

ARIZONA DEPARTMENT OF TRANSPORTATION

REPORT NUMBER: FHWA-AZ98-472(1)

**UNIVERSITY RESEARCH CENTER
PHASE 1**

Final Report

Prepared by:

Vicki Walker
2640 W. Wolf Street
Phoenix, AZ 85017

July 1998

Prepared for:

Arizona Department of Transportation
206 South 17th Avenue
Phoenix, Arizona 85007
in cooperation with
U.S. Department of Transportation
Federal Highway Administration

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Technical Report Documentation Page

1. Report No. FHWA-AZ-98-472(1)		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle University Research Center Phase I				5. Report Date July 1998	
				6. Performing Organization Code	
7. Authors Vicki Walker				8. Performing Organization Report No.	
9. Performing Organization Name and Address Vicki Walker 2640 W. Wolf St. Phoenix, AZ 85017				10. Work Unit No.	
				11. Contract or Grant No. SPR-PL-1-(53) 472	
12. Sponsoring Agency Name and Address ARIZONA DEPARTMENT OF TRANSPORTATION 206 S. 17TH AVENUE PHOENIX, ARIZONA 85007 Project Manager: John Semmens				13. Type of Report & Period Covered	
				14. Sponsoring Agency Code	
15. Supplementary Notes Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration					
16. Abstract <p>The Arizona Department of Transportation Research Center has become separated from its connections with the three in-state universities. In an effort to re-establish a productive relationship with the universities, a survey of state transportation departments and university research centers was conducted in an attempt to determine what organizational structures are currently used and which would best serve Arizona's needs.</p> <p>The diversity of models used indicates that there may be no one best way to conduct transportation research. Therefore, the "best" model is the one which is developed by the entire local transportation community to fit its needs and which is adaptable over time.</p> <p>The success of state DOTs in soliciting private sector participation was explored as a means of procuring additional sources of research funds. Over 75% of the survey respondents indicated they have some private sector involvement in their program; however, most private sector involvement is in the form of materials, equipment, and services, rather than monetary contribution which ranged from 1% to 18% of annual research budgets.</p> <p>Since the private sector does not account for a large portion of a center's budget, funding sources initially come from state legislatures, the DOTs, and/or the university(s). Many states indicated that the transportation center is highly dependent upon the DOT to supply research projects for approximately the first five years. During this time, the center's reputation is expanded and its ability to attract outside funding and projects from other sources increases. The funding provided by the DOT does not need to be large; however, a constant among all states which have productive cooperative programs is the continuity of funding. A commitment must be made by the DOT to sustain a level of support which is sufficient to elicit a similar commitment on the university's part to devote faculty and other resources to meet the DOT's research needs.</p>					
17. Key Words transportation research centers		18. Distribution Statement Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161		23. Registrant's Seal	
19. Security Classification Unclassified	20. Security Classification Unclassified	21. No. of Pages 202	22. Price		

ACKNOWLEDGEMENT

The author would like to thank the many helpful people from transportation agencies and universities who provided the information which formed the basis for this report. In addition to those individuals who took the time to answer the questionnaire, the following are very much appreciated, as well as nameless others who helped to point in their direction.

Arizona Department of Transportation

Tricia Lindley (602-255-7604)
Erika Martinez (602-256-9431)
Frank McCullagh (602-407-3132)
Larry Scofield (602-407-3131)
John Semmens (602-407-3137)

Arizona State University

Mathew Betz, Ph.D. (602-488-7954)
Elizabeth Burns, Ph.D. (602-965-7533)
Terrie Ekin (602-965-1721)
Sandra Houston, Ph.D. (602-965-2790)
Mary Kihl, Ph.D. (602-965-6693)
Jonathan Upchurch, Ph.D. (602-965-1713)

Colorado Department of Transportation

Richard Griffin (303-757-9973)

Iowa State University

Tom Maze, Ph.D. (515-294-8103)

Northern Arizona University

Steve Nix, Ph.D. (520-523-4339)

University of Arizona

Muni Budhu, Ph.D. (520-621-2145)

Washington State Department of Transportation

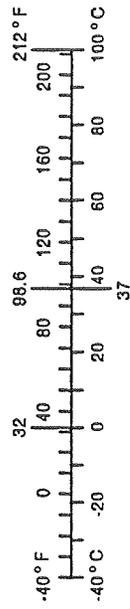
Marty Pietz (360-705-7974)

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS				APPROXIMATE CONVERSIONS TO SI UNITS			
Symbol	When You Know	Multiply By	To Find	Symbol	When You Know	Multiply By	To Find
<u>LENGTH</u>				<u>LENGTH</u>			
in	inches	2.54	centimeters	mm	millimeters	0.039	inches
ft	feet	0.3048	meters	m	meters	3.28	feet
yd	yards	0.914	meters	yd	meters	1.09	yards
mi	miles	1.61	kilometers	km	kilometers	0.621	miles
<u>AREA</u>				<u>AREA</u>			
in ²	square inches	6.452	centimeters squared	mm ²	millimeters squared	0.0016	square inches
ft ²	square feet	0.0929	meters squared	m ²	meters squared	10.764	square feet
yd ²	square yards	0.836	meters squared	yd ²	kilometers squared	0.39	square feet
mi ²	square miles	2.59	kilometers squared	ha	hectares (10,000 m ²)	2.53	square miles
ac	acres	0.396	hectares	ha	hectares		acres
<u>MASS (weight)</u>				<u>MASS (weight)</u>			
oz	ounces	28.35	grams	g	grams	0.0353	ounces
lb	pounds	0.454	kilograms	kg	kilograms	2.206	pounds
T	short tons (2000 lb)	0.907	megagrams	Mg	megagrams (1000 kg)	1.103	short tons
<u>VOLUME</u>				<u>VOLUME</u>			
fl oz	fluid ounces	29.57	millimeters	mL	millimeters	0.034	fluid ounces
gal	gallons	3.785	liters	L	liters	0.264	gallons
ft ³	cubic feet	0.0328	meters cubed	m ³	meters cubed	35.315	cubic feet
yd ³	cubic yards	0.765	meters cubed	m ³	meters cubed	1.308	cubic yards

Note: Volumes greater than 1000 L shall be shown in m³.

<u>TEMPERATURE (exact)</u>	<u>TEMPERATURE (exact)</u>
°F	°C
Fahrenheit temperature	Celsius temperature
5/9 (after subtracting 32)	9/5 (then add 32)



These factors conform to the requirement of FHWA Order 5190.1A
 *SI is the symbol for the International System of Measurements

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EXECUTIVE SUMMARY

The Arizona Department of Transportation Research Center has become separated from its connections with the three in-state universities. In an effort to re-establish a productive relationship with the universities, a survey of state transportation departments and university research centers was conducted in an attempt to determine what organizational structures are currently used and which would best serve Arizona's needs. In addition, several other questions were asked of survey respondents regarding their transportation research activities.

Six models of DOT/university relationships are used by the 41 states that responded to our survey:

- 4 states (10%) have a research center located at a university;
- 6 states (15%) contract primarily with only one university;
- 15 states (37%) contract with multiple universities;
- 1 state (2%) requests bids from consultants and universities;
- 1 state (2%) conducts all research in-house at the DOT; and
- 14 states (34%) use some other process which is generally a combination of the above methods (Arizona is among these states).

The diversity of models used indicates that there may be no one best way to conduct transportation research. Therefore, the “best” model is the one which is developed by the entire local transportation community to fit its needs and which is adaptable over time. The location of the transportation research center is largely dependent upon the model chosen. Situating the center at one university or at several has both advantages and disadvantages, although the disadvantages can be minimized through continual communication among the parties involved.

The benefits of a close working relationship between the DOT and universities included access to specialized knowledge and equipment available within the university environment, research cost-effectiveness, opportunities for both parties to become familiar with the other's motivations and needs, real-world experience for university faculty and students, and increased opportunities for technology transfer.

The importance of establishing a cooperative research agreement between the state DOT and the universities was stressed by many survey respondents. In a survey conducted by the National Cooperative Highway Research Program, 33 of 42 states responding to the survey (79%) reported having some type of basic agreement, which is not a contract with the university, but rather an understanding between the state and the university.

The success of state DOTs in soliciting private sector participation was explored as a means of procuring additional sources of research funds. Over 75% of the survey respondents indicated they have some private sector involvement in their program; however, most private sector involvement is in the form of materials, equipment, and services, rather than monetary contribution which ranged from 1% to 18% of annual research budgets.

