Chapter Five
The Transportation Structure of Iowa: 1900-1920

Introduction

The ebb and flow of transportation developments between 1900 and 1920 preclude a decade-by-decade approach. Because continuity of the analysis would be interrupted and perhaps lost, these two decades are combined in this chapter. By 1900, the basic railroad network was largely in place, and the emphasis was on improvements to properties and equipment and on service. Although the railroad commission had considerable regulatory experience since its inception, further challenges lay ahead as the result of ICC rulings, court decisions and congressional legislation which had an impact on carrier operations, shipper arrangements and public considerations. Among the issues were rates, rate relationships, rate structures and safety measures.

Both the 1904 and the 1913 highway commissions faced unenviable tasks in meeting demands for improvements on more than 100,000 miles of Iowa's roads. Earth roads and stronger bridges needed to be built or rebuilt to form a base for future permanent road systems. Centralized agencies gradually brought order out of uncoordinated local highway projects, and progress was further enhanced through federal-state cooperation and funding. The Lincoln and Jefferson Highways made Iowa an important segment on their transcontinental routes and offered organized compacts among states, industries and organizations in identifying national highways. The railroad and highway commissions actively supervised and administered the development of land-based transportation facilities, each working independently but cooperating on common problems.

Commercial long-haul transportation on the Upper Mississippi River had ceased to function as a system by 1914, although there was considerable short-haul traffic in sand, gravel and low class bulk commodities. The lumber trade, formerly of great magnitude, had virtually disappeared, and an era of packet trade, passenger service and the logging business came to an end. World War I brought the federal government into waterway operations through the Federal Barge Service, eventually known as the Federal Barge Line. It was operated by the Railroad Administration and transferred to the War Department in 1920. The Missouri River was difficult to navigate, obstructed by many snags. Its banks were alluvial and constantly eroding, changing the channels except where protected by revetments and dikes or by natural bluffs.

Iowans were among the early pioneers in the design and construction of aeroplanes, flying them in exhibitions and demonstrations, initiating flying schools, and challenging speed, distance and altitude records. Their efforts contributed in a large measure to the future development of commercial and general aviation in the state. Normal progress in these transportation systems was interrupted by the outbreak and entrance of the nation into World War I.

Railroads

General Observations

The nation generally experienced prosperity during the first few years of the early 20th century. The economy was well established, export trade was expanding, and railroads benefited by the high level of economic activity. The Iowa Railroad Commission indicated satisfaction with their operations, especially on the main lines. The carriers were making substantial improvements to their properties by constructing better stations and yard facilities, adding to rolling stock, improving roadbed and substituting steel for iron rails. Trains were equipped with automatic couplers and continuous air brakes. Block signals for control of train movements were installed, larger locomotives and cars constructed, double track laid, and the gauge widened and standardized.

Some of the trunk lines were spending up to one-half of revenues earned in the state on these permanent improvements. However, the commission was not complimentary on operations of branch lines considered inadequate to meet service demands. They were concerned with dangerous highway and farm crossings; strains on roadbed, superstructures, bridges and equipment by increased tonnage hauled by heavier locomotives or "double headers;" and the constant rate adjustments on inter- and intrastate traffic. Also questioned were accommodations for passengers during heavy demand periods—excursions, conventions and holidays—which resulted in dangerous overcrowding of trains. On matters of state railroad control, there had been no litigation for years.

During the second decade, expansion of traffic and the requirement of published rates greatly increased

the railroad commission's work. A new rate department was established with the Honorable John Henderson of Indianola as commerce counsel to handle prosecuting functions and represent the people of Iowa in cases before the ICC. The work of the commission was further expanded by authorization to grant franchises for transmission of electricity for light, heat and power.

Highway and Farm Crossings

For some years, the railroad commission had called for improvement or elimination of highway and farm railroad crossings. In 1900, their annual report discussed the changed conditions resulting from railroad efforts to strengthen or render more substantial their roadbed and trackage throughout the state. Where excavations occurred or obstructions were removed, improvements often interfered with views of approaching trains which were running with increased speed and frequency, making crossings hazardous. The commission encouraged construction of subways or overhead crossings where such were feasible and not unreasonably expensive. But the State Supreme Court had held in a number of cases that the legal crossing under state statutes was "an adequate crossing." In most instances, the commission was able to convince county supervisors to change the highways in order to ensure a safe crossing but had no jurisdiction to compel such action and therefore called for laws to cover these situations without the necessity of court procedure. "It should not be necessary for a railway company to appeal to the courts to protect it against county supervisors who were insisting upon a crossing at a dangerous location when with a slight change in the highway a safe and adequate crossing might be made."[1]

The highway commission had no jurisdiction in these cases until 1913, after which cooperative efforts with the railroad commission were effected to make the necessary changes in road design and location. The highway commission had made changes suggested on the primary road system but where disagreements occurred, the railroad commission was asked to determine the type of crossing and apportionment of the cost to railroads and highway authorities. The increase in motor vehicles on public highways and the deaths of 240 persons in grade crossing accidents between 1915 and 1920 emphasized the problem. Most of the accidents were at crossings where the view was unobstructed for hundreds of feet and appeared to have been caused by miscalculating the speed of oncoming trains. Recommendations were made for installation of gates, bells and warning signs on the highways, and the railroad commission ordered the railroads to remove all obstructions from their property.

Railroad Operations

In 1900 there were 38 steam railroads serving a population of slightly over 2.2 million people, operating over 9,170 miles of track (including trackage rights) and employing 37,696 workers. Ten years later, 24 railroads operated 9,781 miles of track, an increase of 610 miles on main and branch lines, and employed 57,715 people. If yards and sidings were included, there would be an additional 1,600 miles. In 1920, the number of roads had declined to 20 carriers, operating over 9,843 miles of track. Earnings and operating expenses at five-year intervals are shown in Table 5-1.

The slight drop in mileage after peaking in 1915 resulted through elimination of roundabout routes, line relocation and reduction in trackage rights. Gross earnings more than doubled between 1910 and 1920, but net earnings showed a drastic decline between 1917 and 1918 and a deficit in 1920, even after rate increases during federal control in World War I. Inflationary trends carried over to 1920, indicated by the large increase in operating expenses. Fourteen railroads had disappeared from commission records between 1900 and 1910, and four more by 1920. Absorption of smaller lines had a beneficial impact upon shippers by placing the consolidated roads into higher classifications and reducing maximum freight rates. Also, continuous or through rates could be applied rather than having to use two or more short distance or "local" rates which usually resulted in higher freight charges.

What little extension of lines was accomplished during the ten years, 1905-1915, was generally to close gaps and connect detached portions of the various railroad systems. Only 200 miles were built during

[1] *Thirty-Second Annual Report of the Board of Railroad Commissioners for the Year Ending December 7, 1909*, State of Iowa, Des Moines: State Printing Office, 1909, p. 12.

these years. Every county seat had railroads as did every town and village over 100 or more inhabitants, and a 15-minute automobile journey connected every farm home with a railroad station. Table 5-2 shows the distribution of railroads according to population size of cities and towns in the Iowa Census of 1915. Two observations can be made from the table: one, a high number of cities and towns in the 1,000 to 5,000 category were served by more than one railroad; indeed, a surprising number had three railroads (it was probable that the roads used small towns and cities as junction or interchange points); two, the importance placed on towns with populations between 10,000 and 50,000 and over as locations for routes of three railroads, indicative of the potential competitive nature of the traffic.

Table 5-1
Comparative Earnings and Operating Expenses, Mileages Operated and Earnings Per Mile for Railroads in Iowa

Year	Mileage[1]	Gross Earnings[2] (Millions)	Operating Expenses[2] (Millions)	Net Earnings[2] (Millions)	Net Earnings Per Mile
1900	9,171	$ 52.07	$ 35.40	$16.67	$1,815
1905	9,827	58.47	41.95	16.52	1,681
1910	9,781	74.89	59.08	14.81	1,616
1915	10,002	88.44	65.36	23.08	2,308
1920	9,843	156.54	167.32	-9.78	-940

(Source: Iowa Railroad Commission, *Annual Report, 1921)*
[1] Including trackage rights.
[2] Figures rounded to the nearest number.

Table 5-2
Number of Railroads Serving Cities and Towns in Iowa by Population Size

Population Cities and Towns	Number	One Railroad[1]	Two Railroads[1]	Three Railroads[1]
1,000- 5,000	144	59	70	15
5,000-10,000	17	7	6	4
10,000-20,000	6	--	1	5
20,000-30,000	5	--	--	5
30,000-40,000	3	--	--	3
40,000-50,000	2	--	--	2
50,000-Over	1	--	--	1

(Source: Earle J. Robinson & Co., *Illustrated Review of the Development of the State of Iowa.* Press of George F. Cram, Chicago, 1916.)
[1] Including Interurbans.

Agricultural Traffic

Sage refers to the period from 1897 to 1920 as the "Golden Age of Agriculture" which might have terminated in 1913 if not for World War I. In 1915, there were 199,175 farms in the state with a value of $3.5 billion ($4.0 billion including equipment). The state ranked first in the value of farm crops and cultivation of fruits and vegetables, and it was second only to Texas in the extent and valuation of livestock production. Price inflation raised farm income from $7.8 billion in 1913 to $9.5 billion in 1916, and exports rose from $1.3 billion to $3.8 billion during these years as against virtually no imports. Railroad revenue freight was a measure of the state's agricultural importance, with grains, fruits and vegetables, livestock, packing-house products and dressed meats as the dominant tonnage. Industrial products hauled related to the agricultural sector and included coal, sand, stone, brick, lumber, cement, petroleum and machinery.

The Corn Gospel Trains

Railroads had been utilized to spread information regarding road building and maintenance techniques throughout the state. They also cooperated in furthering agricultural education and extension activities. One of the most notable efforts was the development of the Corn Gospel Trains between 1904 and 1906. P. G. Holden, a corn breeding specialist, became a faculty member at Iowa State College in 1903. Holden had directed extension work for Fink Brothers Seed Corn Company in Illinois, spending much of his time on the road demonstrating the superiority of yellow dent corn to Midwestern farmers. Shortly after arriving in Ames, he organized experimental plots on demonstration farms to teach improved cultivation methods. His success moved him to a plan to bring the college to the people. Following meetings with railroad executives, grain dealers, friends and supporters, he initiated the "Seed Corn Gospel Trains" consisting of three coaches and a baggage car, complete with lecture charts, displays and a speaker's platform. Expenses were underwritten by the CRI&P, Wallace's Farmer, the Iowa Grain Dealers Association and the Central Iowa Grain Company.

For three years the train covered the state, logging 11,000 miles to reach farmers and grain dealers in 97 of the state's 99 counties. An estimated 145,700 people heard the lectures which included not only methods of finding and testing the best seed corn, germination techniques and specifications for testing equipment, but also crop rotation, manure handling and hog raising. He also organized short courses throughout the state before leaving Ames in 1912 to administer the extension program for the International Harvester Corporation.

