

OHIO ASPHALT

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THE PRESIDENT'S PAGE



CLIFFORD URSICH, P.E.
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“... Cost is not the only factor in a system where the motorist’s interests as well as other factors important to sustaining uninterrupted mobility are important. In such systems, cost and factors that are important to both motorists and agency alike are weighed in the balance, the outcome being the selection of the pavement alternative providing the best “value.”

ASPHALT

OHIO’S 21ST CENTURY PAVEMENT

At the time of my writing this article I’m flying back to Ohio from Salt Lake City where I participated in NAPA’s conference, “21st Century Asphalt Pavements – Value, Quality and Performance.” The conference provided the opportunity to tell of the good success asphalt has provided for Ohio’s roads. Asphalt pavement in Ohio has indeed demonstrated good value, high quality and excellent overall performance in terms of long life, superior ride quality, “maintainability” and so much more.

FPO recently had the opportunity to visit some of its customers to talk shop. It was enlightening to find out just why the asphalt industry’s customers choose asphalt for their paving projects, and why it is the “21st Century Pavement.” Unanimously, they cited their appreciation for the product’s friendliness toward managing their pavement system and how asphalt’s attributes align with motorists’ desires and demands!

CAPTURING BEST VALUE

I suspect you will agree that in these times where funds for road construction and maintenance are insufficient, it’s extremely important to capture the highest value in pavement construction. Certainly not all pavement alternatives are equal, whether we’re talking about pavement preservation treatments or materials for new and pavement reconstruction. Each has performance characteristics, and those characteristics many times are unequal or nonexistent in one or

the other alternatives. For example, consider pavement smoothness. Asphalt pavements have the upper hand on that one.

It is well known that the price of asphalt pavement construction has risen, which has allowed its largest competitor, concrete, to be more cost competitive. But cost is not the only factor in a system where the motorist’s interests as well as other factors important to sustaining uninterrupted mobility are important. In such systems, cost and factors that are important to both motorists and agency alike are weighed in the balance, the outcome being the selection of the pavement alternative providing the best “value.” The same is true in the pavement preservation realm, where competing alternatives are each evaluated for cost and the performance characteristics they provide.

In the 21st century, pavement performance characteristics will play a large role. Already we are seeing material selection models that incorporate performance characteristics beyond just cost. Triple Bottom Line (TBL) comes to mind. In such a process, societal and sustainability factors are part of the “equation.” Life Cycle Assessment (LCA) is another discussion taking place. In an LCA estimation, greenhouse gas emissions from pavement construction and a facility’s use are playing a role in what pavement material will be selected. These processes are at our proverbial “front door.” In fact, already the City of Columbus, Department of Public Utilities has investigated TBL for its projects.

It's likely that you who have an appreciation for the value of asphalt pavement could quickly recite its many performance characteristics. Others of you less familiar could identify a few just from your experience traveling around the state. We want all of our readers to be fully informed of why asphalt pavements are Ohio's 21st Century Pavement. Accomplishing that requires taking full inventory of the performance

characteristics of asphalt pavement, the results of which are provided in the table below. As you consider whether you will be using asphalt or concrete, or asphalt overlay vs. a surface treatment, this information will be helpful to you. After all, 21st Century Pavements need to be constructed using 21st century paving materials.

PERFORMANCE CHARACTERISTIC	DISCUSSION
Perpetual Performance	Perpetual Performance is descriptive of pavement that has inexhaustible structural life. Ohio's experience shows that deep-strength asphalt pavements have not needed major rehabilitation or replacement. The earliest deep-strength asphalt pavements constructed in the late 1950s on Ohio's Interstate System continue to provide exceptional service and "perpetual" performance. Conversely, concrete pavements on the Interstate System are systematically being removed and replaced.
Ease of Maintenance	"Ease of Maintenance" implies the characteristic of a pavement to require only low-cost maintenance activities that minimize labor and equipment demand on the agency (e.g. preventive maintenance, crack sealing, partial depth patching). Asphalt pavements historically demonstrate this capability best.
MOT (Maintenance of Traffic)	Asphalt pavements facilitate the movement of motorists through roadway construction and maintenance activities by their non-intrusive rehabilitation strategies that permit flexible traffic control and rapid work zone setup and teardown (e.g. mill-and-fill, night paving).
Serviceability	Serviceability is a pavement characteristic developed during the AASHTO Road Test that continues to have relevance to this day. Serviceability is a measure of the performance of a pavement in meeting the ride quality demands of the motorist. In Ohio, Ohio Department of Transportation (ODOT) data shows asphalt pavements provide the highest level of serviceability when initially constructed and over the long term. The ODOT Pavement Design Manual acknowledges this fact by assigning to newly constructed asphalt pavements a higher level of serviceability than that of newly constructed concrete pavement. ¹
Smoothness	Ohio's experience is that asphalt pavement construction provides the highest level of smoothness when compared against all other pavement types, both initially and over the life of the pavement. Typical IRI results (roughness indicator) for asphalt pavements show it to be smoother than other materials.
Constructability	The term "constructability" infers the advantages afforded by a paving material to facilitate design simplicity, rapid construction, maintenance of traffic, and maximization of safety to motorists and construction workers alike. Asphalt pavements are the most constructible pavement as demonstrated through its preferred use in design-build contracting and its use as the primary pavement type for rehabilitating urban roadways where access to merchants is essential.
Speed of Construction	Asphalt pavements are more quickly constructed than concrete pavements since asphalt needs only hours to gain complete strength rather than days of curing, as is the case for concrete. ²
Noise (Quietness)	Noise has a significant impact on the quality of life and is costly to mitigate. ODOT research and national research shows that asphalt pavements are the most-quiet pavement type. When compared to longitudinally tined concrete pavement, asphalt still measures quieter. ^{3,4}
100% Reusable 	<ul style="list-style-type: none"> Asphalt pavement is 100% reusable, neither requiring removal and disposal costs such as that associated with wasting concrete, nor cluttering of interchange infields or risking water quality from such.⁵ The cementing materials used in manufacturing asphalt and concrete mixtures contribute the greatest expense to these products. The ability to capture their use as cementing materials in new pavement constitutes the highest use and best value of a reclaimed material. Only the re-use of reclaimed asphalt into new asphalt mix accomplishes this. Virgin asphalt binder is conserved and the value of this material is captured in substantial cost savings. Concrete can only be reclaimed as an aggregate, a lower use, and as such a lower value.

Continued on page 8

Sustainability



- Warm Mix Asphalt (WMA) creates new opportunity to incorporate sustainable highway construction practices, thereby encouraging fuel savings, less pollution and improved workplace conditions.⁶
- Recycling of asphalt pavements is a common sustainable construction practice and has been determined to be the largest contributor to the recycling effort in the United States.⁷
- Recycled Asphalt Shingles (RAS) as a component of asphalt mixtures facilitate sustainable construction through re-use of shingle aggregate and asphalt binder components. Asphalt pavement costs are constrained by reduced need for virgin materials. Landfilling of shingles is reduced.
- Crumb rubber derived from scrap tires is successfully being used to enhance asphalt paving mixtures by increasing the usable life of a pavement and creating a beneficial use from an otherwise waste product.
- Asphalt pavement designed to have “perpetual” performance ensures inexhaustible structural life and as such conservation of raw materials since reconstruction is unnecessary.