Estimating the budget requirements for a university transportation research center is dependent upon the model used in establishing the center. Since the private sector does not account for a large portion of a center's budget, funding sources initially come from state legislatures, the DOTs, and/or the university(s). Many states indicated that the transportation center is highly dependent upon the DOT to supply research projects for approximately the first five years. During this time, the center's reputation is expanded and its ability to attract outside funding and projects from other sources increases. The funding provided by the DOT does not need to be large; however, a constant among all states which have productive cooperative programs is the continuity of funding. A commitment must be made by the DOT to sustain a level of support which is sufficient to elicit a similar commitment on the university's part to devote faculty and other resources to meet the DOT's research needs.

INTRODUCTION

Arizona has three state universities: Northern Arizona University (NAU) located in Flagstaff, Arizona State University (ASU) located in Tempe, and the University of Arizona (UA) located in Tucson. Over the years, the Arizona Department of Transportation (ADOT) Research Center has become separated from its connections with the in-state universities. ADOT has come to realize that this situation may not be advantageous for either themselves, the university community, or the private sector. Many successful transportation research centers in other states appear to have strong connections with their state universities. Re-establishing a relationship between ADOT and the universities could be a means of improving the quality of Arizona's transportation research. Additionally, employing more university students in ADOT research projects could offer many advantages: ADOT could save considerable money on needed research work; students could expand their education into "real life" situations; and training opportunities could be provided for undergraduate and graduate engineering students who could be future ADOT employees.

Phase I of this project involved attempting to determine the best organizational structure for a new relationship between ADOT and the universities by examining the working relationships between other state DOTs and their in-state universities. This report offers a synthesis of information obtained from: (a) annual reports of state transportation departments and university research centers and various other literature; (b) responses to a questionnaire which was submitted to all state transportation departments and universities who are members of the Council of University Transportation Centers (CUTC); and (c) interviews with individuals at ADOT, ASU, NAU, UA, and researchers in other states. The individuals interviewed are listed under the acknowledgement section at the end of this report.

An overview of the various methods which the DOTs use to conduct research is presented. Consideration is given to how a university transportation center might improve research results and how it might enhance learning about transportation. The advantages and disadvantages of locating the center at a single university or at more than one university are discussed, as well as the advantages and disadvantages of establishing a cooperative agreement among all three universities to promote transportation research and learning. In an effort to seek additional funding sources, how other state research centers solicit and obtain private sector involvement and funding, and whether this funding can be sufficient to make the research center self-sustaining is addressed. Estimates are also provided of the cost and funding sources necessary to establish a transportation research center at one of Arizona's state universities.

Data from the survey are used throughout the synthesis. A sample of the questionnaire is shown in Appendix A. A list of those state transportation departments and university research centers who responded to the questionnaire is shown in Appendix

B. A summary of the information provided by individual respondents is given in Appendix D, as well as individual respondent contact information for those who wish to obtain additional information about a particular state's program.

HISTORY

In the early 1980s, the research arm of ADOT, the Arizona Transportation Research Center (ATRC), sought to establish a closer working relationship with its in-state universities. They used the Virginia research center as a model, in which the Virginia Department of Highways and Transportation research director and his staff were housed in a research facility built by the Department on the campus of the University of Virginia at Charlottesville. Virginia's research program was developed and implemented by the Virginia Highway and Transportation Research Council, which was jointly sponsored by the Department and the University. [1] At about the same time, ASU's College of Engineering and Applied Sciences established four Engineering Excellence Programs, one of which was the Center for Advanced Research in Transportation (CART).

In 1983, an intergovernmental agency agreement was established between ADOT and ASU. The goals of the new relationship were to provide funded research to Arizona's universities, offer graduate students an expanded education with "real world" research experience, and provide training for students who could be employed by ADOT upon graduation. The agreement directed ADOT to fund four graduate students, one faculty-man-year of release time, and provide for overhead. No set amount of research was to be directed to ASU, as Arizona's Private Enterprise Law required that any research over \$10,000 be advertised. This required that ASU bid on ATRC research projects along with other universities and private sector firms.

The ATRC and CART were co-located in the Engineering Research Center on ASU's Tempe campus. The centers were housed on separate sides of the same floor with shared lab space. This close proximity of the two facilities allowed for direct day-to-day contact which led to a very close working relationship. The two directors often sat in on the other's meetings, and CART personnel were often consulted for technical advice on projects in which they may not be a contracted researcher. Sharing lab space also allowed CART to keep ATRC informed of the progress for those projects which were awarded to ASU.

During the early 1980s, most of the research by an in-state university was done by UA in Tucson. However, according to ADOT personnel, much of this research was not implementable, and contract difficulties caused the ATRC to be disillusioned with UA. By the end of the 1980s, the ATRC/CART relationship had proven to be very successful, and ASU was conducting more research. In 1988, when the first CART director left the center, ASU had close to \$1 million in active contracts.

The late 1980s and early 1990s marked a period of upheaval in the ATRC/CART relationship. As stated previously, the CART director left the center in late 1988 and was replaced by an interim director until a permanent replacement was found in early 1990.

In 1991, the center changed its name to the Center for Advanced Transportation Systems Research (CATSR) to more accurately reflect the multi-disciplinary nature of its research. At about the same time, the ATRC director was replaced with a new director, and the reporting relationship of the ATRC within ADOT changed from the Highway Division to the Transportation Planning Division.

Both new directors were extremely interested in securing federal monies for research into Intelligent Transportation Systems (ITS), and a proposal was written to attract this research and establish a facility at ASU's Research Park located south of the main Tempe campus. This funding was not realized; however, ADOT had entered into an agreement to relocate to the Research Park and felt they must honor that contract when their lease in the Engineering Research Center expired. ASU was also experiencing space shortages on campus which helped encourage the ATRC's move. The move resulted in a reduction of space for the ATRC from approximately 10,000 square feet in the Engineering Research Center to roughly 4000 square feet at the Research Park facility.

In late 1991, the CATSR director was once again replaced with an interim director until a new director was hired in early 1994. There was a change in the Civil Engineering Department Chair (1989) and several changes in the Dean of the Engineering College (1987, 1989, 1991, 1992, 1994, 1995), as well. These changes in addition to the ATRC's move off the main ASU campus saw increased tensions in a relationship which was already becoming strained. The ATRC was experiencing dissatisfaction with the timeliness of the research done, and did not feel they were receiving the desired product from CATSR. This, combined with ATRC's earlier disillusionment with UA, led to a loss of confidence in universities as a whole. During this time as well, ADOT was experiencing slimming measures which resulted in a loss of several positions within the ATRC. The ATRC reporting structure within ADOT was transferred back to the State Engineer's Office, and a change in funding sources resulted in the ATRC moving to their current ADOT facility in downtown Phoenix when the contract expired at the ASU Research Park in 1996. The relationship between ADOT and the state universities had become nearly non-existent at this point, and most research contracts were being awarded to private consultants or out-of-state universities. When the CATSR program came up for review by the Engineering Dean in 1996, funding was not renewed and the program was discontinued. According to the ATRC, university-related individuals currently participate in 11 of 34 projects (32%) which account for 21% of funding.

Another casualty of the break between ADOT and ASU was the Arizona Local Technology Transfer Program, or the T2 Program. The T2 Program was administered by the CATSR and was partly funded by the Local Transportation Assistance Program (LTAP) which began in 1982 as the Rural Transportation Assistance Program (RTAP). T2 centers were created by the Federal Highway Administration (FHWA) to provide technical training and assistance to governments, cities, and towns which had a population of less than 50,000 persons. In 1991, the program was expanded to include cities with up to one million in population, and the name was changed to LTAP. The

CATSR T2 Program provided presentations of a variety of transportation training workshops, distribution of training videocassettes, distribution of publications, and provision of technical field assistance state-wide. [3] By 1996, the annual cost of this program was over \$300,000 and ADOT did not feel the level of service was commensurate to the cost when compared to similar programs in other states. A three-day partnering conference was held to rectify the problem; however, when the contract expired in 1996, the T2 Program was moved from ASU to ADOT for administration.

Interviews of individuals involved with the ATRC and the CATSR programs provided several suggestions as to why the relationship between ADOT and ASU failed. The primary cause expressed by many was a lack of communication by both parties. Changes in leadership at all levels in both organizations contributed to confusion and loss of a joint focus, as well. The move of the ATRC from ASU's main campus to the Research Center was suggested as a pivot point; however, relations were already becoming strained by that time. Although the move led to a physical distancing which prevented the closeness enjoyed when the centers were first established, it was felt this could have been overcome if the prior close "mental" relationship still existed. Relations currently continue to be strained, but ADOT and all three universities have expressed a desire to re-establish a closer relationship. The earlier success of the ATRC/CATSR relationship is pointed out by an increased national standing by the late 1980s, and the success of many graduate students currently located around the country who had the opportunity to participate in research through the early phases of the program, one of whom is the current director of the ATRC.

