1893-1921

# The Beginning of State Highway Administrations Engineers Take Control

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Above, road work at lowa State College, Ames, before 1920, under the direction of the lowa Highway Commission, which was headquartered in the college's engineering hall until 1924. n 2005, five states celebrated the centennials of the formation of their departments of transportation, marking decisions that helped set the pattern for the acceptance of state responsibility for the development of highways. A few states had created highway commissions earlier, but many more followed in the decade after 1905. Ten years later, Congress required each state to establish a strong highway department, with administrative authority and adequate budgets, to participate in the federal highway funds. By then, the pioneering highway commissions created in and before 1905 had established the basic patterns for the operation of state highway administrations.

Officials within those state organizations have worked with their counterparts in the federal government for the past century to oversee the largest public works project in history—the American highway system. The enormous popularity of the automobile was the ultimate reason for embarking on this project, but the goal of developing road-based transport systems predated the automobile, drawing on demands from bicyclists and rural reformers.

The various advocates of better roads eventually concluded that their hopes rested on the creation of administrative agencies at the state level to develop and construct improved highways. The typical structure for state highway administrations developed between 1895 and 1920, yet the story of how and why state highway departments and highway com-

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missions came about involves politics more than technological change.

### **Good Roads Movement**

The Good Roads Movement began in the United States in the mid-1880s, spurred by the introduction of the safety bicycle, the first inexpensive personal vehicle. Early riders venturing beyond city streets discovered that the nation's roads were terrible—dusty ruts in dry weather and impassable mud holes in the rain.

The first road census, conducted in 1904, confirmed that only 154,000 of more than 2 million miles of roads had received any kind of improvement and that paving was almost nonexistent. The League of American Wheelmen (LAW) and other



Bicyclist organizations, like the League of American Wheelmen (*above*, members of the Kentucky Division), were instrumental in the Good Roads Movement.

bicyclists spearheaded the initial push for road improvements and in 1893 persuaded Congress to create an Office of Road Inquiry within the Department of Agriculture, to disseminate information about better roads.

Joining bicyclists as early supporters of road improvements were many of the nation's railroads. Railroad officials saw roads as feeders for rail traffic and steadily pressed for better farm-to-market roads from rail stations into the countryside. Railroads underwrote the cost of good-roads trains that toured states promoting road improvements, with exhibits of road machinery, models of road construction techniques, public lectures, and demonstrations, often in a carnival-like atmosphere. Sometimes a sample road was constructed as an object lesson to show local officials and residents the advantages of better roads.

#### **Rural Reformers**

By the mid-1890s, road improvement efforts gained the support of rural reformers whose initial goal was to extend rural free delivery of the mail. In 1896, the Post Office set minimum standards for the roads used for postal delivery, creating a new incentive for developing better roads. For the first time, rural residents saw a reason to support road improvements.

Other reformers interested in improving rural education, increasing the participation of rural farmers in elections, and connecting rural residents to the more expansive social and economic life of towns also pressed for better roads as the easiest way to make a difference in the lives of farmers and smalltown residents.

#### Who Should Pay?

The challenge all reformers faced was deciding who should undertake road construction and maintenance and who should pay for it. Roads had been the province of local government, reflecting the nation's reliance on railroads, as well as the fallout from the economic depression of the late 1830s.

Many state governments had invested heavily in the first railroad and canal companies, only to take heavy losses when companies defaulted during the Panic of 1837. That financial disaster caused many legislatures to pass constitutional amendments prohibiting state participation in public works projects. The road reformers of the 1890s had to overcome this legal hurdle to be able to shift part of the burden of road construction from local governments to the state.

Road improvement advocates gained support in the general climate of reform and civic improvement in the United States during the late 1890s. The most high-profile reforms involved the Pure Food and Drug Act, prohibiting the sale of tainted meat and milk; the trust-busting efforts of Theodore Roosevelt; and calls for conservation.

#### Management by Experts

The Good Roads Movement was part of this reforming impulse and shared many elements with other calls for change. Reformers emphasized the need for efficient management to end waste, graft, and other forms of political corruption. Road reformers and others argued that good management could be achieved most easily by shifting administrative authority from politicians to experts, and from local to central agencies. Experts could develop standards, let contracts, and create systems that would give taxpayers the most for their money.

The battle cry was to replace political influence with the scientific knowledge of technical experts. Road improvement advocates proposed placing the new state highway agencies in the hands of engineers.

Several obstacles arose. Most Americans liked having the political control of roads close to home, an outlook that stemmed from a distrust of big government—an apparently enduring attitude. But local control also involved pocketbook issues, because property taxes then provided most of the funds for road projects.

