CHAPTER 1

THE EARLY DAYS

The invention of the wheel ranks as one of the most important events in the history of the world. There was nothing like it in nature to copy and it had to be created whole, in a giant leap of the imagination. When this was finally achieved by some unknown genius over 5,000 years ago, it decisively and permanently altered the course of human progress. With carts, ancient farmers could transport their surplus crops to the growing cities so that other men were free to turn to nonagricultural pursuits. The war chariots of Assyria and Egypt helped make their armies and kingdoms into the mightiest of their time. Likewise, the prairie schooner, stagecoach, and railroad led America's dynamic westward movement in the 1800's. Without the wheel, today's civilization would be quite impossible.

In the early 1900's, Henry Bourne Joy, president of the Packard Motor Car Company and first president of the Lincoln Highway Association, made a motor trip west across America to promote better roads. Arriving in Omaha, he sought directions from the local Packard dealer and was told that there was no road going directly west. Mr. Joy insisted that there must be a way. The dealer led him to the western edge of the city, took down a wire fence, pointed him westward, and informed him that he would encounter several more fences on his journey. Mr. Joy proceeded as instructed, taking down fence after fence until, as he recalled:

> "A little farther and there were no fences, no fields, nothing but two ruts across the prairie."

It is indeed difficult for a modern traveller to reflect back a hundred years to a society which was devoid of automobiles, trucks, buses, and even roads as we know them today. The following story, popular in its day, dramatizes the way things were and was told by Louis W. Hurst, Lincoln Supply Base Superintendent, on the occasion of his 40th Anniversary with the department in 1968:

"Years ago, a man, woman, and three little children came to Lincoln in an old wooden wagon pulled by two plow horses. The man drove the rig to a local church, stopped, and they all went in. They were greeted by the Rector who asked, 'How may I help you?' The man replied, 'We'd like to get married.' The Rector stared over his spectacles at the three little children and asked, 'Aren't you a little late my son?' The man said, 'Yes Father, we are a little late, but the roads have been pretty bad.'"

Such was the status of Nebraska's roads before World War I. Throughout America, the situation was much the same. Prior to 1914, the nation's interstate and to a great extent, intercity transportation needs, were served primarily by railroads and steamboats. At the local level, mobility for individuals was mostly by horse and buggy.

The development and maintenance of roads was a local matter, certainly not a state or national concern until the turn of the 20th Century. In some areas, the concern was greater than others. For many years, farmers had experienced hardships in getting their crops to market and transportation problems increased the risk of farming. During rainy seasons, dirt roads and trails became quagmires, making passage impossible. Crops rotted or were stored at high cost. Once the roads were passable, there was often a glut on the market as everyone rushed their crops to the railhead, driving prices down. Better roads, however, had to be financed and many farmers feared that additional taxes would prove an undue burden, further increasing the risk of farm failures. A national commitment to the systematic development and maintenance of a network of highways would have to await the emergence of the automobile as the focus of the mass-production, mass-consumption society of the 1920's.

But, of course, highway history began long before that. In England during the feudal times of the Middle Ages, the care of roads was based upon the "trinoda neccessitas," the threefold required service of the tenant: (1) repelling an enemy, (2) constructing fortifications, and (3) repairing roads and bridges. With the decline of feudalism, the foregoing requirement developed into the common law whereby the repair of highways became the responsibility of the local parishes. Compulsory labor

upon the highways was legalized in the year 1555 when the "Statute for Mending of Highways" specified that:

> "Constables and Churchwardens of every parish shall yearly, upon the Tuesday or Wednesday in Easter Week, call together a number of parishioners, and then elect and choose two honest persons of the parish to be surveyors and orderers for one year of the works for amendment of the highways in their parish."

The statute labor system was introduced to America by the first settlers and became embedded in the laws of the British Colonies and later the United States, where they survived until the beginning of the Twentieth Century. Known as "working out the road tax," the statute labor system was supplemented by other ways and means for improving roads such as donations by public-spirited citizens, private subscriptions, assessments upon adjacent property, bridge tolls, fines for failure to perform statute labor, public lotteries, public land sales, military funds, taxes collected by the various levels of government, etc. The lack of legislation authorizing local taxes specifically for roads, combined with the inequities of the statute labor system, were largely responsible for the poor condition of the roads in the colonies and early republic.

The oldest road in what is now the United States was El Camino Real (The Royal Road). It ran from Santa Fe, New Mexico, via El Paso, Texas, to Chihuahua, Mexico along present-day Interstate 25 and Interstate 10. Spaniards first traveled this road in 1581.

The first highway legislation in the British Colonies of North America was passed by the Virginia Legislature in September 1632. It provided that:

> "HIGHWAYES shall be layd out in such convenient places as are requisite accordinge as the Governor and Counsell or the commissioners for the monthlie corts shall appoint or according as the parishioners of every parish shall agree."

