Fifty Years of Excellence in Research



1948-1998

"We bring innovation to transportation."

### Fifty Years of Excellence in Research

•

The Virginia Transportation Research Council: 1948–1998

Virginia Transportation Research Council

Charlottesville, Virginia

October 1998

Writer: Ann Miller Editor: Linda Evans Photographic Assistance: Ed Deasy

### Dedication

- To the people at the Virginia Department of Highways and the University of Virginia who envisioned the Virginia Transportation Research Council more than fifty years ago and had the patience to work through the details to make that vision a reality.
- To the many people in the central office, the districts, the residencies, and other field units in the Virginia Department of Transportation who have given and continue to give freely of their time and talents to serve on advisory committees, advise us on our program, help with field projects, and help implement the results of our research.
- To our many friends in the division and regional offices of the Federal Highway Administration, Turner-Fairbank Laboratory, and Office of Technology Applications who have been wonderful colleagues and great supporters of Virginia's research program.
- To the faculty and students of the University of Virginia, especially those in the School of Engineering & Applied Science, who have been integral parts of our program for so many years.
- To the top executives in the Virginia Department of Transportation, who have staunchly supported the research program, both in word and in deed, and who continue to include us as integral parts in achieving the Department's mission.
- To the staff of the Virginia Transportation Research Council, past and present, who over the years have been tireless in doing objective and innovative work that improves how we do business in the Virginia Department of Transportation.





TRANSPORTATION RESEARCH COUNCIL



# Table of Contents

Dedication	iii
Prologue: The Research Section	1
The Shelburne Years: A Visionary Beginning	7
The Dillard Years: Growth and Managerial Change	19
The Newlon Years: A Fulfillment of the Shelburne Ideal	27
The Allen Years: Serving Customers and Bringing Innovation to Transportation	33
Snapshots Through the Years	39
Epilogue	43

### Prologue: The Research Section

On August 13, 1944, Tilton E. Shelburne, a research engineer at the Joint Highway Research Project at Purdue University, boarded a train in Lafayette, Indiana. He arrived in Richmond, Virginia, on the 14th, interviewed for a position at the Virginia Department of Highways, and got back home on the 16th. He spent \$75.18 on the trip: \$63.33 for the first class train fare, \$3.50 for one night at a hotel, \$1.30 for dinner, and \$.45 to \$.85 for breakfasts and lunches.

The position Tilton Shelburne applied for was Research Director of the new Research Section of the Virginia Department of Highway's Division of Tests, the predecessor of the Virginia Transportation Research Council.

#### THE INCEPTION

On June 14, 1943, Highway Commissioner Gen. James A. Anderson sent a memorandum to Chief Engineer C. S. Mullen:

A few days ago you expressed a hope that the Department could make available about \$20,000 a year for a research program. I am glad to give my full support to this suggestion and if you will have the initial program outlined, I will attempt to see that the allocation is made.

Mr. Mullen forwarded the memo to

State Testing Engineer Shreve Clark, with a short notation:

... wish you would give this matter very careful thought and then discuss it with me. It is my idea that we try it out in a small way, first by employing a competent man, if one is available, and set up under you, a research office.

The impetus for establishing a "research office" came during the dark days of World War II. Even with a steeply reduced workforce at home, and an Allied victory by no means certain, the Highway Department was looking to the future. The leadership was discussing not a return to the status quo, but the truly radical step of establishing a section dedicated to research. Mr. Clark envisioned a research director, with several specialists working under him:

The man appointed as Research Director should be of unusually high class, and experienced in research in the highway fields of soils, concrete and bituminous construction. He should be a graduate engineer and have published articles on research subjects. He would have under his direction three men who would have had considerable field experience in the lines mentioned above, as well as sufficient educational background to appreciate fully what they were

doing and why; and be capable of translating theory into field practice. Laboratories should be available in which any investigations of a concrete nature could be pursued. This is an ideal set-up, and would cover all phases of any investigations desired.

Chief Engineer Mullen concurred.

Planning for the new division proceeded but was slow and sporadic. On February 16, 1944, Mr. Mullen's secretary sent him a memo:

Mrs. Volmer [Commissioner Anderson's secretary] came over and said that Gen. Anderson in looking over his file found his memorandum to you of June 14, 1943 in regard to setting up \$20,000 a year for a research program and that he would like to know what ever happened.

Mr. Mullen replied:

I have certainly not given up the idea of some research organization. Just at the present time, and as a matter of fact, ever since I discussed the matter, the manpower situation has been such as to make it practically impossible to secure a person with the qualifications that we desire. Just a short time ago, we thought we might have such a man from Kentucky, but on looking into his qualifications we decided he did not have sufficient background to justify his consideration for the position. We are still keeping this in mind and before we get back to full production, I hope we will be able to find the proper man for the position.

By summer, Mr. Mullen was corre-

sponding with K. B. Woods of the Purdue University Joint Highway Project. Mr. Woods mentioned a promising candidate for the proposed Virginia position, and on July 8, Mr. Mullen sent a memo to R. P. Ellison, Executive Assistant to Commissioner Anderson:

Will you please study the attached letter from Mr. K. B. Woods of Purdue University. I would like to discuss this with you, and I think maybe you will want to have Mr. Shelburne come in for an interview.

The Highway Department had finally found "the proper man for the position." Tilton Shelburne accepted the position of Research Director on August 18, 1944, and started work on October 16.

On October 11, 1944, the Virginia Highway Commission formally initiated the departmental research effort with an annual budget of \$20,000. The average salary for an experienced engineering professional at the time was \$4,000 to \$5,000. The new Research Section began operations with the Division of Testing in the basement of the Central Highway Building in Richmond.

#### The Virginia Advisory Board

The Highway Department shortly formed an advisory board modeled after the Joint Project Board at Purdue. Like the Purdue board, the Virginia Advisory Board reflected an important principle of a successful research effort: involve top level managers and specialists in the development of the research program. The board met for the first time on November 10, 1944. Attending were Shreve Clark; C. S. Mullen; J. J. Forree, Maintenance Engineer; C. A. Franklin, Chemist; William R. Glidden, Bridge Engineer; C. S. Phillips, Concrete and Aggregates Specialist; and Tilton Shelburne. Shreve Clark became chairman, and Mr. Shelburne became secretary, with meetings scheduled monthly.

Chief Engineer Mullen delineated the board's purpose:

The Advisory Board is for the purpose of assisting in the Research Program. The members of the Board can assist those conducting the research by giving advice and counsel since they have intimate knowledge of the highway problems existing in Virginia. It is proposed that by the formation of such a board, those conducting research can cooperate with the other Divisions of the Department that are primarily interested. The purpose of the Research Section is to make basic studies of materials and methods in order to facilitate the economic design, construction and maintenance of highways in Virginia.

The meeting began at 3:00 and adjourned at 4:30. In an hour and a half, the board sowed the seeds of what would become the Virginia Transportation Research Council. In a second meeting held one month later, the work of research actually began. In these two short meetings, the board established the essential principles and practices that would guide Virginia's research program through the rest of the century:

• Cooperation with the state engineering colleges and the use of student assistants:

... some form of cooperation with the three State engineering colleges might be worked out later. There is a possibility that some students might be employed during the summer months. If suitable students could be obtained, they might be assigned work which they could use as their thesis assignment. In this matter both the Department and the student could profit.

• Strong interrelationships with other divisions in the Highway Department. Mr. Mullen announced the establishment of a photography laboratory, which would benefit other divisions.

• Dissemination of research findings. The board agreed to publicize the research effort, using the Virginia Highway Bulletin to keep the employees of the Highway Department informed about the research work.

• Cooperation with other research organizations. Shreve Clark would establish and maintain contacts with the Highway Research Board, or HRB; the American Society for Testing and Materials, or ASTM; the American Association of State Highway Officials, or AASHO (now the American Association of State Highway and Transportation Officials, or AASHTO); and the Southeastern Highway Conference. Tilton Shelburne would continue his contact with the Joint Project at Purdue. The Highway Department would closely cooperate with the Bureau of Public Roads (now the Federal Highway Administration, or FHWA).

• Exchange of information among researchers and other research organizations. At the second meeting, participants received the first proposed working plan, Concrete Pavement Performance Survey: Research No. 1, as well as three papers from Ohio, Missouri, and New Jersey summarizing research on pavement pumping.

• A commitment to excellence. Commissioner Anderson set the bar high:

[Commissioner Anderson] was extremely anxious that the Virginia Highway Department rank among the foremost in the Nation, so that others may come to Virginia to learn how they can get the most for their money in highway construction and maintenance.

#### EARLY STAFFING AND STUDIES

Mr. Shelburne and a secretary comprised the initial staff. As the war wound down and the troops came home, qualified men to fill additional positions became available, but the staff remained limited during the early years.

Rodman G. Lilly, a chemist specializing in bituminous materials, joined the staff in August 1945. R. L. Sheppe, a specialist in field surveys, and Phillip L. Melville, a specialist in concrete research, joined in early 1946. Mr. Lilly and Mr. Sheppe had previously worked for the Highway Department. "Phil" Melville was a French national who had escaped from his homeland during the war and completed his engineering education at the University of New Mexico and Purdue. Alfred W. Maner, a specialist in field studies and pavements, joined in May 1947.