¹ Ohio Department of Transportation, *Pavement Design Manual, Section 200, Figure 201-1, Serviceability & Reliability*

² *Review of Construction Techniques for Accelerated Construction and Cost Implications*, by Lee and McCullough, Purdue University, August 2009, Table 10, Pg. 55

³ Colorado DOT Tire/Pavement Noise Study, Report No. CDOT DTD-R-2004-5

⁴ *Effects of Pavement Type on Traffic Noise Levels*, by Herman and Ambroziak, Ohio University, ODOT state job no. 14677(0), March 2000

⁵ *Cleaner Water With Asphalt Pavements*, Asphalt Pavement Alliance

⁶ *Summary Report of 2008 Warm Mix Asphalt Trials*, Powers P.E., Asphalt Materials, Ohio Department of Transportation, November 21, 2008

⁷ *Asphalt Pavement is America's Most Recycled Product*, Asphalt Pavement Alliance



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With the addition of an educational track dedicated to pavement owners and asphalt contractors, Flexible Pavements of Ohio's 2013 Ohio Asphalt Expo will be even more of a must-attend event March 5 & 6.

Planning is currently under way for the 2013 Ohio Asphalt

Expo, which will feature 12 concurrent technical educational sessions, equipment exhibition, general sessions and more. For conference registration and additional information, go to www.ohioasphaltpexpo.org or visit us on Facebook.



A block of rooms have been reserved at the Hilton Columbus/Polaris for March 3-6 at a special conference rate of \$182 per night. The special room rate will be available until February 1st or until the group block is sold out. To make a room reservation at the conference rate, contact the Hilton Columbus/Polaris directly at (614) 885-1600, or visit www.hilton.com and enter event code FLPAVE.

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Ohio's Asphalt Paving Industry:

'GREEN' IMPACTS

Ohio's asphalt paving Industry has contributed significantly to the advancement of "green" (i.e. sustainable) construction practices. "Green" asphalt construction has saved millions of Ohio taxpayer dollars, virgin raw materials and has created a beneficial use for what would otherwise become construction demolition debris.

The industry's entrance into green construction came in the early 1980s as a result of cost and supply concerns created by the OPEC Oil Embargo. Since then, Ohio's asphalt producers have been recycling and reusing reclaimed asphalt into new pavements. In recent years, reclaiming recycled asphalt shingles (RAS) from roof replacements and a new green manufacturing technology referred to as Warm Mix Asphalt (WMA) are "greening-up" the asphalt paving industry to an even greater extent.

In 2011, the National Asphalt Pavement Association surveyed the states to determine recycling usage in 2009 and 2010. The survey, "Asphalt Mix Production Survey on Reclaimed Asphalt Pavement, Reclaimed Asphalt Shingles, and Warm-Mix Asphalt Usage: 2009-2010," was sponsored by the Federal Highway Administration. Table 1 provides the most recent data of reclaimed materials reused into Ohio's new asphalt pavements.

Table 1: Summary of RAP, RAS and WMA Usage – Ohio Total Market

	2010
Reclaimed Asphalt Pavement (RAP)	3,045,195 tons
Reclaimed Asphalt Shingles (RAS)	26,648 tons
Warm-Mix Asphalt (WMA)	7,630,818 tons

Reclaimed asphalt pavement (RAP) comprised 23 percent of the total asphalt market in 2009; in 2010 it grew to 24 percent. That means the average ton of asphalt mixture manufactured and placed in 2010 had 24

"... the Ohio asphalt industry's recycling effort is so large that each year, just in recycled content alone, there is a quantity enough to pave a road from Columbus to Los Angeles."

percent recycled material in it. Applying that same percentage to asphalt tons manufactured in 2011 allows us to estimate the tonnage of recycled material to be approximately 3.4 million tons – an estimated value of \$170 million. To provide some perspective, the Ohio asphalt industry's recycling effort is so large that each year, just in recycled content alone, there is quantity enough to pave a road from Columbus to Los Angeles.

Ohio ranks within the top seven states in the nation as a user of RAP. Ranked above Ohio are Michigan (30%), Virginia (28%), Georgia (25%) and Oregon (25%). The reason for Ohio's good recycling record is that the Ohio Department of Transportation (ODOT) was a pioneer of recycling, which opened the opportunity for local governments in our state to use the technology.

Warm-Mix Asphalt Usage for ODOT Projects
(measured in tons of mix)



Ohio ranks first in the region for use of WMA, a technology that reduces cost, lowers air pollutant emissions during manufacturing and has promise of extending pavement life. ODOT has experienced explosive WMA growth. WMA grew from approximately 10,000 tons in 2008 to 2.8 million tons in 2011. WMA tons contracted by ODOT in 2011 accounted for approximately 60 percent of the asphalt used to pave ODOT projects.

Research conducted by ODOT in 2008 indicates WMA technology afforded an approximate 14 percent fuel savings in asphalt manufacturing. The same research found emissions results supporting WMA emissions testing from around the nation. Although variability existed in the ODOT project results, its analysis shows NOx emissions to be 15 to 30 percent lower, CO2 emissions 10 to 20 percent less, and VOC emissions 10 to 40 percent lower than that experienced in conventional asphalt manufacturing.

The asphalt industry is advancing other green pavement technologies as well. Perpetual pavements are designed to last indefinitely. This removes the need for roadway reconstruction and affords the lowest impact to motorists. Also, since perpetual pavements only require surface maintenance, less virgin raw materials are used. Perpetual pavement research is being conducted on three major highways in Ohio. Porous asphalt pavement is another green technology growing in Ohio. Just as the name implies, porous asphalt allows water to flow through it. In doing so, stormwater is better controlled, stemming soil erosion and leaving waterways cleaner.





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Technical Bulletin: Porous Asphalt Pavement-Updated



Porous asphalt pavements are being used as a stormwater best-management practice to reduce or eliminate and to improve the water quality of stormwater runoff from parking lots and other such facilities. A porous asphalt pavement is constructed over a stone-filled reservoir to collect and store stormwater and to allow it to infiltrate into the soil and/or to be detained and discharged slowly between rainfalls. These treatments have been used successfully for decades throughout the country and have been demonstrated to substantially improve water quality as well as manage the quantity of runoff.

Now, with design guidance specific to Ohio regulatory requirements recently issued by the Ohio Department of Natural Resources and updated material specifications, design is more straightforward than ever. Full details can be found in the updated Technical Bulletin and associated FAQs published in full in this issue of *Ohio Asphalt*.

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Technical Bulletin: Porous Asphalt Pavement, (Rev. 16 July 2012)

Introduction

Porous asphalt pavements are being used to reduce or eliminate stormwater runoff from parking lots and other such facilities. A porous asphalt pavement is constructed over a stone-filled reservoir to collect and store stormwater and to allow it to infiltrate into the soil between rainfalls. Where low soil permeability is not conducive to infiltration, a similar design can be used as a detention facility or an exfiltration solution that filters pollutants from the first flush and improves the water quality of the runoff. These designs can reduce pollution and replace expensive detention and treatment facilities. Porous pavement systems are rapidly gaining favor with designers and regulators as an economical approach to stormwater management for sustainable or low-impact development. As the NPDES permit requirements have become more widely applicable, it has become necessary that developers find more innovative means of compliance. Porous pavement systems are commonly being used as part of a strategy to obtain Leadership for Energy and Environmental Design (LEED®) certification for green building projects. Another benefit of porous pavement for parking lots is the absence of ponded water on the pavement during and after rainfall. Patrons never have to step in a puddle again!