In 1657, this basic highway law was supplemented by the Virginia Legislature and provided:

"That surveyors of highways and maintenance for bridges be yearly kept and appointed in each countie court respectively, and that all gennerall wayes from county to county and all churchwaies to be laied out and cleered yearly as each county court shall think fitt, needful, and convenient, respect being had to the course used in England to that end."

In 1806, Congress provided for the planning and construction of an east-west route from Cumberland, Maryland to Wheeling, West Virginia (then Virginia). This important road, which was later extended westward, was destined to be known as the National Pike or Cumberland Road. From 1806 to 1838, Congress passed 34 appropriation acts for this purpose, totaling about $7 million. It was the first federal construction of an interstate or national road in American history and was located along the route presently known as US-40.

As the newly built railroads appeared on the scene as the solution for long-distance traffic, there was a general decline in the construction of main highways during the remainder of the century. During this period, road construction was confined mainly to local roads of a "horse and buggy" variety under the jurisdiction of local governments. The medieval system of "working out the road tax" was the principal means of local road support. Congress, however, enacted literally hundreds of laws appropriating road funds for military and other purposes, including roads providing access to new settlements. The aggregate amount appropriated by Congress up to 1893 for the construction of roads and bridges was reportedly in excess of $17 million.

Any discussion of historic roads or their design should include the Via Appia, or "Appian Way," which was the first and most famous of the 29 great military roads radiating from Rome. Begun in 312 B.C. by the censor Appius Claudius Caecus, it originally ran to Capua, 132 miles to the south-southeast. And, by about 244 B.C., it had been extended another 230 miles southeastward to the port of Brundisium in the "heel" of Italy on the Adriatic Sea. The Via Appia averaged 35 feet in width, 3-5 feet in thickness, and its surface was slightly convex to facilitate good drainage. It consisted of a 15.5-foot two-way roadway, flanked by curbs

2.0 feet wide by 18.0 inches high, and paralleled by 7.75-foot one-way side roads. The foundation was of heavy stone blocks cemented together with lime mortar. Over these were laid polygonal blocks of lava that were smoothly and expertly fitted together. The lava blocks formed a good traveling surface which had extraordinary durability over the centuries. The massive solidity of this thick Roman cross-section was standard practice for more than 2,000 years until superseded by McAdam's light wearing-surface in the 19th Century.

John Louden McAdam (1756-1836) was a Scotsman who invented the "macadam" road surface. He maintained that roads should be raised above the adjacent ground for good drainage and covered with a surface of small, broken stones. His design called for a drained and compacted subgrade to support the load. Eighteen feet in width, the center of the road was constructed three inches higher than the edges. On that, he required stone to serve as a wearing surface and roof to keep water out of the foundation. That surface was about 10 inches thick and consisted of clean, broken stone without clay, earth, or other organic material that might hold water or be affected by frost. Each of the stone fragments was to weigh not more than six ounces and had to pass through a two-inch ring. The layers of stone were laid on top of another, each compacted by the traffic rolling over it. As weak spots appeared, they were repaired before the next layer was added. It was one of the best systems of rolling and compaction ever devised. Mr. McAdam reached the pinnacle of his fame in 1827 when he was appointed Surveyor-General of Metropolitan Roads in Great Britain.

In 1824, a process for making Portland cement was patented by bricklayer Joseph Aspdin in England. He chose the name because of a resemblance of the cement (when set) to Portland stone, a limestone quarried on the Isle of Portland, Dorset, England. By having conferred the name, Mr. Aspdin is commonly considered to be the inventor of what has become the modern Portland cement.

Asphalt is a material with a long history. The ancient Egyptians preserved bodies of the dead by wrapping them in cloth impregnated with asphalt. It was used in the Tower of Babel and as waterproofing for the basket in which the infant Moses was found in the 13th Century B.C. (Exodus 2:3). The Babylonians also used it with brick to pave a road 600 years before the birth of Jesus Christ. And in the 10th Century A.D., the streets of Cordova, Spain were treated with asphalt during the Moorish occupation.

A native of Vermont, Amzi Lorenzo Barber graduated from Ohio's Oberlin College in 1867 and moved to the nation's capitol in that year to teach at Howard University. Extensive street improvements planned for the District of Columbia caused him to study asphalt as a paving material. In 1877, Mr. Barber obtained a franchise to procure asphalt from the great pitch lake on the Island of Trinidad, a former British possession about the size of Delaware located off the coast of Venezuela. A year later, his paving company was converting the streets of Washington, D.C. into the nation's smoothest. In 1884, he had a nationwide monopoly of the Trinidad deposit and by 1888, his Trinidad Asphalt Company controlled all leases on the deposit. Thus, Mr. Barber became known as the "Asphalt King" because he controlled the world's chief source of asphalt for some 20 years.