At first, the Research Section conducted field studies and the Division of Tests handled the laboratory work. The early research projects primarily involved materials studies in soils, aggregates, portland cement, bituminous concrete, bituminous mixtures, and stabilized mixtures. Staff attended conferences to present papers on their research projects and developed and maintained relationships with other research organizations.

Even during this early period, though, the Research Section was branching out beyond traditional materials testing and research. The years 1946 through 1948 saw research on air-entrained concrete, a survey of statewide road conditions, the initial work on pavement pumping, and two pavement-related projects that would be a major part of the research effort for many years to come: skid resistance and road roughness testing.

The skid resistance testing was a cooperative effort by the Highway Department, the Virginia State Police, district field forces, and the Equipment Depot. The American Automobile Association furnished the detonator used in the tests, and the Goodyear Tire and Rubber Company provided the natural rubber tires. Mr. Shelburne and Mr. Sheppe presented a paper on "Skid Resistance Measurements of Virginia Pavements" on December 2, 1947, at

the 27th meeting of the HRB in Washington, D.C.

The road roughness tests used a state-of-the-art road roughness indicator built from plans furnished by the

Research has been defined in various ways and there are many types, such as exploratory, applied, and fundamental or basic research. I particularly like the definition given by Mr. Kettering, an outstanding researcher, who stated: "Research is a high-hat word that scares a lot of people. It needn't. It is rather simple. Essentially it is nothing but a state of mind—a friendly, welcoming attitude toward change. Going out to look for a change, instead of waiting for it to come. Research, for practical men, is an effort to do things better and not to be caught asleep at the switch. The research state of mind can apply to anything: personal affairs or any kind of business, big or little. It is the problem solving mind as contrasted with the letwell-enough alone mind. It is the composer mind instead of the fiddler mind. It is the 'tomorrow' mind instead of the yesterday mind."

> Tilton Shelburne, "Highway Research Results in Virginia," in Proceedings of the Fifth Annual Virginia Highway Conference, 1951

Bureau of Public Roads. Research involved testing different pavements, construction methods, subgrade soil types, traffic and weather conditions, and other variables to determine how to produce the smoothest riding pavements.

Regular updates and articles on research projects and concepts, many written by Mr. Shelburne, appeared in the *Virginia Highway Bulletin*, along with announcements of conferences attended and papers presented.

#### A New Name and a New Home

By the late 1940s, the work being requested of the section was more than the limited staff and shared facilities could handle. Expansion was a necessity, and the Highway Department explored the possibility of a cooperative venture with a university (similar to the Joint Project at Purdue).

In 1948
Harry S. Truman was President.
The Indians won the World Se-
ries over the Braves.
The minimum wage was 40
cents an hour.
The median family income was
\$3,187.
The average price of a car was
\$2,055.
Gas was 28 cents a gallon.
A loaf of bread was 14 cents.
A quart of milk was 21 cents.
A first-class stamp was 3 cents.

Initially, the Highway Department considered all three state engineering colleges: Virginia Polytechnic Institute & State University, or Virginia Tech; Virginia Military Institute, or V.M.I.; and

the University of Virginia, or U.Va. Virginia Tech was the least interested as well as being the farthest from Richmond. V.M.I. graduates were well represented in the hierarchy of the Highway Department, which at first made "The Institute" a strong contender. But there were problems. V.M.I. had no graduate program and concentrated solely on technical areas. Most important, at V.M.I., the research offices would be housed in the old stables (only recently vacated with the mechanization of the horse cavalry). The idea of occupying a hastily rehabbed space that had previously housed four-legged tenants was unacceptable to Mr. Shelburne.

With things at this impasse, attention centered on U.Va., its position bolstered by its central location and the broad scope of its academic and gradu-

ate engineering programs. Exploratory discussions between the Highway Department and U.Va. were successful, and during the spring and summer of 1948, Commissioner Anderson and U.Va. President Colgate Darden worked out the details of an agreement to establish a cooperative research unit. Among other provisions, the Council would sponsor highway conferences and short courses as well as any other activity "tending to promote the advancement of highway engineering." The agreement also specified that some members of the Council staff would teach engineering courses at U.Va. On November 1, 1948, the agreement was finalized, and on February 1, 1949, the Research Section, Division of Tests, ceased to exist and the Virginia Council of Highway Investigation and Research was born.



U.Va. President Colgate Darden, Highway Commissioner Gen. James Anderson, and Tilton Shelburne

## The Shelburne Years: A Visionary Beginning

Research is a state of mind. Tilton E. Shelburne

ilton Shelburne was to be the Council's director for twenty years. A gentlemanly individual who saw the Council as a family unit, he was very much a father figure to his employees, many of whom were young researchers just starting their career. "Mr. Shelburne," as he was invariably called, had a rare management philosophy for his era: rather than take the part of the autocratic leader, he acted more as a coordinator and facilitator for the Council's projects. Although he frequently took the lead in soils and pavement, his own areas of specialization, he hired specialists in other fields and delegated the direction and work in those areas. The autonomy and complete responsibility he permitted, once projects had been approved, encouraged his researchers to develop themselves in the profession and to maintain high standards. In addition, they set the stage for the tolerance for individualism (and, occasionally, eccentricity) that is still a hallmark of the Council.

In addition to being one of the top men in his field, and supportive of his employees' efforts, Mr. Shelburne had a profound strength: he was willing to take advice as well as give it. Insisting on the highest standards of research, he constantly repeated his motto"Research is a state of mind"—and those who worked with him were exhorted to work toward, and develop, that state of mind.

#### The New Board

The new Council was overseen by the Administration Board, which, in accordance with the agreement, was to consist of the Highway Department's chief engineer as chairman (C. S. Mullen), the dean of U.Va.'s School of Engineering (E. W. Saunders), and the director of research of the Council (Tilton Shelburne). The board established policies for personnel, finances, and facilities; made the final decisions on the research program; and coordinated the interests of the two cooperating organizations.

The board established the Highway Research Advisory Committee to assist in developing the research program. This committee was to be made up of the three members of the Administration Board; the heads of the departments of civil engineering at U.Va., V.M.I., and Virginia Tech (or their authorized representatives); and two optional members, one from U.Va. and one from the Highway Department. The members of the first advisory committee were the members of the

#### Tilton E. Shelburne

Born in Zionsville, Indiana, in 1902, Tilton Shelburne received his bachelor's in civil engineering from Purdue University in 1927. After working at Indiana's Department of Conservation and its State Highway Commission, he returned to Purdue in 1936 and joined the newly formed Cooperative Joint Highway Research Project as a research engineer. He received his master's in civil engineering from Purdue in 1939 and remained on the joint project staff until he joined the Virginia Department of Highways in 1944.



When Mr. Shelburne was first hired, the High-

way Department's research efforts consisted of his one-man operation at the Division of Tests. Under his leadership, operations expanded. He played an instrumental role in establishing the Council in 1948 and served as its first director for twenty years.

Mr. Shelburne was chairman of the HRB's Department of Design from 1954 until 1963, when he became a member of the HRB's Executive Committee. In 1962, he became the first chairman of the NCHRP Committee. These are but two of his many committee memberships.

Mr. Shelburne was still serving as director at the time of his death in 1968.

Administration Board; Col. R. B. H. Begg from Virginia Tech as chairman; Col. R. A. Marr from V.M.I. as first vicechairman; Professor R. E. L. Gildea from U.Va. as second vice-chairman; and K. G. McWane from the Highway Department. The committee was to suggest projects, review working plans and progress reports, and recommend publication of reports.

#### Setting Up Shop in Charlottesville

Early in 1949, Tilton Shelburne, R. L. Sheppe, Phil Melville, and Al Maner prepared to move to Charlottesville. More than 5,000 square feet was allotted for joint use by U.Va. and the Council in Thornton Hall, which housed U.Va.'s School of Engineering. The space included office space, workrooms, a concrete materials laboratory, a curing room, a darkroom, shop space, and laboratory equipment, some acquired from war surplus. The staff set up four laboratories (concrete, soils, bituminous, and airphoto), six offices, a conference/study room, a concrete curing room, and a photographic darkroom. A large Quonset hut was available for storage.

Mr. Shelburne continued the practice he had used at the Division of Tests and modeled the general administrative organization of the Council (right down to its filing system) after that used at Purdue. At its creation, he organized the Council into five sections: Concrete, Soils, Field Studies (later renamed Pavement), Airphoto, and Bituminous.

Once in Charlottesville, the Council began to expand. By mid-spring of 1949, two additional permanent staff

# The Objectives of the New Council

(1) To train men in the fundamentals of highway engineering and related subjects.

(2) To carry out research programs for the purpose of facilitating the economic design, construction and maintenance of highways.

(3) To maintain relations and to cooperate with the Highway Research Board, Research Divisions of various highway departments, universities and other agencies performing research.

(4) To report and publish findings that are of general interest and value and which add to fundamental engineering knowledge.

(5) To hold joint meetings and conferences of men interested in the development and improvement of all phases of highway engineering.

From the 1948 Memorandum of Agreement Between the University of Virginia and the Virginia Department of Highways

members (a stenographer and an engineer) came on board. The temporary staff numbered thirteen: a technician shared by the Council and U.Va. and twelve undergraduate "student helpers." Among the latter was Jack H. Dillard, who would become the second director of the Council in 1968.