While detention basins are often used to collect and slow the rate of runoff from the impermeable surfaces of roofs

and pavements, and are effective, they require additional land. Especially on re-development sites, additional land may not be available or may be prohibitively expensive. The porous pavement/recharge bed design may be the solution to the problem.



Figure 1: Parking facility of the Mansfield Art Center, Richland County, Ohio

The “Porous Pavement” concept was conceived in the Franklin Institute Research Laboratories in 1968, and was developed there under a grant from the U.S. Environmental Protection Agency

during 1970 and 1971. After the final report on the project was issued, interest in the concept prompted Edmund Thelen and Leslie Fielding Howe to prepare a book about its development that included a design guide. The publication, *Porous Pavement*, was published by the Franklin Institute Press in 1978. The book is out of print; but, it is still available in some technical libraries and online (2). The Ohio Department of Natural Resources (ODNR) has developed a comprehensive guide for the use of porous asphalt pavement. It is contained in the ODNR, *Rainwater and Land Development Manual* (4) and

is recommended for its guidance on hydrologic design, construction and maintenance.

Design Considerations

In considering a porous pavement recharge bed, designers must consider some key factors: soil percolation characteristics, local topography and climate, the proposed uses of the site, the traffic-loading factor, stormwater regulations, site runoff and stormwater quality requirements. Frost penetration depth is also a factor in determining reservoir course thickness.

The soils investigation will include a reconnaissance to determine the soil types on the site and standard percolation test(s) to determine the average permeability of the site.

A typical porous asphalt pavement recharge bed design consists of one or more porous asphalt courses, a top filter/stabilizing course, a reservoir course, filter fabric and existing soil or subgrade material. In the case of a

detention or exfiltration design, this typically may be modified by the inclusion of outlet or underdrain pipes as may be appropriate.

Stone-Filled Reservoir Recommendations

The reservoir for a porous pavement stormwater management facility is constructed by first excavating into undisturbed and uncompacted soil to the depth needed to contain the design storm volume. To ensure year-round operation, the bottom of the reservoir should be below 0.65 of the normal frost depth. The reservoir is lined with a geotextile fabric (Recommendation: geotextile material meeting ODOT specification 712.09, Type B). The reservoir is then filled with No. 2 (1½ to 2½ inches) size stone and topped with a top filter/stabilizing course consisting of an approximately 2-inch-thick layer of No. 57 (½ to 1-inch) size stone to stabilize and provide a paving surface for the asphalt concrete layers. Too thick of a top filter/stabilizing layer is detrimental and may distort under hauling and paving equipment. All aggregate must be 100 percent fractured material,

with a quality level that meets ODOT specification 703.04.

Permeability Considerations

How permeable is the porous asphalt pavement (Open-Graded HMA)? Various values have been reported in the literature. All are so high relative to the percolation values of the soil as to not present any limitation and are typically not considered in design. A permeability of 6,000 ft/day is attributed to Lovering and Cedergren (1). Thelen and Howe report an asphalt permeability of 176 in/hr. (352 ft/day) (2). Roseen is quoted as

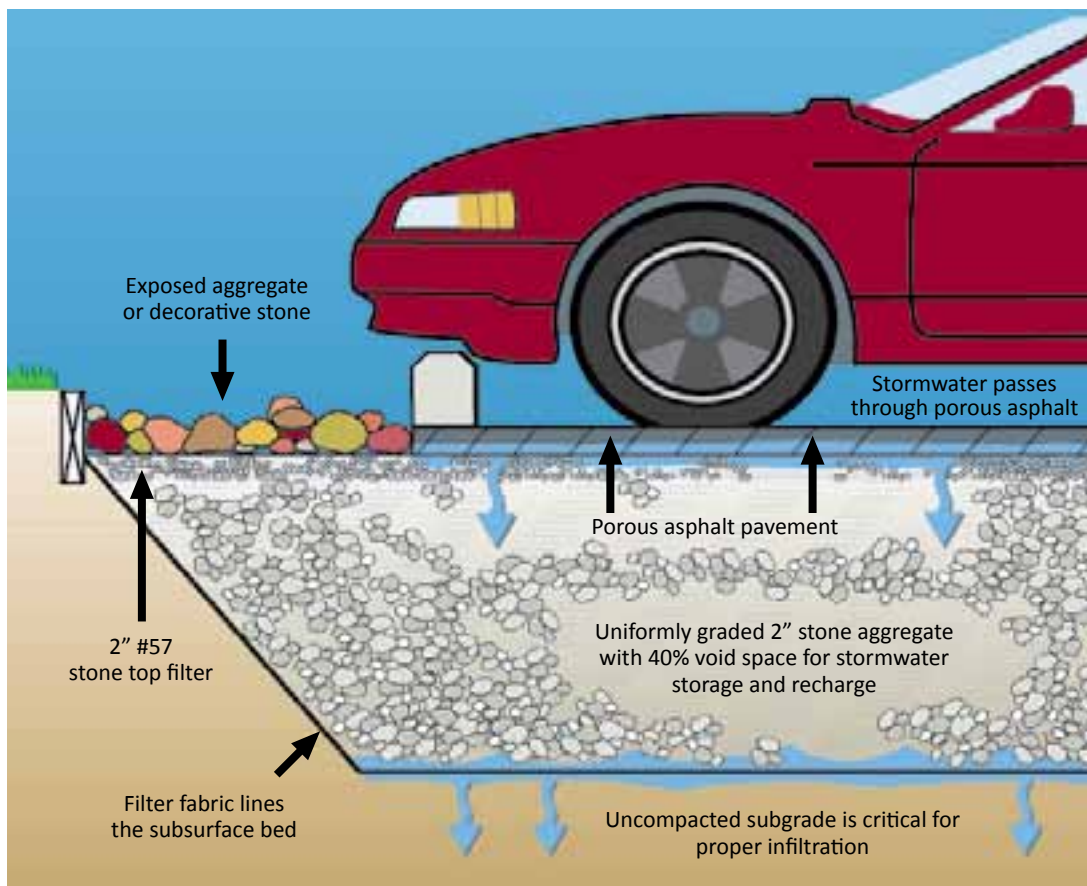




Figure 2: Permeability demonstrated

saying that, “if 99 percent clogging were to occur, the infiltration rate would still be greater than 10 inches per hour, which is greater than most sand and soil mediums.” (6)

In any case, these values are orders of magnitude higher than the best soil permeability of about 6 in/hr. Figure 2 gives a visual indication of the porosity of a porous asphalt pavement surface course.

