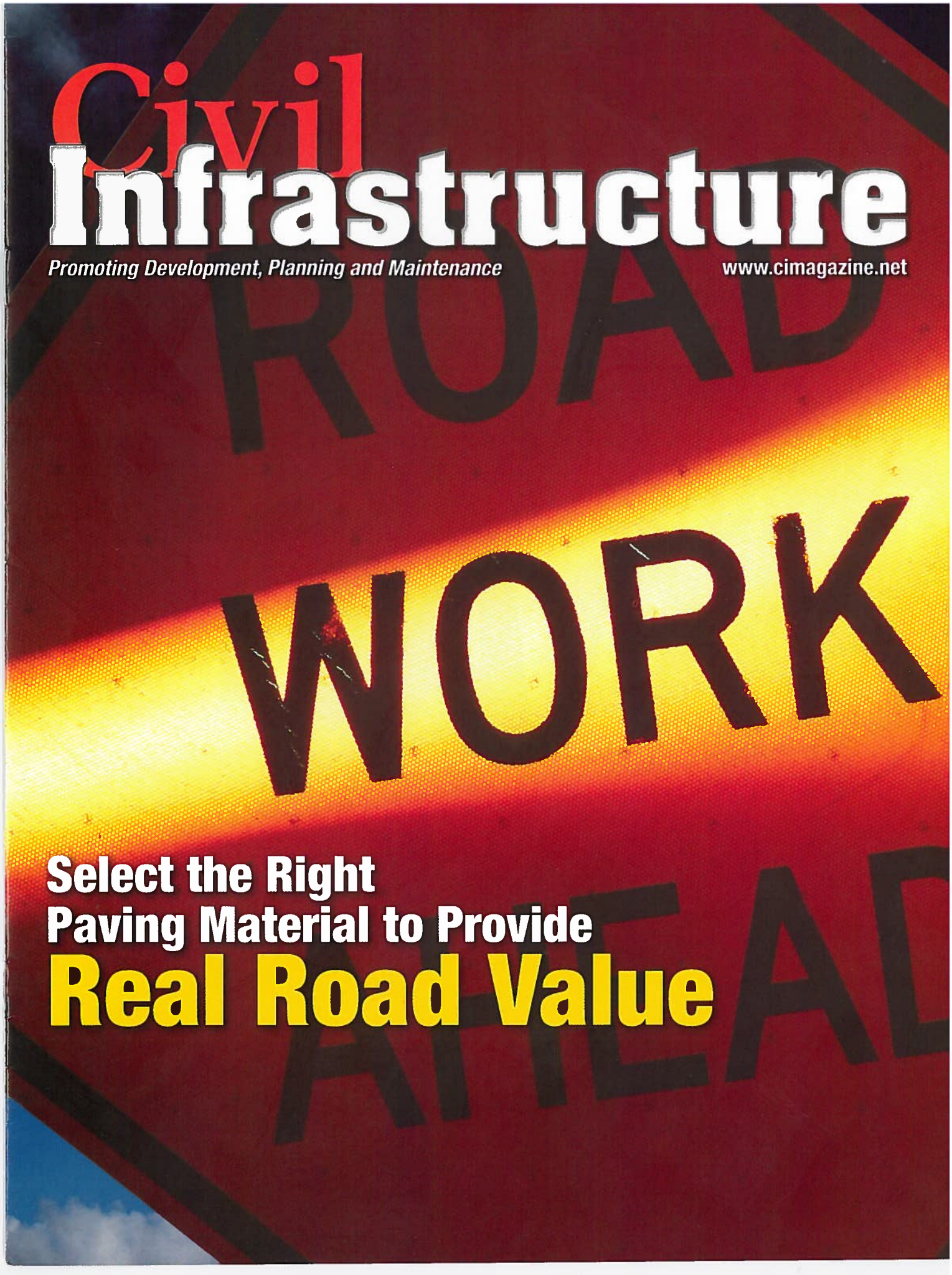

Civil Infrastructure

Promoting Development, Planning and Maintenance

www.cimagazine.net

Select the Right Paving Material to Provide Real Road Value

FEATURE STORY

Select the Right REAL Paving Material ROAD to Provide VALUE

By Bob Bushmeyer

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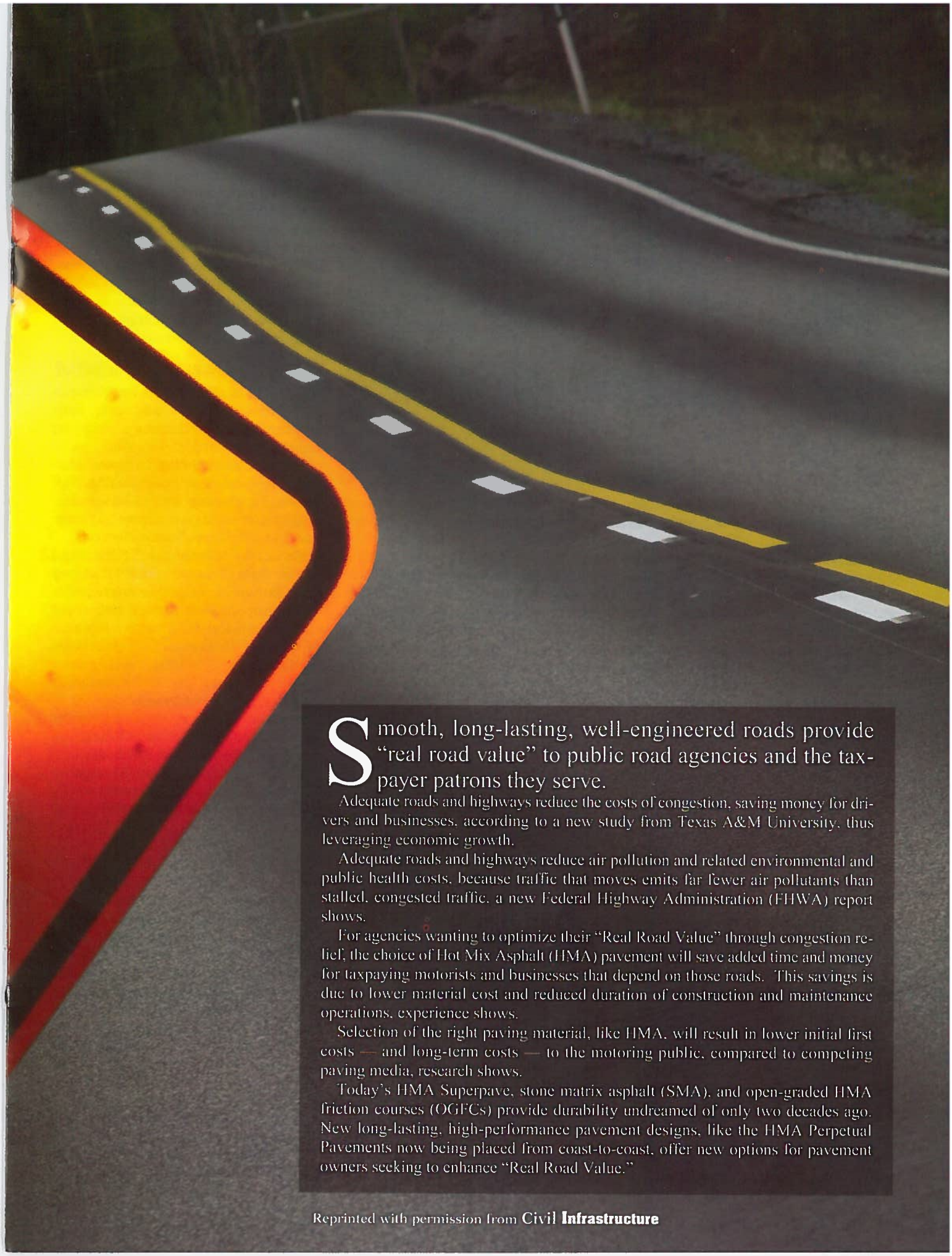

Smooth, long-lasting, well-engineered roads provide "real road value" to public road agencies and the taxpayer patrons they serve.

Adequate roads and highways reduce the costs of congestion, saving money for drivers and businesses, according to a new study from Texas A&M University, thus leveraging economic growth.

Adequate roads and highways reduce air pollution and related environmental and public health costs, because traffic that moves emits far fewer air pollutants than stalled, congested traffic, a new Federal Highway Administration (FHWA) report shows.

For agencies wanting to optimize their "Real Road Value" through congestion relief, the choice of Hot Mix Asphalt (HMA) pavement will save added time and money for taxpaying motorists and businesses that depend on those roads. This savings is due to lower material cost and reduced duration of construction and maintenance operations, experience shows.