Henry Ford (1863-1947), the industrialist who became within his lifetime the one person most universally identified as the creator of modern mass production, was born on a farm near Dearborn, Michigan during the Civil War. The principal manufacturing innovation credited directly to Mr. Ford is the assembly-line method of automobile production, which he first employed in 1913. His industrial philosophy was deceptively simple: reduce the price of the product, increase the volume of sales, improve production efficiency, increase output to sell at still lower prices, and so repeat the cycle indefinitely.

By the 1880's, the demands of various interest groups, however, would force the federal government to reexamine its role in road development and prove significant to the ultimate development of a national highway

system. The first such organization, the Good Roads Movement, came from bicyclists. Using the motto, "Lifting Our People Out of the Mud," they organized the League of American Wheelmen in 1880 and lobbied state and federal officials for better roads. The bicyclists were supported in their efforts by the National Grange, the Populists, and the Farmer's Alliance. Even railroad interests supported this movement, recognizing the advantage to be gained if farmers could more easily move their crops to the rail centers.

In response to the Good Roads Movement and the appropriate congressional legislation, U.S. Secretary of Agriculture J. Sterling Morton (1832-1902) of Nebraska City, Nebraska instituted the Office of Road Inquiry within the Department of Agriculture on October 3, 1893. With an annual appropriation of $10,000, this office undertook an investigation of the condition of roads throughout the nation. It represented a departure from usual federal policy. In 1896, however, the annual appropriation dropped to $8,000 and remained at that level for four years.

The automobile, developed in the 1890's, created an even greater demand for better roads. While affordable only to the rich, fascination for this horseless, mechanical contraption was clearly widespread. In 1895, there were four experimental automobiles in the United States. In 1896, Henry Ford built his first automobile and, in 1903, established the Ford Motor Company at Detroit. Mr. Ford's ambition was to produce an automobile at a price within the reach of millions. By 1904, there were 54,590 cars and 700 trucks in actual use. In 1910, the number of automobiles was estimated at a half-million and, by 1920, there would be over nine million registered vehicles in the U.S.

Technical progress, however, was not limited to automobiles. On December 17, 1903 near Kitty Hawk, North Carolina, Orville Wright (1871-1948) made the first successful powered, sustained, and controlled flight in a fixed-wing aircraft. It was one of the great technical achievements of all time and one that would soon alter the course of human events.

By 1904, the increase in motorized transportation led the federal government to commission a census of the nation's roads. The census showed that there were slightly over two million miles of roads in the nation, most of which were plain dirt. But the census also revealed that the nation had begun to experiment with other surfaces such as gravel, shell, sand, sawdust, burned clay, plank, and macadam. In 1905, there was not a single mile of paved rural road in the entire United States. It would be another four years, however, before the first mile of rural concrete pavement was completed on Woodward Avenue in Wayne County, Michigan.

Between 1903 and 1916, the federal government wrestled with its role in highway construction. Numerous bills were introduced in Congress (over 60 in 1912 alone) calling for federal funds for road construction. Pressure came from various quarters and as more and more farmers purchased vehicles to transport goods to market, they continued to press for better farm-to-market roads. The Good Roads Movement expanded into 50 large associations and over 500 smaller ones. Automotive manufacturers recognized that better roads were essential to the industry. The poor condition of America's highways was made even more apparent as Rural Free Delivery (RFD) began on October 1, 1896. By 1900, RFD was nationwide and the Post Office began replacing the horse and buggy with motorized delivery vehicles. In 1912, Congress passed the Post Office Appropriation Act which allotted $500,000 for rural road construction to facilitate mail delivery. The Act was designed for local and state governments who were willing to provide two-thirds funding for road projects. Seventeen states took advantage of this measure which resulted in the construction or improvement of 425 miles of roads.

The Ford Motor Company introduced the Model T in 1908, claiming that it was "a car that every man earning a good salary can afford." The initial price was $850. With mass production, the price of a Model T was reduced to $600 in 1912, $450 in 1918, and its all-time low of $290 in 1924. Nicknamed the "Tin Lizzie," the Model T was high-slung, gauche, dependable, almost indestructible, and quite unforgettable. This car changed the face of the land, pulled America out of the mud, and

transformed a people. By 1930, half-grown boys had more mechanical know-how than most skilled mechanics of 1910. In 1910, mechanical skill meant knowledge of how to "use" machines. By 1930, it meant knowledge of how to "make" them.