Asphalt Pavement Thickness and Material Recommendations

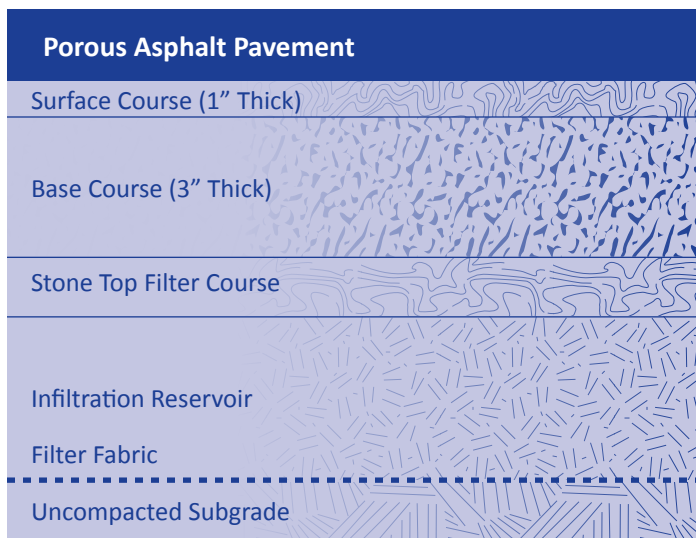
For light-duty pavements, intended primarily for cars, 3 inches of porous asphalt surface course is the minimum. FPO suggests using a total of 4 inches of porous asphalt placed in two courses: a 3-inch base course and a 1-inch surface course. For the base course, use materials and methods meeting the requirements of FPO specification Porous Asphalt Pavement Base Course, dated April 30, 2012 or later. For the surface, use FPO specification Porous Asphalt Pavement Surface Course of the same date. These specifications can be downloaded from www.flexiblepavements.org on the “Sustainable Pavement” page. For pavements that will need to support heavier loads, FPO recommends using a structural thickness of asphalt concrete based on an accepted pavement design protocol. The same porous asphalt materials can be used to make up the required structural thickness.

Cost

The cost of the porous surface material over conventional Type 1 material is estimated to be approximately 40 percent more. The porous base is approximately 30 percent more compared to a normal Type 2 material.

Construction

Construction methods for the excavation and placement of the stone-filled reservoir are detailed in the ODNR manual (4). Construction methods for the asphalt layers are called out in the FPO sample specifications. In general, construction equipment and methods used



in placing porous asphalt pavement are the same as for conventional asphalt concrete construction with a couple of special considerations. As a result, users can expect the same levels of smoothness, speed of construction and use as with conventional asphalt pavement materials. The differences are that porous asphalt materials are not compacted to achieve maximum density and must be protected from contamination that would tend to plug the pores in the materials. Rolling is done using a minimum of four passes of a static tandem steel wheel roller having a minimum weight of 8 tons to smooth the surface and to seat the stones in the mix so that it doesn’t consolidate under traffic nor ravel. The finished pavement must have 16 to 20 percent air void content (80 to 84 percent density). Porous asphalt materials will cool more rapidly than conventional asphalt mixes, making it necessary for close monitoring that compaction is completed while the binder temperature facilitates compaction, typically $1,400 \pm 200$ centistokes. Care must be exercised in the scheduling of construction to protect the porous pavement from contamination that might tend to clog the pores of the system. It is best to build the porous pavement last, after grading and erosion control measures are complete.

Maintenance

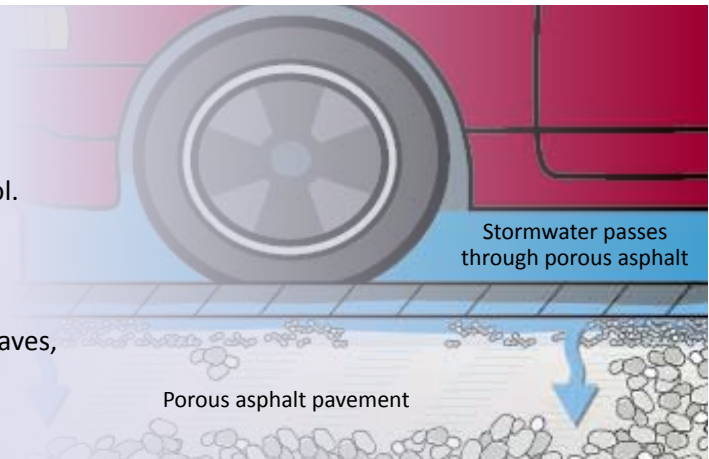
Porous asphalt pavements are generally maintained like conventional asphalt pavements, with a few exceptions. Sometimes cleaning is needed to remove contamination that will plug the pavement and reduce its porosity. Methods may include blowing, vacuuming or sweeping

Let it flow!

Do not use sand or other abrasive for snow and ice control.

Do not place soil, mulch or other materials that can clog.

Regularly sweep, vacuum or blow pavement to remove leaves, needles or other debris that can clog.



with a vacuum-type street sweeper. Surface sealants should not be used as they would tend to plug the pores in the asphalt. For snow and ice control, the owner should avoid placing abrasives or grits that would tend to plug the pores of the pavement. Otherwise, snow and ice control is similar to that for conventional asphalt pavement. Patching can be done with readily available materials without seriously impacting the operation of the porous asphalt pavement.

The owner will need to educate maintenance and grounds-keeping staff on these differences, as the porous pavement will not look substantially different from conventional pavement. Posting of an informational sign (such as the “Let it flow!” example above) at the facility will help inform both customers and employees of the special features of the porous pavement.

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

References:

For more detailed information on design, construction and maintenance of porous asphalt pavements, consult the following references:

1. Structural Section Drainage, Proceedings, International Conference on the Structural Design of Asphalt Pavements, 1962 in the NAPA publication, Asphalt Treated Permeable Material – Its Evolution and Application, QIP 117, Raymond Forsyth.
2. Porous Pavement, Franklin Institute, 1978, (ISBN Number 0-89168-010-1) http://www.hotmix.org/images/stories/porous_pavement-thelan.pdf

3. Porous Asphalt Pavements, NAPA, Information Series 131, 2003
4. Rainwater and Land Development Manual, Chapter 2, Section 2.11, Pervious Pavement, Ohio DNR, 2012, <http://www.dnr.state.oh.us/soilandwater/water/rainwater/default/tabid/9186/Default.aspx>
5. UNHSC Design Specifications for Porous Asphalt Pavement and Infiltration Beds (Rev. 10/09) http://www.unh.edu/unhsc/sites/unh.edu/unhsc/files/pubs_specs_info/unhsc_pa_spec_10_09.pdf
6. Pervious Pavements, Stormwater Journal, September 2008 <http://stormh2o.com/september-2008/pervious-asphalt-concrete.aspx>

View the many other linked documents, case studies and resources at <http://www.flexiblepavements.org/node/1037> which includes charts outlining possible LEED credits.

Porous Asphalt Pavement FAQs (16 July 2012)

Q: What is the lifecycle of a porous pavement? (This would apply to both permeability life and structural life.)

A: There are case studies of several examples of porous pavement installations that are still functioning well after 15 or 20 years. Dr. Robert Roseen, director of the University of New Hampshire Stormwater Center (UNHSC), has written that porous asphalt pavements “will have a longer lifecycle from reduced freeze-thaw susceptibility and greater load-bearing capacity than conventional parking lot pavements.” (<http://stormh2o.com/september-2008/pervious-asphalt-concrete.aspx>)

If designed, constructed and maintained appropriately, porous pavements should have life spans at least comparable to conventional asphalt pavements.

