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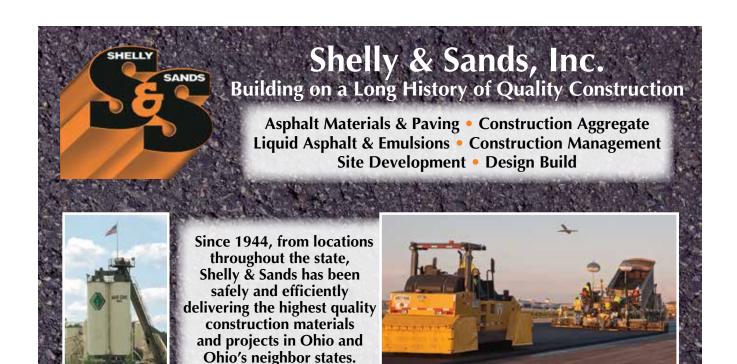
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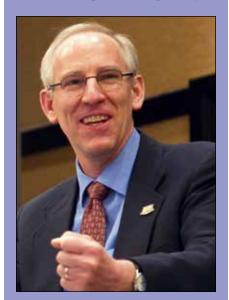


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THE PRESIDENT'S PAGE



CLIFFORD URSICH, P.E.
PRESIDENT & EXECUTIVE DIRECTOR

"What I've come to understand is that pavement assets consist of more than the value of the materials from which they are composed. The asset includes the service received by the user in terms of a tangible product that facilitates Driveability. 'Driveability'... includes all that's important to them, like being able to get to work on time because the road needs no repair, has a comfortable ride and is safe. Asset management done right uses dollars effectively and improves driveability."

Asset Management – It's More Than Making Do with What You've Got

All of us likely have heard the expression make do with what you've got. Well ... that's not what asset management is all about. It was probably a decade ago when I first heard discussion of asset management in terms of pavements being viewed as assets. It made sense to me since dollars invested in the construction of streets and parking facilities result in a tangible product; "bricks & mortar," as it were. What I've come to understand is that pavement assets consist of more than the value of the materials from which they are composed. The asset includes the service received by the user in terms of a tangible product that facilitates Driveability. "Driveability," that's the motorists' metric for identifying a quality driving experience. It includes all that's important to them, like being able to get to work on time because the road needs no repair, has a comfortable ride and is safe. Asset management done right uses dollars effectively and improves driveability.

There is no debating that managing pavement assets is appropriate. In fact, it is the prudent and responsible thing to do for those entrusted as stewards of other people's money. Cash is hard to come by, and even harder when the users (motorists) perceive rough riding pavements as the result of poor stewardship of their tax dollars. Motorists could care a hill of beans whether a road is black or white (or stone all under), the cracks filled, or the pavement is coated. Driveability is their metric. Yes, maintaining pavements by sealing cracks, etc., is necessary work for ensuring driveability. However, if asset management is to ensure motorists' satisfaction, then it stands to reason that the motorists' metric be a consideration.

"What gets measured gets managed."

~ Peter Drucker

Pavement performance can be measured in two ways. The first, pavement condition rating (PCR) is an accounting of distresses in a pavement. Things like rutting, crack sealing deficiency, faulting, edge cracking, raveling and another dozen or so distresses are measured and the extent and frequency are determined. The worse the pavement condition the lower the PCR number will be. A second measure is "serviceability." Akin to driveability, it is largely a driving comfort metric. It was developed during the famed AASHO Road Test and is based on the premise that "the user [motorist] opinion in the final analysis dictates the adequacy of the [pavement] design." (Witczak & Yoder). Here's the rub: The typical systems management process used as the backbone of asset management relies solely upon pavement condition ratings. Hence, pavement repair treatment selection under an asset management system tends to focus on fixing distresses only, and doing such by using less costly but more frequent surface treatments — to the detriment of motorists' driving experience. Peter Drucker was quoted as saying, "What gets measured gets managed." Conversely, what doesn't get measured doesn't get managed. And if there is such a thing as entropy – and there is – asset management that ignores driveability is destined to ensure mediocre service in the eyes of the motorist. Any person who's responsible for pavement maintenance knows this firsthand when the public makes its ire known over the use of a slurry or chip seal on what was previously an asphalt surface.

The figures shown below illustrate the performance of pavements. Figure 1 illustrates performance in terms of pavement condition (PCR). A pavement that shows no distresses receives the highest rating. With time, weather and the pounding from traffic, pavement condition declines - as illustrated by the curve falling from 100 to a lesser number. At some point in the life of a pavement an intervention is made to stop the deterioration. In doing such, the pavement condition rating is restored to a near-new condition. Life extension (usable life to next treatment) depends on the robustness of the treatment used to restore the pavement condition. More robust treatments, such as asphalt overlays and thinlays, provide greater life extension when compared to surface treatments. Added strength from thickness is the reason. That's important because pavements experience fatigue - even the farm-to-market roads that are often considered lightly traveled, carry grain buggies, trucks and farm machinery of very significant weight. Fatigue is what causes pavements to fail structurally, requiring big fixes. Treatments must be sufficiently robust to restore pavement strength lost to fatigue. It is a misnomer to think asset management will facilitate use of low-cost chip seals and slurry seals ad infinitum. If pavement strength is not restored, each successive surface treatment experiences less usable life.

