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APPRAISAL OF UNIVERSITY-BASED
RESEARCH IN URBAN TRANSPORTATION

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APPRAISAL OF UNIVERSITY-BASED RESEARCH IN URBAN TRANSPORTATION

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ABSTRACT

University-based research in transportation, particularly urban transportation is in disarray. This disarray stems from a major decline in research funding in real terms available to universities and from a lack of a consistent policy and practice with respect to research in transportation. As a result, university researchers are pursuing new options for both basic and applied research in transportation. This paper sets forth issues involved in developing university-based research programs in transportation. Particularly, it argues for a more open and peer review based process for a basic transportation research program. This paper provides a context for needed assessment of the university role in such research. The effort should also include U.S. DOT and TRB. There is also a need to distinguish among basic and policy research, training, and technology transfer and provide coherent programs for each.

Introduction

University-based research in urban transportation is in disarray. Declining financial support, the lack of stable research programs, and the absence of consistent funding for research and

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training programs have resulted in a number of talented university researchers moving away from transportation and gravitating to research areas where funding is more predictable, reliable and available. The lack of research funding is not only siphoning existing researchers away, but the field is not attracting new talent. The loss of research, as well as the loss of training programs, is damaging the flow of qualified professionals into transportation and will have long-term effects on the overall vitality of the nation's transportation services. The reason for this disarray is manifold. Largely though, it stems from a major decline in research support and the lack of a consistent policy and practice with respect to research in urban transportation, particularly basic research.

Absent a consistent research policy, the mission-oriented research programs of the U.S. Department of Transportation (DOT) have started, changed, or stopped with disturbing frequency. The theme of this paper is that there is a need to rethink research policy at the federal level and to revitalize programs of university-based research in transportation.

Two DOT programs designed for universities are considered in this paper, the Urban Mass Transportation Administration (UMTA) University Research and Training (URT) program and the University Research and Technology Innovation program of the Research and Special Programs Administration (RSPA) and formerly of the Office of the Secretary. These two programs have provided the bulk of

support for urban transportation research, particularly as it relates to policy, planning and public transportation issues. Other programs of the federal government such as those of FHWA have focused on non-urban issues and physical research. For example, the university-oriented Rural Transportation Assistance Program (RTAP), Federal Highway Administration (FHWA) is primarily a technology transfer program, and is not included in this analysis, directly. UMTA's URT program is examined most closely because it has the longest history and has been the subject of considerable discussion and analysis. This focus on the UMTA URT program does not single it out for criticism, but serves to provide examples for the issues raised in this paper.

Background

During the past several years there has been a major decline in the federal funding available for university activities in transportation both in absolute and real terms. The U.S. Department of Transportation periodically publishes reports of awards to academic institutions (1). These reports list awards by different agencies within DOT and provide a basis for a review of past funding trends. The overall pattern in awards by agency is shown in Table 1. These awards cover a variety of activities, both research and training in all aspects of transportation and include physical research as well as research in policy and planning. This section describes an analysis of these data as it pertains to activity in urban transportation. Several modifications were made from the U.S. DOT reports in order to prepare this table. First, indirect awards to universities via

NCHRP and HPR funding from FHWA were added to the FHWA totals for fiscal years 1972 to 1975 to be consistent with the remainder of the table (2). Secondly, awards under the UMTA university center program were added for fiscal years 1984 and 1985. Finally, awards by the Federal Aviation Administration to Oklahoma University beginning in fiscal year 1982 were excluded. These latter awards are for very specialized activities including air traffic controller training which does not impact on universities in general and the large amounts (\$11.0 million estimated for FY 82, \$14.4 million in FY 83, \$10.8 million in FY 84 and \$21.8 million in FY 85) present a distorted picture of overall university activity in transportation. It should also be noted that the table does not include awards to universities by agencies outside of U.S. DOT. Several agencies such as NSF have made awards for transportation related topics. Ideally, these figures should be obtained to complete the picture.

As can be seen in Table 1, awards to universities reached a peak in 1974 and have generally declined in absolute values since that time. Funding increased in 1972-74 due to the start-up of the program of university research in the Office of the Secretary (later in the Research and Special Projects Administration) and general increases in activity by FHWA, FAA and NHTSA. During the time period of 1974 to 1978 funding was maintained at a level of \$25 to \$30 million per year. Following 1978, funding has declined to a range of \$16 to \$19 million per year in fiscal years 1982-85.

The decline in funding following FY 1978 has occurred at the same time that the costs of performing activities at universities have increased substantially. For example, monthly stipends of half-time graduate students have increased from approximately \$300 per month in 1972 to over \$700 per month in 1985. It is interesting to look at funding patterns using constant dollars. In order to do this, a cost index was developed based on the cost of graduate student support at universities. This is shown in Figure 1. The cost index is based on the annual cost of supporting a graduate student including fringe benefits and overhead for various years with 1972 given a value of 100. While this index does not include all elements of the cost of activities at universities, it is reasonably representative of the general pattern of the costs of university activities.

