PIONEERS
OF TRANSPORTATION
INTRODUCTION

This book is about a profession—transportation engineering—and its developing years in the United States from the early 20th century through the Federal Aid Highway Act of 1956. A profession’s beginning is never at one date certain, rarely is it confined to one country, and never does it truly end its evolution.

Transportation engineering began to evolve as a profession sometime in the first quarter of the century as “traffic engineering,” which initially focused largely on the role of improving the efficiency and safety of automotive and pedestrian traffic in urban areas. Over the years, it has evolved in scope and in nomenclature to the current label and the definition used herein: the planning, functional design, and operation for all modes of surface transportation.

The primary focus of the profession at this time is the safe and efficient use of roadways and other travel ways for passenger and goods movement involving vehicles, pedestrians, bicycles, and other modes. Whether these boundaries will expand or contract as evolution continues remains to be seen.

The decisions to confine this treatise to the United States and to the early years of professional evolution were entirely pragmatic. Another decision, to structure the description of the profession’s evolution in the framework of a limited number of individual’s biographical sketches, caused great soul-searching: How does one tell this story in an interesting and readable form without slighting someone, some place, and some time?

And, of course, one can’t. The biographical sketches that are included are an exemplary sample, but only a sample, of those who made significant intellectual contributions to the profession’s growth. The committee earnestly hopes that others will be moved to expand on the breadth, depth, and geographic limits of this document to chronicle contributions of our other professional pioneers, domestic and worldwide.

The committee’s goal has been to tell the story of our professional heritage in a way that would appeal particularly to newcomers and incipient members of the profession. The intent here is to lead them to appreciate the truth of Sir Isaac Newton’s dictum that “it is by standing on the shoulders of giants that we command the prospects that we now do.”

As a final note of introduction, this publication was inspired by leaders of the Bureau of Highway Traffic Alumni Association and is dedicated to recognizing and honoring the bureau’s significant contribution to our profession during its 57 years of service at Harvard University, Yale University, and Pennsylvania State University from 1925 to 1982.

The Alumni Association itself was nurtured over much of its existence by the efforts of a dedicated volunteer and caretaker, Harvey B. Boutwell (1924–2006), who arranged the meetings, maintained the records, and husbanded the resources of the association.

The committee deeply appreciates Harvey’s efforts, as it does the help of the International Board of Direction and the staff of the Institute of Transportation Engineers, which assisted the committee in the inception, production, and distribution of this document.
CARLTON C. ROBINSON, P.E., Chairman and Principal Author

Robinson is a past international president and honorary member of the Institute of Traffic Engineers (now called the Institute of Transportation Engineers or ITE). He graduated from Oregon State College with a B.S. in civil engineering in 1946 and from the Yale Bureau of Highway Traffic in 1950. He served as junior traffic engineer and assistant city traffic engineer for Portland, Oregon, from 1946 to 1954 before joining the staff of the Automotive Safety Foundation in Washington, DC. He served as traffic engineer and director of traffic engineering for the foundation and its successor organization, The Highway Users Federation, until his retirement as the federation’s vice president in 1991. He was active in the Transportation Research Board of the National Academy of Science and a member of the American Society of Civil Engineers and has authored or edited numerous technical contributions to the profession. He was the first recipient of ITE’s Past Presidents’ Award for service to the profession in 1951. In 1985, he received ITE’s Theodore M. Matson Memorial Award for professional achievement.

THOMAS W. BRAHMS, Executive Director and CEO of the Institute of Transportation Engineers and the Transportation Professional Certification Board

Brahms graduated from Northeastern University in 1971 with a B.S. in civil engineering. He is a recipient of the Burton W. Marsh Award for Distinguished Service to ITE and was made an honorary member of the Institute in 1988. Brahms also was awarded the American Society of Civil Engineers’ (ASCE) Wilbur S. Smith Award in 2004 and the Administrator’s Award for outstanding Public Service from the U. S. Department of Transportation Urban Transportation Administration in 1988. He has served on numerous NCHRP panels, on the Eno Center for Transportation Leadership Development Board of Regents, on the board of ITS America, and as the access chair of Partners for a Walkable America.

LAURENCE A. DONDANVILLE, P.E., Past International President and Honorary Member of the Institute

Dondanville graduated from Purdue University with a B.S. in civil engineering in 1950. He began his career with the Illinois Division of Highways, Bureau of Research and Planning. Following military service, he joined De Leuw Cather and Company (now the Parsons Transportation Group). He served for many years as senior vice president and chief engineer of De Leuw, Cather International. When he retired in 1992 he was senior vice president, project services, responsible for corporate direction of engineering systems and the transportation planning and advanced highway systems business areas. He continued to serve for several years as a consultant to Parsons on international transportation projects.

LEON GOODMAN, P.E., PTOE, Past International President of the Institute

Goodman graduated from City College of New York in 1956 with a degree in civil engineering and from Yale University Bureau of Highway Traffic in 1958. He also completed the Program for Management Development at Harvard Business School in 1968. He was secretary of the ASCE Highway Division Executive Committee and chair of the ITE Transit Council Executive Committee. He retired in 1992 from the Port Authority of New York and New Jersey, where his career included service as manager, transportation planning division. From 1992 to 2006 he held senior positions at Storch Engineers and at Parsons Transportation Group. He is currently an independent transportation consultant and teaches courses at Stevens Institute of Technology in New Jersey and at Pratt Institute in New York City.

JAMES L. PLINE, P.E., PTOE, Past President and Honorary Member of the Institute

Pline retired from the Idaho Transportation Department and then formed his own consulting business. His state employment encompassed the Interstate Era, locating, designing, building, and operating Idaho freeway facilities. Early in his career, his enrollment in the Yale Bureau of Highway Traffic initiated him into traffic engineering, which has become his lifetime profession. Recent activities include editing a number of Institute publications and serving on several state and national transportation organizations. He organized the Transportation Safety Council and was instrumental in creating the Professional Traffic Operations certification program. He is currently serving as clerk of the Bureau of Highway Traffic Alumni Association.

ALAN E. PISARSKI, Writer and Consultant in the Fields of Transportation Research, Policy, and Investment

His continuing studies include the Commuting in America series conducted each decade since 1986; and The Bottom Line a statement of national investment requirements prepared for Congress for each of the last five reauthorizations. He is invited frequently to testify in both Houses of the United States Congress and in state legislatures regarding economic and demographic factors that define travel demand, infrastructure investment requirements, and public policy. His work has been reviewed and reported in all of the nation’s media. TRB honored him with the Distinguished Lecture in 1999 and the WN Carey Award in 2007 for Lifetime Distinguished Service and Leadership in Transportation Research.
The beginnings of the transportation engineering profession in America are best understood by reviewing the cultural and technological context that preceded and accompanied its early years.

In America’s developing years, water modes dominated long-distance travel—up and down the Atlantic coast and into the major estuaries and river valleys east of the Appalachian Mountains. Road travel was slow and arduous, carried out on foot or by horseback and frequently impossible by wagon.

Some military roads and pioneer trails penetrated the Appalachian barrier. In 1806, the national government embarked briefly on construction of a 20-foot, stone-surfaced road from the Potomac River valley to the Ohio River. That road was eventually constructed and extended as far west as central Illinois but never became the anticipated major western gateway, and Congress backed away from further road construction ventures.

The Mississippi, Missouri, Ohio, and Rio Grande River routes to the west were a long detour from East Coast America. The trip around the horn to California was even longer.

The Erie Canal opened in 1825, connecting the Atlantic seaboard to the Great Lakes and to the fertile Midwest. This was truly the first gateway to the continent.

Canal systems continued to expand. By 1835, there were more than 2,600 miles of canals on both sides of the Appalachians. When the Chesapeake & Ohio Canal foundered in the Appalachian foothills and the Baltimore & Ohio Railroad reached the Ohio River near Wheeling, the canal era began its decline. The age of the railroad was upon us.

With the exception of a few struggling turnpikes financed through collection of tolls, rural roads primarily linked farm and village with the nearest trading centers and rail heads. Few were drained properly, and even fewer had all-weather surfaces. Dust and mud frequently bedeviled travelers on these early rural roads.

These critical roads were solely the responsibility of the most local of jurisdictions. They were typically created by following animal paths and maintained, if at all, by “statutory labor” under haphazard supervision. Neither state nor national governments took part in road affairs beyond chartering, and occasionally helping to finance, a few favored private turnpikes.

“A HISTORICAL PERSPECTIVE

“The true history of the United States is the history of its transportation.”

Aqueduct over the Mohawk River at Rexford, New York, one of 32 aqueducts on the Erie Canal.

Source: Clifton Park Collection, http://library.byways.org/view_details.html?MEDIA_OBJECT_ID=62568
That was largely the rural transportation picture as the 20th century arrived. The urban scene was different. America, which began very much as a rural economy, was becoming urban. New York City was the only urban area with more than 50,000 residents in 1800. The nation boasted 10 such areas by 1850. By 1900, there were 78 cities with more than 50,000 residents, and they contained 35.9 percent of the nation’s population.

The electric streetcar first appeared in Richmond, Virginia, in 1888, freeing the “radius” of the city from a walking-distance criterion. Urban areas responded and bloomed; major streets were graded and hard-surfaced for year-round travel. Individual travel was still by human or animal muscle, but the bicycle was the rage, and the motor vehicle was on the horizon.

At the turn of the century, there were few if any “rules of the road” in either rural or urban environs. The practice of passing other vehicles on the right side was common in America but not mandatory. Pedestrians followed no rules whatsoever, and all sorts of commerce were conducted on and in the public way. Chaos was approaching as the Duryea brothers introduced the first American-made, gasoline-driven motor vehicle in 1893.

In rural areas, the lack of all-weather surfaces presented a challenge for horse-drawn or motor vehicles and bicycles. In 1893, the federal government established an Office of Road Inquiry within the Department of Agriculture, but it had little power except to compile statistics. Bicycle enthusiasts began forming “good roads” movements, and their early allies were the railroads, which saw roads as feeder systems, not as competition.

In 1905, the Federal Office of Public Roads was established. By 1914, several states had established road-building authorities. They joined with federal agencies in founding the American Association of State Highway Officials (AASHO) — an entity now known as the American Association of State Highway and Transportation Officials (AASHTO).

The automobile fleet exploded with the help of Henry Ford’s Model T—from perhaps 8,000 vehicles in 1900 to more than a million in 1913 and 10 million by 1921. Trucks, after a slow urban beginning, blossomed nationwide following World War I. Auto owners began forming local clubs to demand better roads and fair laws, and some clubs even took on the installation of needed traffic signs. In 1902, the American Automobile Association (AAA) became the voice of the motorist.

In urban places, the problem was more muddle than mud. The job of correcting the mess fell to the police, or in a few cases of self-preservation, to the street car companies, which stationed “traffic directors” at congested intersections on their routes. Finally, in 1903, New York City became the first city to adopt a simplified set of “rules of the road” for vehicle drivers and began controlling parking, loading, and commercial intrusions on the street rights of way.

In the 1920s, America became urbanized, with more people living in cities than in rural areas. A total of 22 million people immigrated to the United States from the late 1800s to the mid 1920s. During this same period, people were moving from the rural southern states to the bigger cities in the north to seek a better life. The cities began to grow, not only vertically but also horizontally. Commuting to work became a way of life. This growth challenged the early transportation system’s inadequate streets, creating a need for a new expertise to solve emerging transport problems. The automobile also became affordable for the rural population,
and this newfound affordability provided more frequent shopping trips and access to a larger area of travel. The improvement of the road systems to serve the auto boom created a whole new business field of service stations, auto camps, motels, and restaurants oriented toward auto travel.

As automobile use increased and pneumatic tires allowed higher speeds, accidents became a serious challenge. Intersection congestion further strained the police departments’ resources to control the problem. The need to plan for and devise progressive, rather than repressive, solutions was obvious, and a movement began to seek “scientific, factually based solutions.”

In 1923 America was introduced to a new highway concept—the limited-access highway—and it was an accident. The Bronx River valley was becoming a mess of dumps and landfills. To cure this eyesore, the legislature-created commission developed a linear park that included a recreational road. It was soon obvious that the prohibition of cross traffic and of access from abutting private property had created a new—and better—road design and operational concept.

The concept grew and expanded in the New York region and in Washington, DC, where the Mount Vernon Memorial Highway, George Washington Memorial Highway, and Baltimore-Washington Parkway were authorized by Congress in 1924 as monumental automotive entrances to those locations. Other cities followed. The parkway, and later the freeway, were born.

The explosion of automotive travel on inadequate roads and streets was accompanied by a tragic increase in auto crashes. By 1925, the fatality rate was nearly 18 per 100 million miles of highway travel. In 1924 and 1926, two national conferences on street and highway safety were convened by then-Secretary of Commerce Herbert Hoover. The conferences recommended nationally uniform traffic rules and traffic control devices and, in larger cities, an “official traffic commission” headed by a trained traffic engineer. This ushered in the era of the urban traffic engineer.