Railroad Rate Regulatory Control

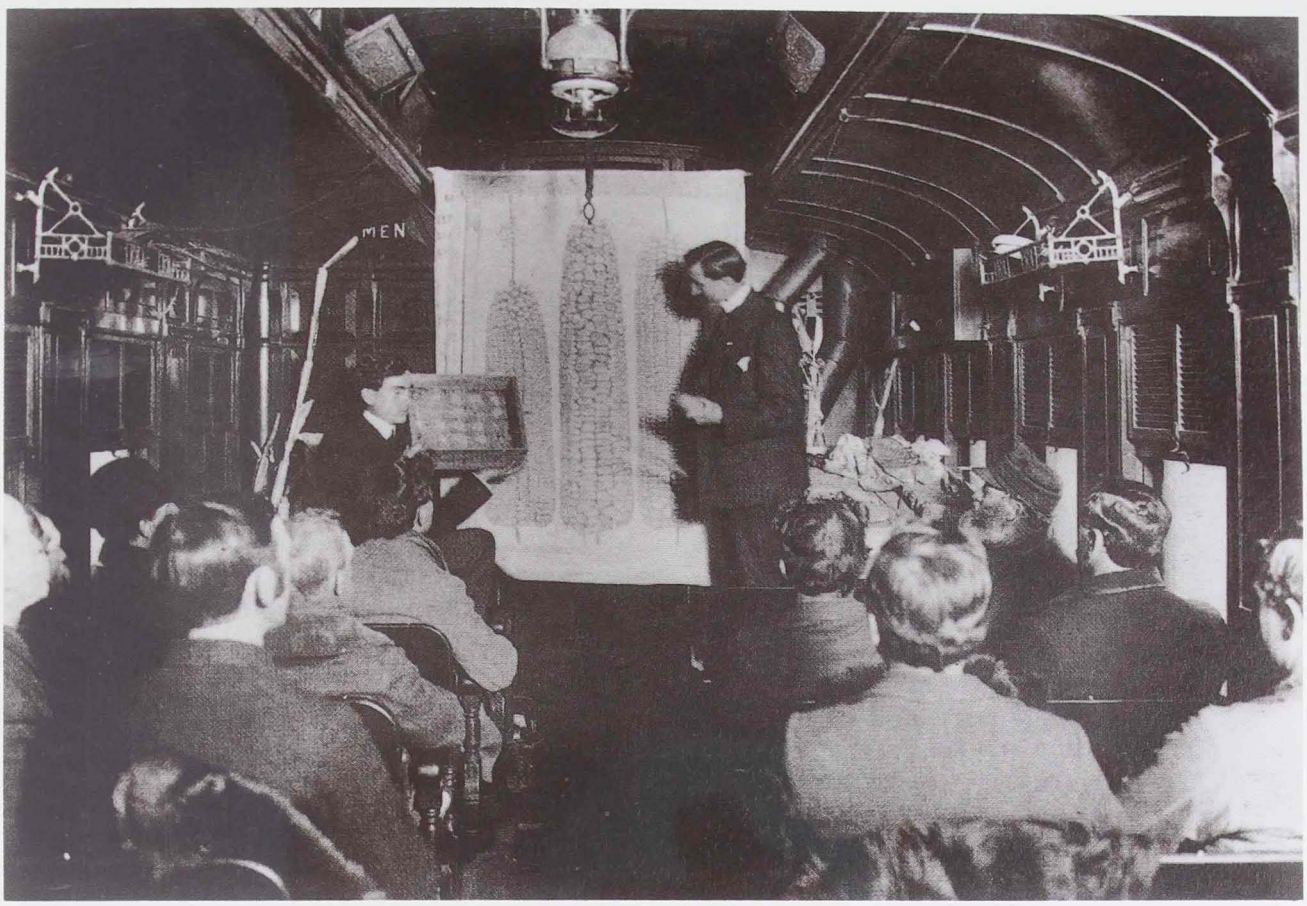
The Federal Level

From the beginning, the ICC was seriously handicapped in administering the 1887 Act in rate matters. Basic weaknesses appeared in the enforcement provisions, and court interpretations stripped the commission of authority to deal with rate grievances which had led to its passage. In prescribing reasonable rates, it was assumed that if a certain rate had been found unreasonable, maximum reasonable rates could be prescribed, a practice followed between 1887 and 1897. But in 1897, the U. S. Supreme Court decided that the ICC was without power to prescribe rates for the future and also overruled them on interpretations of the long and short haul clause. Legislation to correct these weaknesses was passed by Congress in 1903, 1906 and 1910.[2]

The General Rate Level Cases

Rate level cases are revenue cases and were proposed by the railroads to ensure an adequate rate of return on their investment. In 1898, the U. S. Supreme Court in *Smyth v. Ames* established a standard for determining reasonableness of the general level of rates. "We hold that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used for the convenience of the public . . . . What a company is entitled to is a fair return of that which it

[2] ICC v. Cincinnati, New Orleans & Pacific Railway Co., 167 U. S. 479 (1897); ICC v. Alabama Midland Railway Co., 168 U. S. 144 (1897). The first case was known as the "Maximum Freight Rate Case." The second gave a new interpretation to decisions relating to the long and short haul clause. In addition, the Elkins Act, Statutes at Large 32, sec. 1, 847-849 (1903), was a railroad-sponsored measure relating to personal discrimination. The Hepburn Act, Statutes at Large 34, sec. 1, 539-557 (1910), further strengthened the commission's powers on rate matters and clarified the distance principle at issue in the long and short haul controversy.



Lecture aboard the Corn Gospel Train.
(Courtesy: Iowa State University Archives)

employs for the public convenience."[3] Thus, some authoritative determination of that value was necessary to satisfy the "fair return doctrine."

The first rate level cases came before the ICC in 1910, calling for an increase of 10 percent to meet rising operational costs. The ICC refused the request on the basis that the carriers had failed to show the reasonableness of the rate increases, citing their inability to substantiate the need for higher rates due to an acceptable valuation of the properties. It had become apparent that further proposals would require property evaluations, and the result was passage of the Valuation Act of 1913. The outbreak of World War I in Europe brought renewed pressures on the roads to meet increased traffic demands, and the inflationary price index of 1910 made further applications for rate increases necessary in 1913, 1915 and 1917. Rates were raised but not to the extent the railroads felt were necessary to meet the higher operating costs. But from the beginning of federal control in 1918, rate increases were inevitable, and they were made under General Order 28, allowing a 25 percent advance. For Iowa, with 90 percent of its traffic moving interstate on eastbound movements, the increases affected over 200 different commodities. Not only were interstate rate increases of concern, but usually the railroads petitioned state commissions for similar increases on intrastate traffic, again raising questions of competitive rate relationships between origins and destinations within the state.

[3] Smyth v. Ames, 169 U.S. 466 (1898).

The State Level

Making intrastate rates or determining changes was a difficult task for the Iowa Railroad Commission. Building a system of rates which would move the traffic without discriminations at levels providing for efficient service and acceptable prices for shippers, and yet return a "fair" amount of revenue to the railroads, was a complicated process. Complex rate structures were in force, including percentage, basing point, zoned and blanket systems. Key point rates from Chicago to New York were published, with locations between taking fixed percentages of the base rates. Large cities with industrial and processing facilities were used as basing points; in the Midwest, rates were made with special application to Minneapolis, St. Paul, Chicago and St. Louis. In the territory east of the Missouri River, origins were given "blanket" rates on traffic to the Pacific Coast. Rates were often equalized from Missouri and Mississippi River cities into Chicago. These rate structures had been built as a logical result of historical forces, transportation and industrial competition, proximity to the rivers and certain large distributing points; also because transcontinental lines had been obliged to rely largely on through business. Among other factors that tended to slow the development of Iowa manufacturing and processing, rate structures which placed the state at a disadvantage played a prominent role.

The position of the railroad commission was that every Iowa industry should be protected to the utmost limit of their rate-making powers, and that Iowa shippers should not be placed at a disadvantage vis-a-vis shippers outside the state who shipped into common markets. Iowa markets should be encouraged and protected to the end that raw materials produced in the state could be processed at home, giving employment to labor and allowing investment of Iowa capital. Packing houses should be encouraged by a low intrastate rate on livestock, particularly hogs: process the product in Iowa and ship to regional or national markets. To accomplish this objective required less interest in the interstate than intrastate rates. "It is much more important, in order to maintain packing houses in Iowa, that freight rates within the state for short distances be low ones than it is to have the interstate rate so low that it will result in taking the hogs raised in the state to Chicago and other distributing centers for packing purposes."[4] What was needed was more flexibility in the Iowa Distance Tariffs.

The Iowa Tariff had been developed by Peter A. Dey and included 10 different classes in the intrastate schedule of freight rates. First class was fixed at 100 percent and the remaining classes at varying percentages, ranging from 85 to 20 percent of first class. Brindley concluded that the Tariff was not a distance schedule except for the first 100 miles, and that beyond, chaos reigned in rate-making and rate relationships. "It would seem that freight rates have not been made but have grown like Topsy and the British Constitution," a conclusion he was not alone in making.[5]

Changes in the Railroad Route Structure

Closing the Gaps

New track was laid to complete direct railroad lines into common points. The CGW built 133 miles from Fort Dodge to Council Bluffs in 1903, featuring a 2,588 foot bridge over the Des Moines River, said to be the second-longest bridge in the state. The CRI&P needed a more direct line from the Twin Cities to Kansas City to eliminate the roundabout route in which they used the St. Louis line to southeast Iowa, thence to the southwest. Independent roads, later taken over by the CRI&P, were built 70 miles from Des Moines to Iowa Falls in 1903, completing the extension to Clear Lake in 1909. A southern section from Carlisle to Allerton was finished in 1913. The short cut through Des Moines eventually became part of the new north-south route cutting diagonally across the Midwest to link the Twin Cities with the Gulf of Mexico.

The CMStP&P was the last railroad to reach Des Moines, absorbing short, independent lines from Des Moines to Boone and Fonda. At Des Moines, it competed with the CRI&P, CNW, CB&Q, CGW and Wabash roads. But the CMStP&P could not compete successfully for Kansas City traffic until its last major construction in Iowa was completed—the Kansas City cutoff. Previously, trains ran from the north and east over the circuitous and hilly route between Marion and Ottumwa. By 1903, a new line was in operation from Muscatine to Rutledge, where it joined the main

[4] *Thirty-Second Annual Report of the Board of Railroad Commissioners,* p. 15.

[5] John E. Brindley, *A Study of Iowa Population as Related to Analytical Conditions,* Bulletin No. 27, Ames: Engineering Experiment Station, Iowa State College, 1912.

line running southwest. Between Muscatine, Davenport and Clinton, the route was further strengthened by reciprocal trackage agreements with the CRI&P and joint arrangements with the CB&Q. Through construction, purchase or lease of trackage rights, gaps on all lines were closed by 1914. Other construction occurred on branch lines carrying coal traffic, and for sidings.

The CNW had double-tracked its main line across Iowa by 1902, and its trains ran on the left-hand track as was customary in Great Britain. Contrary to popular assumption, this situation was more a matter of economy than the influence of British investment. Most CNW stations were built on the north side of the original single track, and it was less expensive to add another set of tracks to the south. Reversing the normal direction of trains meant that stations would not have to be relocated, and passengers would not have to cross tracks to board eastbound trains to Chicago. Those who remember riding the passenger trains from Chicago to Ames will recall the off-boarding on the south side and the walk through the subway to the station and parking lot.

Line arrangement on the CNW resulted in building the "longest, highest, double-tracked railroad bridge in the world," which opened in 1901 over the Des Moines River near Boone. It was 184 feet above the valley floor and 2,685 feet long, and when completed it eliminated the longer, hilly, single-line track through Moingona between Boone and Ogden. The structure became known as the "Kate Shelley Bridge," named for the 15-year-old legendary heroine of Iowa and American railroad history. Her fame in story, ballads, memorials and statues stemmed from her 1881 exploits in stopping the eastbound *Atlantic* (*Midnight Express*) from running over a damaged trestle during a heavy rainstorm, and assisting in the rescue of a brakeman and engineer on a "pusher"

Eastbound train speeding over embankment after crossing Kate Shelley Bridge, 1912.
(Courtesy: Edward S. Meyers Collection)

engine which had fallen into flooded Honey Creek. She was rewarded by being named station agent at Moingona by the railroad. When the CNW and UP railroads discontinued their joint operation of passenger trains in 1955, one of the substitute trains from Chicago to Boone was named the *Kate Shelley*.

Station Agent Kate Shelley at her Moingona Station. (Courtesy: Edward S. Meyers Collection)

Except for a spur near Sioux City, the last branch line in Iowa was built in 1915 by the CNW-controlled Iowa Southern Railway between Consol and Miami to handle coal traffic. Double-tracking the Omaha line of the CMStP&P started at Sabula in 1912 and was completed to Manilla in 1914. The 80-mile gap to Council Bluffs was never finished, and the expected traffic on the line never materialized.

Old main line through Moingona, south of Boone, 1900. (Courtesy: Edward S. Meyers Collection)

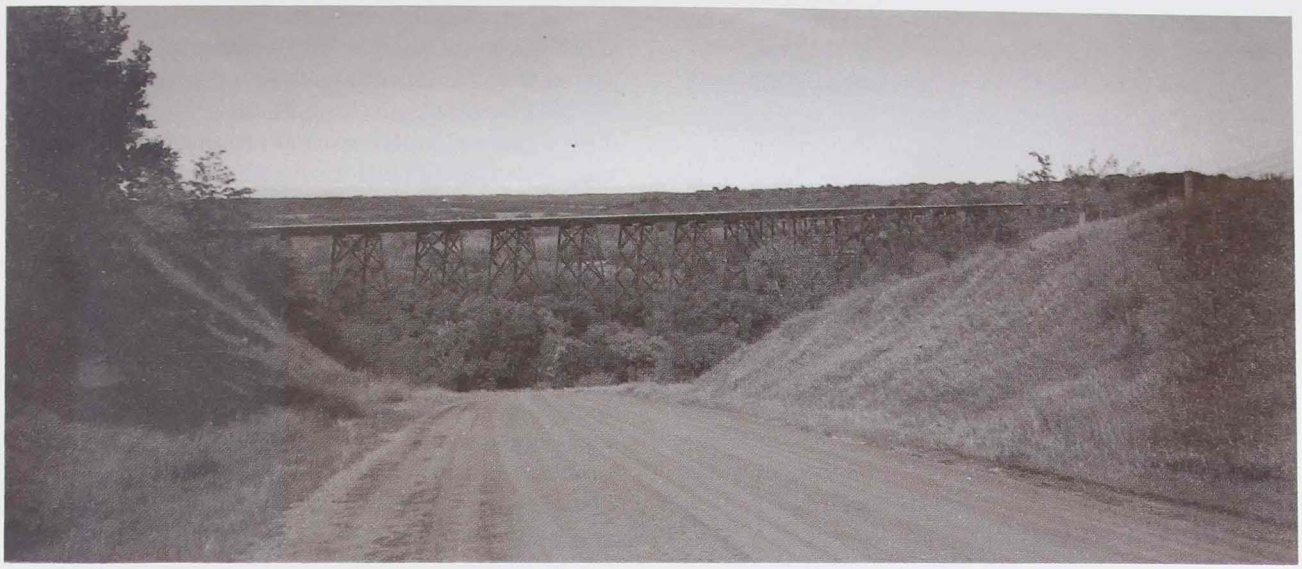
Improvements in Motive Power

Steel cars and longer trains required more power, and by the 20th century, steam locomotives had evolved through the Mogul (2-6-0), the Prairie (2-6-2), the Mikado (2-8-2), the Atlantic (4-4-2), the Pacific (4-6-2), the Hudson (4-6-4) and the Mountain (4-8-2), to the diesel electric, streamlined in the 1930s. The numbers after each name classified the locomotive according to wheel arrangements. A (4-6-2) engine meant a four-wheel leading truck, six driving wheels and two wheels behind the drivers. The diesel became the major power source because of its efficiency and low maintenance, getting approximately four times as much power from a pound of fuel as did the steamer.

