



# rough ROADS

Rough Roads Not Only Cause  
a Bumpy Ride but Cost Motorists  
Hundreds of Dollars a Year

“Driving on rough roads costs the average American motorist approximately \$400 a year in extra vehicle operating costs. Drivers living in urban areas with populations more than 250,000 are paying upwards of \$750 more annually.”



Your Pavement Preservation Resource® since 1972

The full AASHTO and TRIP report is available at <http://roughroads.transportation.org>.

## Sustaining deteriorating roads costs significantly more over time than regularly maintaining a road in good condition.



<< Diamond Grinding of I-70 in Colorado

**WHILE IT HAS BEEN WIDELY ACCEPTED** for years that rough roads lead to diminished safety, higher vehicle operating costs and more expensive road repairs, a recent report sheds light on the true cost. According to a May 2009 report by the American Association of State Highway and Transportation Officials (AASHTO) and The Road Information Project (TRIP) -- a national transportation research organization -- driving on rough roads costs the average American motorist approximately \$400 a year in extra vehicle operating costs. Drivers living in urban areas with populations more than 250,000 are paying upwards of \$750 more annually because of accelerated vehicle deterioration, increased maintenance, additional fuel consumption, and tire wear caused by poor road conditions.

As if these numbers aren't tough enough to absorb, it is important to acknowledge that the American public pays for poor road conditions twice -- first through additional vehicle operating costs and then in higher repair and reconstruction costs. Sustaining deteriorating roads costs significantly more over time than regularly maintaining a road in good condition. Costs per lane mile for reconstruction after 25 years can be more than three times the costs of preservation treatments over the same 25-year period.

This scenario is not surprising considering that many of the original interstate highways that were constructed years ago using Portland cement concrete pavement (PCCP) are still in service today, carrying traffic loads many times in excess of their design projections. Approximately one-third of the nation's major highways, including Interstates, freeways and major roads, are in poor or mediocre condition. Roads in urban areas, which carry 66 percent of the traffic, are in much worse shape. Although our nation has invested \$1.75 trillion in our public highway system over the past 50 years, traffic growth has far outpaced highway construction, particularly in major metropolitan areas. The number of miles driven in this country jumped more than 41 percent from 1990 to 2007 -- from 2.1 trillion miles in 1990 to 3 trillion in 2007. In some parts of the country, dramatic population growth has occurred without a corresponding increase in road capacity, placing enormous pressure on roads that, in many cases, were built decades ago. The

### THE NATION'S HIGHWAYS BY THE NUMBERS

Total miles of public roads	>> <b>3,967,159</b>
Total miles of public roads	
Federal	>> <b>128,378</b> (3.2%)
State	>> <b>783,643</b> (19.8%)
Local	>> <b>3,055,138</b> (77%)
Total miles of rural and urban roads	
Rural	>> <b>2,939,042</b> (74%)
Urban	>> <b>1,028,107</b> (26%)
Total Interstate Highway miles	>> <b>47,000</b>
Annual miles driven in cars and trucks	>> <b>2.9 trillion</b>
Percent of miles driven on urban roads	>> <b>65.6%</b>
Tons of freight moved on America's highways annually	>> <b>15 billion</b>

The 47,000 miles of Interstate highway represent only one percent of total highway mileage in the United States, but carry 24 percent of all traffic. Traffic growth during the past 50 plus years has far outpaced any growth projections made during the initial planning stages. Much of the increase is due to truck traffic. On average, every mile of the Interstate system sees 10,500 trucks a day. By 2035, that number is expected to double, increasing to 22,700 trucks a day for each mile of Interstate highway.

result of this growth is 30 to 60 percent of the roads in the nation's largest urban areas are in poor condition, while 61 percent of rural roads are in good condition. Further, 72 percent of the Interstate Highway System is in good condition, but age, weather conditions and burgeoning traffic are eroding ride quality.

Since the early days of interstate construction, highway funding has failed to match the overwhelming needs posed by the growth and vitality of the nation's economy. This has led many transportation officials to find new and innovative ways to maintain and preserve their existing pavements. Highway agencies across the country are departing from traditional reactive maintenance approaches to new proactive preservation strategies designed to protect their highway infrastructure investment. Preserving the highway network is the most cost-effective and efficient means to ensure serviceable roadways in the future. Interestingly, it costs \$1 to keep a road in good shape for every \$7 needed to spend on reconstruction. But, perhaps the greatest benefit derived from preservation is improved overall performance, measured by attributes such as ride quality, safety and extended service life.