Using the cost index the awards for university activities were recalculated in constant dollars for UMTA and OST/RSPA. These two agencies have provided the bulk of support for work in urban transportation as well as for policy and planning research. The results of these calculations are shown in Figures 2 and 3. In both cases there has been a substantial decline in funding in real dollars. Awards from UMTA (Figure 2) have declined by over 75 percent in real terms since 1972. This program historically provided support for research in public transit and urban transportation planning. The decline in support is even more dramatic when the size of the university program is compared to the total range of UMTA activity. UMTA activity has significantly expanded over the past fifteen years while the

university program remained constant or declined. For example, in 1972 approximately one dollar out of every \$230 was spent on the university program. In 1975 the spending ratio was one dollar per \$700, in 1980 it was one per \$1,700, and in 1985 it was one per \$2,300. The net effect of these trends is that universities have played smaller and smaller roles in providing the research and training base to support transit activities.

Awards by the Research and Special Projects Administration (Figure 3) declined by over 80 percent in constant dollars since their peak in 1975. This program has provided support for a variety of activities ranging from broad scale policy studies to specific physical research with application to specific modes. The OST/RSPA program had an initial buildup of expenditures during the period of 1972-75 when the program was first initiated. Funding reached a peak of approximately \$6 million 1972 dollars in 1975 and declined to approximately \$0.75 million in FY 1985. The situation beyond 1985 is even worse. Virtually all funding for this program has been eliminated beyond fiscal year 1985.

The combined pattern of declining funding for these two programs presents a dismal picture. Eighty percent of the buying power of universities to do federally supported work in urban transportation has disappeared in a ten year period. The effects have been significant. Many universities that once had strong, active programs now do little, if any, work. Universities now

play an insignificant role in providing basic knowledge in transportation policy and planning. The number of people entering transportation with a solid background in fundamentals has declined. The past fifteen years have been a period with shifts in policy and emphasis and major budget constraints. However, it appears that this dramatic decline in purchasing power occurred not because of any conscious decisions that university research was ineffective or unnecessary. Rather, it was a situation that other short term needs were more critical while university programs were vulnerable. Perhaps the time has come to take a long term look at where we have been and what the future should be. The erosion of funding needs to be looked at and policies need to be established. It is for these reasons this paper was prepared.

Issues and Actors

In examining university research in urban transportation several issues need to be considered and debated. These are mission vs. basic research, program size, administrative location, review process, and program design. The problems of shrinking funding have focused attention to these issues as competition increases for the remaining funds and as more people become aware of the problems.

The issue of mission vs. basic research was correctly brought up by reviewers of an earlier draft of this paper as an important question that needs to be addressed. Agencies within U.S. DOT have concerns that relate to carrying out their mission have

supported research which can be directly applied to solving their problems. More basic questions often are not dealt with because of time pressure and/or because they do not have an immediate relevance to agency needs. As the buying power of research funds has declined, the level of basic research has decreased even faster, leaving little if any activity left. The balance between basic and mission oriented research needs to be defined in any future programs.

The issue of administrative location is related to the question of mission vs. basic research. To the extent that research is basic, it should be housed in an agency with basic research concerns. This could be within U.S. DOT or elsewhere, such as the National Science Foundation. Likewise, that work which directly relates to particular agencies should be directly supported by those agencies. The distinction between basic and mission oriented research is not always clear so these distinctions are not easy to make. The audience for the results of the work is critical. Research done for an audience of other researchers may be viewed as basic, while research which is intended to be used by practitioners in the field is more mission oriented.

Program size is a critical question which relates to type of research and administrative location. In the current situation with relatively little support available for activity of any sort, the questions of type of activity and location become moot.

There are no easy ways to determine the proper level of support for research and training in urban transportation. It should be a legitimate proportion of total expenditures; what that proportion should be is open to question. There appears to be a need for the different people involved to take a serious look at this question.

Several efforts have been underway recently to expand university work in transportation. These have included:

1. Legislation modifying UMTA's Section 11 URT program that calls for the establishment of ten regional transportation centers, and,
2. A proposal to create a separate transportation research program in the Engineering Directorate of the National Science Foundation (NSF).

This paper will focus on reform of existing programs within UMTA and RSPA, through the use of peer review and modified program design. We suggest a series of national discussions on these options. Such discussions ought to include all the actors, not just university researchers, but state and federal DOT officials, TRB, and NSF as well. It ought to focus on institutional options for fostering university-based transportation research--basic and applied, urban and rural, and for all modes. With this breadth of scope, some sort of mixed strategy may be needed, which would support the need for a coordinated effort on an array of research programs. This discussion also needs to relate to other more general activity in transportation research.

