

STATEMENT OF DEPUTY FEDERAL HIGHWAY ADMINISTRATOR LESTER P. LAMM
BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
AND THE
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS,
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Mr. Chairman and Members of the Subcommittees:

I am pleased to be here this morning to discuss highway research and development (R&D) activities and the efforts to implement the findings of the research program. Mr. Edwin Wood, Associate Administrator for Research, Development, and Technology (RD&T) is with me and will assist in answering your questions.

Background and Legislative History

Research was one of the principal missions of the first national highway program in the United States and is, in fact, the oldest continuous Federal highway activity. Highway research began with the establishment of the Office of Road Inquiry (ORI) in the Department of Agriculture in 1893. With the creation of this office, whose primary mission was to investigate the best methods of roadmaking and to assist in disseminating this information, a formal, organized research program began.

The first sustained fiscal support for highway research was authorized by the Federal Highway Act of 1921. The foundation for the Federal-Aid State Highway Planning and Research (HP&R) program was laid with the enactment of the Hayden-Cartwright Act of 1934. Under this Act, up to 1 1/2 percent of the funds apportioned to a State could be used for "surveys, plans, and engineering investigations."

The Federal-Aid Highway Act of 1944 added the term "research" to the phrase above, thus allowing the States to use their 1 1/2 percent funds for a variety of research purposes. Funds which were not used for planning or research reverted to the construction program. With the Federal-Aid Highway Act of 1962 came the restriction that the funds be used for planning and research purposes only. If they were not used within the availability period, the funds would lapse. The 1962 Act also gave States the option to use an additional 1/2 of 1 percent of their Federal-aid primary and secondary system funds for planning and research activities.

The Federal-Aid Highway Amendments Act of 1963 expanded the law to include "development" under the planning and research section. Congress intended development to be an integral part of the overall R&D program and this provision encouraged the States to take a more active role in the development phase.

The performance of highway R&D is currently authorized by Section 307, Research and Planning, of Title 23 of the U.S. Code (U.S.C.). The portion of this section applicable to the FHWA administrative contract and staff R&D programs states "(a) The Secretary is authorized in his discretion to engage in research on all phases of highway construction, modernization, development, design, maintenance, safety, financing, and traffic conditions, including the effect thereon of State laws and is authorized to test, develop, or assist in the testing and developing of any material, invention, patented article, or process."

Authority for Federally aided State R&D programs is contained in Section 307(c). This section, as amended by the Surface Transportation Assistance Act of 1982 (STAA), provides that 1 1/2 percent of the funds apportioned to each State under sections 104 and 144 shall be available for "engineering and economic surveys and investigations; for the planning of future highway programs and local public transportation systems and for planning for the financing thereof; for studies of economy, safety, and convenience of highway usage and the desirable regulation and equitable taxation thereof; and for research and development, necessary in connection with the planning, design, construction and maintenance of highways and highway systems, and for study, research and training on engineering standards and construction materials, including evaluation and accreditation of inspection and testing, and the regulation and taxation of their use." (Underlined items added by STAA.) The STAA also provided a minimum Federal share of 85 percent for this program.

The FHWA role in highway R&D has evolved with the changing legislation. Initially, the Federal Government had the major responsibility and resources for conducting research and disseminating the results. As the State research programs increased, FHWA provided a substantial amount of direct technical assistance to the States and conducted staff research in its own laboratories. In the past 10 years, the FHWA involvement has changed; the FHWA program has shifted to relying more heavily on the States to perform R&D and on administering contracts rather than direct FHWA staff research. Personnel allocations for the FHWA R&D program are shown in Figure 1. It should be noted that 44 of the positions currently allocated to RD&T are involved in transferring new technology to potential users, rather than conduct of R&D. This includes positions in the National Highway Institute, which was moved to RD&T in 1982.

