Asphalt Revolution

The History of Hot Mix Asphalt in Ohio

A Publication of Flexible Pavements of Ohio
Asphalt Revolution
THE HISTORY OF HOT MIX ASPHALT IN OHIO
A Publication of Flexible Pavements of Ohio

2 Building Ohio’s Roads
From Indian trails to interstates, Ohio got out of the mud and developed a modern highway system.

9 The Story of Hot Mix Asphalt
Once labeled a maintenance product, asphalt turned improved performance into a paving revolution.

17 Production & Machinery
Ohio has been a leader in making better asphalt plants and construction equipment.

25 Flexible at 40
Ohio’s asphalt paving association celebrates a proud history.
Ohio's earliest roads were Indian hunting trails and trading routes that threaded the forests and prairies west of the Ohio River. By the end of the 18th century, as the Indian wars ended, Ohio began to open to other kinds of settlement, and roads assumed a new importance. Under one of the earliest laws governing the Northwest Territory—the area that became Ohio, Indiana, Illinois, Michigan and Wisconsin—every able-bodied white male was required to work on road building for up to 10 days a year or send a substitute or monetary contribution.

Despite the best of intentions on the part of early settlers, for years the only real road in the territory was Zane’s Trace, which ran from Wheeling through Zanesville and then southwest to the Ohio River across from Maysville, Kentucky. In 1807 a travel writer named Fortescue Cuming traveled the length of the Trace by foot, horse and stagecoach, describing the quaint frontier characters and inns he encountered along the way. Near Sinking Spring in Highland County, Cuming stopped at a shoemaker’s cabin, where he escaped a storm and got his shoes repaired. “I here found a dozen of stout young fellows who had been at work repairing the road and were now sheltering themselves from the increasing storm, and listening to some indifferent musick made by their host on a tolerably good violin,” he wrote. “I proposed taking the violin while he repaired my shoes. He consented and sat down to work, and in a few minutes I had all the lads jigging it on the floor merrily.”

The state’s commitment to adequate road transportation gathered some momentum with its
admission to the Union in 1803. One of the provisions of the statehood act required that three percent of the proceeds of state lands sold by Congress were to be used to make public roads "leading from the navigable waters emptying into the Atlantic, to the Ohio, to the said state and through same." In effect, the statehood act was the first interstate highway legislation.

The following year another piece of legislation provided more details on how landowners might petition for a road and who would be responsible for building and maintaining it. The law specified that "all timber and brush should be cut and cleared off at least 20 feet wide, leaving the stumps not more than 1 foot in height," and that timbers should be laid across muddy places.

In 1806 the United States Congress appropriated $30,000 to create the first leg of what became the National Road. Delayed by the War of 1812, it was not completed from Cumberland, Maryland, to the Ohio River at Wheeling until 1818. After more delays, work began west of the Ohio River in 1825. The road reached Columbus in 1833, Springfield in 1838 and the Indiana line in 1840. The National Road was such a boon to travelers, farmers and merchants that it was congested from the start. Annual traffic through Zanesville in 1832 included 2,357 large wagons, 11,613 two-horse vehicles, 14,907 one-horse vehicles and 35,310 horsecar riders, plus large droves of farm animals.

This famous highway— a high-crowned road of stone and gravel four rods wide, with a ditch on either side— was constructed according to the best engineering principles of the time. Thanks to two Scotsmen, road builders had arrived at some basic principles for making a smooth, fast surface that, with maintenance, would last for years. History books agree that the work done by Thomas Telford and John L. McAdam between about 1780 and 1830 laid the foundation for modern roadway engineering. McAdam's system, which was
somewhat cheaper than Telford’s, became so widespread that it set the standard for a good road surface.

Both understood that the best road foundation for even the heaviest loads is dry earth. Therefore, good drainage is vital to a successful roadway. Each came up with a paving system that involved laying a foundation of large aggregate and filling the interstices with succeeding layers of smaller stones and gravel. This interlocking system transferred the load of the vehicle on the surface of the road to the earth and drained water off before it reached the subgrade. While sand was sometimes used on top as a binder, dust was not much of a problem because of the relatively slow pace of horse-drawn vehicles. At $2,000 to $5,000 a mile to build, macadam roads were expensive but superior pavements for horse-drawn vehicles.

They were uncommon off the beaten path in Ohio, however. Cyrus T. Bradley, a Dartmouth College student, traveled from Columbus to Sandusky via Marion in 1835. He later wrote about his stagecoach journey, “We would occasionally, without warning, dive into a hole of unknown depth, filled with black mud, whose murky consistency effectually concealed the mysteries of the interior—and there stick. This they call being stalled—and on such occasions we were obliged to take a fence rail and help along.” Ohioans’ enthusiasm for canals and then railroads can be traced at least partly to the poor condition of the roads.

Even after railroads connected vast stretches of the country, however, rural roads in Ohio remained primitive and, in some seasons, nearly impassable. Improvements often consisted of throwing large rocks or shale on the roadbed and letting traffic tamp them down. Drainage was so poor that roads occasionally slipped away in a downpour. Plank or “corduroy” roads, with a life span of about seven years, kept wagon wheels out
of the mud in some sections of the state.

Still, however, imperfect the roads were, as the state grew so did the road system. By 1873 Ohio had 1,502 miles of toll roads, 4,327 miles of free turnpikes and some 66,000 miles of state, county and township roads.

Two things stimulated a national interest in road improvements at the end of the 19th century: bicycles and postal service. Well before urban Americans owned cars, they took to the roads on bicycles. By 1899 a million bicycles a year were manufactured. Weekend cyclists found that their outings to rural areas were spoiled by terrible road conditions, however, so they started a public relations campaign for better roads. They cleverly captured the support of the railroads by arguing that farmers needed good rural roads to get their livestock and produce to the nearest train station.

The launch of Free Rural Delivery in 1893 also called attention to rural areas cut off from civilization by lack of transportation. In 1894 Congress added $10,000 to the budget of the U.S. Department of Agriculture to explore road improvement and management. Massachusetts formed the first state highway department in 1893. Ohio was 17th when its Highway Department was created in 1905.

After Henry Ford started mass-producing Model T in 1907, road travel became a matter of common interest. The cost of a car fell from $3,000 in 1900 to less than $500 in 1917, and the number of registered vehicles rose to more than 2 million. As cars reached the masses, the masses demanded good roads. Between 1921 and 1940 the number of miles of paved roads nationally more than tripled, from 387,000 to 1,367 million, and America's love affair with the open road was in full swing.

