Technical Bulletin: Thinlays For Use As Pavement Preservation Surface Treatments – 19Sep2017

General
The heightened interest in pavement preservation (aka, preventive maintenance) has specifiers looking for pavement treatments that are durable, long lasting, able to be placed in thin layers, and won’t break the budget. A treatment developed specifically for the purpose and for use in Ohio is Thinlay Asphalt Concrete. An asphalt concrete treatment designed specifically for thin lift (¾-inch, minimum) placement, Thinlay Asphalt Concrete was developed for use in pavement preservation on structurally sound pavements that are showing signs of aging, oxidation or minor surface disintegration.

Figure 1: Paving Thinlay Asphalt.

The specifications for Thinlay Asphalt Concrete are based upon the extensive Ohio experience with other thin lift asphalt concrete materials including 404, Smoothseal (Item 424, Fine Graded Polymer Asphalt Concrete) and 404LVT.

Thin overlays, have commonly been used as preventive maintenance surface treatments. These overlays can cost effectively protect and preserve the underlying pavement structure in the same manner as other surface treatments, and with additional advantages.

Advantages of an asphalt overlay used as a pavement preservation treatment are:

- Longer life with attendant lower annualized cost (i.e. better cost effectiveness)
- Smoother, providing a higher level of user serviceability (i.e. comfort) than other treatments
- Increased pavement strength and load carrying ability

The reason for pavement preservation gaining acceptance is very simple - it provides the opportunity for extended pavement surface life at a cost that is affordable. When a Thinlay is specified, the driving public receives the additional benefit of a smooth and quiet ride that is typical of asphalt pavements. Also, annualized costs indicate that asphalt concrete treatments used as pavement preservation strategies are among the most cost-effective treatments.

Description of Candidate Projects
Pavements suitable for a surface treatment Thinlay show the following distresses:

- Dry-looking, "bony" pavements that are porous or permeable;
- Pavements that have begun to ravel;
- Pavements with extensive cracking too fine for crack sealing; or
- Pavements with cracking of the surface too extensive for crack sealing alone.

Suitable candidate projects will have no unrepaired structural (fatigue) damage and will have sufficient remaining structural capacity to last the expected life of the pavement preservation treatment. Rapidly deteriorating projects are not good candidates for pavement preservation as the rapidly declining condition may be indicative of structural inadequacy. Thinlay should be used wherever pavement preservation is the objective of a treatment. It should be placed on structurally sound pavements that are exhibiting only surface distress. Raveling and minor cracking due to oxidation are the types of distresses for which a Thinlay is ideally suited.

If significant rutting exists (>¼ inch) in a candidate pavement, the cause must be determined and
Materials Characterization

There are four types of Thinlay Asphalt Concrete – High Traffic (HT), Medium Traffic (MED), Light Traffic (LT) and Ultralight Traffic (ULT). The differences between the four types are seen in the mix design requirements. The HT and MED types require crushed aggregates. The crushed aggregate acts to provide internal friction to the mix, leading to greater stability. Complementing the mixture’s stability is the use of binders 70-22M and PG 64-22 binder grades respectively. The LT and ULT types require natural sand and softer binders, PG 58-28 and PG 52-28, to provide more cracking resistance.

Quality Control Issues

Production of all Thinlay Asphalt Concrete generally follows established ODOT quality control and acceptance testing requirements in Item 403 and S 1041. Exceptions to ODOT requirements are stipulated in the Thinlay Asphalt Concrete specification and include: the sampling frequency and allowable deviation requirements.

Manufacturing and Placement

Manufacturing Thinlay Asphalt Concrete will be similar to any conventional asphalt concrete mixture. Paver operation differs from conventional mix methods only in that the placement of a thin lift requires increased attention to factors affecting pavement smoothness.

Obtaining high quality, smooth asphalt paving projects requires the contractor to be sensitive to all matters affecting mix manufacturing, placement and compaction. With a thinlay these issues are heightened. Uniform mix production, uniform mix temperature, uniform delivery of material to the project, uniform head of material in front of the screed, and uniform compaction, all become critically important.
Butt joints are preferred for joint construction; but, feathering and handwork are easier with the fine graded Thinlay Asphalt Concrete.

The specification requirements of Item 401 of the ODOT C&MS apply to the construction of a thinlay project except as modified by the specification. Ensuring a successful project will require attention to the following:

- The existing pavement surface must be clean and dry prior to placement of a Thinlay.
- Weather limitations are the same as conventional asphalt mixtures per 401.06 of the ODOT C&MS. Minimum pavement surface and air temperatures of not less than 50 or 60 degrees F are required prior to mix placement depending on thickness. Note: allowable time for compaction at 60 degrees F for a 1-inch course thickness is only 10 minutes). For this reason Thinlay asphalt concrete incorporates natural sand to facilitate compaction in narrow temperature windows.
- A uniform application of tack coat, set prior to paving, is necessary to promote bond with the existing pavement.
- Material is placed with conventional asphalt pavers.
- Compaction of the mix must conform to the requirements of Items 401.13 and 401.16.
- The number and types of rollers are governed by Items 401.13 and 401.16. No vibratory rollers are permitted for use if the course thickness is <1½-inch. Vibratory rollers used on thin lifts may cause aggregate degradation due to the impact force of the rolls.
- Construct hot longitudinal joints or seal cold joints per 401.17. Treat the joint using a rate that will thoroughly coat the vertical face without excessively running off.

Specifications, Pay items, Costs
Thinlay Asphalt Concrete is a specification developed by Flexible Pavements of Ohio to provide a material configured specifically for the pavement preservation application of a thin maintenance surface. The four mix types described in the specification are tailored to specific traffic applications ranging from the heaviest traffic to very low traffic roads.

The specification is complete and includes requirements for mix design, construction, measurement, payment and acceptance. The specification mostly follows ODOT practices as appropriate.

Maintenance of Traffic Considerations
Follow the conventional practices for hot mix asphalt overlays. Overlays may be placed with traffic maintained with flagman control for 2-way facilities or with temporary lane closures on multi-lane facilities. Overlays may be placed at night when weather conditions permit satisfactory compaction. Light vehicular traffic may be allowed to cross a newly placed overlay for maintenance of access, but normal traffic should be kept off the overlay until it has cooled below 150 degrees F to avoid deformation or glazing under traffic.

Conclusion
Thinlay Asphalt Concrete is a highly durable surface mixture that is ideally suited to thin pavement preservation applications.

All reasonable care has been taken in preparation of this Bulletin. However, FPO can accept no responsibility for the consequence of any inaccuracy that it may contain.

References:
- Specification, Thinlay Asphalt Concrete, September 19, 2017, Flexible Pavements of Ohio
- Construction & Materials Specifications, 2016, Ohio Department of Transportation
- Pavement Design Manual, July 17, 2015, Ohio Department of Transportation
Flexible Pavements of Ohio (FPO) is an association representing the asphalt paving industry in the state of Ohio to federal, state and local governments, private industry and other construction organizations. FPO supports active educational, technical and outreach programs designed to improve and advance quality asphalt construction.