News from the Asphalt Pavement Association of Oregon
Volume XIX, Issue 1
Spring 2015

CENTERLINE

PAVEMENT DESIGN

Asphalt yields benefits beyond quick construction time

In Bend, an entire roundabout was reconstructed with asphalt at the intersection of Newport and College Way in just three days. It would have taken almost four weeks to complete the project with concrete, which would have severely and negatively impacted several local businesses.

The roundabout was reconstructed in three days with asphalt. It would have taken almost four weeks to complete the same project with concrete.

Newport and College Way roundabout, Bend, Oregon

"Closure time was a big issue," said **Hardy Hanson,** streets manager for the City of Bend. "Several businesses would have been stifled for that (extended) period of time," he added. Even with the three-day closure required for asphalt construction, the work was scheduled to fall over a weekend in order to minimize impact to the college and nearby businesses whose customers, students and staff rely on the roundabout for access.

Hanson reports that the City of Bend has installed approximately 28 roundabouts over the past 10 to 12 years. Previous installations were typically done with an asphalt layer of only three inches, which delivered a service life of about eight years.

"Four years ago, not realizing why our asphalt installations were performing below expectation, we began to renovate with concrete. That worked well, as long as we had good detour routes (because of extended closure times required by concrete)," Hanson said. The City later discovered that a thicker asphalt section would perform very well in such applications.

"Now we're using a nine-inch asphalt section with a mix designed specifically to withstand turning and shoving," he explained. **APAO (then) Executive Director Jim Huddleston** helped develop the formula for the asphalt mix that was used at the Newport/College Way installation.

"This section of asphalt was designed to meet perpetual pavement criteria," Huddleston said. "With routine inspection and maintenance, this pavement should perform indefinitely, with wear confined to the surface where it can easily be milled and filled on a regular interval."

The bottom two lifts of the pavement were designed with lower

(continued on page 2)

INSIDE

Asphalt yields benefits — continued

air voids and higher binder content to ensure long-term durability against water, freeze/thaw dynamics, and oxidation. The higher binder content also improves resistance to cracking; and the higher-than-normal compaction specified for the lower lifts will go even further to ensure long life.

> "The expectation is that we will get 10 to 15 years of service from the reconstructed roundabout before a new inlay would be needed."
>
> *Hardy Hanson*

The top lift of asphalt is designed with a polymer-modified binder with excellent resistance to rutting and shoving at the surface. This is particularly important for a roundabout, where centrifugal force exerts outward stress on the pavement as each vehicle travels its circular path. The modified binder also provides improved resistance to aging and oxidation.

"The expectation is that we will get 10 to 15 years of service from the reconstructed roundabout at Newport/College Way before a new inlay would be needed," Hanson said. "And that work would require a single evening closure, rather than closure for weeks to accommodate a more extensive rehabilitation project," he added.

Newport and College Way roundabout

Subsequent research supports Hanson's projection. "We reviewed construction records and learned that the (Bend) roundabout at Colorado and Century, designed by ODOT and constructed in 2000, has an eight-inch asphalt section," said **Kevin Ramsey, Bend street supervisor.** "That installation is now 14 years old and demonstrates no surface distress," he said. Ramsey projects that it could be four years or more before that roundabout requires a new inlay.

Asphalt offers multiple advantages over concrete, in this example and others. Beyond its fast construction time–which is a fraction of the time required to construct concrete–asphalt is often less costly to construct at the outset. The Newport/College Way roundabout, for example, cost approximately 20 percent less to construct with asphalt than with concrete. Life-cycle costs can be lower as well. With a properly designed and constructed perpetual pavement, for example, 15 to 20 years may pass before an inlay treatment is required.

Choosing the right pavement for any project hinges on several considerations, not least of which is the acceptable length of time for a given location to be closed to traffic. In addition to speed of construction, asphalt offers even more advantages–including longer life and lower costs–that concrete cannot match. ▲

Hickey assumes APAO executive director role

On January 1 **John Hickey** became APAO's fourth executive director in the organization's 45-year history. He assumes the role following **Jim Huddleston's** retirement from the position.