Ohio's progress toward establishing an efficient road system began slowly. The Ohio Highway Department's initial objective was only "to instruct, assist and co-operate in the building and improvement of the public roads... in such counties and townships of the State of Ohio as shall comply with the provisions of the act." It was several years before the Department played more than an advisory role. No money had been appropriated to pay for offices for the new agency, so the employees were allotted "two narrow, badly-lighted rooms" with the Board of Agriculture. The Commissioner himself spent $177.50 for office furniture.

The first authorization of state money for road improvements was $10,000, to be divided equally among the 88 counties as a 25 percent match to local funds. In the first year only one county, Highland, applied for money.

The Department's top highway priorities of the day were the construction and maintenance of rural roads. The general quality of highways was so poor in those early years that the Department also issued specifications for various aspects of road building, such as drainpipes and grading. It was a modest beginning.

It was immediately evident that the state's 25 percent contribution to road improvement was not enough to enable local authorities to construct first-rate roads. Ohio soon increased its share to 50 percent, but the money was restricted to repairs on existing roads and the Highway Department had no quality control over the work.

For many years the vast majority of public thoroughfares in Ohio were dirt roads, so the Highway Department took an interest in developing and testing new surfacing methods and materials. In 1909 the legislature appropriated $5,000 to set up a testing lab at The Ohio State University. The Department also designated sections of roadway for experimental construction with a variety of paving materials. A stretch of experimental pavement in 1912 included 16 different kinds of brick, one segment of asphalt block, and pavement mixtures known as petrifalt and Hassam. None was proof against rutting of the underlying soil caused by the
Deep-strength asphalt as far as the eye can see along US 35 testifies to Ohio's asphalt revolution. Courtesy Valley Asphalt Corp.
growing number of motor vehicles. Rutting of the underlying soil became such a headache to highway engineers that transportation authorities erected signs warning drivers not to follow the tracks of the vehicle in front of them.

As highway improvement funds quickly amounted to more than half a million dollars, they went toward upgrading dirt roads to macadam. The Highway Department’s stated aim was the improvement of rural highways in order to get children to schools, increase the value of farmland, move troops in time of war and entice families to the suburbs, where they could raise vegetables, keep a cow and chickens and enjoy the healthy country air within commuting distance of urban jobs. In those days, this was not yet known as urban sprawl.

During the early teens, the state began to organize its bits and pieces of roadways into a “continuous and connected” highway system. Legislation passed in 1915 conferred on the county surveyor, the forerunner of today’s county engineer, the title of “resident engineer for the State Highway Department.”

World War I drew national attention to the inadequacy of roads under the stress of motorized vehicles, especially military equipment. As such, much of the roadwork during those years was concentrated on high-priority military needs.

With the end of war, the state of public roads again became an issue. Gubernatorial candidate A.V. Donahy ran in 1922 on the promise “to raise the mud quarantine on State Roads in Ohio.” Some counties still had fewer than 30 miles of paved roads. In 1923 bituminous surface treatment of several thousand miles of rural roads was begun, the first step in rendering secondary roads suitable for all-weather travel. Legislation also required counties to establish highway systems that linked with other inter-county systems.

Ohio instituted its first gas tax—two cents—in 1925. The state’s motor vehicle registration that year topped 1.35 million. Over a period of 11 years nearly 4,000 miles of rural highways were upgraded. In 1927, the gas tax was raised a penny. Half of all Ohio auto license fees and motor bus taxes also went to road maintenance and repairs. With the adoption in 1927 of the state highway system, the state finally abandoned its old procedure of working in cooperation with the counties on road improvement. Adding to the interlocking grid of state authority over highways, the Ohio State Highway Patrol was created in 1933.

The Great Depression was in some ways a boon to road building. In an effort to find work for the jobless, the federal government instituted a series of public works programs, including those of the Works Progress Administration (WPA). It financed the construction of 651,000 miles of roads around the country and was responsible for much of the roadwork done in Ohio through those difficult years. The tonnage chart on page 11 shows how the amount of asphalt used in Ohio rose sharply in the depths of the Depression.

During World War II roads of strategic importance to the war effort received priority attention. Construction not related to war priorities needed federal approval. Despite the constraints of these years, the Highway Department looked ahead to an ambitious $200 million post-war reconstruction plan, which included limited access expressways through urban centers, modernization of inter-city routes and rural road improvements.

But lingering materials shortages delayed large-scale construction for some time. Despite the rising number of cars on the roads, the emphasis in the early post-war years stayed on maintenance.

In 1953 the General Assembly raised the gas tax to five cents a gallon and passed a $500 million bond issue for highways. The opening of the Ohio Turnpike in 1955 brought Ohio its first major modern highway. With the passage of the Federal-Aid Highway Bill in 1956, federal interstate highway
funding was made available with a state share of only 10 percent. Although the federal government had levied a gasoline tax since 1932, it was only with the 1956 highway bill that the proceeds were specifically directed into a highway trust fund. The interstate system was the largest public works project in the history of the country. Construction in Ohio began in 1957. By 1966, 959 miles of interstate were open to traffic.

As the interstate system appeared to be nearing completion at the end of the 1960s, the Department began work on the Appalachian Development Highway System, a pet project of then Governor James A. Rhodes, to open 225 miles of four-lane highway in the southern part of the state. In 1970 ground was broken for Ohio's Highway Transportation Research Center, a $30 million facility on US 33 between Bellefontaine and Marysville.

In the early 1970s, the oil embargo and resulting energy crisis, along with the growing environmental movement, shifted the national focus to a broader-based transportation system. In response, Ohio’s Department of Highways was renamed the Ohio Department of Transportation. Although its new divisions of Urban Mass Transportation and Transportation Planning explored such issues as bus lanes and increased rail access, highways remained the Department's main focus.

The energy crisis also caused fuel consumption to drop 30 percent in the Midwest. Income from gas taxes fell accordingly. Through the rest of the decade funding lagged behind maintenance needs for Ohio’s 19,000 miles of roadway. Neither the interstate highway nor the Appalachian highway system was completed.

In 1981 the General Assembly raised the gas tax by four cents and, in a unique provision to the law, allowed for adjustment in the tax to compensate for a rise in road construction costs or a drop in fuel consumption. Although the interstate system was 94 percent finished, the remaining miles would cost almost two-thirds more than had been estimated originally for the entire system. But with new funding available at both the state and federal levels, ODOT let record amounts of both new construction and maintenance projects. The Legislature raised the gas tax twice in the 1980s to try to keep up with the need for resurfacing—estimated at 1,900 miles a year. In 1990 ODOT let nearly $1.1 billion in highway projects, the most ever in Ohio history.

