

2005 In Review

STATE OF THE PRACTICE – WHITETOPPING IS A WINNER

Whitetopping, that is the practice of placing concrete overlays on existing asphalt pavements, include variations such as:

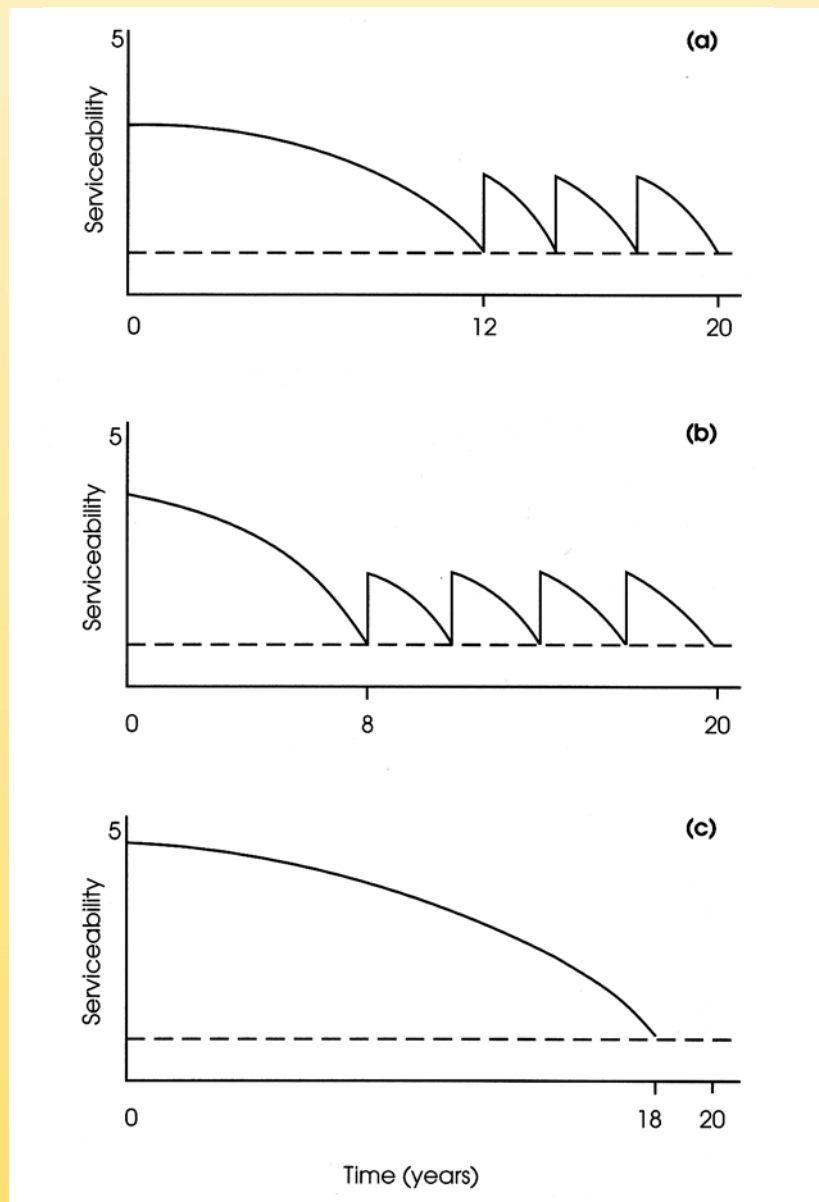
- Conventional whitetopping – a concrete overlay, usually of a thickness of 100mm (4in.) or more, placed directly on top of an old asphalt pavement
- Concrete inlay – a concrete overlay placed in a trench milled out of a thick asphalt pavement
- Ultra-thin whitetopping (UTW) – a concrete overlay usually 100mm (4in) thick or less placed on an old asphalt surface that is prepared to enhance the bond between concrete and asphalt.

Benefits of Whitetopping

The whitetopping of an existing asphalt pavement provides the construction agency, owner, and the public several benefits including the following:

Serviceability and Life

When rated on the ability to carry traffic and based on structural integrity and smoothness of ride, asphalt overlays exhibit a more rapid loss of serviceability than concrete whitetopping. The whitetopping alternative maintains serviceability and requires significantly less maintenance.



Whitetopping maintains serviceability for longer than does asphalt overlays. (a) Remove existing pavement and replace with 320 mm (12.5 in.) new or recycled asphalt pavement. (b) Remove top 100 mm (4 in.) and replace with 225 mm (9 in.) of asphalt pavement. (c) 200 mm (8 in.) whitetop concrete overlay.

Studies show that whitetopping improves structural capacity on highway and airport pavements. The concrete overlay reacts structurally as if built on a strong base course and it impedes structural distresses.

Cost Benefits

A concrete surface drastically reduces time and delays accompanying the frequent high maintenance requirements of an asphalt surface. A concrete surface is durable, long-lasting, requires far less maintenance time and money.