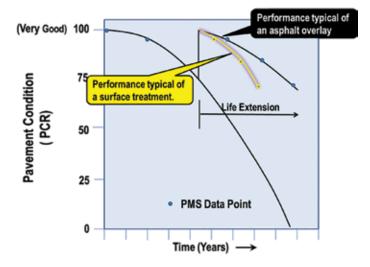
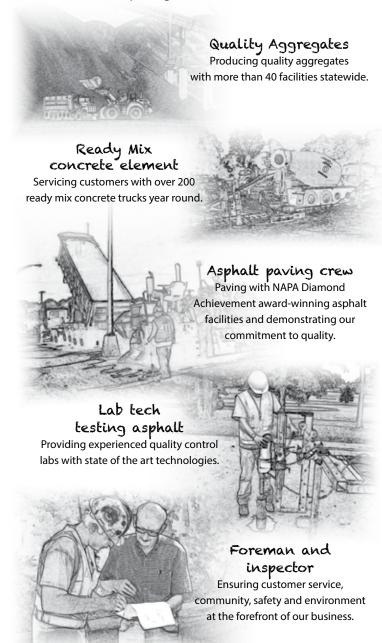


Figure 1: Effect of treatment on life extension. All treatments restore pavement condition to nearnew. Life extension differs according to treatment robustness.

Figure 2, on page 8, illustrates pavement driveability. Well, that's what I call it. Officially, it illustrates serviceability. It is similar to PCR in how it appears, however, a different scale of measurement is used. A rating of 5 connotes the highest-possible level of motorist satisfaction. Accordingly, as pavement is exposed to the pounding of traffic, motorist satisfaction with the pavement declines due to increasing roughness and lost functionality. As illustrated in Figure 2, pavement serviceability is restored when repairs are made.



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Here's where restoring pavement condition and restoring pavement serviceability differ. This is the crux of the matter. Where the application of surface treatments and asphalt overlays equally impact pavement condition (PCR), restoring it to near-new, they do not equally restore serviceability. Only asphalt overlays and thinlays can restore serviceability to the highest-possible level of user satisfaction. Surface treatments, the likes of chip seals and microsurfacing, merely mimic the existing roughness of a pavement. That coupled with the fact that such treatments provide no strength enhancement, fatigue causes them to lose serviceability at an accelerated rate. This illustrates how asset management absent consideration of driveability falls short of satisfying motorists' expectations for pavement quality.

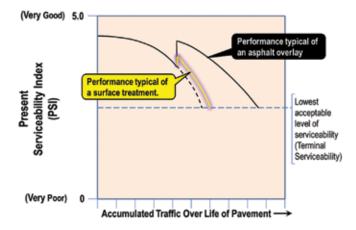


Figure 2: Effect of treatment in restoring serviceability. Surface treatments such as microsurfacing and chip seals mimic existing serviceability. Asphalt restores it to nearnew condition.

Racing to the Bottom

A good friend who works in product design explained to me why it is that some products once made stout and long lasting, now are flimsy and short lived. He described this as the "race to the bottom," where manufacturers shaving off as much cost as they can yet still maintaining functionality of the product for the consumer. Some may call this economizing, others call it efficiency. When does asset management become a race to the bottom? I think that occurs when finances drive asset management rather than serviceability for the motorist. Asset management is simply a tool to help us be effective. That's a bit different concept than efficiency or economizing. Effective use of asset management ensures driveability as well as good pavement condition. At least, that's what the motorists expect. Asset Management: It's more than making do with what you've got.









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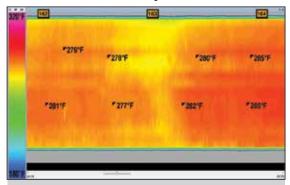
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Over the years, many studies have been performed to analyze the performance of deep-strength, asphalt-base pavements. The various studies have generally confirmed that well-designed, well-constructed asphalt-base pavements have out-performed other types. Yet, myths, misperceptions and misunderstandings of asphalt pavement performance characteristics persist. Common misconceptions include the beliefs that asphalt pavement isn't long-lasting, or that asphalt pavements cannot be used for heavy traffic, or on weaker soils. All of these have been disproven by rigorous study and experience. The body of work shows that asphalt-base pavements can provide longlived, economical and road user-friendly performance.

The pertinent studies essentially began with the AASHO Road Test of the late 1950s (http://www.fhwa.dot.gov/infrastructure/50aasho.cfm). The road test developed the concept of the "Present Serviceability Index" (PSI) as a measure of pavement quality. PSI is the main performance parameter incorporated into the AASHTO '93 pavement design procedure still in widespread use to this day. Attached to this article is a bibliography of a sampling of studies that have documented the performance advantages of asphalt-base pavements.

