5

Joint Construction

Learning Objectives:

- Understand proper joint construction for maximum pavement lifespan.

All pavements have one potential internal weakness — joints. Whether concrete or asphalt, joints probably cause more problems than any other. However, when constructed properly a joint area will perform as well as the remainder of the asphalt pavement. It is difficult if not impossible to construct a pavement without any joints. Therefore, the real trick is to make as few joints as possible and to construct them carefully and properly. The appearance and quality of the joints determines the overall appearance and quality of the finished mat. Fortunately, it is not difficult to construct a good quality joint.
Constructing Transverse Joints

A transverse joint occurs at any point where the paver ends work and then resumes work at a subsequent time. A poorly-constructed transverse joint is noticeable as a pronounced bump in the pavement. Consequently, the inspector must be on hand whenever a transverse joint is made in order to ensure it is done properly. Discovering hours after construction that a transverse joint does not meet the specifications does no good, because joint construction can only be corrected while the mix is still hot and workable. Once the mix cools, corrections can be made only by grinding out the bump, reheating the mix and re-rolling the joint, or cutting out the joint and replacing the mixture.

Terminal Joint

A straightedge should be used to determine the condition of the transverse joint before paving begins. If the mix upstream of the joint is level, the location of the transverse joint is fine. If the straightedge indicates that the previously placed mix is not level, the location of the transverse joint should be moved to a point where the proper thickness and smoothness of the pavement layer exists. The mix downstream of the new joint location should be removed and recycled.

As with the tapered joint that uses the board, one disadvantage of this type of joint is that it is often very difficult to remove the mix downstream of the saw cut from the existing roadway. As an alternative, a cold-milling machine can be used both to form the vertical edge of the transverse joint and to remove the mix in the taper.

After the existing joint materials are removed it is important to thoroughly clean the area exposed and properly tack the surfaces. It requires little work and is good practice to heavily tack the vertical edge of the joint such that slight puddling occurs at its base before paving resumes.
Transverse Joint Construction

Transverse joints during paving are constructed in three steps:

1. ending the first lane or width of pavement at the close of work,
2. rolling the transverse joint, and
3. at the resumption of pavement operations at the start of work at a subsequent time

If traffic will not pass over the end of the paving, a butt joint will be permitted, provided proper compaction is achieved. If traffic will pass over the joint, construct a sloped wedge, at least three feet per inch of pavement depth, ahead of the end of the full depth pavement to provide for proper compaction and protection of the full depth pavement. Construct the joint square to the lane alignment and discard all excess material. A paper parting strip may be placed beneath this wedge to facilitate joint construction.

Before paving operations are resumed, remove the sloped wedge and cut back into the previously constructed pavement to the point of full pavement depth. Coat the exposed edge of the previously constructed pavement with tack coat.

When laying of the mixture is resumed at the joint, complete and then test the construction of the joint while the mixture is still in a workable condition with a 10-foot straight-edge per specification.

Care and attention to quality must be undertaken whenever a transverse joint is constructed to ensure a smooth riding pavement.
Ending a Lane

When terminating paving operations at the end of a day's work, the mixture may be terminated through constructing a tapered joint (at least 3 feet per inch of pavement depth), feathering the remaining mix in the paver hopper, or constructing a vertical butt joint. For construction of a tapered or butt joint, the following steps are typically followed:

1. When the paver is placing the last load of the day, it is shifted into low gear as it approaches the location of the proposed joint.
2. As the hopper empties and the amount of material in the screed chamber decreases below normal operating level, the paver is stopped.
3. The screed is raised and the paver moved out of the way.
4. Hot-mix asphalt is then shoveled away from the end of the mat to form a clean, vertical edge.
5. A heavy wrapping paper may be placed along the edge (tapered joint only).
6. The material that was shoveled away in Step 4 is replaced and used to form a taper (tapered joint only).

Butt joints are acceptable when traffic will not pass over the joint prior to the next paving operation. For feathered joints, the paver operation is continued until the hopper is empty. This creates a longer transition. For tapered or feathered joints, the excess material must be removed prior to the next paving operation.
Daily Construction Joint (Cold Joint/Temporary)

If a tapered joint has been constructed at the transverse joint, the mix in the ramp or taper must be removed before the paving can be started. For a taper built with treated paper, there is no bond between the mix in the ramp and the underlying pavement. The paver and the mix are readily removed and returned for recycling. A vertical face is left at the upstream edge of the joint.

