ASPHALT PAVEMENT: MEETING THE CHALLENGE FOR AMERICA

The asphalt industry is ready to go to meet the challenges of an infrastructure stimulus package and to help pave the way out of America's economic downturn.

This new report from the Asphalt Pavement Alliance shows how.

Executive Summary

Asphalt is an essential building block for the American economy. Throughout the last 100 years, asphalt pavements have created the arteries through which the nation's life blood flows. Today the asphalt pavement industry is geared up to put the country on the road to economic recovery, with many ready-to-go projects lined up that fit the requirements of a massive stimulus package focusing on renewing the nation's infrastructure.

The asphalt pavement industry is an integral part of communities all across the country. There are 4,000 asphalt pavement mixing plants, including one in nearly every congressional district. More than 300,000 people work in the asphalt industry. People who lost their jobs in the recent downturn can quickly be put back to work, in good-paying American jobs that cannot be outsourced overseas.

What's especially important to our economy today is that maintenance and rehabilitation projects utilizing asphalt can be started and accomplished quickly, putting people to work and getting the economy moving again. About 94 percent of America's roads and highways are surfaced with asphalt. Asphalt is best suited to quickly enhance and maintain the top two to four inches of pavement, and will remain so.

Highway maintenance and rehabilitation contracts can be advertised, bid, let, and completed in a short period of time. For example, a highway project in Utah in 2008 involved milling the existing pavement for recycling, then placing an overlay on 4.4 miles of highway. From the date the contract was first advertised to the date it was substantially completed, the project took only 75 days. This project put people to work. It also gave motorists a new, smooth, safe pavement surface that will serve for many years.

For new construction, asphalt Perpetual Pavements can be designed and built to last indefinitely. A Perpetual Pavement never needs to be removed and replaced, unless the geometry of the road needs to be changed. Once it is in place, a Perpetual Pavement is a resource that Americans can use for many years to come, an investment in our future.

A recent survey by AASHTO indicates that there are more than 5,000 highway projects worth $64 billion that could be under contract within 180 days. This translates into jobs: according to the U.S. Department of Transportation, every $1 billion spent on highway

projects generates 35,000 jobs. Many are highway construction jobs, while the rest are spread throughout the U.S. economy in supplier industries and in industries that benefit from the payrolls and spending of highway workers.

As enormous as the challenge is, a recent survey by the National Asphalt Pavement Association indicates that the industry has the capacity to respond as soon as Congress provides the funding.

The asphalt pavement industry is ready to go to help pave the solutions to America's economic downturn. The industry has an impressive track record of working in partnership with the state DOTs to create pavements that are affordable and safe, and that serve the needs of the public well. Agency-industry-researcher initiatives from the past 10 to 20 years have resulted in pavements that are even more environmentally friendly, safe, cost-effective, and long-lasting.

The technology exists to use higher percentages of reclaimed asphalt pavement (RAP) in resurfacing our interstates and roads. Initiatives such as the FHWA/AASHTO/industry Expert Task Group on RAP and the FHWA/AASHTO/industry Warm-Mix Asphalt Technical Working Group have been extremely effective. The next generation of asphalt mixes will include warm-mix asphalt technology that allows a high percentage of RAP.

The bottom line: Asphalt pavements cost less. They also last longer, are more versatile, and are more environmentally friendly than concrete. This document will present the latest information on the benefits of asphalt pavements for environmental sustainability, economics, and performance.

Environmental Sustainability

Many are calling for environmental sustainability to be taken into account in decisions about pavement type. When sustainability is considered, asphalt pavement is the clear choice. A few key points:

1. Asphalt pavements have the lowest carbon footprint of any pavement type. Producing and placing asphalt pavements consumes 40 percent less energy than continuously reinforced concrete pavements. In comparing the two pavements, it is worthwhile to note that production of Portland cement is the number three source of greenhouse gases in the United States. About 5 percent of all CO_2 comes from cement production. [1] An average of one ton of CO_2 is produced for each ton of Portland cement manufactured.[2]

2. The asphalt industry is America's recycling leader. Asphalt is by far the most reused and recycled pavement material in America. About 100 million tons of asphalt pavement is reclaimed every year, and more than 95 percent of the reclaimed material is reused or recycled.

3. When RAP is reused in asphalt pavements, the asphalt cement is reactivated and becomes part of the binder (or glue) for the new pavement. This reduces the amount of virgin asphalt cement that is required. By contrast, when concrete is recycled, the cement cannot be re-hydrated, so recycling concrete does not reduce the demand for virgin Portland cement.

4. Asphalt can provide Perpetual Pavements that virtually never need to be reconstructed. The fact that asphalt pavements can be left in place indefinitely,

and maintained through infrequent milling and resurfacing, gives asphalt the advantage in sustainability.

5. Between 1970 and 1999, the asphalt industry increased production by 250 percent while reducing total emissions by 97 percent. Ongoing innovations by the asphalt industry, such as warm-mix asphalt, continue to reduce fuel consumption and emissions even further.

6. The asphalt industry even helps to recycle concrete pavements. When a concrete pavement needs reconstruction or major rehabilitation, rubblizing the concrete and topping it with an asphalt overlay is the easiest, lowest-cost, and most effective way to rehabilitate the pavement in the shortest amount of time. This saves energy and landfill space as well.