The budget for Fiscal Year 1949, the Council's first full fiscal year, was \$67,662.61, way up from the previous year's \$40,000.

#### The Fifties

By 1950, Mr. Shelburne had added new types of projects, such as research into pavement marking paints. The Airphoto Section was using aerial photographs to produce soil maps. Skidresistance tests and road roughness analysis were continuing. Members of the Council staff were teaching a variety of undergraduate engineering courses, plus a graduate level course, "Testing of Highway Materials." Several cooperative projects with the Bureau of Public Roads were planned or had begun.

Planning was also underway for a graduate assistant program, which would allow graduate engineering students to work half time on their master's and be employed on the Council staff the other half. This program, inaugurated in early 1950, remains in effect today as the Council's Graduate Research Assistant Program. Also initiated in 1950 was the Special Trainee Program, in which department engineering trainees would spend three months at the Council as they did in the other divisions of the Highway Department. Council personnel in 1950 included its first three graduate student assistants (including Jack Dillard), a technician, thirty "student helpers," and six special engineering trainees (rotated through for three months each).

Council researchers became involved in an impressive number of state and national organizations and committees. By 1951, they served on twenty committees of national and state research and technical organizations. Mr. Shelburne was on the advisory committee for the Maryland MD-1 Road Test, which examined various issues related to pavement problems. In 1954, he became chairman of the HRB's Department of Design.

In spring 1952, the Council held its first conference. This was the first of what would eventually become the annual materials conference, sponsored in cooperation with the Highway Department's Materials Division, the district materials engineers, and U.Va. The following year, the Council hosted a meeting of the HRB's Committee on Frost Heave and Frost Action.

In 1953, Mr. Shelburne added the Economics Section for research in highway revenue and finances. It was the first of the "soft science" sections at the



Density testing, 1953

Council, and the more traditional engineers looked somewhat askance at some of its projects. However, one of the first studies documented how travel and demands on the highway system were soaring while highway revenues declined. Commissioner Anderson became particularly excited by the chart that plotted these data into one easily understood graphic—exactly the sort of information he needed in his push for additional funding. He ordered 5,000 copies of the chart—and ensured the future of the section. Fiscal Year 1953 saw the budget top \$100,000.

By 1952, the Airphoto Section had evolved into the Airphoto and Reproduction Section because of the demand for Council reports. In 1954, with the completion of much of the soil mapping projects and the lessening of interest in aerial survey work by the Highway Department, the airphoto operations became inactive. The section became the Report Section (the precursor of today's Media Group), in response to the ever-increasing number of reports, papers, and articles being written by Council researchers.

The year 1954 also saw the formation of advisory subcommittees to provide guidance on large projects. In the same year, the Traffic and Safety Section was formed, with responsibilities including the ongoing studies on sign legibility, paint, reflectorized sign materials, night visibility, and pavement markings. This section included a psychologist to study peoples' reactions to the various types of signs and markings. The familiar VDOT orange paint color was chosen in 1955 as a result of one of these studies.

Joint projects with a number of organizations continued. The Council maintained a weather substation in Charlottesville with the U.S. Weather Service, and cooperative programs with the Highway Department's Division of Traffic and Planning increased in number and scope. In the early 1950s, the Bureau of Public Roads funded the first three cooperative projects: the Charlotte County secondary road study, the truck weight and volume study, and preparation data

The bituminous laboratory, 1950s; Jack Dillard is on right.

for the Virginia highway needs study. These federal funds, later known as Highway Planning and Research, or HPR, funds, were a factor in the Council's growth.

The truck weight and volume studies were particularly significant, since some engineers and industry representatives refused to consider a connection between vehicle weight and volume and damage to pavement. With the advent of the interstate system came additional projects, such as limitedaccess roads and bypass studies.

The mid- and later 1950s also saw a growing space problem. By 1954, the permanent staff had doubled and the temporary staff had increased fourfold. In the 1954 Annual Report, Mr. Shelburne detailed an uncomfortable situation:

As an indication of how serious the situation had become, one room on the first floor of the Council's offices, which was originally intended for use only as a

conference room, now houses: the Council library, a conference table, the Economic Studies Section (which is soon to be expanded in order to undertake an extensive bypass study), overflow files, spirit duplication equipment, an office supplies locker, projection facilities for showing films . . . workers must wait their turns in order to, for example, show a movie, confer with the Finance Associate, get a magazine from the Library, get a new pencil. If a conference happens to be taking place in the room all other activity must cease completely.

Mr. Shelburne estimated that the Council needed an additional 8,000 square feet of space.

In addition to the space problems came periodic staffing woes. By the mid-1950s, all of the original research staff, except for Mr. Shelburne, had moved on. At various times, work in the economics, traffic and safety, soils, and concrete sections was curtailed, or even halted, because of the lack of qualified staff. State job reclassifications during the later 1950s were of some help, but a discouraging number of researchers still left to pursue more lucrative opportunities. The turnover in secretarial and other support staff was also constant because of the sizable influx of government and in-



Experimental continuously reinforced concrete pavement, Thornton Hall, 1958

dustry jobs into the Charlottesville area.

In spite of these setbacks, the Council produced not only materials, economics, and traffic research, but also creative and innovative items such as its 1957 "Short Course on Effective Visual Aids in Technical Presentations." Although such courses are now commonplace, in the late 1950s they were virtually unknown, and the possibilities of improved visual aids were largely unrecognized. The course was so popular that the Council would repeat it for a number of years to come.

Although space and staffing problems continued through the late 1950s, the number and scope of projects, and the overall budget, continued to rise. The budget passed \$200,000 in Fiscal Year 1958, and a number of new projects were begun, many related to the development of the interstate system. A major new materials project involved continuously reinforced pavements, and an experimental section was installed near Thornton Hall. One of the young researchers working on this and other concrete projects was Howard H. Newlon, Jr., who had joined the Council as a graduate student in 1956. The Concrete Section had been unstaffed and dormant since several resignations the previous year. With no other concrete researchers on staff, he found himself the head of the Concrete Lab a semester later, having spent part of his first six months reclaiming the concrete lab equipment salvaged from the unused lab by other sections that were chronically short of equipment. He soon began to build the Council's concrete research program into a nationally known entity. In 1981, he would become the third director of the Council.

In September 1958, the Council hosted the First International Skid Prevention Conference. Held in Charlottesville, the conference was cosponsored by the Council; the Highway Department; U.Va.; and thirty-two other federal, state, and foreign highway agencies, as well as universities and industrial and research organizations. Jack Dillard organized this landmark conference, and Mr. Shelburne was on the steering committee. Largely because of the Council's involvement, ASTM organized Committee E-17 on Skid Resistance in 1960, and for years to come, various members of the Council staff served on or chaired the committee. Also in 1960, the HRB approved a recommendation for the creation of a permanent Committee on Skid Prevention.



The Virginia skid test car (a 1954 Ford), 1958

The year 1958 also saw the establishment of the Council's Bridge Section. With the addition of structures research, the Council could offer graduate student assistants a choice between a standard highway core curriculum and a modified bridge studies program. A faculty consultant headed the section until the Council hired a full-time bridge engineer in 1960.

In 1959, the Traffic and Safety Section, which had become inactive in 1958 after staff resignations, undertook an interstate service sign study, but with further loss of staff, the Council conducted only a few additional studies in this area until the late 1960s.

#### THE SIXTIES

Mr. Shelburne added a Geology and Geochemistry Section in 1962 and a Maintenance Section in 1963. He established the former for research into highway problems involving geology, mineralogy, and analytical chemistry, as well as elemental and crystalline analyses on various highway materials. The latter was originally an administrative arrangement for a large contract project on maintenance management. After the study was completed, Mr. Shelburne established it on a permanent basis and broadened its emphasis.

Staffing continued to be a problem during the early 1960s. Between late 1962 and early 1963, the heads of the traffic and safety, bridge, soils, and economic sections resigned. By the summer of 1963, the traffic and safety position was still vacant, the bridge position was being filled by consultants from U.Va. faculty; the soils and economics positions had been filled from existing staff; and the position of head of the new Geology and Geochemistry Section had been filled by a geologist formerly in the Concrete Section.

The Council continued to grow as it entered the 1960s, with several new sections and projects in evidence. An additional 1,800 square feet of office and laboratory space and an additional Quonset hut for storage were temporarily made available for Council use in 1959, providing quarters for the bridge, economics, pavement, and traffic sections. Additional space was provided after the addition in 1963 of a new wing to Thornton Hall. The bituminous, soils, and geochemistry sections were relocated in rented space in the new wing. The expanded space allowed the acquisition of new laboratory equipment, including an X-ray

defraction apparatus, an automatic freeze-thaw device, a controlled environment chamber for concrete investigations, and a repeated load device for deformation studies of bituminous materials. The director's office and the Council and twenty other agencies (including participants from as far afield as the Technical University of West Berlin) participated in the correlation study, held on special surfaces installed at an airfield in Tappahannock, Vir-



Nuclear gage correlation study, 1960s

bridge, economics, pavement, concrete, traffic and safety, and report sections occupied the original office space in Thornton Hall.

As the decade progressed, the Council set up an increasing amount of its research work in cooperation with the Bureau of Public Roads to use HPR funds. By early 1961, ten such studies were approved by the Bureau. By 1964, thirty-six projects, accounting for seventy-five percent of the Council's expenditures, were being undertaken with HPR funding.