SURVEY

The first phase in the goal to re-establishing a relationship between ADOT and the three state universities involved determining the “best” organizational structure for the new relationship. One method for accomplishing this involved conducting a survey of the working relationships between other state DOTs and their in-state universities. Since a relationship involves at least two parties and the perceived success of the relationship by each party was of interest in this study, the survey included the transportation departments in 49 states (excluding Arizona) and university research centers who are members of the Council of University Transportation Centers (CUTC). The CUTC was established in 1979 by the major transportation research centers and institutes in the United States and promotes continued dialogue among its member institutions, as well as providing a forum for the centers to interface collectively with government and industry. One CUTC goal is to strengthen the role of transportation research and education, both inside and outside the university environment. [4] The 1997 CUTC Member Roster listed 49 active member centers in 28 states. [5]

A questionnaire was developed in order to ascertain the type of relationship or organizational structure existing in each state and the advantages and disadvantages of that structure. Recipients were asked what they would change about their current relationship if they could. Information was also requested regarding whether there is any private sector involvement and funding of the research program, and if so, a description of any solicitation process used. Recipients were asked whether this private sector funding allowed the research to be self-sufficient. Finally, additional comments were requested which the recipient felt they could offer to benefit ADOT's research into the relationship/organizational structure between a state DOT and the state universities for the purpose of conducting transportation research.

Two versions of the questionnaire were distributed - one to state DOTs and one to the university research centers. The questions were virtually identical with wording changed only regarding whether the recipient was a DOT or research center. Samples of the questionnaires are shown in Appendix A.

A listing of the respondents is shown in Appendix B. Thirty-four state DOTs responded for a response rate of 69 percent. Twenty-eight responses were received from the research centers out of 52 surveys sent. (Some research centers had more than one individual listed in the membership roster and surveys were sent to everyone listed.) This gave a research center response rate of 54%. The overall response rate was 61% and responses were received by at least one organization in 41 states which provided representation from 84% of the country.

When the questionnaires were returned, the answers were summarized in a database for ease in analyzing the results. Individual responses were printed on a

questionnaire response form. A sample form is shown in Appendix C, and individual responses are given in Appendix D.

The response form indicates the state where the organization is located, the name of the organization, and the name, phone number, e-mail address, and postal mailing address of the respondent. These are provided so interested parties may contact those individuals for further information regarding their program. Boxes are checked regarding the DOT/university relationship(s) used by that organization. Abbreviations are explained as follows:

1. URC indicates that the DOT has a research center located at a university
2. ONE UNIV indicates the DOT contracts with one university for research
3. MULT UNIV indicates the DOT contracts with multiple universities for research
4. BIDS CONS/UNIV indicates that DOT research is offered for competitive bids from universities and consultants
5. DOT indicates that research is all done in-house with DOT personnel
6. OTHER PROCESS indicates that some process other than those listed above is used

A brief description of the process used is shown, along with advantages and disadvantages of the current process, and changes the respondent would like to see to that process. If private sector funds are a part of the research program, the box under "PRIVATE SOURCE FUNDS" is checked followed by a description of private sector involvement and an indication of whether these funds allow the center to be self-sufficient. Additional comments offered by the respondent are summarized at the bottom of the form. Any question which was not answered is indicated by "None Given" on the response form.

Data obtained from survey responses are used throughout this report.

RELATIONSHIP MODELS

In a National Cooperative Highway Research Program (NCHRP) survey conducted for the Transportation Research Board (TRB) in 1995, states reported on the size of their DOT research staff, the number of projects currently in progress, and where the research for those projects was being done. They also reported on their solicitation process. The following table shows a breakdown of their responses. [6]

Table 1. 1995 NCHRP DOT Survey Data

STATE	DOT RESEARCH STAFF	TOTAL 94-95 PROJECTS	PROJECTS BY CATEGORY *					SOLICITATION PROCESS **
			CONS	UNIV	PF	SELF	OTHER	
AZ ♠	9	34	17	11	-	6	-	RFP
AL	5	32	-	27	2	2	1	RFP-UNIV
AK	1	36	1	31	-	4	-	RFP-UNIV
AR	14	48	-	13	4	30	1	RFP-UNIV
CA	35	134	14	44	21	55	-	RFP
CO	14	69	10	13	10	36	-	RFP, SS
CT	26	54	3	15	7	25	4	RFP
DC	1	8	-	1	3	4	-	RFP-UNIV
FL	4	130	2	96	30	-	2	RFP-UNIV
GA	11	53	4	25	5	19	-	RFP
ID	1	21	1	8	10	2	-	RFP-UNIV
IL	32	34	-	12	-	22	-	RFP-UNIV
IN	25	77	1	58	3	15	-	RFP-UNIV
IA	8	47	7	21	-	15	4	RFP
KY	1	54	-	54	-	-	-	RFP-UNIV
LA	46							RFP-UNIV
ME	15	15	-	11	1	2	1	RFP-UNIV
MD	10	16	-	6	4	6	-	RFP-UNIV
MI	60	139	1	36	7	95	-	RFP-UNIV
MN	12	123	35	88	-	-	-	RFP, SS
MS	14	17	1	3	-	13	-	RFP
MO	22	31	-	7	2	22	-	RFP-UNIV
NE	2	53	-	14	21	18	-	RFP-UNIV
NV	1	9	-	7	2	-	-	RFP-UNIV
NH	3	12	1	3	2	4	2	RFP
NJ	16	63	9	6	8	40	-	RFP
NM	6	11	2	7	-	1	1	RFP
NY	41	60	-	14	17	28	1	RFP-UNIV

STATE	DOT RESEARCH STAFF	TOTAL 94-95 PROJECTS	PROJECTS BY CATEGORY *					SOLICITATION PROCESS **
			CONS	UNIV	PF	SELF	OTHER	
NC	6	24	-	23	4	1	3	RFP-UNIV
ND	4	31	1	-	3	27	-	SS
OH	18	73	11	39	20	-	3	RFP
OR	11	76	1	12	9	54	1	RFP
PA	8	80	20	11	14	35	-	RFP
RI	5	11	-	7	-	4	-	RFP-UNIV
SC	4	18	1	11	4	2	-	RFP
SD	9	48	8	5	2	33	-	RFP
TN	1	31	-	31	-	-	-	RFP-UNIV
TX	16	200	-	200	2	-	-	RFP-UNIV
UT	12	18	4	14	-	-	-	RFP
WA	8	101	2	83	16	-	-	RFP-UNIV
WV	5	25	-	25	-	-	-	RFP-UNIV
WI	8	70	-	28	15	27	-	RFP-UNIV
WY	3	24	3	5	6	10	-	RFP, SS
TOTAL PROJECTS BY CATEGORY			143	1114	254	651	24	
PERCENT PROJECTS BY CATEGORY			6.5%	51.0%	11.6%	29.8%	1.1%	

* CONS=Private Consultant; UNIV=University; PF=Pooled Fund; SELF=In-House Staff; OTHER=OTHER

** RFP-UNIV=Request for proposal from universities only; RFP=Request for proposal from all; SS=sole source

^a AZ data is for fiscal year 1998 and is for comparison purposes only. AZ is not included in the total calculations.

Source: NCHRP Synthesis of Highway Practice 231 Managing Contract Research Programs

As can be seen by this table, the vast majority (80.8%) of projects were conducted either by a university or by in-house DOT staff. In addition, 57% of the state DOTs reported issuing a request for proposals to universities only.

The survey conducted by ADOT attempted to expand on the NCHRP survey by determining the primary model used by each state DOT to conduct their research. The models identified are: (1) the DOT has a research center located at a university; (2) the DOT contracts with one university for research; (3) the DOT contracts with multiple universities for research; (4) DOT research is offered for competitive bids from universities and consultants; (5) DOT research is all done in-house by DOT personnel; and (6) some other process or combination of processes is used. Although most states actually use several of these processes, the model indicated as being used primarily by each state is shown in Figure 1. In cases where different processes were indicated by the state DOT versus the university(s), an attempt was made to classify the state process as that most likely, given the combined descriptions from the questionnaire responses.