John served APAO for seven years as the board's attorney. He practiced construction law since 2006, and previously worked as a registered civil engineer.

"I worked with lawyers when I was a civil engineer, and it seemed most of them weren't familiar with the technical issues they were representing," John said. "I saw an opportunity for someone who knew both the technical and legal sides, and that's when I decided to become a construction attorney," he added.

The decision for John to subsequently leave his law practice and join APAO's staff was a natural one. "The biggest factor is the people I work with at APAO. They are some of the best people I've met in my life. All of these contractors compete with one another, but they're also like family. It makes this association unique," he said.

"Our priorities at APAO will not change," John said. "We're here to educate on asphalt design and construction; to partner with ODOT; and to develop and present our training programs. As an industry, we continue to face challenges with the funding of infrastructure maintenance and improvement, and will face new challenges in the future, like workforce development."

Huddleston remains onboard to consult on technical issues and to ensure a smooth transition. ▲

BITS & PIECES

Infrastructure Funding

The current federal authorization for highway funding expires May 31, 2015. Please write your congressional delegation and ask them to pass a long-term highway bill with increased funding. Without additional funding, our infrastructure will continue to degrade, which will inhibit the growth of our economy and make our transportation system less safe. Continuing to wait to properly fund infrastructure improvement would also increase the overall cost to the public because the cost of repairs increase as conditions worsen.

Congress won't increase highway funding unless we tell them it's critical. Ways to notify your congressional delegation are available at www.dontletamericadeadend.com and www.asphaltpavement.org. Please also encourage your co-workers, employees, family, and friends to write as well.

MISSION STATEMENT

The Asphalt Pavement Association of Oregon, Inc., (APAO) is dedicated to promoting the use of asphalt concrete by developing customer driven programs to enhance quality and excellence in all aspects of asphalt technology. We believe that the key to growth and prosperity in the industry is continuous quality improvement obtained through active association membership, positive customer relationships, education, and training.

MEMBERS

For quality asphalt projects, call one of our members.

Regular Members: 7 Peaks Paving, LLC; Baker Rock Resources; Bayview Transit Mix; Copeland Paving, Inc.; Eagle-Elsner, Inc.; Granite Construction Company; Granite Construction Northwest Columbia 1; H & H Paving Co.; Hampton's Inc.; Harney Rock & Paving Co.; High Desert Aggregate & Paving, Inc.; Humbert Asphalt; James Perrigo Construction, LLC; JF Shea; Kerr Contractors; Knife River - Idaho Division; Knife River - Northwest; Knife River - Materials; Kodiak Pacific Construction Co.; Lakeside Industries, Inc.; Mt. Hood Asphalt Products, Inc.; North Santiam Paving Co.; Old Castle Materials - Eugene Sand Construction; Old Castle Materials - Salem Road and Driveway; Oregon Mainline Paving; Pioneer Asphalt, Inc.; Porter W. Yett Company; Portland Road & Driveway; Road & Driveway Co.; ROBCO, Inc.; Rocky Mountain Construction; Roy L. Houck Construction Co.; S-2 Contractors; S-C Paving Company; South County Asphalt, LLC; TFT Construction; Tidewater Contractors, Inc.; Vancouver Paving Co.; Wildish Sand & Gravel Co.