For a taper constructed with the board and a ramp of asphalt mix, the material downstream of the board will be partially bonded to the existing pavement surface. A front-end loader typically is used to pry up the mix in the taper. This can be very difficult to do, depending on the amount of traffic that has passed over the transverse joint and the environmental conditions at the site. Once the mix has been removed, the board is then removed, exposing the vertical face of the joint.

If a non-formed tapered transverse joint is used, it is necessary first to saw a transverse joint in the asphalt mat. It can be placed far enough back from the taper to assure that the thickness of the layer is constant. Once the joint is cut completely through the asphalt mat, a front-end loader is used to pry up the mix that is downstream of the saw cut.
Transition into Bridges & Under Bridges (ACOT1)

No pavement overlay shall decrease the vertical clearance under a bridge. In situations where the pavement under the overpass cannot be milled in direct proportion to the overlay, the new pavement is to be tied down to the existing pavement under the overpass 75 feet from the outer edge of the overpass.
Rolling Transverse Joints

When a transverse joint is placed next to an adjoining lane, the first pass is made with a steel-wheeled roller moving along the longitudinal joint for a short distance. The straightedge is then used to check for smoothness and to make corrections if necessary. Then the joint is rolled transversely, with the roller on the previously laid material, except for a 6 inches projection of the wheels when using a tandem wheel roller.

A transverse joint should be compacted transversely. If the rolling is done transversely, wood boards must be used to support the roller as it moves beyond the longitudinal edge of the pavement. If the roller cannot compact the joint in the transverse direction because of site restrictions (adjacent guardrail or steep side slope, for example) or traffic in the next lane, the transverse joint will have to be rolled in the longitudinal direction.
Resumption of Paving Operations

When paving is ready to resume, the following procedure is used to form a suitable transverse joint.

1. The taper of material is removed.
2. A 10 ft. straightedge is used to check the longitudinal grade of the mat. Because the paver was running out of material as it laid the last few feet of mat, it is possible that those last few feet taper slightly (ramp down) from the specified level of the mat. If this is the case, a new transverse edge must be cut to full pavement depth behind the point where the ramping down begins.
3. The vertical face of the mat is tack-coated.
4. The paver is backed up to the edge of the mat and the screed rested on the cold mat surface.
5. The screed is heated while it rests on the mat. This provides some heat to the material at the edge of the mat.
6. The heated screed is raised and at least 3 shims or starting blocks as thick as the difference between the uncompacted and compacted mat are positioned under it. The starting blocks should extend the full length of the screed, front to back.
7. The truck with the first load of AC is backed carefully to the hopper. During discharge of the mix from the truck bed to the paver, it is essential that the truck not bump the paver, and cause it to move.
8. The paver starts forward in a low gear.
9. Once the paver has moved away, excess AC is cleaned off the surface of the mat and the evenness of the joint is checked with a straightedge.
10. If a joint is satisfactory, a 6-inches width of the AC is rolled transversely and the joint checked for smoothness. If the joint is satisfactory, transverse rolling is continued in 6 to 12 inch wide increments until the entire width of the roller is on the new AC. If the straightedge shows an uneven joint, the surface of the new mat must be scarified while still warm and workable. Scarification is done, preferably with a tined lute. Excess material can then be removed or additional material added, and the joint rolled and rechecked.
Constructing Longitudinal Joints

A longitudinal joint is the interface between two adjacent and parallel AC mats. Improperly constructed longitudinal joints can cause premature deterioration of multilane AC pavements in the form of cracking and raveling. These distresses, caused by relatively low density (high air voids) and surface irregularity at the joints, can largely be avoided through proper construction techniques and equipment.

This section uses the following terms when referring to longitudinal joints:

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tr>
<td>Cold lane</td>
<td>A previously paved lane. Mix temperature is at or near ambient temperature and the lane can support traffic loads.</td>
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<tr>
<td>Hot lane</td>
<td>The lane being currently placed. AC is at placement temperature.</td>
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<tr>
<td>Joint overlap</td>
<td>The width that the hot lane overlaps the cold lane.</td>
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<tr>
<td>Low density area</td>
<td>That portion of the cold lane that is at a significantly lower density than the rest of the cold lane. This area is typically at the outer edge of the cold lane taper in the joint overlap area and can have low density.</td>
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<tr>
<td>Extra material for compression</td>
<td>The material beyond the anticipated final mat thickness. As a newly placed mat is compacted, its thickness decreases and it becomes more dense.</td>
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The solution to good longitudinal joint construction involves several aspects of the paving operation.