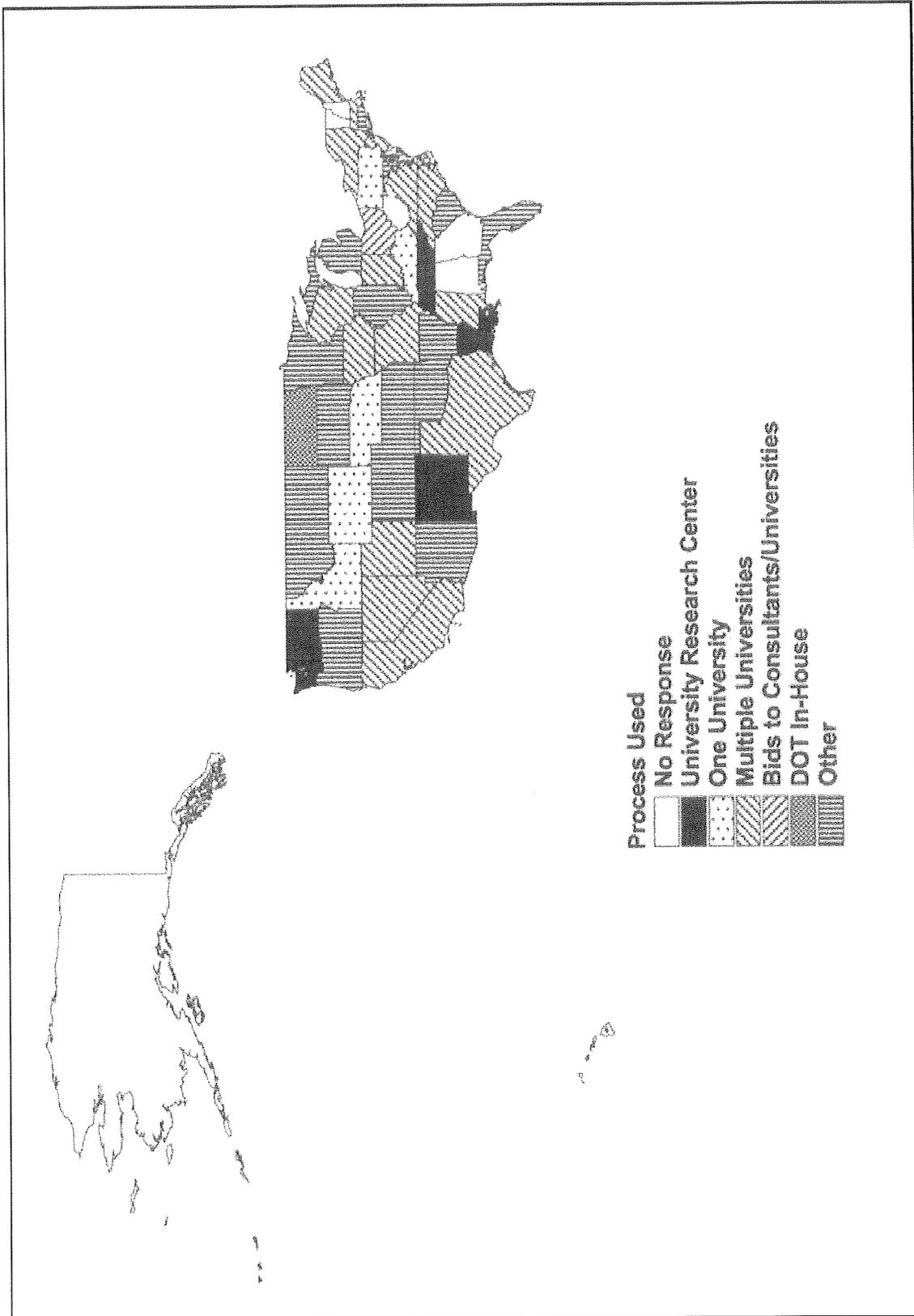
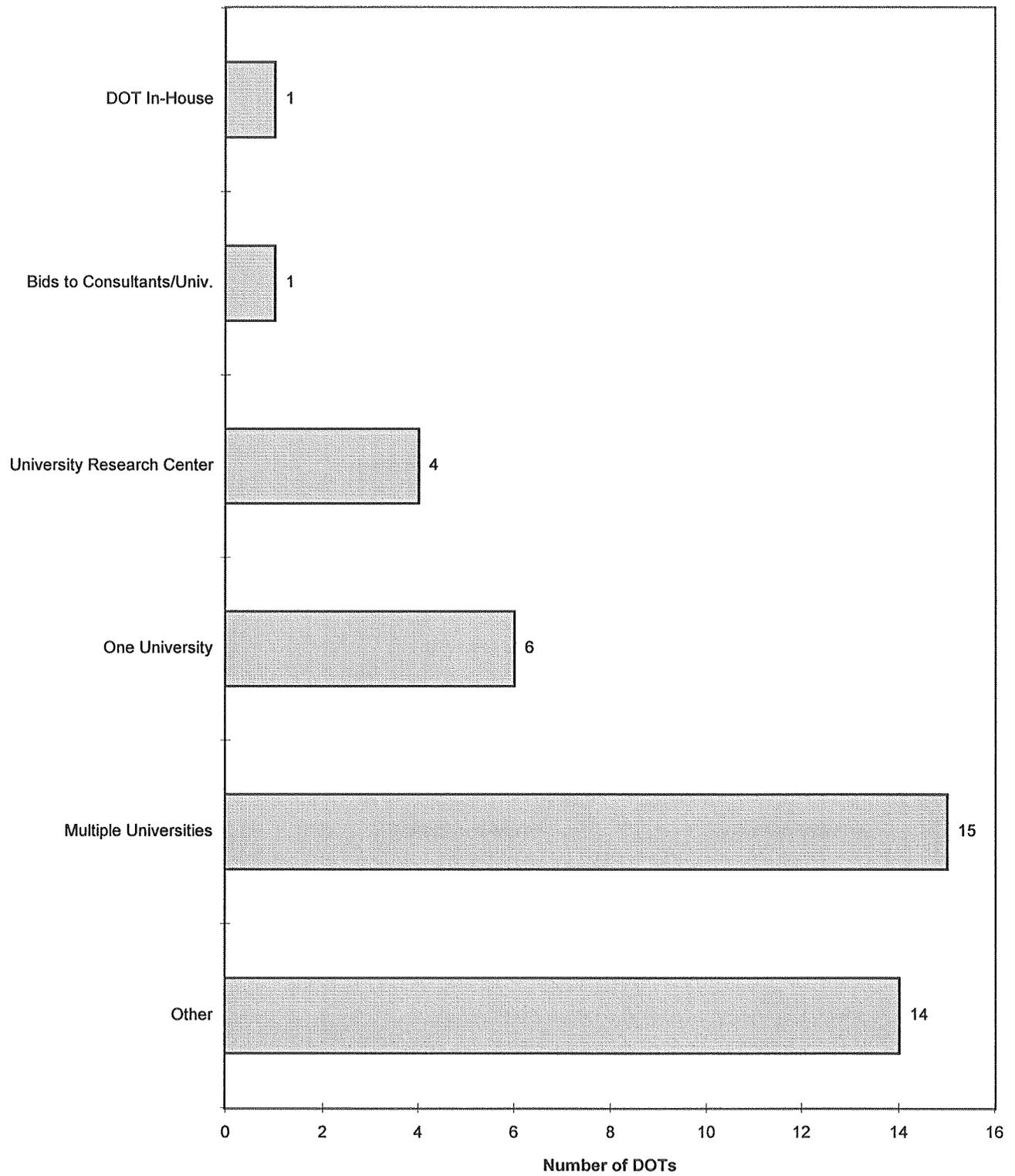


Figure 1. Indication by State of DOT Research Model Used

Of the 41 states represented in the survey responses, the primary method of conducting research is as follows: 4 states (10%) use the university research center model; 6 states (15%) contract with only one university; 15 states (37%) contract with multiple universities; 1 state (2%) requests bids from consultants and universities; 1 state (2%) conducts all research in-house at the DOT; and 14 states (34%) use some other process for conducting DOT transportation research. This breakdown is shown in Figure 2. In summary, 25 of 41 reporting states (62%) have a primary method of conducting research that involves university. This survey finding confirms information reported in the NCHRP survey.

Figure 2

Primary Research Process Used by DOTs



Although each state has been categorized as primarily using a particular model, the exact procedures followed by state often vary. A description of each of the six models is given below with a summary of some states' procedures for each model.

UNIVERSITY RESEARCH CENTER

All universities who are members of the CUTC have transportation research centers associated with their university; however, this model refers to the relationship of the state DOT conducting its research through a specific university research center with which it has some type of joint administration or agreement. Four respondents in the survey indicated this type of relationship (Louisiana, New Mexico, Tennessee, and Washington). Since these state models vary significantly, all four are summarized.

Louisiana

The Louisiana Transportation Research Center (LTRC) is jointly administered by the Louisiana Department of Transportation and Development (DOTD) and Louisiana State University (LSU), but is a budget entity of the DOTD. The LTRC was created by the Louisiana Legislature in 1986 and is largely supported through funding from the Federal Highway Administration and the Louisiana DOTD. LTRC expenditures for 1995-96 were \$6,443,000 (\$4,223,000 for research and development and \$2,220,000 for technology transfer and training).