The DOT, in cooperation with the Transportation Research Board (TRB) has developed a Strategic Highway Research Program (SHRP) that deals with the hardware and management side of the highway program (3). A similar effort is underway in the Group 1 council of the TRB for planning and policy needs for research on highways and transit. Although significant, these efforts do not explicitly address ways in which the university research community will be involved. Similarly, the recent TRB conference on Transportation Education (4) focuses on training needs to supply the transportation agencies and does not directly address university research programs. Finally, the recent NSF sponsored conference on research needs in transportation (5), did not directly address the DOT's university research program needs.

Recent modifications in UMTA's University Research and Training Program and the demise of the RSPA program exemplify the need for examination of problems and whether reforms would strengthen research productivity and depoliticize the current process of awarding grants. The issue is important because the lack of predictability and fairness has led some transportation researchers, to seek directly from Congress an appropriation for regional university research centers. This effort was initially undertaken in 1979. Authorization language has been approved, but several attempts at appropriations have not succeeded. Some in DOT have resisted attempts to fund the program because it takes the Department out of the decision process concerning the

nature and control of research done on its behalf. While this stalemate continues, university-based research flounders. Although, some awards are made to universities in the procurement of research by DOT, ideas and research generated from the university side are difficult to surface where the initiation of research is the responsibility of DOT rather than the investigator.

A major actor in the research process is the Transportation Research Board (TRB). Its traditional role has been to provide a forum for presentation of research results via conferences and publications, and an organizational forum to identify research needs. NCHRP and NCTRP, administered by TRB, serve state and local applied transportation research needs as well as national ones. Although University-based researchers, acting through TRB, influence the mission-oriented research of NCHRP and NCTRP, there is not a competitive general transportation research program within the TRB structure to fund more basic, university research.

UMTA's Research and Training Program in Urban Transportation

The purpose of this section is to examine in depth the UMTA URT program of creating and maintaining a research program. The research and training program in UMTA has undergone several changes since its creation in the late 60's. Initially, the UMTA program supported the development and nurturing of urban transportation programs in about ten universities that had existing programs in transportation. In the early 70's the

program was expanded to more universities, some of which had no prior programs in urban transportation. These universities used UMTA funding to marshal resources and people to create identifiable programs in urban transportation.

Concern over the need to effectively manage the program led to an UMTA contract with George Washington University to examine the program. The GWU report recommended concentrating a major part of the funds to create centers of excellence which would provide larger amounts of money, a continuity of funding and allow for the creation of programs having a critical mass of faculty with urban transportation interests.

The study team at GWU was commissioned in October, 1973 to investigate how university based centers for urban transportation might be started or more effectively continued through UMTA support (6). Important findings of the study include:

1. UMTA grants to universities have significantly increased the amount of research produced and students trained in the field of urban transportation.
2. Shortcomings of the present UMTA grants programs include uncertainty of UMTA's funding priorities and funding commitments, insufficient technical monitoring of work in progress and technical evaluation of results, dispersion of funds to a larger number of institutions than can be effectively monitored, low utilization of research products, uncertain results regarding the placement of graduates in urban transportation careers, and low utilization of university expertise in support of UMTA staff activities.
3. Project grants are not adequate for obtaining "mission-oriented" research.

4. Special-purpose, interdisciplinary efforts in a university context seem to have been most successful when full-time leadership with influence in both the university and the field concerned is available. A university climate amenable to an effective working relationship with both university and field personnel is also helpful.
5. The present and future need for those persons in the transportation field who would be trained by universities is unclear.
6. Whether a university is a public or private institution has little relevance to its ability to serve as a resource for a region larger than a single state. Other institutional characteristics may, however affect this ability.

Major recommendations of the study addressed the perceived shortcomings of the UMTA research funding program and included:

1. UMTA should initiate only a limited number of programs for urban transportation research and training in universities. This would allow a higher level of funding at the institutions than has been the case in the past.
2. A portion of the funds for each grant year should be reserved for less extensive project activities. These projects should assure continued support for innovative and creative concepts, systems, and technologies for transportation in urban areas.
3. A more extensive undertaking, designated as "centers" should be evolved later, on an experimental basis, from one or more programs. A center would contain a wider variety of activities and a stronger commitment on the part of the host institution in terms of policies and resources.
4. A Steering Committee should be created for program monitoring and development. The committee would be composed of UMTA staff, university personnel, representatives of transportation planning and operating organizations and professional consultants.
5. A phased transition should be made from the present system to the proposed new approach.

UMTA adopted most of the GWU recommendations and funded three such centers in the mid-70's--Brooklyn Polytechnic University, the University of Illinois, Chicago and University of California at Berkeley. These centers had an initial funding period of three years. Funding for the program remained constant or declined while pressure to spread the money around grew and the project side of the program grew at the expense of the centers. Independent projects became the primary mode of operation for the UMTA program during the late 70's as individual investigators submitted research proposals in response to research topical areas of interest to UMTA. Except for a solicitation for a 3-year program grants in 1979, UMTA's interest in providing institutional support for broader university research and training programs waned.