The International Skid Prevention Conference in 1958 generated increasing interest in skid resistance and "road slipperiness." In the early 1960s, the Council became heavily involved in planning for the AASHO Road Tests, including a comparative study of road slipperiness tests and the apparatus used to measure road slipperiness. The ginia, in August 1962. As with the 1958 conference, Jack Dillard organized the operation.

A major conference also grew from research on the use of nuclear gages in highway construction, which had begun at the Council in 1960. These revolutionary devices cut testing

time from ninety minutes to about one minute per reading. After several years of testing, the Council held a Conference of Portable Nuclear Density and Moisture Systems in July 1965. Participants included staff from twenty-five agencies from state highway departments, universities, research organizations, and equipment manufacturers nationwide, along with attendees from outside the United States.

In the mid-1960s, the Council was exploring another concept new to highway research, that of statistical quality control. The 1964 Annual Report announced:

> Believing that the statistical quality control techniques utilized so successfully in industry offered a sound approach to the control of highway construction and materials, the Council took the initiative in developing a short

course designed to familiarize persons in the highway industry with the rudiments of these methods.

Organized through the Bituminous Section by Jack Dillard, this short course was presented at U.Va.'s School of General Studies in March 1964 and immediately became a popular concept. In 1967, a statistical short course for highway administrators was developed, and various short courses on statistical quality control continued to be offered over the next several decades.

In 1966, the Council, along with twenty-three other industrial, highway, materials, and academic research organizations, sponsored the National Conference on Statistical Quality Control Methodology in Highway and Airfield Construction in Charlottesville. Jack Dillard was chairman and Tilton Shelburne was a member of the advisory planning committee.

In 1967, the Council provided staff assistance to the Virginia Traffic Safety Study Commission, created by the legislature to examine transportation safety issues, such as the habitual offender problem, and suggest ways of increasing safety for the traveling public. The Council was also involved with a subsequent project performed to meet Virginia's requirements under the provisions of the federal Highway Safety Act of 1966. Council staff also continued to serve on committees of national and state research and technical organizations such as the HRB, ASTM, AASHO, the American Concrete Institute, the Association of Asphalt Paving Technologists, the American Society of Civil Engineers, and the Southeastern

Association of State Highway Officials. In addition to his many other committee assignments and awards, in June 1962, Mr. Shelburne became the first chairman of the HRB's new National Cooperative Highway Research Program, or NCHRP, Committee, through which panels appointed by the HRB recommended research projects and objectives in each of six areas specified by AASHO. Beginning in 1963, he became a member of the HRB Executive Committee.



Student assistant using the repeated load device, 1964

Joint efforts with international organizations were also in evidence. Attendance and participation from a number of countries outside the United States were in evidence at Council conferences. In 1964, two Council research engineers were granted a leave of absence to accept prestigious assignments with the International Road Federation for a survey of road research developments and procedures in Europe.

More than forty projects were underway in 1965, and Fiscal Year 1965 saw the Council's first million-dollar budget. The number of projects continued to increase toward the end of the decade, with many cooperative projects between sections. Materials research still accounted for the lion's share of the research. The long-term investigations of skid resistance and road roughness continued, with support from the Bureau of Public Roads beginning in 1962.

#### ANOTHER NEW NAME AND ACCOMPANYING CHANGES

In January 1966, the Highway Department and U.Va. modified its agreement and made several significant changes. They shortened the name of the Virginia Council of Highway Investigation and Research to the Virginia Highway Research Council and enlarged the Administration Board, with an additional member being appointed by the commissioner of highways and another by the president of the university.

Another new provision allowed the board to appoint *"a Research Advisory Committee, or Committees, at its discretion, to assist in the formation of plans and policies."* In 1966, a research advisory committee was formed for each active section of the Council, and a ten-member Research Planning Committee was established to examine and advise on long-range aspects of the Council's program and the most promising areas and directions of research. Committee members came from the Highway Department, the Council, the Bureau of Public Roads, and the state's engineering schools. The research advisory committees, or RACs, had as their three-fold purpose to produce a closer liaison between research and operations; to broaden contact among research, academic, and operating personnel; and to foster wider participation in the Council's research program.

Several other organizational changes came in the later part of the decade. In 1966, Mr. Shelburne established the Petrography Section, bringing the number of research sections to ten. In 1968, he combined geochemistry and petrography into the Geology Section. The Traffic and Safety Section became the Traffic Section, with an *"exceptionally broad"* research scope.

By the last half of the 1960s, the Council was spilling over into other buildings and rented spaces in Charlottesville. For some time, Mr. Shelburne had been examining ways to solve the perennial space problems, spurred on by complaints from his staff. The response of the Economics Section, housed in rented space under a barbershop on Hydraulic Road, more than two miles north of Thornton Hall, stands out: an unsolicited, unofficialbut heartfelt-research paper detailing the crowded conditions and the need for more space. The 1967 Annual Report announced that "preliminary negotiations are now underway with the University for construction of a building to house the Council."

Mr. Shelburne died on August 8, 1968, before the new building became

a reality. He left a thriving organization with a permanent staff of fortyeight, a part-time staff of more than fifty, and a national reputation for excellence in transportation research. His success in working with the Highway Department and promoting the Council is even more notable given the fact that he, a Midwestern Presbyterian trained at Purdue, successfully dealt with and fit into a departmental culture dominated by Virginia-born, Episcopalian engineers trained at V.M.I.

Mr. Shelburne was succeeded by Jack Dillard, who had been with the Council since 1949 and had developed into a nationally recognized authority on bituminous materials, skid prevention, and statistical quality control. •

## The Dillard Years: Growth and Managerial Change

The Research Council has comfortably accommodated the changing emphasis in transportation and has contributed substantially to the outstanding record that the Department has made in its progressive adaptation to new demands and public attitudes. It cannot be viewed as a coincidence that one of the nation's most outstanding transportation agencies has one of the best in-house research groups in the nation.

#### Jack H. Dillard

Planning for the new building proceeded as the 1960s drew to a close. After extensive studies, discussions, and negotiations, U.Va. and the Highway Department chose a site on the slopes of Observatory Hill on the western edge of the U.Va. grounds. Besides the pending changes in space, other major changes were coming to the Council. Some were the result of the new administration.

Jack Dillard was very different from Mr. Shelburne. He came to the Council in 1949 as an undergraduate student helper, and in 1950, he became one of the Council's first graduate student assistants. Upon graduation, he joined the Council's permanent staff and later became head of the Bituminous Section. "Strong willed and opinionated," "a free-thinking administrator and organizer," and "forward looking, recognized the need for moving ahead" are only a few assessments of Jack Dillard by people who knew him. He preferred to be called "Jack," and everyone on the staff almost invariably addressed him that way.

Jack had a great love for the English language—an unusual trait in someone trained as an engineer during the mid-twentieth century. He loved to use "big" words—particularly words that were uncommon in engineering—either to make people stop and think about the definition or just to be mischievous (since some of his terms were calculated to send people straight to the nearest dictionary). Like Mr. Shelburne, he taught at U.Va.—but Jack taught courses in the humanities, as well as in engineering.

Where Mr. Shelburne was a father figure, Jack Dillard saw the Council as a brotherhood and had formed close friendships with many of his fellow researchers. Adept socially, he encouraged socialization among the staff and viewed social events as team-building exercises. But the staff definitely viewed him as the "Boss." One early Council engineer remembers the standing joke: "Each section head has a vote—but Jack has one more vote than everyone else put together."

#### MANAGERIAL CHANGE

Jack Dillard emphasized timely completion of projects and productivity. He scheduled monthly "productivity meetings" that featured discussions and reports on ways to enhance productivity, establish targets for staff improvement, and re-think the way the Council operated. He knew what he meant by productivity:

"Productivity" as it relates to applied research must imply both qualitative and quantitative aspects. That is, the production of a high type of research work at three times the time that it could be accomplished is clearly not an example of high productivity. Likewise, the rapid production of research work that is unreliable and misleading is not evidence of a productive employee either. So, high productivity would be evidenced by high type output at a reasonably rapid pace. Jack also used a new management tool: he measured performance by "(1) the quality of the recommendations emanating from the research work and (2) publication of research results in high type journals . . . ."

#### NATIONAL ACTIVITY

In the 1970s, the Council continued its involvement in national organizations and committees, with staff holding significant committee positions in many organizations. Council staff appeared before the Congressional Subcommittee on Investigations and Oversight of the Committee on Public Works during its hearings on slippery pavements and skidding. The Council also con-

#### Jack H. Dillard

A native of Charlottesville, Jack Dillard received his 1950 bachelor's and 1952 master's in civil engineering from the University of Virginia. He came to the Council in 1949 as an undergraduate student helper and in 1950 became one of the Council's first graduate student assistants. Upon graduation, he joined the permanent staff.

Specializing in bituminous research, Jack became head of the



Council's Bituminous Section and, aside from his many research projects, organized the landmark skid conferences that were co-sponsored by the Council, as well as the statistical quality control conference and subsequent courses.

Jack was a member of many national committees. He was chairman of the HRB's bituminous section and a member of AASHO's select research committee for the award of NCHRP grants.

After Tilton Shelburne's death in 1968, Jack served as the Council's director until he retired in 1980. Jack Dillard died in August 1998.

tinued to cooperate with the FHWA (the newly renamed Bureau of Public Roads) on numerous research projects.