LTRC is located on the LSU campus in a 25,300 square foot facility containing five research laboratories, a classroom, a conference room, and offices. The facility houses 30 students and more than 60 employees, of which 67% are DOTD employees and 33% are LSU employees. The LTRC director is a DOTD employee and a gratis LSU employee which is considered essential to their success in terms of targeting applied research which can be implemented. Approximately 50% of the DOTD's research is conducted by the LTRC. The other 50% is contracted with seven in-state universities for areas needing external expertise.

The LTRC Policy Committee advises and makes recommendations to the LTRC concerning research and technology transfer programs, budgeting, and policies of the center. The committee meets at least twice a year and is composed of ten members: three appointees of the secretary of DOTD, one appointee of the chancellor of LSU, six appointees from other state universities, the director of LTRC, and an FHWA appointed observer.

No disadvantages were cited by the LTRC. The only changes they would like to make would be that the LTRC director should report to the Secretary of DOTD. They would also like to restructure the internal units and upgrade positions in order to attract DOTD personnel to the LTRC who have experience in operational areas.

New Mexico

The New Mexico State Highway and Transportation Department has co-located its research bureau with the research center at the University of New Mexico, the Alliance for Transportation Research Institute (ATR). This allows for quick exchange of information, and the ability to address research issues and respond to opportunities.

After several unsuccessful attempts at various other models by both the DOT and the state universities, it became apparent that the largest transportation research centers in the state were the national laboratories which conducted defense research. The ATR was established in 1992. It is a unique partnership comprised of the DOT, New Mexico State University, the University of New Mexico, Los Alamos National Laboratory, and Sandia National Laboratories.

The ATR has what they call a “loose-tight” partnership. The premise is that when the partner organizations want to act in concert they have an effective means of doing so, and when they want to work independently, the partnership is flexible enough for that as well. The only stipulation is that a partner wishing to work independently on a project must inform the rest of the partnership beforehand in order to avoid confusion.

Prior to the ATR's formation, the DOT funded approximately \$250,000 for civilian transportation research which was provided 80% by federal funds with a 20% match in state funds. Since the formation of the ATR, an average of \$15 million has been attracted annually, with significant projects 100% federally funded.

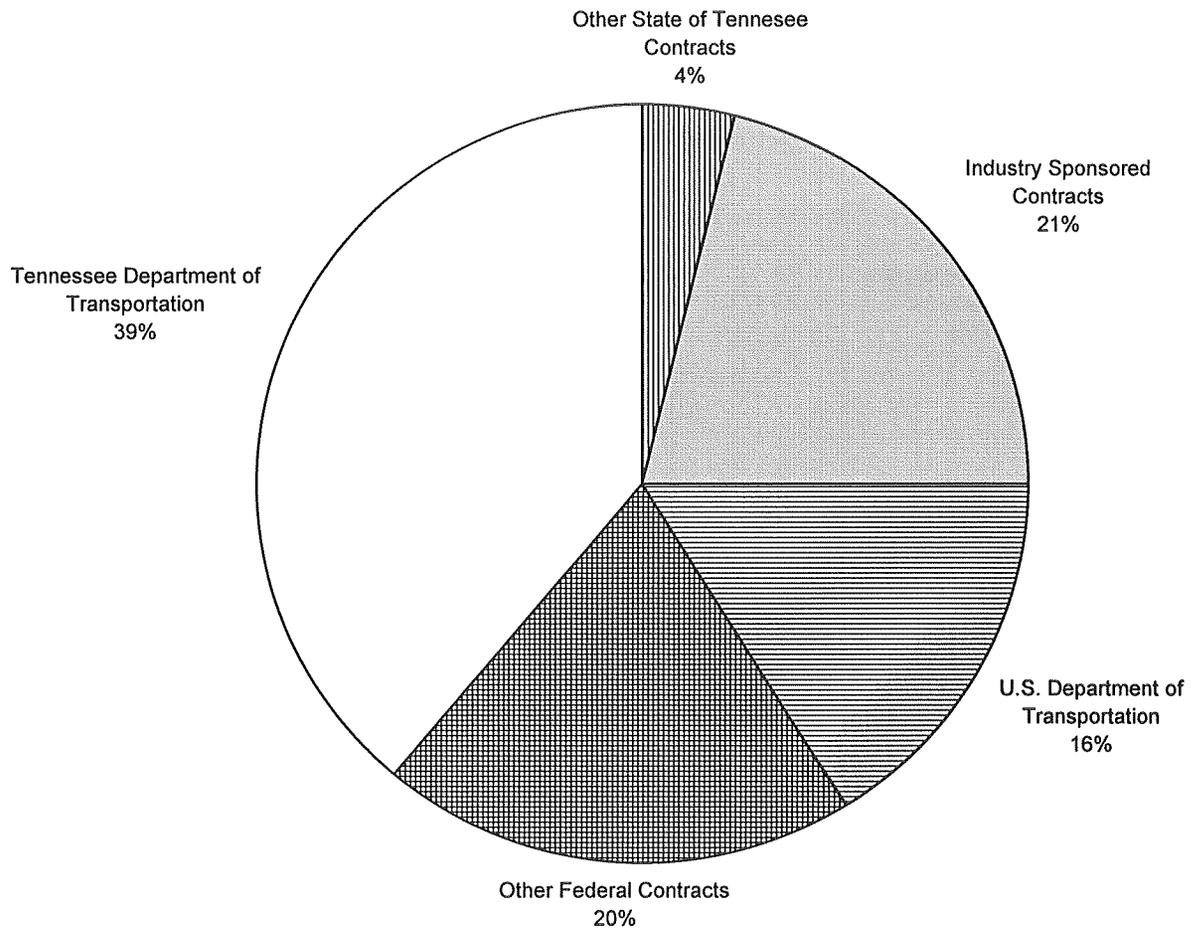
The ATR has published report number FHWA-HPR-NM-92-03 which describes in detail the steps taken to establish this partnership. It includes the successes and failures over the last five years, and presents the ATR's goals for the future which include incorporation as a separate entity and funding self-sufficiency.

Tennessee

The Tennessee Department of Transportation (TDOT) has essentially no research department, but has a formal agreement which is state law for the University of Tennessee (UT) to administer its transportation research program. An advisory committee comprised of members from the TDOT division head level consider problem statements and then forward those selected to UT. UT is then responsible for developing the request for proposal (RFP), awarding and executing the contract, managing the financial and technical matters, and meeting the deadline. The UT transportation center has a full-time staff member who oversees administrative functions and works closely with the TDOT research coordinator, the university, and other TDOT business offices involved. TDOT feels this arrangement allows them flexibility in awarding contracts, while putting the burden of managing those contracts on UT. Total new grants and contracts for fiscal year 1995 were \$6,712,758. A breakdown of these funding sources is shown in Figure 3.

Figure 3

Tennessee Research Center Funding Sources



Neither TDOT nor UT cite disadvantages with Tennessee's process. However, responses from other universities indicate they receive very little research and that they must "court" TDOT in order to be awarded a contract or have a project approved for research. Changes which state universities would like to see include creating a research center within TDOT and formalizing the procedure to solicit and consider research problem statements which are generated outside and independent of TDOT. Establishing a schedule for generation, evaluation, and awarding projects in order to maximize involvement by both TDOT and researchers is also desired.

Washington

The Washington State Transportation Center (TRAC) is a cooperative transportation research agency comprised of the University of Washington (UW), Washington State University (WSU), and the Washington Department of Transportation (WSDOT). TRAC acts as a liaison connecting those who need applied research at WSDOT and those best suited for conducting it at the universities.

The executive board consists of the secretary of WSDOT and the vice provost from each of the universities. Each agency is able to appoint one director. The executive director is currently from WSDOT with co-directors from UW and WSU. In effect, there is a research center located at each agency with the official TRAC office residing at the location of the executive director. Each director is an employee of both TRAC and their respective organization, but they have not found joint reporting to be a problem. TRAC has established a presence in each location by funding support staff to assist with report preparation, for which each university contributes \$30,000 and WSDOT contributes \$60,000.

