News from the Asphalt Pavement Association of Oregon

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CENTERLINE

PAVEMENT DESIGN & TECHNOLOGY

Decisions, Decisions...

The Pavement Type Selection Process Can Help You Make Them

Factors affecting pavement type selection include traffic, weather, soil characteristics, and construction considerations

A number of factors are considered before the pavement process ever begins

By David Newcomb, P.E., Ph.D.
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IF SELECTING PAVEMENT TYPE FOR A given condition amounted to nothing more than financial cost, the choice would be a no-brainer. But there are costs beyond construction to be weighed – like maintenance expense, rehabilitation cycles and resulting impact to road users. Additional factors include noise mitigation, recyclability, safety and ride quality.

Pavement type selection must be a rational process – one based on facts concerning performance, cost of the pavement structure, and realistic maintenance and rehabilitation schedules.

The *1993 AASHTO Guide for the Design of Pavement Structures, Appendix B* discusses primary and secondary considerations for pavement type selection. Principal factors include traffic, soil characteristics, weather, construction considerations, recycling, and cost comparison. This article, followed by another in the next edition of *Centerline,* will examine primary factors, along with considerations such as noise, ride quality, and safety. Within each of these topics asphalt offers specific advantages.

Traffic

Traffic is affected by a number of factors, including land use, planning and development, economics, government policy, competition among transportation modes, and fuel prices. To this end, the *AASHTO Design Guide* encourages "a margin of safety" in design, comparison of alternate strategies offering equivalent service, and use of long-life strategies to minimize traffic disruption.

Hot Mix Asphalt (HMA) has a proven track record of handling heavy loads and high traffic volumes. It is flexible, permitting night or weekend construction that ensures continued access during peak traffic hours. It is also economical, allowing staged construction of adequately designed pavement that will be built up over time to sustain its ultimate capacity.

HMA pavements also have a propensity for long life through periodic surface renewal. This concept of "Perpetual Pavement" minimizes traffic congestion and maintenance expense by avoiding a comprehensive reconstruction process.

Soils

The *AASHTO Design Guide* appropriately emphasizes the important role of soil in pavement performance. The stiffness of the working platform is critical to the placement and compaction of overlying HMA and granular layers. Both seasonal and geo-

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INSIDE

Decisions - Continued

Within each of these topics, asphalt offers specific advantages

graphic subgrade variability may dictate the viability of a given pavement strategy.

HMA pavements have been built successfully over a range of soil types. Proper treatment and compaction will depend upon soil classification, drainage requirements, and climate. There are numerous techniques to improve subgrade behavior in all types of pavements. Asphalt provides an additional advantage in being able to accommodate a certain amount of settlement in the underlying soil without a significant loss in serviceability.

Weather

The *AASHTO Design Guide* discusses the effects of weather on the subgrade as well as the wearing course of the pavement. Snow, ice, and rainfall affect the strength of soils on a seasonal basis. Likewise, moisture and temperature, in terms of freezing and thawing, have an impact on the road surface.

Asphalt pavements have been successfully employed in all types of climates, with location-specific conditions addressed in the design of the pavement structure.

In both warm and cold climates, HMA surfaces provide excellent service. Rutting resistance may be provided by SMA, Superpave, or Open-Graded Friction Course (OGFC) mixtures. In addition to rut resistance, OGFCs have the added capability of draining water from the pavement surface and reducing splash and spray.

Construction Considerations

The *AASHTO Design Guide* states that stage construction may dictate the type of pavement selected. Staging the construction process permits a substantial portion of the pavement structure to be built initially, with additional thickness applied in the future. This allows agencies to stretch budgets, and enables construction to break after the initial stage if necessary, and resume the following construction season.

Other factors may also play a role in the pavement selection process, including speed and timing of construction, maintenance of traffic during construction, ease of installation, safety, and accommodation of future traffic. Speed of construction is one of the primary advantages of HMA, which requires only a matter of hours to cool to a temperature that allows it to support traffic.

In the next *Centerline,* additional pavement selection considerations in the *AASHTO Design Guide* will be discussed, along with a summary of the Asphalt Pavement Alliance's position on pavement type selection. ▲

David Newcomb, P.E., Ph.D., is Vice President, Research and Technology for the National Asphalt Pavement Assn.