With the new century, the final section of Ohio’s part of the interstate highway system, the Spring-Sandusky Interchange in Columbus, was under construction, ending a process that had begun more than 40 years before. By the time that last section of interstate was built, major reconstruction work was already underway on most of the earlier sections, this time using hot mix asphalt rather than Portland cement concrete, which had been used in the original construction.

The 20th century brought tremendous progress, often under difficult circumstances, in the extent and quality of roads in Ohio. Motorists got out of the mud and onto some of the best engineered highways in the nation.
Hot mix asphalt is known as a flexible pavement because its inherent pliability allows it to give under the weight of traffic and recover, conforming itself to imperfections in the subgrade while maintaining a smooth surface. Unlike a rigid pavement, which has to be strong to bridge those subgrade imperfections, HMA maintains contact with the subgrade, transferring the traffic load to the dry earth foundation that John McAdam identified as the basis of every good road.

Prevost Hubbard, one of the founders of the Asphalt Institute, concluded an address to the annual banquet of the Ohio Bituminous Concrete Producers Association in 1944 by extolling the virtues of asphalt pavement. He said that road builders “have been overlooking a big bet” by not seriously considering the advantage of “all bituminous concrete pavement in which both base and surface course are constructed of this material.”

The superiority of deep-strength HMA was discovered only over time, although people used bituminous products in paving when the principles of Telford, McAdam and their contemporaries were still fresh. To keep the dust down on early roads and bind the stones together more firmly, road builders used “tarmacadam” or tar poured over the top course of stones. The word “tarmac,” if not the process, has remained in the vocabulary to this day.

Some of the earliest bituminous pavement projects from the middle of the 19th century used coal tar as a binder. Others used sheet asphalt made from natural asphalt mined at Trinidad and Bermudez lakes in Venezuela. In the 1860s and 1870s manufacturers developed many varieties of pavements mixing bitumen and aggregates, had them patented and marketed them to governmental entities that were building roads. Some were very well-known, such as Topeka Mix and the Warren Brothers’ Bitulithic pavement.

Photo: Early road construction required much hand labor. This crew works with T-50 on US 50 in Ross County. 1933. Courtesy ODOT
The process used by J.L. and W.H. Hastings Contractors in Columbus had been patented by William Parisen in 1871. It combined gas or coal tar boiled with Trinidad Lake asphaltum, road metal, fine hot screened gravel, plaster of Paris and Portland cement. It was laid while hot, then rolled, then layered with hot rock mixed with coal tar and cement and rolled again, layer upon layer. In his self-advertising, Parisen scorned as an “absurdity” a rival mixture patented in 1869 by John L. Kidwell: It contained 40 pounds of asphalt, 15 pounds of coaltar or pine tar, five pounds of sulfur, 45 pounds of lime, 300 pounds of sand, 95 pounds of coal ashes, 100 pounds of powdered clay, fine gravel, ground iron cinder and iron slag, and five to 25 pounds of kitchen salt.

Over time manufacturers learned how to create asphalt from refined petroleum, and by early in the 20th century manmade asphalt had nearly replaced natural. When oil was first discovered in Ohio there was an attempt to use it to make asphalt, but the results were unreliable because there wasn’t enough base in the crude. Mideast crude, which was readily available, produced a superior product. While the development of better mixes depended largely on trial and error, not science, progress was quick.

As automobiles and trucks took to the roads, they destroyed macadam surfaces and raised dust. Water-bound macadam no longer took the punishment of traffic. Rural roads were least likely to have paved surfaces, so they stood up least well to motor vehicle traffic. They needed dust-free, water-repellent surfaces. According to ODOT mix design records, hot mix asphalt was laid on thoroughfares in Lorain and Wood counties in 1916, and it may have been used on rural roads in Pike and Harrison counties even earlier.
Early in the century state highway departments were formed to bring order to the nation's road building needs. They soon turned their attention to trying to raise construction standards. One result of this interest in quality control was the proliferation of specifications, which varied from state to state.

In 1923, after the national Asphalt Association expressed concern, the U.S. Department of Commerce reduced the number of asphalt cement grades from 102 to just nine.

Once asphalt came into use, its annual production tonnage increased dramatically, although sometimes in fits and starts. In the first half of the 1920s the state's rural road improvement program called for bituminous surface treatments. The hot mix asphalt tonnage chart (right) shows clearly the period during which Ohio farmers were raised out of the mud.

With the onset of the Great Depression, roads needed to be built and repaired, but money was in short supply. The search for low-cost products led to the widespread use of chip seals. A film of cutback, an asphalt cement thinned with naphtha or fuel oil, was sprayed on the road surface to make a sticky surface coat, then covered with a single layer of stone chips. For environmental reasons, cutback...
eventually was replaced by a water-based asphalt emulsion.

Hot mix asphalt also was a popular and economical surface course during the Depression, and many brick and macadam roads were surfaced and widened with it. The tonnage chart also shows the long-range trend toward the use of hot mix asphalt.

The most common top course in the 1930s was the hot mix, hot-laid dense-graded bituminous concrete called T-50. It had two drawbacks, however. The specified compaction rate for it (150 to 200 square yards per hour per roller) was slow, which caused contractors to complain about the low annual tonnage that could be laid. It required a relatively high mixing temperature, too, so it took longer to be traffic-ready, and construction detours had already become a common complaint of motorists.

“The bituminous industry, ever anxious to score, forthwith advanced on a lateral pass,” Your Thoroughfare reported. The industry started to switch to an asphalt mix called T-35 that used an 85 to 100 penetration asphalt cement, allowing lower temperature mixing, better compaction and earlier access to motorists. Within 10 years it had almost completely replaced T-50 and remained the dominant surface course until about 1975. T-35 was renamed 404 in the mid 1960s, when the Highway Department rewrote its entire specifications book, adopting the format and numbering system of the American Association of State Highway and Transportation Officials (AASHTO).

The contemporary perception of asphalt in the 1930s as an economical topcoat for roads is clear in the following passage from The Ohio Department of Highways Triennial Report for 1935-37: “The adaptability of bituminous concrete for salvage work in widening and resurfacing the great mileage of old pavements that are too narrow and rough for present day traffic needs is perhaps responsible for the widespread popularity of this type of pavement.”

In this and a later report from the 1940s, the Highway Department acknowledged a trait that
would help make asphalt the most popular road construction material. In 1943, the Highway Department wrote, “This type of construction has proven to be popular because the improvement can be made without closing the road to traffic and the new pavement is ready for use soon after its compaction is completed and also because it is possible to complete an extensive mileage during the normal construction season.” In 1946, 279 miles of old pavement in Ohio were widened and/or resurfaced with asphalt.