A solicitation process for prospective research projects is conducted every two years by WSDOT. Anyone can submit a problem description; however, the selection committee does not include university or private sector representatives. Successful proposals tend to be those sponsored by WSDOT rather than those desired by the universities or private sector. The problem descriptions are sorted by probable emphasis area. A workshop for each emphasis area is convened to rank the potential projects by urgency, benefit/payoff, probability of success, and complementary factors such as availability of funding outside of WSDOT's research budget. The workshop committees contain representatives from the Federal Highway Administration (FHWA), WSDOT executives, line engineers from affected areas, and the WSDOT regions. The ranked potential projects are next placed in a funding matrix, by rank within their emphasis area rather than a single list. The Research Executive Committee approves the final program based on available funds. Those projects which are actually undertaken are either issued a task order to one of the two universities or an RFP from consultants and other in-state and out-of-state universities. Approximately 85% of research is conducted by either UW or WSU with the majority going to UW, and the other 15% is conducted via RFP. A technical monitor has oversight of each research project to keep it on track.

When TRAC was originally established in the early 1980s, research project funding was primarily from WSDOT; however, growing national recognition has provided other funding sources. During the 1993-1995 period, TRAC researchers were involved in 125 projects with

budgets totaling over \$14.1 million and expenditures of \$10.1 million, not including administrative costs. Funding support during that same period came from the Strategic Highway Research Program (SHRP), the U.S. Department of Transportation, the FHWA, the Federal Transit Administration (FTA), the TRB, the National Science Foundation, and the U.S. Forest Service. Other public supporters included the Washington State Energy Office, King County Metro Transit, the Puget Sound Regional Council, and Snohomish County Public Works. Private supporters and contributors included PACCAR, Chaparral Systems, ERES Consulting, Urban Systems, Inc., and Cambridge Systematics. In addition, TRAC was involved in research partnerships with the Michigan State and Louisiana State departments of transportation.

WSDOT uses this organization model primarily for ease in contracting and the ability to establish a presence at UW and WSU. The process has enabled the three organizations to establish a long-term relationship and has helped the universities to understand WSDOT needs. The task order process allows executing research requests quickly. WSDOT foresees no change in the current procedure. Examples of WSDOT's interagency agreement, basic agreement, and task order format are shown in Appendix G, H, and I, respectively.

CONTRACT WITH ONE UNIVERSITY

Six states reported that they contract primarily with one university (Hawaii, Idaho, Kentucky, Nebraska, Pennsylvania, and Wyoming). Five of these states (Hawaii, Idaho, Kentucky, Nebraska, and Wyoming) use this process due to the small size of the DOT research staff and/or limited access to universities with graduate engineering programs in their states.

Hawaii performs some research in-house; however, the university offers expertise and equipment which the DOT does not have for many areas of transportation research.

The Idaho Department of Transportation (IDOT) research staff consists of only 1½ people, so the majority of research contracts are with the University of Idaho, although a small number are awarded via requests for proposals (RFP) from consultants and other universities. IDOT would like to develop better in-house capability for support and publication of some projects which are being performed in-house, but are currently undocumented due to lack of staff.

The Kentucky Department of Transportation conducts all research through the Kentucky Transportation Center (KTC) located at the University of Kentucky. A research coordinator (currently the assistant to the state highway engineer) acts as liaison between the Kentucky Cabinet and the university. The Cabinet has a research program and implementation advisory committee which is responsible for study selection and general oversight of the program.

The Nebraska DOT (NDOT) contracts primarily with the Mid-America Transportation Center at the University of Nebraska at Lincoln (UNL), although they occasionally seek competitive bids. NDOT cites advantages to their relationship including the development of a good working relationship, and improved and expanded testing facilities at UNL in order to accommodate a wider spectrum of research activities. The main disadvantage seen is the

tendency for research to be academia-driven with little accountability for quality. NDOT would like to see changes to include stressing the need for research which can be implemented, rather than something “which is just a good topic for a graduate student thesis”.

The Wyoming Department of Transportation (WYDOT) performs administrative oversight only, with most research performed by the University of Wyoming (UW) and a small portion awarded to private consultants. They do not currently have an official RFP process which has led to an exclusive relationship with UW that does not foster competition. As the result of a recent peer exchange process, WYDOT plans to add one or two individuals to the WYDOT research staff and develop a more structured RFP process.

Pennsylvania

Until five years ago, the Pennsylvania Department of Transportation (PennDOT) bid all research projects. In 1993, PennDOT entered into a partnership agreement with the Pennsylvania Transportation Institute (PTI) located at Pennsylvania State University (Penn State). According to the agreement, PennDOT matched grants received by Penn State, which currently amounts to approximately \$300,000 annually for each organization. During this five-year period, PennDOT-funded research to PTI has grown consistently and now totals nearly 40 percent of PTI's externally funded research activities. Effective early 1998, PennDOT and PTI have negotiated a broader, long-term collaborative agreement whereby PTI will become the single point of contact to coordinate all university-based research, education, and technology transfer (T2) activities sponsored by PennDOT. It is estimated that PTI will perform approximately 75 percent of the research, and universities outside of Pennsylvania will perform the rest. The new agreement is valued at \$15 million over the next five years.

CONTRACTS WITH MULTIPLE UNIVERSITIES

More than one-third (37%) of the states reported contracting with more than one university for their transportation research. These states include California, Indiana, Iowa, Maine, Massachusetts, Mississippi, Missouri, Nevada, New Jersey, New York, North Carolina, Texas, Utah, Virginia, and Wisconsin. All of these states (with the exception of Nevada) have relatively large DOT research departments and reportedly conduct some research in-house (see Table 1), although they report that the out-of-house research relationship is with multiple universities.

The advantages for conducting research through several universities rather than with just one university are: (1) the wide variety of expertise available; (2) the ability to handle a large research workload; and (3) the ability to match the capabilities of an individual university with the project requirements. Another advantage is the competitiveness which is engendered through issuing RFPs to more than one university, although several states report limited competition for research (e.g., California, Indiana, Iowa, Maine, Missouri, and Nevada). [6]

Chief disadvantages with this relationship model include: (1) over-reliance on the universities to develop research problem statements and proposals; (2) less in-house research

staff available to address the immediate needs of DOT departments; (3) considerable DOT time spent managing the research program and monitoring progress; and (4) lack of broad-based representation on the research advisory committees.

Changes the DOTs would like to implement include: creating a co-op research program; creating a partnership agreement allowing better identification of research needs, development, and implementation; and implementing a process to develop internally-proposed problem statements for which an RFP could be issued.

Summaries of several programs are given below.

California

The California DOT (CALTRANS) funds the university research centers located at the University of California campuses at Berkeley, Davis, and Irvine. CALTRANS sees this association as providing multiple sources for both bids and contracts with multiple participants providing good diversity. They also cite short-term availability of very specific expertise on specific projects. Most projects are considered interactive rather than just contract management by CALTRANS. The universities agree that the master agreements provide strong relationships between CALTRANS and themselves, as well as facilitate funding and easy access to researchers. However, they report a lack of coordination between the various arms within CALTRANS. This overlapping of various CALTRANS departments has at times led to competition for funding which can be self-defeating. The universities would like to see more coordination within CALTRANS, as well as an annual conference which involves all academic units and DOT units in order to establish the agenda for the upcoming year and improve communications among all groups.

Indiana

Indiana has a unique situation in that even though research is conducted by several universities, state legislation enacted in 1937 requires that all proposals be reviewed by the Joint Transportation Research Program (JTRP) located at Purdue University. The JTRP advisory board consists of nine Indiana Department of Highways (IDOH) representatives, nine Purdue representatives, one FHWA representative (non-voting), and four highway industry representatives (non-voting). The advisory board solicits problem ideas from IDOH personnel at an annual meeting and then meets approximately monthly to review written proposals and approve projects. [1]

Iowa

The Iowa DOT (IDOT) has had a long-standing relationship with the Iowa universities since the early 1900s. The Iowa Highway Research Board was created in 1950 to promote, review, and recommend funding of research. The board now includes six county engineers, three IDOT engineers, the deans of the engineering colleges at Iowa State University (ISU) and the University of Iowa (UI), and three engineers representing Iowa cities. In 1996, IDOT and the

three state universities (ISU, UI and the University of Northern Iowa) entered into the Iowa Transportation Collaboration Agreement. This agreement identified the mechanisms for the university community to participate and support IDOT's research management process, as well as identifying an active role for the universities in defining the state's transportation research agenda. In 1997, IDOT and ISU's Center for Transportation Research and Education (CTRE) entered into two long-term agreements. The first is a basic agreement which allows CTRE to support IDOT in developing new initiatives, quick-response information gathering, and areas of assistance to IDOT which are not included within the scope of an existing project. The second agreement is an umbrella agreement known as the Research Management Agreement which allows IDOT to initiate research projects with ISU through a one-page addendum to the umbrella. These agreements are presented as examples in Appendix F.

