Connecticut Begins to Use the Notched Wedge Joint

James Mahoney, Executive Program Director
Connecticut Transportation Institute

Longitudinal joints in asphalt pavements are formed between individual passes of the paver. Ideally, this longitudinal joint is as durable as the rest of the asphalt pavement mat and will have a life span comparable to the rest of the pavement. The most common longitudinal joint failure occurs from a crack forming in the longitudinal joint, this is sometimes referred to as the longitudinal joint “opening up”. All longitudinal joints will eventually crack, but the severity and width of the cracking dictates whether or not standard pavement maintenance activities such as crack sealing can be effective in preventing further pavement degradation. In some cases, the crack in the longitudinal joint will become so large that it becomes a safety hazard, as bicycle and motorcycle wheels can fit into and become wedged in the crack. Even if the crack does not become large enough to present a safety hazard, the crack will allow water to infiltrate into the pavement structure and ultimately damage it.

One of the major causes of asphalt pavement cracking, along with longitudinal failure, is the thermal cycling that all pavements experience virtually everyday. These thermal cycles will slightly increase the overall thickness of
Work Zone Safety Training for Law Enforcement

Mary McCarthy, Training Specialist
Technology Transfer Center

Many local municipal agencies and private contractors enlist the assistance of local law enforcement to manage traffic in and around their work zones and to protect the exposed workers. State troopers are also regularly used by the Department of Transportation in work zones on our highways. This is a huge responsibility for our law enforcement officers and it is very important that they receive proper work zone safety training. Recognizing proper work zone practices will help keep our workers and officers safe.

We at the Technology Transfer Center have long been committed to training our State and Local highway employees on the principles of work zone safety and have recently added a training specifically addressing the role of law enforcement in the work zone.

We held our first two sessions of Safe and Effective Use of Connecticut Law Enforcement in Work Zones in early May and received very positive feedback from our participants. Evaluations show that participants found the class to be very helpful and the information to be useful for their jobs.

We will offer additional sessions of this training in the future.

For more information about this training, visit our website at: www.t2center.uconn.edu or contact Mary McCarthy at (860) 486-0377

This year in Connecticut, several bills were proposed to our state legislature that address improving work zone safety and Public Act 09-187 (S.B. 1081) Section 47 was passed and encourages the State Police, the Post Officer Standards and Training Council, and each municipal police department to provide work zone safety training for law enforcement in each basic and review police training program.

For more details about the new bill, please visit: www.cga.ct.gov/2009/BA/2009SB-01081-R01-BA.htm

From the T2 Center Resource Library

State and local transportation and public works agencies within Connecticut may request the following resources by calling 860-486-5400 or using the online information request form at www.t2center.uconn.edu/resourceRequest.php.

Protecting Our Pavements: PREVENTIVE Maintenance
Federal Highway Administration and Foundation for Pavement Preservation, 1998, VHS, 15 minutes

Presents highway agency decision-makers with information about the need for, and benefits of, policies and funding strategies in support of preventive maintenance programs.

Preventive Maintenance Project Selection: Right Road, Right Treatment, Right Time
Federal Highway Administration and Foundation for Pavement Preservation, 2000, VHS, 30 minutes

Provides state and local maintenance supervisors and highway managers with information on selecting the right road for the right treatment at the right time. Addresses various pavement groups, environmental effects on pavements, and pavement condition measurements, and presents examples of preventive maintenance treatments.
the pavement; as the asphalt binder expands, it warms and pushes the aggregates apart slightly. Then as it cools, it is unable to pull the aggregates back together as tightly as they were when the material was placed. As there is only so much asphalt pavement in a road, in order to increase the thickness, the dimensions in the length and width must decrease. A prime example of this is the gap that typically forms between the asphalt in a driveway and a garage floor. More than likely, the asphalt, at the time of construction, was flush with the garage floor and over time, it has slowly pulled back. Another place where this phenomenon is quite evident is in large parking lots where there are wide cracks. In many situations, if you were able to somehow push the two sides back together, they would fit back together like two pieces of a jigsaw puzzle. In these cases, there is no material missing from either side of the crack, so the overall thickness of the pavement had to increase slightly to form the crack.

One of the keys to ensuring good performance of longitudinal joints is achieving a high degree of compaction at the joint. Achieving a high degree of compaction provides adequate material so that as the thermal cycling begins to slowly change the pavement’s dimensions, there is adequate material to minimize the amount that the longitudinal joint “opens up”.

The most common method used to make these longitudinal joints in Connecticut has been the standard butt joint. A longitudinal butt joint typically consists of two faces that are essentially vertical that are placed along side of each other from two separate paver passes. As indicated above, experience has shown that these joints may not last nearly as long as the rest of the pavement and may present safety concerns as well as potential damage to the entire pavement structure.

