



Construction & Materials Tips

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Superpave Status

To date, over 40 Superpave projects have been constructed in Texas. Generally, the Superpave mixes are performing satisfactorily, but some problem areas have been identified, such as tenderness in the mix, segregation, and achieving in-place density. Superpave mixtures appear to be more difficult to compact than conventional mixtures. Consequently, permeability is a concern. The average in-place density for Texas Superpave projects is 91.5% (8.5% air voids) compared to conventional mixtures which have an average in-place density of 92.6% (7.4% air voids). However, the Superpave projects were not constructed under QC/QA specifications, which may have been a contributing factor to the lower densities.

Visual distress surveys have been conducted on all Superpave projects, using LTPP guidelines. The pavements were inspected to determine cracking, rutting, surface defects, patching and potholes. The age of the projects varies from less than one year to seven. The majority are less than 3 years old. In general, the pavement mixtures appear to be performing about the same as conventional mixtures. One project experienced premature failure, which was attributed to low joint density and subsequent water intrusion.

The 25.0mm Superpave base mixtures appear to be the most promising. Across the country, as well as in Texas, these mixtures are being promoted as a significant improvement over conventional base mixtures such as Type A or Type B dense-graded mixtures.

In general, the Superpave surface mixtures (19.0mm and 12.5mm) appear to be more rut resistant than conventional mixtures but potentially more permeable. Several contractors have reported that 12.5mm Superpave designs are interchangeable with CMHB-F designs.

For more information, please contact Dale A. Rand, of the Bituminous Branch, at 512.232-1903.

Hot Weather Concreting

The American Concrete Institute (ACI) publishes the ACI Manual of Concrete Practice, a five-volume document containing numerous reports and standards on concrete practices and procedures. ACI 305R-91, "Hot Weather Concreting" is a very useful and practical document addressing the issue of placing, finishing, and curing concrete during hot weather operations.

Hot weather is defined as any combination of conditions such as high ambient temperature, high concrete temperature, low relative humidity, wind velocity and solar radiation that tend to hurt the overall quality of freshly mixed concrete by increasing the rate of cement hydration and moisture loss.

Fresh concrete problems include a higher water demand and loss of slump, leading to the use of more water at the jobsite. Fresh concrete may harden faster, making it more difficult to handle, consolidate, and finish. There is also increased risk of cold joints, a higher probability of plastic shrinkage cracking, and greater difficulty in controlling air entrainment content.

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There can also be problems with the hardened concrete. Such problems include lower 28-day strengths and an increased potential of drying shrinkage and differential thermal cracking due to the cooling of the structure or from differences in temperature within the concrete member.

All of these problems lead to a decrease in the overall durability of the concrete. Therefore it is important to take special precautions during hot weather conditions.

ACI recommends good planning and the use of cool concrete, which should be transported, placed, consolidated, and finished with minimal delay, while protecting it from moisture loss at all times.

Another good source of information on hot weather concrete is in the Portland Cement Association's publication Design and Control of Concrete Mixtures. Every District Laboratory should have at least one copy of this publication.

The rate of cement hydration (driven by temperature) and moisture loss are the key concerns. If concrete temperature can be controlled and the concrete protected from moisture loss during placement and curing, problems during hot weather operations should be drastically reduced, if not eliminated. For further information, please contact Gerald D. Lankes, P.E., of the Concrete/Cement Branch, at 512.465-7986.

Working Drawings

Standard Specifications (Item 5) require Contractors to submit working drawings and calculations for formwork and falsework for bridges, retaining walls, and other major structures to TxDOT for review. Drawings must be signed, sealed, and dated by a Professional Engineer registered in Texas (Items 5.3 & 1.50).

TxDOT's review serves to protect the safety of the traveling public, protect the safety of TxDOT and contractor personnel, and insure compliance with TxDOT specifications and other applicable codes or standards. TxDOT's approval does not relieve the Contractor of responsibility under the contract (Item 5.3).

Regrettably, only about 10% of formwork and falsework drawings can be approved without additional information, details, or even redesign.

Specific incidences supporting the need for TxDOT review of these drawings include: a contractor modified a drawing after the engineer sealed it without notifying the engineer; another contractor tried to reuse an approved drawing from a different project; an unqualified but registered mechanical engineer designed formwork details that could have resulted in a catastrophic failure of the forming system; one pre-engineered forming system failed and almost fell due to incomplete and inadequate details; and one engineer was sealing plans twenty years after his registration had expired.

Review of these materials should be performed by an engineer qualified by training or experience in the design of temporary works for bridge construction. Several districts have one or more engineers qualified to review these drawings. Districts without a qualified engineer are encouraged to send their drawings to the Construction & Maintenance Branch of BRG. Review time is generally seven working days, but drawings are often returned sooner. To expedite time-critical items, review results can be called to the district and the drawings returned by mail.

If you would like additional information, please contact Brian Merrill, P.E., at 512.416-2232.