Asphalt research in general, and performance studies in particular, intensified in the 1980s with the advent of the Strategic Highway Research Program (SHRP) and Long-Term Pavement Performance Program (LTPP). Studies began to document the excellent performance of asphalt-base pavements (1, 2 & 3).

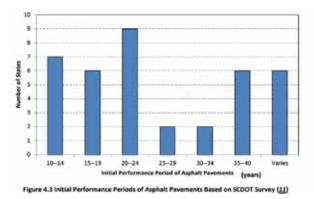
In the same timeframe, studies were being performed in Europe that documented the long-life of asphalt pavements and generated renewed interest in the perpetual pavement concept first hypothesized by Dr. Carl Monismith in the 1970s (4 & 5). A number of independent studies have looked at the economics of asphalt pavements. One of the earliest was the analysis in 1983 by Willis B. Gibboney of Ohio Interstate Highway System pavements, which was later updated in 1995 by Clifford Ursich, P.E. (6). More recent studies of lifecycle costs include studies in Kansas, Alabama and another Ohio study by the University of Toledo in 2004 (7, 8 & 9). For links to the referenced studies, see the list of references at the end of this article.

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PERFORMANCE CHARACTERISTICS	DISCUSSION
Serviceability	Serviceability is a pavement characteristic developed during the AASHO Road Test that continues to have relevance to this day. Serviceability is a measure of the performance of a pavement in meeting the service demands of the user. In Ohio, ODOT data shows asphalt pavements provide the highest level of serviceability. The ODOT Pavement Design Manual acknowledges this fact by assigning to asphalt pavements a higher level for initial serviceability than that of concrete. ^a
Smoothness	ODOT's experience is that asphalt pavement construction provides the highest level of smoothness, both initially and over the service life of the pavement. Typical IRI results (roughness indicator) for asphalt pavements show less roughness.
Noise	ODOT research and national research has consistently shown that asphalt pavements are the most-quiet pavement type. When compared to longitudinally tined concrete pavement, asphalt still measures quieter. ^b
Perpetual Performance	ODOT's experience has shown 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 serviceability and "perpetual" performance. Concrete pavements on the Interstate System are systematically being removed and replaced.
Ease of Maintenance	Asphalt pavements facilitate maintenance activities that are non-intrusive to the motoring public (e.g. thinlays, mill-and-fill, night-paving). Pavement preservation is most readily accomplished when the original pavement is composed of asphalt.
100% Reusable	Asphalt pavement is 100% reusable, not requiring removal and disposal costs such as needed by concrete, nor cluttering interchange infields or risking water quality. The National Asphalt Pavement Association reports recycling asphalt pavements in 2014 was at a rate greater than 99 percent.
Sustainability	Warm Mix Asphalt (WMA) creates new opportunity for the department to incorporate sustainable highway construction practices thereby encouraging fuel savings, improved air emissions and worker environment. Re-use and recycling of asphalt pavements is commonplace and has been determined to be the largest contributor to the recycling effort in the United States.

- a Ohio Department of Transportation, Pavement Design Manual, Section 200, Figure 201-1, Serviceability & Reliability
- b Colorado DOT Tire/Pavement Noise Study, Report No. CDOT-DTD-R-2004-5
- c Cleaner Water With Asphalt Pavements, Asphalt Pavement Alliance
- d Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt Usage 2014
- e Summary Report of 2008 Warm Mix Asphalt Trials, November 21, 2008, Dave Powers, Asphalt Materials, Ohio Department of Transportation
- $f \quad \text{Asphalt Pavement is America's Most Recycled Product, Asphalt Pavement Alliance}$

To illustrate typical findings, Figure 4.3 from Reference 8 is reproduced on this page and reflects the results of a survey taken in 2008 by the South Carolina DoT. The graph shows the pavement performance (time in years to first rehabilitation) being realized by various states. Life of the original construction is shown to last from 10 to 40 years with the median being in the 20- to 24- year range.



These cited studies and Ohio's experience with the performance of asphalt-base pavements lead to the conclusions shown in the accompanying table (page 12) of the Performance Characteristics of asphalt-base pavements that differentiate flexible pavements (asphalt) from rigid pavement (concrete). Asphalt pavements are the best choice for economy, long life and user convenience.

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NCAT PERPETUAL **PAVEMENT DESIGN STUDY REPORTED**

The National Center for Asphalt Technology (NCAT) has recently completed a study, "Refined Limiting Strain Criteria and Approximate Ranges of Maximum Thicknesses for Designing Long-Life Asphalt Pavements," which may be very helpful in advancing the design and implementation of Perpetual Pavements. The objective of the study was to establish critical design thresholds and approximate ranges of maximum thickness to

Subgrade

Mr (ksi)

10

10

10

10

20

20

Base

Mr (ksi)

30

100

250

30

50

250

500

50

100

Table 13 Ranges of Maximum AC Thicknesses for 6-inch Base

Minneapolis

(PG 64-34)

12.5

12

12

8.5

10.5

10.5

10

8.5

7.5

8.5

8

Calculated AC Thickness (in.)