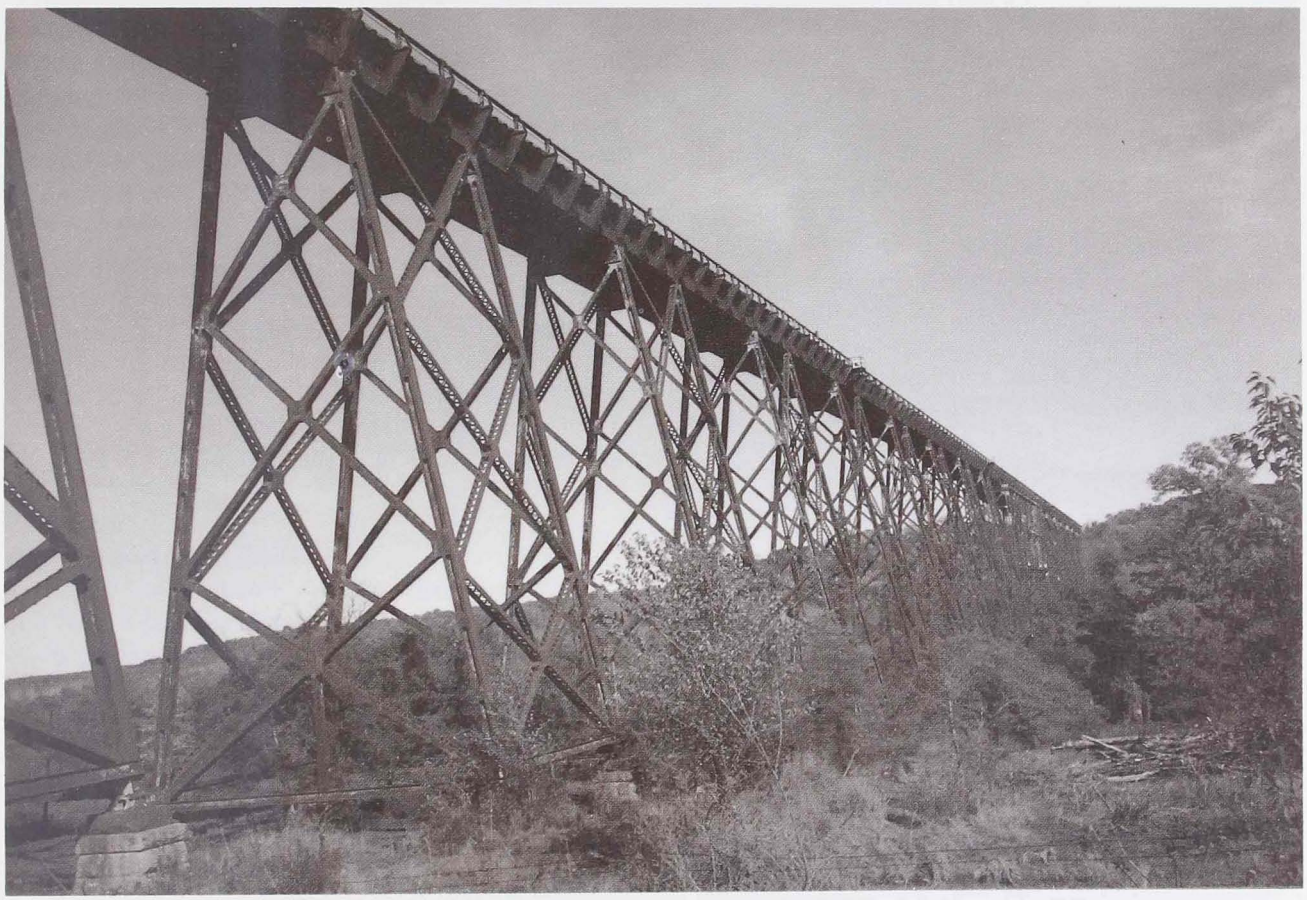
Faster schedules were required to meet passenger and freight service and to enable carriers to bid for lucrative mail contracts. The CNW and CB&Q competed agressively for mail on the Chicago-Omaha route, both striving to cut the time in transit and often reaching 90 miles an hour. The fast mail trains were pulled by the most powerful locomotives, operated by the most highly skilled and experienced engineers and had clearance over all other traffic. The CNW was credited with operation of the first railroad post office unit and the CB&Q, the first railroad car used in sorting mail between stations. The glamour of a railway mail clerk, in the author's youth, was second only to being God or a city fireman.

Steam Passenger Trains

By the early 1900s, each of the major railroads in Iowa was running transcontinental trains to the West Coast. These were well advertised, popular and subject to numerous articles and books by travelers.



The Kate Shelley Bridge.
(Courtesy: Author)



The Kate Shelley Bridge.
(Courtesy: Author)

The CNW's *Overland Limited* ran continuously for 60 years from 1887; the CB&Q offered the *Overland-Express* and the CRI&P ran its luxurious *Golden State Limited,* scheduled to compete with the AT&SF's *California Limited.* The *Olympian* was the pioneer train of the CMStP&P, and the CGW provided sleepers from the Twin Cities. In addition, regional trains crisscrossed Iowa between Chicago, Omaha, Lincoln and Denver on the east-west routes and Minneapolis to Kansas City and St.Louis on the north-south lines. The CRI&P and CMStP&P promoted passenger service to the Iowa Great Lakes region, and the latter road—perhaps unwittingly—assisted in providing transportation for the first "hobo" convention at Britt in 1900.[6]

The Battles for Financial Control

Capital stock purchases and financial manipulation to secure control of railroads was common in the early years of the century. The CRI&P was a well-managed road which made dividend payments even through the Panic of 1893. However, broad distribution of the stock made possible speculation for quick profits. In 1901, four men—Daniel Reed, William B. Moore, who was leader of the group and had made a fortune organizing the National Biscuit and Diamond Match Companies, J. Robert Moore, his brother, and W. B. Leeds—took control of the railroad. Through holding companies which initiated new construction, mergers and purchases, the system expanded from 7,123 miles in 1903 to 14,270 miles in 1907. To make the railroad a transcontinental line, the St. Louis-San Francisco (Frisco), Chicago & Alton, and Chicago & Eastern roads were absorbed. Then, through an affiliated syndicate, they sought control of the eastern link, the Lehigh Valley and Lake Erie & Western. The over-expanded, overcapitalized system went into receivership in 1915, emerging two years later with its debt structure and ratio virtually intact. The Reed-Moore administration transformed a once profitable and highly respected operation into one which faced financial problems periodically throughout its existence.

James J. Hill controlled the Great Northern (GN) and Northern Pacific (NP) and wanted the CB&Q to round out his empire. E. H. Harriman of the UP had similar ideas. While Hill, in collaboration with the Morgan banking interests, secretly bought into the CB&Q, Harriman went after the NP to get partial control of the CB&Q. The bidding war between these two railroad giants caused the NP's stock to rise from $114 to $1,000 a share in three days, ending on May 9, 1901, resulting in a brief panic on Wall Street until called off by the parties. Hill got control but it was agreed that Harriman should have representation on the NP's board of directors. The Hill era were years of expansion although most of it occurred outside of Iowa. The CB&Q's historical tradition of developing its territory continued. In 1913, the road operated a Silo Train in Iowa, stopping at 42 stations where lectures were given on the proper storage of grains and silo construction. A Dairy Special followed in 1914, visiting 24 communities in the interest of improving dairying techniques.

Another contest for control took place on the IC when Harriman and Stuyvesant Fish, a long-time associate, became locked in battle. It culminated in 1906 with the ouster of Fish, president for nearly 20 years, and the election of James T. Harahan, second vice president and Harriman's choice as his successor. The internal fight had only modest impact on stock prices. Harriman, reputed to be the largest stockholder with 15,000 shares and a director since 1883, won the fight. Expansion of the road also was primarily outside of Iowa. Influenced by construction of the Panama Canal, it concentrated on sharing traffic originating in the southeastern United States and handling tonnage moving through the canal into the Midwest via the Southern ports as well as its own port at New Orleans.

A stock-purchasing coup was responsible for Edwin Hawley's M&StL taking control of the Iowa Central in 1900 and merging the two roads in 1912. These were relatively weak lines when operated as independents, but together they had both economic and strategic advantages. Through this merger, Iowa gained more than half of the total mileage of the

[6] Frank P. Donovan, Jr., "The Milwaukee in Iowa," *Palimpsest 45* (May 1964): pp. 225-226. The idea of a national convention of hobos came from T. A. Potter of Britt, who had heard of a similar assembly in Illinois. His efforts in organizing the meeting were assisted by E. N. Baily, editor of the *Britt Tribune.* Both men promised a carload of beer and sufficient food for 500 tramps. They noted that the Milwaukee ran on the main line through Britt and that north-south service was provided by the M & StL. Although the delegates rode the boxcars, the officers of the Association arrived in sleepers. An estimated 250 legitimate hobos attended the first convention and made Potter Britt's first member of the "Order of the Honorary Sons of Rest."

combined railroads. It was this unification which allowed Hawley and his associates to lay the foundation for expansion which, from its modest beginning in 1896, served four states with a fourfold increase in mileage by 1912.

Roads and Highways

The Highways of Iowa—1904-1908

When the highway commission was formed in 1904, less than two percent of the state's 102,000 miles were improved with gravel or broken stone.[7] Approximately 25 percent were recommended for classification as main travelled roads with no person situated more than two miles, or a large majority of the people less than one mile, from a main road running in each direction from centers of population. When hard-surfaced roads were built, it was predicted that a farmer would be able to reach town markets during any season, and communities could diffuse their business throughout the year. The remaining 75 percent were considered as second-class roads—cross roads in sparsely settled areas, to be kept passable but receive a lower priority on expenditures until a system of main roads was perfected. It was these roads that were giving Iowa the reputation of one of the worst "mud road states" in the nation, a condition noted by Dean Marston who stated: "It seems absurd that in a state so wealthy and prosperous, so advanced in education and intelligence, the entire agricultural economy and the basis for practically all business activity should be left to the mercy of bad weather on account of roads which would be a disgrace even to a barbarian."[8] In the first annual report of the 1913 commission, road mileage of approved county systems certified by county engineers totaled 104,082 miles, outside of incorporated towns.

Geology and Road Building

Although Iowa was considered a prairie state whose surface is a gentle undulating plain, road makers faced topographical and geological conditions which varied in different areas. Three principal incursions of ice, known technically as "drifts," were the origins of soils and glacial debris. These were the Iowan, Wisconsin and Kansan "drifts," each of which gave certain characteristics to their regions. The Kansan Drift, covering the entire southern and western sections, was the oldest formation, cut by streams causing deep valleys and affording good drainage. Gravel was not universally distributed throughout the area, although it was found in the valleys of the streams and at the margins of the other drift regions. Stone, as a road building material, was found principally in the eastern section.

The Iowan Drift covered the northeastern section within one or two counties bordering the Mississippi River. The terrain was level, and drainage required careful attention as streams did not have time to cut deep courses. Large deposits of gravel were available for road purposes, and limestone and large boulders suitable for road building were widely distributed. The Wisconsin Drift; youngest of the three, covered the north central area, was level and had little drainage development. An understanding of the features of the drift areas was necessary for the road builder because of soil conditions, drainage, hills and valleys, and the availability of building materials (Fig. 5-1, 5-2).

Early Road Building

Practically all of the public roads were laid out on section lines, and new roads opened were located without much deviation from this practice. As a result, the road system was developed without regard to engineering efficiency or economy. In the Iowan and Wisconsin Drift areas, this situation was not considered serious. However, the area covered by the Kansan Drift was cut by water and other natural forces into a series of ridges and valleys, and the exclusive system of section line road location caused impractical grades and heavy expenses for moving earth. The topography required that the road had to be curved in plan or profile. Section line location prohibited the first and made necessary the second, which was worse. The heaviest grade of any road will limit the size of loads hauled over it, and for economy the maximum grade should be kept as low as possible. Therefore, it was suggested by the commission that the cost of construction and

[7] Maurice O. Baldridge, *Public Road Mileage, Revenues and Expenditures in the United States in 1904,* Washington, D. C.: Office of Public Roads, Bulletin No. 32, 1904. In 1904, Iowa's 102,448 miles of roads placed the state third behind Texas and Missouri. Improved roads consisted of 1,408 miles graveled, 241 miles with macadam or stone surfaces, and 20 miles by other materials.

