Targeted Overlay Pavement Solutions (TOPS)

Every Day Counts
Innovation for a Nation on the Move

Solutions for integrating innovative overlay procedures into practices that can improve performance, lessen traffic impacts, and reduce the cost of pavement ownership.


Source: NAPA


Source: ACPA

Approximately half of all infrastructure dollars are invested in pavements, and more than half of that investment is in overlays. By enhancing overlay performance, State and local highway agencies can maximize this investment and help ensure safer, longer-lasting roadways for the traveling public.

IMPROVED PAVEMENTS THAT LAST LONGER

Many of the pavements in the Nation's highway system have reached or are approaching the end of their design life. These roadways still carry daily traffic that often far exceeds their initial design criteria. Overlays are now available for both asphalt and concrete pavements that enable agencies to provide long-life performance under a wide range of traffic, environmental, and existing pavement conditions.

Thin overlays can be designed specifically to improve rutting and cracking resistance, increase structural capacity, improve friction or reduce splash and spray. Source: NAPA

Concrete overlays now benefit from performance-engineered mixtures, including thinner-bonded and unbonded overlays with fiber reinforcement, interlayer materials, and new design procedures that improve durability and performance. Curing of a fiber-reinforced concrete overlay should follow the same practices as implemented for conventional concrete pavement. Asphalt overlay mixtures have also advanced significantly with the use of stone-matrix asphalt (SMA), polymer-modified asphalt (PMA), and other materials, designs, and agents that can increase rutting and/or cracking resistance, increase structural capacity, preserve the underlying structure, improve friction, and extend pavement life.

BENEFITS

- **Safety.** Thousands of miles of rural and urban pavements need structural enhancement and improved surface characteristics, such as smoothness, friction, and noise. Targeted overlay pavement solutions can improve the condition of highways significantly in a relatively short time.
- **Cost Savings.** Timely and well-designed overlay applications are consistently cost-effective because less subsurface work is required. In urban areas, impacts to utilities and pedestrian facilities are minimized.

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- **Performance.** Targeting overlay solutions to high-priority highways and high-maintenance areas (which could include limited locations such as intersections, bus lanes, ramps, and curved alignments) can pay immediate dividends in terms of reduced maintenance needs, fewer work zones, and improved safety as well as longer service lives.

STATE OF THE PRACTICE

Recent improvements to design methods, interlayer technology, slab geometry, and concrete mixtures have broadened concrete overlay surface treatment applicability, reliability, sustainability, and cost-effectiveness. A joint effort by eight States (Georgia, Iowa, Kansas, Michigan, Minnesota, Missouri, North Carolina, and Oklahoma) resulted in the development of an improved design procedure for jointed unbonded concrete overlays on either concrete or composite pavements.

For asphalt overlays, several State departments of transportation (DOTs) have adopted SMA due to increased service life and performance. The Maryland, Alabama, and Utah DOTs each used over 1 million tons of SMA during a 5-year period. DOTs in Florida, Georgia, New Jersey, New York City, Tennessee, and Virginia found highly modified asphalt in thin overlays is more resistant to reflective cracking and rutting. It has increased pavement life by two to four times for DOTs in Alabama and Oklahoma. New Jersey and Texas DOTs have successfully implemented alternative mixture design procedures for high-performance thin overlays and overlay mixtures to minimize reflective cracking.

Open-graded friction course is being used successfully by Florida, Georgia, and Massachusetts to reduce noise and stormwater spray while increasing friction. Ultra-thin bonded wearing course (UTBWC) is used by several agencies in the northeast to restore ride quality while sealing and protecting the underlying pavement. Associated tools include improvements and focus on mixture design, thickness design, project selection, and advanced scoping / forensics.

Fiber-reinforced concrete overlay with 4 lb/yd^3 of synthetic macrofiber and 4-in depth showing excellent finishability.
Source: Iowa Concrete Paving Association (ICPA)

RESOURCES

FHWA EDC-6 Targeted Overlay Pavement Solutions (TOPS)

FHWA Tech Brief: The Use of Thin Asphalt Overlays for Pavement Preservation

National Asphalt Pavement Association (NAPA): Stone-Matrix Asphalt

National Center for Asphalt Technology: Highly Modified Asphalt

Rutgers University: High Performance Thin Overlays

Texas A&M Transportation Institute: Thin Overlay Guidelines

National Concrete Pavement Technology Center: Guide to Concrete Overlays

American Concrete Pavement Association (ACPA): National Concrete Overlay Explorer

Technology Transfer Concrete Consortium Pooled Fund TPF-5(313): Fiber-Reinforced Concrete for Pavement Overlays: Technical Overview

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