(PG 70-22)

15.5

15

14

12

11

14

13

12

11

10.5

12.5

12.5

12

10

Baltimore

(PG 64-22)

14

14

13.5

10

12

12

9.5

8.5

10

9.5

9

14.0

13.7

13.2

10.2

9.3

12.2

11.8

11.0

9.7

8.8

10.5

10.2

9.7

improve the cost-effectiveness of long-life pavements. The report was written by Dr. Nam Tran, P.E.; Dr. Mary M. Robbins; Dr. David H. Timm, P.E.; Dr. J. Richard Willis; and Dr. Carolina Rodezno. NCAT report 15-05 can be found at http://www.ncat.us/ files/reports/2015/15-05.pdf.

A Perpetual Pavement is designed and constructed with appropriate layers and materials so as to prevent the development of structural distresses; such as, bottom-up fatigue

cracking and subgrade deformation. Accordingly, a Perpetual Pavement can sustain the heaviest loads while providing an indefinite structural life. Perpetual Pavements can be kept serviceable over a very long life with only surface maintenance.

In the study, the authors conducted a laboratory and test road analysis of the Fatigue Endurance Limit (FEL) values that resulted in perpetual pavement performance. These values were then used in the PerRoad analysis program (http://www.eng.auburn.edu/users/timmdav/PerRoad35. msi) to create hypothetical designs that would have perpetual pavement performance. Typical designs are shown in Table 13 of the report and is reproduced here.

The authors suggest that the maximum thicknesses shown in Table 13 be used as a check for designs developed using conventional design methods. Where the conventional design thickness exceeds the maximums shown in Table 13, a perpetual pavement design should be developed using PerRoad, which could result in a more economical pavement design that will still perform as a perpetual pavement.

Ohio University reported in 2015 on a study done for ODOT, "Implementation and Thickness Optimization of Perpetual Pavements in

Range of

Maximum

Thicknesses (in.)

12.5-15.5

12-15

12-14

8.5-12

8-11

10.5-14

10.5-13

10-12

8.5-11

7.5-10.5

9-12.5

8.5-12.5

8-12 7.5-10.5

7-10

Ohio," SJN 465970, by Shad Sargand, Issam Khoury and Ben Jordan. In that report the authors recommended that new pavement designs resulting in an asphalt thickness greater than 13 inches (33 cm) on a 6-inch (15 cm) dense-graded aggregate base on stabilized subgrade or 15 inches (38 cm) of asphalt on a 6-inch (15 cm) dense-graded aggregate base on un-stabilized subgrade should be evaluated for perpetual performance. The OU final report can be found

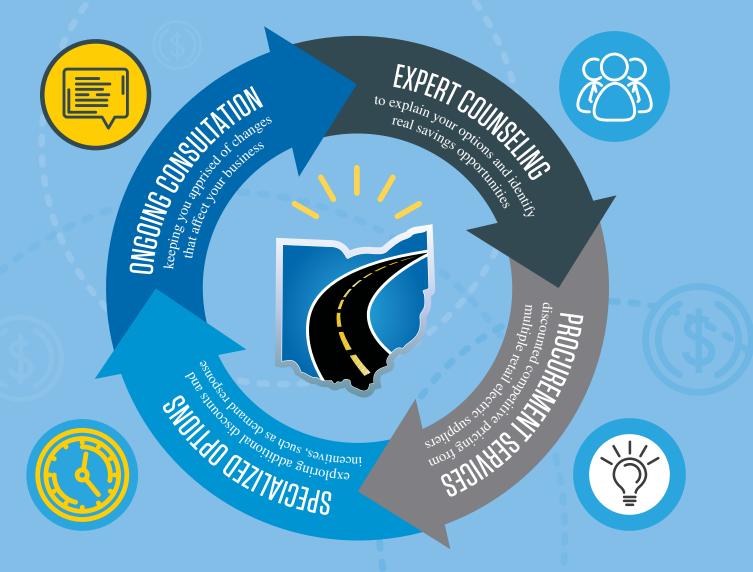
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at: http://www.dot.state.oh.us/ Divisions/Planning/SPR/Research/reportsandplans/ layouts/listform. ID=466&ContentTypeID=0x0100BD006C89430C884FB603A74E63BB6849.

In a similar manner, after an extensive design study, the Illinois DoT has adopted a pavement design procedure where its mechanistic/empirical pavement designs are checked against a maximum Perpetual Pavement thickness ranging from 14 to 16.5 inches. The Illinois design guide can be found at: http://www.idot.illinois.gov/assets/uploads/files/doing-business/ manuals-split/design-and-environment/bde-manual/chapter%2054%20 pavement%20design.pdf.

As a result of these studies, we now have a much better understanding of Perpetual Pavement design, a simple measuring stick to check if our conventional pavement designs may be unnecessarily thick; and a free design tool, PerRoad, for checking perpetual designs.

