PennDOT LTAP
technical
INFORMATION
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ASPHALT PAVING PREPARATION AND CONSTRUCTION OVERVIEW

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Whether your municipality performs asphalt paving with its own crews or through the services of a paving contractor, it is important to understand the many fine details involved in constructing a successful new asphalt pavement. This technical sheet is intended to provide the municipality's roadmaster and/or inspector with a reference document when preparing for and constructing an asphalt paving project.

Before paving, a roadway must be prepared through proper pothole repairs, base repair, crack sealing, or scratch and leveling courses to address surface irregularities and provide a uniform foundation. Photo: PennDOT LTAP

Avoid interruptions to the flow of material to achieve a smooth and long-lasting pavement surface. Photos: PennDOT

Project Preparation

Prior to the start of the project, the designee — either an inspector or municipal employee — should become familiar with the plans, specifications, and contract documents and the materials specified by the contract.

If planning for contractors to do the work, the municipality should evaluate the roadways to be paved and establish a narrative to be placed in the contract documents. These contract documents shall reference the PennDOT Publication 408. If the municipality has an engineer, they can assist in preparing these evaluations and documents or your PennDOT municipal services representative can also assist. You must explain in detail exactly what you want the contractor to do under the contract.

Appropriate advance notice should be provided to businesses, schools, residents, police department, emergency services, and PA One Call so that all underground utility facilities are identified. Plans for maintenance and protection of traffic also need to be in place, keeping in mind that the safest and easiest paving operation will detour traffic, if possible.

The approved PennDOT Bituminous Asphalt Mix Design (Job Mix Formula) must be received from the plant at least five days before the start of work. The Job Mix Formula is the recipe that the mix will follow. It is determined by the specifications, and the amount of traffic on the roadway. These job mixes are supplied by the asphalt producer to the municipality if purchasing direct or the contractor that is performing the paving under contract. A copy of this document becomes a part of the records required whenever a Liquid Fuels Audit occurs.

Pavement Preparation

Preparing the pavement for paving may be as simple as sweeping the surface and applying a tack coat. To provide a uniform foundation, additional preparation may be required with proper pothole repairs, base repair, crack sealing, or scratch and leveling courses to address surface irregularities. If paving is performed over a poor base, the surface will crack as the base continues to degrade. Also, if irregular depths of pavement overlay are placed, the pavement will continue to compact under traffic where the paving was thicker, thus resulting in surface depressions. In this case it will be difficult to obtain uniform compaction density resulting in possible premature failure of the pavement in areas of poor compaction.

The **municipality/contractor** should do the following before paving begins:

- Do any needed base repair.
- Fill potholes.
- Seal all cracks over ¼ inch wide using a 3-inch overband of sealer flush with the surface.
- Mill the surface to restore curb reveal and/or to eliminate surface irregularities.
- Use scratch and/or leveling courses for rut repair and low areas, remembering to build up the pavement with uniform thickness layers.

This Tech Sheet is an overview. There are more resources and support on paving operations available from your PennDOT District Municipal Services Representative or through LTAP Technical Assstance.

pennsylvania
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- Sweep the pavement surface to remove all loose material.
- Apply tack coat as per PennDOT PUB 408 Specifications as outlined in Section 460.

Tip: It is always a good idea to schedule a meeting with the contractor to review the project before any work begins; also known as a pre-pave meeting.

Asphalt Delivery

Following best practices in hauling the asphalt mixture from the plant to the paver is essential for a paving project to be successful. The plant operator, the truck driver, and the paver operator must pay careful attention to detail, including the proper care and handling of all equipment being used in the mixing, paving, and compaction process.

As the first rule, you want to ensure an uninterrupted flow of material from the plant to the paver to avoid stopping and starting the paver, which may result in small bumps in the riding surface. The following best practices have been proven to contribute toward a smooth and long-lasting pavement surface:

- Calculate the number of trucks required to deliver material with uninterrupted delivery. Consider haul time to and from, load time, delays at plant and job, and dump time.
- Clean the truck bed and apply a non-petroleum release agent. Raise the bed and drain any excess agent before loading.
- Load the truck uniformly with two or three drops starting at the cab, then the tailgate, and finally the center to avoid segregation of the aggregates.
- Pick up the delivery ticket to verify the mix and loading temperature.
- Tarp the entire load, overlapping the truck sides to avoid air cooling portions of the load.
- Proceed to park at the project site just far enough ahead of the operation to be ready back up to connect to the paver.
- Back toward the paver but stop short to let the paver make contact with the truck first.
- Verify the delivery ticket mix and temperature against the mix design.

Asphalt Paving

Throughout the paving operation, many techniques and established practices exist to ensure a successful paving project. Understanding the components of the paving equipment and proper operations are the first step in a long process that involves delivering material from the plant, transferring it from the truck to the paver, placing it on the pavement, and providing initial compaction.

Compaction

Compaction is the single most important factor that affects the long-term performance of the pavement. Compaction increases strength and stability, provides resistance to permanent deformation, reduces water penetration, and reduces the potential for low-temperature cracking.

Compaction is achieved using an optimum-rolling pattern or until there is no movement, which typically results in eight percent air voids that may further consolidate over time to four percent. Delivery temperatures should match what is stated on the Job Mix Formula sheet.

When compacting the mat, always run with the power drum toward the paver. Make sure the water system is working well to keep asphalt from sticking to the roller. When rolling mixes, initial compaction can be as close as three to 15 feet from the paver, depending on the temperature of the mix. Sometimes a "tender zone" may develop between 190 and 240 degrees F where the material will shove under the roller. The operator should back off to allow some cooling until density can increase. However, proper compaction must be accomplished before the mat cools below 175 degrees F. No further compaction will occur when the mat cools below 175 degrees F. Keep calibrated thermometers on the project to check the mix temperature when it arrives at the paver and as the pavement is compacted. Infrared, probe, and surface thermometers are used to monitor the material. Be careful to avoid burns with this hot material!

Rolling should be performed from the low side of the mat to the high side, and the second pass should be kept 12 to 18 inches away from the longitudinal joint. On the third pass, overlap the longitudinal joint by 6 inches onto the cold mat. The third pass forces the mix against the adjacent mat and pinches the joint to achieve a uniformly dense longitudinal joint. Although some of the aggregate along the surface of the longitudinal joint may be crushed due to this operation, a well-compacted joint will result. Keep in mind that any crushed aggregate will wear off once the road is open to traffic. The road can be open to vehicle traffic after 24 hours or after the course cools to 140 degrees F or less.

Resources

PennDOT District Municipal Services Representative
https://www.penndot.pa.gov/Doing-Business/LocalGovernment/MunicipalServicesRepresentatives/Pages/default.aspx
PennDOT Publication 113, Highway Foreman's Manual
https://www.dot.state.pa.us/public/PubsForms/Publications/PUB_113/PUB%20113/PUB%20113%202020-2.pdf
PennDOT Publication 408, Section 413
https://www.dot.state.pa.us/public/PubsForms/Publications/Pub_408/408_2020/408_2020_IE/408_2020_IE.pdf