

HIGHWAY "FIRSTS" - STATE OF IOWA

by
Public Information Department
June 1971

June 29, 1971

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FIRST CHIEF ENGINEER - BUREAU OF ROADS

The first Chief Engineer of the Bureau of Public Roads, Mr. T. H. MacDonald, moved to the position from his assignment as Chief Engineer of the Iowa State Highway Commission. MacDonald, longtime Chief Administrative Officer of the Bureau of Public Roads, was employed by Iowa's first Commission in 1904, "to take immediate charge of the work of the Commission".

IOWA STATE HIGHWAY COMMISSION

The original organization of the Iowa State Highway Commission was unique - thus a probable "first". The Iowa Highway Commission was originally founded by legislative action in 1904 as a function of Ames College (Iowa State University), to provide short course instruction to local authorities in the construction and maintenance of the roads. The Dean of Engineering, Anson Marston, was named a Commissioner along with the college's Dean of Agriculture, C. F. Curtiss. The Commission at that time had no roads to construct or maintain. Dean Marston did pioneer work in analyzing loads on underground drainage pipe. Probably the greatest accomplishment by the Iowa Highway Commission occurred when 1,030 miles of PCC pavement was constructed in 1929-30, on the primary road system which consisted of 6,813.

SLIP-FORM PAVER

A most significant "first" for Iowa was the development of the Slip-Form Portland Cement concrete paver, which was designed by James W. Johnson, an Iowa State Highway Commission employee. The first models paved one lane at a time, in 1949, leaving a center line gap to be filled separately. This machine developed by Johnson, who was the Commission's Laboratory Chief for many years, has gained almost universal acceptance.

ALUMINUM I-BEAM BRIDGE

The world's first aluminum girder type highway bridge built in 1958 is in place over Interstate 80 and 35 north of the city of Des Moines. This bridge was built due to a delay in receiving steel.

PROPORTIONING MATERIALS BY WEIGHT

This practice began in 1919 or 1920 when the Highway Commission persuaded two paving contractors to equip for proportioning by weight. It was required by specification soon after, about 1922. This method has become recognized as superior and is used almost universally.

COLD FEED CALIBRATIONS

Iowa was first, in 1953, to require that calibrations be made on cold feeds on hot mix plants.

PRESTRESSED STEEL I-BEAM BRIDGE

The first bridge with pretensioned steel beams was placed on U.S. 6 in Pottawattamie County, in 1961. This bridge was built by placing camber in the beam when the coverplates were welded to the beam.

THE MUD JACK OR MUD PUMP

The mud pump was developed first in Iowa by John Poulter, a Highway Commission employee in Mt. Pleasant. Poulter devised the mud pump to raise hydraulically a section corner of the Highway Commission garage floor at Mt. Pleasant. Poulter later sold his idea to Koehring Manufacturing Company and became a Vice President of the firm. While an employee of the Iowa Highway Commission, Poulter first raised depressed pavement with the machine in the Burlington area in 1930.

REINFORCED CONCRETE BRIDGE

The first Melan Arch Type reinforced concrete bridge built in the U.S. was placed on a county road in Lyon County in 1893. The 30' long bridge crossed "Dry Creek" southeast of Rock Rapids, Iowa and had a 16' roadway. Cement for the structure was shipped from Germany and the cost of the structure was \$830.00. In 1964 the bridge was moved to "East Side Park" in Rock Rapids for preservation. Public subscription paid for the move.

CONTINUOUS REINFORCED PAVING - NO TRANSVERSE BARS

This was an Iowa 'first' used on Interstate 35 in September 1966. Now widely used, the method called for the development of machinery to place the reinforcing steel without chairs to support it. This method eliminated a great amount of hand labor.

USE OF PAPER FOR CURING

This widely accepted practice began in Iowa in the early 1920's using paper and later the use of plastics when they became available.

USE OF IMPERVIOUS FILM UNDER CONCRETE

Iowa was first to use an impervious material ("tar paper" originally), under concrete slabs to retain moisture during the curing process. This method was initiated in 1920.

POLYURETHANE PAVEMENT JOINTS

The use of polyurethane joints for pavement was developed in Iowa in 1964. The original use was for bridge approaches. The Highway Commission worked jointly with Phelan (Midwest Manufacturing Company, Burlington, Iowa), in development of this method.

FULL DEPTH, NO BASE HOT MIXED ASPHALTIC CONCRETE FOR INTERSTATE

A section of Interstate 80 east of Iowa City built in 1964, is thought to be the first section of Interstate with hot mixed asphaltic concrete as the full depth of the pavement structure, resting on earth with no lower base or sub-base.

"NO PASSING ZONE" SIGN

Iowa was first to introduce the pennant-shaped "No Passing Zone" sign. In 1959 this sign was introduced and placed on U.S. 30 across the state of Iowa on a trial basis. Its reception was so good that within two years time (1961), this sign was erected on the left shoulder at the beginning of all "No Passing Zones" on the Iowa Primary System. This sign will be in the new manual on Uniform Traffic Control Devices for Streets and Highways, prepared by the National Joint Committee.

OPTIMUM ENFORCEMENT LEVEL

Iowa is the only state that has made a study by research consultants to determine the "Optimum Enforcement Level" for Traffic Weight Operations". The study was published in October 1968.

PHOTO/FILE TECHNIQUE

The Iowa State Highway Commission in 1962 was first to use Photo/File Technique on its 10,000 mile primary road system.

24 HOUR TRAFFIC COUNTS FOR CLASSIFYING TRAFFIC

The use of 24 hour traffic counts for classifying traffic was first practiced in Iowa in 1934, and is now being used by many others.

TAPERED INLET CULVERTS

The use of tapered or flared end culvert inlets in 1952 to increase hydraulic capacity was the result of research conducted by the Iowa Highway Research Board. Flared ends are used where feasible in Iowa and the use is spreading to other agencies and consultants. The use of bell jointed culverts in Iowa is a possible first.

PIPE TESTING PROGRAM - CONCRETE CULVERT

Iowa may have been the first state to recognize the importance of concrete culvert pipe strength. As early as 1905, Dean Anson Marston, developed tests and initiated the idea of "Imperfect Trench Method".

MACHINE FINISHING BRIDGE DECKS

Iowa was certainly among the first if not the first to require machine finishing of bridge decks. Smooth bridge decks were of concern to the entire highway industry in 1961. At that time Iowa's Engineer, W. W. Wickham, presented a paper at AASHO in Detroit on machine finishing. The process created interest as a new approach. It has since become almost standard practice.

THE WATER/ALCOHOL TEST

The Water/Alcohol Test was developed in Iowa in 1937. This is a severe freezing-and-thawing test for high-quality aggregate.

HORIZONTAL CYLINDER MOLDS

The use of horizontal cylinder molds for concrete compression tests originated in Iowa in 1957. The developer of the Slip-Form Paver, J. W. Johnson, designed this method. This method was used to test prestressed concrete without the time lag necessary for capping. The cylinders went from the curing to the testing machine immediately. The

horizontal mold controlled the surfaces so no capping was necessary.

TWO-POINT LOADING OF TEST BEAMS

Iowa was first to use two-point loading of test beams for testing tensile strength of P.C. concrete beams. The method begun in 1935 has become widely used.

FIRST IN MILES OF SECONDARY ROAD PCC

As of June 1, 1971, Iowa leads the nation in the number of miles of PCC paving in its secondary system. 2,750 miles of PCC have been constructed or are under construction in Iowa.