During the early 80's the tide turned again, UMTA resurrected the GWU report in response to then Administrator Teele's program initiatives. The GWU report became the vehicle to justify a new set of programs called Centers for Transit Research and Management Development. A total of nine centers were established, beginning in Fall, 1983. Again, the expectations for these Centers have not been fully realized and their funding is not being continued. This program had also been criticized for the lack of an open and competitive selection process.

The 1974 GWU report was the major comprehensive study of the state of urban transportation research funding through UMTA. Although UMTA has performed several internal reviews of the

Section 11 program, none have been widely circulated.

A major problem with respect to the Section 11 program has been the balance or tension between its training and research missions. The universities view the problem as training researchers and entry-level professionals, while UMTA and the transit industry have emphasized the need for in-service training and technology transfer. UMTA's research emphasis has been to develop immediately usable research products for transit operating agencies. Basic research and long-term issues tend to be ignored in this type of environment.

The UMTA University Research and Training Program does not have a strong constituency within UMTA, the transit industry, nor universities. In fact, unhappiness with the UMTA Section 11 program was instrumental in persuading some universities, acting through the Council for University Transportation Centers (CUTC), that the mission orientation of UMTA is not conducive to research, particularly basic research. Consequently, they have gone directly to Congress for line-item funding for transportation research. This effort has been ongoing since the late 70's and has yet to produce a funded program.

The rationale used for this proposal is presented in the following summary of a statement to the House Subcommittees on Transportation and Related Agencies, U.S. Congress, made on April 27, 1983 (7).

Summary of "The Need for Increasing and Sustaining University Research and Development in Transportation". Universities

can contribute effectively to maintaining viable transportation through research and development activities. The concept of regional transportation research centers could be extremely beneficial to the United States. This would permit continued resources to be devoted to addressing problems of national and regional interest. Currently, there are over 300 individuals working in transportation research and development and in teaching.

Programs that fluctuate cannot be strong contributors to solving transportation problems and issues. Continuity in programs is essential. Federal funding is needed if research and development in transportation is to be undertaken. The benefits of much research and development in transportation is national in nature, so it is unrealistic to expect that individuals in states fortunate enough to have quality university transportation programs to shoulder the burden on behalf of the nation at large.

There is a very direct linkage between training and successful research and development. If research and development is neglected, the U.S. will lack the brain power to be a viable competitor in world markets. Long term consistent support of transportation research at university research centers is the only way to accomplish these goals.

This argument relates to the value of university research but does not directly relate to the particular form that a university research program should take. The research program spelled out in the most recent version of legislation takes the form of regional centers. These centers require a minimum program size, and require a fifty percent non-federal match. This will make it difficult for many schools to participate, and may result in guidelines, written by an unsympathetic DOT administration, that hamstrings the program. The concept appears to limit participation to only large universities and/or or consortia of schools. The efficiency and effectiveness of such an approach

remains a question of debate.

The case for transportation research and regional transportation centers in particular, may or may not be persuasive to Congress, particularly in the time of major budget shortages. If it is not, it is essential that university-based transportation researchers and federal officials begin a new a process to deal with the research issues and to create an effective program of university research. The remainder of the paper will present our views on how to structure future university work in urban transportation. Two basic elements are discussed. First, the need for a peer review process to assure the quality of effort and to help depoliticize the program. Secondly, we propose a set of ground rules which can be used to insure healthy competition among universities while at the same time be used to consider their strengths and weaknesses.

The Peer Review Process

In this paper, peer review is being proposed as a means to more efficiently and equitably allocate research funding in the area of transportation. Because this process has not been used for the funding of transportation research in the past, we will look at the peer review process used by the National Science Foundation (NSF) and the National Institutes of Health (NIH).

The peer review process takes different forms but can be defined in a general sense in the words of one researcher:

"Stripped of its elegance, it is simply a sensible arrangement for enlisting volunteer referees to call balls and strikes on proposals pitched to funding agencies. Its credibility and durability rests on the integrity and responsibility of the referees. That in itself is no small thing and is indeed the center beam which holds up the house of science."(8)

Peer review is a process by which peers in the research community are asked to review research proposals and make recommendations as to which proposals should be funded based on their extensive knowledge of appropriate research in the given field of inquiry. The two Federal bodies that currently make the most extensive use of the peer review system are the NSF and NIH.

NSF makes use of a single stage review process. This process is described as follows:

"For each application for a grant, a NSF program director selects a group of scientists, generally four or five, who are knowledgeable in the relevant subject matter, to act as referees. Each reviewer is sent a copy of the proposal and is asked to evaluate it on the basis of scientific merit, and on the ability of the principal investigator. Ability of the principal investigator is currently defined as the quality of his or her recent scientific performance. Each reviewer is asked to make substantive comments and to assign one of five ratings to the proposal; excellent, very good, good, fair or poor."(9)

In the NSF peer review system, the final assignment of funding priorities is left with program directors.

