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WESTERN OHIO ON ARNOLD ROAD BETWEEN CHILDREN'S HOME-BRADFORD ROAD AND BECHTOL ROAD IN DARKE COUNTY. FOR MORE INFORMATION ABOUT THIS NEW FLEXIBLE PAVEMENT SEE FPO'S THINLAY TECHNICAL BULLETIN STARTING ON PAGE 12.



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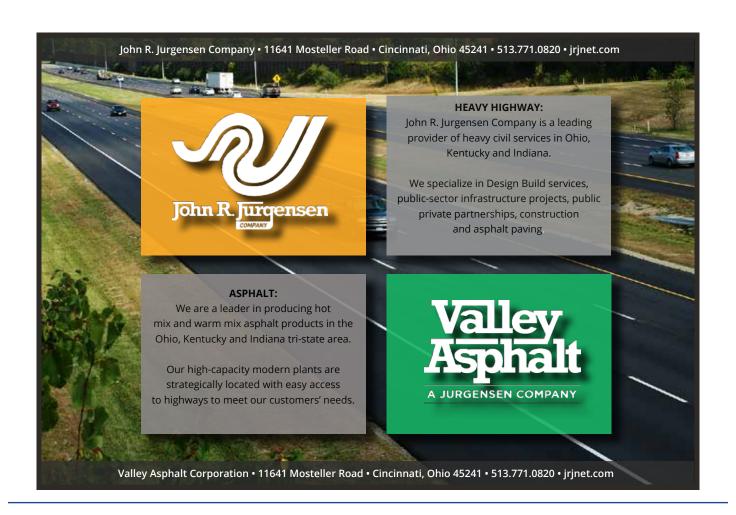
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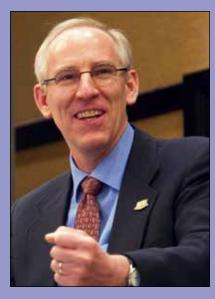
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#### THE PRESIDENT'S PAGE



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"Keeping roads great requires measuring some things; first, measuring them according to the same metric as used by motorists. That metric has been determined for us; it's smoothness. Second, we measure the pavement condition for functionality and strength. That's the engineering side of maintaining great roads ..."

# OHIOHAS OHIOHAS GREAT ROADS

"Ohio has great roads." Those words were spoken to me as unsolicited comments from non-highway types; one a retired attorney who also is a sports car enthusiast, the second from a young man whose job requires a lot of road time in and out of Ohio.

Earlier this year, I too was impressed in a similar way upon my motoring across the fruited plain and crossing the border into Ohio. It was one of those ahhhh feelings when you finally motor onto one of Ohio's smooth asphalt pavements. That's not to imply that every road in Ohio is great, as all of us could point to an ailing pavement on which we've bumped along; in particular are municipal and county roads where funding woes have struck hardest. That being said, we are fortunate to enjoy a roadway system here in the Buckeye State where the DOT and other agencies have seen the value in using asphalt roads.

#### What Makes a Road "Great"?

As I contemplated the remarks made to me, I wondered what John Q. Public uses as the

basis for judging pavement quality. After all, the road users certainly don't know what the pavement condition rating (PCR) may have been for a stretch of road they just deemed "great." They're without knowledge of the structural condition of the pavement. As far as they are concerned, structural deducts are meaningless. The number of unsealed cracks is nothing they count. "What's raveling?" they would respond if the question was ever posed to them. Except for rutting, loudness and the "b-dump b-dumps," motorists are otherwise indifferent to all the pavement engineering jazz with which guys like me concern ourselves. So what is the motorist's metric for determining a road's greatness? The answer is ... their personal riding experience.

That's right! Ultimately, "greatness" of a roadway is measured by personal riding experience.

#### Defining the Motorists' "Riding Experience"

There's a lot that can influence a person's riding experience; traffic flow, pavement

quietness, construction expediency, sense of safety through work zones and all the rest of the factors that can be summed up in one word, "DRIVABILITY." All that being said, when the retired attorney and the young fella remarked how Ohio has such great roads, I asked them to explain what they were referring to. In both cases the response was the roads they drove on in Ohio ride so much better. Interestingly, their metric for identifying "great" pavement was smoothness. Their knowledge of the road went no deeper than their personal riding experience – and ride quality was the main quality. Now, someone might say that two opinions of ride quality do not define a trend. I would agree, if it weren't for the fact that with every survey of the public, ride quality ranks near the top of respondents' desired roadway attributes. In fact, ODOT's statewide customer preference survey conducted for its long-range strategic plan, ACCESS OHIO 2040, showed that making pavements smoother received highest priority when ranked against other pavement characteristics. Research scientists at the famed AASHO Road Test came to the same conclusion: Motorists define quality based on their riding experience. AASHO scientists called it "Serviceability." It continues to be a prominent factor in pavement thickness design.