Progress in rural areas came apace. The inability of the railroad system to meet the gigantic demands of World War I introduced truck travel to the rural scene and demonstrated the need for stronger rural pavements. “Trail associations,” formed to promote longer-distance rural auto travel, were amplifying the bicyclists’ clamor for “good roads.” More states established state highway agencies in response. Money was a problem, but that eased somewhat when, in 1919, Oregon began taxing motor fuel for road purposes. By 1929, all states and the District of Columbia had levied motor-fuel taxes, usually dedicating the collected funds to road improvement.

The Great Depression of the 1930s changed the face of transportation. Many companies and manufacturers, including transportation entities, went out of business, but the automobile carried on as an inexpensive means of transport.

The mid-1930s saw major migration out of the drought-stricken Midwest “dust bowl.” The automobile moved families to the west and provided the mobility for one to scrape out a living as a migrant worker, moving from harvest to harvest.

World War II pulled the nation out of the Great Depression and boosted the economy but restricted travel for the war effort. The shortage of rubber, along with gasoline rationing, severely limited automobile travel. The end of the war led to the “suburban explosion” of the nation, with returning servicemen starting new families. The need for new housing created whole new cities. Shopping centers and new business sprang up to serve the needs of the automobile-oriented suburban population.

The character of the central city began to change because of commuters, congestion, and available transportation systems. While workers still used available rail, transit, and buses for commuting, the automobile was favored because of its flexibility and mobility. Spurred along by federal and state roadway priorities, this period became the era of urban expressways and freeways at the expense of transit expansion.

The Pennsylvania Turnpike demonstrated the benefits and popularity of freeways with a number of eastern toll roads opened in the early 1950s. The public demand for freeways was increasing with the Eisenhower administration bringing a national system to fruition. The Federal Aid Highway Act of 1956 created and funded the largest public works project ever undertaken, the U.S. Interstate Highway System.

Many would place the start of the Interstate Highway System as June 29, 1956. We celebrated that date a few years ago as the 50th anniversary of the system. But that date really commemorates the congressional agreement on

Traffic on the Pennsylvania Turnpike.
Source: ©istockphoto.com
the funding of the system. The ideas, the concepts, and the plans go much further back. Preceding all of the planning were the years of data collection. The 1934 Highway Act permitted funding of “surveys, plans, and engineering investigations of projects for future construction.” Fundamentally, these programs collected the three main sets of data that are the backbone of the program today: Physical extent and condition of the system, counts of volumes by class of vehicle, and financial data covering revenues and expenditures for all roads. For the first time, the nation knew the extent and condition of its road system and the uses being made of it.

Planning studies followed upon the availability of the data. The two landmark studies were Toll Roads and Free Roads produced in 1938, and Interregional Highways in 1944. The first tested the system idea designated by President Franklin D. Roosevelt himself, sketching with a blue pencil on a large map of the United States, and evaluated the concept of a toll road system to pay for it. In his transmittal letter to Congress, President Roosevelt stated that the report, prepared at the request of the Congress, is the first complete assembly of data on the use being made of our national highway network. It points definitely to the corrective measures of greatest urgency and shows that existing improvements may be fully utilized in meeting ultimate highway needs. It emphasizes the need of a special system of direct interregional highways, with all necessary connections through and around cities, designed to meet the requirements of the national defense and the needs of a growing peacetime traffic of longer range. In a brave moment, rather than simply delivering their finding that toll roads were infeasible, the Bureau of Public Roads appended a second part to the report, in which it proposed an option of a free system that became the basis for the interstate system.

World War II intervened, but work continued on the concept throughout the war, and in 1944 Interregional Highways was published as the product of a small commission created by the president in 1941 “...to investigate the need for a limited system of national highways to improve the facilities now available for interregional transportation, and to advise the Federal Works Administrator as to the desirable character of such improvement, and the possibility of utilizing some of the manpower and industrial capacity expected to be available at the end of the war.” This document set down the plan for the system very much as we know it today.

The 1944 Federal Aid Highway Act is to be recognized as one of the few actual landmark events in the era. It designated the interstate system, authorized apportionments as soon as the wars in Europe and the Pacific ceased, and notably set aside 1.5 percent of highway funds for research and planning.

From 1944 onward, the idea of the system received little support or funding. Among other pressures, the Korean War affected planning and funding. In 1954, a new group, the National Committee on Urban Transportation (NCUT), with participants of all associations representing various government levels, was formed to “help cities do a better job of transportation planning through systematic collection and analysis of basic facts.”

In 1954, a series of efforts began, finally successful in 1956, in which the Congress created the Highway Trust Fund as a way of assuring users that the funds collected by a proposed user fee would be dedicated to transportation and not, as had been the case, simply incorporated into general revenue for all purposes. Although the Clay Commission, appointed by President Eisenhower, with Frank Turner as secretary, failed in its proposal to fund the system by bonding, it was the commission that established the need for action and created the environment for the final decision.

The years after the Trust Fund enactment were filled with increasing efforts to broaden the planning process and to assure cooperative planning between the states and metropolitan entities. Among the notable conferences seeking to bridge the gaps in planning mechanisms and institutions were the First National Conference on Highways and Urban Development, the Sagamore conference in 1958, the Hershey Conference on Freeways in the Urban Setting in 1962, and the second conference at Williamsburg in 1965. The Hershey conference noted that “... the concept that urban highway systems should be planned in conjunction with comprehensive community planning is now generally widely accepted.”

The 1962 Federal Aid Highway Act was most notable for the requirements in Section 9 for the creation of a continuing, comprehensive, cooperative process between the states and local governments (the 3C process) that required the governments in areas with a population of more than 50,000 to develop long-range plans cooperatively and to coordinate highway plans and programs with other modal plans. By the time of the Williamsburg conference, most urbanized areas had already initiated planning processes required by the act. The goals and recommendations of that conference addressing land use planning issues and their interactions with transportation are still being sought today.

Examples of those influences on transportation are found here in the individual stories that follow. The biographical sketches are grouped by the timeframes in which these individuals made their contributions to the field. Join us now in meeting these pioneers and in exploring the heritage of the profession.
Arch Bollong was clearly an urban traffic engineering pioneer. He was appointed city traffic engineer for Seattle, WA, in 1924, but records indicate that as an engineer in the Seattle Street Department, he was directing traffic studies as early as 1919.

Arch understood the transition of the city’s responsibility from providing a sound travel surface to providing something more systematic: an efficient operating facility. Some of his earliest writings (1924) were on the basics of street traffic regulation; however, he returned most frequently to the theme of consolidating responsibility in city government for the planning of improvements and the daily operations of the street system. His major emphasis was on long-range planning of the major street system, freeways, and municipal parking.

He built such a consolidated division in Seattle and was an important force not only in improving traffic and parking conditions on the city streets but in being the city’s voice in the very early development of Seattle’s urban freeway network by the Washington State Highway Department immediately following World War II. The Alaskan Way in Seattle was the first element of that system.

Arch retired in 1952, at which time he said, “I am today rich (in your praise), rich beyond all of my fondest expectations.” The praise was well deserved for the man who defined and pioneered an evolving urban function.
William Phelps Eno was born with a silver spoon in his mouth. His father once owned New York’s iconic Flatiron Building. Young Billy, as he was known, was caught in a traffic jam in 1867, in one of the few places in America where traffic jams existed: lower Manhattan. This made a lasting impression on his nine-year-old mind. He needed to fix that. Eno graduated from Yale University and entered the real estate world to make his own mark. At age 41, he quit the real estate world for his first love, fixing traffic jams.

Keeping in mind that this was 1899 and the automobile in America was all of seven years old, his target was horse-drawn vehicles and the draymen, who would “make a stable of the King’s highway.” Eno concluded that there had to be rules.

In 1900, he published his first set of Rules of the Road. In 1903, they were adopted by the Manhattan superintendent of police. By this time, the increasing number of automobiles had made it apparent that Eno was right.

His one-page set of rules was parochial. North-south traffic had right of way over east-west traffic. Based on existing conditions, the speed limit for wheeled vehicles was 10 miles per hour, reduced to 3 miles per hour (but not stopping) at intersections. Eno had the basics right: Drive on the right half of the road, yield rights of way, control speeds, signal before turning, and don’t drive vehicles on sidewalks. All of these were revolutionary ideas in 1903. He later added the heresy that pedestrians should also obey rules. That came later after the automobile joined the lorry, buggy, and horse car in the traffic stream. When somewhat antagonistic city authorities would not post signs or publish and distribute the rules, William Phillip Eno did so himself, spending thousands of dollars of his own money.

The Eno Rules of the Road set the model for America and influenced practice in Europe, which he visited frequently, advising French, British, and other governments. It still holds true today that rules and regulations are the very foundation of accepted control and movement of traffic. He imported the traffic control tower concept from Paris, which received widespread use in the 1920s before it was replaced by traffic signals.

His seminal concepts were important, but William Phelps Eno made another lasting contribution to the profession when, in 1921, he established the Eno Foundation for Highway Traffic Regulation, housed at his estate in Connecticut. This foundation, which Eno left, fundamentally, to the direction of professional leaders, was to become a fountainhead of the profession and an enabler for many of the thought leaders depicted in these biographical sketches. The Eno Foundation remains an important contributor to the transportation environment. The profession owes a great deal to William Phelps Eno, a man who ironically never learned to drive an automobile. Mr. Eno is an honorary member of the Institute.
Ernest Goodrich was a very early traffic engineer, although he defined himself as a “planning consultant.” As a consultant to the Manhattan borough president’s Department of Public Works, he observed the “platoon” movement of vehicles and encouraged interest in the subject through presentations to the American Society of Civil Engineers (ASCE) and the Institute of Planners. He also advocated greater control of pedestrian movements in busy lower Manhattan.

Goodrich was a founder of the Institute of Traffic Engineers (now the Institute of Transportation Engineers), was its first president, and is an honorary member of the Institute.

A graduate of the University of Michigan in 1898, Goodrich established his consulting practice in municipal planning in the early 1900s. Greatly interested in the question of the carrying capacity of a traffic lane, he estimated in a 1925 report that an uninterrupted flow of 1,880 passenger vehicles per hour could be accommodated—slightly less than the 2,000 vehicles per hour figure in early versions of the Highway Capacity Manual.

Much of Goodrich’s career was in the New York City area, where he served in various capacities with the city, the Manhattan borough president, and the New York Regional Planning Association. However, his expertise was widely sought on transportation subjects, including port design, and he advised such cities as Cincinnati, OH; New Haven, CT; and Springfield, MA, as well as Nanking, China; and Bogota, Columbia. Goodrich was awarded the Collingworth Award by the American Society of Civil Engineers in 1905.
Ed James joined the U.S. Office of Public Roads, predecessor to the Bureau of Public Roads, in 1910 with an engineering degree from the Massachusetts Institute of Technology (MIT) and three years of experience with the Army Corps of Engineers. He had little knowledge of highway or transportation engineering, but in 1910, very few did. The Office of Public Roads was a division of the Department of Agriculture and, along with local road agencies, was beginning to appreciate that the automobile had come to rural areas to stay and that the automobile’s pneumatic tires and speed were destroying the only rural road surfaces in common use. James immediately became engrossed in road construction problems and was placed in charge when Congress funded a demonstration program for county roads in 1912.

In 1921, Congress took the major step of limiting the mileage of primary and secondary roads that each state could select for its share of federal aid to no more than 7 percent of the state’s total road system. Of the limited mileage that each state selected, three-sevenths were required to be primary roads, linking cities and large towns, and designated as U.S. highways.

James was assigned the responsibility of developing a national federal aid system reconciling the individual state’s proposals. The individual states in most cases had only limited data and information on their road systems with a provincial interest in obtaining maximum designated mileage in their state. James was overall director, negotiator, and compromiser of a pioneering transportation engineering process: a data-based designation of a national highway transportation system, the U.S. Highway System.

Not all states had accurate statewide system maps. James used maps based on Post Office information and any other sources that he could find, together with census data and economic projections assembled for each county, as the basis for his analyses. He fostered agreement on a nationwide system that was under the 7 percent ceiling, met at state lines, traversed the counties of greatest population and economic activity, connected 94 percent of the cities with populations of more than 5,000, and came within 10 miles of an estimated 90 percent of the nation’s citizens—quite an achievement.

Edwin W. James had many accomplishments during his 43 years of public roads service, including involvement on the first Manual on Uniform Traffic Control Devices. The nationwide road system designated under his leadership was a lasting monument to his sagacity and engineering judgment.

Map of the final U.S. highway system as approved November 11, 1926.
Source: Scanned by the Oklahoma Department of Transportation and converted from [http://www.okladot.state.ok.us/hqdiv/p-r-div/maps/misc-maps/1926us.pdf this PDF]. http://en.wikipedia.org/wiki/File:1926us.jpg
Arthur N. Johnson served at various times during his early career as state highway engineer of both Illinois and Maryland and as chief engineer of the Bureau of Public Roads. In 1920, he was appointed dean of the College of Engineering of the University of Maryland, the institution where Johnson earned his doctor of engineering degree. He remained in that position until retirement in 1936. Johnson was a founder of the Institute and is an honorary member.

