

**C O L D
I N - P L A C E
R E C Y C L I N G
A C R O S S
N O R T H
A M E R I C A**

**P R E S E N T E D B Y
T H E C O L D I N - P L A C E R E C Y C L I N G
C O M M I T T E E O F T H E**

**A S P H A L T R E C Y C L I N G A N D
R E C L A I M I N G A S S O C I A T I O N**



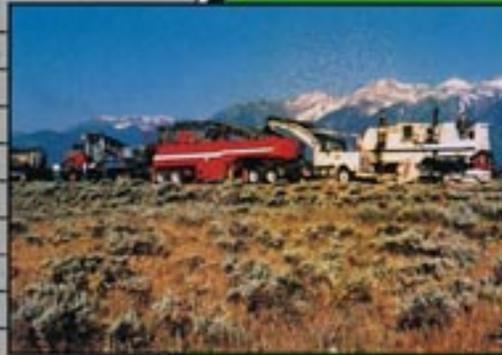
Examples of Successful Co

Cold in-place recycling is an extremely efficient method of rehabilitating deteriorating asphalt roadways. Cold in-place recycling reuses the existing pavement structure and results in a stable road at a total energy saving of from 40% to 50% compared to conventional construction methods. In addition, recycling conserves our depleting resources of aggregates and petroleum products.

Cold recycling has been practiced by various methods and under a variety of names for over half a century. Thanks to cooperation between equipment manufacturers, the petrochemical industry, contractors, and contracting agencies, great advances have been made. Today, the process combines sophisticated engineering and testing procedures, microprocessor blending controls, specially formulated additives, and highly productive machinery to achieve both superior quality and economy.



OREGON - State Highway 20 in Western Oregon



WYOMING - Near Jackson with Teton Mountains in background



COLORADO - near the Mountains



CALIFORNIA - US 395 Near Victorville



ARIZONA - Frontage Road Along I-10



NEW MEXICO - On Interstate near Maxwell



STATE 2-LANE HIGHWAYS - US 283 & K-9 Norton County, Kansas



LOW VOLUME STATE ROADS - SR 389 in northern Arizona



INTERSTATE HIGHWAYS - Lordsburg, New Mexico

Old Recycling



CANADA
on Region R



an Juan



KANSAS - On State Road K-18, near Bennington



IOWA - County Road in Muscatine County



MINNESOTA
between Ca



erstate 25,



OKLAHOMA - Ponca City Streets



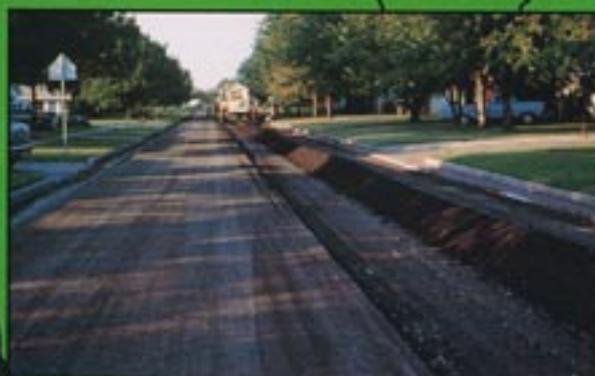
TEXAS - Interstate 37 South of San Antonio



MICHIGAN



WAYS - I-10 West of
co



CITY STREETS - Residential Street in Ponca City, Oklahoma



FEDERAL HIGHWAY AND
PROJECTS ON FEDERAL
Ridge Road North of Estes



Province of Ontario
Roads 5 and 8 Ottawa Area



NEW YORK - State Highway near
Albany



NEW JERSEY - State Highway 95
Princeton and Princeton



INDIANA - S.R. 38 - Crawfordsville
District



NEW YORK - New York County
Highway



MICHIGAN - Near Wixom



PENNSYLVANIA - Sumneytown
Pike in Montgomery County



FLORIDA - Residential street in
Orange County



MINISTERS OF
LAND - Trail
Park, Colorado



BUREAU OF INDIAN AFFAIRS
PROJECTS - West of Cuba, New Mexico



AIRPORTS - Quincy Airport,
Tallahassee, Florida

Advantages of Cold In-Place Recycling



Conserves Aggregate - The quantity of high-grade aggregates present in our existing highways may equal or exceed the quantity of aggregates available in deposits that can be economically produced for highway construction or reconstruction. One mile of asphalt roadway (24 ft. wide, 4" thick) will have between 2800 and 3000 tons of aggregate. At a cost of \$6.00 per ton, the value of this aggregate is between \$17,000.00 and \$18,000.00.