#### **Keeping Ohio's Roads Great**

While growing up, one of the jobs I had was as a grocery clerk. That's frontline customer service. I learned two rules while in that job. Rule No. 1: "The customer is always right." Rule No. 2: "When the customer is wrong, refer to Rule No. 1." From that, I learned what customer service was and how I could best ensure for them a pleasant shopping experience. Why should I have cared? Well, my wage relied on it. The amount of jingle in my pocket was directly related to the dollars being exchanged at the cash register. That exchange would only occur if the customers shopping at my store had a good shopping

experience; otherwise they would take their business elsewhere. Though as stewards of road assets we don't typically think in these terms, truth is, motorists are our customers. Though we're not so much interested in their shopping experience, we certainly are concerned with their riding experience. After all, they put the jingle in our pockets whether you're an agency person, contractor, or consultant who earns a living designing, building, or maintaining roads.

Keeping roads great requires measuring some things; first, measuring them according to the same metric as used by motorists. That metric has been determined for us; it's smoothness. Second, we measure the pavement condition for functionality and strength. That's the engineering side of maintaining great roads. Truth is, smoothness and pavement condition are crucial components in ensuring a great personal riding experience. To neglect pavement condition eventually leads to poor ride quality. To neglect ride quality is to the detriment of customer satisfaction.

What's true of Ohio's roads is that approximately 98 percent of them have asphalt surfaces. With that high percentage of asphalt surfaces, it's not surprising to hear "Ohio has great roads." It is an established fact that asphalt pavement has the smoothest surface of all pavement types or surfacing treatments. To the extent that asphalt remains the pavement surface of choice, we can be assured by our customers — the motorists — that Ohio has great roads.





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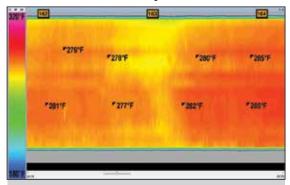
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Most citizens of Ohio are at least vaguely aware of the sorry state of our infrastructure, but likely don't view it as a crisis — yet. The daily news media carry early warnings: A deteriorated bridge here or a contaminated water supply there. The reports usually indicate that responsible officials are working to remedy the specific problem. But, troublingly, there are some reports of large projects where no solution is foreseen — due to lack of resources.

The American Society of Civil Engineers (ASCE) has quantified the magnitude of the problem with its "Report Card for America's Infrastructure," which is issued every four years. Since 1998,

"D" averages. The failure to make sufficient investment to maintain and improve the infrastructure, though well identified, has been allowed to continue.

America's infrastructure has persistently received

Now, ASCE has developed a series of reports that answer the key question: How does the failure to improve the condition of the infrastructure affect the nation's future economic prosperity?

The ASCE "Failure to Act" series, which began in 2011, has been recently updated with the report, "Failure to Act: Closing the Infrastructure Gap for America's Economic Future." The most-recent report details the economic impact of the current under-investment in infrastructure improvement.

In the report, ASCE predicts that between 2016 and 2025 inefficiencies caused by inadequate infrastructure will cost American families an average of \$3,400 per year. During that same period, infrastructure needs will total \$3.3 trillion, but planned investment is only \$1.8 trillion. Closing the investment gap would cost every household \$3 per day. The report can be found at http://www.asce.org/failuretoact/.

We in Ohio are probably in better condition than some other states. Our state government has managed through the financial crisis that has paralyzed other states. Transportation funding at the state level has benefitted from a large use of borrowing in the form of bonds. However, Ohio's gas tax, which is the state's greatest source of funding for transportation infrastructure, was last increased in 2005. With the combination of inflation, more-efficient vehicles and the limit on bonding capability, the present funding system cannot sustain Ohio's infrastructure into the future. The time to act is now, before the situation becomes a crisis and while the situation is still manageable.



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# Technical Bulletin: Thinlays For Use As Pavement Preservation Surface Treatments, (29March2016)



#### 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
- 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 corrected. Pavement

layers exhibiting plastic deformation must be removed and replaced with materials having sufficient stability to resist the stress being applied. Structural or base deformation is an indicator of the need for a structural overlay (i.e. thick overlay) or pavement reconstruction. See Appendix B of the ODOT, Pavement Design Manual, for guidance in dealing with high-stress conditions.

#### **Materials Characterization**

There are four types of Thinlay Asphalt Concrete – HT, MED, LT and UltraLT. 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 UltraLT types require natural sand and softer binders, PG 58-28 and PG 52-28, to provide more cracking resistance.



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Figure 2: Thinlay Asphalt mat texture.



Thinlay Asphalt Concrete mixes are designed in the laboratory using the well-established Marshall mix design method to specific parameters contained in the specification. Compaction blow counts, stability and flow requirements and voids in mineral aggregates (VMA) vary for the four types of mixes.

#### **Description of Application**

A thinlay treatment will generally consist of a single course 3/4-inch to 1-inch thick. Application thickness should be appropriate for the surface conditions and mix specified. That is, sufficient thickness must be specified to permit placement and compaction of the overlay over the existing pavement irregularities without exceeding the material's minimum or maximum layer thickness. Uniform courses are best for optimum compaction. Sufficient course thickness must be placed to ensure at least two-times the largest aggregate particle size over high spots, and not more than three-times in the low spots. For Thinlay Asphalt Concrete this means using a course thickness that is a minimum of 3/4 inches to a maximum of 1-1/2-inches. Pavement surfaces having greater variation will require planing (ODOT Item 254) or a leveling course prior to placement of thinlay.