At the University of Maryland, Johnson was able to pursue his long-standing interest in highway capacity. He conducted aerial studies of traffic flow on what is now U.S. Highway 1, which passes by the University of Maryland campus, and on other heavily traveled routes along the eastern seaboard. Considering that the airplane had first flown less than 20 years before, using it for a traffic study was adventurous.

Johnson was one of the earliest engineers to postulate a lane capacity based on car-following observations. His 1926 projections yielded a maximum theoretical capacity of a two-lane, two-way roadway of about 2,800 passenger vehicles per hour at low speeds but noted that no full-hour volumes greater than 2,000 had been observed. By 1930, he was proposing a figure compatible with the Highway Capacity Committee’s 1956 judgment of 2,000 passenger vehicles per hour.

Johnson was also concerned with intersection capacities and experimented with five-minute flow rates and percentage of vehicles stopped. He noted that a main variable was the number of pedestrians involved but was not successful in establishing a reliable relationship. He was a member of the Second Hoover Conference on Street and Highway Safety in 1927 and was instrumental in drafting the first national Uniform Vehicle Code, which that conference adopted. The Uniform Vehicle Code became the model for traffic regulations in each state and continues to promote national uniformity.
THOMAS H. MACDONALD
(1881–1957)

Thomas Harris MacDonald has been called “the towering figure of road transportation in the 20th century.” He headed the Bureau of Public Roads (BPR) for 34 years—from the farm-to-market era of 1919 to the beginning of the interstate highway era in 1953.

MacDonald came to Washington, DC, from Iowa, where he had served for several years as state highway engineer. In that capacity, he worked closely with the Office of Public Roads and the American Association of State Highway Officials (AASHO; now the American Association of State Highway and Transportation Officials, or AASHTO) to fashion and secure support for the Federal Aid Road Act of 1916. That first federal aid program shared authority and funding with the states. The dogmatic approach of “overzealous and inflexible” BPR staff during initial years of the program created an attitude of criticism toward the department.

In accepting the position as chief of the Bureau of Public Roads, MacDonald insisted that he have the authority to make the adjustments needed to “assist in changing the attitude of criticism toward the Department and to ensure the cordial co-operation of the state highway officials . . . .” He believed that state control of site selections would reduce the leverage of political forces on these decisions.

When MacDonald took over the federal road leadership, the situation was far from ideal, to say the least. The boom of World War I truck traffic, higher automobile speeds, and pneumatic tires had overwhelmed the road structures and surfaces built for horse-drawn vehicles. For all practical purposes, the nation had to start over.

MacDonald was instrumental in encouraging the states to concentrate their use of federal aid funds on limited mileages of each state’s primary and secondary roads. He helped convince the states, through AASHO, to support this concept as a core requirement of federal financial aid, which Congress adopted in 1921.

Another visionary legacy of Chief MacDonald’s leadership was a concern for urban transportation problems. The Federal Highway Program, in its infancy, was devoted solely to rural roads. MacDonald insisted, as early as 1922, that the states institute long-range planning studies that included urban travel movements, even though the latter were not then eligible for federal funding.

MacDonald’s expertise was the structural side of highway development, but he recognized that a key to creating a successful highway transport system was the fundamental relationships of how the system met the users’ needs. He directed BPR research into operational questions such as lane capacities, driver vision, reaction times, and other safety issues. He believed strongly that highway agencies should have transportation engineering expertise to ensure that these considerations be represented in policy and practice.

Thomas H. MacDonald was the nation’s top highway official for 34 years, serving under seven U.S presidents. He created an atmosphere of seeking knowledge, demanding competence, and insisting that the public welfare be preeminent. Our mobility today is his legacy to the nation. McDonald is an honorary member of the Institute.
Miller McClintock was, arguably, the father of traffic engineering. Born in Cedar Rapids, Nebraska, he moved to California in his early adult years.

In the early 1920s, McClintock was an English instructor at Stanford University, with a master of arts. Deciding that that career path didn’t match his interests, he enrolled in Harvard University’s municipal government doctoral program. In his research he attempted to analyze the causes of then-existing street traffic difficulties, summarize the experiences of the greater American cities, and present the conclusions of the foremost practical experts. In 1924, he was the first person to be awarded a doctorate in traffic studies. His dissertation on street traffic control stirred up great interest as the first scholarly paper on this subject. He was immediately in demand as a traffic advisor to many large cities, including New York City and Chicago.

During the early years of the automobile, cities began patching together traffic codes on a piecemeal basis, adding provisions as each new situation dictated a need. The Los Angeles Codes were 135 pages of legal, ambiguous, and contradictory language. In 1924, Los Angeles became the first major city to develop a simplified traffic code. The city hired Miller McClintock, based on his Harvard reputation, to draft the ordinance. It was noteworthy for its simplification to only four pages and introduced many pioneering concepts such as parking restrictions, right turns on red, and pedestrian regulations. The Los Angeles ordinance became the model for the Uniform Vehicle Code adopted nationally in 1928.

In 1925 McClintock established a Bureau of Street Traffic Research at the University of California, Los Angeles (UCLA) and continued his traffic consulting practice. Paul Gray Hoffman, a Pasadena auto dealer, was impressed with McClintock’s Harvard dissertation, Street Traffic Control, and his work in Los Angeles.

Hoffman became a vice president of Studebaker in 1925 and convinced Studebaker Chairman Albert Russell Erskine to support McClintock’s idea of a university graduate-level program in traffic studies. A grant was received from Studebaker in 1926 to establish the Erskine Bureau of Street Traffic Research at Harvard University within the Graduate School of Engineering. McClintock was appointed director. The bureau’s initial concentration was on traffic regulation and control but rapidly expanded to geometric design, traffic operations, and the 3Es (engineering, education, and enforcement) as the school gained more knowledge through research. Hoffman was a founder of the Institute and is an honorary member.

In time, McClintock moved on to pursuits in broadcasting and advertising, but the Bureau of Street Traffic Research, which moved to Yale University in 1938 and to Pennsylvania State University in 1968, became the earliest center of traffic engineering research and education and graduated more than 800 traffic engineers and transportation planners in its 50-plus-year existence.
Les Sorenson was a pioneer transportation engineer in every sense of the word. He joined the city of Chicago in 1914 as an inspector in the Bureau of Gas and Electricity. He was named Chicago’s first traffic engineer in 1916, serving the city under eight mayors and for more than 47 years.

There were no stop streets or traffic signals in Chicago in 1914. Sorenson obtained funds and installed the first traffic warning sign near the city’s first motorized fire station. He installed a 24-inch yellow diamond shape with black letters that was widely used later throughout the Midwest and adopted in the 1935 Uniform Manual. The design and color have since persisted as one of the standard warning sign shapes. Sorenson installed a progressive traffic signal system in the “Loop” and along famous Michigan Boulevard that was synchronized by an innovative mechanical control board under a stairway in the basement of City Hall.

In 1915 he conducted Chicago’s first traffic study, which documented the need for a new four lane, bi-level bridge over the Chicago River at Michigan Avenue. The 1926 Sorenson traffic code for the city, together with the work undertaken by McClintock in Los Angeles, became the basis for the first national Uniform Code, which was adopted in 1928.

By the time Sorenson retired in 1960, there was a network of prominent traffic engineers throughout the United States who had begun their careers in Chicago under his tutelage. Leslie J. Sorenson was, indeed, a pioneer. Mr. Sorenson was a past president of ITE and is an honorary member of the Institute.
An early Highway Research Board publication named Roy W. Crum “the Highway Research Board’s ‘idea man’ from Iowa,” which indeed he was. Crum was a 1907 graduate of Dean Marston’s trailblazing civil engineering program at Iowa State College. His specialty was highway materials and construction techniques, as was expected of early highway pioneers. The “highway problem” of the early 1900s was not congestion; it was mud.

Roy Crum became director of the Highway Research Board in 1928 and was quick to expand the organization’s interests in the financial, operational, and social aspects of highway transportation. He supported establishing a Department of Traffic and Operations within the board and added qualified transportation engineers to the board’s staff to provide it with direction. In 1944 and again in 1951, Crum compiled exhaustive catalogs of traffic engineering research needs and accomplishments and wrote, “Extension of research in traffic must be urged and promoted.”

He organized a highway research census in the early 1930s, followed by the Highway Research Information Service and, in 1945, the Highway Research Correlation Service. All of these strengthened the Highway Research Board’s ability to correlate transportation research, reduce duplication, and identify important research needs in operational and safety as well as structural fields.

In an important review of transportation safety challenges in 1937, Crum wrote, “The hazards of the road must be studied in relation to driving practices and motorists’ behavior…. In 1944, he stressed the need for reliable cost and expenditure data for economic evaluation of improvements and comparison of highway transportation with other modes. And he encouraged the Highway Research Board to lead this research effort.

Crum served the Highway Research Board for 23 years, until his death in 1951. In his eulogy to Crum, Thomas H. MacDonald stated: “Roy Winchester Crum left three heritages: an organization grown from nine committees and 81 members to one of 80 committees and 758 members, a five-foot shelf of the finest in highway research publications, and the concept that highway research is a continuing, unfolding process which each new man, year by year, should be encouraged to share in.”

In 2006, Crum was listed in a Roads and Bridges magazine article as among the most influential people in U.S. transportation in the past 100 years and has the recognition of the Transportation Research Board’s research achievement award being named in his honor. Crum is an honorary member of the Institute.
Charles E. De Leuw, a 1912 civil engineering graduate of the University of Illinois, returned from service in World War I to a tough job market. So he and fellow veteran R. F. Kelker pooled their meager $600 and formed the consulting firm Kelker, De Leuw & Company.

At the time of Charles De Leuw’s death 51 years later, the successor firm, De Leuw, Cather and Company, was among the world’s largest consulting engineering firms. The firm engaged in a broad spectrum of planning, design, operations, and construction management services.

Initially, the firm concentrated on projects involving traffic control studies, street improvements, and the usual mix of municipal engineering services in the Midwest. From those early traffic operations studies De Leuw came to realize that, with the rapid growth in automotive travel, streetcar systems soon would no longer be able to provide a reliable level of service operating in mixed traffic.

In 1923, the firm undertook the task of preparing a comprehensive rapid transit plan for the city of Chicago. De Leuw participated in later studies that led to passage of the unified transit ordinance and Chicago’s initial system of subways. His reputation in the transit systems area grew rapidly. De Leuw played a major role in preparing transit reports for Los Angeles, CA; Baltimore, MD; St. Louis, MO; Detroit, MI; Washington, DC; Toronto, ON; and Cleveland, OH. Those reports led directly to development of comprehensive transportation plans and the evolution of rapid transit systems for these cities.

De Leuw also was an early champion of the freeway as the backbone of a successful urban transportation plan. His 1939 “Report on a Comprehensive Superhighway Plan for the City of Chicago” stated, “…construction of superhighways free from grade crossings and providing for through traffic—not only from local traffic, but also from all cross traffic—can no longer be postponed.” This was a visionary position in 1939, and cities just emerging from Depression-era conditions were rarely able to heed this advice. However, in the United States, the trend in toll revenue bond finance in the early 1950s and the infusion of massive highway-user funds on urban routes following adoption of the National System of Interstate and Defense Highways in 1956 supported the validity of this early conviction.

During his career, Charles De Leuw took on several special assignments. In 1935 he served as director of the Illinois Statewide Planning Survey and as assistant state highway engineer. From 1941 to 1944, he served as acting chief engineer for the Department of Subways and Superhighways. De Leuw is an honorary member of the Institute.

Charles E. De Leuw’s stature as a recognized leader of urban transportation thought laid the vital foundations for comprehensive transportation planning and for mandating freeway standards for urban areas.
RALPH T. DORSEY
(1891–1967)

Ralph Dorsey joined the city of Los Angeles in 1922. Although traffic regulation was a police function, Dorsey’s job of installing the city’s first traffic signal system, at 31 intersections, was for the Department of Electricity. The signals were of local design, post mounted with semaphore arms reading “STOP” and “GO” accompanied by red and green lights and a loud gong at the beginning of each change interval. Timing was controlled from a central station, and Dorsey experimented with progression patterns.

By 1925, Dorsey was the de facto city traffic engineer, although organizational names and job titles varied. In 1930 the City Council established a Bureau of Street Traffic Engineering within the Police Department and Ralph Dorsey was named street traffic engineer, a title he held until retirement in 1954.

Dorsey accepted the concept advanced by Miller McClintock that pedestrians be required to cross only at intersections and must obey traffic signals. He also recognized that pedestrian flows had to be factored into traffic signal priorities and timing patterns. Dorsey was the first traffic engineer to utilize pedestrian actuation, for the Los Angeles Luther Burbank High School in January 1929. This was new territory in the early 1920s.

The traffic signal network in Los Angeles has expanded out of the downtown area with more than 3,000 signalized intersections, all centrally coordinated under a signal system initiated by Dorsey. His 1925 study identified systems of major and secondary arterials that exist today. In 1928, Dorsey conceived and installed the concept of reversible lanes and reversible one-way streets on the arterial systems to accommodate peak hour traffic flows. Early on, Dorsey recognized the problems created by left turns and instituted the concept of separate, added left-turn lanes at intersections—a universal pattern now.

