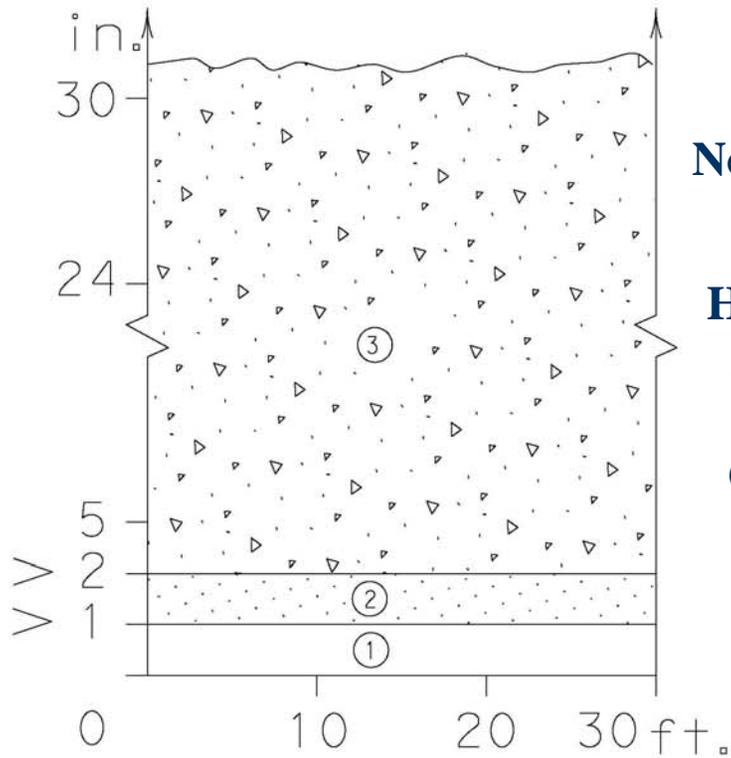
Item 341 – Lift Thickness

Table 10

Compacted Lift Thickness and Required Core Height

Mixture Type	Compacted Lift Thickness		Minimum Untrimmed Core Height 9in.) Eligible for Testing
	Minimum (in.)	Maximum (in.)	
A	3	6	2
B	2.5	5	1.75
C	2	4	1.5
D	1.5	3	1.25
F	1.25	2.5	1.25

Edge Condition with Notched Wedge Joint

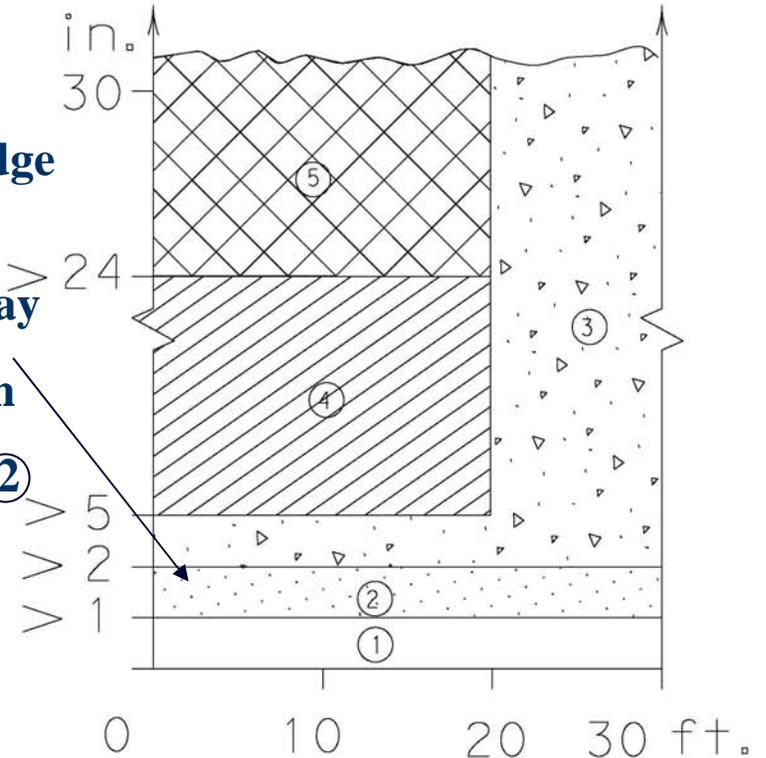


Notched Wedge Joint

HMA Overlay

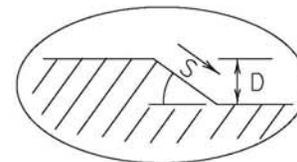
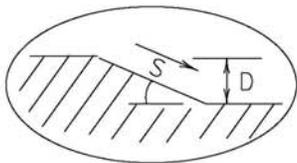
Typically in