Conserves Asphalt Cement - It has been proven over the past few years that the residual asphalt in our existing highways can be rejuvenated and reused by both hot and cold recycling methods to equal or exceed the quality of virgin asphalt cement. The residual asphalt content of most of our existing asphalt highways is between 5 and 6 percent. One mile (24 ft. wide, 4" thick) will have between 150 and 170 tons of reusable asphalt cement. At the current price of approximately \$100.00 per ton, the value of this liquid asphalt is between \$15,000.00 and \$17,000.00.



Surfacing Costs Are Reduced - Depending on traffic volume, cold recycled projects can be surfaced with a chip seal or one to three inches of hot mix asphalt. Normally a cracked and deteriorated asphalt roadway would require a two to five inch hot mix overlay.



Reduces Reflective Cracking - Normally, transverse and longitudinal cracks on projects overlaid with 1" to 2" of hot mix will reflect through the overlay within one to two years. Cold recycled projects constructed over the past few years have proven that cracks do not reappear to any appreciable extent. On one experimental cold recycled project reconstructed in 1979 on K96 in Scott County, Kansas, only 14 percent of the original cracks had reappeared as of August 1986. On the control section, over 60 percent of the original cracks had reflected through the surface. On several projects in New Mexico, the 24' driving lanes were cold recycled. A 2" hot mix overlay was laid on the driving lanes and the 8' shoulders. After 2 years, most of the cracks in the shoulders reappeared, but none have reflected through the cold recycled driving lanes.



Minor Inconvenience To The Traveling Public - One-way traffic can be maintained by the use of pilot cars, or two-way radios and flag persons at each end of the construction area. The full roadway is open to two-way traffic at night and on weekends.



Conserves Energy - No heat required. No transportation except for additive. All other materials are in the existing roadway.



Hydrated lime slurry and Type C fly ash are some of the newer additives being introduced into the cold in-place recycling process with very impressive results.



Cost Effective - Costs for cold in-place recycling are very economical due to the high productivity of the equipment in use today. Production rates vary from one to four lane-miles per day depending on type of equipment used, depth of material recycled, length and location of project. Projects let in Kansas in 1987 that included 4-inch cold recycling, .5% to 1.0% additive, and a 3/4-inch machine laid surface were completed for between \$30,000 and \$35,000 per mile.



Restore Original Crown And Cross Slope - By using a paver with a large hopper capacity, minor irregularities in the profile of the existing roadway can be corrected. Crown and cross slope can be improved. Laydown of cold recycled material requires the close, expert attention of the paving crew. All of the processed material in the windrow must be relaid, and no additional material is available.

Modern Cold In-Place Recycling Equipment On The Job

The future undoubtedly holds new challenges and advances for the road construction industry. But through years of testing and development, cold in-place recycling has proven itself to be an effective and economical process for rehabilitating aged, rutted, and/or badly cracked asphalt pavements.

To date, New Mexico, Oregon, and Kansas have completed several hundred miles of cold recycling and are planning to increase the number of projects let each year. In fact, almost all agencies that have constructed one cold recycled project either have followed with more projects or have others ready to let. The results speak for themselves to those who have seen the benefits of cold in-place recycling firsthand.



Three-piece recycling train



Milling Machine with combination screening / crushing / mixing unit.



Milling Machine and one-piece screening / crushing / mixing unit.



Milling Machine equipped with additive metering system.



Milling Machine followed by combination blending / laydown unit.

Your Registered ARRA Member



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