For the 2009 construction season, the Connecticut Department of Transportation (CTDOT) is allowing the use of a notched wedge joint to create longitudinal joints in asphalt pavements. There are as many different names for the notched wedge joint as there are different variations of the joint construction technique. They all work on the same basic principal—instead of creating two nearly vertical faces for the longitudinal joint as is done with the butt joint, during the placement of the first paver pass, a taper is created that extends eight to twelve inches from the end of the paver pass. The CTDOT specification requires a small compactor to follow the paver and compact the taper. Many contractors have opted to attach a plate compactor directly to the paver. Compacting the taper helps to prevent traffic from tearing the taper apart and it minimizes the amount of loose aggregate on the roadway. The second paver pass then matches up with the first pass, covering the taper.

Now instead of two vertical faces comprising the longitudinal joint, the interface between the two paver passes involves a considerable amount of material; making it much more difficult for the longitudinal joint to open up.

Research conducted by the Connecticut Advanced Pavement Lab at CTI indicates that the overall average density of longitudinal joints constructed using the notched wedge joint is higher than the densities achieved using the butt joint construction. This results in a more durable longitudinal joint. This is not to say that the notched wedge joint is a cure-all that will eliminate longitudinal joint failures, but it should be looked upon as a viable option to achieve the best possible product. In short, to ensure the best possible performance of any longitudinal joint, it is important to make sure that the best construction practices are followed.

continued on page 5
FHWA Urges Road Agencies to Consider “Top Nine” Life-Saving Strategies

The FHWA Safety Program urges State and local roadway officials to consider implementation of nine safety countermeasures that show great potential to reduce highway fatalities and injuries. As State highway agencies develop plans to address the safety challenges identified in their strategic highway safety plans, they are urged to consider the benefits of investments in these proven roadway safety tools and techniques.

ROAD SAFETY AUDITS

A road safety audit (RSA) is a formal safety performance examination of an existing or future road or intersection. Audit teams are independent and multidisciplinary. The team reports on potential road safety issues and identifies opportunities to improve safety for all road users.

RUMBLE STRIPS AND RUMBLE STRIPES

Rumble strips are raised or grooved patterns on the roadway that provide both an audible warning (rumbling sound) and a physical vibration to alert drivers that they are leaving the driving lane. They may be installed on the roadway shoulder or on the centerline of undivided highways. Rumble stripes are rumble strips that are placed at the centerline or edgeline.

MEDIAN BARRIERS

Median barriers are longitudinal barriers used to separate opposing traffic on a divided highway. They are designed to redirect vehicles striking either side of the barrier. Median barriers can significantly reduce the number of cross-median crashes and the overall severity of median-related crashes.

SAFETY EDGE

The Safety Edge asphalt paving technique minimizes vertical drop-off safety hazards. A Safety Edge shape is created by fitting resurfacing equipment with a device that extrudes and compacts the shape of the pavement edge at a specific angle as the paver passes. This mitigates shoulder pavement edge drop-offs immediately during the construction process and over the life of the pavement. Because the technique involves only a slight modification of paving equipment, it has a minimal impact on project cost. Improved compaction of the pavement near the edge is an additional benefit of the Safety Edge.

ROUNDABOUTS

A roundabout is a circular intersection where entering traffic yields to vehicles on the circulatory roadway. Roundabouts are designed to channel traffic at the entrance and provide collision deflection around a center island. Modern roundabouts are geometrically designed to reduce speeds and deflect collision forces, which substantially improves safety, while providing excellent operational performance at the intersection.

LEFT- AND RIGHT-TURN LANE AT STOP-CONTROLLED INTERSECTIONS

Left-turn lanes are auxiliary lanes for storage or speed change of left-turning vehicles. Left-turn lanes reduce the likelihood of intersection crashes. They also make turning easier for drivers and improve the intersection’s operational efficiency. Right-turn lanes provide a separation at intersection approaches between right-turning traffic and adjacent through-traffic. This reduces conflicts and improves intersection safety.

YELLOW CHANGE INTERVALS

Yellow signal lights that are not timed appropriately are a safety hazard. Yellow change intervals that are not consistent with normal operating speeds create a “dilemma zone” in which drivers can neither stop safely, nor reach the intersection before the signal turns red.

MEDIANS AND PEDESTRIAN REFUGE AREAS IN URBAN AND SUBURBAN AREAS

Medians reduce traffic conflicts and increase safety by providing a buffer area between opposing lanes of traffic. Medians can be open (pavement markings only), or channelized (raised medians or islands) to separate various road users. Pedestrian Refuge Areas—also known as crossing islands, center islands, refuge islands, pedestrian

continued on next page
islands, or median slow points—are raised islands placed in the street to separate crossing pedestrians from vehicles.