The mix specified must be appropriate for the traffic conditions to which it will be subjected. These range from heavy trucks to



the lightest traveled roads. For this purpose, the specification includes parameters for traffic volumes and the mixture composition needed to ensure a successful application.

The pavement preservation concept does not necessarily preclude the use of pavement planing or a leveling course, which can provide the advantages of a smoother ride, achieving greater density in a uniform thickness, or being able to maintain curb exposure, etc. If pavement planing is desired, it is recommended that SS 897, Pavement Planing, Asphalt Concrete, Class A (Fine Planing) be specified. Research has shown that fine planing may facilitate better density with a thinlay. If a leveling course is desired, a scratch course of Thinlay Asphalt Concrete material may be specified.

#### **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 & 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:



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- 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 Fahrenheit 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 inches. 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 two-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° 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:

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- Pavement Design Manual, July 17, 2015, ODOT





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is often stated, quite correctly, that density is the most important factor that affects the long-term performance of an asphalt pavement.

The weather this summer has been hot, hot, hot. The ambient air temperature, as well as the temperature of the surface on which the asphalt concrete mixtures have been placed, has been high. But, like it or not, the fall season of the year is coming. Although that means lower and nicer air temperatures for the paving crew to work in, it also means that the asphalt concrete mixture will cool more quickly and be more difficult to compact and to obtain the desired level of density.

#### **FACTORS AFFECTING COMPACTION:**

There are several primary factors that affect the cooling rate of an asphalt concrete mixture. That cooling rate is the time it takes for the mix temperature to change from the temperature at which the mix is delivered into the hopper of the paver (laydown temperature) to the

temperature at which the mix becomes too stiff to compact. The time between those two temperatures is the Time Available for Compaction.

The first temperature that is important is the temperature of the asphalt concrete mix when it is delivered from the hopper of the paver to the paver screed. The mixing temperature of the material at the plant is not the concern, nor is the loss of temperature that occurs when the mix is in the truck bed during the hauling operation. The temperature of the mix when it passes out from under the screed is the most-important temperature for the compaction operation.

The second temperature that is important is the cessation temperature. The cessation temperature is the temperature at which the mix becomes too cool for a pass of the roller to increase the density of the mix. That lower temperature is typically 175 degrees Fahrenheit. Although it is

often possible to take out some roller marks at a temperature below this temperature, no significant increase in density can typically be achieved with additional roller passes.

Two other temperatures are also very important. One is the ambient air temperature. The higher the air temperature, the longer it will take for the mix to cool. The second is the base temperature, or the temperature of the surface on which the asphalt concrete mix is being placed. An asphalt concrete mix, as everyone knows, cools both to the air and to the underlying surface. That existing surface is certainly cooler in the fall of the year than it is in the summer.

Another extremely important factor is the compacted thickness of the asphalt concrete mixture. Obviously, a thicker layer of mix will take longer to cool than a thinner layer of mix. A layer 1 ½ inches thick will take less time to cool than a layer 2 ½ inches thick.

Two other factors that affect the cooling rate to some extent are the wind velocity and the solar flux. An asphalt concrete mix will cool more quickly on a windy day compared to a day when the wind is calm. An asphalt concrete mix will cool more quickly on a cloudy day compared to a sunny day.

#### TIME AVAILABLE FOR COMPACTION CHART:

In the chart shown below, a number of examples are provided in regards to the time that it will typically take for an asphalt concrete mix to cool from the laydown mix temperature to a cessation temperature of  $175^{\circ}$  F. In this example, no effect of wind velocity or solar flux is included in the estimated time. Twelve examples of the time available for compaction are shown.

Further, for simplicity, it is assumed that the air temperature is the same as the temperature of the surface on which the mix is being placed, so that it does not make any difference whether the primary direction of the mix cooling is upward to the air or downward to the underlying pavement surface. In addition, the pavement thicknesses shown are the compacted thickness of the asphalt concrete layer, not the mix thickness coming out of the back of the paver screed.

From the chart, it can be seen that the most-important factor that affects the cooling rate of the asphalt concrete mix is the temperature of the mix when it comes out from the paver screed. The second-most important factor is the compacted thickness of the mix. A relatively minor effect is seen in regard to the air temperature/base temperature — the change from an air temperature/base temperature from  $60^{\circ}$  F to  $40^{\circ}$  F does reduce the time available for compaction, but not nearly as much as the effect of mix temperature and compacted layer thickness.

#### **EXAMPLES 5 VERSUS 6:**

In example 5, the mix temperature is  $300^\circ$  F, the air/base temperature is  $60^\circ$  F and the compacted layer thickness is 2 inches. The time available for compaction is 18 minutes. In example 6, the mix temperature has decreased to  $250^\circ$  F behind the paver, but the air/base temperature is still the same at  $60^\circ$  F and the layer thickness is still the same at 2 inches. The time available for compaction, however, is only 11 minutes. The reduction of the mix temperature from  $300^\circ$  F to  $250^\circ$  F has reduced the compaction time from 18 to 11 minutes.