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As a broker and aggregator, Riverside Energy was instrumental in performing electric rate analysis for use by the materials coalition of which Flexible Pavements took part to challenge the American Electric Power rate increase in 2012. Sherri Loscko, President, has over 30 years' experience in the electric rate industry, and since 1989, with her partner Stan Loscko, has helped many businesses reduce their costs for electric service.



Sherri Loscko, President

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P3s - PUBLIC/PRIVATE PARTNERSHIPS

The funding of construction projects for public use through public-private partnerships — known as P3s — is increasing at all levels, including on federal and federally funded projects. Typically, the public entity will provide the land and authorize the private entity to design, build and frequently operate the resulting public work. In trying to maximize the incentives for the participation of private investment in P3 projects, federal agencies, as well as state and local governments using federal funds to help finance construction, try to minimize government "red tape." The zeal to reduce "red tape" and minimize costs has damaging consequences, however, when it eliminates traditional requirements related to public procurement, such as the statutory payment protections for work performed, which is provided by the federal Miller Act and state and local so-called "little Miller Acts," enacted by all the states, including Ohio.

The Ohio General Assembly has authorized ODOT to enter into P3s with private entities after soliciting proposals. Fortunately,

ODOT is statutorily obligated to require that the public-private agreement include a:

- Contract performance bond
- Payment bond pursuant to R.C. §5501.73(B)(10) and (11)

Those providing labor or material to other P3 projects should not necessarily conclude that the work is protected by a payment bond in the usual public fashion. Further investigation is recommended on such projects if ODOT is not involved.

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The asphalt paving industry has contributed significantly to the advancement of 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. Ohio's asphalt producers have been recycling and reusing Reclaimed Asphalt Pavement (RAP) since the early 1980s and, in recent years, utilizing recycled asphalt shingles (RAS) and green manufacturing technologies such as Warm Mix Asphalt (WMA).

The National Asphalt Pavement Association (NAPA) recently released a survey of the states conducted in 2014 to determine recycling usage. The survey, "Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt Usage 2014," was conducted in partnership with the Federal Highway Administration. Nationally, the asphalt industry remains one of the largest recyclers with 71.9-million tons of RAP used in 2014. This represents more than 3.6-million tons or 20-million barrels of asphalt binder conserved and 68-million tons of virgin aggregate.

Ohio's asphalt producers utilized 3.7-million tons of RAP in 2014. RAP use comprised 26.3 percent of the total asphalt market in 2013, and steadily grew to nearly 28 percent in 2014. Nationally, Ohio ranks among the top seven states in the nation as a user of reclaimed asphalt pavement. In addition to RAP, Ohio's asphalt producers reclaimed 10,400 tons of asphalt shingles, which otherwise would have been placed in a landfill.

Ohio ranks among the top five states in the nation for the use of Warm Mix Asphalt, a technology that reduces cost, lowers air pollutant emissions during manufacturing and has promise of extending pavement life. WMA use grew to nearly 9.9-million tons in 2014, accounting for approximately 77 percent of the total asphalt used in Ohio pavement projects.

Blast furnace slag, steel slag and rubber tires are also incorporated into asphalt pavements in Ohio. Although utilized to a much lesser extent than RAP or RAS, the use of these materials demonstrates the industries commitment to sustainability.

Go to http://www.asphaltpavement.org/recycling#Results for additional information and to view NAPA's survey report.





Design Guidance for Driveways & Other Pavements



From time-to-time, Flexible
Pavements of Ohio (FPO) receives
requests for information regarding the
design, materials and construction of driveways,
parking lots and recreational pavements that are not
subject to design by conventional highway structural design
methods. These types of light-duty pavements are typically based on
catalogs of designs that have proven successful for such applications. Most
asphalt pavement authorities have such catalogs of designs and FPO is no
exception. But, in addition, FPO provides guidance on selection of asphalt
concrete materials that is specific to the Ohio market.

The document reprinted here, "Section 2.4 Residential Driveways." was originally published in FPO's Asphalt Pavement Design and Construction Guide and is available on the FPO website. This document contains guidance on the structural build-up, materials selection and construction details needed for a good-performing asphalt concrete, driveway pavement.

This and other useful design information is found on the FPO website at www.flexiblepavements.org by choosing the Technical Resources/Pavement Design Resources menu buttons.

SECTION 2.4 RESIDENTIAL DRIVEWAYS

Asphalt concrete pavement is a popular choice for residential driveways. Properly designed and constructed, it stays smooth, sound and attractive in appearance over many years. Flexibility allows the pavement to conform to minor subgrade settlements and still retain a continuous surface free of abrupt bumps.

Either a full-depth asphalt or an asphalt with an aggregate-base design may be used for this purpose. One may be better suited than the other to a given situation. The design and construction of both are discussed in the following paragraphs. Sample specifications are provided for reference in Section 3 of this guide.

