

Ohio Asphalt Interstates are Long-Lasting and Economical



Prepared for the Asphalt Pavement Alliance

Reconstruction of Ohio interstates has proven asphalt pavements to be long-lasting and economical. The structural courses of the original asphalt pavements have remained in service while concrete pavements of comparable age have been removed.

One ODOT official says that asphalt is more economical in initial cost. "It's less than concrete initially," he says, "and it's more economical in the long run, too, because you don't have to dig it up. When the concrete goes bad, you usually have to replace it. When you do that, it is a lot more expensive than resurfacing with asphalt." He adds that he hasn't encountered a situation where he has had to dig up an asphalt base. "Yes, you have to resurface an asphalt pavement, but you don't have to remove and replace the base."

Contractors reconstructing asphalt sections of I-71 and I-70 in Ohio say that they have been able to use 80 per-

cent of the original asphalt pavement that was built 29 years ago. They also say that other sections that they are rehabilitating have required the removal of the original concrete because it has worn out. They are replacing the concrete with Full Depth® asphalt.

"What's exciting about these projects," says Wayne Brasell, Vice President of Kokosing Construction Company's Asphalt Division, "is that we are able to use 80 percent of the original asphalt pavement, all the base layers, that were built in 1962. That speaks a lot for the durability and structural integrity of asphalt pavements."

The I-70 and I-71 projects that Kokosing is doing are the complete antithesis of one another. "On I-70, we are removing all the existing concrete and putting in Full-Depth asphalt," says Brasell. "On I-71, however, 80 percent of the pavement will remain in place. This allows us to complete the project in two years

rather than the three years needed for removal and replacement."

Studies Prove Asphalt's Structural Integrity

Conclusions from past road studies in Ohio show that asphalt pavements provide continu-

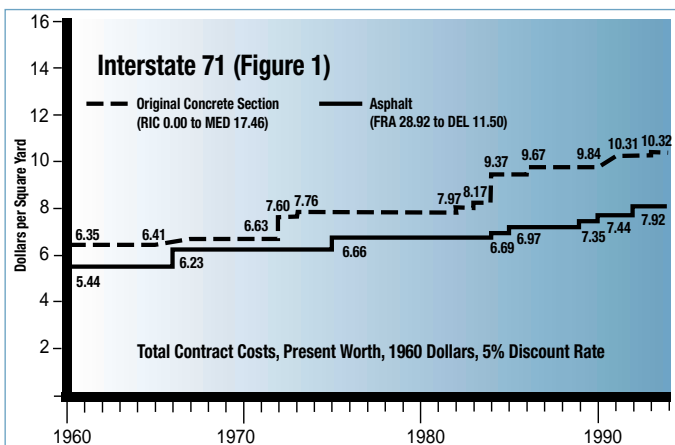


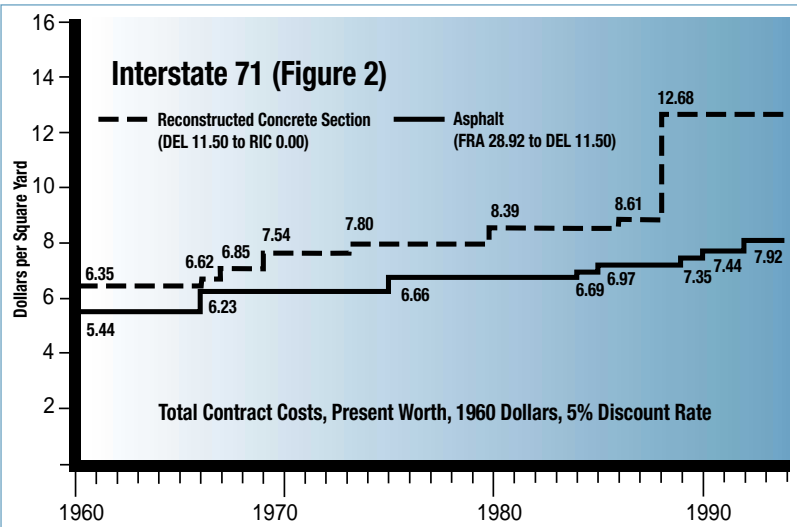
ous service for up to 34 years without need for major rehabilitation. They show that perpetual asphalt pavements cost less to build and less to maintain.

A 1994 hallmark study of Ohio's asphalt and concrete Interstate pavements showed that asphalt pavements have provided 25 to 34 years of continuous service and were less costly to construct and maintain than adjoining concrete pavements.

The study, done by a former Ohio Department of Transportation (ODOT) pavement engineer, showed that asphalt pavements:

- ▲ Provided more than 25 years of service without the need for reconstruction or major rehabilitation
- ▲ Cost less to construct and maintain than adjacent concrete pavements
- ▲ Had a lesser rate of increase in maintenance costs than the adjoining concrete pavements.