Selection of the right paving material, like HMA, will result in lower initial first costs — and long-term costs — to the motoring public, compared to competing paving media, research shows.

Today's HMA Superpave, stone matrix asphalt (SMA), and open-graded HMA friction courses (OGFCs) provide durability undreamed of only two decades ago. New long-lasting, high-performance pavement designs, like the HMA Perpetual Pavements now being placed from coast-to-coast, offer new options for pavement owners seeking to enhance "Real Road Value."

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Hot Mix Asphalt (HMA) pavements are 100 percent recyclable, with long-term environmental and cost benefits, adding to its HMA's Real Road Value.

Lastly, new GASB 34 accounting standards now incumbent on municipalities and counties of all sizes require those governments to inventory and maintain their road system as managed capital assets with attributed "Real Road Value." Easy, low-cost maintenance through HMA thin-lift overlays makes HMA the pavement of choice for road system asset management.

Real Road Value: Congestion Relief

Increased congestion will sap the ability of your roads to add economic value to your community and to serve as economic multipliers.

"Recent surveys of the driving public have shown the three primary concerns surrounding our current state of our highway system are, first, congestion, second, safety, and third, the impact each of the first two will have on our economy," said Charles F. Potts, CEO of Heritage Construction & Materials, Indianapolis, and 2004 chairman of the National Asphalt Pavement Association.

"It was only a few years ago that these same surveys placed safety as the clear, No. 1 concern of the driving public," Potts said in January. "This in itself should be a clear indication of the frustration of the citizens of our nation and the recognition that we must make dramatic changes."

"Congestion, especially in urban regions, is weakening America's ability to compete globally, as the vast bulk of goods and products shipped in the U.S. are transported on highways," said TRIP, The Road Information Program, a non-profit transportation research group. "Time lost to gridlock also reduces productivity on the job and higher costs for consumers."

Costs of Congestion Worsening

This problem was detailed on a national level, including individual metro areas, by a Sept. 30 report from the Texas Transportation Institute (TTI) of Texas A&M University.

The 2003 Urban Mobility Study (http://mobility.tamu.edu/ums/) found that traffic congestion nationwide continues to worsen. The Texas researchers looked at 75 cities, measuring factors such as hours of travel delay per person, and the Travel Time Index, a measure of the extra travel time per trip.

The report found that the costs of congestion continued to climb for 2001, the most recent year for which firm data were available. The 5.7 billion gallons of wasted fuel, and 3.5 billion hours of lost productivity resulting from traffic congestion, cost the nation $69.5 billion in 2001, $4.5 billion more than the previous year.

The report also found the extra time needed for rush hour travel has tripled over two decades. The national average Travel Time Index for 2001 was 1.39 (meaning a rush hour trip took 39 percent longer than a non-rush hour trip). The national average in 1982 was only 1.13.

"Cities are the hubs of our nation's transportation system," said the National Conference of Mayors in November. "Our vast transportation network has been an integral part of our metropolitan and nation's success, accounting for more than 86 percent, or $3.9 trillion, of the growth in the nation's economy over the last ten years." However, congestion endangers that growth.

Real Road Value: Pollution Relief

Congestion relief brings health benefits as well as economic benefits, optimizing the real value of a road on multiple levels.

That is because slower, congested traffic produces more air pollution than traffic that is moving freely. As traffic congestion reduces a roadway's average speed, emitted air pollution increases.

For carbon monoxide (CO), and volatile organic compounds (VOCs), two of the three primary mobile source pollutants, the optimal average operating speed is approximately 55 mph, reported FHWA in its 2002 report, Transportation Air Quality: Selected Facts and Figures. As average speed goes down, pollution from these emissions increases.

Highway congestion that reduces speeds below that level unnecessarily increases auto emissions. Without question, it pays for a transportation agency to improve roads and keep the traffic moving, from both cost and public safety points of view.

Real Road Value: HMA Costs Less

Fortunately, Hot Mix Asphalt is a lower-cost solution to mitigating traffic congestion. For many reasons, HMA is the reliable choice for government transportation agencies that want to optimize their "real road value" through congestion relief.

Asphalt pavements save time for motorists, owning agencies and paving contractor because they can be placed and compacted quickly, opening lanes to traffic within hours.

HMA pavements always can be built faster than portland cement concrete (PCC) pavements, and are easier to maintain. This means traffic delays during

construction and rehabilitation are reduced, compared to PCC, with no curing time. To make it easier on drivers, paving at night is possible with HMA.