[8] *Iowa Hiway Hilites* (May 1963): p. 2. Published in Ames by the Iowa State Highway Commission.

maintenance would be considerably lower by building around rather than over the hills, and/or buying new right-of-way around a series of hills. Often, the total cost of entirely relocating a road would be less of a problem than making even a faint start on a good road on a section line.

The early commission gave technical specifications to road builders for construction of earth roads in the first-class category. The width was to be 18 feet for the traveled way, not too wide for easy maintenance, with ample space for ordinary traffic and with a rounding or parabolic contour. The most important consideration was efficient surface, side and sub-drainage. Next came elimination of steep grades and finally the surfacing with gravel, broken stone or some other wearing coat.[9] Advice was available for gravel and macadam construction, suggestions made as to the location of the materials, the necessary tests to be used and the costs. Information was distributed on the use of road machines, scrapers, graders, etc., and the training of men and teams in their usage. "Compared with the permanent roads many if not all of the other state's highway departments are building, the earth or clay road seemed simple and of doubtful value perhaps, but it must be remembered that practically all of the road building in Iowa in the early years is earth building; that men who can do this work are few and hard to find; that the earth road is fundamental and the basis for all road improvements."[10]

Sporadic Road Building

Experimental and permanent roads were planned and built during this early period. Scott County built five and one-half miles of broken stone base with gravel cover in 1907, at an average cost of $7,670 per mile. Des Moines County was building three miles of limestone-based roads at an estimated cost of $5,000 per mile. In and around Keokuk, broken stone roads had been built for many years and with a little maintenance would have lasted for a longer period. The City of Des Moines built two sections of pavement consisting of a mixture of asphaltic oil with earth, gravel or broken stone screenings which gave promise of good results as a new form of road construction in the state. These isolated developments again raised the question of state supervision over highways. "It is not to be expected that where cities or counties experiment with new forms of surface coverings that many of the other counties will profit by their experience unless the information is gathered and distributed by the state, and neither is it to be expected that all the experiments should be successful and the state is far better able to spend the money in experimenting and developing types of road construction than individual counties. Not only should experimental work be done, but as much as possible of the practical work in the counties of building roads should be under state supervision and state encouragement."[11]

The King Road Drag

Earth roads would not maintain themselves in good condition, and so the split log drag was introduced and used in every county by 1906. E. Ward King, a farmer living near Maitland, Missouri, developed the King Road Drag, probably constructed orginally from pump stock and an old fence post nailed together, 30 inches apart. King's success in smoothing his road attracted the attention and interest of Iowa road officials. During 1905, a special CNW train visited 15 northern counties from Onawa to DeWitt, stopping at various places to demonstrate the drag, and the state became familiar with this method of maintenance by additional lectures at the Road School in Ames, and before farm and business organizations. The interesting point about the drag

[9] *American Highways 27,* Washington, D. C.: American Association of State Highway Officials, 1980, 99.2-24. Four pioneers who laid the foundation for the science of modern roads building were Pierre Marie Tresagnet, Inspector General of Roads and Bridges in France in 1775. His fame rests largely upon the innovation of a relatively light road surface designed on the principle that the subsoil must support the load; John Metcalf (Blind Jack) was the first English road builder and a contemporary of Tresagnet. He built 180 miles of turnpikes consisting of a layer of gravel placed on a well-drained and dry subsoil, to be beaten by traffic into a solid road surface; Thomas Telford of Scotland who became a great bridge builder and road mender in the 18th century; and John McAdam, also from Scotland, who built roads in the same century and was best known for the design of "macadam" roads. Both Telford and McAdam used similar methods of building by raising the earth foundations high enough so that ground water would not soften the subsoil, crowning the earth subgrade to drain water into side ditches with a three-inch crown for an 18-foot width road. They used clean stone for surfacing without a mixture of clay, earth or organic material which would be affected by frost and built the highway to suit the traffic and not limit the loads to fit the road. They differed in the maximum thickness of the surface and size and uniformity of stone. McAdam's techniques were considered the less expensive.

[10] *Third Annual Report of the Iowa State Highway Commission For the Years 1907 and 1908,* Des Moines: State Printer, 1909, p. 10.

[11] *Third Annual Report,* p. 13.

was its ease of construction and cost, which varied from $1.50 to $3.00 (Fig. 5-3).

The theory behind the use of the "split" log drag was very simple. If the surface of an earth road was smoothed after each rain, ruts formed were filled and the road was in condition to shed water during the next rainy season. The drag was hauled at such an angle that a little earth was moved toward the center of the road each time, building up a crown by almost imperceptible degrees. If ordinary soil was subjected to continual wetting and mixing, it "puddled" and could be molded into shapes that would not hold water. This condition was observed on main traveled county roads where water stood in ruts and hollows. After the surface softened, the wheels of wagons and hoofs of horses mixed, molded and packed the earth into a series of cups which would hold water until it evaporated. Where the soil contained a mixture of sand or vegetable material, it would not puddle. In addition to preparing the surface for the next rainfall, the drag also distributed the puddled earth over the road in a thin layer which was beaten and packed into a very hard surface by heavy traffic. The gumbo soil held up for considerable periods even with water standing on either side of the traveled way.

Bridges

Bridges were built of wood, steel, masonry or a combination of these materials. The various forms of construction resulted in a heterogeneous array of structures designed and built by counties and townships without systematic planning for the vehicles they carried. Increased rural traffic made wood or pile bridges inadequate for heavy machinery, particularly the traction engines with large water tanks and coal supply. The cost of timber construction was rising, and timber deteriorated rapidly and was undermined and washed out in high water, making wooden bridges quite expensive and dangerous. The highway commission condemned the assorted collections of steel, cement, clay and iron culverts "whose best claim to recognition was the clear profit netted their sellers" and "the various forms of steel or concrete and steel bridges being built

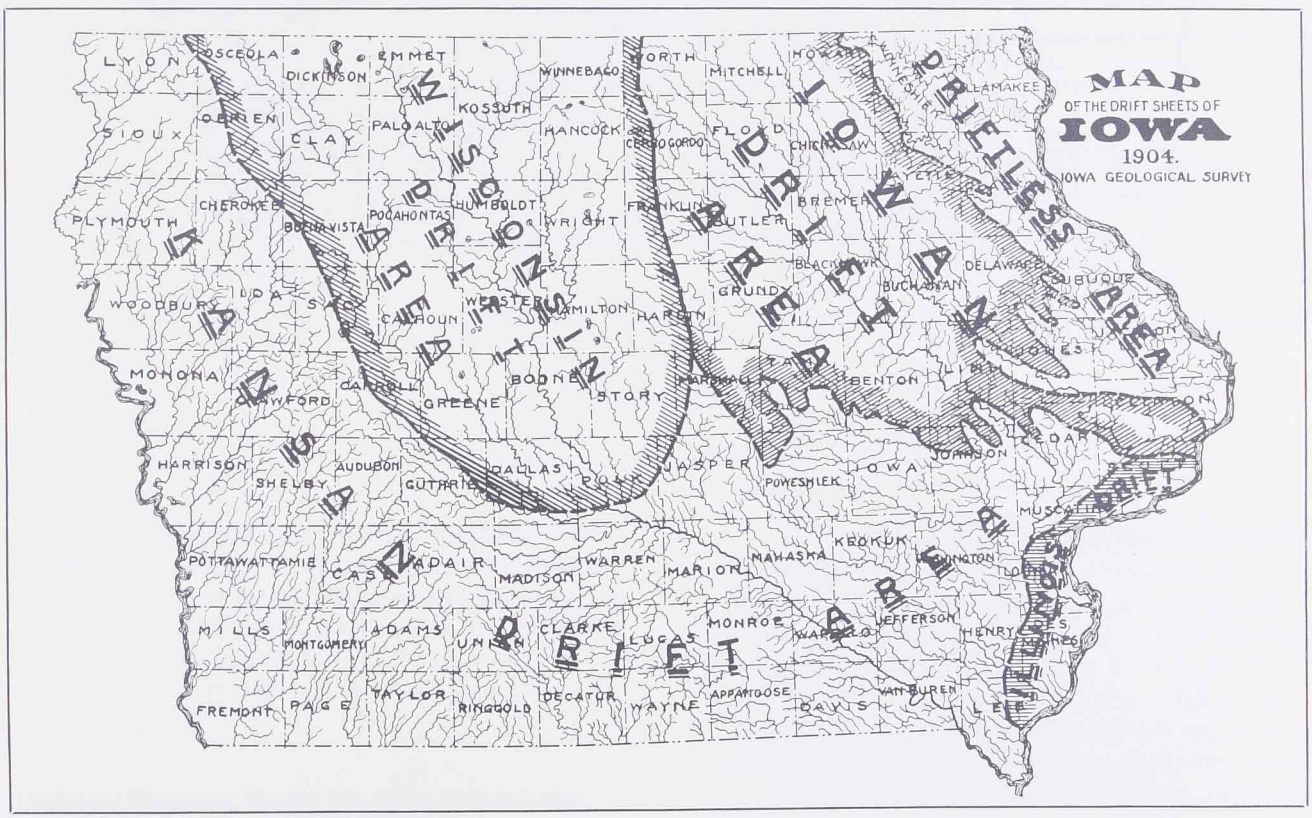


Figure 5-1
Areas of Iowa covered by the different glacial deposits.
(Courtesy: 1904 Iowa Geological Survey)

that have no claim as engineering designs."[12] After two years of study, the commission formulated standard loadings for which all bridges should be designed, and these were recommended for inclusion in state laws. Also recommended was appointment of a county engineer to supervise the road and bridge building programs.

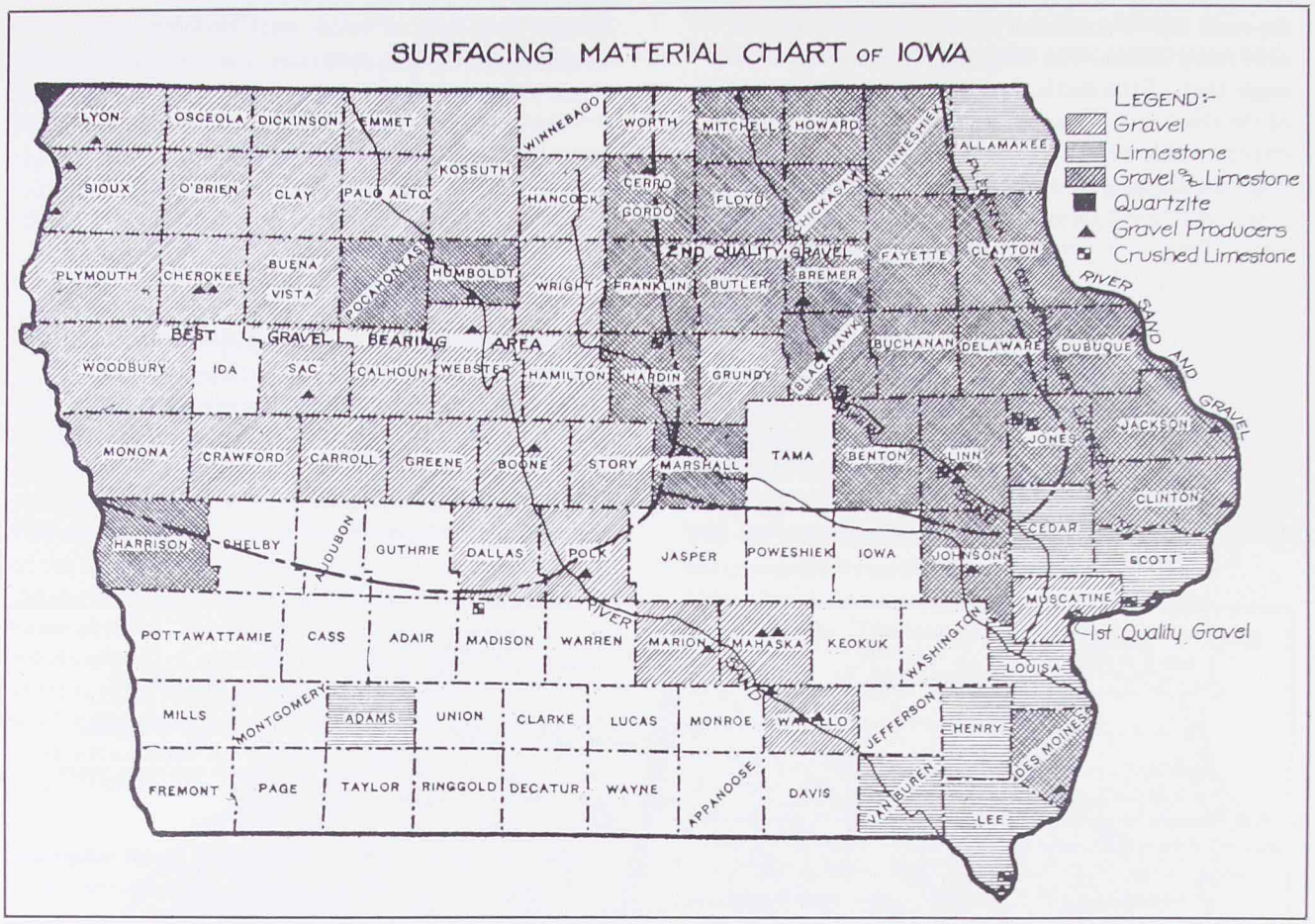


Figure 5-2
Availability of road building materials.
(Courtesy: Iowa State Highway Commission.)