The NIH uses a two stage review process. Proposals are initially reviewed by study sections composed entirely of nongovernment scientists. The proposals are organized and ranked according to their scientific merit. The study section recommendations are then forwarded to the appropriate NIH institute for review by an advisory council of nongovernment scientists and informed laymen. Institute officials cannot make research awards without the prior approval of their advisory council. Thus, projects are ranked in the first stage of review by their scientific merit and in the second stage according to their relevance to the institute's objectives (10).

The peer review process has faced much criticism in the past. The most common criticisms include (9, 10, and 11):

- Decisionmaking is taken out of the hands of elected officials and their appointees and is put into the hands of people who are not accountable to the public.
- Peer review enables the scientific community to use public funds for its own purposes, that is "pure" research, while ignoring the pressing needs of society that might be more properly addressed by "applied" research.
- Peer review discriminates against scientists working in small science departments at low-prestige universities and colleges.
- The opinions of non-academic scientists are not adequately weighted.
- Proposals of questionable scientific merit often fail to be screened out.
- Peer review is an incestuous buddy system or "old-boy" network that stifles new ideas and scientific breakthroughs.

Criticism was heaviest in regard to the NSF, and was the subject of extensive congressional debate in the mid-1970's. Several studies were undertaken to address the criticisms leveled at the NSF. A five year study performed by the National Academy of Science's Committee on Science and Public Policy (COSPUP), yielded some conclusive answers to the questions raised by critics of the peer review system. These results can be summarized as follows (12):

1. There is a high correlation between reviewer ratings and grants made. If one attaches numerical values to the ratings, say from 10 for poor to 50 for excellent, the mean scores predict with a high degree of accuracy which proposals will be funded and which will be denied.
2. For the 1200 proposals studied, there was not a high correlation between grants awarded and measures of the previous scientific performance of the applicants. This result was unexpected, because one of the evaluation criteria is the ability of the applicants to perform the proposed research.
3. Reviewers at major institutions did not treat proposals from applicants at major institutions more favorably than did reviewers at lesser institutions. There was, in fact a tendency in the opposite direction.
4. Professional age (length of career) had no strong effect on either ratings received or the probability of receiving a grant.
5. There were low or moderate correlations between reviewer ratings (and the funding decision) and the following characteristics of applicants: prestige rank of current academic department, academic rank, geographic location, NSF funding history over the previous five years and focus of Ph.D. training.
6. The peer review system employed by the NSF is essentially free of systematic bias.

The study concludes that the NSF peer review process is an equitable one. The second phase of the study examines the rationality of the process, the degree to which random elements are minimized and substantive considerations such as the quality of the proposal and the ability of the principal investigator are maximized. The conclusion of the study is that getting a research grant depends to a significant extent on chance. The degree of disagreement within the population of eligible reviewers is such that whether or not a proposal is funded depends, in a large proportion of cases, upon which reviewers happen to be selected for it (13).

The peer review process has undergone relatively intense scrutiny over the past ten years. In the face of strong pressure by critics, both the NIH and NSF continue to use the process and the processes have to a certain extent been modified to address these critical concerns. The peer review process appears to work well at NSF and to be free of bias. As a result of the COSPUP study, many of the criticisms of peer review have been laid to rest.

Applied to transportation research, peer review could provide a rational and equitable approach to the funding of research. In addition to the basic benefit of a systematic form of independent review, peer review would help established researchers in the field who serve as reviewers. It would help clarify research issues and to identify significant research being performed by young researchers. A key element of this process is in the

definition of peers. That research which is basic in nature should be reviewed by the users of basic research, that is, other researchers familiar with the state of the art. That research which is very applied and mission oriented should be reviewed by its users, namely practitioners and field users who can best assess its utility.

Design of Future University Programs

Given the experience of university "centers" under UMTA and similar experience under the Office of University Research, RSPA, there is a need to think more about a structure for funding research in transportation. This section provides suggestions for the future direction of urban transportation research. These are provided in two categories as they relate to program design and university characteristics.

PROGRAM DESIGN:

Multi-year commitment: To provide a viable program, a multi-year commitment is necessary. Certain activities--internships, advanced research, degree programs, library enhancement--take a long lead time to implement. These activities cannot reasonably be accomplished without some assurance of continuation of support over several years. Funding commitments should be for a minimum of two years, preferably three. At the same time, there is a need for some means to cut off university activities that are unproductive. This could be accomplished by step funding, or funding by phases.

Research/technology transfer balance: Universities should have the opportunity to engage in both research and technology transfer, not just one or the other. The two activities are synergistic. A two way flow will lead to better research and better technology transfer. Universities should work in both areas to enhance this interaction.

