Asphalt Pavement Association of Indiana, Inc.

Indiana

**Asphalt Design and Construction Guide**

**for INDOT Community Crossings Projects**

*This guide incorporates the latest asphalt pavement technologies. It attempts to present the best practices, procedures and processes but is not intended to replace sound engineering knowledge, judgment and experience.*

All work shall be performed in accordance with the project specifications and Indiana Department of Transportation (INDOT) Standard Specifications, Section 402 – Hot Mix Asphalt Pavement dated 2018.

***DESIGN GUIDANCE***

**Conversions**

All HMA and #53 Compacted Aggregate bid items should be measured in weight (tons). To convert from roadway area (SY) and depth of material (in) to weight (tons):

$$Area (SY)×\frac{110 \frac{lbs}{SYD}}{2,000 \frac{lbs}{ton}}×Depth (in)=\\_\\_\\_ tons$$

Excavation Common bid item should be measured in volume (CYD). To convert from roadway length (ft), width (ft) and depth (ft) to volume (CYD):

$$\frac{L \left(ft\right)×W\left(ft\right)×D(ft)}{27\frac{ft^{3}}{CYD}}=\\_\\_\\_ CYD$$

**Lift Thicknesses**

INDOT design guidelines specify the following minimum and maximum lift thicknesses for asphalt mixture size designations:

|  |  |  |
| --- | --- | --- |
| Mixture Size Designation | INDOT Minimum Lift Thickness, in. | INDOT Maximum Lift Thickness, in. |
| 4.75 mm | 0.75 | 1.5 |
| 9.5 mm | 1.0 | 2.0 |
| 12.5 mm | 1.5 | 3.0 |
| 19.0 mm | 2.0 | 4.0 |
| 25.0 mm | 3.0 | 6.0 |

**Materials**

PG binders for HMA shall be supplied by an INDOT approved supplier in accordance with Asphalt Supplier Certification (ASC) Program. Aggregate materials for HMA mixtures shall be supplied by an INDOT Certified Aggregate Producer Program (CAPP). Asphalt design mix formula (DMF) shall be prepared by an INDOT approved Mix Design Laboratory. Agency may request DMF to be submitted for approval prior to paving.

The DMF shall be based on the mixture type, mixture size designation and PG binder grade. This table may be used to assist Agency in selecting the appropriate mixture criteria given the traffic conditions.

|  |  |  |
| --- | --- | --- |
| ***Mixture Type*** | ***Type B*** | ***Type C*** |
| *Design ESAL* | *<3,000,000* | *≥3,000,000* |
| *AADT (Average Annual Daily Traffic)* | *<15,000* | *15,000 - 30,000* |
| *AADTT (Average Annual Daily Truck Traffic)\** | *<1700* | *≥1700* |
| ***Surface*** | Mixture Size Designation | 4.75 mm9.5 mm12.5 mm | 4.75 mm9.5 mm12.5 mm |
| Recommended PG Binder Grade | 64-22 | 70-22 |
| ***Intermediate*** | Mixture Size Designation | 12.5 mm19.0 mm | 12.5 mm19.0 mm |
| Recommended PG Binder Grade | 64-22 | 64-22 |
| ***Base*** | Mixture Size Designation | 19.0 mm25.0 mm | 19.0 mm25.0 mm |
| Recommended PG Binder Grade | 64-22 | 64-22 |

\* Heavy trucks are commercial vehicles with 2+ axles and 6+ tires.

PLEASE NOTE: The majority of Community Crossings projects have ESAL counts below 3,000,000 and will be Type B mixtures. It is imperative to provide the correct mixture designation on project plans and specifications, e.g. HMA, Type B, 64, Surface, 9.5 mm.

The plant discharge temperature for any mixture shall not be more than 315°F whenever PG 58-28, PG 64-22, or PG 70-22 binders are used and not more than 325° F whenever PG 76-22 binders are used. Warm mix asphalt (WMA) mixtures may be produced by using a water injection foaming device or additives as specified and according to the manufacturers’ recommendations.