Although Ralph Dorsey retired before the advent of today’s sophisticated actuated traffic signal control and computerized signal systems, he is credited as the inventor of pedestrian actuation and should be recognized for his early traffic operational innovations.
Herbert Fairbanks’ career spanned virtually the entire development of the modern highway system, from the earliest days of the sand-clay road to the authorization of the Interstate System. During all stages, he took a personal hand. As with other early leaders of the federal highway program, Fairbanks joined the pioneering agency in 1910 immediately following graduation from Cornell University with a degree in civil engineering. He spent his entire 52-year professional career with the U.S. Bureau of Public Roads.

Involved with the promotional “Good Roads Trains” early in his career and building “object-lesson roads” later, Fairbanks’ key interest nevertheless lay in understanding and documenting the role highways could and should play in meeting the needs of the growing American economy. Fairbanks was better able to pursue that interest after being named deputy commissioner for research in 1943.

Even before accepting that title, Fairbanks had conceived and directed the implementation of statewide planning studies in all of the states and used that data to document the 1939 report Toll Roads and Free Roads and its successor report, Interregional Highways, in 1944. The first report concluded that the nation’s comprehensive transportation needs could not be served solely by toll road systems, which required minimizing access points and favored long-distance users. Typical of his visionary view, all through this report was the need for belt-line distribution roads around the larger cities and bypasses around many of the smaller cities and towns. He stated, “Such roads must be constructed of the freeway type; otherwise, they eventually become a ‘ribbon of development.’” The second report, Interregional Highways, outlined what was to become the National System of Interstate and Defense Highways as we know it today.

Although President Dwight D. Eisenhower’s support was essential to pushing through Congress the revolutionary finance plan that made the Interstate System a reality, Fairbanks, not Eisenhower, was truly the intellect behind that system, which changed the face of America. In 1964, the U.S. Bureau of Public Roads named its highway research facility in McLean, Virginia, the Herbert S. Fairbanks Research Station.
Dr. Theodore W. Forbes was a renowned engineering psychologist who devoted his career to understanding and providing guidelines on the relationship of driving skills to the driving task. He joined forces with the transportation engineer early in his career when, in 1936, he joined Dr. Miller McClintock on the staff of the Harvard University Traffic Bureau. When the Bureau moved to Yale University in 1938, Forbes moved with it and cooperated with Theodore Matson on early studies of motorist practices in overtaking and passing on two-way, two-lane roads, which became the basis for U.S. practice in marking no-passing zones.

Among Ted Forbes’ many contributions to transportation engineering were his career-long interest and experimentation with factors affecting the visibility of traffic signs. As early as 1939, Forbes was reporting on studies of traffic sign visibility and legibility and was studying how driver responses were affected by sign-letter size and design, contrast, brightness, and placement. This research provided a documented basis for much of the standard practice in sign design and placement followed routinely in the United States and worldwide. He is credited as the designer of one of the most widely used sign fonts, the “Series E” font adopted by the U.S. Federal Highway Administration.

During his 50-year career, Ted Forbes blended research and writing with his basic love of teaching, through which he contributed greatly to the growth of the transportation engineering profession.
BRUCE D. GREENSHIELDS
(1893–1979)

In the treatise Traffic Flow Theory and Control (1968), Dr. Donald Drew wrote: “Bruce Greenshields used the reciprocal of the spacing values for the abscissa and called it ‘DENSITY,’ changing traffic engineering from an art to a science.” These strong words encapsulate the remarkable career of a pioneer researcher whose life was devoted to understanding the traffic flow phenomenon.

Greenshields received the first doctorate awarded in the United States in the field of highway transportation engineering from the University of Michigan. His dissertation was titled The Photographic Method of Studying Traffic Behavior, a first examination of using photographic measurement methods. He later described the travails of this research using a $25, secondhand movie camera with a used windshield-wiper motor as a timer. This effort in traffic research was the beginning of a lifetime career that he described in his 1976 paper “The Trials of Research and the Excitement of Discovery.”

Dr. Greenshields’ curiosity took him into many aspects of traffic, from driver following and passing behavior to studies of urban intersections to development of an instrumented vehicle “driveometer,” which measured steering and braking movements as a means of defining driver competence.

During his career, Dr. Greenshields was associated with many of the nation’s leading highway research centers, including the Yale Bureau of Highway Traffic, University of Michigan Transportation Institute, and George Washington University. Teaching was an integral part of his contribution to the profession.

In 1952, Greenshields joined Dr. Frank Weida in the seminal document Statistics, with Applications to Highway Traffic Analysis, which stressed the importance of applying statistical analysis techniques to both research and applications involving traffic behavior. He championed the concept of a statistically based, numerical rating of the quality of traffic service which was ahead of its time but was an important precursor to the “level of service” concept, which was widely adopted following the 1965 edition of the Highway Capacity Manual.

This great contributor to the profession’s body of knowledge summed up his career with the simple observation that “There is satisfaction in being the first to uncover some of nature’s secrets.” Dr. Greenshields is an honorary member of the Institute.
Paul Hoffman was not a traffic engineer. He was an automobile salesman and a very good one. Born of modest means in a Chicago suburb, young Paul left college after one year to pursue his fortune selling cars, first in Chicago and then in booming Los Angeles. And he did very well. Upon his return from army service in 1919, he purchased the Los Angeles retail division of Studebaker Corporation and was on his way to his first million.

Los Angeles was growing quickly in the early 1920s, and so were its traffic problems. Civic leaders banded together to form the Traffic Commission of the City and County of Los Angeles, under Paul Hoffman’s chairmanship, to seek answers. They privately funded a study by leading city planners to devise a major traffic street plan and another study to rationalize the city’s 134-page hodgepodge of traffic regulations. The traffic consultant on the first study and the author of the second was newly minted Harvard Ph.D. Miller McClintock.

Paul Hoffman accepted Dr. McClintock’s first thesis that urban traffic solutions were complex, long term and called for a scientific, fact-based approach, best led by engineers. He also convinced himself that business—particularly the automotive business—had an enlightened self-interest in getting those approaches promoted and solutions adopted.

When, in 1925, Hoffman was called to South Bend, Indiana, as vice president of Studebaker Corporation, he convinced Studebaker President Albert Russell Erskine and the Studebaker board to underwrite an institution for street traffic research at Harvard University and place Dr. McClintock in charge. And so was born the Bureau of Highway Traffic, which nurtured the traffic profession for 57 years.

Within a few years, now as president of Studebaker, he convinced his fellow auto makers to take on and expand the research and training of traffic engineers through the Automobile Manufacturers Association. In 1936, he enlarged the breadth of support to include steel, petroleum, rubber, cement, insurance, and other highway-transportation-related industries through the Automotive Safety Foundation, which he conceived and chaired through its first dozen years. During that period, the scope of business support for public competence was expanded to police training at Northwestern University, formation of the American Association of Motor Vehicle Administrators, and support of other education, planning, and engineering branches at leading universities and through associations such as the American Association of State Highway Officials, National Safety Council, and American Automobile Association.

Later in his career, Hoffman accepted President Harry S. Truman’s appointment to administer the Marshall Plan, America’s Herculean contribution to rebuilding war-torn Europe, and later he headed the newly created Ford Foundation.

During his rich and productive 83 years, Paul Gray Hoffman was a man who made a difference—to our profession and to the world. Hoffman is an honorary member of the Institute.
Harry Neal, a 1911 graduate of Ohio State University, joined the Ohio Highway Department in 1921 to “organize and head a new Traffic Bureau to develop a suitable system and means of properly marking the highways of Ohio.” Harry was the nation’s first state traffic engineer.

Although the term “markings” in the above quotation referred to signs and devices other than pavement markings, some of Neal’s most lasting contributions were in the field of pavement markings. He devised, and first used, most of the marking patterns and conventions used today. He was successful in applying centerline markings on every mile of the state highway system—unique at the time.

Neal attended the first National Conference on Street and Highway Safety convened by then-Secretary of Commerce Herbert Hoover. He was an attendee and frequent contributor to professional meetings and publications during his entire 33-year career.

At the time of his death in 1954, his obituary read “Every road in the state carries reminders that he lived and worked to improve safety on Ohio’s network of highways and roads.” Time magazine recognized his passing with the sobriquet “the precursor of all traffic engineers.” Not a bad way to be remembered. Neal was a past president of the Institute.
Charlie Noble wasn’t taught transportation engineering; he learned it on his own. He progressed from rodman to resident engineer with the Alabama Highway Department before World War I. Following service in the U.S. Navy, Noble managed heavy mountain construction for the Kentucky State Highway Department.

In 1923, Noble began a lifelong involvement in the planning and design of modern urban highways with the New Jersey State Highway Department and the Port of New York Authority. He had design responsibilities on the approach roads to the George Washington Bridge and Lincoln Tunnel, as well as other monumental projects.

In 1938, Charlie Noble joined the design staff for the Pennsylvania Turnpike Authority. There he was instrumental in locating interchanges in sag locations with generous sight distances and lengthy acceleration and deceleration lanes. He introduced other modern “freeway” features, such as continuous median dividers, 12-foot lanes, and 10-foot stabilized shoulders.

In 1941, when the Defense Department decided it needed more space than Washington’s Foggy Bottom could provide and moved across the Potomac to Northern Virginia, Noble was given his greatest engineering challenge. He was asked to design a road network to serve the largest office building in the world and the thousands of commuters passing through the Pentagon site to reach downtown Washington. The 1941 Pentagon Network exists today in essentially its original form and continues to perform well: a tribute to a design genius.

Later in his career, Noble was the chief engineer building the New Jersey Turnpike and for three years served as director of highways for Ohio. He was a registered professional engineer in four states, an honorary member of the Institute of Transportation Engineers, and received honors from American and foreign engineering organizations—not bad for a gentleman whose last exposure to a classroom was at age 13 in the seventh grade.
Professor C.C. Wiley joined the staff of the civil engineering department of his alma mater, the University of Illinois, in 1906. He was the university’s first professor of transportation engineering and upon retirement in 1952, he became professor emeritus. A fellow Illinois faculty member recalls Wiley reminiscing that “I was through high school before I ever saw an automobile, was through college before I ever rode in one, and was teaching highway engineering before I ever drove one.” Yet he was instrumental in the evolution of highway and transportation engineering to meet the automobile’s challenge.

In 1914, Professor Wiley organized the nation’s first Conference on Highway Engineering. He was one of the first educators to introduce traffic operations in a university curriculum. He also established the first student chapter of the Institute of Traffic Engineers.

Wiley authored Principles of Highway Engineering, one of the first textbooks on this specialty, in the early 1930s. During his career, he authored numerous papers on highway and traffic subjects. He launched the careers of countless transportation engineers. The C.C. Wiley Traveling Award was established in his honor. A senior student receives a stipend each year for travel to observe and study highway engineering in various states.

Wiley was selected as the 1975 man of the year by the Portland Cement Association. He was noted for being followed in the profession by two sons, Tom and T. T., or “Teke.” The latter served as the first commissioner of traffic for New York City. Professor Wiley was an insightful traffic engineer with a wry sense of humor that endeared him to his students and put a friendly face on the emerging profession. Mr. Wiley is an honorary member of the Institute.
J. STANNARD BAKER
(1899–1995)

Stan Baker earned his electrical engineering degree from University of Wisconsin in 1922. He joined the National Safety Council in Chicago as assistant traffic engineer in 1928. Stan started his career in traffic safety with the publication of his first technical work in 1929 titled The Effects on Accidents of Through Streets and Traffic Signals.

He founded the Research and Development Division of the Northwestern University Traffic Institute in the 1930s and remained as Director until his retirement in 1974.

Baker specialized in accident investigation and reconstruction techniques. His Traffic Accident Investigation Manual was initially published in 1940. Now in the tenth edition, the manual has continuously been expanded to a complete training and reference source for police and accident reconstruction specialists.

The manual was the first publication that accumulated the material needed to provide a scientifically supported reference document for enforcement personnel, insurance professionals, and engineers. Baker—through coordination with practitioners in the field, his own research, and teaching at the Northwestern Traffic Institute—developed and published a detailed, illustrated format for accident investigation. The manual provided detailed information on field measurements, identifying the significance of road marks and the examination of vehicle features. He took the engineering dynamics of a vehicular collision and used energy formulae with collision measurements to scientifically document the contributing causes of the accident.

Stan Baker is credited as the primary originator of scientific traffic accident investigation in the United States—the critical element in improving highway safety, driver training, and selective enforcement activities. Baker has been recognized by the International Association of Chiefs of Police through an award named in his honor for accomplishments in highway safety.
HENRY A. BARNES
(1906–1968)

Hank Barnes was a no-nonsense person. He hated “special privileges” and took on city hall, even when he was city hall. As the Flint, Michigan, police department’s electrician and a sworn officer, he arrested the city’s treasurer for drunk driving. He was fired but was later reinstated.