Q: What is the rehabilitation strategy for a porous asphalt pavement?

A: Rehabilitation of a deteriorated porous asphalt surface will normally entail removing the deteriorated asphalt layer or layers to the depth necessary and repaving with new porous asphalt mixtures. Surface treatments of any kind that would tend to seal the pores in the pavement should not be used.

Q: How does porous asphalt stand up in a snow and ice climate? Or, perhaps better asked, how does snow and ice affect porous asphalt pavement?

A: Thelen and Howe stated in their guide (2) that “cold weather does not damage porous pavement. Water could freeze in the aggregate, but the voids are relatively large and there is room for expansion without damage.”

Studies performed at the UNHSC show that porous asphalt pavement performs well during sub-freezing weather and that frozen media does not reduce performance. Even the frozen pavement and infiltration bed retained a high level of permeability. (Seasonal Performance Variations for Storm-Water Management Systems in Cold Climate Conditions, Robert M. Roseen, Ph.D., P.E., M.ASCE, et. al.) (http://www.unh.edu/erg/cstev/pubs_specs_info/jee_3_09_unhsc_cold_climate.pdf)

Structurally, porous asphalt pavement will be durable if the reservoir is provided with suitable drainage to prevent the asphalt layers from remaining flooded during freezing weather.

Q: What type of maintenance needs to be done on porous asphalt pavements?

A: Porous pavement must be inspected and cleaned regularly to maintain the hydrologic

performance of the pavement system. Agencies have had success with blowers to remove debris such as pine needles and leaves, walk-behind type vacuums and vacuum-type street sweepers for cleaning porous asphalt pavements. Some regulatory agencies may require the property owner to have a maintenance agreement approved by the local MS4.



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Typical maintenance requirements:

- Avoid clogging with construction sediments – during construction and long term
- Clean pavement to ensure pavement is free of debris and sediments – as needed (at least twice a year)
- Check to see that pavement dewater during large storms and does not pond into surface (check observation well for appropriate water levels) – after large storms
- Inspect upland and adjacent vegetated areas. Seed and straw bare areas – as needed
- Inspect pavement surface for structural integrity and areas in need of repair. Repair as needed – annually
- Snow and Ice Removal. No sand or cinders should be used on porous pavements. Instead, winter maintenance should focus on timely snow plowing and judicious use of de-icing materials – as needed (see the UNHSC publication: Winter Maintenance Guidelines for Porous Pavements at http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/pubs_specs_info/winter_maintenance_fact_sheet.pdf)
- Avoid sealing or repaving with non-porous materials – long-term. Areas may be repaired using the same treatment as the original permeable pavement application, or small areas (not the lowest area on a sloping section) can be replaced with standard (impermeable) pavement. In that case the stone bed of the entire pavement will continue to provide storage and infiltration as designed. Surface treatments of any kind that would tend to seal the pores in the pavement should not be used.

Q: Is maintenance of a porous asphalt pavement any more costly than that of conventional pavement?

A: A definitive answer is undetermined and may only be answerable on a case-by-case basis. As noted in this document, porous asphalt pavements will require periodic inspection and cleaning that, depending on the location and use, conventional pavements may not require. However, these extra costs, if any, may be offset by reduced snow and ice-control costs and decreased storm drainage maintenance. And, of course, the true total costs need to be compared not to just alternative

pavements but also to the total costs associated with alternative stormwater management practices as well.

Q: Does the petroleum leach out of the porous pavement?

A: No. Study after study has shown no tendency for the petroleum asphalt to leach out of asphalt pavement. See the report of the study by Brantley and Townsend at http://www.hinkleycenter.com/images/stories/publications/townsend_98-2.pdf

Q: What effect does clogging have on the functionality of the porous asphalt surface?

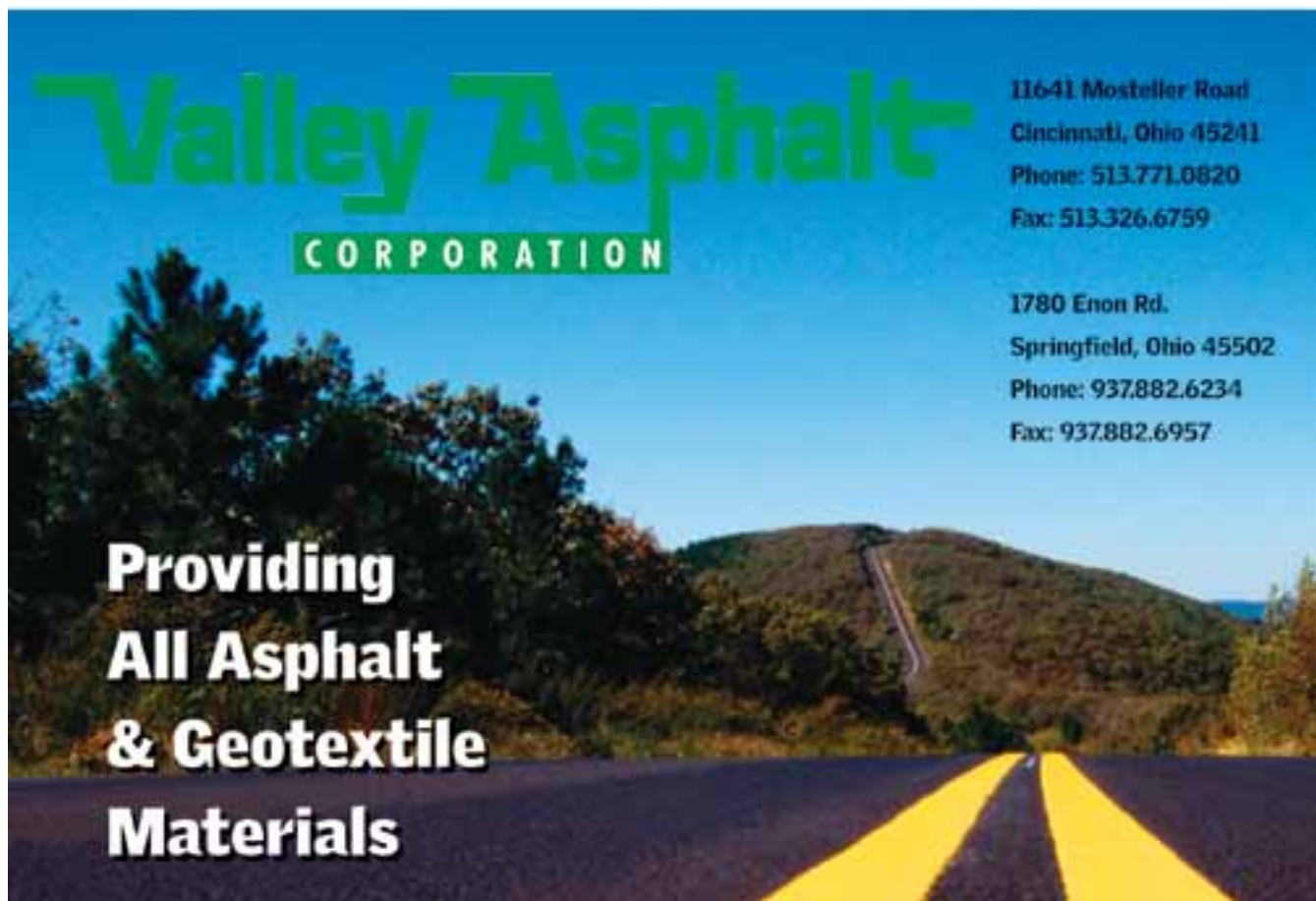
A: The porous asphalt is many times more permeable than any soil it may be constructed over. As a result, the functionality of the system is not compromised by less than total clogging of the surface. Dr. Roseen (6) is quoted as saying that “if 99 percent clogging were to occur, the infiltration rate would still be greater than 10 inches per hour, which is greater than most sand and soil mediums.”