Service to a national market: Centers should be viewed as serving the needs of the transportation on a national rather than a regional scale. Few, if any transportation problems exist only in certain areas of the country and it is natural that the services of universities be made available to all areas. The concept of regional centers of university activity as such puts artificial limits on research activities and effectiveness. Neither university capabilities nor transportation problems neatly fit into regional categories, and to attempt to force them in that direction would be counter productive. Geographical distribution of centers should be a minor consideration in selection.

Open competition: It is important to maintain an atmosphere where all who wish to can compete for funding for centers. Large schools, small schools, public, private, individually or a consortium, should all be allowed to compete. The concept of the "level playing field" applies here. The

program should be designed to avoid preconditions for participation such as a minimum university contribution or a big matching contribution in order to submit a proposal. Small schools should be allowed to compete and should have direct access to programs without having to go through a consortium to do their work. While consortia may work in some cases, they will not work in all cases and to rely upon them as the primary way of program operation will limit competition. The rules should be made clear to all in order to let the best rise to the top.

Adequate funding level: The funding level of the centers should be sufficient to provide for full time commitment of key faculty and students to the program. This would include support for a half-time director, 2-3 faculty associates, support for 4-6 graduate students, academic staff to administer continuing education programs, secretarial support, supplies and expenses. This would probably require a minimum level of \$300,000 per year of support (1986), adjusted upwards to deal with inflation.

UNIVERSITY CHARACTERISTICS:

University track record: The universities involved in the centers program should have a demonstrated record of activity in urban transportation. This should extend over several years and should include past experiences of collaboration between the majority of proposed center

faculty. The university should be able to quickly establish activities and put people to work.

If it is decided to begin programs at schools without an established track record, these should be treated through the provision of small planning or initiation grants to establish the necessary base before acting as a center.

Institutional commitment: Centers should be established at universities that are committed to long term work in public transit. Universities should have the organizational infrastructure in place to operate the program. This would include an existing interdisciplinary center with its own budget, faculty committed to work in urban transport, and a location with office space and appropriate equipment (microcomputers, etc.). The university should also be willing to put some of their own resources into the program. A cost sharing level of 20% is reasonable. More than that may limit competition since universities have vastly different resource bases.

User/industry involvement: An important ingredient to an effective center is involvement on the part of the users of its products in the program. The users of university work (transit agencies, federal, state and local government, the private sector, transit riders, and the research community) should be involved in the selection and design of center activities. This is necessary to assure program relevance.

Student/faculty involvement: The heart of a center program should be student support and faculty directed projects. Centers that extensively use part time people, consultants, etc. should be discouraged. Regular faculty/student interaction is a well proven means to creative work, risk taking and good payoff. It builds a commitment by the university and can provide well trained, motivated people to work in urban transportation.

Efforts to Foster Research in Transportation

A new approach to university-based research in urban transportation is needed. There are several options. The approach described above addresses the issues that have plagued UMTA's Section 11 University Research and Training Program and the RSPA program. These problems have resulted from the literal defunding of these programs through stable (declining dollars in real terms) funding, and finally funding cuts.

A more successful approach has been the Strategic Transportation Research Study: Highways (3) project to deal with the condition of America's highways. The resulting Strategic Highway Research Program (SHRP) will address research needs in the highway area, but is only indirectly committed to building a university research capacity.

A companion effort is being launched in TRB in the area of Planning and Administration. Explicit consideration of a role for university-based research is needed. The problem in this soft side of transportation is the specification of research rationale. Research to find more efficient and effective ways to repair roads is obviously important. Research to find better ways to plan and administer transportation facilities and agencies is less obvious. We need to show the importance and payoff of the research.

These substantive based efforts provide a context for needed assessment of the role of universities in transportation research. Specifically, this should be done by a high level task force to include DOT, TRB, NSF, the universities and user groups. There is a need to distinguish basic research from technology transfer and provide coherent programs for both. Support for university-based basic research in transportation warrants examination and the development of a federal policy. Equally important, DOT needs to develop a policy concerning basic transportation research in relationship to its mission orientation. For instance, other agencies, such as DOD and HSS are involved in basic research. DOT needs to support a basic research function with a role for universities.

It is our contention that the role of university-based transportation researchers needs to be addressed systematically. A neutral forum such as TRB should initiate discussion among university representatives and DOT officials. This dialog is

needed to strengthen relations between DOT and the university research community. A desired outcome of this process would be the establishment of an on-going research program geared to facilitate and encourage university research in transportation, with mechanisms to identify basic transportation research needs. An objective is to find common ground and improve relations between the Department and the university transportation research community. The more important objective though, is to improve the quantity and quality of transportation research and thereby improve the quality of the professionals entering the transportation field.

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This paper is dedicated to the memory of Joe Drake, a friend and colleague who was blessed with creativity and insight and who is missed by those who knew him.