1. First, pavers can be operated in a way that either eliminates the longitudinal joint altogether or at least maximizes the likelihood of adequate material placement at the joint.
   - **Eliminate the joint altogether.** On some roadways it may be practical to pave the entire width in one single paver pass. Generally, without using multiple pavers, screed width limitations limit this solution to roadways narrower than about 24 ft. Further, most modern overlay paving is performed while traffic continues to flow, which necessitates that paving occur one lane at a time. Therefore, in most instances this is not a practical solution.
   - **Echelon paving.** Paving multiple lanes side-by-side (with adjacent pavers slightly offset) can improve the longitudinal joint between pavers because both mats are hot when initially compacted. Rollers behind the echelon pavers can pass directly over the longitudinal joint while both sides are hot, which results in better compaction.

2. Second, several different joint construction devices can be fitted onto the paver screed to assist in material placement and joint compaction.

3. Third, several techniques are available to better prepare the cold side of the longitudinal joint to adhere to the hot side.
   - **Proper mat overlap.** A proper mat overlap is about 1 inch. The hot lane should overlap the cold lane such that there is enough material for compression. A lack of material or inadequate overlap will lead to high longitudinal joint air voids. When possible, this extra material is bumped back with a lute overtop the joint to provide additional material for compression. Because joint overlaps are so small (about an inch), it is critical that the paver be operated on as straight a path as possible for both the cold lane and the hot lane.

Finally, several different roller techniques can be used to increase material compaction at the joint. The various techniques listed below have been field tested with varying degrees of success. In most cases, a combination of several different techniques is required to construct a high quality longitudinal joint.
Joint Construction Devices

Several different devices or techniques have been used with varying degrees of success to aid in the construction of longitudinal joints. These devices, most of which are described in Kandhal et al. (2002) are:

- **Notched wedge joint (NAPA, 1998).** An extended joint taper placed on the first paved lane that helps reduce joint air voids. An attachment on the paver screed forms the mat edge into a tapered section. Notches on either end of the taper eliminate the extremely thin taper extremities which might otherwise cause poor compaction. The notches are at least as deep as the nominal maximum aggregate size of the mix and the taper is usually spread out over about 1 ft. The hot lane overlaps the cold lane notch by about 0.5 to 1 inch and is bumped back to the notch to ensure enough material at the notch for adequate compaction. The notched wedge joint also provides a safe ramp for traffic transition between the cold lane and the yet unpaved portions of the hot lane.

- **Cutting wheel (Kandhal et al., 2002).** 10 inch diameter cutting wheel mounted on an intermediate roller or a motor grader that cuts 1-2 inches of the unconfined, low density edge of the initial lane after compaction, while the mix is still plastic. This technique cuts away and discards the high air void portion of a typical longitudinal joint.

- **Joint maker (Kandhal et al., 2002).** A boot-like device about 3 inches wide which is attached to the side of the screed at the corner during construction. The device forces extra material at the joint through an extrusion process prior to the screed. A kicker plate is also furnished which is attached to the side of the paver to lute back the overlapped AC mix.

- **Edge restraining device (Kandhal et al., 2002).** A 3 inches wide hydraulically powered wheel mounted on a roller that, when operated is positioned alongside the roller drum that pinches the unconfined edge of the first lane towards the drum providing lateral resistance during the first roller pass.
Joint Adhesion

Sometimes longitudinal joints can fail because the hot and cold sides fail to adequately bond with one another. There are three general techniques to increase the likelihood of bonding:

- **Heat the cold side before placing the hot side.** This will, in theory, increase the cold side AC temperature and make the constituent asphalt binder less viscous and stickier. Typically, an infrared heater is mounted on the paver and aimed at the cold joint side. It is possible to heat the cold side to about 200°F with this method (Kandhal et al., 2002).

- **Coat the cold side with an adhesive material.** A tack coat applied to the cold side before paving the hot side will assist in bonding just as a tack coat assists in bonding between pavement lifts. Kandhal et al. (2002) found a rubberized asphalt tack coat applied about 0.125 inches thick by hand worked very well.

