State	Date Last Reviewed	Agency Website	Contact
Illinois	IS-143 – 1/2021	www.dot.il.gov	Engineering@asphaltpavement.org

BMD Implementation Summary Table

BMD Approach	Applicable Mixture Type	Rutting Test	Cracking Test	Performance Testing for Production Acceptance
Approach A	High ESAL Mixtures	HWTT	I-FIT	Yes, HWTT for "Pass/Fail"

STATE-OF-THE-PRACTICE

The Illinois Department of Transportation (IDOT) started the implementation of BMD in 2016. The current specification, *Standard Specifications for Road and Bridge Construction*, and a recent memorandum, *Special Provision for Hot-Mix Asphalt – Mixture* De*sign Verification and Production (Modified for I-FIT Data Collection)*, requires the Volumetric Design with Performance Verification approach for high ESAL asphalt mixtures, where the mix design is required to meet both the volumetric and performance test requirements. The existing volumetric requirements include air voids, VMA, voids filled with asphalt (VFA), and D/B ratio. The design air voids content is 4.0 percent at a N_{design} of 50 to 90 gyrations depending upon the design traffic level. The minimum VMA criteria vary from 12.0 to 16.0 percent as a function of aggregate nominal maximum aggregate size (NMAS).

The mixture performance tests used include HWTT, I-FIT, and Tensile Strength Ratio (TSR) for the evaluation of mixture resistance to rutting, cracking, and moisture damage, respectively. HWTT is conducted in accordance with the Illinois Modified AASHTO T 324 procedure at 50°C. HWTT specimens are conditioned for 1 or 2 hours at the compaction temperature for hot mix asphalt (HMA) and 3 to 4 hours at the compaction temperature for warm mix asphalt (WMA) prior to compaction. The variation in the mix conditioning time is dependent on the aggregate absorption. Test criteria are based on the minimum number of wheel passes to 12.5mm rut depth, which corresponds to 5,000, 7,500, 15,000, and 20,000 passes for projects with a PG 58-xx (or lower), PG 64-xx, PG 70-xx, and PG 76-xx (or higher) binder grade requirement, respectively. I-FIT is conducted in accordance with the Illinois Modified AASHTO TP 124 procedure. Table 4 summarizes the proposed flexibility index (*FI*) criteria effective in January 2021. The short-term aging procedure for I-FIT is the same as HWTT, while the long-term aging procedure for I-FIT requires the aging of compacted specimens for three days at 95°C. TSR is conducted in accordance with the Illinois Modified AASHTO T 283 procedure. Test criteria include a minimum conditioned tensile strength of 60 psi for non-polymer modified asphalt binder and 80 psi for polymer modified asphalt binder, as well as a maximum unconditioned tensile strength of 200 psi.

Table 4. IDOT I-FIT Criteria for Mix Design Verification

Mixture Type	Short-Term Aging, Minimum *FI*	Long-Term Aging, Minimum *FI* [2]
HMA [1]	8.0	5.0 [3]
SMA	16.0	10.0
IL-4.75	12.0	-

Notes:
1. All mix designs, except for SMA and IL-4.75 mixtures.
2. Required for surface courses only.
3. Production long term aging FI for HMA shall be a minimum of 4.0.

In addition to mix design approval, HWTT and I-FIT testing are also required on plant produced mixes that are representative of the test strip at the beginning of mixture production. The acceptance of subsequent production is mainly based on mixture volumetrics although IDOT may require additional HWTT testing during production. Over the last few years, IDOT completed over 100 BMD field projects with HWTT and I-FIT conducted for both mix design approval and production start-up. IDOT is currently in the process of constructing shadow projects where plant produced mixes are sampled behind the paver and tested for I-FIT on both reheated and long-term aged plant-mixed laboratory-compacted (PMLC) specimens on a daily basis (or sublot of every 1,000 tons).