#### **EXAMPLES 5 VERSUS 7:**

In example 5, as discussed above, the time available for compaction is 18 minutes. In example 7, the air/base temperature has been reduced

EXAMPLE NUMBER	MIX TEMPERATURE AIR/BASE	TEMPERATURE MAT	THICKNESS	THE ANSWER
1	300° F	60° F	3 inches	36 minutes
	250° F	60° F	3 inches	22 minutes
3	300° F	40° F	3 inches	32 minutes
4	250° F	40° F	3 inches	19 minutes
5	300° F	60° F	2 inches	18 minutes
<u>,                                      </u>	250° F	60° F	2 inches	11 minutes
7	300° F	40° F	2 inches	16 minutes
8	250° F	40° F	2 inches	10 minutes
9	300° F	60° F	1 inch	7 minutes
10	250° F	60° F	1 inch	4 minutes
11	300° F	40° F	1 inch	6 minutes
12	250° F	40° F	1 inch	3 minutes

from 60° F, in example 5, to 40° F. The mix temperature remains at 300° F and the compacted layer thickness remains at 2 inches. The time available for compaction has been reduced from 18 minutes to 16 minutes. Thus, the air temperature/base temperature is not nearly as important as the mix temperature.

#### **EXAMPLES 5 VERSUS 9:**

In example 5, the time available for compaction is shown to be 18 minutes. In example 9, the compacted layer thickness has been reduced from 2 inches to 1 inch. The mix temperature and the air/ base temperature are the same for both examples. The time available for compaction, however, has been reduced from 18 minutes to only 7 minutes. The compacted thickness of the asphalt concrete layer has a very significant effect on the cooling rate of the asphalt concrete mixture.

#### SUMMARY:

The two most-important factors that affect the ability of a contractor to achieve the desired level of density in an asphalt concrete mix in cool weather are the temperature of the mix coming out from under the screed on the paver and the compacted thickness of the mixture. The air temperature/base temperature is of relatively lesser importance.

In summary, the higher the mix temperature, the more time that is available to properly compact the mix. The greater the thickness of the compacted pavement layer, the more time is available to properly compact the mix.

#### **ROLLER PATTERNS:**

What the cooling rate chart on page 19 means, in essence, is what is already well known: The rollers need to be directly behind the paver. In order to achieve density, it is necessary to finish the compaction operation before the mix cools to a temperature of 175° F. Attempting to compact the asphalt concrete mixture when it is cold is a waste of time, effort and money.

#### **ECHELON ROLLING:**

To quickly compact a 12-foot-wide layer of new asphalt concrete mix, a contractor really needs a 13-foot-wide roller. With that wide a roller, it would only be necessary to make about five passes of the roller up and



back over the mix in order to achieve the desired level of density (a pass being defined as once over a point in the pavement surface). The main problem is that we do not have any 13-foot-wide rollers. Thus echelon rolling needs to be

considered – two rollers essentially side by side directly behind the paver. Such a roller pattern is shown in Figure 1.

For echelon rolling, the width of the lane being paved needs to be divided transversely into different segments depending on the width of each of the two rollers being used. For example, a 12-foot-wide lane can be compacted with two, 7-foot-wide, double-drum vibratory rollers, one on the left side of the lane and one on the right side of the lane. Each roller will overlap the unsupported edge of the lane – or the longitudinal joint between the lanes – by 6 inches. In addition, each roller will overlap the coverage of the other roller in the center of the lane by 6 inches. The whole width can be compacted by the two rollers, each on their own side of the lane.

If the rollers are not wide enough to compact the whole width (plus overlap) in two passes, then three passes across the width of the paving lane by the two smaller rollers will be necessary. As an example, if the two rollers are only 66 inches (5 ½ feet) wide, each roller will have to compact one edge of the new, 12-foot-wide lane plus additional passes up and down the center of the new lane.

If the two rollers are operated in the vibratory mode, and if the rollers are operated within 300 feet of the back of the paver, the desired level of density should be able to be achieved by making five passes of each roller over their portion of the width of the new pavement lane.

The key to achieving density using the echelon compaction method with two vibratory rollers is to keep the rollers within 300 feet of the back of the paver and make all of the roller passes while the mix temperature is high – well above the 175° F cessation temperature. This roller pattern is shown in Figure 1.

#### PNEUMATIC TIRE BREAKDOWN ROLLING:

An alternative compaction method that can be used to obtain density in cool weather is a pneumatic tire roller in the breakdown position directly behind the paver and a double drum vibratory roller in the finish roller position — close behind the pneumatic tire roller.

With this combination of two rollers, the new mix is compacted from the bottom up with the pneumatic tire roller in the breakdown position. The pneumatic tire roller should typically make three passes over each point in the pavement surface, staying 6 inches inside the unsupported edge of the lane and traveling directly over the longitudinal joint between lanes.

Immediately behind the pneumatic tire roller is the vibratory roller, operated in the vibratory mode. The vibratory roller is able to easily remove the rubber tire roller marks in the pavement surface because the mix temperature is still high enough to do so. Typically, three passes of the



vibratory roller, in the vibratory mode, over each part of the lane width should be adequate to finish the compactive effort and achieve density.