FULL-DEPTH ASPHALT

ASPHALT WITH AGGREGATE BASE

	Asphalt Surface Course	
Asphalt Surface Course	Asphalt Surface Course	
Asphalt Intermediate Course	Aggregate Base Course	
SUBGRA	ADE	

RECOMMENDED MINIMUM THICKNESS DESIGNS INCHES AND (MILLIMETERS)

SUBGRADE	FULL-DEPTH	WITH AGGREG	SATE BASE
SUPPORT	ASPHALT	AGGREGATE	ASPHALT
POOR (CBR 3) FAIR (CBR 5) GOOD (CBR 7)	5.5 (140)	6 (150)	3 (75)
	4.5 (115)	4 (100)	3 (75)
	4.5 (115)	4 (100)	3 (75)



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SUBGRADE SUPPORT CAPACITY

The subgrade is the prepared soil foundation for the pavement structure. Pavement thickness design starts with a realistic value for the load support capacity of the subgrade. The pavement then is made thick enough so that load pressures transmitted to the subgrade are reduced to a level consistent with subgrade support capacity.

Values in the table represent the support capacity of a range of fine-grained soils often encountered in Ohio. Coarse-grained soils (very sandy or gravely soils) will have higher support capacities; but, the minimum recommended thickness of asphalt concrete should be used for resistance to climatic stresses. The descriptions indicate the relative firmness the soil retains after it has been compacted and then exposed to the influx of moisture. The CBR (California Bearing Ratio) value is a laboratory test measure of that quality.

An estimate of the relative firmness the soil retains under wet conditions may suffice for small driveways on well-drained sites. Moderate-to-large projects often warrant a professional investigation of subsurface soils and moisture conditions. The purpose is to identify conditions that may affect the overall design as well as to determine soil support capacity for pavement thickness design.

PAVEMENT THICKNESS AND MATERIALS

The minimum thickness recommendations in the table are suitable for the cars and light trucks, plus the occasional heavier service and delivery trucks normal to the single-unit residence.

The asphalt concrete mixtures recommended for use are ODOT standard construction specification Item 441, Asphalt Concrete Intermediate Course, Type 2, for an intermediate course and Flexible Pavements of Ohio (FPO) specification 404LVT, Asphalt Concrete, for the surface course. These materials are described and some suggestions for specifying them are found in the FPO Technical Bulletin, "Specifying Asphalt Pavements in Ohio," on the FPO website, www. flexiblepavements.org.

For full-depth designs, a 1.5-inch (38 mm) Item 404LVT with Item 441, Type 2 as a base is recommended.

For aggregate-base designs, two 1.5-inch (38 mm) layers of Item 404LVT are recommended.

The aggregate base recommended is ODOT Item 304. The material is a high-quality, dense-graded, crushed aggregate. The particle size gradation should be uniform from coarse to fine and the upper limit on the very-fine fraction (passing the No. 200 sieve) should not be exceeded. An excess of that fraction will weaken the base under wet conditions

METRIC LAYER THICKNESS - Layer thickness in millimeters was converted from inches and then indicated according to the practice adopted by the Ohio DOT. That practice is to specify layer thickness less than 45 millimeters to the nearest millimeter and thickness greater than 45 millimeters to the nearest 5 millimeters.

DRAINAGE

The pavement surface should slope not less than a quarter inch per foot (6 mm per 300 mm) for good surface water drainage. The direction of the slope should be in keeping with the surrounding area and may be either from side to side, end to end, or for extra wide drives from the centerline to the sides.

If a poorly drained area cannot be avoided, the subgrade may need to be built up and pipe underdrains may need to be installed. Perforated pipe made for that purpose is placed in a trench a foot (300 mm) more or less below the subgrade surface and backfilled with porous aggregate up to the subgrade surface. A suitable outlet for the pipe to a catch basin or ditch is needed.

SUBGRADE PREPARATION

Top soil, roots, boulders and the like always should be removed before starting subgrade preparation. Suitable subgrade soil then should be compacted thoroughly even though it may already appear to be firm. Appearance can be misleading. Most fine-grained soils are firm when dry, whether compacted or not. If not well compacted, they become very soft when exposed to the influx of moisture.

Compaction is best achieved when the soil is at its optimum moisture content for compaction. Either aerating or adding and mixing water into soil often is necessary. At optimum-moisture content for compaction, a handful of soil can be squeezed into a firm ball. If the soil is too dry, the ball will crumble easily and if too wet it will be soft and plastic.

While good judgment may suffice for small projects, compaction generally should be determined by testing. The test method commonly used for moisture-density determinations is AASHTO T-99.

Soil in areas that still are soft or yielding after compaction should be removed and replaced with suitable soil or aggregate base to a depth of at least 6 inches (150 mm). The subgrade surface should be at proper elevation and cross-slope before paving starts. There should be no loose material or low areas where water would accumulate and soften the subgrade beneath the pavement.

