



Technical Brief

Conventional Whitetopping Overlays

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Introduction

Conventional whitetopping is the construction of a new portland cement concrete (PCC) pavement over an existing hot-mix asphalt (HMA) pavement (see figure 1). These PCC overlays are defined as being greater than 102 mm (4 in) thick, but typically range from 203 to 305 mm (8 to 12 in) when placed on primary interstate highways, and from 127 to 178 mm (5 to 7 in) when placed on secondary roads (ACPA 1998).

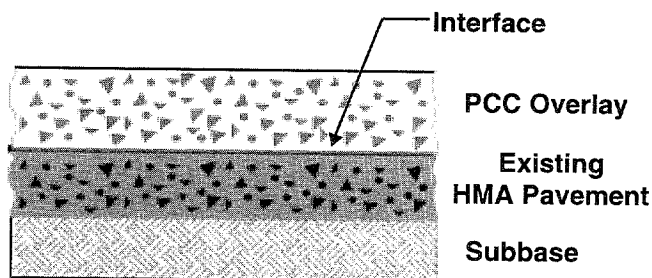


Figure 1. Conventional whitetopping overlay (McGhee 1994).

Whitetopping is an appropriate rehabilitation alternative for badly deteriorated HMA pavements, especially those that exhibit distresses such as rutting, shoving, and alligator cracking (ACPA 1998). Because the PCC surface is capable of bridging a significant amount of deterioration in the underlying HMA pavement, minimal preoverlay repairs are required.

Structurally, conventional whitetopping overlays are similar to new PCC pavements, and they are designed as such. All recommended design and construction practices for new PCC pavement are directly applicable to conventional whitetopping. The only significant difference is that whitetopping overlays require a deeper sawcut to ensure proper formation of joints. Whitetopping overlays can be constructed as jointed plain, jointed reinforced, or continuously reinforced concrete pavement (JPCP, JRCP, or CRCP), with the use of JPCP designs being most common. Current practices are away from JRCP designs, and they are rarely constructed any more.

Conventional whitetopping is contrasted from *thin* and *ultra-thin* whitetopping overlays in that these latter designs employ a milled HMA surface to develop a mechanical bond between the PCC overlay and the existing HMA pavement; conventional whitetopping assumes an unbonded condition, although some bonding does occur. Ultra-thin whitetopping is constructed between 50 and 102 mm (2 and 4 in) thick whereas thin whitetopping is constructed between 102 and 203 mm (4 and 8 in) thick.

General Design Considerations

The design of whitetopping overlays involves consideration of factors that apply to rehabilitation projects, as well as those that apply to new pavements, as shown in table 1. In urban areas, where traffic congestion is already a daily problem, management of detour traffic during construction can be a critical issue. For projects in congested areas, the use of fast-track paving techniques may be appropriate to minimize lane closure times.

Pavement Evaluation

The evaluation of the existing pavement is an essential part of any overlay design, and typically consists of a visual distress survey, deflection testing using a falling weight deflectometer (FWD), and coring. Coring is important in order to characterize the thickness and condition of the HMA layers.

The FWD testing results will provide information on the foundation support value. However, one problem in determining this value for whitetopping is that for existing HMA pavements the subgrade support is generally characterized by the resilient modulus (M_R), whereas the input needed for PCC pavement design is the modulus of subgrade reaction (k-value). Although the 1993 AASHTO Guide contains an approximate correlation between M_R and k, the more appropriate approach is to consider the contribution of the HMA layer in improving the bending stiffness of the PCC surface (Darter, Hall, and Kuo 1994). This approach is adopted in the 1998 AASHTO Supplement for the consideration of stabilized bases in new PCC pavement design (AASHTO 1998).