Q: What is the cost of a porous asphalt pavement facility?

A: Special features such as the underlying stone bed are more expensive than conventional construction, but these costs are more than offset by the elimination of many elements of standard stormwater management systems. On those jobs where unit costs have been compared, a porous asphalt pavement is generally the less-expensive option. The cost advantage is even more dramatic when the value of land that might have been used for a detention basin or other storm-water management features is considered.

Q: Is an approved or certified applicator required to place a porous asphalt pavement?

A: No. An added advantage to porous asphalt is that it does not necessitate proprietary ingredients. It does not require the contractor to have special paving equipment or skills. With the proper information, most asphalt plants can easily prepare the mix and general paving contractors can install it.

A scenic photograph of a two-lane asphalt road with yellow center lines, receding into the distance towards a forested hill under a clear blue sky. The Valley Asphalt Corporation logo is overlaid on the top left.

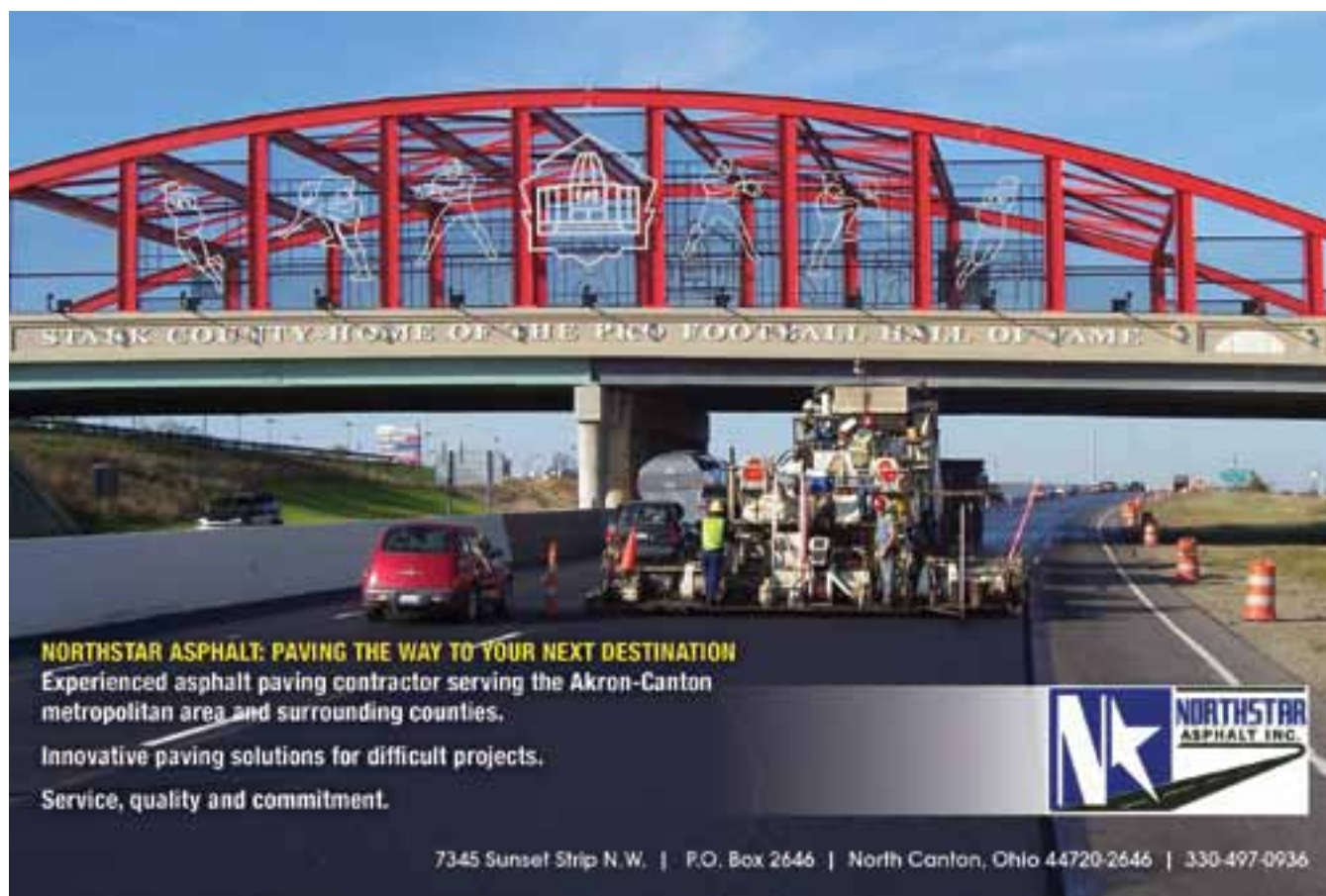
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A photograph of a highway construction site. In the foreground, a red car is on the road. In the middle ground, a large asphalt paver machine is working on the road surface. In the background, a large red steel arch bridge spans the highway. The bridge has several white line-art murals of animals and a building on its side. A banner on the bridge reads "STARK COUNTY HOME OF THE PRO FOOTBALL HALL OF FAME".

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AKRON-CANTON AIRPORT LOOKS TO THE FUTURE WITH ASPHALT PAVEMENTS



When the Akron-Canton Airport launched its ambitious 10-year, \$110-million Capital Improvement Plan known as CAK 2018 in 2008, it began one of the largest construction projects in the airport's 64-year history. This plan committed the airport to invest \$110 million into capital improvements by 2018 and featured a series of facility improvement and infrastructure expansion projects. Principal among these projects was the Runway 5/23 Safety Upgrade and Extension Project, which was the airport's single-largest capital improvement project.

The improvements to Runway 5/23 consisted of the construction of an additional 800 feet of runway and vital safety upgrades, including extended taxiways and widened shoulders. This five-year, \$60-million project extended the runway to 8,200 feet, which allows planes to carry additional fuel on take-off to extend the range of the aircraft. Now, planes can depart Akron-Canton Airport with nonstop service to anywhere in the

continental United States and international destinations such as Mexico City and Puerto Rico.

Additional components of this project included the reconstruction of the intersection of Runways 5/23 and 1/19, resurfacing of existing sections of Runway 5/23 and the extension, widening and resurfacing of Runway 1/19. In total, these projects were designed to support all future planned airport operations and anticipated passenger growth for the next 20 years.

CONFIDENCE IN THE PERFORMANCE OF ASPHALT PAVEMENTS

Asphalt has long been the material of choice for the Akron-Canton Airport, as its runway and adjacent facilities are all asphalt pavements. When it was time for major expansion and reconstruction of the airport, personnel naturally turned to asphalt based on its history of demonstrated performance.