AGGREGATE BASE CONSTRUCTION

Aggregate should be placed by means of a mechanical spreader except on small jobs where only hand placing may be practical. In either case, blading or raking should be done with care to avoid separation of particle sizes.

Thorough compaction is important and is best accomplished when the aggregate contains enough moisture to be quite damp. Compaction using a roller or plate vibrator should be continued until the base is very firm.

ASPHALT CONCRETE CONSTRUCTION

Standard practice in Ohio is to place asphalt concrete by weight per unit of area rather than to an actual compacted thickness. This makes it easy to check the rate of placing and the total quantity placed using load-delivery ticket weights.

Weight-to-volume conversion factors are included in specifications. For mixtures with gravel and crushed stone aggregates the factor is 111 pounds per square yard per inch of thickness (2.37 kilograms per square meter per millimeter of thickness).

Asphalt concrete should be placed by means of an asphalt paver. These are available in a range of sizes. Hand placing, although satisfactory when skillfully done, should be limited to small areas.

Both placing and compaction by rolling must be completed while the asphalt is hot and workable. Thin layers lose heat rapidly after spreading onto a cool surface, and the time available for effective rolling may be less than 10 or 20 minutes. For that reason, placing and rolling always should be done as a continuous process.

TACK COAT

Individual layers must be bonded together for the total thickness of asphalt to act as a structural unit. Unless a layer is placed upon a freshly placed layer, the surface of the previously placed layer should be cleaned of all foreign material and a liquid asphalt tack coat should be applied to it.



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In the summer of 2014, the city of Greenfield, Wis., contracted with Payne & Dolan Inc. of Waukesha, Wis., to reconstruct three of its aging concrete pavements on 51st, 116th and 60th streets.

The plan called for concrete rubblization with a 5-inch Superpave asphalt overlay. Payne & Dolan hired Antigo Construction Inc. of Antigo, Wis., to rubblize the 8-inch-thick, mesh-reinforced concrete pavement. These streets were all 44 feet wide. The concrete pavement was first milled down starting 4 inches deep at the gutter flange and was zeroed out over 16 feet towards the centerline. This was done to provide a vertical face for the asphalt overlay to tie back in to the curb and gutter. Antigo used the process it developed with its MHB Badger Breaker® known as modified rubblization, a concrete fracturing technique that produces particle sizes between full rubblization and a cracking pattern. On

this particular project the sizing was in the 12-inch-to-18-inch range with minimal surface spalling.





Winter 2015 Ohio Asphalt



"The idea is to break the concrete as small as possible to eliminate the reflective cracking in the future, yet still leave a stable platform to pave on," said Antigo Project Manager Jason Jansen. "Most of the urban projects in Wisconsin have marginal subgrade strength. If we fully rubblized the concrete the asphalt overlay would most likely fail. The larger particle sizing of modified rubblization provides a stronger base for the new asphalt pavement. The smaller hammers of our MHB do a nice job in these urban environments in not disturbing any utilities or buildings." The pavement is then rolled to seat it prior to paving.

"The modified rubblization process has streamlined concrete roadway rehabilitation by providing a flexible pavement base that is still passable by passenger vehicles accessing adjacent properties" said

Payne & Dolan Project Manager Trevor Wallner. "Construction durations have been decreased due to less project phasing and less removals/ undercutting. The asphalt installed was a 3-inch-thick, 19mm E-1 lower course and a 2-inch-thick, 9.5mm E-1 upper course. The rubblized base and lower course were sprayed with tack coat prior to asphalt paying."

This was Greenfield's third rubblization project since 2008, and two more are planned for the 2016 construction season. "The City of Greenfield has had great success using this technique to rehabilitate old concrete pavements," said Greenfield City Engineer Jeff Katz, P.E. "The rubblization process preserves much of the strength of the concrete, and prevents reflective cracking of the asphalt overlay. The project included high-traffic streets in front of busy high schools. Our contractor was able to complete the project quickly during the summer months, while keeping the road open to traffic."

The rubblization and asphalt overlay process provides significant cost and time savings in comparison to traditional pavement removal and replacement. Antigo has rubblized 46 million square yards of concrete pavement, including 3.2 million s.y. on urban streets. Antigo rubblizes, cracks & seats and breaks for removal roadway and airfield concrete pavements throughout the world.



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Level 2 Asphalt Quality Control Technician Training January 19-21, 2016

The Shelly Company Training Facility & Lab 8775 Blackbird Lane Thornville, OH 43076

Flexible Pavements of Ohio (FPO) offers this training course to prepare individuals having basic lab familiarity to take the ODOT Level 2 Asphalt Technician Exam. After the training, students will have the opportunity to take the ODOT written examination for Level 2 Asphalt Concrete Technician approval. Individuals who pass the written test will be scheduled for the practical laboratory exam. Achieving Level 2 Asphalt Concrete Technician approval will also satisfy the requirement of newly revised ODOT specifications that individuals who take and handle cores hold an ODOT approval, either FQCS or level 2 or 3 asphalt technicians.

Go to www.flexiblepavements.org for additional information regarding this training.