In the early 1970s, several sections of the Council became involved with various ASTM cooperative programs. The Geology Section was developing an ASTM standard practice for field and petrographic examination of hardened concrete; the Concrete Section was involved in the ASTM cooperative program on accelerated strength testing; the Maintenance Section was working with ASTM on skid testing and skidresistance standards; and the Soils Section was testing for lime content of soillime mixtures and cement content of freshly mixed soil-cement.

#### A BROADENING SCOPE OF RESEARCH

Jack Dillard showed considerable foresight in his astute response to the changing face of transportation research during the late 1960s and 1970s. He particularly recognized the need to broaden the Council's emphasis on materials into new and untraditional highway research fields such as the environment, transportation systems, planning, energy, economics and finance, and data systems and analysis.

In response to the National Environmental Policy Act, or NEPA, of 1969 and the mandates calling for increased sensitivity to the environment on the part of the Highway Department, the Council saw an explosion of environmentally related research. Council staff served as coordinators for the state's antipollution study initiated in the spring of 1970 and completed in October. Council staff also conducted the first environmental impact statements mandated by NEPA.

This activity, along with the subsequently large number of environmentally related research topics, occasioned a major, widespread hiring of researchers who were not engineers. Many of the "old guard" Council engineers were dubious about this new direction: one dryly remembers that the new influx of "soft science" practitioners and their projects "were accepted-but not embraced" by the engineers. The differentiation was visible: those with engineering degrees, classified as "research engineers," were in a higher pay scale than the "research analysts," who had no engineering degree. Not until 1979 was this differentiation eliminated: the classifications were merged and the current classification "research scientist," with one pay scale, was introduced for research staff.



Detecting delaminations in bridge decks with infrared thermography, late 1970s.



Bowstring arch truss bridge (ca. 1870) identified in Council historic bridge survey (now relocated to Ironto Wayside, Montgomery County)

into being at the Council. The position "faculty joint appointee," approved in principle in 1965 and implemented in 1971, reflected a contractual arrangement whereby faculty would teach classes at U.Va. while pursuing their research interests at the Council. This con-

Among the new staff who came to the Council in the early 1970s was Gary R. Allen, a young economist with an interest in transportation finance and policy. He joined the staff as a graduate assistant in 1972 and became a member of the permanent staff a year later. In 1989, he would become the fourth director of the Council.

The Council also became involved in a number of state projects that represented other new areas of study. Among these was the task group for developing a systems approach for the construction of highway bridges. The Safety Section, organized in 1969, played a significant role in the Alcohol Safety Action Project, the first systematic effort in the nation to address drunk driving and reduce alcohol-related crashes. This was the first of many safety studies dealing with similarly sensitive issues, many initiated by legislative requests. Over the years, several of these studies led to changes to state policies and procedures and changes to the Code of Virginia.

During this period, new personnel classifications and subsections came

cept, exclusive to the Council, forms a relationship between the Council and individuals with expertise in particular fields. Jack formed the Data Systems and Analysis Section in 1969 to develop data systems and computer programs for handling the increasing amount of data that were being generated by research projects in the Council's other nine sections and to allow independent research.

In 1972, the Council instituted studies in transportation history. Transportation structures, including bridges, were among those cultural resources that had to be considered for historical significance under the federal Historic Preservation Act of 1966. The comprehensive study of early historic truss bridges begun by the Council in 1973 was the first of its kind in the United States; the bridge survey, with the associated evaluation criteria, became a national model and was used in many other states. The early 1970s also saw the beginning of the still-ongoing Council studies of historic road systems and historic transportation technology in Virginia.



The Tilton E. Shelburne Building. Architectural firm: Rancorn, Wildman & Krause. Contractor: R. E. Lee, Inc.

#### A Home of Its Own and Another New Name

The Tilton E. Shelburne Building was completed in 1973. The final obstacle-a financial one-had been overcome when a mild winter produced a surplus of funds originally intended for snow fences. The modern building wholly dedicated to the Council was a radical departure from the previous housing: the new 42,000 square foot structure, completed at a cost of \$1.3 million, contained space for more than 100 employees, laboratories, conference rooms, an auditorium, and a library, all under one roof. Most of the staff moved in late that year, with the final moves in the spring of 1974.

The building was formally dedicated on May 9, 1974, with members of the Shelburne family in attendance, along with Highway Commissioner Douglas B. Fugate, University President Edgar F. Shannon, Jr., and other guests from the University, members of the State Highway Commission, Council staff members and "alumni," and other members of the Highway Department and groups associated with the Council.

Along with the new building, the Council got a new name. In 1974, with the departmental name change to the Department of Highways & Transportation (or the Department, as it was commonly called), the Council became the Virginia Highway & Transportation Research Council. The 1948 agreement with U.Va., modified in 1966, was revised again in 1975 to confirm the relationship and reflect current conditions.

#### NEW CHALLENGES

While Jack Dillard's willingness to meet change head on moved the Council forward in new directions, there were challenges as well. Some were familiar, but others were not. Some engineers in the Department viewed the Council's work in new, untraditional areas as being out of step with the department's primary business of building roads. This created tension between the Council and the Department. In retrospect, this tension, although it strained the working relationship for a time, was perhaps partially a reflection of the widespread tension the Department was feeling because the 1970s was bringing such sea changes to transportation and what the public wanted from it.

By the early 1970s, fifteen Council sections (eleven research sections and four service units) reported to the director. Mr. Shelburne had merely added new sections as needed. He did this for two very different reasons. First, this action was necessary to respond to the research needs of the Department. But second, under the personnel rules then in place, the only way to reward productive researchers with higher pay was to make them section heads.

Jack Dillard dealt with this challenge in an innovative and forwardthinking way: he introduced the "dual ladder of advancement" concept and convinced the Department's decision makers of its necessity. With this concept in place, technical competence and managerial responsibility were valued equally in determining compensation. This accomplishment, along with additional reorganization in the mid-1970s, led to salary increases for many, and the staff remained stable for the rest of the decade.

#### A Look at the Thirtieth Year

On the occasion of the Council's thirtieth anniversary, Jack Dillard wrote a perceptive overview of the state of the Council at the time. His observations and assessments in 1978 are uncannily current and reveal much about his leadership style and his insight:

Granted that reminiscences are interesting, one might still ask if they are enlightening. A look back through twenty years at the research programs and activities of the Research Council for the year ending June 30, 1958, provides an affirmative answer. The 10th Annual Report covered the period July 1, 1957–June 30, 1958, which, as the reader might recall, was shortly after the Federal Highway Act of 1956 that created the interstate system. In that year Francis A. Davis, Lawrence R. Quarles, and Tilton E. Shelburne made up the Council's governing body—Administration Board—at the beginning of the fiscal year, and Douglas B. Fugate replaced Mr. Davis as chief engineer and member of the Board in the latter half of the year. It was not until 1966 that the director of programming for the Department and the head of the University's Department of Civil Engineering were added to the Board.

A single advisory committee composed of the members of the Administration Board, representatives from VPI (H. M. Morris), VMI (J. M. Morgan, Jr.), and the University of Virginia (R.E. L. Gildea), and the Department's assistant chief engineer (W. R. Glidden) reviewed all research activities. While this arrangement was useful, the replacement of the single advisory group with specialty advisory groups for each of the major activities in 1966 was a milestone event in the history of the Council. Numerous benefits followed from the close affiliation of the operating divisions of the Department with the research program:

• The research program became more responsive to the needs of the various divisions in the Department.

• The review of the research working plans gained the benefit of the expertise of the practicing engineers in the Department.

• The implementation of the recommendations from research became easier as the operating divisions became a component in the process of change.

Another change since 1958 that is very evident is the content of the research program. The program in 1958 was concerned largely with materials researchsuch things as improvements in the durability of bituminous and concrete pavements, base and subgrade stabilization experiments, and similar matters relating to pavements. A modest beginning had been made in evaluating the economic impact of building bypasses around towns and cities, and the effect of the Lexington bypass was being evaluated in that year.

In 1978 one of the largest research activities at the Council can be classified as being environmentally oriented. For

some five or six years the research on siltation control, models for predicting highway noise and barriers for attenuating it, and predictive and monitoring methods in air pollution has been extensive. One can speculate that if in 1958 a research study on the elaborate procedures to control sediment had been proposed to the Council's advisory committee, it would have summarily been discouraged and perhaps even have been denounced as a shameful waste of monev.

Another facet of the research program that was not highly active in 1958 is the work on public participation in highway planning and how public input can be made more effective. In 1958 citizens, in general, were delighted to learn that a new or improved road was planned for their area. It may be remembered that Charlottesville and Lynchburg both were vying for I-64 in the mid-sixties and each mounted a substantial campaign to secure the route for its area. However, segments of the citizenry are now often stirred to oppose new highways, and elaborate expensive efforts must be made by public agencies to communicate with citizens to make certain that they fully understand the implications and need for a potential routing.

Research in highway safety also is now a much broader activity than it was in 1958. The Council has always been involved in safetyrelated subjects such as signing and pavement skid resistance, but a much broader program is now undertaken under the sponsorship of the Highway Safety Division of Virginia.

The shocking events of 1973, the embargo and subsequent formation of the oil cartel, made energy a factor in any transportation research program, and work in this area will occupy a prominent place in the Council's program for many years.