Condition ②



Edge Condition I
 $S = (3:1)$ (or flatter)

Edge Condition II
 $S = ((2.99):1)$ to $(1:1)$



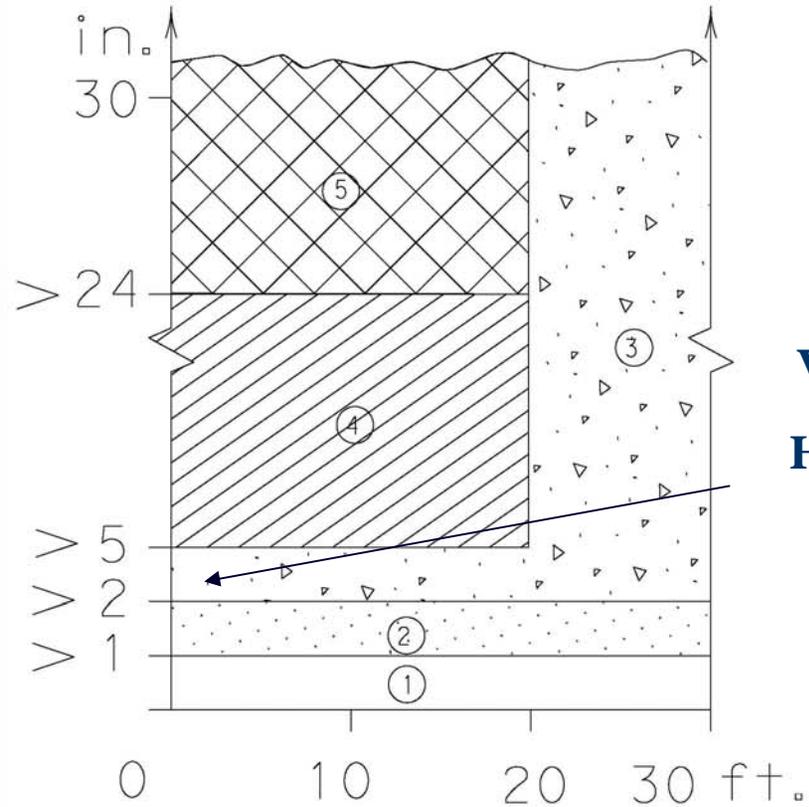
Treatment Type Guidelines

Zone

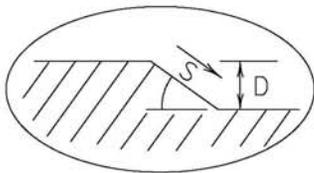
Treatment Types Guidelines:

- | | | | |
|---|--|---|------------------------------------|
| ① | No treatment. | } | Notched
Wedge
Joint |
| ② | CW 8-11 "Uneven Lanes" signs. | | |
| ③ | CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels. | } | Vertical
Joint |
| ④ | CW 8-9a or CW 8-11, signs plus drums.
Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I. | | |
| ⑤ | Check indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone- 4 may be used after consideration of other applicable factors. | | |