It is important to keep both rollers within 300 feet of the back of the paver and make all of the roller passes while the mix temperature is high – well above the 175° F cessation temperature. This roller pattern is shown in Figure 2.

Please remember that the three, most-important factors that affect the ability of a contractor to obtain density in an asphalt concrete mixture when placed on the roadway are temperature, temperature and temperature.



Jim Scherocman, P.E., is a consulting engineer based in Cincinnati. For more information about cold weather paving, he is available by email, at jim@scherocman.com, or by telephone, at (513) 489-3338.

OA

#### **MULTICOOL COMPUTER PROGRAM:**

A more sophisticated way to determine the time available for compaction is through a computer program called MultiCool. This program requires much more detailed input information to accurately determine the rate at which an asphalt concrete mix will cool when placed on the roadway.

The required input information for the MultiCool program is in the following areas:

- **Calendar** the date and time
- **Environmental** air temperature, wind speed, sky conditions and latitude
- **Mixture Specifications** number of pavement layers, mix type, PG binder grade, layer thickness, mix delivery temperature and mix "stop" temperature (usually 175° F)
- Existing Material Surface type of surface, state of moisture (frozen, wet, etc.), moisture content and temperature of the surface

Based on the value of these inputs, the MultiCool program calculates the time for the mix temperature to be reduced from the delivery temperature to the mix stop temperature.

The MultiCool temperature program was developed at the University of Minnesota and version V 2.0 was developed by Dr. David Timm and Ben Peters at Auburn University, with funding from the National Asphalt Pavement Association (NAPA). The MultiCool program can be downloaded from the NAPA website at http://www.asphaltpavement.org/multicool.





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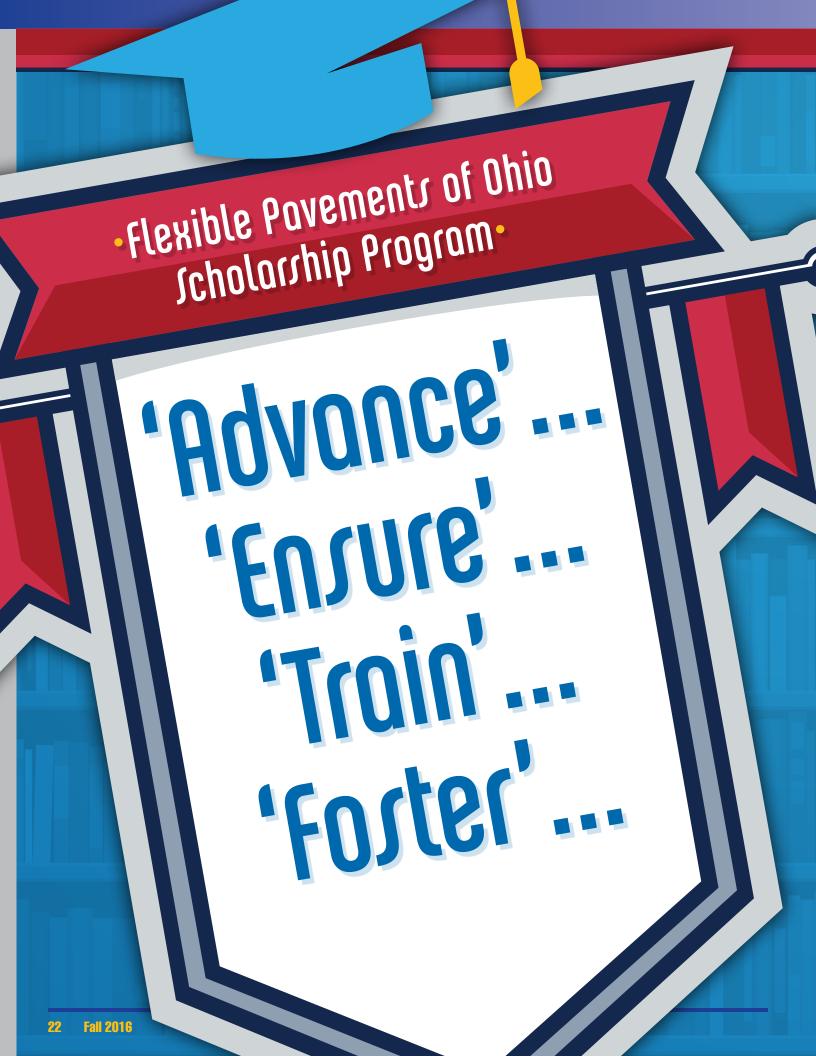
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**Fall 2016** Ohio Asphalt



Although the Flexible Pavements of Ohio Scholarship Program is known by its bottom line — the awarding of more than a half-million dollars in scholarships — the association is banking on the program meaning much, much more

"The scholarship program is an important function of the association, and one of which the members can be rightfully proud," said FPO Director

- of Engineering Services Bill Fair when announcing the 19 students receiving 2016-17 FPO Asphalt Pavement Industry Scholarships. The announcement came in March during the Ohio Asphalt Expo, and students received their scholarship checks at the start of this fall's academic year.
- Provide an incentive for students to gain knowledge in asphalt pavement technology by requiring scholarship recipients to take at least one asphalt pavement course
- Provide an incentive for colleges/universities to offer asphalt pavement coursework
- Establish a relationship between the asphalt industry and universities to raise awareness of asphalt pavement in the academic community
- Provide a workforce trained in asphalt pavement technology

"Advance" ... "Ensure" ... "Train" ... "Foster" ... are the qualities that make up the FPO Asphalt Industry Scholarship Program's bottom line — making it truly an investment into the future.