In total, the contractor, Northstar Asphalt Inc., placed nearly 133,000 tons of full-deep asphalt pavement, utilizing the exacting, high-stress P-401 Federal Aviation Administration (FAA) paving specifications.

PAVING TO MAINTAIN AIRPORT OPERATIONS

Work on the extension of Runway 5/23 was conducted during a nine-month closure. However, the reconstruction of the intersection of Runways 5/23 and 1/19 was particularly challenging as paving operations had to be sequenced to accommodate the Akron-Canton Airport's flight scheduling.



Paving operations could only be performed during an extremely challenging midnight to 6 a.m. timeframe. Every detail of the night's work had to be planned in advance. The decision to close the runway for an evening had to be decided well in advance, which made delays in plant production, trucking or paving operations unthinkable. Northstar Asphalt had to have all equipment and materials staged to begin paving immediately after the last plane landed for the evening and it was cleared to access the runway.

Failure to adhere to this tight paving schedule was not an option, as the contract included a hefty \$1,000-a-minute penalty if work was not completed to allow for the resumption of normal airport activities. All milling, paving, striping and sweeping operations had to be conducted as quickly and efficiently as possible, and all work was completed in an accelerated six-hour block of time in 18 total workdays. Only asphalt could meet this demanding schedule, as asphalt pavements can be opened

to traffic almost immediately upon placement and require only a few hours to gain complete strength rather than days of curing.

AWARD WINNING PAVEMENT

Akron-Canton Airport executives describe the new runway as “very smooth” and the “crown jewel,” which makes the airport more competitive by allowing heavier jets to fly nonstop to farther destinations.

Northstar Asphalt's outstanding workmanship and commitment to quality on the project was recognized by Ohio's asphalt industry, as the Dalton-based company earned the prestigious Quality Asphalt Pavement Award. The award was presented to both the contractor, which performed the work, and to the Akron-Canton Airport in recognition of its appreciation for the value and performance of quality asphalt pavement construction.



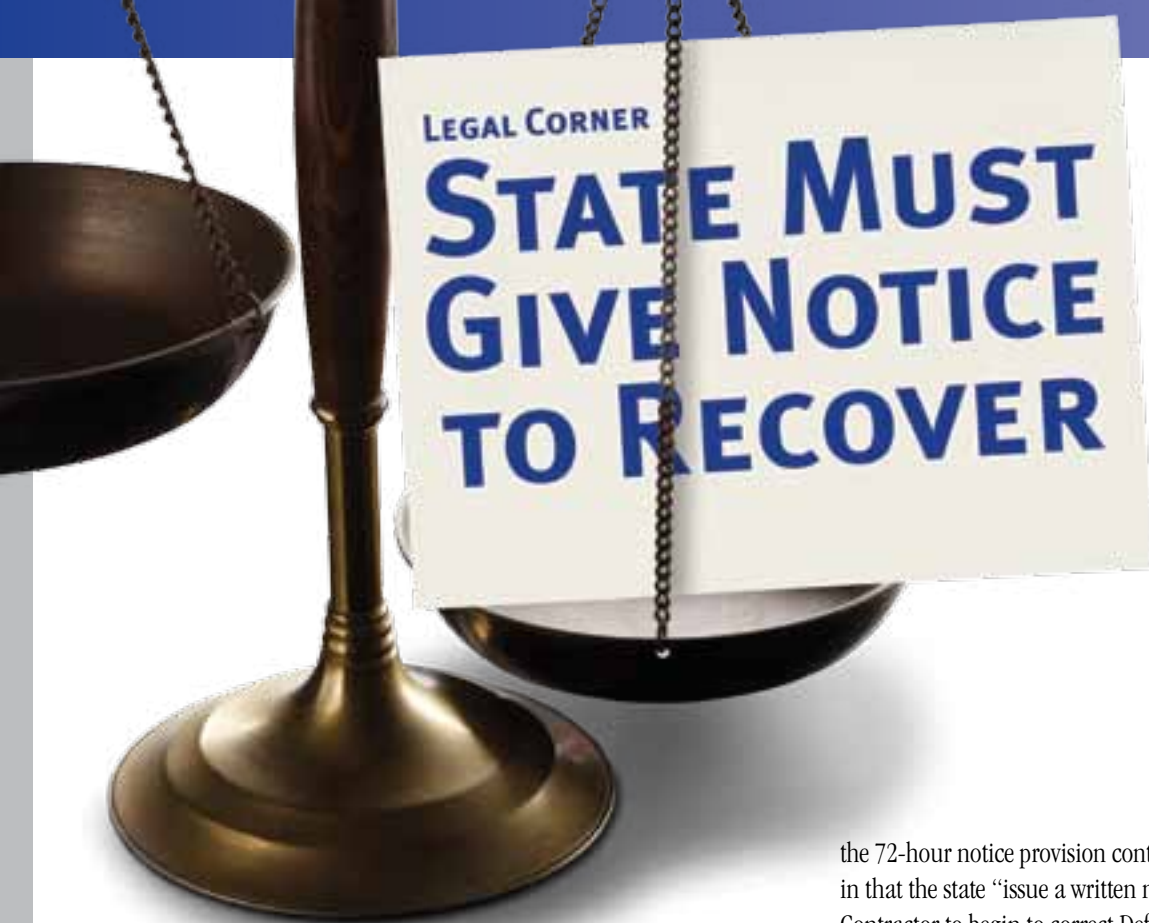


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By Donald W.
Gregory, Esq.
Kegler, Brown, Hill
& Ritter Co., LPA

The State of Ohio has often argued that technical notice must be received from a contractor on a public project to recover additional compensation, but frequently the state is less diligent about providing its own notice when it wants to back-charge a contractor.

The Court of Claims recently found that “the issuance of a 72-hour notice is a condition precedent to the termination of the contract.” See *N.L. Constr. Corp. v. Ohio Dep’t of Admin. Servs.*, Ct. Cl. No. 2011-08318, Aug. 30, 2012. In *N.L. Construction*, the plaintiff-contractor brought claims against the Ohio Department of Administrative Services (ODAS) and the Ohio Department of Transportation (ODOT) for damages arising from the termination of its general trades contract. The contractor moved for summary judgment on the basis that the state failed to follow the contractually mandated procedures when it terminated without first providing the contractor with a 72-hour notice and without permitting it to cure any deficiencies in its performance. The state countered with two arguments: 1) that the 72-hour notice provision of the contract was “permissive;” and 2) that any construction of the contract requiring the state to provide 72-hour notice would impermissibly grant the contractor “greater rights than those guaranteed by statute.”

The Court of Claims rejected both of the state’s arguments and entered judgment in favor of the contractor. First, the court recognized that while

the 72-hour notice provision contained in Article 5.3.1 was “permissible” in that the state “issue a written notice providing three days for the Contractor to begin to correct Defective Work,” when read in conjunction with the remainder of the contract, 72-hour notice was nonetheless “required before ODOT may choose to terminate the contract.” Based on its reading of the plain language of the contract, the court outlined what it interpreted as a “three-step process in order for an agency like ODOT to perfect a termination ‘for cause.’”