Most county road programs allowed residents to work off their road taxes with one or two days a year of physical labor on the roads that passed their property. Few wanted to pay more—or to pay cash—for better roads, especially farmers who believed that good roads primarily served wealthy urban bicyclists and automobile owners. Road advocates faced a large political challenge in developing state-level highway administrations.

# **First Highway Departments**

The process of developing state road organizations was relatively slow and sometimes painful, but the pioneer efforts of a few states proved the value of state-level highway programs and organizations. Three key elements in state road administration



Road construction in Michigan, one of the first states with an engineer highway commissioner.

appeared at the beginning, but fine-tuning the ideas into a general model for state highway departments required more than a decade.

#### **Key Characteristics**

The first idea was state aid for road projects, implemented in New Jersey in 1891. That year, the state legislature provided \$75,000 to meet one-third of the cost of county road projects.

Massachusetts worked out the second part of this financial concept, how to ensure that the state funds would be used wisely. The legislature cre-

ated the first state-level highway building agency-the Massachusetts Highway Commission-in 1893 to oversee the state-aid fund. The commission could require county officials to accept the technical standards and specifications established by the state agency in return for state funds. The first standards related to bridge design, an area that required formal engineering training, but standards eventually emerged for all aspects of road building.

The third key element was to devote state funds to the most important roads and not at the whim of county road officials. Massachusetts granted the only substantial state funding for road improvements, with the state highway commission disbursing approximately \$6.75 million between 1894 and 1903.

The Massachusetts commission included another element that would not become a standard

part of the state highway agency structures for nearly 30 years—a materials testing laboratory. The impetus came from Harvard engineering professor Nathaniel Shaler, a member of the first commission, who had published an early treatise on road construction and launched the first university curriculum in highway engineering. Shaler also had developed a laboratory at the Lawrence Scientific School at Harvard to test materials, and he made the facility available to the highway commission. Road builders across the state could submit materials for testing. One of Shaler's first students, Logan Waller Page, ran the laboratory from 1892 to 1900, when he moved on to head the Division of Tests, Bureau of Chemisty, in the Department of Agriculture. Following the Leads

Similar agencies slowly appeared in other states. New Jersey appointed a commissioner of public roads to oversee the state-aid fund in 1894, but the legislature did not inaugurate a regular highway commission until 1909. A handful of other states also followed the Massachusetts example; the state road agencies authorized in Connecticut and California in 1895 evolved for several years. In 1897, LAW launched a campaign in Minnesota to overturn a constitutional restriction on state participation in internal improvements. By 1899, six states had organized highway departments or commissions.

Unlike the Massachusetts commission, most of the new road offices lacked strong administrative authority and adequate financial resources. The Connecticut Commission, for example, struggled in its first years as legislators decided how much control the agency should have. Connecticut already had a version of state aid, with the state providing the bulk of the funds for local work. Commissioners also worked on creating construction plans and on developing standards, but not until 1901 was the commission required to hire an experienced road builder. In 1908 the commissioners began to focus on trunkline highways and to consider which roads to complete and how to fill the gaps in roads between

The Connecticut process, however, worked a little better than North Carolina's. That state formed a weak highway commission in 1901 that went out of business only two years later. This was not a unique occurrence.

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Construction of Fall River Road, the first road to cross the Rocky Mountains in northern Colorado, September 1915. In 1909, Colorado formed a three-person highway commission to distribute \$50,000 in state aid to counties, which had to match \$2 in local funds for every \$1 from the state. The commission was expected to develop a state system on a shoestring budget. In 1913 the legislature changed the commission into a state highway department that derived financial support from license fees and, one year later, from a .25 mill state tax.

Similarly, New Mexico formed a highway department in 1912, when the state had only 970 registered vehicles. The commission's total budget for 1912 to 1914, however, was less than \$300,000.

#### Strengthening the Approach

This pattern of administrative and financial weakness slowly began to change, primarily because states gave a greater role to engineers. The pattern took shape in the East Coast and in the Midwest.

In 1904 Iowa adopted the novel approach of assigning the deans of engineering and agriculture at Iowa State College to serve as the state's highway commission, with the initial charge to make a general study of the state's road problems. The commission also was asked to develop a highway plan, demonstrate construction techniques, and spread information to county officials. By 1911, the commission had three fulltime and two part-time employees at the college.