The quality of asphalt pavement also improved as the result of wartime needs. Pre-1940s pavements carried maximum loads of 12,500 pounds. Military airfields required runways that would carry 37,000 pounds per wheel of rolling loads. Asphalt technology rushed to meet the demand. This was a theme throughout the history of the product, as again and again quality improvements drove asphalt to industry leadership.

Short of men, equipment, gasoline and road contracts, the asphalt paving business in Ohio hunkered down during the war years. Many companies stayed in business by bidding minor street work and slimming down their operations while their employees served in the armed forces. Dick Stander said his father’s business, Mansfield Asphalt Paving Co., cut back to one asphalt plant, scrapped its three-wheel Buffalo Springfield roller and sold its earth-moving equipment while he was away in the service.

Most road construction in Ohio in those days was in the hands of families, like Mansfield Asphalt Paving Co., Schloss Paving Company, H. P. Streicher, Inc., Brewer & Brewer Sons and Johnson Paving Co. Many started as aggregate companies that transitioned into asphalt as macadam roads began to be paved. Others owned or made deals with aggregate suppliers, and most companies operated on the local or regional level.

Asphalt was not the preferred highway construction material in Ohio for half a century or more. It wasn’t until the American Association of State Highway Officials (AASHO) conducted road tests in 1956 to 1960 in Illinois that the benefits of deep-strength asphalt pavement started to become widely appreciated. When the 241-mile-long Ohio Turnpike was constructed between 1952 and 1955, preference for concrete was still so engrained that all four lanes were made of rigid pavement, as was the vast preponderance of Ohio’s interstate system.

Asphalt’s place at the center of highway construction in Ohio was ensured when, in the 1960s, the Ohio Highway Department adopted a hot mix base material. Studies by the AASHO in Illinois and the Ohio Department of Highways in the 1960s were highly influential on the industry. The first modern deep-strength asphalt pavement in Ohio was designed for SR 376 in Morgan County in 1966; the first actually to be completed was SR 279 in Jackson County in 1969. From that time on, the use of hot mix asphalt for construction of major roads began to grow rapidly.
At the direction of Willis Gibboney, then Staff Flexible Pavement Engineer, Bureau of Construction, highway engineers Jim Scherocman and John Riley studied a number of sections of old flexible pavement in Ohio, including a high-traffic corridor of the Dixie Highway between Bowling Green and Perrysburg opened to traffic in 1940, which had been used for heavy military traffic during World War II. On that particular stretch, the original northbound lanes, which opened to traffic in 1940, had a 12-inch water-bound macadam base course and a four-inch surface course of bituminous macadam.

The results of the study, released in 1968, were eye-opening. On the 23 highway samples studied, the average length of time between construction and the first overlay was 15.3 years. The piece of highway in Wood County was resurfaced for the first time with an inch of 404 asphalt concrete in 1965. Two of the projects had only one overlay in 39 and 41 years of service. Ten years later the study was updated. "The findings held up big-time," Gibboney said.

In 1993-'94 Gibboney did another study for Flexible Pavements, Inc. comparing all adjacent stretches of rigid and flexible pavement that were completed on Ohio's interstate system and opened to traffic at approximately the same time. He studied original construction costs and maintenance costs over the life of the pavement. "I was surprised that cost advantages [of asphalt] held in all five locations," Gibboney said. Both initial construction costs and maintenance over time were cheaper for flexible pavement, he found. Attitudes toward the use of asphalt shifted so much since the Ohio Turnpike and interstates had been built of concrete that when increasing traffic volume required additional lanes to be added, they were made of deep-strength asphalt in almost all cases.

Not only did asphalt prove itself to be superior as a surface pavement, but appreciation for the qualities of deep-strength asphalt rose as well. Before the mid 1960s a major flexible pavement foundation was water-bound macadam of fist-sized limestone 6 to 10 inches deep, with the voids filled with sand. Several interstate jobs in the Toledo area (I-75 and I-475) were built with this foundation and a hot mix asphalt surface.

But the method was relatively labor-intensive and susceptible to weather delays. The last job Willis Gibboney can remember being done this way was a section of I-75 near Bowling Green, completed in
1966. Thereafter, deep-strength asphalt was seen as a sound and more economical alternative. “Hot mix is no fooling around with weather delays,” Gibboney said. “It’s a one-shot thing.” By 1970 asphalt was nearly all-season, too. The Department of Highways modified its rules to allow paving to be done at 35˚F for courses of three inches or more.

Inside the ODOT laboratory, there was yet another leap forward. “The greatest thing was the fact that we went from penetration graded asphalt to viscosity graded,” said Jack Rettig, who helped develop viscosity grading at the ODOT lab in the early 1970s. The problem with penetration grading, Rettig said, was that it didn’t tell a contractor much about the viscosity of the asphalt. Two asphalt cements produced by two different oil companies might have the same penetration grading but a different viscosity.

Grading based on viscosity, however, gave contractors a better idea of the consistency of their mix, how well it would roll and how soon it would set up. “One contractor could be working on a job a block away and using a different asphalt, but they would work the same,” Rettig said.

The 1970s also saw a major shift in the way the job mix formula was designed and quality control and quality assurance (QC/QA) were performed. Prior to this time, ODOT did all mix designs, quality control and assurance. State inspectors tested for asphalt content and a combination of aggregates, using a formulation developed in the laboratory based on aggregate characteristics.

Ohio has a large number of aggregate types, however, and by the 1970s the number of asphalt plants had multiplied as well. With the large amount of work being done on interstates at that time, ODOT no longer had enough inspectors to cover all the bases. It changed its specifications to require contractors to do the mix design and perform quality control. Each asphalt company must have a quality control plan that is approved and monitored by ODOT. Quality assurance continues to be done by ODOT from samples taken from behind the paver on the job.

This supplemental specification was named 848. It signaled the introduction of the Marshall Mix design method into Ohio for the first time. It also made Ohio one of the leaders in shifting responsibility for mix design and quality control to the contractors. This specification was followed by 448 and then 446, which required the contractor to test for density. Twenty years later, many other states were just getting around to adopting QC/QA.

Recycling became a trend in the asphalt business as it did in suburban neighborhoods. For asphalt the incentive was the energy crisis of the 1970s with its sky-high oil prices. Flexible Pavements Executive Director Bill Baker wrote an article in a 1978 issue of the newsletter entitled “Pavement Recycling: Key to the future or a hopeless dream?”