The changes in the research program over the past twenty years can teach us several lessons. One is that change will undoubtedly future mark the in the transportation field and that perhaps it will occur at an even faster pace. Another is that the orderly accommodation of this change will require a well staffed research organization; one that maintains close contact with operating personnel, but one that always keeps an eye on the horizon to make certain that new demands do not catch the Department unawares.

The Research Council has comfortably accommodated the changing emphasis in transportation and has contributed substantially to the outstanding record that the Department has made in its progressive adaptation to new demands and public attitudes. It cannot be viewed as a coincidence that one of the nation's most outstanding transportation agencies has one of the best inhouse research groups in the nation.

In 1958, the emphasis was on materials and construction; in 1978 it is on the environment, total transportation systems, and energy. No one can know what 1988 will bring, but the last twenty years have taught us that a progressive organization must rely on its research branch to help meet whatever challenges may come. The Research Council must remain relevant and be extremely nimble and visionary, and every person in the Council will remain aware of this charge and the role he must play in serving the Commonwealth in the dynamic years ahead.

# A CHANGING OF THE GUARD

After thirty years at the Council, first as a student, then researcher, and finally as director, Jack Dillard retired on December 31, 1980. In addition to his many contributions in bituminous research, skid resistance, and statistical applications, he left three major administrative legacies at the Council: his recognition and support of the need for the Council's involvement in new types of research projects; his willingness to devote the staff and space to these expansions; and his insistence on and defense of the Council's independence and objectivity.

Jack Dillard was succeeded by Howard Newlon, who had come to the Council as a graduate student in 1956.

# The Newlon Years: A Fulfillment of the Shelburne Ideal

The greatest contribution of the Council in fifty years has not been a specific research result or technological breakthrough (although there have been a number) but rather the training of people and the development of a research state of mind.

Howard H. Newlon, Jr.

oward Newlon was an excellent example of the loyalty the Council can engender in its staff. A brilliant researcher who genuinely liked people and got along well with nearly everyone, he had a total commitment to the research program, excellent credibility, and national visibility through his concrete research and committee work with the Transportation Research Board, or TRB; NCHRP; and other organizations. He came up through the ranks at the Council, from graduate student in the 1950s, to his fourteen years as head of the Concrete Lab where he launched his national reputation in concrete research, to assistant director, to associate director, and to director in 1980.

Howard had little interest in, and virtually no patience with, the minutiae of administration and did not especially want to be director. But he had the support of the Council staff and was well respected in the Department. As it turned out, he was the right man at the right time: his efforts helped put the Council on a strong footing with the Department's top management and opened doors for Council staff to undertake vital work for the field and central office divisions during the 1980s.

# CLOSER RELATIONS WITH THE DEPARTMENT

Realizing that the support of the Department's hierarchy was vital to the Council, Howard devoted the majority of his time as director to the task of making sure that several key administrators-including Deputy Commissioner Leo E. Busser, to whom the Council reported; Director of Planning Oscar K. Mabry, who became deputy commissioner in 1983 after Leo Busser's retirement; and Commissioner Harold C. King-recognized the Council's value and respected its work. With Howard concentrating on the relationship between the Council and the Department, Commissioner King and Oscar Mabry became stronger and more vocal supporters of the Council.

One of the steps that helped create a strong view of the Council among the Department's top management stemmed from the study of the Department by R. J. Hanson Consultants, Inc. The report called for the Council to strengthen its financial and administrative management. In response, Howard led the development of the Council's *Program Manual*, which addressed many of the management

#### Howard H. Newlon, Jr.

Howard Newlon, a native of Culpeper County, received his bachelor's in civil engineering from the University of Virginia in 1953. Following employment with the Tennessee Valley Authority in 1953 and 1954 and military service in the Army Chemical Corps, he returned to the University of Virginia. While still pursuing his master's in civil engineering, he joined the Council staff in 1956, with concrete research as his field of specialization, and subsequently became head of the Concrete Lab.



He remained at the Council after receiving his master's in 1959.

Building a nationwide reputation in concrete research, Howard spent fourteen years in charge of the Council's portland cement concrete research. His national committee work included the chairmanship of the HRB's Concrete Section and membership on the American Concrete Institute's twelve-man technical activities committee, which reviewed all institute publications and technical activities.

Named the Council's assistant director in 1968, he served as liaison between the Council and academic programs and personnel. In 1972, he headed the Council's history research efforts, including studies of historic roads and bridges in Virginia. He became associate director in 1975 and director in 1981, following Jack Dillard's retirement. Howard retired as director in 1989 but continues as a consultant to the Council in transportation history projects.

concerns and strengthened the financial and management control.

In the early eighties, studies of the Department by the Joint Legislative Audit and Review Commission, or JLARC, the oversight organization for Virginia's General Assembly, proved to offer significant opportunities for the Council. On several occasions, the Council was called upon to review and comment on a number of studies of the Department that JLARC was doing, as well as studies done by the Department. This provided the Council the chance to have its abilities and objectivity recognized by both entities, and the Council was able to provide the Department with discussions, assets, and resources they needed and had not realized the Council could offer. Council researchers—Gary Allen among them—were closely involved in reviewing the JLARC studies and to them goes much of the credit for the reputation for tough-minded and rigorous analysis of research issues the Council gained during this period.

In 1986, Ray D. Pethtel, the former head of JLARC, succeeded Harold King as commissioner. Commissioner Pethtel used the Council extensively for planning and reports, with continued visibility and a high profile for the Council as a result. As part of what he called a "Skills Bank," he asked for a list of the skills Council staff had to offer. Coming from a research background, he quickly recognized the Council for the excellent resource that it was—and he called on the Council frequently.

Howard Newlon also encouraged various individuals and groups to visit the Council as a way to keep them apprised of the research program. During his administration, for example, he invited the Commonwealth Transportation Board to meet at the Council to expose them to the research program. Although this was a highly visible period for the Council, Howard remembers that he had only one personal agenda item—to revive Tilton Shelburne's ideal of the director as a coordinator and facilitator.

#### LEAN FINANCIAL TIMES

In the early 1980s, the Department went through lean financial times. This resulted in a hiring freeze and raised the possibility of layoffs. Although there were no layoffs at the Council, there were reductions in the hiring of summer student helpers and graduate assistants. And despite Howard Newlon's interest in history and archives, one of the cost-cutting measures virtually eliminated the Council's annual reports.

Equipment was also a problem during the 1980s, when computers became vital components of research work. Funding for adequate computers had not been forthcoming. Howard



Freeze-thaw machine in concrete lab, 1982

remembers that when he asked for funding, he stated he did not need topof-the-line machines but merely wanted his staff to be equipped "at least as well at work as they were at home." Still, his request was not approved. Finally, in a rare show of temper, he threatened to let people work at home "so they could do in an hour what it takes them three days to do here." Howard got the computers.

There is no better indication of the strong relationship that ultimately developed between the Council and the Department than an event in the late 1980s. In Fiscal Year 1989, because of federal cutbacks, the Council's HPR funding was reduced by \$600,000. In a significant vote of confidence for the Council by Commissioner Pethtel and Deputy Commissioner Mabry, the Department made up the difference in the Council's budget from state funds.

#### Research Activities and Another New Name

During the 1980s, the Council continued the research trends that began in the 1970s: an ever-increasing emphasis on technology and the environment. Materials and engineering research continued, but with changes in scope, and there is no clearer illustration of this than the end of the venerable Council skid testing program in 1984, although the Council continued to oversee district skid tests for a few more years, until 1988.



A student assistant conducting a seat belt survey, late 1980s

In 1982, members of the Council's Safety Section served as staff support for the Governor's Task Group on Drunken Driving, resulting in legislation in 1984. In addition, the group provided staff support for studies on mandatory safety belt use, with resulting legislation in 1987. In 1983, the Division of Highway Safety, which had functioned as an independent unit since its creation in the late 1960s, became the Department of Transportation Safety (now Transportation Safety Services) within the Department of Motor Vehicles. Thereafter, the Council's Safety Section continued to provide research support to this administrative unit until 1998.

Council staff during the 1980s carried on the tradition of teaching courses at U.Va. In addition to the more traditional engineering and economics courses, Howard Newlon designed courses in historic building materials and early technology that he presented through the School of Architecture. He continues to give these courses, which are especially useful in historic preservation.

A significant development at the Council in 1986 was the establishment of the Virginia Transportation Technology Transfer Center. Funded by allocations from the federal Rural Technical Assistance Program (RTAP) and the Department, the T<sup>2</sup> Center, as it is informally known, became part of a national network of technology transfer centers that provide technology information and support services to all transportation agencies in the host state.

With the 1987 renaming of the Virginia Department of Highways & Transportation to the Virginia Department of Transportation, or VDOT, the Council received its current name of the Virginia Transportation Research Council.

# Another Change in Directors

Howard Newlon retired in 1989. As director, he had kept close to the Shelburne path of having good relations with VDOT and being a coordinator and facilitator. He left office with his goals fulfilled: the relationship between the Council and VDOT's Central Office was close and respect for the Council was high. Equally important are his legacies in research: Howard's projects included many innovative, ground-breaking contributions to concrete research and transportation history that had a national impact and are still factors in the Council today. Howard was succeeded by Gary Allen, an economist with a specialty in transportation finance and policy who had come to the Council in 1972. For the first time in its history, the Council had a director who had not been hired and trained by Tilton Shelburne.