In 1912, real estate developer/promoter Carl Graham Fisher (1874-1939), who built the 2.5-mile, oval Indianapolis Speedway in 1909, became interested in a project to build a transcontinental highway. Mr. Fisher traveled throughout the nation promoting the idea and raising funds for the construction of a highway, which was named the Lincoln Memorial Highway in honor of President Abraham Lincoln, to run from Jersey City, New Jersey through Omaha, Nebraska to San Francisco, California. Mr. Fisher's motivation stemmed from his belief that too little was being done by state and local governments and too often there was a suspicion of mismanagement or corruption on the part of politicians and contractors. "The highways of America," Mr. Fisher said, "are built chiefly of politics, whereas the proper material is crushed rock or concrete." He was supported in his efforts by the automotive industry, states, and private citizens. Thus, the Lincoln Highway Association was formed in Detroit on July 1, 1913 and the Lincoln Memorial Highway was officially dedicated as such on October 31 of that year. Mr. Fisher continued to be a major force behind the project, publishing periodic reports on the condition of the nation's highways while encouraging people to stay at home less and travel more. His slogan, "See America First," underscored his promotion of American tourism which, in turn, would create a greater demand for continued highway development. In a 1914 publication of the Lincoln Highway Association, entitled "Following the Path of Progress," Mr. Fisher left a great deal unsaid in describing highway conditions west of Omaha:

> "The tourist must be prepared to put up with a few inconveniences. At no point is the distance between ranches or towns greater than 80 miles or so. No real hardships nor dangers which would make the trip disagreeable to women will be encountered."

The charter meeting of the American Association of State Highway Officials (AASHO) was held at the Raleigh Hotel in Washington, D.C. on

December 12, 1914. Attending were 19 persons representing 16 states and the federal Office of Public Roads. The purpose of this first meeting was twofold: (1) to organize an American Association of State Highway Officials, and (2) to draft a federal-aid road bill. The latter was the associations first substantial contribution to the nation's highways. The bill was founded on the principle of cooperation between the 48 states and the federal government, as equal partners, in the development and improvement of the nation's highways in a comprehensive manner and pursuant to a well-conceived plan.

The 1916 Federal-Aid Road Act, signed by President Woodrow Wilson on July 11, was a landmark in the debate over federal-state responsibilities for highway construction and maintenance. This legislation (H.R. 7617), 90 percent of which had reportedly been drafted by AASHO, was introduced in the House of Representatives on June 6, 1916. It provided federal financial support for highway development and, at the same time, established the separate responsibility of the states for sharing the cost of construction and assuming the responsibility for maintaining highways financed in this manner. The Act allowed the federal government to finance up to 50 percent of the cost of construction, not to exceed $10,000 per mile (exclusive of bridges of more than 20 feet clear span), with the state absorbing the remaining costs. It also required that each state establish a state highway department for the purposes of maintenance and administering the federal funds. The state would be the smallest unit of government with which the federal government would transact business. Under this act, Congress appropriated $75 million to be dispersed over a five-year period. The funds were managed by the Secretary of Agriculture and were to be apportioned to the states on the basis of population, land area, and miles of rural postal routes.

The early leaders of AASHO are credited, almost single-handedly, with preserving the partnership concept between the state highway departments and the federal government. After approval of the 1916 Federal-Aid Road Act, which defined the partnership principle, a movement developed for a limited mileage system of highly improved highways to be designated,

constructed, maintained, operated, and owned by the federal government. Such legislation was introduced for congressional consideration. Some backers of the movement were also active in the infant AASHO organization and at the 1918 AASHO Annual Meeting in Chicago, the battle of partnership versus national ownership came to a showdown. The voting ended in a tie and a decision was delayed.

A year later, officials of the Kansas Highway Department took active leadership in an attempt to enlist support for the partnership concept. Representatives from Kansas and six neighboring state highway departments met in Kansas City and prepared a resolution seeking support from other departments. Later, at the 1919 AASHO Annual Meeting in Louisville, exactly one-half of the member states represented had signed the petition. Again, a stalemate appeared inevitable. By explaining, cajoling, and pleading, the supporters of the petition induced the representatives of 12 other states to join the movement by the fourth day of the convention. A resolution, adopted by this convention and confirmed decisively a year later, assured AASHO support for the partnership principle. AASHO then led the successful fight against a federally-owned national system of highways and these principles have prevailed since that time.