One of the arrangements developed under the umbrella agreement is the joint hiring of the director for CTRE who is also a research faculty member and is paid jointly by IDOT and ISU. This collaboration between IDOT and ISU also allows IDOT engineers to teach classes for ISU students and ISU staff to conduct workshops for IDOT employees and others. The agreement has the flexibility to allow IDOT to contract with any of the three state universities, as well as allowing CTRE to contract with other state DOTs.

Massachusetts

The Massachusetts DOT (MDOT) previously had a blanket contract worth \$900,000 annually with the university research center located at the University of Massachusetts. They recently chose not to renew this agreement because the university has three campuses and they found that MDOT got better results dealing directly with each campus individually rather than using the university research center as the "middle man". MDOT's research policy is very strict due to reduced availability of funds; therefore, they only conduct applied research which will help solve a current problem or condition.

Texas

The Texas transportation research program is one of the largest, oldest, and most highly regarded programs in the country. Many states have attempted to copy its tenets, and others have come to believe that the program cannot be duplicated in any other state. In either case, the program offers many examples for success.

The Texas Department of Highways (TDOH) first contracted with Texas A&M in 1917. In 1950, the Texas Transportation Institute (TTI) was established, and in 1963, the Center for Transportation Research (CTR) at the University of Texas entered into contract with TDOH as well. In the past, nearly all TDOH research has been conducted at these two universities; however, outside pressures have recently opened the research up to 22 state universities. TDOH feels this allows for competition and improved products, as well as bringing real world problems to all the universities. The two original universities, however, feel it has weakened the cooperative partnership which they previously enjoyed with TDOH. Even so, both TTI and CTR cite advantages in the current program as being stability and continuity of funding, active

research involvement at all levels of TDOH, support for students and faculty, preparation for future employees of TDOH, and lower overhead costs for TDOH by working with the universities. No changes are anticipated in this proven system.

COMPETITIVE BIDS FROM UNIVERSITIES AND CONSULTANTS

Only the Ohio Department of Transportation (ODOT) responded as conducting all research solely on bids from universities and private consultants. Ohio has 13 in-state universities with engineering programs which ODOT feels promotes competition and reasonable prices, as well as making it easy to find expertise in any area. Using this process makes more knowledge and equipment available for research, and decreases ODOT staffing and operating costs. Students are exposed to practical engineering problems, and the low cost of student labor decreases the cost of labor-intensive research. Small research projects which need immediate attention are carried out through “special student studies” which have a maximum cost of \$10,000 and a maximum of 12 months duration.

The main disadvantage ODOT finds is that researchers sometimes don't understand the problem being researched. ODOT finds it difficult to change the direction of the research, and problems or errors may go undetected. With so many universities in addition to private consultants conducting research, ODOT also finds it difficult to monitor progress of ongoing research projects. They also believe that research funding which is spent on private consultant profits doesn't benefit research and could be spent more productively at the universities.

ODOT would like to see more ODOT involvement in the areas of technology transfer and implementation. Currently, “hands on” knowledge gained during research stays with the university or consultant, without being passed on to ODOT employees.

IN-HOUSE

Currently, only the North Dakota Department of Transportation (NDDOT) conducts the majority of its research in-house, which is primarily in the area of materials testing. A research advisory committee allows the Upper Great Plains Research Center at North Dakota State University (NDSU) the opportunity to suggest and submit research projects for inclusion in NDDOT's budget. NDDOT would like to see more dialogue between themselves and NDSU in order to allow the university a better understanding of the type of research which NDDOT can utilize.

OTHER

The remaining 14 states responding to the survey (34%) reported their DOT/university relationship as something other than those five relationships previously described, although some of the programs in this category are similar to those in other categories. The majority reported using a combination of university contracts, solicitation of bids from universities, and/or conducting some research in-house. Only four of the states (Maryland, Oklahoma, Oregon, and South Dakota) also report soliciting bids from private consultants. The process currently used by

Arizona falls into this category along with those of Arkansas, Colorado, Connecticut, Florida, Illinois, Kansas, Maryland, Michigan, Minnesota, Montana, Oklahoma, Oregon, South Carolina, and South Dakota.

Advantages of using a combination of research sources include the flexibility to contract with well-qualified researchers regardless of their affiliation, access to a large number of transportation research personnel allows the best researcher to be matched to the particular project, in-house personnel provide continuity on long-term projects, and projects which require a solicitation process have a well-defined scope and expected product stated.

The primary disadvantage stated is the time required to start the project due to the RFP and contract negotiation process. Multiple contracts also require considerable time spent by the DOTs on administrative functions. Following are descriptions of the model used and comments for a few states.

Arizona

The research division of the Arizona DOT (ADOT) is the Arizona Transportation Research Center (ATRC). Each year, the ATRC solicits ideas on ADOT's transportation research needs. Those which are the most highly regarded and urgently needed (as determined by customer feedback) are forwarded to the ADOT research council, a committee made up of ADOT's division heads and top management, for funding consideration. Selected ideas are developed into research projects which are either performed by the ATRC or awarded via solicitation of bids to universities or private consultants. University-related individuals currently participate in 11 of 34 projects (32%) which account for 21% of funding. Most research contracts have been awarded to private consultants (67% of funding and 50% of projects).

Colorado

In 1992, the Colorado DOT (CDOT) formed the Colorado Transportation Institute which was established as a joint public-private-university cooperative transportation research unit involving CDOT and five state universities. A copy of the memorandum of understanding is shown in Appendix E. This agreement was not renewed when it expired due to lack of response from the universities. The current process which CDOT uses involves solicitation of bids from consultants and multiple universities, or in-house use of research specialists. CDOT feels this process allows them to tap into national expertise, gain access to expertise and equipment which CDOT does not have, and focus resources for quick turnaround. In addition, maintaining a quality staff of CDOT researchers facilitates implementation and project management. CDOT did not cite any disadvantages with their current process; however, they would like to streamline the contracting process and would like to once again develop a cooperative agreement with the state universities.

Florida

The Florida DOT (FDOT) created its research center in 1989 with the idea that research funding should be available to all functional areas of FDOT, each Florida university should have an equal opportunity to compete for FDOT research funding, research initiatives should address identified needs (applied vs. basic), the program should concentrate on state rather than national issues, and that information regarding all research results should receive a wide distribution. FDOT's research center maintains a small staff and does not perform any in-house research, although some strength and materials testing is done in-house at labs which are not administered by the center. The research center has an annual budget of approximately \$6 million and awards 25-35 new contracts per year with about 130 active contracts.

A key component of FDOT's research strategy is the use of professionals throughout FDOT to serve as research project managers. FDOT feels that not centralizing project management at the research center allows the research to be managed and the results to be implemented at the working level of each office. This strategy also promotes ownership of research which assists the implementation process and also allows the professionals to maintain active involvement in new and developing technologies. To ensure that all research needs are being adequately considered, FDOT formed a technical research advisory committee made up of 22 employees representing each of FDOT's eight district offices and functional work areas. The committee's primary duty is to review research needs and balance them to available funding. Proposals must be submitted by an FDOT employee so universities must have a willing sponsor to have their proposals considered.

Research is conducted primarily at Florida's seven state universities, with approximately 15% awarded to private consultants, other state agencies, and out-of-state universities. Contracts are either awarded directly to universities without competition based on a proven record and expertise or offered for solicitation of bids. The decision as to which process is used is up to FDOT staff depending on the project. Awarding contracts directly avoids wasted time when a proven researcher is available; however, all projects require an individual contract. This requires considerable and repetitive administrative functions which could be eliminated or reduced by establishing a master task-order contract with the universities. Overall, FDOT and the universities appear happy with the current process and anticipate no changes.

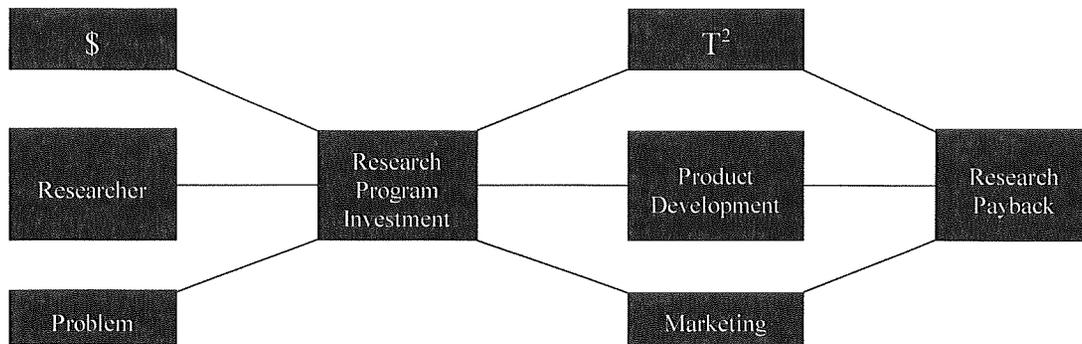
Kansas

The Kansas DOT (KDOT) conducts research through their in-house research program and through contracts with the two major state universities, Kansas State University (KSU) and the University of Kansas (UK). A cooperative transportation research program was created during 1990 between KDOT, KSU, and UK. The program is called the Kansas Transportation Research and New-Developments (K-TRAN) Program, and was modeled after the Texas program. The annual K-TRAN Program budget is approximately \$500,000. Each university is guaranteed from \$100,000 to \$250,000 which funds graduate students and faculty. The overall benefit to cost ratio in July 1996 was 30.7:1, and some K-TRAN funds are used as matching funds for Mid-America Transportation Center (MATC) projects which further leverages their

research dollars. In addition, KDOT does not pay indirect costs to the universities as a result of state legislation. Both KDOT and the universities find the program to be highly successful. The only change anticipated is the merging of the K-TRAN technical committee and the research steering committee so that one committee will oversee the technical aspects of both university and in-house research.