Associate Members: Ad-Tek Calibration; AggReCon West; Albina Asphalt Company; Antigo Construction Inc.; Blue Line Transportation; CEI Enterprises Inc.; CMI Roadbuilding Inc.; Caterpillar Global Paving; Clyde/West, Inc.; Construction Equipment Co.; D'Ambra Equipment & Supply; DeAtley Crushing Co.; DynaPac USA; Exxon Mobil; Idaho Asphalt; Maxam Equipment, Inc.; McCall Oil; Modern Machinery; Northwest Shingle Recyclers; Papé Machinery; Peterson CAT; Recycled Asphalt Solution, LLC; Reliable Asphalt Products, Inc.; RoadTec, Inc.; Troxler Electronic Laboratories; U.S. Oil Trading LLC; Valero Asphalt Marketing; Volvo Construction Equipment, N. America; Western States Asphalt; Windsor Rock Products; Zydex Inc.

Affiliate Members: ACS Testing; AGC Oregon Columbia Chapter; Alliance Testing Services; ALLWEST Testing and Engineering, LLC; American Concrete Company; Anchor Insurance & Surety; Anderson-Perry & Associates, Inc.; Asphalt Pavement Technologies; CM Consulting; Carlson Testing; College of Engineering; Coral Constructing Co.; David Evans & Associates; FEI Testing; Fred Bond Consultant; GeoDesign, Inc.; GeoPacific Engineering; Jordan Ramis, PC; KE & Associates; Materials Testing & Inspection; Mayes Testing Engineers, Inc.; MeadWestVaco, Corp.; Northwest GeoTech, Inc.; NW Natural; OCAPA; Oregon Institute of Technology; PSI-Portland; Pavement Services Inc.; Pinnacle Western Inc.; Safety Electric Inc.; Scott Hookland, LLP; STRATA, Inc.; Terracon Consultants; Thermo Fluids, Inc.; Umpqua Testing Services; Ward Insurance; Whole Brain Creative, Inc.; Yazbeck, Cloran & Bowser, PC; Yelton, Inc.

For member contact information, visit www.apao.org and click the membership tab.

CENTERLINE is published four times a year by:
Asphalt Pavement Association of Oregon
5240 Gaffin Road SE, Salem, OR 97301
Ph (503) 363-3858 Fax (503) 363-5571

President: **Todd Allen**
Vice President: **Mike Curtis**
Secretary/Treasurer: **Tyrone Belgarde**
Executive Director and Editor: **John Hickey**

EDUCATION

High-albedo pavements bring unintended consequences to urban head island effect

HIGH-ALBEDO MATERIALS HAVE been promoted uncritically for their ability to reflect heat back to the sky and away from our increasingly developing urban areas. They've gained acceptance as a solar-energy reflector on rooftops, for example, and subsequent efforts have been made to implement them at lower elevations (paved surfaces and pavements) as a potential tool for urban heat island mitigation.

According to the U.S. Environmental Protection Agency, the urban heat island (UHI) effect is defined as "the phenomenon whereby urban regions experience warmer temperatures than their rural surroundings."

Over the past two decades, proponents of reflective pavements (typically concrete pavements) have heavily promoted their materials exclusively as a means to mitigate the urban heat island effect. This position has made its way into green building programs and the awarding of LEED credits that promote the use of concrete over asphalt, solely for its reflective qualities.

While reflective pavements would seem a logical approach toward reducing the UHI effect, a host of other factors indicates that in some cases, these pavements have the potential to exacerbate it, making urban areas even hotter. A report from Arizona State University, Unintended Consequences, by **Jiachuan Yang** and **Drs. Zhihua Wang and Kamil Kaloush,** examined the literature for mitigating the UHI effect through the use of reflective roofs and pavement materials.

While reflective pavements would seem a logical approach toward reducing the UHI effect, a host of other factors indicates that in some cases, these pavements have the potential to exacerbate it, making urban areas even hotter.

As noted in the report, a reflective-only approach mainly considers that solar energy reflected from pavements travels directly back to space. Cars, trees, pedestrians and the built environment, however, all play a role in intercepting and redirecting energy that radiates from the pavement. From the cited literature, the study identified potential for "substantial unintended consequences" with this approach, including increased cooling loads in adjacent buildings; increased heating demands during cold weather; snow and ice buildup; reduction in precipitation, runoff and soil water content; and other adverse human health impacts like additional UV radiation exposure.