In Denver, given charge of traffic at a festival in the Red Rocks Amphitheatre, he found that the festival had been oversold. When parking lots were full, he had state police block the entrance roads and deny entry to the late-partying sponsors. In New York City, he took on the parking privileges of the medical fraternity by towing illegal cars, observing that entirely too many medical emergencies were occurring at Macy’s department store.

Barnes did more than fight special privilege. He hired good people and inspired them to get things done. He turned the Denver, Baltimore, and New York City traffic engineering offices into 24-hour operations with radio-equipped vans, not worn-out police cars. He let his staff do the engineering while he won project approval from elected officials through an aggressive public relations program. He convinced city councils to put up the money for state-of-the-art traffic signal systems and round-the-clock surveillance. In New York City, he even fought legendary Robert Moses to put buses on his parkways and parking garages under his trees. While he lost both times then, in the 1990s the parkways were opened to New York City transit buses and school buses.

The “Barnes Dance” as it was named by a Denver newspaper reporter—an exclusive traffic signal interval for pedestrians first introduced by Barnes in downtown Denver in the late 1940s—didn’t stand the test of time in most places but is still the rule at at least one New York City intersection. The first exclusive pedestrian signal interval was introduced in Boston in 1924 as part of a traffic signal tower operations and was used by many cities in the late 1920s. Most of his innovations in the cities he served, however, have lasted and the organizations he built have persevered. Hank Barnes died in his New York City office in September, 1968. He was 62.
DONALD S. BERRY
(1911–2002)

Don Berry was born on a ranch near Vale, South Dakota, during a blizzard in January 1911. He graduated from the South Dakota School of Mines in 1931 and earned his master of science from Iowa State University in 1936. He received his Ph.D. in transportation engineering from the University of Michigan in 1936.

Berry's first job was with the National Safety Council in Chicago. The council, an important early supporter and platform for transportation engineering, sponsored a national traffic safety contest, and Don was put in charge. In his 10 years as director of the Council's Traffic and Transportation Division, Don broadened and improved this program to measure the elements of effective urban- and state-level traffic safety programs, including traffic engineering.

Don also engaged in independent research. In 1939, he was the first to incorporate the aviation ball-bank indicator in studies of vehicle speeds on curves to measure lateral acceleration. His research on advisory speed signing for horizontal curves remains part of basic traffic engineering practice today. During his career, Berry authored more than 100 papers on numerous projects in traffic and transportation engineering.

Dr. Berry was instrumental in organizing graduate education programs in traffic and transportation engineering. In 1948 he accepted a position at the University of California at Berkeley as assistant director of the newly established Institute of Transportation and Traffic Engineering. In 1955, he moved to Purdue University for two years to get its program started. He then moved to Northwestern University in 1957, eventually becoming head of the Department of Civil Engineering. He retired from Northwestern in 1979 after 22 years of service. In each of his academic assignments, Dr. Berry taught an engineering approach to problem solving based on careful measurements and quantitative models through which the practitioner could understand and better predict how traffic would react to each geometric and operational environment.

Through extensive interactions throughout his career with students and diverse transportation professionals in committee work and through meetings sponsored by such entities as the Transportation Research Board, Institute of Transportation Engineers, National Safety Council, and American Society of Civil Engineers, Don Berry extended his influence and professional approach well beyond the engineering field. Dr. Berry was proud to have been the first transportation educator elected to the National Academy of Engineering.
CHARLES D. CURTISS
(1887–1983)

Charles D. Curtiss grew up with America’s highway system and played an important role in shaping the system as we know it today. Charles joined the Bureau of Public Roads in 1919 after his army service. He was a captain in the engineer corps, where his friends called him “Cap”—a name that he would retain through the balance of his life.

Cap Curtiss remained with the Bureau of Public Roads for 38 years, becoming deputy commissioner in 1943 and commissioner in 1955. During this long career, he was a constant proponent of transportation engineering concepts.

In 1957, shortly after his retirement, Cap wrote that “Two major accomplishments have been recorded in the field of highway planning research since 1945: (1) the development and subsequent refinements of the comprehensive metropolitan area transportation studies and (2) the development of methods for determining the capacity of highway facilities.” Both are basic to transportation engineering practice and both received significant support from the Bureau of Public Roads during his tenure.

In the same article, he wrote “Let us remember that ... we are not only planning highways, we are shaping a way of life for all America.” This insight was a guiding conviction during his entire career and reflected heavily his chief responsibility in his last two years of service: reorganizing the BPR to oversee the design and construction of the world's largest public works project, the American Interstate System. Curtiss is an honorary member of the Institute.
THOMAS H. FRATAR
(1913–2001)

Tom Fratar graduated from Rensselaer Polytechnic Institute in 1936 and engaged in location surveys for New York’s West Side Highway with Highland Consulting Engineers. In 1941, he served as a research analyst for the Bureau of Street Traffic Research at Yale University, and, in 1942, received a master’s degree in civil engineering from that institution.

After a period spent overseas, Tom joined the New York firm that became Tippetts-Abbett-McCarthy-Stratton. He became a partner and retired from a successor firm.

In 1954, he wrote, “If the character and growth conditions of traffic zones are known or can be predicted, it is possible to estimate with equal dependability the total trips to and from each zone and the distribution of those trips in inter-zonal travel.” Given that current trip arrival-departure totals are known for each pair of zones being analyzed and that the future arrival and departure totals for each zone have been estimated based on growth factors and projected future land uses, the challenge is to determine the new arrival and departure values for each pair of zones that will create the estimated totals and balance each zones estimated arrivals with its departures. A considerable mathematical challenge indeed!

Fortunately, during Tom’s time at Yale he had studied under Professor Hardy Cross, who had postulated an iterative process to solve similar distributions in complex hydraulic and structural networks. With Professor Cross’ encouragement, Tom successfully applied that method to the traffic distribution problem and created the commonly known “Fratar method” of traffic distribution.

The validity of the method requires that the “accessibility” of travel between each zonal pair remain the same in the current and future time periods. When stability of access does not exist, an additional set of adjustments must be made.

Other methods of estimating future travel totals and zone-zone accessibility have evolved, but the Fratar method was a valuable and widely applied advance in computational approaches to this difficult problem.
HAROLD F. HAMMOND
(1908–1995)

Harold Hammond’s entire career was devoted to improving America’s highway transportation system. Graduating from the University of Michigan in 1930, he and close friend D. Grant Mickle enrolled in the Erskine Bureau of Street Traffic Research at Harvard University, where they were among Dr. Miller McClintock’s first graduates in 1931. Harold was a past president and is an honorary member of the Institute. After a short tour with the Michigan Governor’s Committee on Street and Highway Safety, Hammond joined the National Conservation Bureau as director of its Traffic Division. The bureau was an early supporter of transportation engineering and permitted Hammond to devote a major part of his time to nurturing the fledgling Institute of Traffic Engineers. He acted as executive director of the Institute for several years and, in 1941, coauthored the first Traffic Engineering Handbook.

In 1950 Hammond moved more directly onto the national scene as Washington, DC manager of the American Transit Association and later as manager of the Transportation and Communications Department of the U.S. Chamber of Commerce. In 1955, Hammond moved again to the Transportation Association of America, first as executive vice president and then as president until his retirement in 1980.

In all of these prominent professional positions, Harold Hammond championed professional transportation system management and marshaled the support of American industrial and congressional leaders behind transportation engineering at local, state, and national levels and influenced national transportation policy.

In a 1990 resolution, the Institute of Transportation Engineers honored Harold “for years of service devoted to the transportation profession and for the influence he has had shaping transportation policy and legislation in the United States.”
Pyke Johnson started his working career as a reporter for Denver’s Rocky Mountain News. He soon became involved with Colorado highway affairs and, in 1917, moved to Washington, DC, as technical assistant to the Highway Transportation Commission. The commission was charged with speeding up the flow of war materials to the World War I battlefields.

At war’s end, Johnson stayed in Washington to become secretary of the Highway Committee of the Automotive Chamber of Commerce, predecessor to the Automobile Manufacturer’s Association. He became executive vice president of AMA in 1939. When the Automotive Safety Foundation required a full-time executive officer in 1942, he was chosen as president. Pyke remained in that position until his retirement in 1953.

Soon after retirement, he was drafted as chief of staff for the Clay Committee, which was appointed by President Eisenhower and charged with responsibility for developing a program and financing plans to modernize America’s highway system to include a high-performance network of limited access interstate highways.

The Clay Committee brought together the federal planners with the business and association leaders who represented the public, who would pay the bill to convince Congress to embark on an ambitious interstate highway program that changed America.

In selling the program, the committee relied heavily on the set of state highway needs studies that had been conducted by the engineering staff of the Automotive Safety Foundation when Johnson was president of the organization.

In 1971 the executive committee of the Transportation Research Board established the Pyke Johnson Award honoring the ex-Rocky Mountain News reporter who had been highly influential and active in the affairs of the board from its inception and who had served as its 23rd chairman. Johnson is an honorary member of the Institute.
GUY KELCEY
(1889–1973)

Guy Kelcey was transportation engineering's man of many seasons and possibly the first individual in the United States to bear the title traffic engineer.

In 1920, the American Gas Accumulator Company asked Kelcey to head its new traffic engineering division, which would seek to apply the firm’s expertise in maritime signaling devices to the emerging field of highway traffic control. The cube-corner reflector, which Kelcey adapted to highway use, is still a major element in the night visibility of highway signing and in delineation.

Guy became president of Vehicular Parking Limited in 1941, although his growing reputation was in geometric design and intersection channelization. He authored significant technical papers and guidelines in both areas. He served in the Office of Defense Transportation in World War II and with the New York Port Authority until 1946.

Kelcey co-founded the firm of Edwards and Kelcey in 1946. He served as president and, later, as board chairman. The firm played a lead role in design of the New York State Thruway, the New Jersey Turnpike, and other major transportation facilities in the United States and worldwide.

Guy Kelcey was a founder, director, honorary member, and lifelong contributing member of the Institute of Traffic Engineers. He was a frequent guest lecturer at university transportation centers and short courses, sharing his insights and fundamental understanding of the diverse elements of highway traffic control and direction and emphasizing their continuous evolution.

In accepting the Theodore M. Matson Memorial Award in 1966, Guy wrote, “That which is fantastic today has a very disconcerting way of becoming possible tomorrow and commonplace the day after…. I predict but one thing … CHANGE. You can be certain that the future starts right now!”
Don Loutzenheiser joined the U.S. Bureau of Public Roads in 1930 as a summer employee while still a civil engineering student at the University of Nebraska. Upon graduation, he continued with the bureau, serving in many capacities and eventually becoming chief of the Highway Standards and Design Division of the Federal Highway Administration (FHWA).

Although one of Loutzenheiser’s earliest research topics was passenger vehicle acceleration and deceleration capabilities, his career focus was in matching geometric design features to driver expectations. In the early 1940s, Loutzenheiser was responsible for conceiving and designing the system of signage for the 24-mile network of roadways serving the Pentagon building in Arlington, Virginia. In that same time period, he authored the report proposing design standards for interregional highways, the precursor of the National System of Interstate and Defense Highways. He served on the American Association of State Highway Officials (AASHO) special committee that approved the signing and marking standards for that system.

Don Loutzenheiser chaired the Highway Research Board’s Committee on Geometric Design and was a member of the Committee on Highway Capacity. In these and related roles, he implanted an indelible mark on the geometric and signing concepts that have guided the design of much of America’s road network.
ALGER F. MALO
(1905–1985)

As America’s “Motor City,” Detroit, Michigan, could be expected to have a strong municipal agency dedicated to making automotive travel work. And indeed it does. Detroit’s Department of Streets and Traffic, established by charter amendment in 1951, consolidates all of the city’s authority over the planning, design, and operation of the city’s surface transportation system. This includes the development and execution of a master street and traffic plan, the geometric design of all street and highway improvements, and the installation of all traffic controls.

Alger F. Malo directed that department from its inception until his retirement in the early 1970s. Malo used this authority to provide the city’s residents with a high-quality, smoothly functioning transportation system among the finest in the United States.

Malo graduated from the University of Detroit in 1928 and began his career with the Michigan State Highway Department’s Road Design Division. He attended the Bureau of Highway Traffic at Yale University in 1940 and was made acting traffic and safety engineer for the state upon his return. Mr. Malo is a past president of the Institute.

In 1944, Malo transferred to the city of Detroit as expressway engineer. In 1948 he was appointed city traffic engineer and he became director of streets and traffic in 1951. Malo was instrumental in the design of Detroit’s Central Business District Expressway Loop and in initiating extensive research and development of real-time freeway surveillance and control systems.

Al Malo received the mayor of Detroit’s commendation for design and implementation of the city’s arterial traffic control system. His contributions to the city of Detroit and to traffic engineering practice in the United States are of lasting significance.
Burton Marsh entered the transportation engineering profession upon his graduation from Worcester Polytechnic Institution in 1921. He retired from a full time professional role in 1970. Marsh was founder and past president of ITE and is an honorary member of the Institute.