Economics

Asphalt is the most economical choice for pavements. Both for initial construction and over the long haul, asphalt pavements cost less.

1. Perpetual Pavements constructed of asphalt can last indefinitely. Perpetual Pavements are constructed in layers that are designed to limit distress to the surface, so that routine maintenance is a simple matter of infrequent milling followed by an overlay. The material that is reclaimed is reused or recycled. A Perpetual Pavement never needs to be removed and replaced. A Perpetual Pavement is there for a lifetime, making it the most economical choice.

2. Asphalt pavements offer the lowest life-cycle cost. Studies in Iowa,[3] Kansas,[4] Ohio,[5] Washington,[6] and elsewhere around the United States have validated that asphalt pavements are both less costly to construct initially and less costly to maintain. Properly designed and constructed asphalt pavements have lasted well beyond their expected lives and have carried far more traffic than ever expected, with minimal routine maintenance. A new asphalt pavement can be expected to last 15 to 20 years or more before needing maintenance.[7] When maintenance and rehabilitation are needed, the process is economical and simple.

3. Hedging against inflation. Because asphalt is 100 percent recyclable, existing asphalt pavements constitute a treasury of material. Both the asphalt cement and the aggregate in RAP can be swapped one for one, allowing for maximum economic benefit. RAP retains both its glue-like properties and its aggregate properties when reused in new asphalt mix. Reincorporating RAP into new asphalt mitigates construction inflation and maintains agencies' buying power.

Performance

Smoothness

Smoother roads, regardless of the type of surface, are more comfortable for the traveling public. What's even more important is that they *conserve fuel, save money,* and *contribute to sustainability*.

Conserving fuel: A study at a test track in Nevada showed that trucks driving on smooth pavements consume 4.5 to 5 percent less fuel.[8]

Saving money: Driving on substandard roads causes maintenance problems for vehicles. These costs are estimated by a nonprofit research institute at $65 billion a year, or $413 per urban motorist.[9]

Contributing to sustainability: When trucks drive on rough roads, their tires bounce on the pavement, delivering impact loadings that cause roads to deteriorate prematurely. Smoothness makes a pavement last longer; long life is one reason that asphalt is the choice for pavements that are both economically and environmentally sustainable.

Asphalt roads tend to be smoother than concrete, both when newly constructed and years later. **Many state DOTs have different smoothness specifications for newly constructed asphalt and concrete. In every state where this is the case, asphalt pavements are required to be smoother than concrete.**

Speed of Construction and Ease of Maintenance

No pavement will last forever without maintenance. Once roads are in place, taking them out of service for rehabilitation causes delays and difficulties. Therefore it makes sense to construct them out of a material that can be maintained and rehabilitated with minimum inconvenience to the traveling public.

1. Construction is faster with asphalt. Newly constructed asphalt pavements can be opened to traffic as soon as they have been compacted and cooled, without curing time.

2. With asphalt, maintenance and rehabilitation can be accomplished in off-peak hours. Sometimes, commuters never see an orange barrel; they find out about road work when they drive on a new, smooth, quiet pavement the next day.

Conclusion

The asphalt industry is committed to working with owner agencies at all levels to provide the best possible value for building and maintaining America's roads and highways. When considering whether to choose asphalt or concrete for new construction, specifiers should consider the most economical use of the taxpayers' money. They should also keep in mind what happens to concrete pavements at the end of their lives. With even the newest, best-constructed concrete pavement, one thing is certain: at some point in the future, it will become, at best, the base for a new asphalt road.

Endnotes

1. Huntzinger, Deborah N. and Thomas D. Eatmon, *Journal of Cleaner Production,* http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VFX-4SWP1TT-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=b0d842769dba93030f5915f9888b6c82, downloaded December 22, 2008.

2. http://www.buildinggreen.com/features/flyash/appendixa.cfm. Downloaded December 22, 2008.

3. Villacres, Jorge N., et al, *Pavement Life-Cycle Cost Studies Using Actual Cost Data: A Synthesis,* Asphalt Pavement Alliance, Lanham, Maryland. February 2003.

4. Cross, Steven A. and Robert L. Parsons, Evaluation of Expenditures on Rural Interstate Pavements in Kansas, Kansas University Transportation Center, University of Kansas, Lawrence, Kansas, February 2002.

5. Villacres, Jorge N., et al, *Pavement Life-Cycle Cost Studies Using Actual Cost Data: A Synthesis,* Asphalt Pavement Alliance, Lanham, Maryland. February 2003.
6. Villacres, Jorge N., et al, *Pavement Life-Cycle Cost Studies Using Actual Cost Data: A Synthesis,* Asphalt Pavement Alliance, Lanham, Maryland. February 2003.
7. Von Quintus, Harold L., Jag Mallella, and Jane Jiang, *Expected Service Life and Performance Characteristics of HMA Pavements in LTPP,* Asphalt Pavement Alliance, Lanham, Maryland. February 2005.
8. Sime, M., et al., *WesTrack Track Roughness, Fuel Consumption, and Maintenance Costs,* Tech Brief published by Federal Highway Administration, Washington, DC. January 2000.
9. Moretti, Frank. *Keep Both Hands on the Wheel,* The Road Information Program, Washington, DC. March 2008.