Yes, FPO members and industry leaders have stepped up in the past 21 years to award 427 scholarships totaling \$567,000, however, also paying dividends is the foundation in which the program was initiated.

"Annually," Fair added, "we award these scholarships to help advance education in asphalt pavement technology to try to ensure that students coming out of the Ohio universities in engineering and construction management are aware and trained in asphalt pavement technology. It also fosters our relationship with the universities."

Along with the importance of the program for this year's scholarship recipients, the same is true for the industry.

The ideals of the scholarship program originated in the association's 1994 Long Range Strategic Plan. The reason being is that until the mid-1990s, no universities in Ohio offering civil engineering and construction management degrees provided coursework in flexible pavements technology. Since the inception of the FPO Asphalt Industry Scholarships for the 1995-1996 academic year, the program has encouraged Ohio's institutions to advance their curriculum in asphalt pavement technology, as well as complemented the flexible pavement industry's continued quest for quality in pavement and the future work force.

Since its inception, the FPO Asphalt Industry Scholarship Program has promoted the following objectives:



# 2016-2017 FPO Asphalt Pavement Industry Scholarship Recipients

The 2016-17 scholarship recipients were announced and honored earlier this year during the Ohio Asphalt Expo in March.

Barrett Paving Materials Inc.

Wayne & Debbie Brassell Asphalt Pavement Industry Scholarship

Burgett Family/ Kokosing Construction Co.

Erie Blacktop Inc.

Flexible Pavements of Ohio



**Taylor Schepers** U. of Dayton



Evan Holcombe<sup>\*</sup> Graduate Student Ohio U.



Chelsea Vretenar Ohio State U.



**Alexander Thomas-Dull** U. of Toledo



Courtney Bucci U. of Dayton

Flexible Pavements of Ohio

Flexible Pavements of Ohio

Flexible Pavements of Ohio

Flexible Pavements of Ohio

Fred & Teresa Frecker



Adam Hillen

Ohio U.

Gerken Paving Inc.



Nicholas Kelsey U. of Dayton

John R. Jurgensen Co./ Valley Asphalt



Robert Parker Ohio U.

Kenmore Construction Co./ Northstar Asphalt Inc.



Michael Spade U. of Akron

Martin Marietta Aggregates



Carly Yowell Ohio State U.

Ohio CAT/ Caterpillar Inc.



**Blake Dickmann** Ohio State U.



**Matthew Burton** U. of Cincinnati



Michael DeLisio Ohio State U.



**Colton Forcum** Ohio U.



**Rachel DuBois** Ohio State U.



Ohio U.

The Shelly Co.

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The Shelly Co.



U. of Dayton



Shelly & Sands Inc.

Jennah Rawahneh

\*Repeat **Scholarship** Recipient

FPO Asphalt Pavement Industry

# Scholarship Fund Contributors

The Pollowing companies and individuals have contributed to endow the Ohio Asphalt Pavement Industry Scholarship Fund through the National Asphalt Pavement Association Research & Education Foundation (NAPAREF)

Osama Abdulshafi, Ph.D. Barrett Paving Materials Inc.\* Bowers Asphalt & Paving Inc. Burgett Family/ Kokosing Construction Co. Inc.\* Columbus Bituminous Concrete Corp. Columbus Equipment Co. Cunningham Asphalt Paving Inc. Dine Comply Inc. Erie Blacktop Inc. William H. Fair, P.E. Fred & Teresa Frecker

General Insurance Co. Gerken Paving Inc.\* Hardrives Paving Construction Inc. Hy-Grade John R. Jurgensen Co./ Valley Asphalt Corporation\* Kenmore Construction Co.\* The Koski Construction Co. M&B Asphalt Co. Inc. The McLean Co. Martin Marietta Aggregates\* Meeker Equipment Co. Inc.

Northeastern Road Improvement Northern Ohio Paving Northstar Asphalt Inc.\* Ohio CAT & Caterpillar Inc.\* Osterland **Schloss Paving** The Shelly Co.\* H.P. Streicher Inc. Thomas Asphalt Paving Co. Valley Materials Inc.

\*Denotes pledges of \$50,000 or more

In addition, the following companies and individuals have made a supplemental contribution to enable additional scholarships:

Erie Blacktop Inc. • Wayne & Debbie Brassell • Shelly & Sands Inc.