Highway Funding and Traffic

The total income in 1904 for road construction, maintenance and bridges amounted to $4.5 million, not including revenue from poll taxes. Townships had revenues of $2.28 million, or an average of $22.83 per year for every mile of road. Although the counties had no jurisdiction or control over any road, supervisors built and maintained county bridges on all roads. For this work, each county assessed a bridge tax which amounted to approximately $1.63 million per year for the entire state. The county road tax resulted in annual revenues of $547,000 statewide. With this fund, counties could assist townships with road work or directly repair township roads. Since all parts of the township road system were consistently in bad condition, the supervisors had wide latitude as to

[12] *Second Annual Report of the Iowa State Highway Commission Made to the Governor of Iowa For the Year Ending July 1, 1906,* Des Moines: State Printer, p. 26.

where, how or when they spent the money. In some counties, the road fund became known unofficially as the "campaign" fund.

Based upon house-to-house canvasses in typical townships throughout the state in 1905, traffic counts indicated that heavy hauling over county roads totaled 55 million ton-miles, and that light hauling and general traffic totaled over 350 million miles per year. The mileages approximated would equal one string of teams traveling 30 miles per day reaching more than one and one-half times around the world. In monetary terms, if regular wages and expenses were charged for the actual time of men and teams, the amount would be between $30 and $40 million. A road census taken in one township in each county showed the following averages (Table 5-3):

Table 5-3
Average Highway Traffic of One Township in Each County

Component	Average
Average size of full loads hauled	2,090 pounds
Average distance to market	4.17 miles
Total ton-mile hauling	22,065 ton-miles
Average time per round trip	3.19 hours
Average time required per ton-mile	50 minutes
Total miles without considerable load to market	61,829 miles
Total miles traveled other than to market	92,818 miles
Total of all miles of light travel	162,923 miles

(Source: Iowa Highway Commission, *First Annual Report, 1904:* p. 23)

Since practically every business in Iowa depended upon agriculture, the condition of county roads as all-weather arteries of trade were of major concern. The commission studied records of agricultural price fluctuations relative to road conditions in all sections of the state. The relationship for one county (Woodbury) in 1902-1903 showed that the price of hogs reached the highest level at the same time or during the same period that the roads were impassable.

Highway Progress Under the New Commission

It became evident by 1913 that expenditures for bridges and culverts had to be placed on a more efficient basis, and that contracting practices had to be improved before any real progress on road construction could be made. As soon as the new highway commission began a study of these matters, it was subject to attacks by interests which would be affected by placing bridge work on open competitive bidding. Two situations were unearthed: (1) the state had been divided into districts by supplying companies, making competition impossible; (2) there were no standards or general knowledge among road officials as to the market value of bridge materials or labor, nor was there uniformity in quality or prices of the materials furnished.

Approximately half of the entire road taxes were spent on bridges and culverts, often to the neglect of necessary grading, drainage and dragging of roads. The influence of the suppliers was so great that it amounted to little less than blackmail schemes to control bridge and culvert funds. Not until supervisors were removed in Polk and Clinton counties and money refunded was the public aware of these circumstances. Similar conditions existed in other sections of the state, and these plus the demands for efficient and trained supervision of construction under responsible administrators resulted in the road law under which the new state highway department was organized and a new system of administration established.

The State Highway Department, 1913-1920

During the first year, personnel visited every county board of supervisors to explain provisions of the new road law, completed preliminary investigations, and approved 15,000 miles of county roads which eventually became a system of highways connecting every important market center. With county engineers, they surveyed county roads for the purpose of making maps, plans and specifications for permanent road building; assisted in designing and approving plans for more than 800 structures in 86 counties; and established a uniform system of records, accounts and reports for county road and bridge expenditures. Educational meetings were held throughout the state, and charts, maps, photographs and standard plans were exhibited at state and county fairs, conventions and county engineers' "short courses." To become fully informed of the work of various counties, the state was divided into five districts, each headed by a district engineer whose headquarters were located at convenient places in the district. The location was determined by grouping counties easily reached by railroad from one central point. The original five districts were reorganized into

nine districts for administrative purposes in 1919.

By the close of 1913, the work of the highway department brought a change in the sentiment of the public, and criticism of the new road law gave way to a more fair consideration of the principles involved. Fayette, Clayton, Worth, Benton, Cerro Gordo, Story, Black Hawk and Woodbury counties, among others, built more miles of permanently graded earth roads and more permanent bridges and culverts than in any previous year. When the construction season of 1914 began, county after county started road building on a broad scale with the quality of workmanship and materials constantly improving. However, there were two major problems. One involved organization—the employment of men to do the work in an efficient manner—and the other concerned an adequate system of maintenance. The commission noted that the state had to depend upon earth roads for a long time and that good earth roads needed constant maintenance, "the greatest of problems to be faced in the future."

Special attention was given to dangerous railroad crossings. As of January 1, 1915, there were 8,676 crossings in the state, or one for every 12 miles of highway, exclusive of those within the limits of incorporated cities and towns, not a surprising number when the total mileage of all highways and railroads was considered. County road crossings totaled 1,533, and there were 7,143 on township roads. Nine hundred of these were classified as dangerous by county supervisors. Since the county road system carried the larger percentage of the

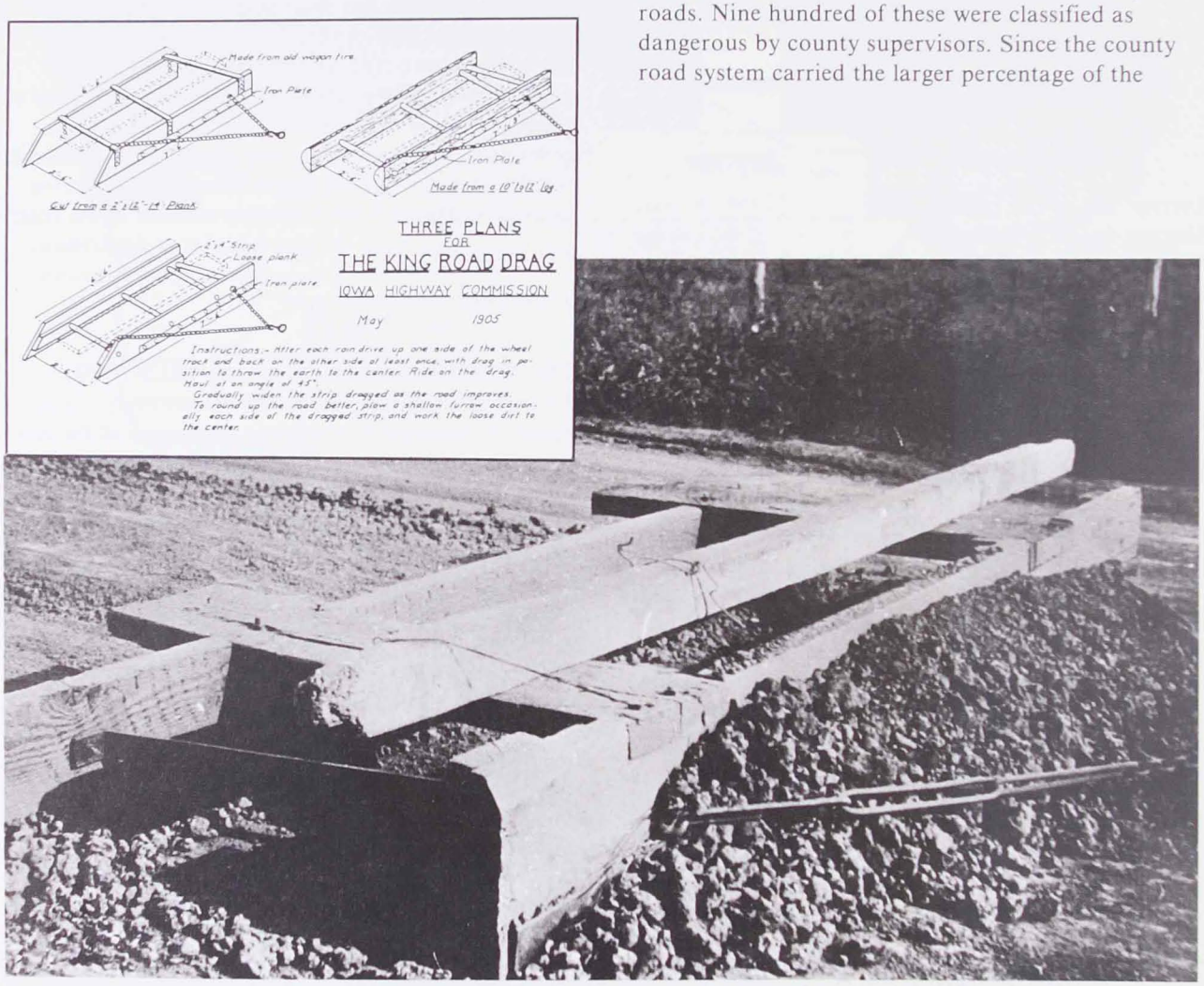


Figure 5-3
The King Road Drag, popularized in Iowa after 1905 by D. Ward King of Missouri. This is an "improved model." King preferred to use split logs, rather than the planks used in the drag shown above.
(Courtesy: Iowa Highway Commission)

traffic, the most dangerous county road crossings were given first priority for improvement or elimination. Distribution of crossings, with reference to railroads and road systems, are shown in Table 5-4.

Between November 1, 1914, and January 1, 1916, total expenditures from county road funds approximated $3.4 million. Townships were estimated to have spent about $3.5 million, but when divided into 88,300 miles they averaged only $40 per mile, little over half of the average cost of repairs and maintenance per mile of county roads. An appropriation of $30,000 was made by the U. S. Department of Agriculture for improvement of the Dubuque-Dyersville Post Road which when completed would be the most extensive single highway improvement undertaken to this time. The road was to be graveled for 19 miles and would cost $160,000, including the cost of viaducts and subways for railroad crossing elimination. A portion of this cost was shared by the IC railroad. Road and bridge expenditures by counties and townships did not change materially during 1916, but the average spent on township roads increased to $44 per mile, two-thirds of the average for county roads.

Funds available through the Federal Aid Act of 1916 provided $146,200 for road projects in 1916, increasing each year to $731,000 in 1920. The total over the five years of approximately $2.7 million was matched by state funds from automobile license fees. These were apportioned to counties on the basis of area. The 37th General Assembly, in accepting the provisions of the federal legislation, stated that the 2,000- to 6,000-mile program should include a part of the roads in each county, named subsequently the "Inter-County Road System." Counties could apply for funds and designate that portion of the inter-county system that they wished to improve, indicating also the character of the improvement. Dubuque county was the first to apply, followed by requests from 58 other counties.

Following the nation's entrance into World War I, prices of materials and supplies rose rapidly; for example, structural steel was 250 percent higher than in 1915. Transportation facilities were diverted to the movement of troops and war materials, labor was scarce, yet the amount of highway work was near normal levels. Counties and townships spent $15 million for road and bridge improvements with increased funding resulting from bond issues. Of the $11 million raised through bonds, over 80 percent was used for bridge work, the remainder on roads.

Table 5-4
Distribution of Crossings in Reference to Railroads and Road Systems

Railroad	County Road Crossings	Twp. Road Crossings	Total No. of Crossings
CRI & P	349	1,526	1,875
CMStP&P	251	1,227	1,478
CNW	208	1,183	1,391
CB & Q	272	915	1,187
CGW	123	633	756
M & StL	111	582	693
IC	95	442	537
Wabash	41	142	183
FtD, DM & S	15	93	108
Misc. Small Railways	68	400	468
Total	1,533	7,143	8,676

(Source: Iowa State Highway Commission, *Annual Report, 1913-1914:* p. 163.)

Automobile registrations rose from 799 in 1905 to 147,078 in 1915, and the increased usage brought renewed demands for hard surfaced roads. The early supporters of good roads considered macadam as an ideal surface, but it was difficult to obtain the necessary materials. The automobile quickly changed that idea. "Before the advent of the automobile, the stone dust that served as a binder for the stones in the macadam road was ground in by the steel tires of horse-drawn vehicles. The automobile . . . sucks out the binder and loosens the stones and . . . tears the road to pieces rather than bind it together."[13] It was fortunate that Iowa could not build macadam roads, for it would have been necessary to spend large sums to maintain them under the heavy pounding of motor traffic. Gravel was more plentiful in northern and eastern Iowa and had proved practical for surfacing less traveled roads, but heavy maintenance costs on main highways discouraged its use.