The 1916 Federal-Aid Road Act was the impetus for most states, including Nebraska, to assume greater leadership in the development of roads. To a large extent, many of the issues with which the federal government had grappled were also reflected in the states. In Nebraska, these issues predate its statehood. On February 17, 1855, Congress appropriated funds for the construction of a military road from Omaha west to Fort Kearny in the Nebraska Territory. The first Territorial Legislature in Nebraska also recognized the need for developing roads to connect settlements within the territory and passed several measures dealing with survey procedures and road specifications. However, it was generally assumed that the construction and cost of such projects should be the responsibility of the counties affected. This responsibility was spelled out in the first county road law passed on January 26, 1856, which placed the basic authority for constructing territorial roads with the

county commissioners, who could levy taxes and appropriate labor to construct and maintain these roads:

> "The opening, making, and keeping in repair of all territorial roads, shall be under the jurisdiction of the board of county commissioners of the county in which the same may be situated. All public roads shall be surveyed, opened, made passable, and kept in repair, forty feet wide; and all bridges on any public road shall be at least sixteen feet wide, with a good and sufficient railing on each side, three feet high, the whole length of the bridge. To provide a fund for opening, making, and keeping roads in repair, there shall be laid upon each able-bodied male citizen within any organized county, between the ages of twenty-one and sixty years, a poll-tax of two days' labor to be expended upon the public roads."

A January 1860 amendment to the Nebraska Territory's county road law provided that four rods (66 feet) was the legal width of a county road.

In September 1860, the first telegraph line in the Nebraska Territory was completed between Omaha and Brownville. That same year also saw the beginning of the Overland Stage Service and the Pony Express.

Also in 1860, the Nebraska City business community and Otoe County Commissioners undertook a project to build a new road 190 miles westward from Nebraska City to Fort Kearny. It was later referred to as the Steam Wagon Road because of the 1862 attempt of Major Joseph R. Brown of New Ulm, Minnesota, an early fur trader and businessman, to use it for his steam-powered tractor which pulled a string of freight cars. The wagon itself was a version of the huge steam-powered tractors that later became fairly common on the Great Plains. Built in New York by John Reed, the 20-ton, $9,000 steam engine arrived at Nebraska City aboard the steamboat "West Wind" on July 12, 1862. The huge red machine, with 12-foot drive wheels at the rear and 6-foot steering wheels in front, was the first self-propelled road vehicle to operate west of the Mississippi River. On its maiden voyage to Denver, this pioneer motor vehicle, manned by a crew of three, broke down about seven miles west of Nebraska City. Major Brown put the crew up in a local hotel and wired New York for replacement parts, only to learn that the foundry had been nationalized by the federal government for war production and that parts would be unavailable. Thus,

the steam wagon experiment was abandoned for lack of replacement parts but the Steam Wagon Road remained a part of the Denver Trail and was one of the most traveled roads in the West. The project represented an early and successful effort of local government in road construction.

The first rail on the Union Pacific line in the Nebraska Territory was laid at Omaha in July 1865 and the first train service was offered early in 1866.

The Nebraska Legislature recognized the need for public roads again in 1879 when a law was passed providing that all section lines become roads. This law granted counties the authority to build and maintain these section line roads and authorized a tax levy of three mills to finance the projects. The state was taking the leadership in recognizing the need for roads, but not in their construction. This meant that road construction and maintenance would remain largely a local matter, and because of local taxation, interest in better roads would rarely extend beyond township lines. Generally, the men of the community would opt to do road construction work to pay off their tax levy, but showed little interest in additional taxation to extend the road or in volunteering for additional work of that nature.

In 1890, there were almost 63 million people in the U.S. and two-thirds lived in the rural areas. At that time, Nebraska's population was 1,062,656.

As more and more automobiles appeared in Nebraska, concern for the condition of roads would increase. By 1904, when the federal government commissioned its Census of Roads, Nebraska had 79,462 miles, most of which were section line roads. There was growing concern over the condition of these roads and also for the lack of or poor condition of the bridges within the state. In an effort to improve the quality of the bridges, the 1905 Legislature required the State Board of Irrigation to supply bridge plans, for bridges costing over $200, to counties that requested them. This law was a major step toward greater state involvement in road

development by centralizing one aspect of road construction under an existing state agency.

The 1895 Legislature created the State Board of Irrigation on March 26 of that year by passing House Roll No. 443 with the emergency clause. Governor Silas A. Holcomb signed the bill into law on April 4. The basic duties of the board were to oversee and regulate irrigation practices in an effort to manage and conserve the water resources of the state while maintaining the integrity of affected rivers and waterways. The complex, technical nature of these functions required the involvement of engineers and other specialists. Thus, the additional responsibilities for bridge plans and specifications was a logical extension of the work of this agency. Less than 19 years after Lieutenant Colonel George Armstrong Custer and his men rode to death and eternal fame at the Battle of the Little Big Horn in Montana, the board's first meeting was held on April 24, 1895. The board consisted of Governor Holcomb; Arthur S. Churchill, Attorney General; and Henry C. Russell, Commissioner of Public Lands and Buildings. At its May 10 meeting, the board elected a Secretary, Robert B. Howell, who the law required to be a "hydraulic engineer with theoretical knowledge, practical skill, and experience." At its meeting on May 16, the board resolved "that the official title of the Secretary ... shall be State Engineer and Secretary of the State Board of Irrigation."