The year 1905 marked significant moves toward expert control as five states formed highway organizations: Maine, Minnesota, Michigan, Washington, and New Hampshire. Michigan acted because of the relentless efforts of Horatio Earle, an impassioned road advocate and engineer who became the state's first highway commissioner. Maine appointed Paul Sargent, an Office of Public Roads engineer, as its first commissioner.

#### **Expert Control**

California revamped its highway organization in 1907, adding a state highway engineer, and two years later, the legislature passed the first bond issue for roads. The importance of expert control can be seen by comparing the experience of Washington, which had formed a weak commission in 1905. It took four years for the organization to acquire basic control over local road building activities. In 1909, state officials gained some authority over contracts, and in 1911 they were charged with developing hard-surface roads for commercial uses, but the resources were far from adequate.

Road improvements in New York also were hampered by the lack of expert control. In 1898, the state embraced the principle of state aid to local and county road programs by giving the state engineer authority to approve petitions for funds. But in the next five years, only 59 miles of new roads were built out of the 1,308 miles requested. To speed construction, the legislature approved a \$50 million bond issue in 1905, the largest road fund in the country for many years. Yet not until 1909 was a state highway commission charged with overseeing this program.

The New York legislation authorizing the commission also outlawed the payment of road taxes through labor and centralized control of construction and financing for state roads in Albany. But the new commission proved vulnerable to political influence and soon was bogged down with charges of graft and corruption. Officials were appointed on political criteria and the agency had no stability in leadership; political needs similarly shaped projects and con-



Anson Marston,

the first Dean of

as the state's first

of the U.S. Bureau of Public Roads, a position he held until 1953.

Engineering at Iowa

State College, served

highway commissioner in 1904, with C. F. Curtis, the college's Dean of Agriculture. One of Marston's former students, Thomas MacDonald, worked 15 years for the commission and left to become Chief

The new Iowa Highway Commission building on Lincoln Way in Ames, 1924.

tracts. Because of the problems of waste and political interference, New York's road commission remained a disappointment throughout the second decade of the 1900s.

# **Office of Public Roads**

The primary reason that states slowly began after 1905 to develop stronger, better-funded highway departments with a measure of control over local road building activities was the Office of Road Inquiry in the U.S. Department of Agriculture in Washington, D.C. Founded in 1893 in response to demands from LAW, the agency grew into the Office of Public Roads (OPR), as it was known from 1905 to 1918, when it became the Bureau of Public Roads. From the beginning, even before it administered federal funds for road construction, the office played a significant role in defining the structure and shape of state highway organizations.

The first director of the office, General Roy Stone, had been a lobbyist for LAW and authored a general state-aid road bill that state legislators could use for forming state highway agencies. Stone continued to provide this type of assistance as office director, although he was sensitive to the limits of federal authority. By 1895, he had fielded and responded to requests for legislation from Iowa, Connecticut, New York, Rhode Island, Kansas, and Michigan, where he volunteered to appear before the legislature.

Stone also drafted the bill that shaped the initial California highway department, met with the governor, and reported that the bill was "speedily adopted" by the legislature. Stone's legislative ideas resembled in basic features the state highway commission legislation from Massachusetts, which situated central authority for system development and standards in the state office and granted administrative authority to engineering experts, not to politicians. Stone's preferred model of a competent and efficient state highway agency, in other words, embodied the classic elements of progressive reform movements.

#### **Engineer Influence**

Later directors at OPR continued this pattern, especially Page, who arrived in Washington, D.C., from Massachusetts in 1900 to head the office's materials testing laboratory. In 1905, Congress mandated that the office be administered by an engineer, and Page was promoted. His main suggestion to the states was to emulate federal government policy by installing engineers as the directors of state road building. Even if the state commission was politically appointed, he maintained, engineers should control the road construction. Page also urged that state commissioners designate the road systems that were eligible for state aid, and that the state offices set specifications and standards for work by county roadbuilders.

After 1905, the federal office's efforts to assist in framing legislation for state highway agencies steadily increased. In 1907, OPR engineers lectured in support of state-aid bills in Delaware, Arkansas, and Washington, where the engineers canvassed the state from January through April before addressing the legislature. OPR distributed state-aid bills in California, Oklahoma, and Colorado in 1907, and in Kansas, Indiana, and Texas in 1909. By 1911, the office received so many requests for help that staff drafted a model bill that was distributed in at least 24 states.

OPR was not the only source of information about state highway agencies. The American Automobile Association also distributed sample bills, and later the Lincoln Highway Association circulated its ideas about state highway agencies. Basic similarities are apparent in the content of the legislation advocated by these different organizations. Yet OPR had a special position in this process—its efforts after 1905 coincided with a steady upswing in the number of state highway departments.