The answer became clear in subsequent years. In 1980 the state’s first major hot mix recycling project took place: Six and a quarter miles of Cleveland Avenue in Stark County was replaced with a 50/50 recycled-to-virgin material by Thomas Asphalt Paving Company of Kent. What began as a response to high oil prices has come to be a real asset to the asphalt industry. With more than 70 million metric tons recycled every year, asphalt is now the most recycled material in America.
The energy crisis of the 1970s also led to the opening of new oil sources all over the world. They produced asphalt of variable quality and performance. The search for consistent performance and better construction methods led Congress in 1987 to appropriate $150 million to create the Strategic Highway Research Program (SHRP). The lion’s share of the dollars went toward asphalt research to reduce rutting and low temperature thermal cracking.

The SHRP stimulated a surge of interest in asphalt paving research in universities across the country that continues to this day. It led to the development of the breakthrough Superpave mix design method, incorporating performance grade binders and using a Superpave gyratory compactor to test the compaction of pavement under heavy traffic. In Ohio it has displaced the Marshall mix design method for high-volume roads.

Today asphalt additives help protect the pavement from temperature variations. Advances such as large stone bases, stone matrix asphalt (SMA) and Superpave extend the life of asphalt pavements. In the testing field, the gyratory compactor allows testing labs to simulate real-world traffic. A new asphalt binder grading system can now account for seasonal change and traffic volume.

Perpetual Pavement, a three-layer HMA pavement design introduced in 2001, makes the biggest promise of all. A rut-resistant layer lies on top of a crack-resistant layer, and both are covered with a top course that takes all the wear and tear of highway use. Only the surface of the pavement ever has to be milled and replaced, saving money, materials and immeasurable traffic delay time. It lasts virtually forever, with minimal periodic maintenance. And it has turned the “hopeless dream” into a matter of fact: Perpetual Pavement is 100 percent recyclable.

Today’s superhighways, with high-speed traffic from thousands of cars and heavy trucks, bear little resemblance to early rural roads with penetration asphalt or T-50 over a macadam foundation.

As asphalt pavements have developed over the past century, the paving industry has changed, too. Family-run businesses in some instances have been replaced by regional and even global enterprises, as widespread consolidation has occurred. Freestanding asphalt or aggregate companies have given way to vertically integrated enterprises that combine asphalt, aggregate and performance grade binder production.

This sort of growth is partly a search for greater efficiency. It also reflects the need for big bidders on the large federal highway projects funded by the TEA-21 highway bill of 1998, which appropriated 40 percent more federal dollars for highways. So today’s asphalt paving company, while still managed locally, may have a home office as far away as France or Ireland.
Ohio has played a major role from the beginning of the asphalt paving industry in the development of asphalt plants and the production of internationally recognized paving equipment. Improvements in these areas have been just as significant as they have been in the quality and durability of asphalt pavements, thanks to the industry’s continuing quest for a better product.

Heating and mixing asphalt and aggregate into an effective paving compound had always been a major part of the challenge in using HMA. Significant strides have taken over the past half-century in making production more efficient and consistent.

The mechanics of mixing batches of tar and aggregates took some time and ingenuity to develop. By the mid 19th century stationary and portable mixing plants had been invented using rotating cylinders and wooden paddles. One of the earliest manufacturers of asphalt plants was the Cummer Co., which began in Scotland but moved to Cleveland in 1870 and made Ohio one of the biggest names in that field for many years.

Till the middle of this century all asphalt was mixed in batches. For decades, plants had a dryer to dry the aggregates and a mixer to mix the asphalt cement with the aggregates. Heated aggregates passed from a dryer by conveyor belt to the top of the plant, where they were sorted by size through a screen deck. The sorted aggregates fell into separate...
Mansfield Asphalt Paving Company’s Mar-Zane Plant 21 in Mansfield received the 2001 Ecological Award from Flexible Pavements of Ohio and the National Asphalt Pavement Association. Courtesy Shelly & Sands, Inc.
bins. Then an operator would pull levers to measure quantities from each bin according to the mix design. Once the aggregates had been measured into the mixer, or pug mill, the heated asphalt cement would be injected and mixed with the aggregates.

With the development of the drum mixer and other innovations, the modern asphalt plant has combined the processes of drying and mixing into a continuous process that greatly enhances the production capacity of the plant. Electronic control of the mixture’s proportions and electronic storage of mix designs have improved consistency. Surge bins now hold hot mixtures so that the plant production rate no longer limits laydown capacity, and pneumatics have replaced muscle power in opening and closing bins.

Despite the fluctuation in oil prices during the 1970s and 1980s, manufacturers were able to keep...
asphalt mixture prices down relative to other commodities partly because of these technological improvements. Today’s multiple-barrel drum mixers have efficient pollution controls and allow manufacturers to mix greater proportions of recycled asphalt at high temperatures. The modern plant can produce 5,000 tons of hot mix asphalt a day with just a few workers, whereas in the past 1,000 tons a day was a huge accomplishment.

Batch plants have not become obsolete, however. Ray Schloss of Schloss Paving Co., the oldest paving company still operating in Cleveland, bought a drum mix plant in recent years. It is more efficient and makes mix designs in quantity much faster for large-scale projects. However, Schloss also acknowledged the continuing value of the batch plant because it is better suited to the smaller retail customer. “We try to keep all our customers happy,” Schloss said. “The customer is king.”

Pollution control requirements in the 1960s also resulted in the installation of wet scrubbers or baghouses at all asphalt plants to control dust. In addition, asphalt producers found they could improve production by extending the working life of hot mixed asphalt in surge bins or storage bins, which came into use during that same decade. Finally, the self-erecting automated asphalt plant, which could be set up in one day, brought high-quality, consistent hot mix right to the project site.

These innovations did away with the limiting factor of how much a plant could produce; today, it is possible to take full advantage of the laydown
capacity of modern paving machines.

Methods of laying asphalt have also improved. In times past, the work of road construction was labor-intensive. Aggregates were broken by hand and sized by passing the pieces of stone one at a time through measuring rings. Later, road crews armed with shovels, rakes, brooms and lutes spread and leveled hot asphalt mixtures, followed by a horse-drawn roller. But the steam and internal combustion engines caught up with road construction as they did with other industries and ended much of the handwork.

Ohio played an outstanding role in the history of asphalt road construction. It once had more road building equipment manufacturers than any other state in the country. Most contractors were familiar with Buffalo Springfield, Jaeger and Baker machines. But the company with widest reach and recognition was the Galion Iron Works and Manufacturing Company in Galion, Ohio.

Founded in 1907 by D.C. Boyd and other local businessmen as the Galion Iron Works Company, it began as a foundry that produced Ideal cast iron culverts, catch basin grates and other road accessories. In 1911 it introduced its first piece of construction equipment, a horse-drawn road grader.