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Table 1

U.S. DOT Awards to Universities, FY 1972 to FY 1985

Agency	(Amounts in Thousands)													
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
OST/RSPA	\$582	\$3,045	\$4,311	\$7,367	\$4,813	\$3,581	\$4,152	\$5,218	\$4,862	\$4,368	\$2,675	\$4,687	\$2,386	\$1,930
USCG	\$1,445	\$651	\$1,002	\$758	\$621	\$633	\$614	\$558	\$373	\$600	\$75	\$495	\$510	\$652
FAA	\$1,966	\$736	\$3,432	\$3,806	\$3,199	\$2,863	\$2,864	\$3,036	\$2,601	\$2,762	\$2,677	\$2,237	\$2,297	\$2,869
FHWA	\$7,438	\$8,823	\$12,979	\$9,206	\$7,127	\$10,993	\$10,102	\$9,128	\$9,282	\$9,562	\$6,645	\$7,275	\$9,432	\$7,261
FRA	\$589	\$719	\$328	\$795	\$2,018	\$887	\$309	\$477	\$258	\$147	\$20	\$0	\$170	\$50
NHTSA	\$3,515	\$4,408	\$4,497	\$5,029	\$4,940	\$6,961	\$6,334	\$3,651	\$3,145	\$3,613	\$2,057	\$2,473	\$2,862	\$3,092
UMTA	\$3,898	\$3,610	\$3,750	\$2,426	\$3,197	\$2,851	\$3,497	\$2,681	\$2,271	\$1,872	\$2,046	\$1,507	\$1,798	\$1,810
total	\$19,433	\$21,992	\$30,299	\$29,387	\$25,915	\$28,769	\$27,872	\$24,749	\$22,792	\$22,924	\$16,195	\$18,674	\$19,455	\$17,664