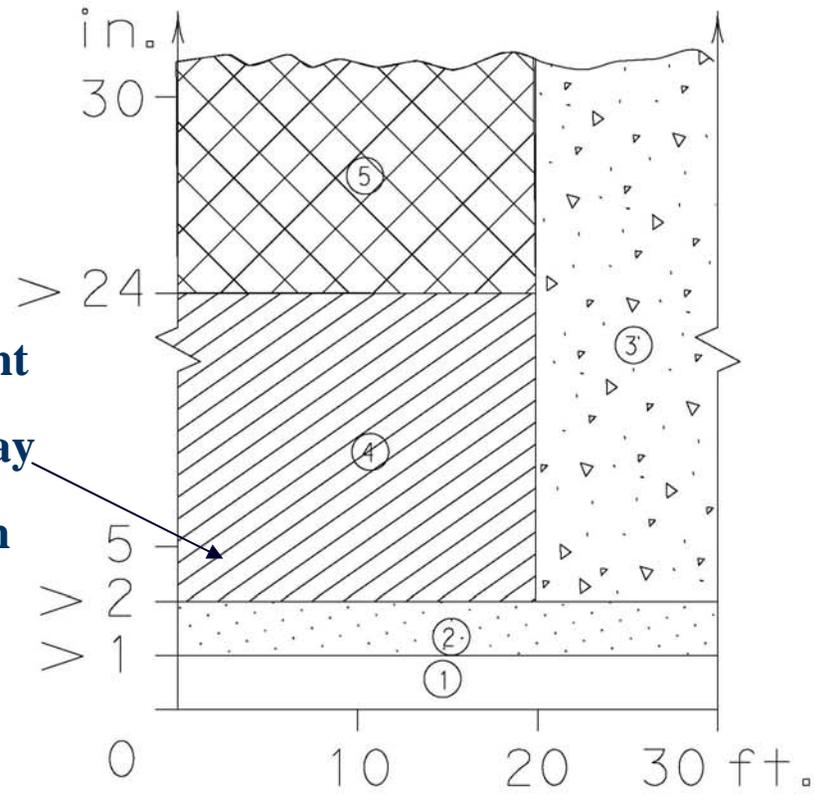
Typical Edge condition Vertical Longitudinal Joint



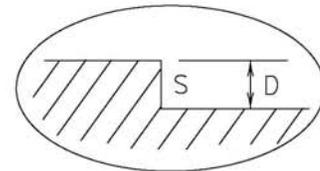
Edge Condition II
 $S = ((2.99):1) \text{ to } (1:1)$



Vertical Joint
HMA Overlay
Typically in
Condition
③ or ④



Edge Condition III
 $S \text{ is steeper than } (1:1)$



Work Zone

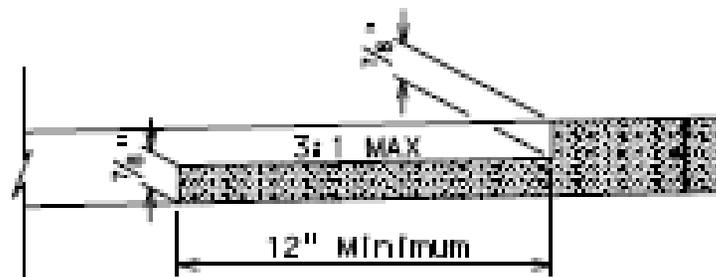


**Buffer/Barrier
Required**

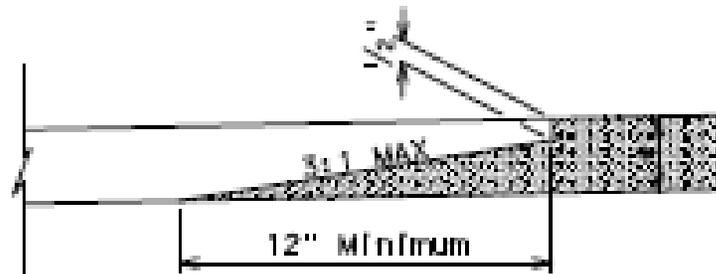


Notched Wedge Joint

**No Treatment or Uneven
Lane Sign**



TAPERED JOINT DETAIL



TAPERED JOINT DETAIL
LEVEL-UP

NOTES:

* SEE TYPICAL SECTION FOR DEPTH AND TYPE OF HMA.

LONGITUDINAL JOINTS SHALL BE CONSTRUCTED BY TAPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL EXTEND BEYOND THE NORMAL LANE WIDTH. THE TAPERED PORTION OF THE MAT SHALL BE CONSTRUCTED BY THE USE OF AN APPROVED STRIKE-OFF DEVICE THAT WILL PROVIDE A UNIFORM SLOPE AND WILL NOT RESTRICT THE MAIN SCREED. TACK COAT SHALL BE APPLIED TO THE IN-PLACE TAPER BEFORE THE ADJACENT MAT IS PLACED. FINAL DENSITY REQUIREMENTS FOR THE ENTIRE PAVEMENT, INCLUDING THE TAPER AREA, WILL REMAIN UNCHANGED. COMPACTION OF THE INITIAL TAPER SECTION WILL BE REQUIRED AS NEAR TO FINAL DENSITY AS POSSIBLE.