The first Galion self-propelled motor-grader, with a tractor engine, came on-line in 1922. About the same time, the company also introduced a steam-powered three-wheel roller. But it was the introduction of the gas-powered Little Master roller,
both cheap to run and easy to operate, that made its mark on the road building industry.

Under the ownership of Jeffrey Manufacturing Company after 1929, and the management of Boyd’s three sons—C. Findley, John S. and Ralph E.—Galion continued to be the nation’s leading manufacturer of road rollers. One of the most popular was a portable pull-roller brought out in 1935 that could be moved easily from job to job. Galion’s first vibratory roller, the V-O-S 84, came out in 1970.

During World War II the U.S. Army Corps of Engineers standardized grading equipment against the Galion motorized grader over other competing products, and Galion became a watchword in the road construction equipment industry. The company had dealers all over the world and a grader-blade factory in South Africa. Galion’s parent company was acquired by Dresser Industries in the 1970s, then by Komatsu, which closed the Galion plant in 1999 but still produces a line of road graders with the famous Galion label.

For many years placement was done by spreading hot mix asphalt out of the back of a truck with a lot of hand labor by the road crew, followed by the screed moving along the side forms striking off the mix. A revolution in mechanizing this process came in 1934, when Barber-Greene introduced two models of finisher, Model 79 and Model 879, with a floating screed and tamping bar. This type of finisher was so well suited to its tasks that it remained the standard in the industry for more than 20 years and is the basic concept still used today.
An automatic screed was developed in the 1950s. It followed a string line along the grade and electronically sensed variations in grade; pavement levels could be adjusted to a tenth of an inch over 50 feet. The string line was largely replaced with the introduction of the extended length ski and other devices now found on pavers. Dual-lane pavers were introduced that could lay two full lanes without a center seam. The first asphalt paver on pneumatic tires was produced in 1953 by the All-Purpose Spreader Company of Elyria. Again, Ohio led the industry in laydown equipment as it had for decades with asphalt plants.

While earlier pavers and rollers increased in size and power, later developments in paving machinery often involved automation and computerization. Early pavers did not have slope control. Because they followed the contour of the foundation, they might create pavements with an uneven slope. The modern paver is capable of fine control of the grade and cross slope. The operator can control the width while the machine is in motion, to widen at a ramp, for example.

Vibratory compactors have been added to the road building equipment inventory in recent years. They increase roller compaction efficiency and provide better density to eliminate rutting under truck tires and reduce voids where air and water, pavement’s two archenemies, may intrude.

“The whole industry is very technology conscious,” said Ray Schloss. Thanks to that consciousness, the industry has set a high standard of achievement while keeping costs in line. It’s been a winning combination for asphalt.
A vibrating roller works on I-70 east during major reconstruction in 2001. Courtesy Kokosing Construction Co., Inc.
In the fall of 1932, in the depths of the Great Depression, C.W. (Cliff) Simpson, president of Federal Asphalt Paving Company in Hamilton, set up an office in Columbus supported in part by a $25 a month contribution from the Texas Company (Texaco). His aims included furthering the use of bituminous road construction and reconstruction in Ohio and developing “a harmonious spirit within the industry.”

Simpson worked on his promotional task for more than a year, until finally, in January 1934, he brought together a group of asphalt paving contractors at the Deshler-Wallick Hotel in Columbus to form the Ohio Asphalt Paving Constructors Association (OAPCA). One of the big issues the organization faced that year was the growing diversion of gas taxes from highways to unemployment relief and school financing. As to asphalt’s ability to compete for whatever jobs there were, association president Carl Stander wrote in an OAPCA bulletin, “Seven or eight paid concrete promoters and a powerful brick association with money and several full time employees will bring out work regardless of the economy or desirability of their types.”

Born in hard times, when contractors found a common interest in survival, the OAPCA was the first organization dedicated specifically to promoting asphalt paving in Ohio. It was succeeded in 1943 by the Bituminous Concrete Producers Association (BCPA), which began with eight members. By the end of the first year it had 33 members. In 1944 it started publishing a newsletter called Your Thoroughfare, and Fred Swineford was named Engineer-Director. In 1945 the organization hired Lloyd “Pat” Burgess, who directed it for more than a decade. The group’s major goal from its inception was to increase the tonnage of asphalt contracts let by the Ohio Department of Highways to one million tons a year.

Ohio State University engineering students observe bituminous concrete being rolled on a macadam base on SR 3 in Delaware County, 1947. FPO archives
As it was, so little work was being done in Ohio and elsewhere in the years just after World War II that Your Thoroughfare printed a lead article entitled “Ouch!” in its August, 1947 issue. It began, “For lack of news, we print the January issue of the publication of the New York State Bituminous Concrete Producers Association, who for lack of news, prints an excellent article about a 644,000 ton job in the State of Maine.”

In 1958, a young woman named Jean Schlaechter went home after interviewing for a job with the BCPA and told her mother she didn’t think she could put up with the primitive conditions in the office there. Her mother counseled her to take the job until something better came along. Schlaechter took her mother’s advice and ended up managing the office at BCPA and then Flexible Pavements for 40 years under a succession of six directors.

In the office she shared with Lloyd Burgess in the old Kresge Building at the corner of State and High streets in Columbus, Schlaechter (later Snyder) sat at a wooden secretarial desk. She said the pull-up typewriter arm shook so hard when she typed that the margins bounced out of place when the carriage returned. At least the typewriter was electric, she remembered fondly. Burgess and his old rolltop desk were just across the room, where he freely used the spittoon at his feet.

Burgess soon retired and was replaced by Frank Williams, formerly with the Department of Highways, District Six. Williams authorized the purchase of some used office equipment left over from a political campaign, including a couple of desks “for next to nothing,” according to Snyder. Soon they saved enough to buy an old mimeograph machine for making copies.

Every other Tuesday Snyder went over to the Highway Department to cover the highway lettings. She took down the project bid numbers, went back to the office, cut a 12-to-16-page stencil, ran it off on the mimeograph machine and mailed it out to the 30 or so association members the same day. Of the paving contracts let back then, “We just got the crumbs,” Snyder recalled. There were lean times when she scrimped and saved on office supplies and wasn’t sure the Association could meet payroll.
Up to this point, despite the best efforts of the BCPA, concrete was in the driver’s seat of Ohio’s highway construction industry, while asphalt was still considered a maintenance material. In the early 1960s Ted Kirkby of S.E. Johnson Company, Inc. in Maumee was appointed chairman of an organizational committee to explore the merger of two statewide trade organizations—BCPA and Macadam Pavements, Inc. He was one of the prime movers in the formation of Flexible Pavements, Inc. in 1962. Most BCPA members were enthusiastic about the venture. “Proceed with all possible vigor,” wrote Bill Wynn of McCourt Construction Company. He suggested that the group adopt the slogan “More Mainline.”