## >> A PROVEN SOLUTION

**INADEQUATE LEVELS OF TRANSPORTATION** funding have resulted in an immense backlog of "ready-to-go" but unfunded projects in the states. A December 2008 AASHTO survey identified more than 5,000 projects valued at \$64 billion that states could have underway within 180 days. In February 2009, President Obama signed the American Reinvestment and Recovery Act of 2009 that provided \$48 billion for transportation infrastructure as a means of stimulating the nation's severe economic decline. Of that amount, \$27.5 billion was made available for highway projects, which will barely make a dent in highway maintenance, preservation and reconstruction needs. The recent AASHTO Bottom Line report documented the need for all levels of government to invest

## PAVEMENT CONDITIONS

*Urban and Rural Arterial Highways in 2007*

	Rural	Urban	All Major Roads
Poor	4%	26%	13%
Mediocre	15%	27%	20%
Fair	20%	11%	16%
Good	61%	36%	51%

*Source: TRIP analysis of FHWA data.*

\$166 billion each year in highways and bridges.

Simply, good roads cost less. That is why pavement preservation is such an important part of asset management. The goal is to extend the service life of roads before they need major rehabilitation or replacement. Maintaining a road in good condition is easier and less expensive than repairing one in poor condition. Costs per lane mile for reconstruction after 25 years can be more than three times the cost of preservation treatments over the same 25 years and can extend the expected service life of the road for another 18 years.


Across the nation, awareness is growing among transportation officials that concrete pavement preservation, or CPP, pays significant dividends in managing pavements. Highway owners can no longer afford to address their concrete pavement repair needs with short-term solutions such as bituminous patches and thin asphalt overlays. CPP projects offer a long-term repair solution engineered to last many years, even decades, and they can be designed and packaged for bid in a matter of days. Further, stiff competition within the industry and advancements in technology ensure that CPP pricing is typically far less than alternative repair treatments. Motorists will benefit from the resulting smooth, safe and quiet ride when pavements are treated using CPP.





## HOW IT WORKS

**CPP IS A SERIES OF ENGINEERED TECHNIQUES** developed during the last 40 years to manage the rate of pavement deterioration in concrete streets, highways and airports. It is a non-overlay option used to repair areas of distress in concrete pavement without changing its grade. This preventive procedure restores the pavement to a condition close to or better than original and reduces the need for major and more costly repairs later. Further, CPP addresses the causes of pavement distress, minimizing further deterioration. In contrast, covering the distress with an asphalt overlay does not correct the cause of the distress and it will eventually manifest itself again, usually as a larger, more expensive problem.

Dowel Bar Retrofit 

### ABOUT IGGA

The International Grooving and Grinding Association (IGGA) is a non-profit trade association founded in 1972 by a group of dedicated industry professionals committed to the development of the diamond grinding and grooving process for surfaces constructed with Portland cement concrete and asphalt. In 1995, the IGGA joined in affiliation with the American Concrete Pavement Association (ACPA) to represent its newly formed Concrete Pavement Restoration Division. The IGGA / ACPA CPR Division now serves as the technical resource and industry representative in the marketing of optimized pavement surfaces, concrete pavement restoration and pavement preservation around the world. The mission of the International Grooving and Grinding Association (IGGA) is to serve as the leading promotional and technical resource for acceptance and proper use of diamond grinding and grooving as well as PCC preservation and restoration. For more information, visit [www.igga.net](http://www.igga.net).

### >> BASIC CPP TECHNIQUES INCLUDE:

- **SLAB STABILIZATION:** This technique restores support to concrete slabs by filling small voids that develop underneath the concrete slab at joints, cracks or the pavement edge.
- **FULL-DEPTH REPAIRS:** This procedure is a way to fix cracked slabs and joint deterioration by removing at least a portion of the existing slab and replacing it with new concrete.
- **PARTIAL-DEPTH REPAIRS:** This method corrects surface distress and joint-crack deterioration in the upper third of the concrete slab. Placing a partial-depth repair involves removing the deteriorated concrete, cleaning the patch area, placing new concrete and reforming the joint system.
- **DOWEL BAR RETROFITS:** This method consists of cutting slots in the pavement across the joint or crack, cleaning the slots, placing the dowel bars, and backfilling the slots with new concrete. Dowel-bar retrofits link slabs together at transverse cracks and joints so that the load is evenly distributed across the crack or joint.
- **CROSS-STITCHING LONGITUDINAL CRACKS OR JOINTS:** Cross-stitching repairs low-severity cracks. This method adds reinforcing steel to hold the crack together tightly.
- **DIAMOND GRINDING:** By removing faulting, slab warping, studded tire wear and unevenness resulting from patches, diamond grinding creates a smooth, uniform pavement profile. Diamond grinding reduces road noise by providing a longi-



 Full-Depth Repair

tudinal texture, which is quieter than transverse textures. The longitudinal texture also enhances macro texture and skid resistance in polished pavements.

- **JOINT AND CRACK RESEALING:** This technique minimizes the infiltration of surface water and incompressible material into the joint system. Minimizing water entering the joint reduces sub-grade softening, slows pumping and erosion of the sub-base fines, and may limit dowel-bar corrosion caused by deicing chemicals.

*CPP treatments can be used stand-alone or as a coordinated system as conditions warrant.*