Whitetopping is particularly effective where annual budget constraints and high traffic levels make frequent traffic disruptions for maintenance intolerable. Since a concrete overlay replaces the asphalt layers by carrying load above the weakened asphalt, less asphalt repair is needed.

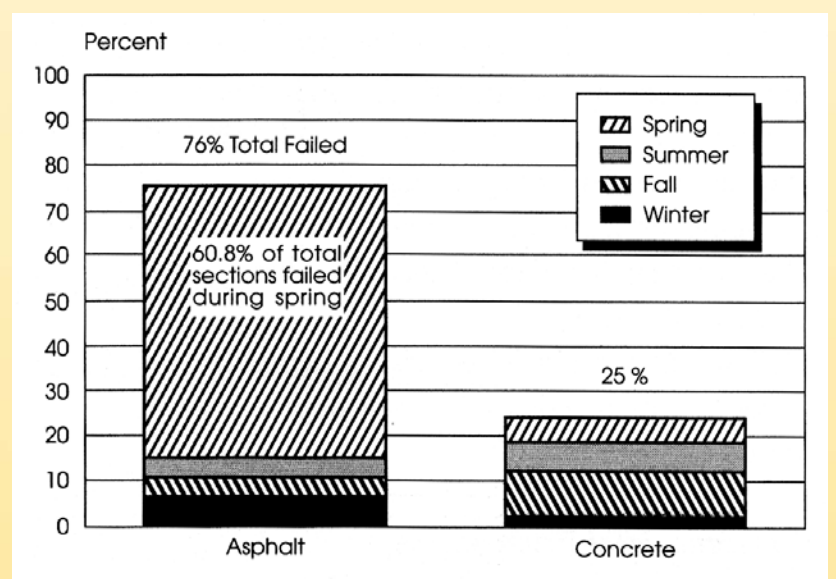
Remedy for Asphalt Pavement Distress

Whitetop overlays do not develop the typical distresses found on asphalt overlays. Concrete can uniformly fill asphalt ruts and correct the surface profile. Reflective cracking is also a form of asphalt overlay distress. Concrete stiffness is much greater than that of asphalt and reflective cracking does not occur, thus increasing expected pavement life.

Since concrete does not exhibit plastic flow, washboarding and shoving are permanently corrected by whitetopping.

Concrete overlays of existing asphalt pavements have been used as an alternative to flexible pavement. In a 'staged construction' the pavement is initially constructed with less structural capacity than needed and is then overlaid some years later. The underdesigned first stage asphalt pavement deteriorates somewhat before the first planned overlay. It has been shown that subsequent asphalt overlays do not perform as well. Analysis of the long-term rehabilitation and maintenance costs of 'staged construction' versus concrete overlay shows that a concrete overlay is the low-risk, long-lasting solution.

Concrete is not affected by seasonal weakening of the subgrade during spring thaw. In an AASHO Road test, nearly 61% of all asphalt test sections failed during spring months, compared with 5.5 percent of the concrete sections.



An example of the weakening of asphalt roads during spring months is found in the data from the AASHO Road Test. Significantly more asphalt sections failed during the spring months than did concrete sections.

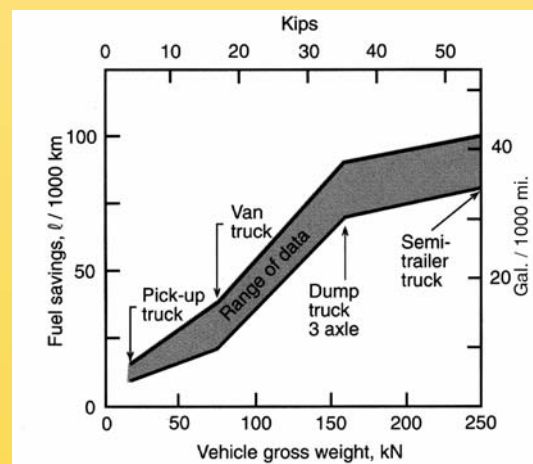
Safety

A whitetop concrete overlay improves the safety of a pavement surface. Heavy loads rut and shove asphalt, which can be dangerous at intersections, toll plazas, ramps, and airport apron areas where traffic is often starting and stopping. Rain-filled ruts in these areas can cause skidding and loss of vehicle control, leading to accidents and personal injury. Hydroplaning is also a serious problem on rutted roads. The stopping distances for concrete surfaces are much shorter than for asphalt surfaces.

Environmental Friendliness

The environmental benefits of whitetopping include:

- Whitetopping reflects light rather than absorbing it. This leads to a reduction of street lights by one-third.
- Whitetopping is cool and in conjunction with the placement of trees can reduce temperatures by 5°C (10°F)
- Whitetopping shows fuel savings of up to 20% compared with a flexible pavement. See the graph below.



Fuel savings for trucks travelling on concrete.

Source: ASCA Engineering Bulletin – Whitetopping, State of Practice