R&T UPDATE
Concrete Pavement Research & Technology

# INNOVATIVE PAVEMENT RESEARCH FOUNDATION DEMONSTRATES ULTRA-THIN WHITETOPPING REPAIR

Ultra-thin whitetopping (UTW), the overlay of 2 to 4 inches of concrete pavement on existing asphalt pavement, has proven to be a viable and successful pavement rehabilitation strategy for intersections, ramps, and light aircraft aprons. Since 1992, distressed asphalt pavements in 26 states have been rehabilitated with UTW. As UTW pavements age, the need for repair will become greater. Through a cooperative agreement with the Federal Highway Administration (FHWA), the Innovative Pavement Research Foundation (IPRF) is perfecting UTW repair techniques.

The IPRF project involves the repair of ultra-thin whitetopping overlay test sections at FHWA's Turner-Fairbanks Accelerated Loading Facility (ALF). In April 1998, eight full-scale UTW test pavements were constructed at the FHWA Accelerated Loading Facility in McLean, Virginia. Strain gages, linear variable differential transformers (LVDT), and thermocouples were installed prior to concrete placement to fully instrument the test sections. The load testing started in May 1998 and was stopped in Spring 2000. After many thousands of heavy test loads, some portions of the eight test lanes exhibited corner breaks and cracks.

While the total number of UTW panels showing distress was low, the cracked panels were ideal for demonstrating UTW repair techniques. Working closely with FHWA, Construction Technology Laboratories (Skokie, IL) and Cherry Hill Construction (Jessup, MD) undertook work to:

- Document repair methods used by states with experience in UTW
- Identify distress types at the test sections and identify specific methods used to repair those distresses
- Perform the identified repairs
- Document the repair procedure used in repairing the deteriorated UTW panels and develop video-based documentation of repair process
- Continue testing the UTW sections with FHWA's ALF equipment

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Since UTW pavements are 2- to 4-inch thick concrete overlays on existing asphalt, any repairs made are usually full depth replacement. The repair process is much like that for full depth repair of traditional concrete pavement, except that no load transfer devices (dowel bars) are needed. The repair process for the test sections went as follows:

1. Identify and mark slabs to be removed
2. Saw cut panels to full depth of concrete using diamond blade saw
3. Remove panels using either:
   - Jackhammers; 30 lb. maximum for interior concrete, 15 lb. recommended for perimeter concrete, or
   - Bobcat to lift out panels, once the first one is broken up, taking care not to damage adjacent panels
4. Prepare area by:
   - Removing any loose materials
   - Cleaning asphalt surface by air/sand blasting

Figure 1. Cleaned surface ready for concrete

5. Place new concrete:
   - Place concrete directly from ready mix truck
   - Consolidate concrete using handheld vibrator
   - Finish using straight edge or vibratory screed to meet existing grade/profile
   - Texture concrete surface (i.e. burlap drag) to match surrounding panels
   - Apply curing compound immediately after water sheen disappears
   - When early opening to traffic is required, cover with insulating blanket if ambient temperature falls below 60ºF with 8 hours of placement
   - Saw joints to align with existing joints (joint depth = 1/3 of slab thickness, joint width = 1/8 in., start sawing as soon as possible without raveling).
6. Cure the concrete with membrane-forming curing compound

Education and technology transfer are integral to all IPRF research efforts. This UTW demonstration has been thoroughly documented with photos and video. Work is now underway to produce a new publication, video and digital slide presentation demonstrating UTW repair techniques.