HMA pavements under construction have the potential to save lives because the sooner a paving crew can get in and out, the sooner the barricades can come down, removing both driver and worker from the peril of the work zone, and the owning government from liability for work zone incidents.

Curtailed access during roadwork often hurts existing businesses, and road agencies are just beginning to understand the impact. A 1989 Wisconsin DOT study found that detours abutting highways under construction resulted in a decline in sales volume to affected businesses of as much as 17 percent. With PCC having longer construction duration, HMA has a more favorable economic impact.

The use of reclaimed asphalt pavement (RAP) in the road base, base course or surface course makes those dollars go even farther, while sustaining the environment.

HMA's benefits are manifest, because of the 2.27 million miles of paved road in the United States, 94 percent is surfaced with HMA, including 65 percent of the interstate system.

Real Road Value: Short-Term

HMA offers Real Road Value to road agencies in the short-term.

In a 1994 reconstruction of a busy rural intersection in Maryland, the Maryland State Highway Administration evaluated the costs and performance of both pavement types under the same conditions. At the intersection of U.S. 40 and Maryland 213, an asphalt contractor milled 8 inches of old pavement and placed 15,000 square yards of new HMA in 11 nights, with minimal lane closures. At the adjacent intersection, a PCC contractor installed 1,800 square yards of material, working with around-the-clock lane closures.

Not counting user delay costs – now a prime consideration in state DOT work – on this project the PCC pavement cost nearly three times as much per square yard ($104.25) as the HMA pavement ($36.11).

While the HMA pavement was lower in cost, it has proved far more durable. In fact, the concrete intersection was so badly cracked that it had to be completely removed and replaced – with HMA – in 2000. The asphalt intersection is still going strong, nearly 10 years after it was first constructed, and shows minimal distress.

In Florida, a three-year analysis conducted by the state's DOT showed that the initial construction of an HMA pavement averaged $544,981, compared to first costs of the same pavement in PCC of $765,729.

Real Road Value: Long-Term

But HMA offers Real Road Value in the long-term as well. Following usage and proper maintenance, in the above study, Florida calculated the residual value of the HMA pavement to be 203 percent higher than the PCC pavement.

PCC or "rigid" pavements are sometimes said to have lower maintenance costs than HMA, thus justifying their higher initial cost. But the Florida DOT calculated its routine annual maintenance costs on the above pavement as $132 per lane mile for asphalt pavement and $261 per lane mile for concrete pavement.

A 2002 Kansas study showed HMA pavements were less expensive to build and maintain over a 40-year period than those of PCC. The study evaluated 481 miles of rural Interstate highways in Kansas, and was conducted by Drs. Stephen A. Cross and Robert L. Parsons, of the University of Kansas-Lawrence. "Evaluation of Expenditures on Rural Interstate Pavements in Kansas" examined the total expenditures of pavements during their life cycles, including original construction, contract maintenance work, rehabilitation and reconstruction.

The study found that after 15 years, annual expenditures over the next 25 years were 2.4 times higher for PCC pavements than HMA pavements, or $63,000 per four-lane mile for PCC, compared to $26,000 for HMA. These numbers were calculated in 2001 dollars.

The study also showed HMA and PCC pavements had similar average service lives until rehabilitation or reconstruction was required, 33 years for HMA and 34 for PCC. Beyond that point, however, reconstruction costs for PCC pavements averaged $2.04 million per four-lane mile, compared to rehabilitation costs of $0.66 million per four-lane mile for HMA pavements.

This study may be downloaded in *.pdf format from the website of the Asphalt Pavement Alliance, www.asphaltalliance.com.

Real Road Value: New HMA Mixes

Now, at the start of the new millennium, varieties of value-added HMA mixes are enhancing Real Road Value for those agencies using them.

Unlike the HMA mixes of just two decades ago, today's HMA mixes are adaptable to different climates, traffic loads and applications.

Most significantly, the industry has moved from familiar Marshall mix designs to performance-related, durable Superpave binder mix designs. Today's Superpave mixes now are only incrementally more expensive than, or equal in cost to, traditional mixes. In fact, Superpave is so common now that many local road agencies may have been using Superpave mixes without realizing it.