OSU Research to Facilitate Application of New Procedures

Dr. Jim Lundy, professor of engineering at Oregon State University, is leading a research initiative to establish dynamic modulus values for typical Oregon mixes. The data will ultimately be used to facilitate application of new design processes published in the next *American Association of State and Highway Transportation Officials (AASHTO) Pavement Design Guide.*

With the new *Design Guide,* dynamic modulus is expected to be one of the components factored into the specification of mix designs. Dynamic modulus is a measure of mix stiffness that will effectively replace the resilient modulus measurement.

"The goal is to establish typical values (for Oregon mixes) that can be used as defaults, and to judge the validity of the existing prediction model," Lundy explained. Having access to that data will enable pavement engineers to apply the new AASHTO design procedures without having to duplicate the work Lundy will soon complete in the lab.

Measuring dynamic modulus is a complex process involving sophisticated equipment and complex environmental controls. Lundy anticipates completion of equipment modification by summer's end, with testing to begin at about that time. And while publication of the new *AASHTO Design Guide* is still in the relatively distant future, **Jim Huddleston,** APAO Executive Director, notes Lundy's work will enable ODOT to prepare for the new guide as well as evaluate current technology and processes.

Asphalt "Volcanoes" Discovered in Gulf of Mexico

German scientists in search of deep-sea methane recently discovered asphalt "volcanoes" in the southern Gulf of Mexico.

The volcanoes are actually collapsed or broken salt domes edged with hardened tar. The deposits are the result of violent expulsions of hydrocarbons from the earth's surface, which explain the presence of tubeworms, mussels, clams and shrimp living on or near the hardened material. These animals live on the chemicals emitted from these and other similar underwater outlets.

Tubeworms growing between asphalt flows – Ian R. MacDonald, Texas A&M University, Corpus Christi

Oil seeps have been identified in most of the world's oceans, but not with the hardened asphalt material like that found in the Gulf. Scientists studying the deposits hypothesized that the material was squeezed out of the seabed like lava, and is indicative of untapped deep-water oil reserves. ▲

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For quality asphalt projects, call one of our members.

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APAO NEWS

Annual Paving Awards Presented

THE EXCELLENCE IN PAVING Awards were presented at the Annual Paving Conference held in Eugene, Oregon on March 18.

The Excellence in Paving Awards Program is a joint effort between the Asphalt Pavement Association of Oregon and the Oregon Department of Transportation. It is designed to recognize contractors and crews for outstanding work, and inspire a commitment to quality among paving professionals across the state. A call for nominations is issued in late August, and projects are evaluated by rating teams in October and November. Winners are announced in March, with the top three projects in each of 8 categories receiving awards. Contractors and owner/agency personnel are eligible to nominate projects for recognition.

> **"What distinguishes a winning project is attention to detail."**
>
> Jeff Gower, ODOT

Projects are evaluated on a number of criteria, including:

(l-r) Ted Kyle, president, APWA, and George Ferge, H&H Paving

(l-r) Adam Markell, ODOT Region 1; Cathy Nelson, ODOT; Drew Whittle, McCafferty-Whittle

- Uniform texture – there should be no segregation
- Smooth tight joints – both longitudinal and transverse
- Smooth tight matches – on all intersections, curbs and/or appurtenances
- Ride – smoothness is a major component of an award-winning project
- Overall appearance – layout and design
- Degree of difficulty – relative to other projects nominated

"What distinguishes a winning project is attention to detail," said **Jeff Gower,** State Construction and Materials Engineer for ODOT, and a member of ODOT's rating team.

Gower explained that up to 400 points may be awarded based on how the project meets rating criteria. About 60% of points are related to roadway finish (straight edges, tight joints, uniform texture, etc,); 25% are related to smoothness; and 15% are tied to project complexity.