Burt Marsh was a city traffic engineer in Pittsburgh and Philadelphia early in his career. His most important contributions to the profession were made during the 30 years he served as director of traffic engineering and safety for the American Automobile Association (AAA) in Washington, DC.

Burt was a strong contributor on the executive committee and as chairman of the National Joint Committee on Uniform Traffic Control Devices. He was a long-time member of the executive committee and was chairman of the National Committee on Uniform Traffic Laws and Ordinances. He served many years as a member, executive committeeman, or chairman of the Highway Research Board of the National Academy of Science.

He was the principal architect and promoter of AAA’s School Safety Patrol program to improve the safety environment for millions of American grade-school students. He played a major role in the creation and dissemination of Sportsmanlike Driving, a publication used in driver education programs nationwide. He was a founder, past president, and career-long member of the Institute of Traffic Engineers.

In the engineering, education, and enforcement elements of the traffic safety movement in the United States and throughout the Western Hemisphere, Burton Marsh provided a half-century of leadership, inspiration, and service to the road-using public.
Ted Matson, a founder of the Institute, had two mentors: Miller McClintock, who hired him out of Stanford University to be resident engineer for the landmark 1926 San Francisco Traffic Study, and Burton W. Marsh, under whom he served and later succeeded as Philadelphia’s city traffic engineer. These experiences prepared him for his preeminent contribution to the transportation engineering profession as a teacher. In 1936, Matson rejoined Miller McClintock as a research associate at the Harvard Bureau of Street Traffic Research and, in 1943, he succeeded McClintock as director of the bureau (which by then was at Yale University.) In his 18 years at Harvard and Yale, Ted Matson was a guiding instructor of more than 300 Bureau of Highway Traffic graduates and numerous other students who attended short courses and seminars.

Ted Matson was a true teacher. In addition to emphasizing “tools of the trade,” he stressed the philosophies of fact-based engineering approaches to improving transportation services and the importance of a continuing, strong research program to build the professional knowledge base. In December 1954, the month of his untimely death at age 51, he wrote: “It is only through basic research that the complexities of traffic movement can be reduced to their simplest elements.”

The pioneering textbook Traffic Engineering, (1955) which he coauthored with Wilbur S. Smith and Fred E. Hurd, presented the course materials used at the Yale Bureau of Highway Traffic. It reflected those strong beliefs and did much to establish the transportation engineering profession as a legitimate engineering and academic pursuit.

THEODORE M. MATSON
(1903–1954)
KARL MOSKOWITZ
(1910–1975)

Karl Moskowitz graduated from the University of California in 1930 with a bachelor’s degree in civil engineering. His first 17-plus years were with the U.S. Bureau of Public Roads in a variety of assignments. In 1948, he moved to the California Division of Highways, initially in design and then in traffic engineering. His true talent was research. Karl dearly wanted to understand relationships.

In a 1965 paper, “Research and the Engineer” he defined a number of kinds of research: to prove that what you knew was right really was, or to demonstrate that what everyone else believed was right really wasn’t. The kind of research that Karl preferred was defined by Lawrence Hafstad of the General Motors Research Laboratory: “to comprehend relationships which no one has previously known.” Karl wanted to understand relationships.

With the state of California and later with Roy Jorgensen & Associates, Karl explored a broad variety of relationships in highway and traffic areas, from legibility of signs with lower-case lettering to improved design of median separations to traffic surveillance and communication techniques and other similar subjects. In each case, the objective was to better understand the relationships and to apply that knowledge to improving the safety and service of the highway system.

Karl Moskowitz’s successes were recognized in a tribute by the Western Section of the Institute of Traffic Engineers, which named him “one of the guiding lights in the development of transportation in California and the nation.”
Olav Normann, known universally as O.K. Normann, was a born researcher. He joined the Bureau of Public Roads in 1928, following receipt of his bachelor of science in civil engineering from the University of Minnesota. Following his completion of the bureau's training program, he was assigned to Washington, DC, and began a lifetime research career.

In 1928, the focus of highway concern was on the physical—that is, how to build stronger roads. But O.K. Normann’s focus was always on how the highway facility served its customers. He was concerned with the interaction of lane widths and other roadway features, the mix and operating characteristics of vehicles in the traffic stream, and, most importantly, the reactions of the drivers to this environment. He conducted research to determine how well and how safely the road “worked” under varying roadway and operating conditions. Normann wrote in 1950, “It is of little value to know the quantitative measure (of capacity) without knowing the quality of service provided.”

His earliest target was to put some dimension on how drivers negotiated curves and followed and/or overtook preceding vehicles and why. But first, he had to overcome the enormous complexity of these questions, even in the far-simpler 1930s world of mainly two-lane roads and manageable traffic volumes. He devised observation techniques and collection tools. His seminal work affected the geometric design standards that still underpin American highway design practices.

Among other accomplishments, he debunked the conventional wisdom of the day that per-lane capacity of multi-lane facilities diminished as the number of lanes increased: This was a powerful conclusion.

In 1935, Normann was given the research assignment that dominated the rest of his career: What is the capacity of a highway? Many observers over many years had devised theoretical answers to this question, usually based on limited data and little acknowledgement of critical variables. A meaningful answer was needed, but to be useful, it required much more detail and critical terms had to be defined.

With impressive support from the federal road agency and state and local engineers, Normann set out to define those terms and determine those answers. The data came pouring in, and he faced another challenge. Although he understood the science of mathematical statistics, he knew too well that his “computational resources” consisted of two or three clerks with hand-cranked calculators. As a result, the famous speed-volume curves defining “basic” capacity—which Normann created and the National Academy of Science committee endorsed—were visually selected “boundary curves” rather than statistically pure “central tendencies.”

Later sophistication, aided by high-speed computers, confirmed that O.K. Normann’s “inferential statistics” and inspired eyeball were right on. The relationships of road geometrics, vehicle mix, and drivers so defined in his famous 1950 Highway Capacity Manual—confirmed and expanded in three subsequent revisions—is today accepted worldwide as the most significant and influential set of relationships in the highway engineering profession.
Over his 50-year professional career, Wilbur Stevenson Smith built a major consulting engineering firm active on five continents. He became one of the most widely recognized transportation engineers of his era. However, his most memorable contribution was not the reputation of his firm or his public recognition. Rather, it was in his leadership of the evolution of the profession from one exemplified by the role of the traffic engineer as simply an expert in highway signs, signals, and markings to the role of the traffic engineer as spokesman and champion for the social and economic role of all modes of transportation—the hallmark of the professional transportation engineer.

Wilbur graduated magna cum laude from the University of South Carolina in 1932 with a bachelor of science in electrical engineering. In 1933, he received his master of science. The sad state of economic conditions in America in 1933 was indicated by Wilbur’s first employment upon graduation: stamping vehicle license plates for the state of South Carolina.

Following a year at the Bureau of Street Traffic Research at Harvard University in 1936—‘37, Wilbur joined the South Carolina Highway Department and rose to the position of state traffic engineer. He moved to New Haven, Connecticut, in 1943 to join the staff of the Bureau of Highway Traffic at Yale University. At Yale, Smith conducted research and began his extensive contributions to the transportation state of the art. He became consultant to the Eno Foundation and later rose to the chairmanship of that organization. He was visiting lecturer at a number of universities, a consultant to the FBI and the Office of Civil Defense, and a member of the National Academy of Engineering.

He formed Wilbur Smith and Associates in 1952 but retained his position as associate director of the Yale Bureau until 1968. As the firm and its international scope grew, his responsibilities expanded, but he continued his extensive writings and outreach and involvement in other professional and research organizations.

In response to receiving the Institute’s Theodore M. Matson Award in 1965, Wilbur Smith wrote of the transportation engineering profession he loved: “With an improvement in methods and skills, and with a greater depth of knowledge, we can constantly expand our field of interests and our scope of activities. We must seek continuous innovation, and, above all we must maintain high moral levels and stress complete professionalism.” This is, indeed, a creed to live by.

Smith was a past president and honorary member of the Institute.
David M. Baldwin was described a number of years ago as “Mister Accident Records.” This is an accurate, if inadequate, summary of Dave’s distinguished 44-year career in transportation engineering. His career began in 1935, with him taking the post of city traffic engineer for Evanston, Illinois.

The need and focus on accurate and timely information about collisions really began two years later when Dave became safety engineer for the Virginia State Police. In 1937, America’s fatal accident rate was 14 fatalities for every 100 million vehicle miles traveled. Now, 70 years later, the rate has been reduced to 1.37 fatalities per 100 million miles of travel, a tenfold improvement. Imagine the many lives that were saved—and their contributions to society. That remarkable reduction is the result of many program improvements by many contributors, but all of these contributions share a common reliance on accurate accident information. Improving that flow of timely and accurate information was Dave Baldwin’s professional goal.

In later roles with the Institute of Transportation Engineers and the U.S. Bureau of Public Roads, he continued to advocate a strong traffic accident information system as the essential backbone of an effective traffic safety program. Baldwin was a past president of the Institute.
JOHN L. BARKER  
(1912–1982)

John Barker was a pioneer in the traffic signal industry. His career employer, Automatic Signal Corporation, was a leader in moving traffic signal controllers from predetermined, fixed-time systems into flexibly timed vehicle- and pedestrian-actuated systems.

John Barker obtained his bachelor of science in electrical engineering from Johns Hopkins University in 1933. He then joined the Automatic Signal Corporation, with which he remained associated for 48 years until his retirement in 1981.

Barker assisted in the development of a variety of vehicle detection systems to augment the initial roadway pressure pad equipment. His major contribution, however, was the invention and development of the volume-density controller. This device, now in general use worldwide, differs from other vehicle-actuated controllers. It takes into account three variables on each intersection approach: number of vehicles waiting on the red signal, length of time waiting by the first vehicle arriving on the red signal, and instantaneous volume of traffic on the phase having the green signal. This information and parameters established by the design engineer permit the equipment to continuously optimize the signal cycle to minimize delay.

It should be noted that, in its early years, the traffic signal industry developed as separate, competitive companies with proprietary interests and patent control of their equipment. This created major problems of equipment interchangeability and the variety of terms to define and describe the equipment’s functions. In the 1970s, John Barker contributed greatly to the profession by bringing together the 18 National Electrical Manufacturers Association (NEMA) companies, which represented 90 percent of the vehicle-control industry, to adopt common nomenclatures and compatible equipment interfaces and to draft standards for actuated equipment. These standards were subsequently adopted by both the Federal Highway Administration and the Institute of Transportation Engineers. John Barker’s persistence in promoting industry standards has given the profession important tools to improve the performance of traffic facilities and the economy of providing and maintaining traffic control systems worldwide.

The Theodore M. Matson Award Committee stated in 1961, “Literally, it is impossible to drive on the highways of any region of our nation without being guided by traffic control equipment which has been influenced in important degree by the work of John Barker.”

Automated Traffic Signal.  
Source: iayabharathdriving.com
Martin Bruening’s career in traffic engineering spanned 48 years, all with the city of Milwaukee. He began in 1924 as a junior draftsman, was promoted to become Milwaukee’s first traffic engineer, and retired in 1972 as superintendent of the Bureau of Traffic Engineering and Electrical Services. He took a two-year drafting course at the Boys Technical High School and went to work with Allis-Chalmers Manufacturing as a draftsman in the hydraulic turbine department. He then enrolled in night courses at the University of Wisconsin, obtaining his credits in engineering and becoming registered as a professional engineer.

He constantly emphasized the three Es of traffic safety (engineering, education, and enforcement) and the necessity of the coordination of geometric design and traffic control. He was particularly noted for the concept of complete intersection design, integrating channelization, signalization, signs, and markings. In his words, a successful intersection design “makes the right thing to do the easy and efficient way for both vehicle drivers and pedestrians.”

Bruening was an early advocate of progressive signal timing and employed many innovations in Milwaukee’s traffic signal program. He would often use unusual graphic charts, hand-drawn by staff under close direction, showing green bands of progressive flow to explain the impacts of unwarranted traffic signals with poor spacing on a given signal system.

The city’s first origin and destination survey in 1946, conducted under Bruening’s direction, formed the basis of Milwaukee’s early freeway system. He preached and practiced the concept of a balanced, multimodal transportation system long before it was mandated by legislation. In 1969, he was invited to testify before Congress to support such a change, including use of the gas tax to fund mass transit.

Martin Bruening joined ITE in 1937. He was an active member of the Midwest Section before Wisconsin had enough members for a section of its own. He often led a group of staff to Chicago for the local section meetings. In 1966, he was a charter member of the newly created Wisconsin Section.

Bruening was active in the International Municipal Signal Association and the National Joint Committee on Uniform Traffic Control Devices and was very interested in providing traffic control devices to aid pedestrians. As a result of his work, Milwaukee equipped all of its traffic signals with the early “WALK” lights in the 1960s. He was one of the early experts in traffic signal control, drafting many of the Manual on Uniform Traffic Control Devices’ provisions that were adopted in the 1960s. Bruening is an honorary member of the Institute.
Doug Carroll was born in Minneapolis, Minnesota in 1917. His family moved to Chicago in the early 1920s. Doug graduated from Dartmouth College in 1938 and served in the U.S. Navy during World War II. He received his master’s degree in city planning from Harvard University in 1947 and went on to become only the third person to receive a Ph.D. in city and regional planning from the Harvard School of Design. Doug’s first job following graduation was with the city planning commission in Flint, Michigan. His focus shifted to urban transportation in 1953, when he was commissioned to head the Detroit Metropolitan Area Traffic Study (DMATS).