Simultaneously with Superpave, stone matrix asphalt (SMA) mix designs have been adopted from Europe and are outperforming even the new durable Superpave designs. The chemistry of liquid asphalt is being changed by a new generation of asphalt modifiers, boosting performance of open-graded friction courses (OGFCs), Superpave mixes (Superpave Plus), and thin-lift overlays.

Real Road Value: Superpave

Superpave is a performance-based system of specifications for designing asphalt pavements to hold up to the demands of the new century.

Performance-based mixes offer more durability because they are conceived with local temperature extremes and traffic loads as an essential part of the process. Superpave mixes provide asphalt pavements that will stand up to local climate and traffic volumes at lower long-term costs.

The name Superpave is derived from SUperior PERforming Asphalt PAVEments, and the design system was a product of the Strategic Highway Research Program (SHRP, 1988-1993), a five-year, $150 million research program.

Two elements make up the Superpave system of asphalt mix design, an asphalt binder spec which takes into account measured pavement loads and local weather, and a volumetric mix design and analysis system.

Today, after SHRP and the decade of the 1990s, at the beginning of 2003 (the most recent data available), 47 states incorporated Superpave specifications as a standard, or the only specification allowed, for state DOT paving.

For the 2002 construction season, 4,726 scheduled projects were engineered using Superpave. That is three times the number of Superpave projects built in 1998 and about 60 percent of the state asphalt paving projects scheduled for letting in 2002. More recent data soon will be available.

Real Road Value: SMA

SMA, or Stone Matrix Asphalt, is a premier surfacing mix that is gaining favor all over the U.S. SMA is a "gap-graded" mix that brings together strong, coarse aggregate and a high content of as much as 6 to 8 percent of asphalt cement. The outcome is a strong, durable HMA mix with a stone-on-stone skeleton, which easily resists rutting.

Since SMA's introduction to America in 1990, last year over 28 states were using SMA in wearing surface course applications, compared to 48 states using Superpave. Georgia and Maryland, which are taking an active role in SMA development, are increasing their use of SMA and are helping to educate other states about it.

Under equal conditions, SMA outlasts Superpave with a performance anywhere from 20 to 30 percent longer life than conventional dense-graded hot mix asphalt (HMA) pavement. It usually is about 10 to 30 percent more costly than traditional HMA mixes, but its durability – and the fact that user delay costs are avoided – still makes it very attractive for high-volume applications.

Real Road Value: OGFCs

Today, HMA open-graded friction courses (OGFCs) are enhancing Real Road Value by providing safer roads through enhanced surface drainage, and by reducing pavement noise.

These drainable OGFCs offer road agencies a better-performing, driver-friendly pavement with an "open" aggregate structure (without fines) in which larger-sized aggregate is held in place by polymer-modified and fiber-modified performance-graded liquid asphalts.

A new wave of OGFC pavements being built here and in Europe have considerably higher air void contents than the first generation of OGFCs in the 1970s, today in the range of 17 percent to 22 percent.

The open structure of voids allows water to drain right through the driving or friction course to an impervious intermediate course below, and out into roadside ditches. The result is the elimination of tire spray and hydroplaning.

Moreover, because noise generated at the tire/pavement interface is attenuated by the voids, OGFCs are significantly quieter pavements, with documented noise reduction of 50 percent or more.

Real Road Value: Perpetual Pavements

Tremendous progress has been made in developing new HMA mix designs. Now, an HMA pavement design brings those elements together into a long-lived, stable, thick asphalt pavement that is bringing additional value to government agency transportation infrastructure.

Perpetual Pavement is a multi-layer, full-depth or deep-strength HMA pavement design that results in pavements that last a lifetime, with only infrequent renewal of the surface to maintain a smooth, quiet, safe surface.

Perpetual Pavements are topped with a "sacrificial" driving course that may be cold-milled as needed. As a long-lasting and smoother paving material, HMA Perpetual Pavements can spell dramatic savings for state and local transportation agencies striving to balance tight road budgets.

The Perpetual Pavement asphalt layers are a durable, fatigue-resistant base layer; a rut-resistant and durable intermediate layer; and a rut-resistant, wear-resistant surface layer.

Because asphalt pavements are 100 percent recyclable, Perpetual Pavements offer further cost advantages as well as environmental benefits.

Repairs are confined to the easily serviced top layer, eliminating the need for costly and disruptive reconstruction, dramatically reducing life-cycle costs. This pavement design will keep motorists happy with a consistently smooth, quiet driving surface, provide a safer and smoother driving surface and reduce tire-to-pavement noise compared to PCC.