The first location, I-71—Franklin County to Medina County—began with the asphalt pavement section just south of I-270 in Franklin County and



The purpose of the study, done for Flexible Pavements of Ohio, was to compare the actual costs of adjacent asphalt and concrete pavements in the Ohio Interstate system. The actual costs were dollars spent to construct and maintain both types of pavements.

Similar Standards

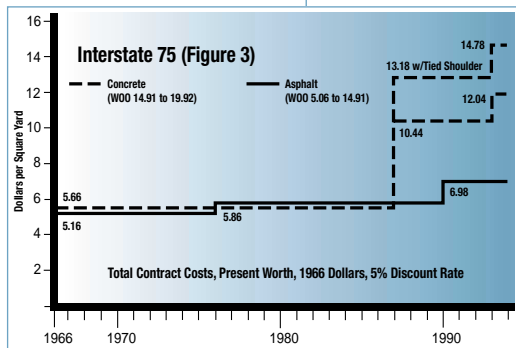
The cost comparison is meaningful because it is based on data obtained from pavements that are similar in age, traffic loading, design parameters and environment. Project data on all sections included in the study was tabulated from ODOT plans and contract files.

Original pavement construction costs were for the main-line pavement layers above the subgrade. Maintenance costs were for contracts to maintain, rehabilitate or reconstruct the mainline pavement.

proceeded north to Delaware County. At this point the pavement became concrete and continued north. The pavements were constructed in 1957 and 1958. The projects were opened to traffic at approximately the same time.

Figures 1 and 2 compare the actual cost of constructing and maintaining both pavement types. The Figures show cost versus time. The cost from 1960 to 1994 for the asphalt pavement section is shown as a solid line. The cost over the years from 1960 to 1994 for the PCC projects is shown as a dashed line. Each step and cost increase in Figure 1 and Figure 2 indicates that contract maintenance occurred somewhere within the pavement section. The

cost per square yard in the year 1960 is the cost for the original construction of the mainline pavement.



Asphalt Costs Less

From Figures 1 and 2 we see that the asphalt pavement has been significantly more economical than concrete. Until 1994, when the study was completed, the asphalt pavement cost \$2.40 per square yard [in 1960 dollars] less than the concrete section in Figure 1.

Figure 2 provides additional analysis. The reconstruction costs incurred in 1988 show the future expenditure of funds required to maintain the concrete pavement. In contrast, the asphalt

pavement shows only a modest increase in the cost per square yard during the 34-year period.

Also, there is no evidence that reconstruction of the asphalt pavement will be needed in the near future. At the completion of the study, the Pavement Serviceability Index (PSI) was 3.8 (out of a possible 5.0); its Pavement Condition Rating (PCR) was 90 (out of a possible 100), and its Structural Deduct (SD), which indicates the amount of structural deficiency, was 4.0.

Concrete Costs More

The second location that allows us to compare the economy of asphalt and concrete pavement is on I-75 in Wood County. Both the asphalt and concrete pavements were constructed in 1966 and opened to traffic on the same day in 1968. In Figure 3 we see that the initial cost of construction for the two pavement types were about the same, with asphalt the lesser of the two.

Figure 3 shows us that over the years the cost of maintaining the asphalt pavement has increased at a steady yet moderate rate. But we see a dramatic increase in the cost per square yard of concrete due to pavement repair incurred in 1987. That repair also called for the removal of existing shoulders and replacement with tied concrete shoulders.

Figure 3 shows the cost per square yard for the concrete pavement with

I-71 and I-75

Table 1 shows four Interstate locations comparing asphalt and concrete pavements. Of these, I-71—Franklin to Medina County, and I-75 in Wood County are similar enough to provide a meaningful comparison.

Recap of Project Costs (Table 1)

Maintenance Locations		Original Project \$/SY	Discounted Maintenance	
			r=5 \$/SY	r=2.5 \$/SY
I-71 Franklin to Medina County				
Flexible	FRA-28.92 to DEL-11.50 (1958 projects).....	5.44.....	2.48.....	4.07
Rigid	DEL-11.50 to RIC-0.00 (1957-58 projects; reconstructed in 1988).....	6.35.....	6.33.....	11.17
Rigid	RIC-0.00 to MED-17.46 (1957-58 projects).....	6.35.....	3.97.....	6.61
I-75 Hancock and Wood Counties				
Rigid	HAN-19.25 to 25.23 (1956 project; part reconstruction in 1960).....	5.78*.....	3.75.....	7.36
Flexible	WOO-0.77 to 5.06 (SB) (1959 project).....	4.63*.....	2.20.....	3.58
I-75 Wood County				
Flexible	WOO-5.06 to 14.91 (1966 projects).....	5.16.....	1.82.....	2.89
Rigid	WOO-14.91 to 19.92 (1966 project).....	5.66.....	9.12.....	15.55
	(without tied shoulder costs).....		6.38.....	11.00
I-275 Hamilton and Clermont Counties				
Rigid	HAM-30.96 to 32.27 (1964 project).....	5.79*.....	3.32.....	5.66
Flexible	HAM-32.37 to 34.91 (1968 project).....	4.94.....	2.26.....	3.88
Flexible	CLE-0.00 to 10.98 (1970 projects).....	5.08.....	2.03.....	2.99