The Detroit study came at a critical time in the evolution of urban transportation planning from a base of existing travel patterns to existing land use patterns and the trip attractions between these uses. It also was a critical time in the technology of such studies. Earlier studies used a system of tabulation cards and card readers to store and manipulate the data of a major study, but much of the calculation was by hand. In Detroit, Dr. Carroll put computers to work, inventing data processing and analysis techniques as the project progressed. For the first time, transportation facilities were planned as a system rather than on an individual facility basis.

Carroll became director of the Chicago Area Transportation Study (CATS) in 1956. There he continued replacing tabulating technology with computer-based data banks and calculations. Importantly, he also switched the study orientation from projecting travel patterns to projected land use patterns and travel-generation relationships. An intervening opportunity model, forerunner to the gravity model, was utilized to develop trip future distribution tables. Unlike DMATS, the Chicago study included public transit and was based on future rather than existing land use.
Nat Cherniack’s 1922 degree from the Massachusetts Institute of Technology was in civil engineering administration, but his life’s work and professional contributions centered on the economic analysis of transportation facilities, not their administration.

As a 45-year employee of the Port of New York Authority, Nat’s principal focus was on predicting the economic feasibility of bridge and other facilities proposed for authority construction—foremost being the crossings of the Hudson River, such as the George Washington Bridge, which was planned, built, and operated by the authority. He also conducted economic analyses of proposed New York City bridges while on loan to the Triboro Bridge & Tunnel Authority.

In addition to these economic analyses, he was a frequent and vocal advocate of the professional responsibility of transportation engineers to create a balance of transportation modes, focusing particularly on the development of bus rapid transit networks operating on preferential or exclusive lanes of the expressway and arterial systems. Such networks would, in his judgment, be in better balance with, and more economically serve, the disbursed development of modern American cities than extensive rail systems could.

Cherniack was equally concerned that parking and other terminal facilities be planned and financed in conjunction with urban roadway system improvements—another feature of balance. Although these concepts have not been universally followed, they have had an important impact on transportation development patterns in the United States and worldwide. His advocacy of bus rapid transit, for example, led directly to the introduction, in 1970, of the country’s first contraflow exclusive bus lane on a freeway, on the New Jersey approach to the Lincoln Tunnel.

Nat Cherniack was considered among the nation’s outstanding authorities on vehicular, passenger, and freight movements. Cherniack is a past president and honorary member of the Institute.
Daniel Hanson held both bachelor's and master's degrees in civil engineering from the University of Illinois. In 1968, he joined the staff of the American Road and Transportation Builders Association (ARTBA), where he served with distinction for 23 years. Nineteen of those years were as chief executive officer, and the last two were as President Emeritus.

Dan spent the first 16 years of his career as an urban traffic engineer. Receiving his bachelor's degree in January 1951, he worked for the city of Champaign, Illinois, as assistant to the city engineer, affording him the opportunity to complete work on his master's degree. He joined the Chicago Motor Club in 1952, the following year accepting a position as Peoria, Illinois' first city traffic engineer. In 1958 he became traffic commissioner of St. Louis County, Missouri, and in 1965 joined the District of Columbia's Department of Highways and Traffic, where he spent three years as deputy director for traffic engineering and operations.

During his ARTBA years, Dan participated in many of the major events of that very formative period in transportation history. As ARTBA chief executive, he was one of the transportation construction industry’s leading advocates, helping to guide the formation of surface transportation legislation through the 1970s and 1980s. Among his most notable undertakings was the championing of the 1982 "Drew Lewis Nickel," the five-cent increase in the gas tax to fund transportation projects. That was the first federal increase in 23 years. That work was recognized when he was honored in 1985 as the first private-sector recipient of CIT Corporation's "Rebuilding America Award."

Dan was a frequent expert witness before Congress and a widely sought after speaker who advocated the value of transportation investment. Long active in urban planning and highway organizations, he served on committees of the Highway Research Board, National Safety Council, Institute of Transportation Engineers, and the Transportation Research Board.

He devoted many years of service to the “Road Gang” and served as its chairman in 1972. The “Road Gang” is an informal group of business, government, highway engineering, public relations, and trade association professionals that promotes fellowship and the exchange of ideas among Washington, DC’s transportation “fraternity.” Hanson received that group’s P.D. McLean Award in 1981, and in 1990, the group established an award in his name. The award is presented annually “to commemorate extraordinary service to the organization.”

For his career accomplishments and service Dan received the Institute's Burton W. Marsh Award for Distinguished Service in 1983 and the Theodore M. Matson Memorial Award in 1994. In 2004 the ARTBA Foundation named Dan Hanson one of America’s top 100 private sector transportation design and construction professionals of the 20th century.
When Ted Holmes received his civil engineering degree from the Massachusetts Institute of Technology in 1928, he had already served a summer as a student engineer with the U.S. Bureau of Public Roads (BPR). He went on to serve that organization for an additional 43 years.

In the early years, Holmes’ focus was on assembling data on traffic flow characteristics, and he was instrumental in applying then-relevant high tech devices such as pneumatic road tubes and 20-pen recorders to aid in obtaining accurate traffic observations. In 1962, as director of research of BPR, he fathered the development of the National Cooperative Highway Research Program. The program funnels federal funds through the states to the National Academy of Science’s Transportation Research Board, resulting in a stable financial basis for essential research.

Gradually, Ted Holmes’ career shifted focus to the macroscopic. He began looking at the social and economic factors that drove the growth of highway traffic. It was Holmes who first postulated that the growth of traffic on America’s roads paralleled the growth of U.S. gross national product (GNP). In 1950, Holmes predicted to an ITE audience that traffic would grow at an annual rate of 4 percent for the next five years. This high projection was met with disbelief. In 1955, Ted faced the same audience and noted that 4 percent had been too conservative and that annual growth had been 5.1 percent. He ruefully observed, “A sage economist once remarked that the man who forecasts traffic has the dubious choice of being considered crazy now, or later.”

One of Ted Holmes’ greatest contributions to the profession, and to the nation, was a joint effort with D. Grant Mickle. In the post-World War II period, Holmes recognized the compelling need to organize and conduct urban transportation planning on a metropolitan scale. With Holmes’ government background and Mickle’s private industry know-how, the two men jointly formed the National Committee on Urban Transportation, bringing together the states, Conference of Mayors, League of Cities, National Association of Counties, and technical organizations to draft an organizational and technical package to address this need. The result was the “3-C Planning Process” (comprehensive, cooperative, and continuing), which was embodied in the Federal Aid Highway Act of 1962 and remains the essential urban transportation planning structure in America today.

Ted Holmes retired from the Department of Transportation in 1971 with the department’s Silver Medal for Meritorious Achievement, marking a career well spent.

E. H. (TED) HOLMES
(1906–1990)
HERMAN J. HOUSE
(1910–1997)

“One of the noblest callings in our profession lies in employment in the public sector.” Herman Hoose expressed this philosophy in 1986 in his acceptance of the Theodore M. Matson Award honoring him for nearly 50 years of public service.

Herman was a professional in every sense. He believed that each decision as a professional transportation engineer must be based on facts that were carefully collected and rigorously tested against established engineering principles and also met the ultimate criterion: advancing the public interest. And further, Hoose understood that an essential part of the professional’s job was to assure that the political leadership, the media, and the general public understood and supported implementation of needed transportation improvements.

Herman Hoose received his bachelor of science in civil engineering from Tri-State College, Angola, Indiana, during the difficult years of the mid 1930s. He found employment with the Lucas County Planning Commission in Toledo, Ohio. During the years of World War II, he worked for the U.S. Army Corps of Engineers, laying out the street systems for the “Manhattan Project” in the new towns of Hanford, Washington, and Oak Ridge, Tennessee. Following the war, he served as traffic engineer in Fort Wayne, Indiana.

In 1948, Hoose was hired by the city of Charlotte, North Carolina, as its first traffic engineer. Charlotte was experiencing a population boom. While there were no other city traffic engineers in the southeastern United States at that time, the city leaders in Charlotte recognized that they needed a professional with this discipline. The newly created director of traffic engineering position reported directly to the city manager and was assigned a breadth of authority, staffing, and resources appropriate to the task at hand.

The unique Hoose contribution came not so much from what he accomplished but rather from his approach to the task—sound proposals, well documented and carefully sold to the institutional and community leadership. With this professional style, he was able to organize a through-street system, adopt needed safety measures, bring order to parking controls, create a municipal off-street parking program, and guide the transportation investments of a growing metropolis.

As Charlotte grew, Hoose was appointed coordinator of transportation planning and became more influential in creating and expanding capacity of the through-street system. While in that position, he devised and promoted a system of limited-access facilities, culminating in a state-financed circumferential freeway.

Herman Hoose retired from public service in 1978, leaving Charlotte—a vibrant city nearly three times the size that it had been when he arrived there in 1948—with a lasting tribute to the Hoose philosophy of professional excellence. Hoose is an honorary member of the Institute.
Fred Hurd joined the staff of the Bureau of Highway Traffic at Yale University in 1945 when it resumed classes following a four-year World War II hiatus. Fred had graduated from the Bureau in 1939 and had previously served with Wayne County, Michigan, and the Missouri and Michigan state highway departments.

Although thoroughly grounded in all aspects of transportation engineering, Hurd’s strongest suit was geometric design. He taught that subject and authored the design portions of the 1955 publication Traffic Engineering, which he co-authored with Theodore Matson and Wilbur Smith. That text, which was the first on the traffic engineering discipline, was patterned after the Yale bureau’s curriculum and became a bureau reference text for many years.

Fred Hurd became director of the bureau in 1954. He was principally responsible for adding traffic flow theory, computer programming, and a more rigorous mathematical and statistical approach to the traffic operations segment of the curriculum. He continued a strong program in the design area and initiated a joint degree-granting program with the Department of City Planning at Yale University. The transportation planning area continued its growing influence on the program after the move to Pennsylvania State University. Fred continued as director at Pennsylvania State University until his retirement in 1972.

Under Fred Hurd’s directorship, the bureau graduated 473 students. It is noteworthy that more than 60 of these students were from outside the United States, spreading the philosophy and profession worldwide. Although graduate programs at the University of California, Texas A&M, Northwestern University, and other leading institutions supplied a growing proportion of the entrants in to the practice of transportation engineering over the years, the curriculum and the graduates under his direction were a guiding influence on the profession and form his legacy.

FRED W. HURD
(1907–1984)
Roy Jorgensen made significant contributions to transportation engineering literature and practice during his 60-year career. He developed and reported important advances in areas such as applying accident statistics to highway planning, estimating diversion resulting from urban freeway development, and one-way toll collection systems on bridges. Jorgensen’s most significant contributions were in the field of organizational management of state and local highway agencies.

Roy was born and raised in Berkeley, California. He moved east in the 1930s to accept a position with the Bureau of Public Roads in Washington, DC. He served with the bureau for 12 years before joining the Connecticut State Highway Department as director of planning and later as chief engineer and deputy commissioner. There he formulated an underlying philosophy of organizational management. “There is no one ideal highway department organization. To improve an organization”, he advised, “you must start from where you are and subject the structure to continuing review and adjustment, not one massive overhaul. The reason is people.”

Jorgensen joined the National Highway Users Conference as engineering counsel in 1951. He directed all engineering activities and served in an advisory capacity to national and state highway users groups during the critical years leading up to passage of the Federal Aid Highway Act of 1956. He was a respected voice within both Congress and the administration, helping to mold the legislation that defined and financed the interstate system.

Roy organized the firm of Roy Jorgensen and Associates in Washington, DC, in 1961 and focused that practice on improving the management of state and local highway agencies. His firm addressed organizational structure and modern management techniques but with a prevailing emphasis on the need and responsibility of management for aggressive and continuing investment in training and educational opportunities throughout the organization.

In Roy’s words: “The reason is people.”
Jack Leisch is perhaps best known in the highway transportation engineering profession for his pioneering work in modern geometric design. As chief of the Design Development Branch of the U.S. Bureau of Public Roads (1936–1956), Jack gave the final technical review and approval to all freeway and expressway projects proposed for federal funding. Importantly, he was the principal author of two design documents published by the American Association of State Highway Officials, (AASHO; now AASHTO) followed in the United States and many areas of the world: A Policy on Geometric Design of Rural Highways (1954) and A Policy on Arterial Highways in Urban Areas (1957). Jack received the Department of Commerce Meritorious Service Award for his “valuable contributions to highway engineering through the development of geometric design guides and design capacity charts.”

In 1956, following adoption of the National System of Interstate and Defense Highways, Jack left the public sector to join De Leuw, Cather and Company as chief highway engineer. He continued to develop innovative tools for use in operational analysis and design of freeway interchanges and channelized intersections. These included templates for turning paths of design vehicles, three-centered curve templates, and updates of the design-capacity charts for signalized intersections that he had initially developed in 1951. He formed his own company in the 1970s.