Hard-Surfaced Roads—The Problems

Although the state was making considerable progress in permanently grading earth roads, anticipating that they would serve communities under proper maintenance for years, generally they were not adequate for motorists. T. R. Agg pointed out that no one of the types proposed for hard-surfacing—gravel, broken stone, macadam, brick, concrete, etc.—would have universal application. Traffic, soil and financial conditions were the decisive factors in the selection of permanent surfacing, and the choice for one community would not necessarily satisfy the requirements of others. Even considering these elements, the category chosen would depend on maintenance or the lack thereof for its length of life. Agg further suggested that bonding for road improvements was a less objectional method of financing than direct property taxes, and by 1919, 26 counties had voted favorably for hard-surfaced road systems, thereby authorizing construction of 1,700 miles of pavement. The Primary Road Law provided that counties who wished to move faster on road improvements than possible through normal funding could use bonds after affirmative vote of the people in a special or general election.

The use of concrete as a road surface appeared to have started with a half block in LeMars in 1904. In 1909, Mason City and Davenport laid 6,000 square yards within their cities. In 1911, a quarter mile, 14 feet wide, was built near Eddyville, with materials, labor and cash supplied by businesses, farmers and the Mahaska County supervisors. By 1912, concrete, formerly relegated to a minor place in surfacing materials, began to achieve some prominence. A mile was built in 1913 west of Mason City, extended into that community in 1915, and in 1917-1918 the 11 miles between Mason City and Clear Lake were paved, marking the first interurban highway in Iowa. These "experimental" roads, together with the "seedling mile" in Linn County in 1918 on the Lincoln Highway, proved their ability to withstand heavy traffic and weather conditions and stimulated the demand for additional mileage. But while practical, construction expenses of $30,000 per mile in the 1920's were a deterrent. Yet, when the relative expenses for maintenance and motor vehicle operations on concrete roads were compared to those on gravel roads, such costs were cited by good roads advocates as evidence that concrete would be less expensive in all respects over long periods of time.

The Lincoln Highway

In 1912, a community of interest had developed between the automobile and highway users. Carl Fisher, manufacturer of the Pres-O-Lite automobile systems, conceived the idea of a transcontinental highway from the Atlantic to the Pacific coast, hard-surfaced and marked throughout its entire length. Because stone or rock were common surfacing materials, he called it "The Coast to Coast Rock Highway." An association with membership fees and annual dues was proposed to finance the estimated $10 million required to build the road. The title was changed to the "Lincoln Highway" through efforts of Fisher and Congressman Borland of Missouri, who suggested that the road plan would be more popular if some patriotic appeal was introduced into its title.

In addition to cash contributions, the cement industry agreed to furnish its product on the same basis as contributions of motor car manufacturers: one-third of one percent of the annual gross for three years, estimated to provide 2.3 million barrels of cement.

[13] George S. May, "Getting Iowa Out of the Mud," *Palimpsest 46* (February 1965): p. 96.

Western states joined the movement by improving roads and bridges along the proposed route, chartered originally by a series of automobile tours. The road was planned to start from New York City to Jersey City, N.J., thence to Philadelphia and Pittsburgh, Pa., Fort Wayne, Ind., around Chicago and westward through Geneva, Ill., to Clinton, Iowa. Continuing it would run through Omaha, Neb., and Cheyenne, Wy., to Salt Lake City. From there, it followed the old Pony Express Trail to Ely, Reno and Carson City, Nev., Sacramento and San Francisco. Entering Iowa at Clinton, it would pass through DeWitt, Cedar Rapids, Tama, Marshalltown, Ames, Jefferson, Denison and Logan to Council Bluffs, for a total of 358 miles across the state. Except for the "seedling mile" east of Cedar Rapids and short stretches of concrete west of Jefferson, the longest segment of 38 miles from Clinton to Lowden was not paved until 1924. Other sections of the route were surfaced with oiled dirt, graded earth and gravel. In dry weather, the trip on the highway could be comfortably made but rain made the earth roads a barrier to traffic. In this weather, "the tourist should stop if he wishes to save his car, his time, his tires and his temper"[14] (Fig. 5-4, 5-5).

The highway was marked four different times. The first was by use of red, white and blue bands painted on poles, rocks or other convenient objects. Later, the official insignia was adopted consisting of red, white and blue rectangles with the words "Lincoln Highway" in blue above and below the letter "L", painted on telephone poles and metal signs. More permanent enameled steel signs were next erected, and finally 3,000 concrete posts bearing the insignia and letter were placed along the route. Two of these may be seen on the south side of Lincoln Way in Ames, in front of the Department of Transportation building.

Lincoln Highway between Ames and Nevada, 1918.
(Courtesy: Iowa State Highway Commission)

[14] The Lincoln Highway Association, *The Lincoln Highway,* New York: Dodds-Mead & Co., 1935, pp. 210-226.

The joys of motoring, 1915-1920.
(Courtesy: Iowa State Highway Commission)

Difficulties on mud roads, 1915-1920.
(Courtesy: Iowa State Highway Commission)

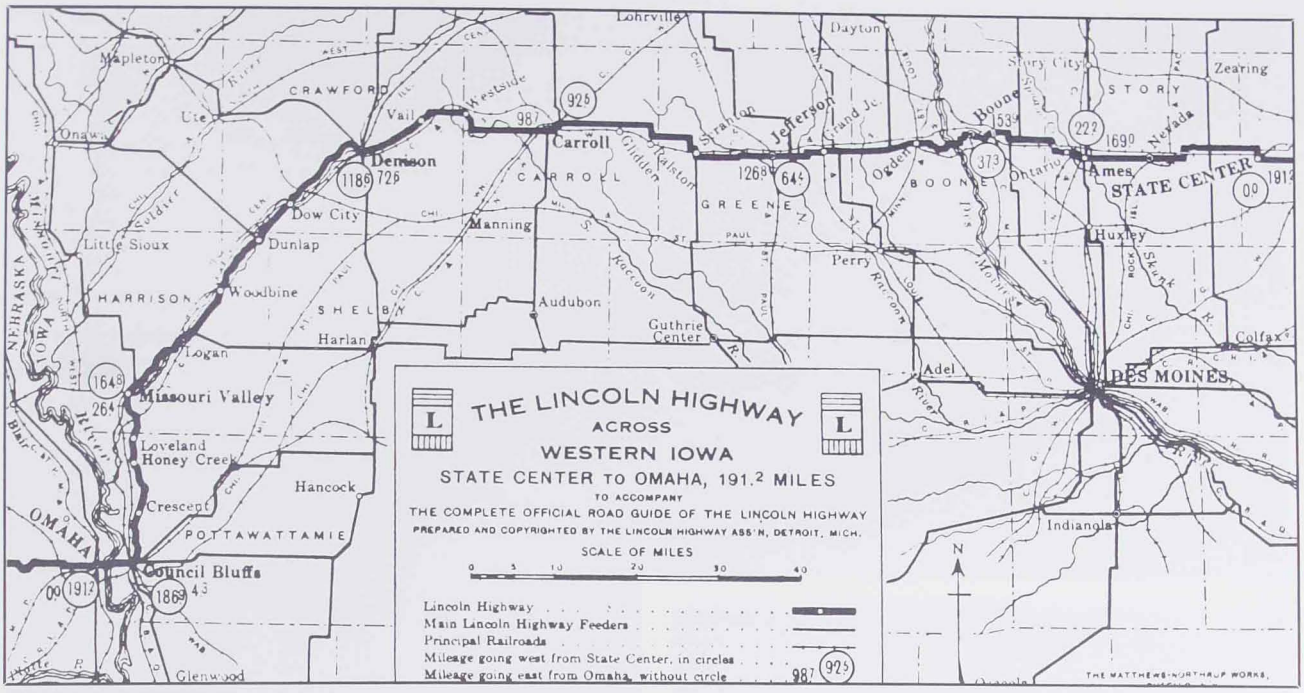


Figure 5-4
Lincoln Highway Across Western Iowa.
(Courtesy: Lincoln Highway Association, Detroit, Michigan)

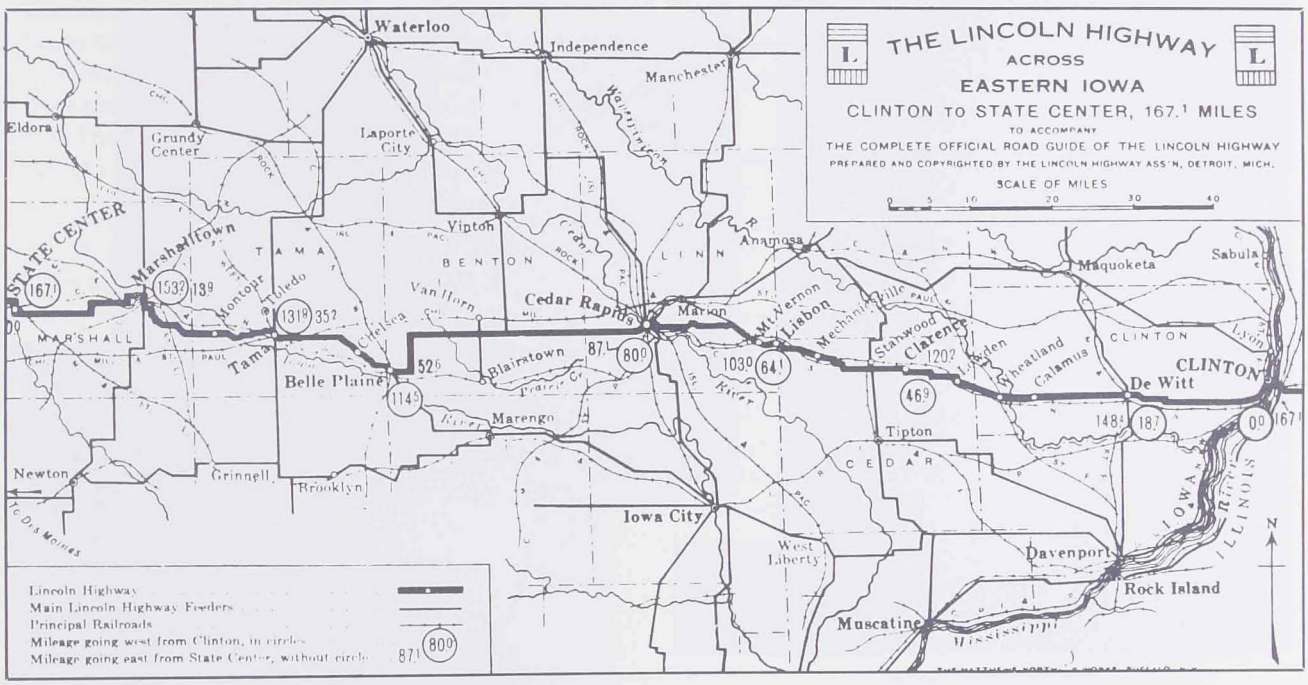
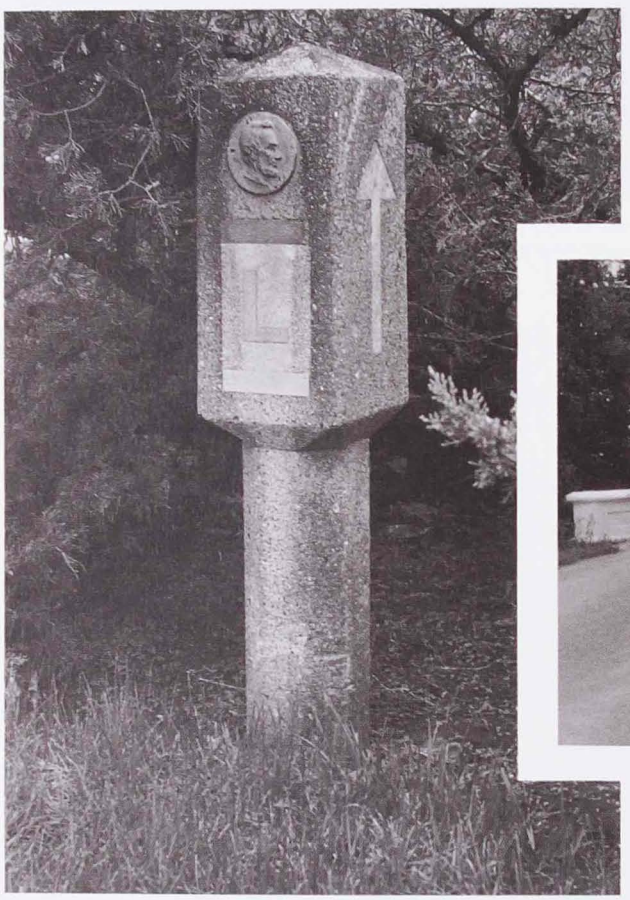
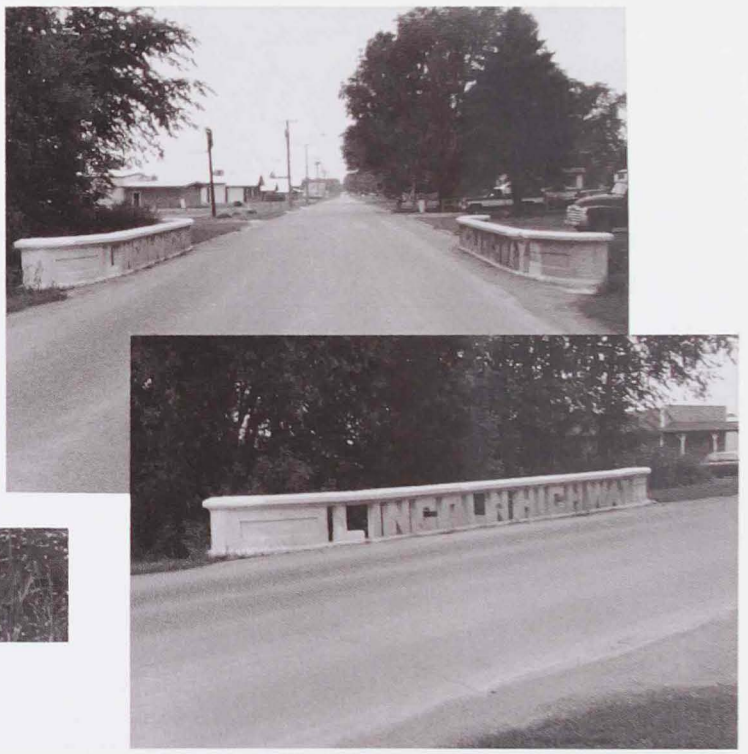


Figure 5-5
Lincoln Highway Across Eastern Iowa.
(Courtesy: Lincoln Highway Association, Detroit, Michigan)

The Lincoln Highway at Tama, 1920s.
(Courtesy: Iowa State Highway Commission)



Lincoln History Marker.
(Courtesy: Iowa State Highway Commission)



Bridge at Tama on old road, 1986.
(Courtesy: Author)

The Jefferson Highway

On March 14, 1911, the Des Moines-Kansas City-St. Joseph Interstate Trail was organized at Lamoni. In 1915, the original trail was extended to Mason City from Des Moines through Nevada and Iowa Falls and continued to St. Paul via Albert Lea, Faribault and Northfield, and the name changed to the St. Paul-Des Moines-St. Joseph-Kansas City Interstate Trail. It covered 503 miles, was well marked, and became part of the preferred road systems in Minnesota, Iowa and Missouri. With the exception of one county in Iowa, it connected all of the county seat towns and cities along its route.