- **Coat the cold side with a heavy tack coat.** A tack coat applied to the cold side before paving the hot side will assist in bonding. The cold side vertical face and at least 12 to 18 inches of the surface to be overlaid is tacked with tack puddling along the edge. This is the approach specified by VDOT.
Compaction

Various longitudinal joint compaction techniques have been suggested to increase density and provide the proper confinement of the outside mat edge so that it compacts rather than deforms. The key differences in rolling techniques involve the exact placement of the roller on the initial pass over or near the joint. No matter which initial pass technique is used, subsequent passes are usually done in accordance with the "rolling from the hot side" technique. Typical initial roller pass techniques are (Kandhal et al., 2002):

1. *Rolling from the hot side 6 inches away from the joint. Best practice.* The first roller pass occurs in the vibratory mode with the entire roller wheel on the hot lane and about 6 inches from the joint. This technique pushes the material between the roller and joint towards the joint during the initial roller pass, which crowds the mix at the joint producing a higher density. This method is particularly recommended by some asphalt paving technologists for tender mix or thick lifts, which have the potential for the mix to be pushed towards the joint.

2. *Rolling from the hot side. Not recommended.* The first roller pass occurs in vibratory mode with the majority of the roller wheel on the hot lane and overlapped onto the cold lane by about a 6 inches.

3. *Rolling from the cold side. Not recommended.* The first roller pass occurs in the static mode with the majority of the roller wheel on the cold lane and overlapped onto the hot lane by about 6 inches. This technique is believed to pinch the joint together. Timing in this type of rolling is critical. When the roller is operated on the cold side of the joint, the hot side undergoes cooling which can make it difficult to achieve the desired compaction level before the hot side reaches cessation temperature.

VDOT specifications require rolling toward the cold mat joint. This indirectly incorporates the best practice technique of rolling from the hot side above when the last full pass is made 6 inches from the joint. The roller starts on the outside of the hot lane and progresses across the mat toward the cold lane. Prior to overlapping the joint, the last roller pass, on the hot mat, should be made 6 inches away from the joint. The next pass will overlap the joint and approximately 6 inches of the roller will be on the cold lane.
**BEST PRACTICES**

The National Center for Asphalt Technology (NCAT) has participated in a number of studies aimed at determining longitudinal joint construction practices that result in long-lasting high performance joints.

The following is a brief list of best practices concluded from these studies:

- **Use a rubberized joint adhesive material or a notched wedge joint to obtain the most consistent high quality joint.** Kandhal et al. (2002) observed these to perform best. The notch in the notched wedge joint is critical to its performance (Kandhal and Mallick, 1997).

- **Roll the longitudinal joint from the hot side 6 inch away from the joint for the first roller pass.** Kandhal et al. (2002) observed this rolling technique to be the best with the rolling from the cold side being the worst.

  *The cutting wheel and edge restraining device techniques are highly operator dependent.* Both these techniques can produce high quality joints but they are highly dependent on operator skill and therefore may not produce consistently good joints.

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**Location of Longitudinal Joints**

Width of pavement is controlled in many instances by the location of the longitudinal joint. The VDOT specification requires that when multi-lane multi-layer construction is required, the longitudinal joints in each layer shall be offset from the joint in the layer immediately below by approximately 6 inches.

Overlapping of successive courses rather than stacking the joint directly on top of the joint below helps to prevent cracking and separation along the longitudinal joint. The locations of joints must be planned such that the joint in the final layer of pavement is located, where possible, between designated travel lanes of the final traffic pattern. This will assure that the joint is not located in the wheel path of a lane. When possible, the joint should not be in the same location as the final pavement marking. Future maintenance operations to the joint such as crack sealing could obscure the marking and make placement of new marking difficult.
Longitudinal Joints

Longitudinal joints are constructed in the following manner:

1. Tack the exposed edge of all longitudinal joints prior to placing the adjoining pavement.

2. From the hot side toward the joint, form longitudinal joints by allowing the paver to deposit the mixture adjacent to the joint to such depth that maximum compaction can be obtained along the joint. Pinch the joint by rolling immediately behind the paver from the hot side of the joint.

3. Construct the joints in the final layer, where possible, between designated travel lanes of the final traffic pattern.

Construction Procedures

Tack the exposed edge of all longitudinal joints prior to placing the adjoining pavement.

Form longitudinal joints by allowing the paver to deposit the mixture adjacent to the joint to such depth that maximum compaction can be obtained along the joint. The material should be overlapped 1 to 2 inches onto the cold mat and bumped back with a lute. Pinch the joint by rolling immediately behind the paver from the hot side toward the joint.