Much more information about the Perpetual Pavement concept is available from the Asphalt Pavement Alliance at www.asphaltalliance.com.

Real Road Value: Recycled HMA

The recyclability of HMA is another reason why asphalt enhances your Real Road Value. Not only are HMA pavements 100 percent recyclable; the savings and good will inherent in use of a 100 percent-recyclable pavement can go a long way in justifying road construction programs to local residents.

Long before environmental issues became popular, asphalt pavements were being recycled as granular aggregate for

road base, as embankment fill, and in pavement driving and base courses.

Today, specialized machines mill off the surface layer of asphalt pavement and convey this reclaimed asphalt pavement (RAP) to dump trucks, which haul it to stockpiles. From there, it is reused as road base or shoulders, added to virgin materials as part of new HMA mixes, and used for highways, streets, driveways, bike paths, recreational trails, and much more.

Asphalt pavement is unquestionably the nation's most widely recycled product. According to an FHWA/EPA report, about 80.3 million of the 100 million tons of asphalt pavement that is removed each year during resurfacing and widening projects is reused as part of new roads, roadbeds, shoulders and embankments. That is a recycling rate of 80 percent.

The 80.3-million-ton volume of recycled asphalt pavement is about one-third higher than the total volume of 60.7 million tons of post-consumer recycling. It is double the volume of paper, glass, plastic and aluminum combined.

Real Road Value: Conserving Resources

Use of RAP adds Real Road Value because it saves valuable aggregate resources. While in the United States there are plenty of construction aggregates in place in the ground, fewer and fewer aggregate sites are "permitted" or licensed for mining. Existing quarries or gravel pits once outside of a city now are being overwhelmed by new suburbs and neighbors who do not like living near quarries and will fight any kind of expansion.

But the RAP already contains existing aggregates that have already been acquired, permitted, shot, loaded, crushed, screened, stockpiled, reloaded and hauled, saving time, money and resources.

In making HMA, the RAP then may be further crushed, proportioned, heated and blended with new materials, then mixed to meet pavement specs. RAP can be incorporated into HMA in both drum mix and batch plants.

RAP now is accepted in asphalt paving mixtures as an aggregate substitute and as a portion of the binder in nearly all states. Experience shows that RAP can be used in Superpave mixes predictably and reliably, so long as the unique properties of the RAP used are tested and known.

Real Road Value: Thin Lift Overlays

Now, as local governments shift to the asset-based accounting system required by GASB 34, HMA thin-lift overlays are yet another weapon in the road manager's arsenal for enhancing pavement value and ensuring a literal "Real Road Value" for the books.

These General Accounting Standards Board (GASB) 34 accounting regulations now in adoption are forcing municipal and county governments to manage their public works infrastructure not as a web of pavements and underground systems that wears out and must be fixed, but an asset that must be fostered, maintained and valued.

Since 2000, the FHWA has promoted transportation infrastructure asset management as a best practice for state and local road and bridge owners. (More information is available from FHWA's Office of Asset Management at http://www.fhwa.dot.gov/infrastructure/asstmgmt/index.htm).

One way of preserving pavements is by judicious use of HMA maintenance techniques. Occasional pothole patching or crack sealing can be undertaken at minimal cost and traffic disruption. When needed, cold milling and thin overlay can be accomplished quickly. All of the reclaimed HMA can be recycled.

Thin HMA overlays provide an as-new surface, prolong pavement structure life and make a pavement stronger for moderate cost.

For many roads and streets, the best preventive maintenance strategy will be a thin HMA overlay. This thin (0.5 to 1.5 inch) surfacing combines the best attributes of HMA's strength, smoothness and quiet with a low cost that makes scarce maintenance dollars go farther.

Because they add structural strength, thin HMA surfacings will extend pavement life beyond that provided by simple crack filling and pothole patching. They will improve ride quality and correct surface defects, pleasing your citizens and road users.

Safety is a paramount concern of road agencies and owners. Thin-lift HMA overlays will improve road safety by increasing skid resistance. New pavement markings will enhance safety. By re-establishing road crown, drainage is improved, reducing spray and skidding.

Aesthetically, the overall impression is of a brand-new road, at the price of a thin overlay. Other benefits include HMA's "trademark" quiet pavement, the result of reduced noise at the improved tire/road surface interface, and the smoothness and skid resistance that road users look for. ■

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