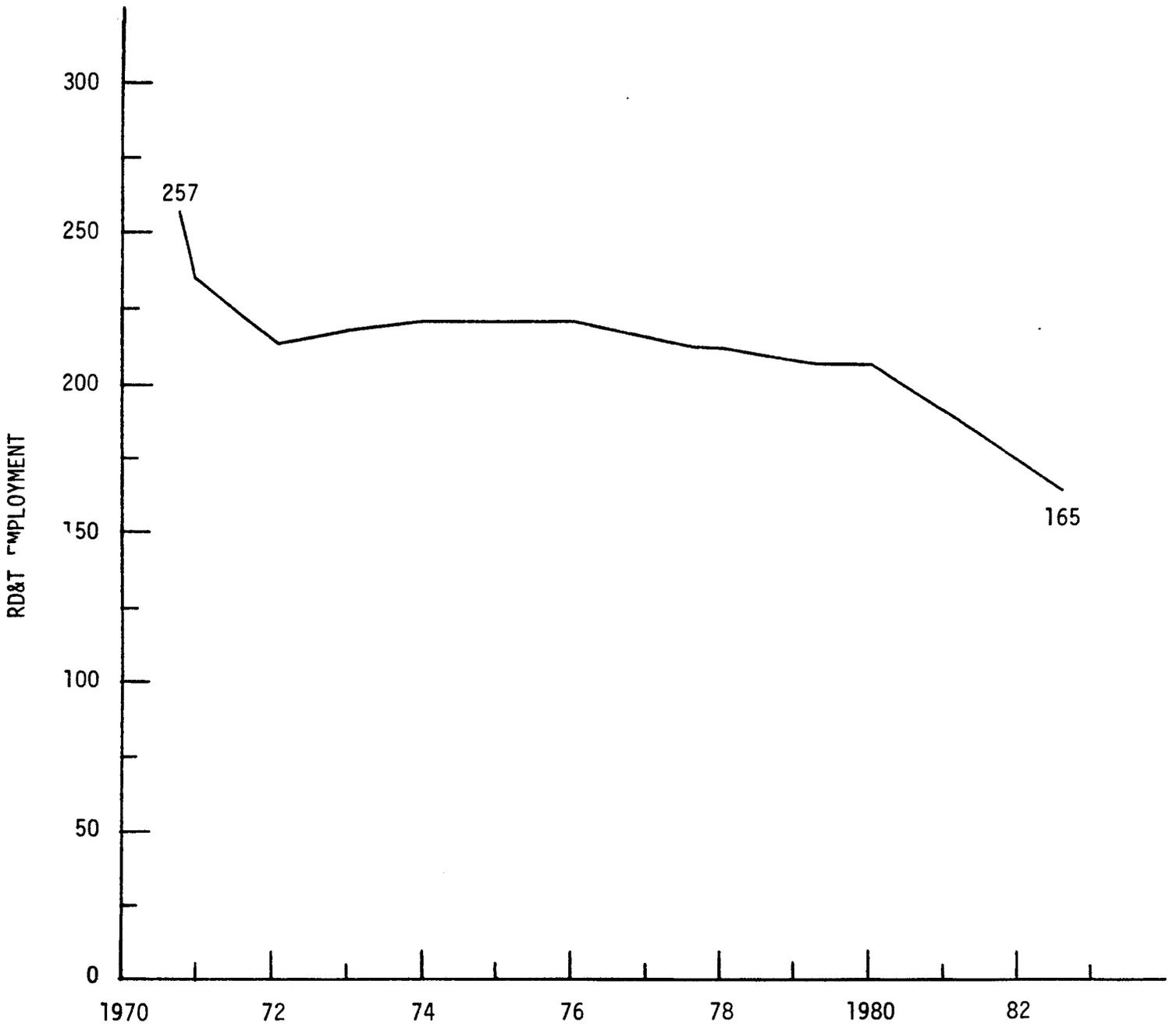


FIGURE 1
FHWA RD&T EMPLOYMENT

Current Programs

Federally assisted highway R&D programs will spend nearly \$60 million this fiscal year and involve many organizations and people. All of the States and many localities receive Federal-aid or administrative contract funds for R&D. Highway research is performed by contractors, universities, associations, institutes, State highway agencies, other Federal agencies, and our own staff. We also work cooperatively with the Transportation Research Board (TRB) and with other elements of the Department of Transportation. Through cooperative agreements with foreign nations, international research results are also included in the R&D program.

Today, there are four major programs performing highway R&D. These are the HP&R program; the National Cooperative Highway Research Program, or NCHRP; the FHWA administrative contract program; and the FHWA staff research program.