Bernard Witten was hired from City Asphalt Paving Company as interim director of Flexible Pavements, Inc. He led the fledgling organization for a year, until being replaced by Dale Fulton, who had been director of Macadam Pavements, Inc. Over the next 40 years, the Association offices were in the Neil House, until it was torn down in 1983; then in the third floor of the French Tailor building at 20 South Front Street, directly across the street from the new Highway Department offices; and finally in its present quarters next door in the Huntington Plaza building. Jean Snyder saw the Association through all these moves.

Flexible Pavements began to publish its newsletter in 1966. The six-times-yearly publication was named Flexible Pavements. The new organization also began an unbroken run of “legendary” annual conventions featuring celebrity speakers, such as newsmen Paul Harvey, Harry Reasoner and David Brinkley, in addition to break-out sessions on matters of interest to members. The convention’s first-rate trade show, the envy of asphalt paving associations around the country, was larger than many national shows.

Both the newsletter and the conventions reflected the changing times in the industry. The third issue of Flexible Pavements contained an article on the growing use in the industry of electronic devices, such as electronic scales in conveyor systems and push-button control panels in aggregate production facilities. Partly because of savings...
realized from automation, hot mix asphalt pavements cost less in 1966 than they had 10 years before.

In 1969 William A. Brewer of Pinckney P. Brewer & Sons Company and The Brewer Company wrote in Flexible Pavements that back in 1964 he had predicted that some day asphalt production would be controlled by one white-collar worker. Just five years later four of his companies’ six plants were fully automated.

During the 1970s, environmental mandates and the fall-out from the Arab oil embargo (loss of highway money and rise in oil prices) remained major concerns. In 1973, as the asphalt industry attempted to cope with federal environmental laws and a blizzard of regulations issuing from the new Ohio Environmental Protection Agency, one writer lamented, “The day seems to be gone when reasonable, clear-minded men can gather around a table and arrive at sensible answers to anything.” Annual meeting topics in 1978 included energy resource development and conservation, recycling and Ohio EPA policies and regulations affecting asphalt plants.

Whatever the challenges of the 1970s, the asphalt industry’s rewards were abundant. As the concrete interstates aged, they began to require major repairs. The situation offered a great opportunity for asphalt. Large portions of the interstates were resurfaced or replaced— with hot mix asphalt. Two thousand yards of concrete slabs were torn out of a section of I-90 in Ashtabula County in 1977 and replaced with 10 inches of 301 asphaltic concrete base. In the fall of 1978, seriously deteriorated concrete sections of I-70 east of Columbus and I-76 east of Akron were covered or replaced with asphalt. Since Flexible Pavements, Inc. had been formed, the face of the industry had changed completely. Asphalt pavement, once a poor cousin to rigid pavement, had become the reigning choice for highway construction.

For 15 years during the 1970s and ’80s, Flexible Pavements, Inc. was led by executive director Bill Baker, former deputy director of Highways. Baker was quoted as saying that when he first walked in the door of the Association, the most technical document in the office was the Wall Street Journal. He immediately set about establishing a more businesslike atmosphere, restoring the Association’s technical credibility and positioning HMA from a maintenance material to “more mainline.”

In his long tenure in office, Baker was widely respected for his leadership in the industry and also for his complete identification with the interests of asphalt paving in Ohio. He became a dominant figure on the national scene, where many people looked to him for advice and guidance. He heavily promoted the “fractured slab” technique for breaking up existing concrete highway slabs to be used as the base for new HMA pavement. Today, in the form of rubblization, this is an accepted technique for rehabilitating old pavements.

After his untimely death in 1991, the Bill Baker Award was established as Flexible Pavements’ highest honor for service to the industry in Ohio.

The 1990s marked a revolution in the asphalt paving industry in Ohio and in the operations and philosophy of Flexible Pavements, Inc. Under the administration of Gov. George Voinovich and ODOT Director Jerry Wray, ODOT completely revamped its operations. Because ODOT is Ohio asphalt’s biggest customer, buying 40 to 60 percent of all the asphalt produced in the state, the kinds of changes it instituted in the ’90s required corresponding changes in the asphalt business.

ODOT introduced new management systems, streamlined and opened up its contracting processes and developed its first strategic plan. It announced a policy of emphasizing quality in pavement construction over bottom-line bidding. It sped up the process of issuing plans. It formed the Transportation Advisory Council to take charge of the highway construction planning process and funding prioritization. Through downsizing, it freed $50
Flexible at 40

The Asphalt Revolution

Flexible Pavements, Inc. regarded the changes at ODOT to be more than rhetoric. "We reacted and treated the Department differently," said President-Executive Director Fred Frecker. Under Frecker’s visionary leadership, FPI set to work and developed its first strategic plan. Recognizing that quality was now a high priority with ODOT, the Association made quality an equally high priority within the asphalt paving business. That priority has remained the same ever since, driving a number of the Association’s initiatives.

The Federal Strategic Highway Research Program had made substantial funds available for asphalt research for the first time, which led to such technological improvements as Superpave and performance graded binders. The industry was ready and willing to meet ODOT’s quality challenge that Flexible Pavements approached the Department about putting warranties on asphalt road work, and ODOT launched five pilot projects to test the idea. Before the Ohio General Assembly mandated warranties, Flexible Pavements was already on board.

Likewise, the Association recommended that the Department use polymers in pavement surface courses on high-volume roadways to improve quality, a step that would actually reduce tonnage sold by driving up the cost of the pavement. Recognizing that improved quality would secure the market over time, however, Flexible Pavements took the long view. The Ohio Society of Professional Engineers gave the Association its New Product of the Year award in 1998 for this step. With such...
Over the past decade Flexible Pavements, Inc. (now Flexible Pavements of Ohio) has also created strong ties with academic institutions in order to encourage study of asphalt paving engineering and research into paving processes and techniques. Before this initiative, none of Ohio’s 10 university civil engineering programs offered courses dedicated to asphalt technology in its curriculum. The Association established a scholarship program in 1995 that awards 25 to 30 scholarships a year to Civil Engineering and Construction Management majors who agree to take a course in asphalt. With incentives such as these, university programs have responded. Today six of the 10 programs in Ohio offer a course in asphalt technology. The HMA industry supports these courses by offering instructor training, a textbook and course materials.

The Association also designed a hot mix asphalt performance competition for university students akin to existing bridge construction competitions. Interest in the competition has spread to Wisconsin and West Virginia and sparked a “national” championship.