Robert Beecher Howell was born at Adrian, Michigan on January 21, 1864. He entered the United States Naval Academy on September 21, 1881, graduated on June 5, 1885, and moved to Omaha in 1888. At age 31, Mr. Howell became Nebraska's first State Engineer on May 10, 1895 and served until April 2, 1896. He served as a Naval lieutenant during the Spanish-American War and was discharged on December 2, 1898. He was elected to the State Senate in 1902. Mr. Howell was appointed to the Board of Directors of the Metropolitan Utilities District (MUD) at Omaha and elected to that board in 1904, 1910, 1916, and 1922. He was appointed Omaha Water Commissioner in 1912 and served as the MUD General Manager from 1913-23. A Republican, Mr. Howell was elected to the U.S. Senate in 1922, re-elected in 1928, and died on March 11, 1933 at Walter Reed Hospital in

Washington, D.C. He was married to the former Alice Chase Cullingham of Omaha.

In his "History of Irrigation in Dawson County," H. O. Smith of Lexington describes the 1894-95 construction of a large ditch by the Farmers and Merchants Irrigation Company. In this November 1896 document, the value of good engineering was superbly recognized and well stated:

> "There is one mistake common to enterprises of this kind that this company was shrewd enough to avoid, the mistake of thinking that money could be saved in engineering. From the start, a thoroughly competent engineer was employed and kept on the work till it was completed, and to this fact is the success of the enterprise largely attributable. Mistakes in engineering are always costly and frequently irreparable. A good engineer knows what he is worth and will not work cheap. A cheap man guesses at his value, and guesses at his work, too, and the best guessers cannot guess right all the time. A company that puts a costly enterprise in the hands of a guesser doesn't have to guess at the result; it is an assured failure."

The State Board of Irrigation thus became the agency through which the state would address, for the time being, the issues of roads and motor vehicle transportation. To this extent, it was the state's first "Department of Roads." In addition to its involvement with bridge planning, the board sought legislation for a motor vehicle registration fee, which was passed by the Legislature in 1905. Each automobile was to be registered with the Secretary of State at a cost of $1.00. Other legislation passed during the 1905 session involved: (1) speed limits and safety considerations, (2) motor vehicle operation near horses or other draft animals, (3) brakes, signals, lights, and (4) penalties for violation of the foregoing. According to one story:

> "A gentlemen traveling across Nebraska in 1903 with his bulldog named Bud, so startled a farmer that the poor fellow leaped from his haywagon and hid underneath. The sight of both driver and dog wearing goggles in an open-top vehicle speeding across the plains must have been a frightening apparition."

However, the automobile was not destined to remain a rare sight. From 1902, when the first automobile reportedly rolled down the streets of

Lincoln, until 1906, the number of automobiles in Nebraska would increase by over one thousand. In 1906 alone, 1,087 automobiles were registered with the Secretary of State. Two years later, the number would be quadrupled. This dramatic increase in the number of motor vehicles represented statewide enthusiasm for automotive travel as farmers and city-dwellers alike recognized the advantages of "horseless buggies." In 1914, the production of motor vehicles in the United States exceeded the output of wagons and carriages for the first time. As the number of automobiles and trucks continued to increase, so did the demand for better roads.

By 1910, motor vehicle registrations in Nebraska had risen to 11,339 and the Legislature was compelled to respond because the automobile was obviously here to stay. Recognition of this was reflected in 1911 legislation which changed the name of the State Board of Irrigation to the State Board of Irrigation, Highways, and Drainage. This legislation provided that the board "shall elect a Secretary who shall be a civil engineer of general theoretical knowledge, practical skill, and experience, who shall be known as the State Engineer." Registration fees were raised to $2.00 a year, the income derived from this source to be allotted to the county road funds. In addition, the State-Aid Bridge Act was established, which required that the state and county act jointly in the letting of bridge contracts with the state paying half of the construction costs. Anticipating larger and heavier vehicles, the law required all new state-aid bridges to be constructed to support loads of not less than 20 tons and over streams at least 175 feet in width. To finance this legislation, a levy of one-fifth mill per annum on each dollar was assessed. By 1912, $175,808 had been raised for the State-Aid Bridge Fund. By becoming a more active participant in bridge building, the Board of Irrigation, Highways, and Drainage hoped to promote higher quality and thus, safer bridges.

A summary of Nebraska's automobile laws, as published in the 1913 Official Road Book of the Nebraska State Automobile Association, showed the following:

"Register with the Secretary of State in Lincoln; fee, $2.00 per year. No provision is made for individual operating licenses. Owner must provide his own tags. Non-residents are exempt if they have their own state tags. Speed limits: 10 miles an hour in business section, 15 miles in residence district, 20 miles elsewhere. Lights: one or more white lights in front and a red light in the rear."