The HP&R program is the cooperative Federal/State venture authorized by Section 307 of Title 23, U.S.C. The available HP&R funds are used by the States to finance a two-part program: Part I, Planning, and Part II, Research. The share allocated to research ranges from 5 to 55 percent, with an average of approximately 20 percent. This year the States have programmed \$31 million, of the \$151 million available in HP&R funds, for research activities. States initiate R&D studies to be conducted by their own staff or by contract with public or private research organizations. Universities and colleges do a substantial portion of the State HP&R research. The FHWA provides technical guidance and coordination, and reviews and approves both the overall program and the individual study elements.

The NCHRP is a three-way contract between the American Association of State Highway and Transportation Officials (AASHTO), the FHWA, and the TRB. Research activities are selected by a special committee of AASHTO, called the Select Committee on Research, and administered by the TRB, with approval by the State highway officials.

Under this program, 4 1/2 percent of the HP&R funds are pooled by the States on a voluntary basis for research which responds to the collective needs of State highway agencies. The FHWA, being responsible for the Federal-aid funds used in NCHRP programs, reviews contractor selection, program content, and determines when completed work has fulfilled the technical requirements. Program selection and composition are the prerogative of AASHTO and the participating State highway agencies, through the Select Committee. For FY 1983, \$6.8 million is available for this program.

The FHWA now conducts a major portion of its own research and development work by contract as authorized by Title 23. Funding for this activity comes from the Highway Trust Fund and is reviewed, authorized, and appropriated annually by the Congress. These funds are separate and apart from the HP&R funds, and amount to \$21.5 million this year.

Contract research is performed by private firms, universities, nonprofit organizations, individual consultants, other Federal agencies, and State highway agencies. This work is contracted under Federal Procurement Regulations and supported entirely by Federal funds. The FHWA funding may be supplemented by other agencies within DOT, such as the Urban Mass Transportation Administration and the National Highway Traffic Safety Administration, and by other Government agencies such as the Department of Housing and Urban Development, and the Department of the Interior, when these organizations have mutual interest in the research.

The final program, our staff research and development, is conducted by FHWA employees. While some of the staff R&D is devoted to continuing efforts in major problem areas, a significant portion is geared to quick-action response for immediate problems identified by the operating offices of FHWA.

Our staff research activities have recently been enhanced by the completion of a new research facility at our Turner-Fairbank Highway Research Center in McLean, Virginia. The new structure provides 80,000 square feet of laboratory, office and support service space. The light laboratories include a highway driving simulator, pavement components laboratory, experimental vehicle preparation area, highway communication and electronics laboratory, and a highway noise laboratory. New heavy laboratories in the building include a structural and a highway hydraulics laboratory.

Approximately 20 percent of total R&D employee time is spent conducting staff research. The remaining time is used to plan, administer, and monitor activities supported by Federal funds, including contract research, HP&R, and NCHRP. An important benefit of staff research is direct involvement with the latest technology, thus enhancing staff ability to manage research contracts and aid the States in the HP&R program.

R&D Budgets

Budget allocations for highway R&D are shown in Table 1. For FY 1982, the FHWA administrative contract allocation was \$18.5 million or 0.22 percent of the total FHWA authorization. With the addition of the FHWA staff research and the funds allocated to R&D by the States under the HP&R programs, the total obligated for highway R&D was \$40.3 million or 0.47 percent of the total Federal allocation for the highway program.

With the increased funds available from the Surface Transportation Assistance Act of 1982, the State allocations for R&D have increased from \$19 million in FY 1982 to \$31 million in FY 1983. In addition to the activities in the Federally supported HP&R program, some States supplement this program with additional 100 percent State funds. For FY 1983 the States have allocated an additional \$20 million for planning activities and nearly \$12 million for additional R&D work. In future years there is a strong indication the States will use the increased HP&R funds to finance many activities previously covered with 100 percent State funds, that is, Federal funds will substitute for State funds. It should also be noted that the size of the research program in many States is constrained by the limited staff available to conduct or administer the State program.

Table 1

	<u>FY '82</u> ^{1/}	<u>FY '83</u> ^{2/}	<u>FY '84</u> ^{3/}
Highway Authorization	\$8.5B	\$13B	\$13.4B
FHWA Contract R&D	\$18.5M (0.22%)	\$21.5M (0.17%)	\$23.6M (0.17%)
Total Highway R&D	\$40.3M (0.47%)	\$43.0M (0.34%) ^{4/}	\$48.7M (0.35%) ^{4/}

1/ Actual Obligations

2/ Programmed Amounts

3/ Estimated Allocations

4/ Increased to \$58.6M (0.46%) for FY 1983 and \$65.1M (0.47%) for FY 1984 to reflect current State Work Plans and projected plans for the HP&R program.