Following the business model that ODOT adopted in the 1990s, Flexible Pavements began to issue an annual report in 1992, marking achievements toward the goals outlined in its strategic plans. The same year, the newsletter was reformatted and renamed Ohio Hot Mix Asphalt Current News; it now focuses on industry and government news. FPO joined the electronic age with the creation of its Web site in November 1998. This has been a valuable, far-reaching communications tool for members, the public and others interested in hot mix asphalt pavement.

The single most frequently used feature is the live on-line broadcast of ODOT lettings, which gives members access to real-time information that affects their businesses—a far cry from the mimeographed reports of 1962.

By educating professionals and the public about the superior qualities of asphalt paving, by constantly improving its product, keeping prices down and joining eagerly in the trend toward quality control, the asphalt industry now represents 98.7 percent of all paved surfaces in Ohio. The Association has grown to 140 members. Thanks to a progressive vision translated into determined action, the quality of Ohio’s highways has never been better, and the future for new and improved asphalt paving has never been brighter.

Congratulations to Flexible Pavements of Ohio for 40 years of leadership in the asphalt paving industry.
Flexible Pavements of Ohio Executive Directors

Bernard G. Witten 1962

Dale E. Fulton 1963-1976


Fred F. Frecker 1992-present
## Flexible Pavements of Ohio Chairmen of the Board

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>Arthur Schultz</td>
<td>H&amp;S, Inc.</td>
</tr>
<tr>
<td>1966</td>
<td>Arthur Schultz</td>
<td>H&amp;S, Inc.</td>
</tr>
<tr>
<td>1967</td>
<td>Bill Rhodes</td>
<td>American Aggregates</td>
</tr>
<tr>
<td>1968</td>
<td>Robert Heston</td>
<td>Shelly &amp; Sands, Inc.</td>
</tr>
<tr>
<td>1969</td>
<td>John Morgan</td>
<td>Tri-State Asphalt Corp.</td>
</tr>
<tr>
<td>1970</td>
<td>Paul Miller</td>
<td>Miller-Mason Paving Co.</td>
</tr>
<tr>
<td>1971</td>
<td>John “Jack” C. Jurgensen</td>
<td>Valley Asphalt Corp.</td>
</tr>
<tr>
<td>1972</td>
<td>Don Mill</td>
<td>The L.P. Cavett Co.</td>
</tr>
<tr>
<td>1973</td>
<td>Raymond Schloss</td>
<td>The Wm. L. Schloss Paving Co.</td>
</tr>
<tr>
<td>1974</td>
<td>Henry Garlick</td>
<td>The City Asphalt Paving Co.</td>
</tr>
<tr>
<td>1976</td>
<td>James Walls</td>
<td>Walls Brothers Asphalt Co.</td>
</tr>
<tr>
<td>1977</td>
<td>M.H. Leahy</td>
<td>The McCourt Construction Co.</td>
</tr>
<tr>
<td>1978</td>
<td>James Morris</td>
<td>Clinton Asphalt Paving Co.</td>
</tr>
<tr>
<td>1979</td>
<td>Arval Graff</td>
<td>Standard Materials, Inc.</td>
</tr>
<tr>
<td>1981</td>
<td>Charlie Stayton</td>
<td>Triasco Corp.</td>
</tr>
<tr>
<td>1983</td>
<td>Charles “Chuck” Rauh</td>
<td>Northern Ohio Paving Co.</td>
</tr>
<tr>
<td>1984</td>
<td>Gerald “Jerry” Jones</td>
<td>Walter Jones Construction Co.</td>
</tr>
<tr>
<td>1985</td>
<td>John “Jack” C. Jurgensen</td>
<td>Valley Asphalt Corp.</td>
</tr>
<tr>
<td>1986</td>
<td>Charles “Chuck” Rauh</td>
<td>Northern Ohio Paving Co.</td>
</tr>
<tr>
<td>1987</td>
<td>Jerry Churchill</td>
<td>Churchill Construction Co.</td>
</tr>
<tr>
<td>1988</td>
<td>Charlie Stayton</td>
<td>Triasco Corp.</td>
</tr>
<tr>
<td>1989</td>
<td>Don Mill</td>
<td>The Shelly Co.</td>
</tr>
<tr>
<td>1991</td>
<td>Don Weber</td>
<td>S.E. Johnson Co., Inc.</td>
</tr>
<tr>
<td>1993</td>
<td>James “Jim” P. Jurgensen</td>
<td>Valley Asphalt Corp.</td>
</tr>
<tr>
<td>1995</td>
<td>Brent Gerken</td>
<td>Gerken Paving, Inc.</td>
</tr>
<tr>
<td>1996</td>
<td>Peter “Pete” M. Alex</td>
<td>The Osterland Co.</td>
</tr>
<tr>
<td>1997</td>
<td>William “Bill” G. Heffner</td>
<td>Agg Rok Materials</td>
</tr>
<tr>
<td>1998</td>
<td>Doug Anderson</td>
<td>Columbus Bituminous Concrete Co.</td>
</tr>
<tr>
<td>1999</td>
<td>James “Jim” S. Tharp</td>
<td>The L.P. Cavett Co.</td>
</tr>
<tr>
<td>2000</td>
<td>Dean Wikel</td>
<td>Erie Blacktop, Inc.</td>
</tr>
<tr>
<td>2001</td>
<td>Paul L. Scala</td>
<td>Highway Asphalt Co.</td>
</tr>
<tr>
<td>2002</td>
<td>Michael “Mike” D. Thompson</td>
<td>Barrett Paving Materials, Inc.</td>
</tr>
</tbody>
</table>
Selected Readings

ARBA Pictorial History of Roadbuilding, Charles Wixom
Building the American Highway System: Engineers as Policy Makers, Bruce E. Seely (1987)
An Informal History of ODOT, Ron Poole (1995)
The National Road, Karl Raitz (1996)
An Outline of the History of Ohio’s Roads and Related Transportation Development (1949)
Pictorial History of the Galion Manufacturing Company (n.d.)

Acknowledgements

Our thanks to Willis Gibboney, Jack Rettig, Ray Schloss, Jean Snyder and Dick Stander for their contributions to this history. For photos and other assistance we are also grateful to the Asphalt Paving Alliance, Barrett Paving Materials, Inc., Caterpillar, Betty J. Fulton, Kokosing Construction Co., Inc., Northern Ohio Paving Co., the Ohio Department of Transportation, the Ohio Historical Society, PS Construction Fabrics, Inc., Ronyak Bros. Paving, Sarver Paving Co., SE Johnson Companies, Shelly & Sands, Inc., The Shelly Co., Southern Ohio Paving, Valley Asphalt Corp. and Margery Witten.