The Jefferson Highway Association was organized in New Orleans in 1915 through the efforts of Walter Packer of the New Orleans Association of Commerce, the Honorable E. T. Meredith, later Secretary of Agriculture in the Wilson Administration, and Senator Lafayette Young, both of Des Moines. The Interstate Trail formed an important segment of the Jefferson Highway, and their organizational methods and marking system were followed largely by the Jefferson group. The major cities on the north-south route were Baton Rouge, Alexandria and Shreveport, La.; Muskogee, Okla.; Joplin, Kansas City and St. Joseph, Mo.; Des Moines, Iowa; St. Paul and Minneapolis, Minn.; and Winnipeg, Canada. The Mason City-Clear Lake paved road (Federal Project No. 1) was part of the projected road in Iowa. Paving across the state was expected to be completed by 1919. The insignia was similar to that of the Lincoln Highway with the letters "JH" in the middle band.

Highways or trails were not only organized on a national or regional basis but were quite common locally or statewide. The commission was authorized under Section 1527-S22, Supplement to the Code, 1913, to register highway routes promoted by voluntary organizations and to issue certificates for a fee of $5.00 to protect the names and markers used by the various associations. From 18 of these trails registered in 1914, the list grew to 64 by the close of 1925. A map showing these trails is included with this book.

Highway Accidents and Fatalities

Increased use of automobiles resulted in railway crossing accidents and caused injury and fatalities on Iowa highways. Speeding vehicles went over embankments, turned turtle, collided with each other and with bicycles and buggies, struck people, ran into trains and were hit by them. In 1916, there were 2,574 accidents which killed 199 people and injured 2,834. The headline in the Commission's Service Bulletin of January, 1918, read: "To be Safe, Go to War Until Careless Speeders are Banished from Iowa Highways."

As early as 1915, there were proposals to prohibit the sale of high speed automobiles in Iowa. "Limiting the speed of cars allowed in the state is the only effective way to cut the motor speed maniac and prevent the killing and maiming of people by reckless, inexperienced and incompetent drivers. Laws naming speed limits of so many miles per hour or, as Iowa puts it, 'reasonable speed,' with 25 miles per hour as evidence that a driver is exceeding that speed, are worthless. The high-powered car, advertised by manufacturers to hold the road at 50 miles an hour or accelerate from a standing start to 60 miles in 16 seconds, are a deadly menace to all users of the highways and sweep on their way unchecked. . . . The only effective way to curb the speed evil would be to forbid the sale of high speed cars, for there are reckless and careless drivers who will continue to have accidents as long as they are allowed to run cars on the highways."[15] Sixty-five years later, despite new laws, new regulations on driver qualifications, national speed limits, new enforcement procedures and much more improved and safe highways, the state still struggles to control the level of deaths and struggles carnage on the highways.

Convict Labor on State Institutional Roads

Under an Act passed by the 34th General Assembly and amended by the 35th General Assembly, the Board of Control was placed in charge of approximately 50 miles of roads through and adjacent to state lands at all of the state institutions. Except for county bridges, costs of improvements and maintenance came from the general funds of the state. The chief engineer of the commission was appointed to supervise the work and surveys, and planning was conducted by commission personnel. Labor was provided by convicts, 20 of whom were used to build

[15] "Can Appalling List of 1916 Highway Fatalities Shock Iowans Into Saner Driving in 1917?" *Iowa State Highway Commission Service Bulletin 5* No. 1-2-3, Ames: Iowa State Highway Commission, 1917, p. 3.

two miles of roadway at the Iowa State College in 1914, and in 1915, about 100 were engaged in building roads and culverts at other state institutions. They were housed in tent camps, wore any type of clothing and were paid 20 cents per hour. There were no visible restraints on the men as they went about their work, and the camps were virtually unattended. While the commission considered that convict labor had made a good showing in these isolated instances, they did not feel that the experience warranted its use in general road work as contrasted to contracting the projects to those with the necessary experience and equipment. "It is not practical to use men who must be placed under guards . . . and no economy would result to counties or townships in attempting to use prisoners in this way."[16]

Traffic Surveys

In 1917 and 1918, traffic counts were taken for a continuous period of seven days on the inter-county system, and for the two years, survey results were compiled for 87 stations in 36 counties. These locations were away from the immediate vicinity of larger cities, widely distributed, and considered as fairly representative of state patterns. They did not cover traffic on main roads leading to major cities. Briefly summarized, the survey showed that the average traffic was 300 vehicles carrying 800 people per day and that more than 80 percent were motor driven. Forty-six percent were local (town-to-town, town-to-farm and traffic originating in the towns); 47 percent were inter-urban or inter-county and the remaining 7 percent was interstate travel. An additional study made by T.R. Agg in 1919 showed the traffic situations as follows:

1. Tonnage was considerably higher than generally supposed, which emphasized the wisdom of constructing road surfaces of great durability. The system of earth roads had been carrying traffic considered moderately heavy for paved roads.
2. Passenger automobiles were predominant.
3. The present highways did not encourage the use of motor trucks because of the extreme variations in surface conditions.
4. Interstate traffic was insignificant, emphasizing that Iowa roads were constructed not for tourists but for Iowa people to be used for their pleasure and business.
5. About 90 percent of the traffic was motor driven, which indicated the equity of requiring a substantial contribution from motor vehicles for construction and maintenance on Iowa highways.[17]

The Highway Situation by 1920

By the close of 1920, considerable progress had been made on highway improvements despite the interruptions caused by World War I. Road builders looked forward to 1919 and 1920 in keen anticipation of a return to normal conditions. But labor was still scarce and remained so until mid-1920; rail transportation was uncertain and materials difficult to obtain. Highway officials had authority to build roads and could pay for them, but could not produce the product in a quantity desired. However 1919 should be remembered as a year of great achievement—a year in which the state embarked upon a program of modern highway construction. From 1913 to 1920, 3,216 miles of road had been built to permanent grade, 1,256 miles to temporary grade, 13,660 miles were tractor graded, 2,035 miles gravel surfaced, and 43 miles of the primary system paved.

River Transportation—The Doldrums

The Upper Mississippi River

The original project for improvement of the Upper Mississippi between the Missouri River and Minneapolis was adopted in 1879. Proposed was a channel or waterway by means of wing and closing dams so as to allow a depth of four and one-half feet at low water. The plan to secure a depth of six feet was adopted in 1907. During that year, President Theodore Roosevelt appointed the Inland Waterways Commission to prepare and report on a project to improve and control the waterways of the United States. Traffic had fallen on the Mississippi since Civil War days. Shallow depths, inefficient boats, irregular schedules, lack of terminals, and the seasonal nature of the traffic were among the reasons. On the other hand, railroads offered regular and efficient services.

[16] *Report of the State Highway Commission for the Year Ended December 1, 1916,* Des Moines: The State of Iowa, 1916, pp. 143-144, 149.

[17] T. R. Agg, *Traffic on Iowa Highways,* Bulletin No. 56, Ames: Engineering Experiment Station, Iowa State College, 1920.

The most important commerce on the river during the first decade of the 20th century was lumber products, although rapidly declining due to deforestation of the pine forests in Wisconsin and Minnesota. In 1882, 87 sawmills were operating along the river, keeping about 100 towboats busy. The largest milling centers in terms of board feet of lumber processed were Minneapolis, Winona, Dubuque, Clinton, Rock Island, Muscatine and Davenport. The impact of the lumber trade can be measured by the commerce through the Des Moines Rapids Canal in 1900, when 822 steamboats and 381 barges were counted. By 1914, the lumber traffic had almost disappeared.

During 1909, 22 packets, 36 towboats, 17 ferryboats, 147 pleasure boats and 26 government boats, totaling 16,103 gross tons, were in operation between Minneapolis and St. Louis. In addition, there were 300 unregistered barges of various sizes used for freight and construction materials. The principal steamboat lines were the Diamond Joe, the Eagle, the Carnival City and the Acme. Traffic, consisting mainly of lumber, rock, sand and gravel, reached a high of 4.53 million tons in 1904 and fell to a low of 761,522 tons in 1921. Passenger traffic between 1904 and 1920 averaged between two and three million annually.

A shortage of rail cars in the Mississippi Valley during World War I led to the formation in 1917 of a Committee on Inland Transporation to study the possibilities of the use of waterways to relieve congestion on the railroads. Their report concluded that rail freight could be handled on the waterways with adequate terminals and recommended that the federal government initiate such action. From the U.S. Shipping Board, $3.9 million was granted to the Emergency Fleet Corporation to build and operate towboats and barges between St. Paul and St. Louis, the first federal operation of equipment on the River. The Federal Control Act of 1918 commandeered all floating equipment on the Mississippi and Warrier Rivers, and appropriated $12 million for new construction. The Federal Barge Service emerged from these actions and eventually became known as the Federal Barge Line on the Upper Mississippi. It was operated by the Railroad Administration and transferred to the War Department in 1920.

The Missouri River

Steamboats had navigated the Missouri since 1819 when the first boat reached Council Bluffs; arrived at the mouth of the Yellowstone in 1832; and to the head of navigation, Fort Benton, Montana, in 1859. The length of the navigable river from Fort Benton to the Mouth is 2,285 miles. Originally, and into the 20th century, the condition of the river was one of alternate pools and bars. Water depth ranged from three feet in low water to nine feet in high water. The navigable depth did not increase as rapidly as the water height since the bars rose with the stage of the river. No projects for improvement throughout its length had been adopted by 1919.

Under a federal appropriation of $1 million in 1910, improvements were made from Kansas City to the Mouth with a view of securing a permanent six-foot channel. Previously, in other sections, work on the removal of snags, miscellaneous obstructions and trees had the effect of equalizing and reducing freight rates to approximately 60 percent of rail rates, a somewhat similar ratio as the 66 percent found on the Upper Mississippi. The maximum draft in 1910 at mean low water from Kansas City to the Mouth was four feet; from Kansas City to Sioux City, and on to Fort Benton was three feet. Traffic on the river never exceeded one million tons annually during the 1900-1920 period; the high of 843,863 tons was reached in 1907, thereafter falling steadily and especially during the war years. Generally, the character of upstream movements was merchandise and supplies; downstream, grains and livestock.

Early Aviation in Iowa

The Pioneers

Space permits only a brief discussion of individuals who contributed to aeronautical development in the state. For those interested in an inclusive description of general aviation history from 1845 to 1918, the most authoritative coverage is found in Ann Holtgren Pellegreno's *Iowa Takes to the Air*. A considerable portion of the presentation which follows has been drawn from this publication.

The fascination of flying in Iowa dates back to the gas-filled balloon era before the Civil War. An unmanned flight occurred in Burlington in 1845, and the first manned balloon was piloted by Professor Silas Brooks in the *Hercules,* also at Burlington in 1856. Following the war, when captive observation balloons were used by both armies, this form of aerial activity was taken seriously, and balloon ascensions and races were popular at state fairs and city and town celebrations. The Mississippi River cities, Des Moines and Sioux City, were among leading metropolitan areas for these events. Parachuting was an innovation

of the Baldwin brothers, Sam and Thomas, who became world famous for their daring feats, one of which almost cost Sam his life during a jump at Muscatine in 1888, when he fell into the Mississippi River.