Program Control and Coordination

The FHWA is responsible for coordinating the activities within the four R&D programs and minimizing duplication of effort. With over 1400 active studies each year, this could be difficult. In 1970, we created an overall national program structure to coordinate the many activities and plan the future work. This structure, designated as the Federally Coordinated Program of Research and Development (FCP) is continually updated to reflect the most urgent problems facing local, State, and Federal highway officials.

The FCP is not merely a system for classification and tracking of activities. Rather, it provides active leadership to focus the efforts of the many participants on the problems of current national interest. The FHWA research staff selects those aspects of such problems which can best be addressed by Federal contract or staff activity, and actively promotes Federal-aid studies on aspects which the States' research resources are in the best position to undertake. The States have experience with operational problems and a pool of research talent which cannot be obtained elsewhere, and often have effective cooperative arrangements with local universities for studies of highway problems. By this approach, the FCP serves to integrate the efforts of all participants, allowing common objectives to be achieved within the shortest possible time and at minimum cost. The involvement of the States also facilitates the subsequent step of technology transfer of research results into practice.

The structure of the FCP provides a framework for organizing the major areas and distinguishing the subelements of these areas. Thus, major program areas are classified into categories, each category is divided into projects, and each project subdivided into tasks. Individual studies within tasks are the smallest identifiable elements in the program.

The major areas, or categories, in the FCP are:

Safety

Traffic

Maintenance and Environmental Management

Pavements

Structures

Work within these categories accounts for approximately 70 percent of the total highway R&D program. The remaining 30 percent of the R&D effort seeks solutions to problems of local, rather than national, interest, and is not included in the FCP.

Program Development and Priorities

The FCP is not a rigid structure. Activities within the program are updated as old problems are solved and new problems arise. This is particularly necessary in a time when we are moving from a major interstate highway construction program to a period of restoration and reconstruction of the existing highway system.

When Ray Barnhart became the Federal Highway Administrator, he questioned the process used to develop the program and priorities for our administrative contracts. Under his guidance, we have undertaken several actions to improve this process.

As a starting point, we acted like good businessmen; we asked our customers for advice. Acting on Administrator Barnhart's suggestion to the AASHTO Policy Committee, last year we asked all of the State highway administrators to comment on the Federal role in highway research, development and technology transfer, and requested their recommendations for priority work. Forty States responded to our inquiry. They gave overwhelming support for continuation of our current functions, and provided many positive recommendations.

- o Over half of the respondents specifically cited and strongly supported our technology transfer activities
- o Work in the pavement management area was noted as a priority by 23 States
- o One-third of the States indicated the need for more State or other input (including TRB and AASHTO committees) to the FHWA RD&T program development and project selection process
- o One-fourth of the respondents cited the need for research to support 3- and 4-R work, with cost-effectiveness as a principal focus
- o Seven States specifically noted the need for FHWA involvement in basic or long range research, and
- o Five States supported planning research related to highway finance and resource allocation

We appreciated this fine response from the States and have already started actions responding to their recommendations.

Last year when we were developing the FY '83 program, we asked our FHWA Pavement Management Coordinating Group, which includes representatives from our offices of Engineering and Highway Operations, Research and Development, Implementation and Planning, to review and develop new studies in the pavement area. There was good coordination among the research and operating office staff, and we were very pleased with the recommended program which resulted from this effort.

For the FY '84 program we expanded that approach, establishing Research Advisory Councils in the remaining areas of the FCP: Safety, Traffic, Structures, and Environmental and Maintenance Management. These Councils, composed of FHWA Headquarters and field office representatives, also coordinate with the appropriate TRB and AASHTO Committees, and others who can help keep our program responsive to the needs of the highway community.

After the individual Council recommendations are reviewed by top management in RD&T, the major activities in the entire program are presented to our Contract Review Board. This Board, chaired by our Executive Director, was created to assess individual requirements in the light of overall FHWA program priorities and to ensure the appropriateness and cost effectiveness of the methods used to satisfy program needs.