INDOT specifications allow a maximum of 25.0% binder replacement from RAP (recycled asphalt pavement) and RAS (recycled asphalt shingles) combined for all dense graded asphalt mixtures.

HMA wedge and leveling mixtures shall consist of surface or intermediate mixtures.

***CONSTRUCTION GUIDANCE***

**Subgrade, Subbase, Milling and Surface Preparation**

Prior to HMA placement, subgrade should be checked for adequate compaction with no visible water or movement. Subgrade should be firm, dry and unyielding under the pressure of construction trucks. A proof roll is recommended to check for soft areas and verify uniform subgrade stability.

Crushed aggregate material for subbase shall be uniformly compacted, smooth and clean prior to mixture placement.

Milled surface shall have uniform milling pattern. Care should be taken to minimize scabbing which can cause future delamination. Milled surface shall be inspected for integrity and areas with visible distress and fatigue cracking should be patched or repaired where necessary. Milled surface shall be swept or vacuumed prior to mixture placement.

Verify that roadway is graded properly to direct water to proper drainage or containment areas and minimize water puddling on surface. Utility structures shall be adjusted to proper grade.

Surfaces on which a HMA course is placed shall be clean and free from debris and vegetation at the time of mixture placement.

**Tack Coat**

Tack coat shall be uniformly applied across the entire width of pavement to be overlaid. Areas of inadequate coverage that created streaking or areas of excessive coverage that create ponding shall be corrected to obtain an even distribution. Contact surfaces of curbing, gutters, manholes and other structures shall be tacked. Sufficient time should be given for tack to break and set to minimize tracking from hauling and laydown equipment.

**Asphalt Mixture Placement**

Segregation of aggregate in the mat should be minimized. Transverse and longitudinal joints shall be properly constructed.

The finished mat should be smooth with no deviations greater than ¼ inch over 10 feet. A continuous slope/grade between paver passes should be maintained. Roadway should be crowned appropriately to ensure proper drainage.

Truck bodies should arrive at site tarped and clean of debris. An approved release agent (no diesel fuel) shall be used to clean equipment and hand tools.

**Compaction**

Proper compaction is the most critical part of asphalt installation as it impacts service life directly by increasing resistance to rutting and cracking. The mat shall be compacted with rollers immediately after the mixture has been spread and finished. A rolling pattern should be established by Contractor to achieve density targets. Number of rollers, sizes and types may vary depending on mixture type and depth, speed of production and weather. Mixture temperatures of mat should be monitored to ensure proper compaction. Extra compaction effort in handwork areas inaccessible to rollers may be needed.

Rollers shall not cause undue displacement, cracking, or shoving. The rolling pattern should be adjusted if detrimental results are observed.

To avoid scuffing, the mat should cool to a minimum of 160o F prior to allowing traffic on the freshly paved surface. Additional cooling time may be needed on hot summer days.

**Weather Limitations**

HMA courses less than 1” are to be placed when the ambient and surface temperatures are 60o F or above. HMA courses equal to or greater than 1” but less than 2” are to be placed when the ambient and surface temperatures are 45o F or above. HMA courses equal to or greater than 2” are to be placed when the ambient and surface temperatures are 32o F or above. Mixture shall not be placed on a frozen subgrade. However, HMA courses may be placed at lower temperatures provided the density of the HMA course is monitored by Contractor and approved by Agency and Inspector.

**Asphalt Mixture Acceptance**

Verify correct, specified asphalt mixtures are delivered to project site. HMA course shall be installed at the specified compacted lift thickness. It is recommended to request INDOT Type D certification to verify mixture types. For unit price contracts, truck delivery tickets should be collected to document tonnage placed.

A Type D certification shall be supplied by Contractor and shall list test results for air voids and binder content for material supplied to the project. A Type D certification shall be submitted to Inspector each day asphalt material is received.

If the user has questions regarding this guide, APAI encourages you to contact the contractor located in your area. A list of APAI member firms and asphalt plant locations can be found on the APAI website at [www.asphaltindiana.org](http://www.asphaltindiana.org).