One of the conditions then commonplace, which now seems preposterous, was the total lack of road markings such as mileage markers, direction signs, and identification numbers. Carl G. Fisher dramatized that lack with a story from his own experience in 1913:

"Three of us drove out nine miles from Indianapolis and were overtaken by darkness before we could return. It began to rain and we came to a road which forked three ways. We couldn't remember which way we had come and could see no lights from the city. We also couldn't read the sign posted at the fork. One of us would have to climb the pole to read the sign. We matched to see who would climb and I lost. I was halfway up the pole when I remembered that my matches were inside my coat and I couldn't reach them. So down I had to come, dig out the matches, put them into my hat, and climb again. I got to the sign, scratched a match, and before the wind and rain put it out was able to read: CHEW BATTLE AXE CUT PLUG."

In 1914, State Engineer Donald D. Price reported that Nebraska had three major highways: (1) the Meridian Highway, which paralleled the Sixth Principal Meridian from Winnipeg, Canada to the Gulf of Mexico, following the present-day path of US-81, (2) the Lincoln Highway, which followed the path of present-day US-30 from Omaha to Fremont, Columbus, Grand island, Kearney, North Platte, Ogallala, and Sidney, and (3) the Omaha-Lincoln-Denver Highway, referred to as the O.L.D., which passed through Omaha, Lincoln, Hastings, and McCook, to Denver on the path of present-day US-6 and 34. These highways were described as being in fairly good shape although in many places, particularly in the West, they deteriorated into deeply-rutted trails. Overall improvement in road conditions throughout Nebraska was noted as county boards extended their road systems, often coordinating their work with Good Roads Associations and Commercial Clubs. While recommending a more vigorous role for the state in road development and the creation of state highways, Mr. Price noted the increased interest and initiative on the part of counties and

individuals in building and maintaining roads. He recognized that a coordinated state highway system would inevitably require greater centralized authority and funding.

The 1915 Legislature passed a law which provided that the Secretary to the State Board of Irrigation, Highways, and Drainage "shall be a civil engineer and practical road builder, and shall ... be known as the State Highway Engineer." This legislation also provided that the "State Highway Engineer shall make, in cooperation with the engineering department of the Nebraska State University, tests of materials for road construction and ... shall issue bulletins showing compressions and tensile strength of such materials."

The state found itself moving gradually toward a more central role and ventured further into the area of highway construction when the 1915 Legislature appropriated $35,000 as the state's 50 percent share of a project to pave the roads on the south and east side of the State Agricultural School in Lincoln. This is the first record of state-supervised road construction in Nebraska. At his discretion, Governor John H. Morehead decided to use convict labor on the project and Assistant State Engineer W. D. J. Steckelberg was assigned to supervise the construction. Six inmates from the State Penitentiary began work on August 27, 1915 and the entire project, from grading to brick work, was built by hand and completed at 9:00 a.m. on Thanksgiving Day, November 25, 1915. State Engineer George E. Johnson had the following to say about the last two days of construction:

> "On the afternoon of November 24th, the last bricks were laid and the pitch gang, with two heating kettles, figured that they could finish the remainder by working a couple of hours overtime in the evening. Several newspaper reporters who came out to see the finish were told by the superintendent that the street would be opened to traffic the next morning. As luck would have it, the last reporter had hardly disappeared when one of the tar kettles sprung a leak and was rendered useless. This meant that the road could not be opened for another day at least. After debating among themselves, the men of the pitch gang, convicts if you will, volunteered to work all night in order to keep the word of the superintendent. This they did, cheerfully, faithfully, and for twenty-six hours continuously without sleep or

rest. Consequently, the 25th of November was, after all, a day of thanksgiving. The following morning...the men packed up their belongings and returned, once again, to complete paying their debt to society. The superintendent is more than pleased with the results and has nothing but praise for the way in which the men responded to the demands of the work."

In 1914, when workers' wages in U.S. manufacturing industries were averaging about $11 a week, Henry Ford announced unheard-of benefits for his employees: a minimum daily wage of $5.00, an eight-hour workday, and profit sharing. In 1922, he raised his minimum daily wage to $6.00 and introduced a 40-hour workweek in 1926. State workers in Nebraska would not have a 40-hour workweek until 1958.

The Good Roads Movement also was at work at Nebraska as numerous groups pressured the Legislature for more active involvement in road development. In his message to the Legislature in 1915, Governor Morehead reported that:

"For ten years, the Legislature had been besieged by different good roads projects, but no tangible results had arisen. The state was in a transition period between the old-fashioned, farmer road government and the newly promoted projects... and the major proposals for a centralized road system were killed by a lack of votes."