**WALKWAYS**

 Appropriately designed walkways increase safety for all road users. Types of walkways include:

- **Pedestrian Walkway (Walkway)** – A continuous way designated for pedestrians and separated from motor vehicle traffic by a space or barrier.

- **Shared Use Path** – A bikeway or pedestrian walkway physically separa from motor vehicle traffic by an open space or barrier, either within a highway right-of-way, or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheel chair users, joggers, and other non-motorized users. Shared use paths also are referred to as “trails” or “multiple-use trails.”

- **Sidewalks** – Walkways that are paved and separated from the street, generally by curb and gutter.

- **Roadway Shoulder** – In rural or suburban areas where sidewalks and pathways are not feasible, gravel or paved highway shoulders provide a safer area for pedestrians to walk next to the roadway.

---

*Notched Wedge continued*

The notched wedge joint has additional advantages as well. One of these is that traffic can safely traverse between the freshly-paved lane and the existing pavement. This does still require proper signage to ensure the motoring public is aware that there is uneven pavement. With traffic being able to traverse on and off of the fresh pavement, it is not always necessary to pave curb-to-curb each day. One note of caution with regard to not paving curb-to-curb is that the freshly-placed pavement must extend to the crown of the road to prevent holding water in the event of rain—rainwater retention would create unsafe conditions. Not having to switch the traffic control pattern and back the paving train up increases the efficiency of the paving operation. This reduces the overall duration of the paving operation which, in turn, minimizes disruption to the public. In addition, not having to switch the traffic pattern reduces the exposure of construction workers.

The notched wedge joint is not appropriate for lift thicknesses less than 1.5 inches. For applications less than 1.5 inches, it is not possible to form the notch and the taper as the lift thickness is not sufficient. The notched wedge joint may also not be appropriate for areas with excessive amounts of turning traffic, such as in heavy retail areas. Large amounts of turning traffic have a tendency to severely damage the partial joint.

The notched wedge joint has the potential to improve the performance of longitudinal joints in asphalt pavements. In order to realize this improved performance, it is important to follow best construction practices—if a joint is constructed with poor workmanship, it does not matter what technique is used to construct it—its durability will be compromised.
2008 HMA Paving Awards

At the 51st Annual Paving Conference hosted on April 8, 2009 by the CAAPA (Connecticut Asphalt & Aggregate Producer’s Association), the CCIA (Connecticut Construction Industries Association) and the Connecticut Department of Transportation, the following awards were presented:

To recognize a quality HMA Pavement placed on a municipal roadway, the following team exemplified the highest standards of paving excellence.

| Location: Old Whitfield Street, Town of Guilford |
| Prime Contractor: American Industries |
| Paving Contractor: American Industries |
| Inspection Agency: Town of Guilford |

To recognize a quality HMA Pavement placed on a limited access roadway, the following team exemplified the highest standards of paving excellence.

| Location: Route 9-Newington, New Britain, Farmington |
| Prime Contractor: Tilcon Connecticut, Inc. |
| Paving Contractor: Tilcon Connecticut, Inc. |
| Milling Contractor: Costello Industries, Inc. |
| Inspection Agency: ConnDOT – District 1, Maintenance |

To recognize a quality HMA Pavement placed on an unlimited access roadway, the following team exemplified the highest standards of paving excellence.

| Location: Route 190 – Somers |
| Prime Contractor: Galasso Materials, LLC |
| Paving Contractor: Galasso Materials, LLC |
| Milling Contractor: Costello Industries, Inc. |
| Inspection Agency: ConnDOT – District 1, Maintenance |

For updates on our training programs, visit us at:
www.t2center.uconn.edu
2009 Technology Transfer Expo

Come and see the latest in technology and services!

Join public works professionals from around the state for a day of demonstrations, activities, and networking.

SAVE THE DATE

September 16, 2009
9:00 to 1:30
Rain or Shine

University of Connecticut ~ Depot Campus ~ Storrs, CT

Call 860-486-5400 for tickets
Technology Transfer Center Request Form

_____ Please change my address/contact information as indicated below.
_____ Please add this person to the mailing list.  _____ Please remove this person

Name: ______________________________________________________________
Title: __________________________________________________________________
Agency/Organization: __________________________________________________________________
Address: ____________________________________________________________________
____________________________________________________________________________
City/State/Zip: __________________________________________________________________
Phone: ____________________ Fax: ____________________ E-Mail: ____________________
I would like to see a future newsletter article on the topic of: ______________________
I would like to suggest the following future training topics be offered by the T2 Center:
____________________________________________________________________________
I would like to request the following informational resource materials:
____________________________________________________________________________

Please fax a copy of this form to (860) 486-2399 or mail to:

University of Connecticut
Technology Transfer Center
270 Middle Turnpike, Unit 5202
Storrs, CT 06269-5202