Construct the joints in the final layer, where possible, between designated travel lanes of the final traffic pattern.

The first lane placed should be true to line and grade, and the longitudinal joint or edge of the paving should have a near vertical face. It is most important that the paving machine keep on a straight, predetermined line of travel. In laying the first lane, the stringline, curb, or other reference line must be used to guide the paver on the proper course. It is also important, for good results, that the thickness adjustment controls on the paver not be over-controlled.

Before the lane is compacted, the material along the unsupported edges should be butted and slightly elevated with a tamping tool or lute. This sets up the edge and permits the full weight of the roller wheel to bear on the material at the extreme edges of the mat.
After the first lane has been placed and rolled, it is important that the adjoining lane be placed so that it uniformly overlaps the first lane by 1 to 2 inches. The thickness of the overlay should be left 1/4” per inch higher than the desired compacted pavement thickness. If another layer is to be placed over the course being spread, the excess coarse aggregate at the joint may be distributed over the unrolled lane with a broom or lute.

The overlapping material is then bumped or crowded back onto the hot lane so that the roller can crowd the small excess into the hot side of the joint. When the overlap is excessive, the excess material should be trimmed off so that the bumped ridge of material along the joint is uniform.

A trimmed joint is sometimes used. This joint is constructed by removing all freshly placed material that has overlapped the rolled lane. This is best done by trimming the joint immediately behind the paver with a square-ended shovel. In this way the operator can tell where the edge of the cold joint is and gauge his cutoff line accordingly.

If the lanes are placed simultaneously with two pavers moving in echelon, the loose depths of the mats should match exactly, with no overlap for a hot joint. The joints of a freshly paved mat are usually compacted before the rest of the paved width.
Compacting the Joint

As previously mentioned, if the level of the new, uncompacted mix is even with or below the level of the compacted mix in the adjacent lane, the compaction equipment will not be able to densify the mix along the joint properly. Whether the first pass of the roller is on the cold side of the joint or on the hot side of the joint, part of the weight of the roller will be supported on the previously compacted mat.

This means that the compaction equipment will bridge over the mix in the joint, leaving it essentially uncompacted or only partially compacted. (Use of an intermediate pneumatic tire roller instead of a steel wheel roller-static or vibratory can reduce this problem.)

The level of the mix at the longitudinal joint must be above the elevation of the compacted mix, by an amount equal to approximately ¾ inch for each 1 inch of compacted pavement, if proper compaction of the mix at the joint is to be accomplished.
Edge Definitions

- **Unconfined Edges**
  - No Unconfined Edges
  - One Unconfined Edge
  - Two Unconfined Edges
Rolling Unconfined or Unsupported Edge - First Paver Pass

This method is usually best for achieving maximum density at the unsupported edge.

- Roll from the outside edge toward the middle.
- The preferred approach shown below is done by overlapping the outside edge with the drum by about 6 inches to obtain some confinement.

![Diagram of Vibratory Roller](image1)

Edge of drum outside of unsupported edge - Preferred approach

Shown below is an alternate method of rolling the first pass on an unsupported edge. This method can cause cracking near the edge and lateral mix movement at the unsupported edge.

![Diagram of Vibratory Roller](image2)

Edge of drum inside unsupported edge
Here is another alternate method for rolling an uncompacted edge. This method can cause lateral mix movement at the unsupported edge.

![Vibratory Roller](image)

Edge of drum on the unsupported edge

**Mat Compaction - Subsequent Pass**

The mat should be rolled from the unconfined/outside edge to the longitudinal joint (number of passes to cover the mat depends on the roller widths).
Confined Edge Compaction

Adjacent Lane Open to Traffic

The last pass across the mat pinches the longitudinal joint.

typically 1/16” - 1/4”
Confined Edge Compaction - Alternate Method

Adjacent Lane Open to Traffic

The next to the last pass across the mat leaves 6” uncompacted at the joint. The last pass pinches the longitudinal joint.

Confined Edge Compaction

This shows the first pass beside a curb and gutter section.
Tacking Joints

It is often a challenge to achieve proper density at both transverse and longitudinal joints. Additional tack must applied to vertical joint faces as well as underneath the joint area to aid in obtaining density requirements. Loose material should be removed before this area is tacked. (VDOT Road and Bridge Specification Section 315.05(b)1).
Tacking of Joints After Milling

Tack is to be applied to the vertical face with a hand wand or spray bar at the rate of 0.2 gal/yd$^2$. The application should be heavy enough that slight puddling occurs at the base of the vertical face. At the joints, the tack applied shall be 2 feet in width with 4-6 inches protruding beyond the first pass. Tack for the adjacent pass shall completely cover the vertical face of the mat edge so that slight puddling of asphalt occurs at the joints and extends a minimum of 1 foot into the lane to be paved.