In addition, the element of expert control became more common, as shown in the 1913 highway bill for Montana. The legislation created a highway commission under the control of three commissioners, all of them engineers: the professor of civil engineering at Montana State College, the state engineer, and an engineer appointed by the governor as chair of the commission.

#### **Tortuous Paths**

Despite its strong influence, OPR could not mandate that states form strong highway departments nor could it guarantee proper implementation. Tennessee, for example, underwent a long struggle to develop a state road-building agency. The legislature created a commission in 1907 but refused to renew its legal mandate in 1909. Not until 1913 was a bill passed allowing counties to issue bonds for road construction, and the state road department was not approved until 1915. This administrative agency, however, had no separate source of funds and was forced to work with county road officials. Only in 1923 did the state legislators agree on a reorganization plan that strengthened the department sufficiently to carry out a road program.

Kansas followed a similarly tortuous path to develop a competent state roads office. By 1909, many of the components of legislation in other states were in place, including a statewide good roads organization and assistance from OPR. A state General Roy Stone, a Civil War and Spanish-American War veteran was the first director of the federal Office of Road Inquiry, and the architect of many stateaid laws for road building. He also proposed the first parcel post, the first rural free delivery, and postal savings banks.

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Illustration from a 1943 highway department history, showing the evolution of highway travel in Montana.

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highway engineer was appointed to work with the counties, which resisted the centralized control. Stymied in the legislature, supporters of good roads settled for legislation that created the position of state highway engineer to pass state funds to the counties, which would build the roads.

## Federal-Aid Road Act of 1916

The final step in bringing professional state roadbuilding agencies into all the states started with the passage of the Federal-Aid Road Act of 1916, which authorized the first federal funds for road construction. Pressed by Page and other state highway engineers, Congress accepted the concept of federal aid to the states with construction costs divided evenly.

But Congress also required the states to have in place highway departments that met OPR approval. This gave federal engineers a club with which they could force the states to create engineer-controlled highway agencies. Nearly every state had to make changes after 1916, as federal engineers set out to ensure that state engineers had sufficient authority and funding to carry out the tasks of developing the roads of greatest national significance.

Only California had to make no changes, and for some states, such as Michigan, the adjustments were minor. But 15 states, such as South Carolina, lacked a highway commission and had to establish an agency to qualify for federal-aid funds.

Three states passed constitutional amendments to allow state funding of internal improvements, 18 others had to strengthen or reorganize, and 15 had to make less extensive changes. OPR directly assisted 23 states in bringing their highway departments to minimum standards, often by drafting appropriate legislation. In Texas, Missouri, Indiana, and South Carolina, OPR assigned engineers to organize the new departments.

Even with this mandate, the task of forming competent and professionally managed state highway departments was not simple. Good roads supporters in Kansas, for example, hoped that the 1916 federal-aid bill would settle the debate between supporters of strong state authority and those who advocated local control of road work. The 1917 legislation designed to bring the state into conformity with OPR guidelines, however, required the new state highway commission to pass federal-aid funds directly to county road commissioners, who would provide the matching funds.

At least three times during the 1920s, a U.S. Senator had to add special language to the federal-aid highway bill granting Kansas more time to create an appropriately strong highway agency. Without these exemptions, the state would have lost its share of federal-aid funds. Not until 1929 was county control over roads dissolved and control given to the Kansas Highway Commission.

The historians of the Kansas Highway Department suggest that the state's resistance was the "last assault for a lost cause" namely, the protection of citizen control of road construction. But few other states and citizen groups were willing to wage such a battle.

Many states in the South and the intermountain West were much less capable in terms of engineering and administration than those with longer histories, especially those on the coasts or in the industrial states of the Midwest. Arkansas, for example, nearly lost federal-aid funding in the mid-1920s because of excessive political interference in the affairs of the highway department.

But in general, professional state highway organizations directed by engineers and focused on efficient use of taxpayer resources for state road networks already had become the norm by the second decade of the 20th century. The Federal-Aid Highway bill provided the legislative muscle that moved the last holdouts into line. OPR's program of helping to create strong highway departments by working with the states before 1916 made possible the acceptance in Congress of the idea that America's highways could be built in a process consistent with federalism. The critical prerequisite was a strong highway department, which remains a cornerstone of American highway policy today.

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Logan Waller Page applied his experience with the pioneering Massachusetts Highway **Commission materials** testing laboratory to assignments at the federal level, becoming director of the Office of Public Roads in 1905. He championed engineer control of state road building and was one of the founders of the American Association of State Highway Officials.