Presenters of the 2004 Excellence in Paving Awards included **Cathy Nelson,** Technical Services Manager, ODOT; Jeff Gower, State Construction and Materials Engineer, ODOT; **Ted Kyle,** President, American Public Works Association, Oregon Chapter; and **Jim Huddleston,** Executive Director, Asphalt Pavement Association of Oregon. ▲

2004 Award Winners

Commercial/Industrial

First:	*Argyle Square* *Brix Paving*
Second:	*OSU Hilton Parking Lot* *Morse Bros., Inc.*
Third:	*Toys R Us Parking Lot Overlay* *Portland Road & Driveway*

Emulsified Asphalt Concrete (EAC)

First:	*Warner Highway* *Tidewater Contractors*

Rural Road

First:	*Del Rio Road* *Roseburg Paving Co.*
Second:	*Barlow Trail Road* *Jim Turin & Sons*
Third:	*Maple Grove Paving Package* *Roy L. Houck Construction*

Smoothness

First:	*The Dalles – California Highway* *MP 123.15-133.11* *Hooker Creek Asphalt & Paving*
Second:	*Glen Aiken CR – N Fork* *Coquille River Bridge* *LTM – Bracelin-Yeager*
Third:	*Steens Highway – New Princeton to* *Virginia Valley Road, MP 37.66-47.23* *McCafferty-Whittle Construction*

Special Project

First:	*Francis Eagle Driveway* *Roseburg Paving*
Second:	*Kraemers Nursery – Sorting Yard* *North Santiam Paving*
Third:	*Young Estates* *H&H Paving*

State Highway

First:	*Glen Aiken CR – N Fork* *Coquille River Bridge* *LTM – Bracelin-Yeager*
Second:	*I-84 Old Oregon Trail – LaGrande to* *North Powder, MP 260.27-285.33* *J.C. Compton Contractors*
Third:	*I-84 Columbia River – Corbett to* *Multnomah Falls, MP 22.40-31.77* *McCafferty-Whittle Construction*

Urban Street

First:	*ST 03-02 Geary/14th/Clay Restoration* *City of Albany* *D&D Paving*
Second:	*Brush College – City of Salem* *North Santiam Paving*
Third:	*City Street Overlay – City of Grants Pass* *Copeland Paving*

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EDUCATION

This is Not Your Grandfather's Asphalt

Colored and textured asphalt application using StreetPrint™

Image courtesy of StreetPrint, www.streetprint.com

IN THE OLD DAYS, THE ONLY WAY TO achieve the charm of a cobblestone drive was backbreaking labor. Today, thanks to advanced asphalt capabilities, a variety of colors and textures can be applied to bike lanes, parking lots, street crossings and more.

One of the most popular and economical methods is StreetPrint. It is a proprietary technology that produces realistic brick, slate and stone effects using asphalt as its base.

The desired imprint pattern is pressed into fresh asphalt while it is still hot. Existing asphalt can be imprinted as well, after it is softened by specially-designed infrared heating equipment. This "reheating" capability also makes for quick, seamless repairs. Color is applied as a finish coating that also acts as a protective seal, fortifying the asphalt against weather and extending its life.

"This product is designed to compete with stamped concrete," said **Jim Johnson,** a custom job estimator for LTM Roseburg – a StreetPrint-certified contracting company. "It is definitely cheaper, running $5-$6 per square foot to pave, print and color versus $7-$15 per square foot for stamped concrete," he said.

Other methods of applying color require a more integrated approach – meaning the coloring agent is part of the mix. "Traditionally," explained **Richard Schreck,** Executive Vice President of the Virginia Asphalt Association, "the only way to change the color of pavement was to use colored aggregate, but once the aggregate is coated with asphalt and the hot mix is placed, you have to wait until traffic and/or weather wears the asphalt off to see its color." This process could take months or even years, depending on traffic.

Over the last 20 years, research has yielded clear polymer resins as synthetic asphalt binders that can be processed through an asphalt plant just like traditional (black) asphalt binders. The clear resins allow the color of the aggregate to show through immediately. You can also create a colored binder by using powdered fines from material such as iron oxide or dry paint and mortar pigments.

"Gritting" or sanding can also alter the color of asphalt, though its primary benefits are safety-related. The process involves spreading sand-sized aggregate over fresh asphalt and pressing it with a roller. Popular in Germany, it is used for skid resistance on high-speed arteries like the Autobahn. By using light colored aggregates as the grit material, it can also reduce lighting requirements because of its reflectivity. The grit also fills tiny surface voids and "blots" the asphalt, significantly decreasing surface permeability. Though this practice is not widespread in the U.S., Schreck said representatives from the Virginia Department of Transportation observed its benefits first hand during Virginia's 2003 Germany SMA Study Tour. VDOT is excited about the potential benefits and plans to conduct field trials on some of its paving projects this year. ▲