Toward the end of the 19th century, gliders were being designed and flown, and the experiments led to the development of the first flying machine. Flying gliders had been proven practical by German and American engineers and in 1898, Carl Bates, a 14-year-old from Clear Lake, built and flew the first man-carrying glider in Iowa. Bishop Wright, an official in the United Brethren Church, lived in Cedar Rapids from 1878 to 1881, later settling in Dayton, Ohio, where sons Orville and Wilbur began experiments which led to their manned engine-powered flights on December 17, 1903 at Kitty Hawk, North Carolina. The four flights that day averaged 31 miles per hour and initiated the age of powered airplanes. Rotary engines were designed by F. Oscar Farewell and built by the Adams Company of Dubuque, and a version rated at 55 horsepower was available by 1909.

As small internal combustion engines were developed, innovators began installing them on sausage-shaped dirigible balloons, giving the operators some directional control. Among aeronauts who flew these dirigibles were Thomas Baldwin, Roy Knabenshue and Charles Hamilton. It was Hamilton who flew Knabenshue's dirigible at the 1906 State Fair in Des Moines, landing at the Capitol and returning to the fairgrounds. However, despite the numerous balloon ascensions, parachute leaps and powered airship flights, no aeroplane had been flown over Iowa at the close of 1909.

This situation changed in 1910. Arthur J. Hartman built and operated a two-cylinder monoplane at Burlington in May. Eugene Ely of Williamsburg and James C. "Bud" Mars flew at Sioux City in June, and Thomas Baldwin at Iowa City in October. Ely, a member of the Glenn Curtiss exhibition team, worked with the U.S. Navy on plans for launching an aircraft from a ship and took off on November 10 from a slanted platform built over the forward deck on the cruiser *Birmingham,* steaming down Chesapeake Bay, for a two and one-half mile flight to shore. His next flight was from shore to ship and on January 11, 1911, at San Francisco, Ely flew to the cruiser *Pennsylvania,* landed on a platform built on the stern and returned safely to shore. These flights made Ely an international celebrity. On October 19, 1911, he was killed in exhibition flight at Macon, Georgia.

In his *Story of Iowa,* Peterson listed some 46 flights by 23 aviators over different cities and towns in Iowa during 1910-1911, although no identification was given. Over the next five to six years, the challenges of flying brought new developments on engine and plane design and construction and pushed pioneering efforts to greater heights with rather astounding success, given the extremely poor condition of landing fields. One of the most famous flyers of this period was William "Billy" Robinson of Grinnell, internationally recognized for piloting mail planes in Canada and well known in central Iowa.

Robinson organized the Grinnell Aeroplane Company with a view of establishing a factory and flying school, plans cut short by his premature death. His most successful flight was sponsored by the *Des Moines Capital* and *Chicago Tribune* in 1914. The trip started from Des Moines on October 17 for a non-stop mail flight to Chicago, authorized by the federal government. Weather conditions and a fuel shortage forced him down at Kentland, Indiana, about 80 miles southeast of Chicago. The distance covered was 300 miles, exceeding the American record by 125 miles, and took four hours and 30 minutes, averaging 80 miles per hour. Having established the non-stop record, Robinson then tried to break the altitude record which in 1916 was 17,000 feet, about 3,000 feet higher than he had ever flown. On March 11, 1916 he crashed and was killed in the attempt. The plane was completely wrecked but the engine is preserved in the museum at Grinnell College as a memento to his exploits.

Others active during the early years were Oscar and Mary Solbrig of Davenport—designers, builders, mechanics and pilots who invented an airplane which could be quickly taken apart, crated and reassembled. They flew exhibitions throughout Iowa and midwestern states until Oscar joined the U.S. Air Force in World War I. Ruth Law soloed in 1912, was the first woman to fly at night and held the women's altitude record. Katherine Stimson received her license also in 1912 at age 16, becoming the fourth woman to be enrolled in the Davenport School of Aviation. J. Herman Banning, also from Ames, was the first black aviator to receive his license. Glen Martin of Macksburg left Iowa at an early age, flew his first plane in 1909, and became a stunt pilot before starting an aeroplane factory on the west coast.

World Famous Aviators

Three internationally famous pilots linked to early Iowa aviation history made news in the 1920's. Clarence Chamberlin of Denison captured the long distance record by flying from New York to Berlin. He was the first to fly a passenger, his financial backer Charles Levine, across the Atlantic Ocean. Later, Chamberlin and Bert Acosta broke the endurance record in his Bellanca monoplane, *Columbia,* by staying in the air for more than 51 hours. Charles Lindberg, whose exploits need no detailed descriptions, flew at many points in Iowa and dedicated several airports. Amelia Earhart lived for a time in Des Moines, and in 1928 flew as the first woman passenger from Newfoundland to Wales in a tri-motored Fokker monoplane. Four years later, she made a solo Atlantic flight and subsequently made long distance flights across the United States. Her career ended in an unknown spot in the Pacific Ocean in 1937.

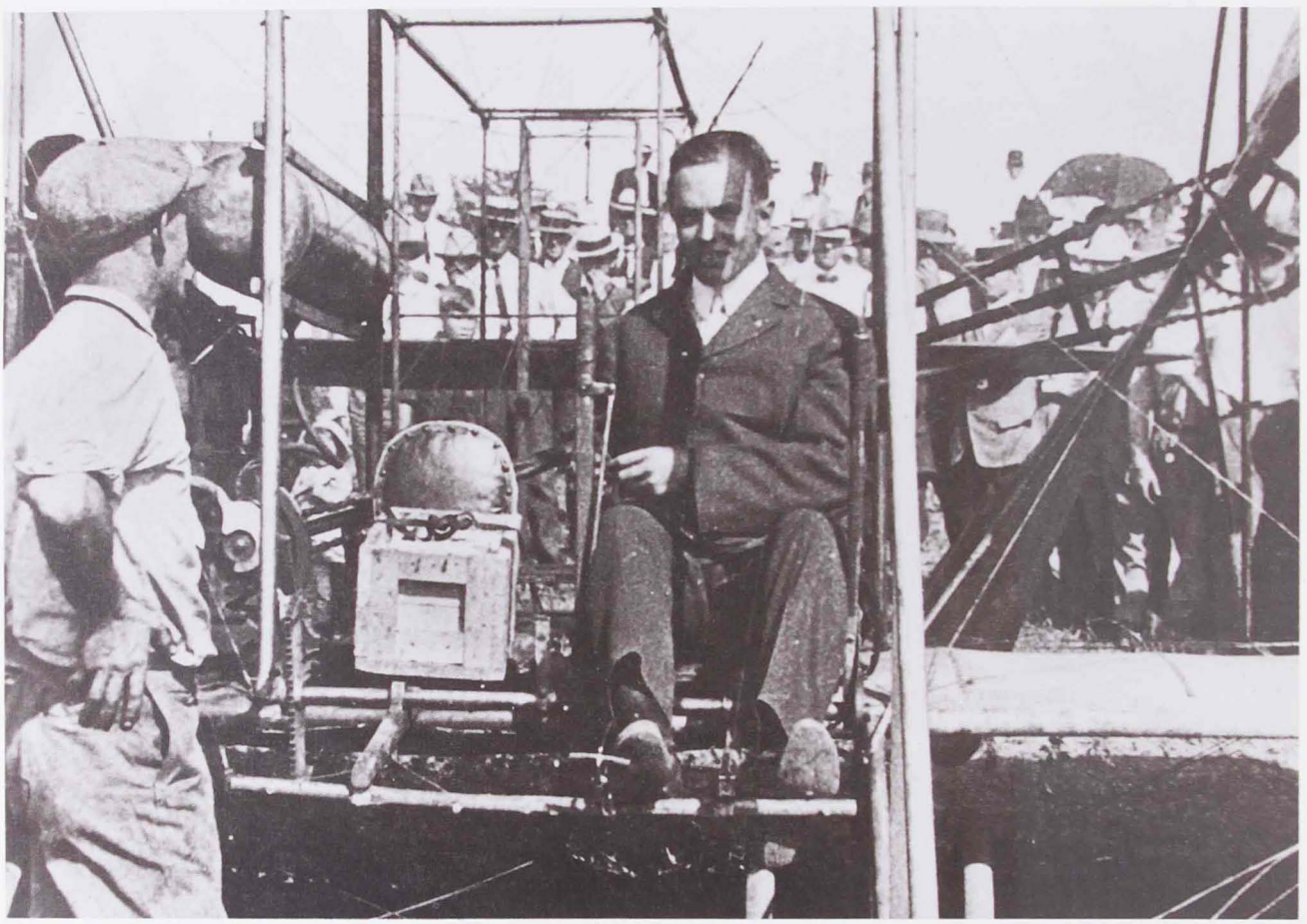
Steamboat *Andrew S. Bennett* on Missouri River, 1880s.
(Courtesy: Scott Sorenson, Sioux City Public Museum)

The War Years—1917-1918

Within five days following the declaration of war on Germany on April 6, 1917, representatives of all major railroads met in Washington and voluntarily merged the roads into an operational system of 254,000 miles under the direction and control of a Railroad War Board of five railroad executives. But the railroads under private operation could not meet the demands for service, and on December 28, 1917, President Wilson took possession for the war effort. William G. McAdoo, Secretary of the Treasury, was appointed Director General, followed later by Walker D. Hines. Despite an increase in rates in 1918, revenues did not keep pace with increased operating expenses. The result was that the ratio of expenses to revenues, commonly known as the "operating ratio",

rose from 78.14 percent in 1917, the last year of private operation, to 102.5 percent in 1920. For the first time in railroad history, operating expenses exceeded operating revenues for the railroad system.

The net cost of federal control to taxpayers from 1917 to 1920 amounted to more than $1.6 billion, cited over and over as evidence of the evils of federal ownership and operation of the nation's railroads. The experience of federal control during wartime does not offer a sound argument for or against control in peacetime. The effect was to provide "as to the country's war needs and as to the interests of railroad security owners, a protection which had become impractical on the part of private control in view of the emergencies and limitations with which it was confronted. Any fairly balanced study of the situation as a whole must lead to the conclusion that in periods of extraordinary difficulty, the government's temporary operation of the railroads accomplished with credit the objects which made resort to it imperative."[18] What the experience demonstrated was that railroad regulations since 1887, despite numerous amendments, were so restrictive as to prevent a unified system from operating under private control during periods of extreme emergency. Historians have referred to this period as one of "negative regulation" which reached its climax during the war years and which necessitated serious consideration of a more positive legislative approach toward railroads in the 1920s.



Pilot sent to Iowa State Fair by the Wright brothers, 1911. A box of rocks is strapped to the passenger seat to balance the weight of the engine. (Courtesy: Des Moines International Airport)

[18] Walker D. Hines, *War History of the American Railroads*, New Haven: Yale University Press, 1928, p. 239.

Summary

The physical structure of the railroads was largely in place in Iowa by the turn of the century, in contrast to the archaic conditions of the roads over which journeys were often hazardous. Additional railroad mileage had been built between 1900 and 1920, primarily to close gaps in the systems, make more direct connections between major cities, for branch line service, and to expand yards, terminals and sidings. Private investment and state support provided a network of almost 10,000 miles connecting nearly all of the small towns and large cities within and outside the state.

With principal building programs behind them, railroads focused attention on operational techniques and improvements. Supervision and regulation of these operations in conformity with federal and state laws, and the solution of local problems, was the responsibility of the railroad commission. Safety of employees and the public was of paramount importance as passenger and freight schedules increased in speed and frequency. Rate and service changes raised issues of discrimination with which the commission struggled in order to protect Iowa's industries. The period was one of railroad stabilization, road and equipment improvements, of consolidation of weaker into stronger lines—all designed to provide more efficient service at lower costs.

Progress in developing statewide systems of highways and roads was slow and widely scattered until the state and federal governments realized the necessity for improvements for private travel and commercial trade. The first highway commission laid the foundation for organized effort in planning and managing road construction even though hampered by limited funds and personnel. The second commission was given broader powers and responsibilities to provide uniform programs for highway and bridge design, construction and maintenance.

Organization, planning, specifications, supervision, uniformity of standards, accurate record keeping and cooperation with local road officials, were key elements in the 1913 commission's program for road development. Original concerns centered on the type of highways needed, materials to be used and methods of financing, rather than the nature of the traffic. Yet, the expanding number of vehicles and their impact could not be ignored, especially in the accident and fatality records on railway crossings and elsewhere. The second decade, principally from 1913 to 1920, was characterized by fairly rapid progress, culminating in the organization of a Primary Road System and the use of county bonding for construction.

Navigation on the Upper Mississippi and Missouri rivers was difficult because of shallow water, snags and obstructions. Wing and closing dams were built on the Mississippi, and dikes and revetments were built on the Missouri to partially alleviate the problem and to maintain navigable channels. Lumber and construction materials furnished the heaviest traffic on the Mississippi, whereas on the Missouri, general merchandise and agricultural products were the major commercial movements.

Iowa aeronautical history started before the Civil War with balloon ascensions and progressed through gliders to engine-powered machines in which Iowa pilots challenged distance, altitude and endurance records. The pioneering efforts of builders and flyers, many of whom lost their lives, were instrumental in the future advances of aviation in the state.

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