Field studies and modeling have shown that while surface temperatures can be decreased by reflective pavements, "there is no discernable difference" in temperatures above the surface of sizable pavements with differing albedos. Reflective rooftops have even been shown to generate elevated temperatures above the surface, and in the case of large-scale deployment, can adversely impact surrounding rural areas with higher temperatures.

Due to the potential adverse affects mentioned above, researchers concluded that use of reflective pavements exclusively as a means to mitigate the UHI effect is premature, pending further investigation. The most appropriate solutions will incorporate a mix of several different tactical approaches, and will vary by geographic location and local environmental conditions. Additional research will be required to model different solutions, quantify the effects, and develop an effective strategy. ▲

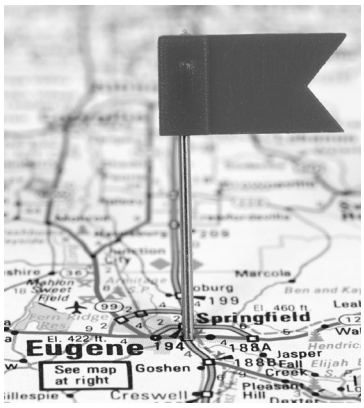
A copy of the report is available from the Arizona State University National Center of Excellence for SMART Innovations: http://ncesmart.asu.edu/news/unintended-consequences

Asphalt Pavement
Association of Oregon

5240 Gaffin Road SE Salem, OR 97301

PRSRT STD
US POSTAGE
PAID
PORTLAND, OR
PERMIT #2580

EDUCATION



City of Eugene leads the way in RAP

The City of Eugene is aggressively testing asphalt mixes with high percentages of recycled asphalt pavement (RAP), going so far as to exceed maximum RAP content percentages specified by ODOT. They are the first entity in Oregon to do this.

There are several drivers behind the effort, according to **Jenifer Willer, P.E.** and pavement preservation program manager for the City of Eugene.

"One of the reasons we're exploring higher levels of RAP content is to meet City sustainability goals," Willer said. "Using RAP means less asphalt waste in landfills. But there's also potential for economic benefit," she explained. "Our local contractors are as eager to do this as we are. They have huge stockpiles of RAP, and this is a cost-effective way to reuse the material and lower their production costs," she said.

Cost savings resulting from higher RAP content can be substantial. In a previous *Centerline* story (Summer 2012), **Dr. Ray Brown** of the National Center for Asphalt Technology estimated that 70 percent of the cost of hot mix asphalt lies in the materials, and up to 50 percent of binder and aggregate costs could be saved by fully leveraging RAP content.

Willer notes that APAO's research has provided confidence to move forward with mixes containing higher RAP content, and that the City has worked closely with APAO on projects constructed in Eugene over the past two years. "We provided APAO with standard mixes and mixes with increased binder replacement for comparison," she said. "It's too early to judge performance of the constructed projects, but the APAO tests have all been positive," she said.

Several recent City projects contained as much as 35 percent reclaimed binder. Increased binder replacement works particularly well with warm mix asphalt–another environmentally-friendly pavement design–that the City already specifies as standard. "That's a plus," Willer said. "We're also using softer binder to offset our higher RAP content, with softer binder providing the additional performance benefit of less cracking and rutting."

"This is emerging technology," Willer said. "It's important to do your research and be mindful of mix design principles—I can't stress that enough."

The City of Eugene's program is initially focused on low-volume residential streets with low loading. Performance data and continued testing of new mix designs will guide further expansion of the program. ▲

> "Using RAP means less asphalt waste in landfills. But there's also potential for economic benefit. Our local contractors are as eager to do this as we are. They have huge stockpiles of RAP and this is a cost-effective way to reuse material and lower their production cost."
>
> *Jenifer Willer, P.E.*