However, when the first Federal-Aid Road Act became law on July 11, 1916, Nebraska was quick to respond. The 1917 Legislature appropriated $640,000 to match the first three-year appropriation from the Federal Road Fund and authorized the State Board of Irrigation, Highways, and Drainage to proceed with road construction. In cooperation with county officials, the board devised a plan to connect all county seats with approximately 5,000 miles of highways, to be designated as the state highway system. In addition, the State-Aid Road Fund was created. This fund was financed by general taxation and apportioned on the same basic formula established by the 1916 Act: population, land area, and miles of existing roads. In order to allocate highway funds equitably, the board divided the state into 19 project districts (A thru S), each consisting of four or five counties.

By accepting the provisions of the 1916 Act, Nebraska was launched full-scale into the construction and maintenance of state highways. In spite of a slow-down caused by construction deferments in 1917-18 while the United States was engaged in World War I, significant progress was made in highway development by the end of the decade. By 1918, sixteen projects comprising 512 miles had been approved by the federal Office of Public Roads and Rural Engineering, and contracts for 200 miles had been let. An additional 1,600 miles had been surveyed and the plans for some 952 miles had been prepared.

The first federal-aid road project in Nebraska, FAP No. 1, was started in July 1918 on the road between Lincoln and Emerald (West "O" Street). The project was completed in 1919 at an estimated cost of $217,295, of which $54,400 was federal-aid and $162,895 was county funds. The work consisted of 5.44 miles of three-inch vertical fiber brick paving, culverts, etc.

In a paper read before a technical institute in 1917, Lincoln Highway promoter Henry B. Joy said that:

> "The national interest in good roads will continue to increase until we have in this country a road system second to none, which will bind this country closer together, eliminate sectionalism, eliminate provincialism, make Americans cosmopolitans, and work wonders in the unification of American sentiment and in the forming of a cohesive empire of democracy, permanently linked together through just such a system of highways as was the foundation of Rome's greatness."

In 1918, U.S. Secretary of Agriculture D.F. Houston selected Thomas H. MacDonald (1881-1957), the chief highway engineer for the Iowa Highway Commission and co-founder of the Mississippi Valley Conference, as the director of the federal Office of Public Roads and Rural Engineering. While the Secretary probably could have cared less about Mr. MacDonald's political background, it was a well known fact that he had come from a "rock-ribbed Republican family of the Iowa variety." President Woodrow Wilson and Secretary Houston, both Democrats, needed the best man that they could find regardless of his political affiliation. They also needed a

man: (1) who fully believed in federal-state cooperation, (2) with extraordinary capabilities, vision, and who was completely familiar with the 1916 Act and the day-to-day administrative problems encountered in working under it, and (3) who was extremely dedicated to making federal-aid a success so as to reflect great progress in producing the roads that everyone was demanding. They found such a man in Thomas Harris MacDonald. Finally taking office on May 3, 1919, Mr. MacDonald set the stage for his tenure as head of the federal agency with his first public pronouncement:

> "This is an All-American job. It will require support and understanding from all because all will be affected. So long as I am in this office, the door will always be open and we will try to set our policies on a basis of fact, research, and good will. We must recognize the important part that the states have in this work."

On July 1, 1919, Mr. MacDonald's title was changed to chief of the Bureau of Public Roads and he was affectionately referred to by highway officials as "The Chief" from that time until his death many years later. Under his direction, the bureau undertook numerous research projects dealing with vehicle movement and highway safety. He advanced the theory that it would be better to design highways to fit the kind of drivers actually operating vehicles than to attempt to remake drivers to fit some engineering ideal of highway design. This concept, which has now been generally accepted, was for many people a new viewpoint when he advanced it.

His March 31, 1953 retirement from the bureau marked the end of an era of highway progress entirely undreamt of at the time he assumed office. Unquestionably, America's leadership in the highway field and highway progress in the years to come, to a considerable degree, will be a reflection of the vision and integrity of "The Chief." On the occasion of his retirement, Mr. MacDonald commented on the future role of his office:

> "I think that the role of the federal government is not to dictate to the states, cities, or counties; but through their legislatures and highway departments, to help the cities and counties in the administration of this work."

From 1953 until his death four years later, Mr. MacDonald held the title of Distinguished Research Engineer at Texas A. & M. University, College Station, Texas. He was buried at Washington, D.C. in the Cedar Hill Cemetery, which has a commanding view of the nation's capitol. Dr. K. W. McCracken, minister of the New York Avenue Presbyterian Church, called for a rededication to the enduring principles which Mr. MacDonald did so much to bring into being:

> "This is not the time or place to laud the man. Rather, it is the place to call on those who follow him to carry on the great work which he has done for the people of his country and the world."

In this spirit, AASHO immediately established a Thomas H. MacDonald Memorial Award to be given annually to an employee, or prior employee of a member department, who has rendered continuous, outstanding service over a period of time in highways, or who has made some single or exceptional contribution to the art and science of highway engineering.