# The Allen Years: Serving Customers and Bringing Innovation to Transportation

As the transportation profession and VDOT's responsibility have become more complicated, our research program has played a key role in applying the most advanced technology to transportation.

Gary R. Allen

n many ways, Gary Allen represents both the continuity and the new directions of the Council. Like Jack Dillard and Howard Newlon, Gary joined the Council as a student and came up through the ranks of the organization. But unlike all previous directors, Gary is an economist, not an engineer.

Before he became director in 1989, Gary headed the Council's Administration and Finance Section and was responsible for developing a program in applied economics, public administration, finance, and policy analysis. Commissioner Pethtel already knew Gary to be an astute analyst, remembering his involvement in reviewing departmental and JLARC studies. He had also made extensive use of Gary's talents, in both research and advisory capacities. Gary's service as VDOT's staff member during the many deliberations of the Commission on Transportation in the 21st Century created by Governor Gerald Baliles' transportation initiative in 1986 is but one example.

As director, Gary brought to the Council an agenda that reflected the best of previous directors: the continuing importance of a close relationship with VDOT and other customers, an insistence on very high standards, support and appreciation for the staff, objectivity, the timely conclusion of research projects, and strong financial and management structures. To these he added another item: making research results accessible and understandable in a fast-paced, demanding information age.

#### THE CONTINUING CLOSE RELATIONSHIP WITH VDOT

VDOT's top management challenged Gary to continue to work very closely with all of its units, as Howard Newlon had done. They saw the Council as an important part of VDOT, retaining both autonomy and objectivity. Commissioner Pethtel, who remained vocal in his praise of the Council, and Deputy Commissioner Mabry, who remained extremely supportive of the Council's work during his tenure as Virginia's Deputy Secretary of Transportation, looked to the Council for assistance and involved the Council in many highvisibility matters.

Under Commissioner Pethtel, the Council administration of the 1990s participated in VDOT management

#### Gary R. Allen

Born in Lexington, Virginia, in 1947, Gary Allen received a bachelor's in economics from Berea College in 1970; a Certificate in Transportation Pricing, Finance and Investment Planning from Carnegie Mellon University in 1977; and a doctorate in economics from the University of Virginia in 1978. He joined the Council as a research analyst in 1972 and became a senior research scientist in 1983.

Before Gary became director of the Council in 1989, he headed the Council's Administration and



Finance Section and was responsible for developing a program in applied economics, public administration, finance, and policy analysis.

Among many other committee memberships, he is a member of the AASHTO Standing Committee on Research, appointed by the AASHTO Board of Directors to oversee the NCHRP program. As Virginia's Research Director, he also serves as the state's representative on the TRB.

decisions and was instrumental in making research and technology part of the decision matrix. Good relations with VDOT continue today. Commissioner David R. Gehr, Assistant Commissioner



Capturing environmental data sets with the global positioning system (GPS), 1990s

Peter R. Kolakowski, and the other members of VDOT's Executive Leadership Group are strong supporters of the Council. Commissioner Gehr's association with the Council goes back to his membership on the Traffic Research Advisory Committee years ago, and he retains a seat on the Safety Research Advisory Committee today.

#### IMPROVED SALARIES

Traditionally, the Council has provided a highly empowering and challenging atmosphere for professional and intellectual stimulation and growth, along with opportunities to work on important things for VDOT. For many, this outweighed the fact that higher salaries may be available elsewhere—but in more restrictive and less challenging atmospheres. Nevertheless, the old problems of low salaries and staff turnover were still nagging at the beginning of the decade.

Echoing voices from years past, one team leader in 1990 described the problems in filling vacant and soon-tobe vacant research positions:

. . . recruiting efforts to find a qualified replacement have been unsuccessful because of the need to adjust the salary the position commands. . . . The [staff] needs [of the team] must be met in a reasonable period of time. The team leader is approaching retirement and no successor is readily available due to the difficulty mentioned earlier in filling the vacant research scientist position. The position demands a highly qualified technical person, and one cannot be attracted by the current salary. Similarly, the team's technician, who produces wonders with the outstanding student assistants he has been able to recruit, should have an apprentice who can be moved into that or a similar position as retirement of technicians becomes more frequent over the next few years.

When Gary Allen assumed the leadership of the Council, the issue of the competitiveness of research scientist salaries, which had gone unaddressed for many years, was of primary concern internally. During the interview process and as part of his discussion with Commissioner Pethtel when he accepted the position, Gary made clear that this issue would be a primary focus in the coming months. After more than two years of intensive work and extensive negotiations with Virginia's Department of Personnel and Training, Gary was finally able to secure improvements in the Council's salary structure in 1991.

#### THE EARLY RETIREMENTS AND A RESHAPING

In 1991, more than one third of the Council's research scientists and many of its veteran support staff retired under a state-sponsored early retirement program. This offered Gary an opportunity to reshape the Council in three ways that had not been afforded any director other than Tilton Shelburne.

First, he reshaped the several small research sections into four research groups: Materials and Environmental; Structures, Pavements, and Maintenance; Safety; and Socioeconomics and Transportation Systems. This allowed a more effective structure with better spans of control that could better complement VDOT's needs. He also shaped an Administrative Group and made the Media Group part of the T<sup>2</sup> Center. He has made only slight changes since then: he moved the environmental and history functions to the Socioeconomics and Transportation Systems Group and made the Media Group autonomous again.

Second, and equally important, he selected a large group of talented scientists, technical staff, and research managers to fill the openings created by the early retirement program. In this way, he built a very strong leadership team of his choosing, but he also brought to the Council a cadre of extremely capable scientists uniquely suited to complement the skills of the experienced staff.

Third, he focused the Council on customer service and aligned it with VDOT's Purpose, Mission, and Values. As a result, the Council has a singular purpose, "to bring innovation to transportation," and its leadership focuses on modeling the VDOT values of honesty, fairness, and respect for others and using everyone's talents to create customers who rave about the Council's work.



Technical assistance and technology transfer are perhaps the most visible aspects of what typifies the Council in the 1990s: an ever-increasing effort to make research results accessible to transportation organizations and the public. The most recent innovations in this field include the "Research Briefs" (concise, visually appealing, nontechnical, easy-to-read, and widely distributed descriptions of the results of Council research and development) and the Council's web site, which offers the transportation community upto-date information on research findings and an interactive mode for contacting Council staff. The Research Briefs, written and produced by the Council's Media Group in consultation with the research staff, go to every state as well as to more than 800 customers in VDOT. They also appear on the Council's web site and have become



The asphalt binder lab (completed in 1996)

very popular and widely read by the international transportation community.

Technical assistance (informal verbal, written, or on-site consulting between Council researchers and other individuals or organizations) harks back to one of the Council's original objectives: to communicate and cooperate with other researchers and groups. Technical assistance forms a major part of the Council's work in the 1990s, accounting for a hefty percentage of many researchers' schedules. Inguiries come from a variety of sources that include other Council staff, VDOT's central office and field unit divisions, other state departments of transportation, private citizens, other state agencies, members of the legislature, the secretary of transportation's office, the governor's office, federal agencies, and academic and private consulting organizations. The Council also retains its emphasis on education: a number of Council staff teach at U.Va. This carries on the tradition of other Council directors and is a visible bond between VDOT and U.Va.

The  $T^2$  Center continues to expand in the 1990s. With the enactment of the Intermodal Surface Transportation Efficiency Act of 1991, the program expanded in scope and became the Local Technical Assistance Program (LTAP), operating under the FHWA's Office of Technology Applications. The functions of the T<sup>2</sup> Center include assessing training needs and developing and conducting training sessions such as short courses, workshops, and seminars; providing speakers for conferences and meetings; furnishing technology transfer materials; providing technical assistance; and marketing the products of research. Annually, the center currently conducts thirty to forty workshops, courses, and seminars and sponsors three to five major conferences and seminars. In 1997, conferences included the Roadway Management Conference, the Statewide Incident Management Conference, the Post-Hurricane Recovery Conference, the Cities and Towns Workshop, and a High Performance Concrete Showcase that had participants from forty-eight states.

#### NATIONAL STATURE

The Council is well respected nationally, and it is certainly no accident that VDOT has both a nationally recognized transportation program and a nationally recognized research program.

At no other time in the Council's history has its national stature been higher and its contacts and cooperation with other research organizations and agencies been such a major part of the Council's activities. Council staff continue to serve on various committees of organizations such as the TRB, American Concrete Institute, ASTM, Association of Asphalt Paving Technologists, and Institute of Transportation Engineers. Staff are also extensively involved in NCHRP and numerous organizations. Council staff continue to receive numerous national, state, and organizational awards and honors for work that has significantly advanced transportation engineering and related disciplines.

Since the late 1980s, the Council has played a significant role in the Strategic Highway Research Program, or SHRP. This AASHTO project, funded under the Surface Transportation and Uniform Relocation Assistance Act of 1987, was the largest single highway research program in the United States. Initially a five-year, 150-million-dollar research program to improve the nation's highways through high-performance technology, the project is now in the implementation phase. The Council has been involved in this program since its conceptual stage and is currently involved in three of SHRP's lead state efforts: concrete assessment and rehabilitation, high performance concrete, and alkali-silica reactivity.