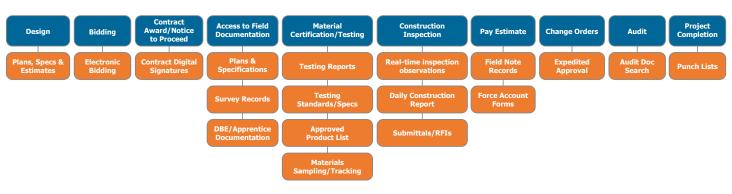
Construction projects for transportation systems are often complex and require a significant number of interactions between the owner and contractor to ensure a successful project outcome and timely project delivery. These projects require a significant amount of documentation that has traditionally been accomplished through clunky, paper-based documentation systems, which necessitate significant time, money and storage. More importantly, they're extremely vulnerable to unintentional errors and omissions.

In today's world of instant messaging and real-time communication requirements, the transportation infrastructure industry is best served by managing its construction projects using the best-available paperless solutions, otherwise known as **e-Construction**.

#### What is e-Construction?

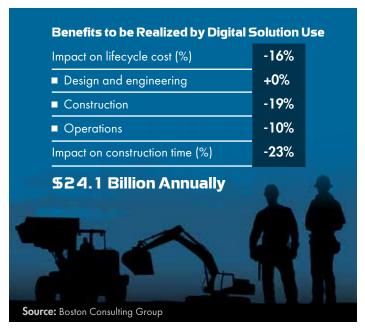
The FHWA defines e-Construction as the collection, review, approval and distribution of highway construction contract documents in a paperless environment:

- Electronically capturing construction data
- Electronic submission of all construction documentation
- Increased use of mobile devices
- Increased automation of document review and approval
- **Essential** use of electronic signatures by all parties throughout the process
- Secure electronic document and workflow management accessible to all stakeholders on any device



The phases of construction (blue) that can be influenced by e-Construction and examples of e-Construction improvements (orange).

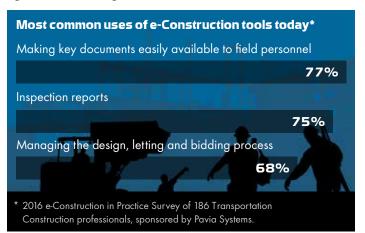
E-Construction has the potential to dramatically change the way construction projects are managed by enabling communications that are more timely, efficient, flexible and cost-effective. More importantly, it has the potential to reduce risk of project cost overruns and delays and ultimately make our lives safer by showing agency officials and decision makers video and photos of problems when they happen onsite; engineers can experience real-time, strategic project inspections providing clear visibility to any issues in the field.



Many infrastructure projects — such as transportation and energy distribution facilities — will realize a 15- to 25-percent reduction in engineering and construction costs. The figure here from a Boston Consulting Group case study shows how performance on a highway project can be enhanced by digitalization, specifically through the application of digital design, models and e-Construction throughout the project lifecycle, including automated and autonomous construction equipment and condition monitoring.

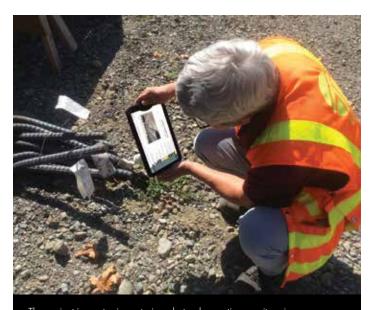
#### How to get started with e-Construction?

Moving your current process to this type of paperless technology can be a significant undertaking.









The project inspector is capturing photo observations onsite using HeadLight, a mobile project inspection solution. Observations are shared real-time with members of the project team both in the office and in the field.

Many early **e-Construction** adopters have found focusing their efforts on mobile project inspection solutions to be an advantageous first step in the process.

By understanding and implementing the use of transformative technologies and processes in project inspection, organizations can create higher quality, eco-sustainable construction projects — all while saving money, time and liability risk.

#### Common Obstacles can Easily be Overcome

Developing and implementing any **e-Construction** initiative comes with some key considerations and challenges. It is important that your organization considers all of the potential obstacles to fully implement a project inspection e-Construction system. Most commonly obstacles and limitations include:

■ **People:** Organizational change management concerns

Perhaps the greatest obstacle faced is challenging of the status quo and convincing your organization that the effort in moving away from a paper-based system to mobile project inspection is well worth the investment in learning a new process. Selecting a software provider that offers change management consulting is a smart solution.

■ **Process:** Training and ongoing field support

One of the most important considerations when selecting a new solution of this magnitude for your organization is if the provider will serve as a partner in the training and support of the software you purchase for your team in the field.

**Technology:** Concerns about integration with other software

Choosing a mobile project inspection provider with an open API that will allow your internal IT team to integrate the system with other technologies should be a priority. You should also select a product whose development team has thoughtfully considered integration with the industry's most widely used solutions.

**Budget:** Restrictions, limitations and competition for grants

It is important to consider the cost of doing nothing. Yes, all change initiatives require an initial startup funding, but the return on investment for e-Construction exceeds those costs-a fact that's been proven by several early adopter states on various e-Construction initiatives.