*Cost based on ODOT's average contract prices for the project year. Actual prices not available.

To account for the time value of money, contract maintenance costs were discounted to their present worth during the original construction year. Discount rates of 5 percent and 2.5 percent were used to show the effect of the discount rate. Project costs shown in Table 1 reveal that a higher discount rate is less favorable for asphalt than for concrete. For comparison purposes, a 5 percent discount rate was used because that rate was used by ODOT when the projects were originally constructed.

and without tied concrete shoulders. The study includes the tied shoulders cost because current thinking recognizes that they contribute to the strength of the mainline pavement.

On these I-75 sections, the cost of the asphalt pavement is \$5.06 less per square yard in 1966 dollars than the concrete, when tied shoulders are not included. When they are included, the cost of the asphalt pavement is \$7.80 less per square yard than the concrete. Like the asphalt sections on I-71, the asphalt pavement condition on I-75 shows no evidence of needing reconstruction. Its PSI is currently 4.0, its PCR is 90 and its SD is 4.8. Cost differences would be even greater if other factors such as traffic maintenance and user delay costs were included.

Asphalt's Life Cycle Cost Lower

Although the original asphalt sections on the I-71 corridor have not been reconstructed, much of the original concrete is in the process of recon-

struction. "We're doing a major reconstruction of I-71 between Columbus and Cleveland," says Jim Mawhorr, Head Administrator for ODOT's District 3.

"All three projects in the plan involve replacing the original concrete pavement with Deep-Strength® asphalt.

Mawhorr says a careful life-cycle cost analysis was part of the reason ODOT chose asphalt for the new pavement on I-71. "The life cycle cost analysis (LCCA) showed us that maintenance on the asphalt pavement was higher in the early years, but less than concrete in the later years." Mawhorr adds that after 15 years or more, patching and maintenance on concrete pavement can be extensive.

Mawhorr says that ODOT currently has approximately 2.8 million tons of hot mix asphalt work under contract. Of that 2.8 million tons, 1.8 million tons of it is under warranty contracts. The remaining one million tons



is being placed on primary and other routes. “We are removing all the original Portland cement concrete (PCC) on I-71 in ODOT’s District 3 and replacing it with Deep-Strength asphalt. We also have a rubblize and overlay project on I-271 where we are rubblizing the concrete and overlaying it with asphalt. ODOT is requiring a 7-year warranty on that project.”

Not only is the LCC lower, but asphalt pavement is easier to maintain too, says ODOT’s Engle. “You can resurface with asphalt at night, but it is difficult to pave with concrete at night. When paving with concrete, you can have some major traffic backups. When paving with asphalt, you can open the job the following day.

Asphalt Widening and Rehabilitation

Asphalt pavements are out-performing concrete on other parts of the Ohio Interstate System too. Under ODOT’s Third Lane Addition plan, ODOT is widening and rehabilitating I-71 between Columbus and Cleveland. The huge 10-year project is the first major

reconstruction on this portion of I-71 since it was built in the late 1950s and early 1960s.

On the 16-mile, two-year project, Kokosing is currently adding a lane on each of the north/south roadways and rehabilitating the existing passing lane. Kokosing will also rehabilitate the existing driving lanes and put a surface course on the entire pavement. All the work is asphalt. The new inside lane is being built with 9 inches of aggregate base and 16.75 inches of asphalt. The project has a five-year warranty required by ODOT design.

Costs Less to Build, Less to Maintain, Lasts Forever

Conclusions from past studies and current projects indicate that asphalt pavements will provide continuous service for 35 years or more without need for significant rehabilitation. The structural layers of these asphalt pavements, which compose 80 percent of the road, will last indefinitely. They will require resurfacing after 12 to 15 years, but the structural portion of the road is a Perpetual Pavement. Consequently,

these asphalt pavements cost less to build and less to maintain, and the rate of increase in cost for maintenance is also less than for concrete.

Statistics, coupled with experience, confirm there is a significant economic advantage in favor of asphalt pavements over concrete—both in the short run and in the long run.▲