Ohio Asphalt Paving Conference February 3, 2016

The Fawcett Center
The Ohio State University
2400 Olentangy River Road
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.

Go to www.flexiblepavements.org for additional information or to register for this conference.

Comprehensive Asphalt Mix Design School February 8-12, 2016

Ohio Department of Transportation Testing Laboratory, Lower Conference Room 1600 West Broad Street Columbus, Ohio, 43223

This course meets the requirements for ODOT HT.306, Asphalt Level 3 training. 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.

Go to www.flexiblepavements.org for additional information regarding this training.



2016 Ohio Asphalt Expo March 30-31, 2016

Columbus/Polaris Hilton Hotel 8700 Lyra Drive 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.

Go to www.ohioasphaltexpo.org for additional information or to register for this event.







Obituary: William "Bill" Boyd Burgett Kokosing Construction Founder Remembered Affectionately as Bill, Respectfully as Mr. Burgett

William "Bill" Boyd Burgett, age 85, went to be with the Lord on Thursday, Nov. 26, 2015. To those who knew him, he will be remembered for his integrity, perseverance, compassion for others, resilient work ethic and faith in God. To his wife of 67 years, he was a loving husband and a trusted best friend. To his children, grandchildren and great grandchildren, he was a role model. He will be greatly missed.

Bill was born May 29, 1930, in Sparta, Ohio, to George and Lenora (Boyd) Burgett. Following his graduation in 1948, from Johnsville School, he married the love of his life, Shirley Ackerman. Together they raised five children in the home that Bill built in Richland County. Learning from his parents' example, Bill made faith and church involvement a priority for his family. He was a lifelong, active member of the Waterford United Methodist Church.

In 1951, Bill combined his love for building things and his need for a job, and started Kokosing Construction Company. Bill was active in the construction industry at both the state and national levels. He served on the Flexible Pavements of Ohio (FPO) Board of Directors from 1991 thru 1996, and in 1994 he was elected by the association membership to serve as chairman of the Board of Directors.

His contribution to the association was significant. During the years on the board he also served on the association's Legislative and Marketing and Promotion committees. The strength of his political advocacy was felt in Ohio and nationally. He was a key director in the advancement for quality asphalt pavement construction. To Bill, attaining quality went beyond the

materials used in constructing pavements. It included the need for skilled labor, college graduates that have been instructed in asphalt pavement design, and support for warranty paving. The Flexible Pavements of Ohio's 1994-1999 Strategic Plan embodied those passions and led to an annual paver operator school supported by partnership between Ohio Operating Engineers Local 18 and FPO; a scholarship program for college engineering and construction management students, which has supported 408 students for a total in excess of one-half million dollars — a program Bill personally championed; warranty construction demonstration projects; and other association institutional issues to serve the FPO membership.

To some in the asphalt paving industry he was affectionately known as Bill, but to others his achievements compelled them to address him as "Mr. Burgett." For his very significant and visionary contribution to Ohio's asphalt paving industry, Mr. Burgett was awarded its highest honor, the William Baker Award.

Among his fellow contractors, he was known for being a mobilizer and political advocate. He was a past president of the Ohio Contractors Association and the National Utility Contractors Association; and a past board member of the Ohio Operating Engineers Apprenticeship Fund and American Road & Transportation Builders Association.

Flexible Pavements of Ohio and its members express their deepest sympathy to Bill's dear wife Shirley, the Burgett family, and the men and women of the Kokosing Construction Company.



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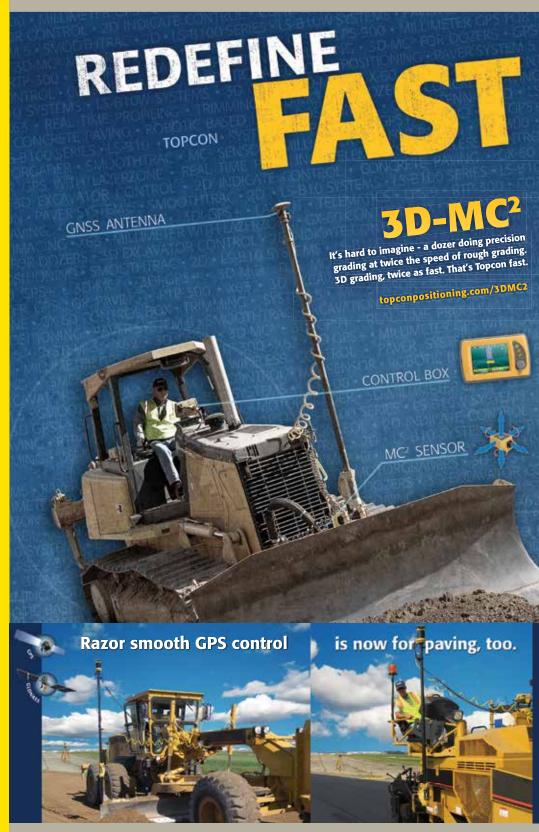
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