Tacking of Joints During AC Placement

Tack is applied under the proposed first lift 18 inches from the joint edge with a 6 inch overlap onto the second lift area. Tack is then applied on the second course to the vertical face and within 12 inches of the joint area. A longitudinal joint should be tacked using a hand wand or spray bar at the rate of 0.2gal/yd$^2$. There should be slight puddling at the joints and extend a minimum of 1 foot into the lane to be paved.
Construction Problems

If no construction precautions are taken, the longitudinal joint of a multi-lane paving project will often be significantly less dense than the majority of the pavement and contain surface irregularities that may or may not be caused by segregation.

Low Density

Low density is a general AC problem that can lead to numerous distresses including decreased stiffness, reduced fatigue life, accelerated aging/decreased durability, rutting, raveling, and moisture damage (Hughes, 1984; Hughes, 1989). Keep in mind that "low density" and "high air voids" refer to the same thing.

Usually a well-constructed joint will be about 1 - 2 percent less dense than the rest of the lane away from the joint, however a poorly constructed joint can have significantly lower density - on the order of 5 - 10 percent (Kandhal and Mallick, 1996). Low joint density is common since the edge of the lane first paved (cold lane) is unconfined. As the roller passes over, this unconfined edge tends to deform laterally rather than compact. The subsequent lane (hot lane) is confined by the cold lane and therefore tends to be more dense. Typically, the hot side of the joint is about 2 - 4 percent more dense than the cold side (Kandhal and Mallick, 1996). Furthermore, the overall joint does not typically meet minimum density requirements established for the mat as a whole. Many agencies that specify minimum densities (maximum air void contents) for AC construction specifically exclude joint areas because of this.

Longitudinal joint densities that are slightly less than the mat average (on the order of 1 - 2 percent) are generally acceptable because, if properly placed, longitudinal joints with these densities (usually about 91 or 92 percent of TMD) are usually not subject to much loading, and their air void content is not high enough to cause significant raveling. Lower densities at unconfined shoulder edges are also generally acceptable because even if they are porous enough to allow water infiltration, they are not subject to much loading and they are usually sloped towards the shoulder, which allows any infiltrating water to quickly drain away (Brock and Skinner, no date given).
Surface Irregularities

Longitudinal joints often look coarse, open-graded or segregated. This can happen for several reasons:

- **The joint contains segregated material.** Because longitudinal joints occur at the edge of the paver screed and auger system their constituent material can come from material pushed out beyond the end of the auger and/or screed. Because it has been moved more and moved beyond the end of the auger, this material has a higher likelihood of being segregated.
- **The joint deforms rather than compacts.** If a joint is unconfined (either at the roadway edge or as the first lane placed) roller passes over the joint will cause it to deform sideways rather than compact.
- **Handwork.** Typically, AC from the hot lane that overlaps the cold lane beyond its taper is luted back onto the hot side of the joint. This handwork usually results in a coarse surface texture and can, in extreme instances, result in segregation.

### INSPECTION AND MEASUREMENTS

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<td>- Surface Tolerance for Transverse Joints using 10 feet Straight-edge</td>
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<tr>
<td>- Proper tacking of longitudinal and transverse joints</td>
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<tr>
<td>- Proper taper length for transverse joints</td>
</tr>
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<td>- Proper rolling procedures for Joints</td>
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*Describes inspection, Quality Assurance and/or Quality Control practices.*
Chapter Five Knowledge Check

1. A ____________________________ joint occurs when one lane of asphalt mix is constructed adjacent to a previously placed lane of mix.
   a. Longitudinal
   b. Conventional
   c. Transverse
   d. Uniform

2. One key to the construction of a good longitudinal joint between lanes of asphalt mix is the amount of overlap between the new mat and the previously placed mat.
   a. True
   b. False

3. When the placement of the asphalt mix is to be suspended for a period of time and traffic is going to be passing over the end of the paving, a vertical butt joint may be constructed.
   a. True
   b. False

4. Constructing a temporary tapered joint using sand or dirt as the bond-breaking medium is not an acceptable VDOT paving practice.
   a. True
   b. False