NOTCH DEPTHS ARE APPROXIMATE AND MAY BE ADJUSTED WHEN APPROVED BY THE ENGINEER, HOWEVER THE NOTCH DEPTH SHALL NOT EXCEED 2 INCHES.

Details and Notes from Bryan District Standard
"HOT MIX LONGITUDINAL JOINT DETAILS"

NOTCH DEPTH >= largest aggregate in mix

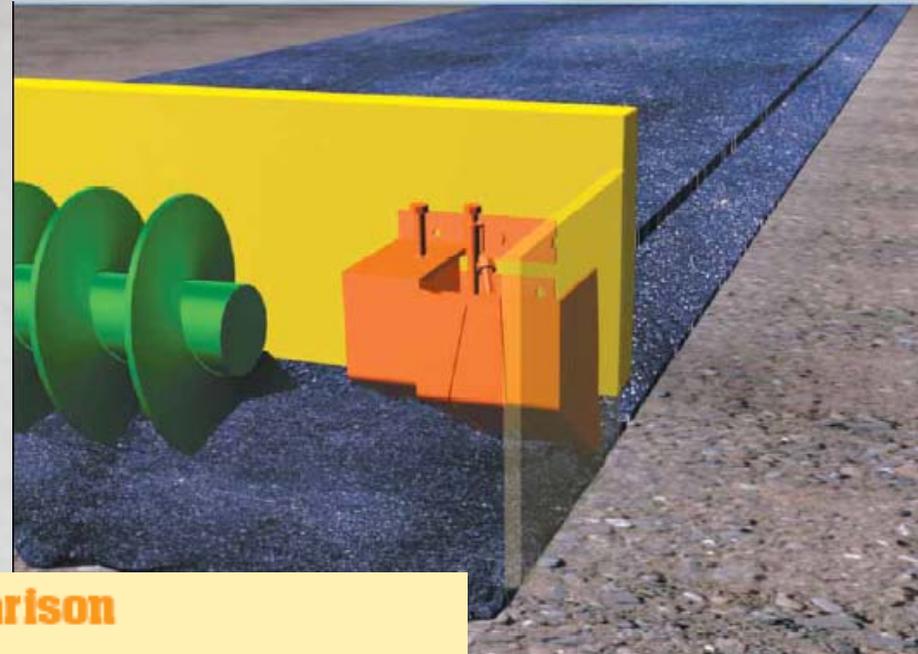
Example Notched Wedge Joint Maker

Trans  **Tech**
TRANSTECH SYSTEMS, INC.