Jack Leisch was one of the first to recognize the importance of driver characteristics and expectations in developing design concepts and implementing design details such as route continuity, lane balance, and ramp spacing. Jack conceived the concept of a “speed profile” to achieve more uniform operating speeds, one of the bases for the Interactive Design Safety Model developed by FHWA.

Among his more than 50 publications, Jack proposed a “major transportation corridor” concept. This concept recognized and adapted to the real-world challenges presented by the urgency to create urban transportation networks, spurred on by the evolution of the cityscape and emerging travel demand patterns.

Jack Leisch was a teacher. He taught courses in geometric design and traffic engineering at a number of leading universities and at many short courses and seminars through which he influenced thousands of professional careers with his applied research and enthusiasm for the driver-oriented design process. Leisch is an honorary member of the Institute.
Harold L. Michael was born on a farm near Columbus, Indiana, on July 24, 1920. Returning from army service in 1946, he had the benefit of the GI Bill to provide him the support to enroll in Purdue University in Lafayette, Indiana, where he received his bachelor of science in civil engineering in 1950 and master of science in transportation engineering in 1951.

His entire career was at Purdue, where he moved up through the ranks, from assistant professor to full professor, between 1954 and 1961. He served as associate director of Joint Highway Research Project of Purdue University and Indiana State Highway Commission for many years before becoming its director and head of the School of Civil Engineering in 1978. He retired in 1991 but remained active until his death on August 3, 1999.

Harold’s specialty of traffic engineering and planning was a new field in the 1950s, and unequivocally he contributed to shaping it into a discipline. He was one of the early proponents of the use of statistical methods to relate peak hour flows to average daily traffic flow, to express pavement surface qualities as rider responses, to quantify a hazard index for highway-railroad grade crossings, and to estimate the performance of unsignalized intersections. In the 1960s he was also one of the pioneers in using computers for processing traffic data.

An educator with practical applications in mind, Michael was not a contributor of traffic theories or mathematical models. His interest was in devising tools and techniques that would be used to regulate traffic flow. He supervised the educational programs of numerous graduate and undergraduate students. He was a gifted teacher who authored more than 100 technical publications on a variety of transportation engineering subjects.

Harold was an outstanding volunteer for various professional organizations. He chaired the Transportation Research Board, the Institute of Transportation Engineers, the Education Division of the American Road and Transportation Builders Association, and was president of Indiana Highways for Survival, an aggressive citizen support group. He was elected to the National Academy of Engineering in 1975. Purdue University honored him with an honorary doctorate of engineering in 1992.

Harold was a calm and effective presiding officer, and this was the characteristic for which he was selected to chair the 1971 Constitutional Convention of the Institute of Traffic Engineers, which revised the structure and governance of that association. It was truly a stellar performance and exhibited his ability to produce consensus and bring closure to a complex task.

Harold Michael was a distinguished teacher and researcher, but above all, he was a leader. Michael was a past president and is an honorary member of the Institute.
Grant Mickle played many roles during his nearly 50-year career in transportation engineering, from city traffic engineer to deputy federal highway administrator. Among his many accomplishments, two landmark efforts occurred during his tenure as director of the Traffic Engineering Division of the Automotive Safety Foundation (1943–1961).

During this period, Mickle and his staff analyzed the administrative structure assigned to transportation engineering in more than a dozen of the nation’s largest cities. In each case, at the invitation of the municipal government, the study recommended changes that positioned the functions and provided the authorities and resources to obtain maximum effectiveness.

These recommendations were adopted in large measure by the cities involved and became the de facto guiding principles for effective traffic planning and operations at the municipal level in those cities. Many additional U.S. jurisdictions adopted and applied the concepts. These consolidated and strengthened units of local government largely persist to this day—a tribute to Grant Mickle’s deep understanding of local government, his prestige, and his persuasive abilities.

In the immediate post-World War II period, it became apparent that the burgeoning size and importance of the large urban complexes that had come into existence would require a massive restructuring and improvement of the nation’s urban transportation networks. The technical aspects of planning for such massive changes were known to the professionals involved but not always understood by the policy and political leaderships at state or community levels. Many states historically had little involvement in urban transportation affairs. There was no established history of effective cooperation among the myriad independent and sometimes competitive jurisdictions within the metropolitan areas.

Grant Mickle, in close cooperation with Ted Holmes, recruited private industry, the states, Conference of Mayors, League of Cities, National Association of Counties, and technical organizations to sponsor and endorse a National Committee on Urban Transportation. The committee outlined a planning process to meet emerging needs based on the “3-C” planning process (comprehensive, cooperative, and continuing), replacing the fragmented and sometimes idealistic past efforts that often had failed to energize significant, area-wide transportation improvements.

In 1962, due in great part to Grant Mickle’s foresight, Congress mandated the “Three-C’s Planning Process” which the National Committee had devised. The process became a condition of federal financial participation and remains the essential urban transportation planning structure today. Mickle was a graduate of the Yale Bureau of Traffic and is a past president and honorary member of the Institute.
Charles Prisk joined the U.S. Bureau of Public Roads (BPR) in 1935 after five years with the Connecticut Highway Department. In the 1930s, his research on passing practices for two-lane highways established the design and pavement marking practices at that time. He attended the Bureau of Highway Traffic at Yale University in 1939 and on his return to the BPR was assigned to direct the bureau’s traffic control research program. He documented for the first time many of the relationships between speed, accidents, and vehicle and driver characteristics.

During the late 1940s, Prisk and his staff collected accident data comparing the safety records of highways with access control. The safety benefits of freeways were documented in the Clay Committee report to Congress in 1954. That report was instrumental in passage of the Federal Aid Highway Act of 1956 and a monumental increase in federal authorization for the interstate system.

Congress directed a national highway safety study in 1957, with Prisk named director of the study. The report, published in 1960, was titled “The Federal Role in Highway Safety.” That report became the supporting documentation for the Highway Safety Act of 1965 and for the creation of the National Highway Traffic Safety Administration. Prisk was appointed as the assistant director of the Office of Highway Safety, where he was instrumental in implementing the national standards of the highway safety act, increasing the safety effectiveness of state and local governmental agencies.

From the 1940s to 1970, Charlie Prisk was an active participant in the National Joint Committee on Uniform Traffic Control Devices and the National Committee on Uniform Traffic Laws and Ordinances. He served as staff secretary for a number of years as well as chaired the Research Committee.

In 1973, Prisk retired from the bureau to become staff engineer for the Subcommittee on Investigations of the Public Works Committee of the U. S. House of Representatives. He played an important role in guiding that committee in its investigations and legislative initiatives to improve safety on America’s roads and streets until his final retirement in the mid 1980s. Charles Prisk improved the transportation engineering profession and its dedication to increased safety during his long and fruitful career. Prisk was a past president of the Institute.
Ed Ricker was introduced to transportation engineering research early in his career. In 1942, the U.S. Army was concerned about drivers’ ability to operate safely under low-level and infrared illumination. Ricker’s research provided guidelines. As a staff member at the Yale Bureau of Highway Traffic in 1947, he was asked to prepare a definitive work on the traffic design of parking garages, which was published by the Eno Foundation in 1948.

This highway traffic research orientation remained central to Ricker’s career, but its focus soon settled on safety issues. As traffic engineer for the newly opened New Jersey Turnpike in 1951, he was confronted with the significant safety problem caused by mixing turnpike speeds with New Jersey’s frequent low-lying fogs. After lengthy experimentation, Ricker concluded that no practical means existed to either predict or disperse the fogs; the only corrective must come from prompt detection, prominent driver warnings, and rigorously enforced speed limits.

Ricker designed the centrally controlled warning and speed limit system but determined that its day-to-day operation should reside with the turnpike police, who were best able to react quickly and at all hours to fog’s unpredictable occurrences. The system is still in place.

Ricker moved from the New Jersey Turnpike to the Pennsylvania Department of Transportation in 1959, where he remained until retirement in 1975 as head of the Office of Highway Safety.

In 1974, Ed Ricker joined with David Baldwin from the FHWA Office of Traffic Operations in co-authoring the landmark American Association of State Highway and Transportation Officials (AASHTO) publication Highway Design and Operational Practices Related to Safety. This document, commonly known as the “Yellow Book,” was an important precursor to the AASHTO Strategic Highway Safety Plan, which is relied on by American legislators and transportation officials and their international counterparts in determining the appropriate role of engineering effort in reducing traffic accident occurrence and severity. Ricker was a past president of the Institute.

EDMUND R. RICKER
(1915–1990)
FRANCIS C. TURNER
(1909–1999)

“Frank Turner was truly an agent of change,” then-Secretary of Transportation Rodney Slater said at the time of Turner's death. “He pioneered development of the nation’s surface transportation system as we know it today and set the Interstate Highway System on course for America.”

Frank Turner was a Texas boy. He was born in Dallas and spent his childhood there, then graduated from Texas A&M University in 1929 with a bachelor of science in civil engineering. Turner joined the Bureau of Public Roads’ Trainee Program. He never had another job.

In 1943, Turner was chosen to expedite construction of the Alaska Highway, the 1,500-mile road between Dawson Creek and Fairbanks that was essential to the movement of military forces during World War II. Later, he was sent to the Philippines where he helped resurrect its highway agency and restore bridges and roads damaged in the war. In 1950, he was appointed coordinator for the Inter-American Highway.

Frank Turner’s greatest contributions started in 1954, when he was appointed to serve as executive secretary to President Eisenhower’s Clay Committee, which was charged with developing a financing mechanism for an interstate highway system. Turner brought to the committee his direct knowledge of highway finance and construction gained through 25 years with BPR. He acted as liaison between the bureau and the committee and as chief negotiator in resolving disputes among the administration, industry, and congressional leaders.

Frank Turner served as chief engineer and deputy commissioner from 1957 to 1967. He was appointed federal highway administrator in 1969. He served in that capacity until retirement in 1972. He had the position of power in the nation’s surface transportation system as it morphed from a “build it” philosophy to an “operate it” one.

The changes Frank Turner fostered included a significant adoption of highway-based transit to move people as well as cars and the dedication of federal funds to improve traffic management and operations as well as drainage and pavements. He supported both of those concepts as well as the transition from “city planning” to “metropolitan planning” that took place on his watch.
William Vickrey, a world-renowned economist, authored five books and more than 100 major papers, including 10 on highway and urban transportation. On the latter subject he argued that there is no other major area where pricing practices are as irrational and out of date as well as conducive to waste as in urban transportation.

In 1994, he authored a proposal for revising New York’s subway fare structure to better reflect the higher cost of providing and value of peak hour service. His recommendations were not followed.

In the area of highway transportation, Vickrey also proposed a system of variable pricing, reflecting costs and collected through an extensive system of electronic monitoring. He contended that this would reduce the average cost of providing service by spreading peak demand. Although these recommendations have not been implemented in total, the concept of cost-based peak hour surcharges are increasingly accepted in the profession and are applied in a growing number of individual facilities.

Vickrey’s innovative, far-reaching advocacy of applying economic pricing policies to transportation was recognized in 1996, when he was the recipient of the Nobel Prize in Economics just days before his death.

Vickrey was a member of the National Academy of Sciences and a frequent participant in meetings of the Transportation Research Board. His economic concepts and writings will continue to influence highway policy in the years to come.
In 1955, Alan Voorhees published “A General Theory of Traffic Movement.” The theory postulated in that paper led to development of the Gravity Model. With its derivations, the model has become the basis for travel forecast and trip distribution in urban transportation planning worldwide.

The Voorhees theory was simple in concept. The movement of people between two parts of an urban area is related directly to the “pull” of each part (however measured) and inversely to some power of the “distance” between them, expressed as travel time. He also noted that about 80 percent of all urban trips start or end in a residential area for which the scale of total trip generation could be estimated. Much of Voorhees’ distinguished career from that date forward was devoted to the practical task of applying this theory to estimating future traffic in the real world of scarce and expensive data and the inevitable variability of human systems.

Voorhees’ education was in civil engineering (Rensselaer Polytechnic Institute), city planning (Massachusetts Institute of Technology), and transportation engineering (Yale Bureau of Highway Traffic). After a short tour in city planning at Colorado Springs, Colorado, he joined the staff of the Automotive Safety Foundation in Washington, DC, where he was involved in traffic planning studies in a number of U.S. cities. Each of these experiences added texture to the trip generation concepts underlying the Gravity Model.

Alan M. Voorhees and Associates, the consulting firm he formed in 1961, became one of the leading firms in the transportation planning arena. Their work was heavily, but not exclusively, devoted to perfecting and applying the Gravity Model. Voorhees and his firm contributed significantly to comprehensive transportation and urban development projects worldwide. He left the firm in 1967 to engage in engineering and management roles in a widening circle of economic arenas but continued to contribute to transportation education and research.

Alan Voorhees was a remarkable individual who contributed greatly to his profession and to the society as a whole. Voorhees is an honorary member of the Institute.