Figure 2: UMTA University Awards

in 1972 dollars, FY 72-85

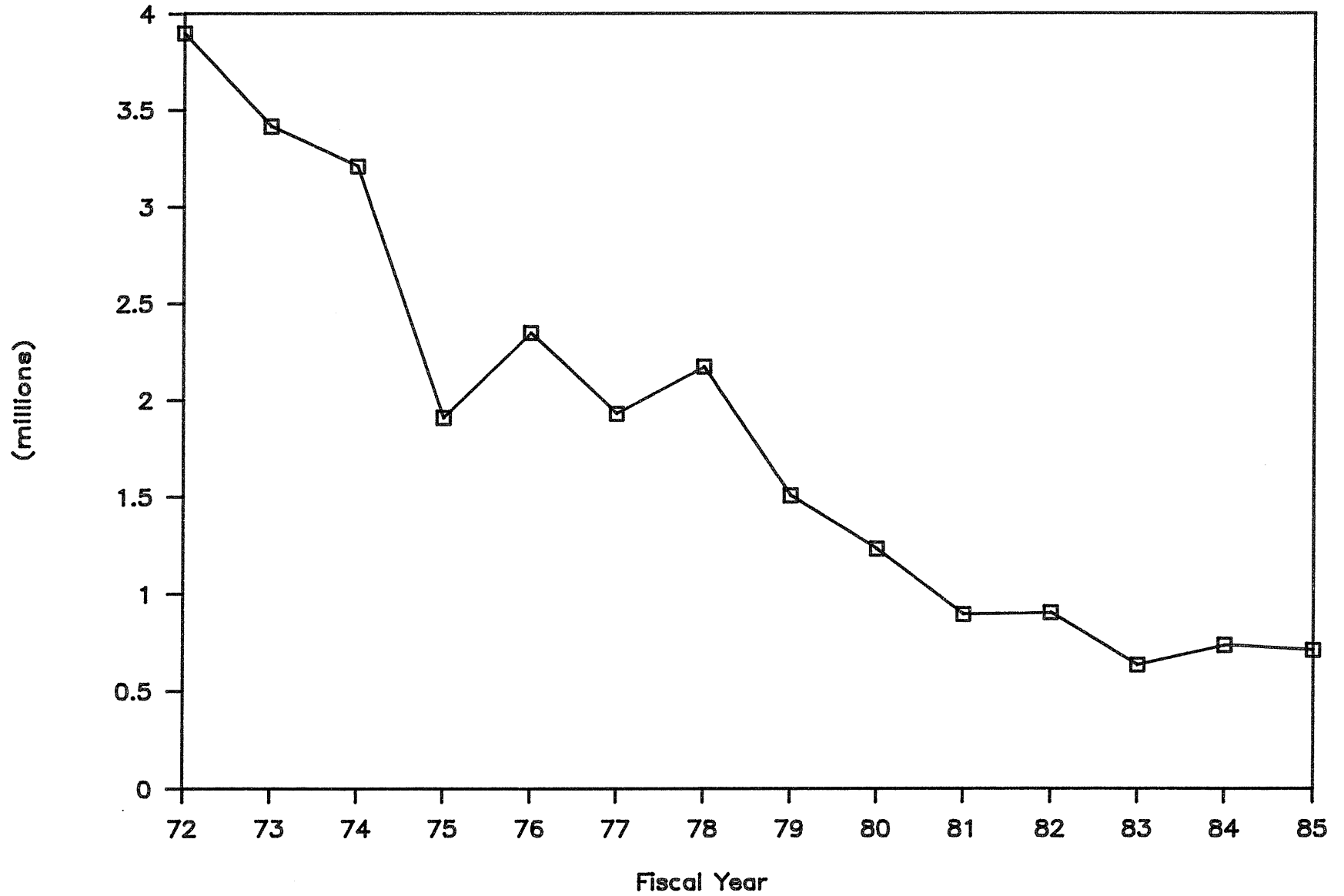


Figure 3: OST/RSPA University Awards

in 1972 dollars, FY 72-85

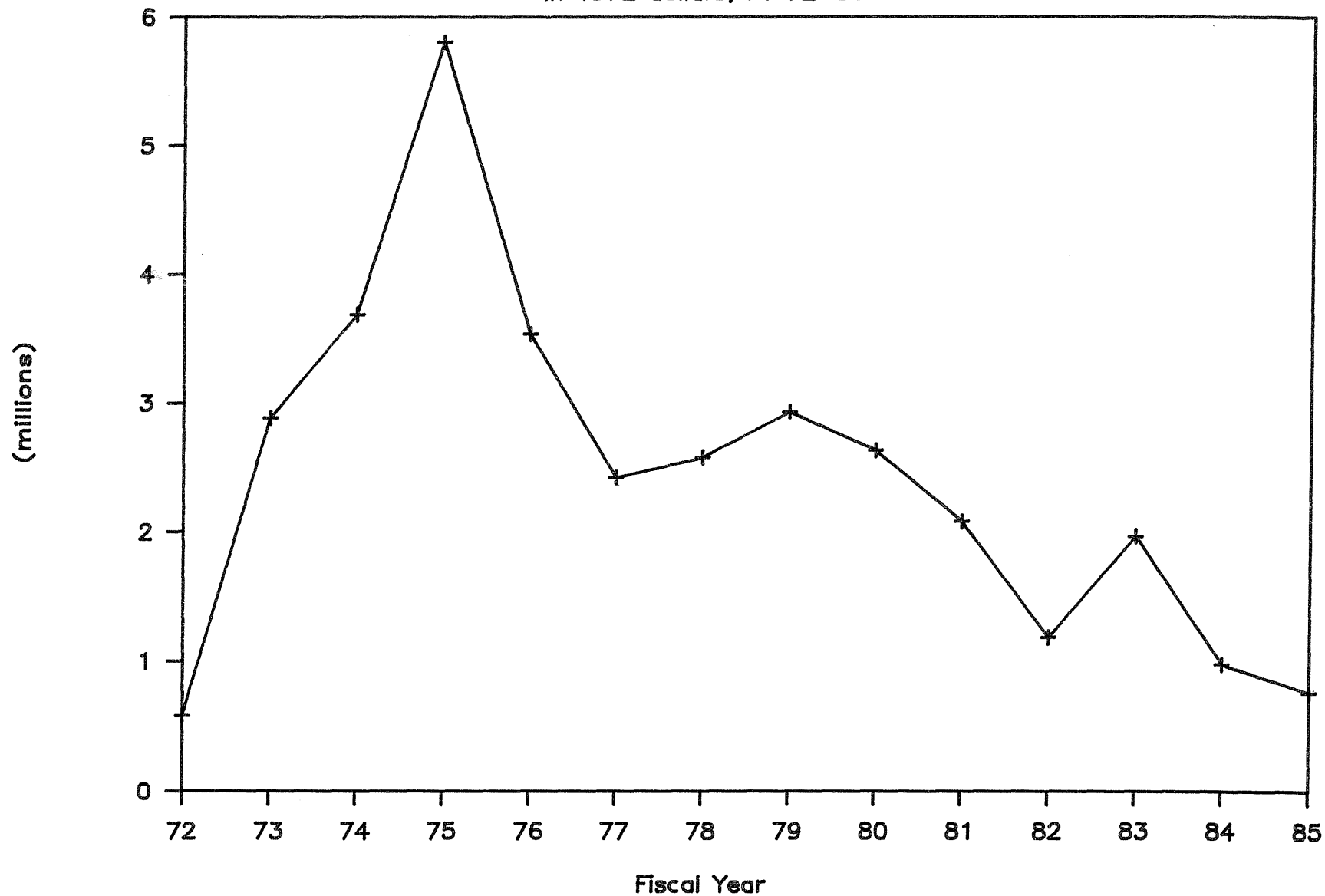


Figure 1: University Cost Index 1972–85