Simple Solutions to Not-So-Simple Problems

1594 State Street • Schenectady, NY 12304 • 1-800-724-6306

phone 518-370-5558 • fax 518.370.5538 • www.transtechsys.com



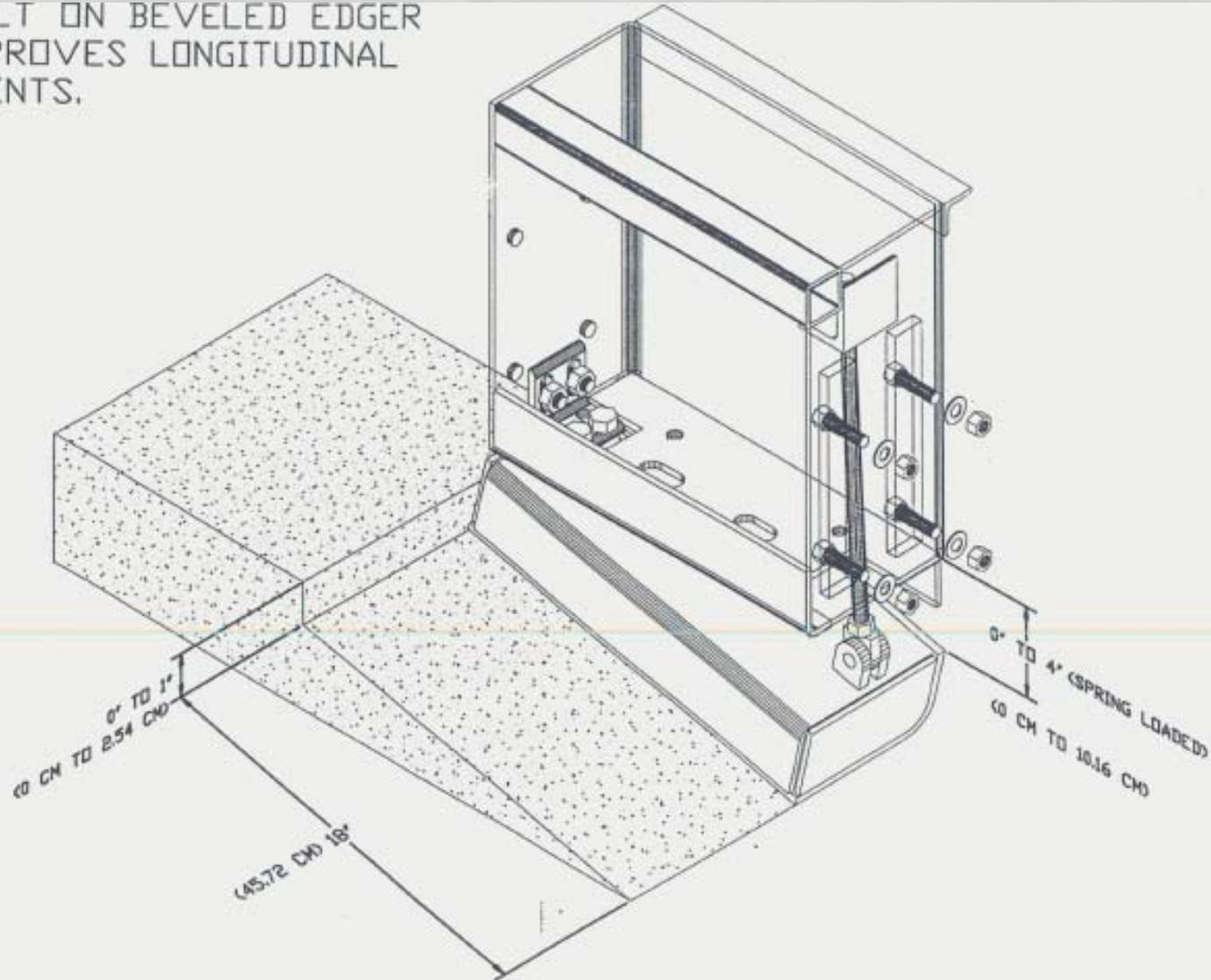
Vertical Joint Density Comparison

COUNTRY/ STATE	PAVING CONTRACTOR	PAVEMENT TYPE	AVERAGE DENSITY DIFFERENCE		
			MAT	JOINT	DIFFERENCE
Maine	Lane Construction	Highway	92.0%	93.8%	+1.8%
Indiana	Milestone Contractors	Highway	94.1%	94.1%	+0.0% (Warranty, SuperPave)
Manitoba, CAN.	Nelson River Construction	Highway	94.8%	94.1%	-0.7%
Pennsylvania	Quaker Sales Corp.	Airport	97.4%	96.6%	-0.8% (Military Project)
Pennsylvania	McMinn's Asphalt	Highway	94.0%	93.0%	-1.0%
Florida	Better Roads, Inc.	Airport	98.1%	96.9%	-1.2% (P-401 Mix)
Indiana	Milestone Contractors	Airport	97.6%	96.4%	-1.2% (P-401.75 Mix)
Indiana	Milestone Contractors	Airport	97.4%	95.8%	-1.6% (P-401 Mix)
Puerto Rico	Betterroads Inc.	Airport	100.0%	98.3%	-1.7% (P-401 Mix)
New York	Janik Paving & Construction	Airport	99.2%	97.3%	-1.9% (P-401 Mix)
Louisiana	TL James and Company	Airport	99.3%	97.0%	-2.3% (P-401 Mix)



Example attachment

LT ON BEVELED EDGER
PROVES LONGITUDINAL
INTS.



Equipment



Notched Wedge Joint



US 77



SH 21



18.05.2007 10:36



18.05.2007



23.05.2007 14:45

SH 30 - Brazos County



Constructed with Notched Wedge Joint in 2002

Questions