The Council and, in turn, VDOT are also nationally recognized leaders in the implementation of Superpave, a new mix design and analysis system resulting from \$50 million in research as part of SHRP. The implementation includes the purchase of new equipment; renovation or construction of new lab space (including the Council's new binder test lab, the site where Virginia's quality assurance testing will be conducted); and a massive training effort in partnership with the Virginia Asphalt Association and VDOT's Materials Division, including workshops to introduce Superpave to mix design technicians from VDOT and industry and short courses for engineers, local governments, and inspectors.

#### PARTNERING

In addition to a number of ongoing partnerships, many local, state, and national groups and individuals pursuing research contracts want to develop partnerships with the Council, as the Council's name, staff, and reputation carry a great deal of influence and the assurance of expertise and quality.

Currently, the Council is involved in a number of significant partnerships. The new "Smart Travel Lab" is being built in concert with VDOT's ITS Unit and U.Va. and is scheduled to open in late 1998. It will be located at U.Va. and staffed jointly by the Council and U.Va. Tied directly to VDOT's major traffic control systems in Northern Virginia and Tidewater, the lab will train and provide support to traffic control operators and provide an unparalleled venue for testing innovations in traffic management.

Virginia Tech and the Council are co-directing a national, four-year, 2.6million-dollar study on enhanced night visibility. Its purpose is to improve visibility, especially for older drivers and for those driving under adverse conditions. Additional partnerships with Virginia Tech include research for the "Smart Road"—the first-of-its-kind test roadbed in Blacksburg, Virginia—as well as structures design and testing.

Because of the strong partnership between the Council and VDOT's Structure & Bridge Division, Virginia is the only state to fulfill the FHWA's Implementation List (for bridge projects), for which VDOT was awarded the Federal Highway Administrator's Public Service Award in early 1998. As specified by the FHWA, these projects, undertaken in partnership with the Council, were "... bridge projects using the heated bridge deck, the thin bonded overlays, the high performance materials (steel, concrete, aluminum and fiber reinforced polymer composites), the nondestructive evaluation/testing, and the jointless bridge technologies."

#### AN ONGOING LEADERSHIP

Gary's tenure as director has been marked by a streamlining of the Council's organization, the building of a strong leadership team committed to high quality and customer service; alignment of the Council with VDOT's Purpose, Mission, and Values; further diversification of research projects; a close working relationship and partnering with other divisions of VDOT and other transportation-related agencies; and a concerted effort to make the Council's research results accessible and understandable.

## Snapshots Through the Years

t this writing, the composition of the Council is much different from what it was at the beginning of the decade, and additional changes are certain to come over the next decade. Although the Council's senior researchers, research managers, and director, who have been with the Council since the 1960s and 1970s, provide a bridge between the Council's traditions and achievements and the changes and challenges of the future, more changes are certain in the years ahead. But change is familiar at the Council, and Tilton Shelburne's admonition of "a friendly, welcoming attitude toward change" is still remembered and practiced.

#### A Look at Staff and Budget Changes

- The Research Section in 1944. Salaried staff: Mr. Shelburne and a secretary. Budget: \$20,000.
- At the formation of the Council in 1948. Salaried staff: 6 (the director, a secretary, associate research engineers, a technician). Budget: \$40,000.
- 1958 (tenth anniversary). Salaried staff: 22 (the director, highway research engineers, highway economists, highway materials technicians, clerk-stenographers, a laboratory mechanic, an illustrator, an information officer. Part-time staff:

47 (trainees, graduate assistants, graduate student helpers, student helpers). Budget: \$212,086.

- 1968 (twentieth anniversary). Sala-• ried staff: 48 (the director, highway research engineers, a bridge design engineer, highway research analysts, highway materials analysts, highway engineer trainees, a construction supervisor, an information officer, an illustrator, a research administrative supervisor, highway materials technicians, a laboratory instrument maker, a duplicating services supervisor, a library clerk, clerk-stenographers, clerk-typists. Part-time staff: 51 (faculty consultants, an information officer, a librarian, a chemist, graduate assistants, undergraduate student helpers). Budget: \$885,000.
- 1978 (thirtieth anniversary). Salaried staff: 78 (the director, the associate director, assistant directors, research engineers, research analysts, clerks, clerk-stenographers, clerk-typists, materials technicians, traffic technicians, materials research analysts, engineer trainees, a staff photographer, an illustrator, a printing press operator, a laboratory instrument maker, a chemist). Part-time staff: more than 100 (joint appointees, consultants, technical and clerical workers, graduate assistants, graduate legal assistants,



Lecturing on TRAF-NETSIM, 1990s

graduate student helpers, undergraduate student trainees, undergraduate student helpers). Budget: \$2,604,420.

1998 (fiftieth anniversary). Salaried staff: 55 (the director, research managers, research scientists, a transportation engineer, engineering technicians, traffic technicians, program support technicians, secretarial staff, a librarian, a computer support technician, a photographer, a graphic designer, a printing press operator, a utility worker, a public relations coordinator). Part-time staff: 60 (joint appointees, research scientists and associates, graduate research assistants, graduate legal assistants, undergraduate student assistants, consultants, public relations coordinators). Budget: \$6,428,521.

#### A Look at Significant Projects and Contributions

In the early years of operation, the Council focused exclusively on materials. This research led to the establishment of standards for skid resistance and major advancements in the types of materials and construction techniques used to build highways. As the scope broadened, the Council added research in economics, traffic management, safety, maintenance, structures, and environmental and historical concerns. By 1970, projects ranged from

conducting traditional materials research to developing methods for preparing environmental impact statements and establishing standards for constructing the first noise barriers in Virginia. As the transportation profession and VDOT's responsibility have become more complicated, the Council's research program has played a key role in applying the most advanced technology to transportation.

In a recent survey, Council staff and "alumni" mentioned the following (in no particular order) when asked about the Council's most significant research projects and contributions during its first fifty years:

skid resistance continuously reinforced concrete nondestructive testing concrete durability nuclear testing Superpave statistical approach to quality control high-performance materials alcohol countermeasures intelligent transportation systems historical bridge surveys sign reflectivity

Fifty Years of Excellence in Research

pavement marking cement stabilization of soils bridge studies cable-stay bridges rideability work zone safety expansive aggregates epoxies polymer concrete bridge deck testing cathodic protection transportation finance stormwater management. Howard Newlon felt that people,

not projects, were the Council's greatest products. He called attention to the large number of people (both in and out of the transportation professions) who had been trained at the Council and the large percentage of Council researchers who had started as student assistants and had "come up through the ranks." Indeed, the increase in membership on national committees speaks to the quality of the staff. In 1949, Council staff served on fifteen committees of national research organizations, including ten HRB committees. Now, fifty years later, Council staff serve on, and in some cases chair, more than forty TRB committees and are members of twenty-five NCHRP panels and more than ninety other technical bodies.

#### A Continuing Thread

Tilton Shelburne kept a printed card entitled "The True Gentleman" mounted on his desk during his tenure at the Council. It passed, in turn, to Jack Dillard, to Howard Newlon, and to Gary Allen, and for fifty years has retained its place on the director's desk. In many ways, it reflects the values-driven focus of today's Virginia Department of Transportation and, thus, the Virginia Transportation Research Council. The inscription reads:

The True Gentleman is the man whose conduct proceeds from good will and an acute sense of propriety, and whose selfcontrol is equal to all emergencies; who does not make the poor man conscious of his poverty, the obscure man conscious of his obscurity; or any man of his inferiority or deformity; who is himself humbled if necessity compel him to humble another; who does not flatter wealth, cringe before power, or boast of his own possessions or achievements; who speaks with frankness, but always with sincerity and sympathy, and whose deed follows his word; who thinks of the rights and feelings of others rather than of his own; who appears well in any company, and who is at home what he seems to be abroad—a man with whom honor is sacred and virtue safe.

# Epilogue

One of the most impressive aspects of the history of the Virginia Transportation Research Council is the remarkable vision of its creators. As they worked to establish the Council in 1947, they made decisions that not only served the organization well at the time, but also continued to carry it through decades of change.

We count the following among the key legacies that continue to have an impact on how we think, how we work, and how we meet the needs of our customers:

• The association with a well-respected university, the University of Virginia, which created an environment of objectivity and excellence in research and which provided access to resources, technical expertise, and students as enhancements to the program.

• The selection of Tilton E. Shelburne, a dedicated and extremely capable leader, as the first director. The respectful way he operated and the strength and capability of the staff he built during his twenty-year tenure set the standard of excellence for later directors and researchers.

• The decision that Council staff would be employees of the Highway Department. This fixed in both the directors and the staff a dedication to innovation and improved technology in the Department.

The thing we are most proud of is our strong partnership with VDOT's field and central office divisions and our relationship with the University of Virginia. At its founding, the Council had a single advisory committee for research projects. Today, we have thirteen advisory committees made up of more than 200 VDOT employees who make this partnership work.

This glance at our first fifty years helps us see the continuity of our organization, the legacy we have the duty to preserve, and the responsibility the Virginia Department of Transportation has vested in us. As we look to the future, our focus on *"Bringing Innovation to Transportation,"* the help we get from our advisory committees, and the support of VDOT's leadership will form the foundation for another *"*Fifty Years of Excellence in Research."

Gary R. Allen Director