Two other activities are underway which will affect the content and form of the program. The first deals with how to identify and justify a long term component in the research program. Although it is tempting to do so, highway research should not be confined to solving today's problems; it must also anticipate and identify future needs in the highway system. In addition, there must be sufficient lead time so solutions can be found before the needs reach crisis proportions. Due to the urgency of some current operating problems and budget limitations, the long range research activities in our program have been somewhat reduced in the past several years. We have been able, however, to continue long range work on development of substitutes for binders derived from petroleum sources, the development of a noncorrosive and environmentally acceptable replacement for salt as a deicing chemical, improved criteria for design of bridges to resist earthquakes and strong winds, improved welding technology and flaw detection techniques, certain aspects of accident analysis and skid resistance, and traffic flow simulation. We are actively working on a plan to revitalize and expand the long range activity and specific budget proposals for the FY '85 program to finance this activity.

We have already sought advice from our field offices, States and others in the highway industry, and developed preliminary topics for the long range research component. We are also anticipating good information from the Strategic Transportation Research Study which is being conducted by the TRB with our financial support and technical assistance. We believe this study will be very helpful in recommending priority work areas and appropriate resource allocation for the next several years. It is also expected some basic research needs will be identified through this study.

Our final effort in this area is an attempt to improve our communication with State highway agencies and others regarding research needs. We have recently established new procedures to solicit research problem statements and major new project recommendations from the States. The system is patterned on the successful process which is already used for the NCHRP. We will also use the Federal Register to seek wider input regarding our program and priorities.

Technology Transfer

The final effort in our RD&T process is Technology Transfer. Even though the R&D program may be responsive to our needs and produces valuable new technology, we do not reap any benefits until the technology is understood and adopted by State and local highway agencies. Our technology transfer program provides the special effort needed to bridge the gap which often exists between research and practice. To emphasize the importance of this activity, we have made technology transfer a management Emphasis Area in FHWA this year. This ensures special attention to technology transfer activities, both in Headquarters and in our field offices.

The technology transfer program includes four major activities with functions as follows:

Implementation - Translates research findings into a form which is more readily understood by a practicing engineer or highway official. Using the research findings as a base, field tests and evaluations are often conducted in cooperation with the State highway agencies. If the technology proves useful in the field, user manuals, technical advisories, video-tapes and slide-tape presentations are developed to ease and promote adoption by the potential users.

Experimental Projects - Determines whether previously researched, field tested or documented materials, techniques or equipment can be adopted for use in highway construction. Experimental features are incorporated in Federal-aid highway construction projects to determine the suitability of the features as regular construction items. Results of the field evaluations are published in a National Experimental Projects Tabulation.

Demonstration Projects - Selects R&D products which can best be promoted through actual onsite demonstrations. The three promotional techniques used in this activity include hands-on demonstration, workshop training seminars and pilot demonstration installations at appropriate locations.

National Highway Institute Training Courses - Develops and presents training in new highway technology to State and local highway officials and their employees. Activities authorized by Section 321 of Title 23 U.S.C. include presentation of courses in "modern developments, techniques, and procedures relating to highway planning, environmental factors, acquisition of rights-of-way, engineering, construction, maintenance, contract administration, and inspection."

In addition to these special efforts to get new technology to State highway agencies, we are also emphasizing new technology for local highway agencies. There are thousands of cities and counties in the United States with bridge and highway responsibilities, and they could benefit from our work. Although some States already provide technology and assistance to local agencies, many have neither the mandate nor the resources to do so.

We have worked with the States and selected 14 locations to serve as technology centers or contact points for the local governments. The centers will maintain a stock of new technology reports and other materials, and will provide certain services to the local agencies. This includes newsletters, advice on new technology available for specific local problems, and presentation of short training courses.

This is a pilot program which will run for 2 years. At the end of the pilot phase we will evaluate the effectiveness of the program and, if warranted, will try to continue the program in the future. There is also a possibility the program may become self-supporting in some States.

Conclusion

Mr. Chairman, I have tried to give an overview of the four elements in the highway R&D program which is administered or financially assisted by the FHWA. I have described the FCP, our program coordination structure, and explained the several activities used to develop and update our administrative contract program. Finally, I have indicated the special efforts which are made to prevent research results from lying on the shelf, unused by the highway agencies. We believe our technology transfer efforts have been very successful, and our recent survey of the States confirms this belief.

This concludes my prepared statement, Mr. Chairman. Mr. Wood and I would be pleased to respond to your questions.