The first step is to notify the contractor of the deficiencies in its performance and its right to cure (72-hour notice). Next, if the contractor fails or refuses to cure within 72 hours, the owner may either perform the work itself; or back-charge the contractor; or resort to other contractual remedies including a termination for cause pursuant to Article 12.3. If the owner chooses termination for cause, the owner must then issue a five-day notice in accordance with Article 12.3.2. Finally if the contractor fails to satisfy the requirements of the five-day notice within 15 days from receipt thereof, the owner may declare a default and terminate the contract.

The court’s concise logic clearly sets forth the conditional nature of the so-called “permissive” notice provisions – it, and *only* if, the contractor fails to cure the defective work after being given proper notice, *may* the owner intervene and terminate the contract.

The Court of Claims also rejected the state’s argument that this interpretation of the contract granted the contractor “greater rights than those guaranteed” in Ohio’s remedial work statute, R.C. 153.17. Specifically, there was no indication with the contract that the parties did not intend to grant “greater rights,” and furthermore the statute itself did not preclude the state from adding a 72-hour notice provision to the contract. The state chose the contractual language it used in the contract, under which, “read as a whole, ODOT’s right to choose other contractual

remedies, including termination under Article 12.3, arising only after the contractor fails to comply with the 72-hour notice.”

Because it was undisputed that the state failed to comply with the mandatory 72-hour notice, the *N.L. Construction* court found the state’s termination of the contract to be invalid. Furthermore, under the doctrine of first breach, the court found that the state’s counterclaims to recover under the contract were barred as a matter of law. (*Citing Software Clearing House, Inc. v. Intrack, Inc.*, 66 Ohio App.3d 163 (1st Dist. 1990); *Kersh v. Montgomery Dev. Ctr.*, 35 Ohio App.3d 61, 62 (10th Dist. 1987).)

As made clear by the *N.L. Construction* court, contractual and statutory notice and an opportunity to cure is a condition precedent to termination of the contract, and failure to abide by these requirements is a material breach of the contract that operates to bar the state’s recovery against a contractor.

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Ohio Asphalt Paving Conference

February 6, 2013

The Fawcett Center

The Ohio State University

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The 2013 Ohio Asphalt Paving Conference (OAPC) is scheduled for February 6 at the Fawcett Center located on the campus of The Ohio State University. The OAPC 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.

Registration for this conference is \$65 per person until January 25. After that date, registration is \$80 per person. There is no charge for university engineering students, but registration is required.

A block of rooms has been reserved at a special conference rate of \$124 per night at the Blackwell Inn on The Ohio State University campus at 2110 Tuttle Park Place. The special room rate will be available until

January 11th. To make a room reservation at the conference rate, contact the Blackwell Inn directly at (614) 247-4000 and request the Ohio Asphalt Paving Conference block of rooms.

Go to www.flexiblepavements.org/calendar/oapc/oapc for additional conference information or to register for this event.

Best Practices Workshop for Constructing Asphalt Pavement Longitudinal Joints

February 21, 2013

Ohio Department of Transportation

Central Office, Lower Level Auditorium

1980 West Broad Street • Columbus, OH 43223

The Ohio Department of Transportation (ODOT) and Flexible Pavements of Ohio (FPO) are pleased to present the Federal Highway Administration's (FHWA) Best Practices for Constructing & Specifying Longitudinal Joints Workshop. This workshop is designed to provide state and local government transportation agencies and asphalt pavement contractors with the latest information for the construction of better performing longitudinal joints.

The workshop is a result of a recent joint FHWA and Asphalt Institute project that took an in-depth look at how longitudinal joints are currently being specified and constructed across the country. The comprehensive study included a literature and specifications review; a survey of all the FHWA Division Offices; focused interviews with well-known paving experts; and site visits with some of the more pro-active states with respect to research and specifications of longitudinal joints.

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March 5-6 • Columbus/Polaris Hilton Hotel • 8700 Lyra Drive • Columbus, Ohio, 43240

The 2013 Ohio Asphalt Expo is scheduled for March 5-6 at the Columbus/Polaris Hilton Hotel located at 8700 Lyra Drive Columbus, Ohio, 43240.

Planning is currently underway for this must-attend event, and the educational program has been expanded to include a fourth educational track dedicated to pavement owners and asphalt contractors. In total, the program for the 2013 Ohio Asphalt Expo will contain 12 concurrent technical educational sessions with presentations by more than 20 national industry experts.

A block of rooms has been reserved at the Hilton Columbus/Polaris for March 3-6 at a special conference rate of \$182 per night. The special room rate will be available until February 1st or until the group block is sold out. Access the conference room reservation page at www.hilton.com and enter event code FLPAVE, or contact the Hilton directly at (614) 885-1600.

For conference registration and additional information, go to www.ohioasphaltexpo.org or visit us on Facebook.

This workshop will highlight recommendations from this project aimed at improving the longevity of longitudinal joints.

ODOT's Local Technical Assistance Program (LTAP) will be providing additional workshop information at www.dot.state.oh.us/Divisions/Planning/LocalPrograms/LTAP/Pages/default.aspx as it is available.

Comprehensive Asphalt Mix Design School: Level 3 Technician Training

February 25-28, 2013

Ohio Department of Transportation

Testing Laboratory, Lower Conference Room

1600 West Broad Street • Columbus, OH 43223

This course meets the training requirements for certification as an ODOT HT.306, Asphalt Level 3 Technician. It is designed to give the participants a working knowledge of the principles associated with asphalt concrete volumetric mix design. On the final day of the course, students will have the opportunity to take the ODOT examination for Level 3 Bituminous Concrete Technician approval.

Students will learn the properties and tests applicable to the selection of asphalt binders and aggregates; Marshall and Superpave mix design methods using volumetric analysis; and the information necessary to complete the examination for ODOT Level 3 approval.

Go to www.flexiblepavements.org/calendar for additional information or to register for this training.

Field Quality Control Supervisor (FQCS) Training

March 26, 2013

Ramada Plaza Hotel & Conference Center

4900 Sinclair Road • Columbus, OH, 43229

FPO has scheduled a Field Quality Control Supervisor (FQCS) training seminar for March 26. This seminar provides the required training to become certified

to perform the FQCS function on ODOT projects or to renew an existing certification after five years since the previous training. FQCS certification is required by ODOT specification for paving operations on all departmental projects. FQCS course content includes:

- An introduction and review of the FQCS program
- An overview of contractor quality control and quality assurance
- A review of ODOT construction specifications, supplemental specs and proposal notes
- A review of issues related to typical asphalt construction

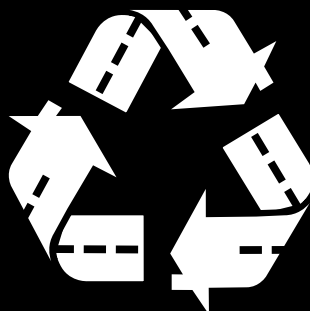
Go to www.flexiblepavements.org/calendar for additional information or to register for this event.

New Member Welcome



FPO would like to welcome the C&S Companies® as an associate member of the association. With a staff of more than 500 industry professionals, C&S Companies® is a comprehensive engineering, architecture, planning, environmental, and construction services provider. Headquartered in Syracuse, N.Y., the C&S Companies® have 13 offices across the country, including a local office in Cleveland.

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