#### Stop Wasting Money & Embrace e-Construction

Implementing e-Construction will be disruptive. It will be transformative. Processes that could have taken weeks may only take days. Processes that took hours may only take minutes. This will translate to fewer hours wasted on administrative work, which should result in better efficiency and a lower overall cost to deliver the project. The cost savings for various expenses can be significant, as you will see a reduction in the usage of fuel, postage, printing, etc. A reduction in these types of expenses will also provide a significant reduction of the environmental impact of your state, considering the amount of paper and fuel consumed will be significantly diminished.

**E-Construction** will make the oversight and management of construction projects dramatically easier, but, full disclosure, it will not be straightforward or easy to put an **e-Construction** system in place. Once this is done, however, the time, energy and expense saved moving forward will be worth the investment made in improving your people and processes on the front-end.



George White is the CEO and co-founder of Pavia Systems Inc. He is a familiar face to FPO, as he led the seminar "Using Mobile Technology for Field Data" at the 2015 Ohio Asphalt Expo.

### 2016 Quality Asphalt Paving Award Nominations



Flexible Pavements of Ohio (FPO) is now accepting nominations for the 2016 Quality Asphalt Paving Awards, the Ecological Award and the Master Craftsman Award.

Nominations for the Quality Asphalt Paving Awards are being accepted for work performed during the 2016 construction season. Quality

Asphalt Paving Award nominations are being accepted for Ohio Department of Transportation/Ohio Turnpike Projects, Local Roads or Streets, Commercial Parking Facilities, Special-Use Pavements and Airport Pavements.

The FPO Ecological Award was established to recognize asphalt production facilities that best demonstrate safe and responsible environmental practices. Facilities will be judged on design layout, clean operation, maintenance performance practice and community awareness activities.

The Master Craftsman Award recognizes contractors whose work has stood the test of time. The winner of this award will be acknowledged for a commitment to quality workmanship exhibited by exemplary pavement performance. The award recipient will be selected from pavements with an existing surface course having given acceptable service for 15 years or more and continues to provide exceptional service.

Go to www.flexiblepavements.org for additional information, including award nomination forms and eligibility requirements. Nominations for all award categories must be received at the FPO office by Friday, October 14, with a final cutoff date of Thursday, November 10.

Please contact Andrew Gall at (614) 791-3600 or by e-mail at andrew.gall@flexiblepavements.org with any questions regarding the awards program.



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### **Mark Your Calendars**



#### **Ohio Transportation Engineering Conference** October 25-26, 2016

Columbus Convention Center 400 North High St. • Columbus, Ohio 43215

The Ohio Transportation Engineering Conference (OTEC) is a two-day event attended by more than 3,000 transportation professionals from throughout the nation. OTEC is co-sponsored by the Ohio Department of Transportation and The Ohio State University.

Visit the OTEC website at www.otecohio.org for up-to-date conference information as well as archived material from previous conferences.



#### **Ohio Asphalt Paving Conference February 1, 2017**

The Fawcett Center The Ohio State University 2400 Olentangy River Rd. • Columbus, Ohio 43210

The Ohio Asphalt Paving Conference is a collaborative effort of state and local government, academia and the asphalt industry to present practical, usable technologies and strategies for the design and construction of asphalt pavements.

Visit FPO's website at www.flexiblepavements.org for more information regarding this event.



#### Ohio Asphalt Expo March 14-15, 2017

Columbus/Polaris Hilton Hotel 8700 Lyra Dr. • Columbus, Ohio 43240

The Asphalt Expo is Ohio's premier asphalt pavement event with multiple, concurrent educational sessions and an indoor and outdoor trade show and exhibition. If you construct, inspect, manage or maintain local or private transportation infrastructure, the Ohio Asphalt Expo has the information you need to ensure a successful, long-lasting asphalt pavement.

Visit the Expo website at www.ohioasphaltexpo.org for more information regarding this event.



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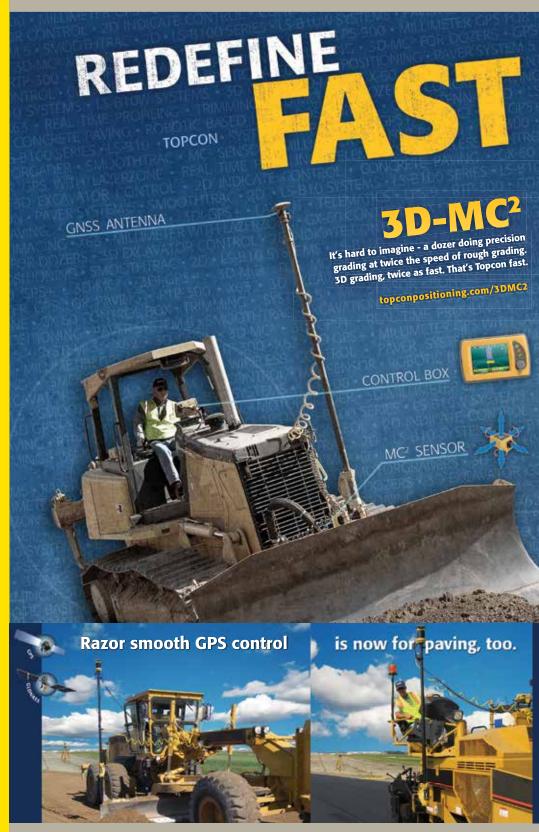
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