



RECYCLING PCC PAVEMENTS

Greene County, Iowa

Project Report #3

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Greene County, Iowa has a 212-mile network of Portland cement concrete (PCC) pavements serving an agriculturally based population. Although the pavements were designed for a standard 20-year life, nearly 100 miles of these roads, constructed prior to 1967, continue to serve the traveling public. Lifetime maintenance expense for the PCC pavements was minimal. The challenge of the future for the Greene County Board of Supervisors and engineering staff is to maintain, renovate and upgrade its established pavement network.

In 1984 County Engineer Ron Betterton and his staff began to develop a long-term plan for preservation of their pavements. Various construction methods such as patching, bonded and unbonded PCC overlays, AC overlays or reconstruction were evaluated. Betterton and the supervisors acknowledged that the existing pavements had performed beyond design expectations. The older roadways did not meet today's geometric standards for the paved Farm-to-Market system. Shoulders were too narrow, drainage structures were failing and horizontal and vertical alignments were sometimes unsafe.

Recycling of existing PCC pavements was considered as a method of reconstruction and a project was proposed to remove and crush existing pavement, grade and drain the roadways to current standards and construct new PCC pavements using crushed concrete as the primary source of aggregate. This methodology would conserve dwindling supplies of virgin aggregates, eliminate the necessity of providing waste areas for old concrete and ultimately provide Greene County with low cost, low maintenance roadways designed for the future. The life expectancy of the new PCC pavements exceeds 30 years.

During the winter of 1984-1985, Greene County designed the first major recycling project for a Farm-to-Market roadway in Iowa, County Road E-18 beginning at Payton and extending 2.37 miles west. The original pavement was constructed in 1955 by Hallett Construction Company of Boone, Iowa. The 1955 standard design specified PCC pavement 6 in. thick by 20 ft. wide and earth shoulders 4 ft. wide. The coarse aggregate was durable river gravel.

The 1985 reconstruction contract specified removal and crushing of old pavement, regrading the roadway, installation of concrete culverts and construction of 7 in. thick by 22 ft. wide PCC pavement with 6 ft. wide earth shoulders. Central Paving Corporation of Indianola, Iowa was the low bidder at the letting in June of 1985. The cost of total reconstruction was \$200,000 per mile. Recycling and paving totaled \$140,000 per mile. Greene County furnished a stockpile and plant site area. Central Paving Corporation used a Rex Model S central mix batch plant and a paving train made up of a CMI "Iowa Special" Subgrader, Rex Town and Country slipform paver and a CMI cure and texture machine.

In 1986 the county let a contract for pavement removal, crushing, grading and drainage on projects totaling 4.3 miles. The original pavements near Payton and Dana were constructed in 1955, 1956 and 1959 by Hallett Construction Company. Betterton separated the grading and paving contracts to allow the new grade to settle one winter. The 1986 recycling and grading contract was awarded to Herman Buns and Son. Pound Construction Company subcontracted crushing of the old concrete.

Greene County let contracts in March of 1987 for 7 in. PCC pavement specifying use of recycled concrete. Central Paving Corporation of Indianola, Iowa was again the low bidder. The total cost of recycling and paving was \$134,000 per mile. Construction and material specifications are attached as IDOT Special Provision 624 - Removal and Crushing of Old Pavement.

Betterton estimated that 95% of the old concrete was reusable as fine and coarse aggregate for concrete. Sufficient material was produced from one mile of old pavement to supply aggregate for two miles of reconstructed pavement. Material not incorporated into the pavement can be used for roadstone, driveway surfacing or granular shoulders. Betterton estimates that the excess material has a market value of \$10 per ton.

Greene County has adopted their recycling program for the next 5-year planning period. Five or six miles of reconstructed pavement using recycled concrete for aggregate will be constructed each year. This program assures the continuance of a superior Farm-to-Market road network well into the 21st century.

Additional information may be obtained by contacting the Iowa Concrete Paving Association at (515) 278-0606.