Minnesota

Transportation research in Minnesota is conducted through a combination of Minnesota DOT (MnDOT) in-house research and contracts through multiple universities. All university research, however, is coordinated through the Center for Transportation Studies (CTS) at the University of Minnesota (UM). Having only one research university in Minnesota makes the process simpler and has the advantage of a strong university/DOT relationship in terms of both organizations understanding the other's culture. MnDOT is represented on both the CTS executive committee and the research councils. MnDOT finds the use of both internal and external sources broadens the scope of expertise available, stimulates the discussion and debate on research questions, and minimizes the consequences of dependency on a sole source. The flexibility and range of subject matter which MnDOT researches requires a greater investment in the program and considerable management support. MnDOT is known for having an administration that values research as a process which provides continuing education of all staff and new employees in the long-term. To this end, the users of the research are expected to participate throughout the project for mutual learning by both the user and the researcher. A flowchart of MnDOT's research process is shown in Figure 4.



Source: Minnesota Department of Transportation, Transportation Research 1995 Annual Report

Figure 4. Minnesota Research Process

The process begins with problem identification which directly affects the potential for the project's implementation. The problem statement is then matched with funding and the desired researcher to create the research program investment. Completion of the research leads to the implementation process which includes education of users through the Technology Transfer (T2) program, and product development and marketing if appropriate. The process concludes with the effective application of research results and an identifiable benefit to MnDOT and its customers.

RESEARCH IMPROVEMENTS

Regardless of the type of research relationship maintained between the state DOT and their university(s), the sole reason such a relationship is established in the first place is to conduct transportation research. The quality of the research product is of utmost significance. It is important, therefore, to ascertain how conducting research through a university research center might improve the DOT's research results.

Shuldiner's findings in the late 1980s suggested that while it was not necessary for a strong highway agency research program to be conducted in conjunction with a university, the two usually seemed to go together. It was also found that where a close, long-standing relationship existed between the state highway agency and a university, not only was the agency's research program strong, but the university's highway education, research, and public service programs were strong as well. [1] This correlation appears to hold true today. University research programs which have total grants in excess of \$2 million yearly are also programs which have strong relationships with their state transportation department. According to the financial summaries in the 1995 CUTC Member Profile [4], as well as data obtained from the survey conducted by Arizona's DOT, these centers include the states of California, Florida, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, New Mexico, North Carolina, Pennsylvania, Tennessee, Texas, and Washington. Not surprisingly, these universities also have strong relationships with their state transportation departments.

Although the benefits realized by the DOTs varied with the type of arrangement maintained with the state universities, several themes were commonly expressed.

- A major benefit to the DOT in maintaining a collaborative arrangement with a university is access to the specialized knowledge available at the university. This knowledge is not limited to specific disciplines within the university, although a wide range of disciplines is available (e.g., civil engineering, construction, geography, geology, business, planning, social sciences, etc.). Of equal benefit, is the general knowledge and experience of university faculty in developing and conducting research. University faculty are generally up-to-date on the latest research methods and provide access to national expertise if needed. Universities are, by nature, research institutions; state DOTs generally are not.
- Ongoing, sustained relationships between DOTs and universities allow the university research programs to grow and gain national exposure. While the DOT may prove to be a major source of funding for initial development of the university program, subsequent growth allows the university to attract other sources of funding which eases the dependence of the university on the DOT. This growth and national standing is important in attracting top researchers and students to the university program, as well as adding

research equipment and expanding facilities, which in turn provides an improved research product to the DOT.

- Universities provide the potential for flexibility in hiring highly qualified technical professionals on a temporary basis. This can benefit DOT research in several ways. University faculty and/or graduate students can meet rapidly changing needs for which research positions within the DOT are not available. Universities can also make use of “visiting professors” (professors from another university), other professionals, or collaborations with other universities and/or private industry to assist in research projects for which their on-staff faculty may lack the necessary expertise or manpower.
- Universities are considered by many state DOTs to be the most cost-effective means for conducting research, partially due to the availability of student research assistants. For example, Kansas cited a 30:1 return on research dollars spent, and Ohio pointed out that since available research funds are limited, using those funds on private consultant profits would not appear to be of benefit to research.
- Established contractual relationships between the DOT and university allow less complicated, time-consuming contract negotiations when awarding research projects. This reduces the time required prior to beginning the project. Specified responsibilities and monitoring procedures also ensure deadlines are met and project goals are achieved, thereby benefitting the final research product.
- Finally, one of the most significant and most frequently expressed benefits of maintaining a close relationship between the DOT and the university is the opportunity for both organizations to become familiar with the other's motivations and needs. Day-to-day involvement allows quick exchange of information, and the ability to address appropriate research issues. University faculty and students are exposed to “real life” issues and can understand the DOT's need to conduct applied research which can be implemented. On the other hand, DOTs can begin to understand the university's need for some “theoretical” or basic research which could prove beneficial to the DOT in the long-run. This mutual understanding and frequent contact can also lead to successful completion of research projects by the desired due date and change of direction during the research if deemed necessary.

Combining the best of both DOT and university researchers can only serve to strengthen the resulting research and offset any weaknesses inherent in either organization in order to produce the best research product available.

EDUCATIONAL BENEFITS

The primary goal of any research project is to become more knowledgeable about the particular situation which generated the initial problem statement; therefore, education is inherent in the research process. DOTs conducting research in conjunction with a university enrich the learning experience for all parties involved.

The first group to increase their knowledge about transportation is the student population. This includes both undergraduate and graduate students, and it is for the education of this group that universities exist. The traditional education experience for many students involves training in the basic tenets and theories of their field of interest. The students graduate and enter the workforce with this basic understanding, but no “real world” experience, and it is left up to the employer to continue their education in the specific areas important to that employer. Cooperative research between the university and the DOT can bridge this gap and provide the student with the opportunity to work on projects which are relevant to the real world. This not only benefits the student, but allows the DOT to have some influence in the training of potential future DOT employees. ADOT, for example, has expressed the desire for the addition of classes such as design cost estimating and project management accounting. An established relationship would allow these needs to be made known to the universities which could then respond by incorporating these needs into the curriculum. Some states (e.g., Iowa) commonly have DOT staff members as guest lecturers and instructors. The interdisciplinary nature of many research projects also allows the student to be exposed to other university disciplines in a team situation which is also a real world experience that may not occur in a traditional education program.

A secondary benefit to the student is the financial support which they receive by working on a research project. This opportunity for increased education and financial support for the student has a side effect for both the university and the DOT, as well, by allowing the university to compete more effectively for top students which serves to enhance the final research product. The ability of the university to attract top students as a result of a cooperative research environment applies to university faculty also. Drawing top researchers not only improves the research conducted, but allows the students to be taught by some of the best in their field.

The association of the university and DOT can serve to provide educational opportunities for the university faculty. Diverse research projects can expand their expertise in research, and a close relationship with DOT personnel will provide an increased understanding of DOT problems, needs, and motivations. This, again, is an exposure to the “real world” which can be beneficial to the university faculty. It can also ease some of the difficulties experienced by the DOTs who require applied, implementable research, and often times are unable to relate this need to the universities.

Those at the university are not the only participants to benefit from a cooperative research relationship. The DOT and its employees are the benefactors of increased education, as well. Continuing education of its staff is expected by many DOTs, as expressed by the Minnesota

DOT. A partnership with academia allows the DOT to benefit from the expertise and research methods of the university faculty. Allowing the DOT user to follow a research project from its inception to its implementation provides valuable training in new methods and technologies, and requiring the researcher to also follow the project to completion has added educational value for them as well. As with the university faculty, an ongoing, close relationship allows the DOT staff to understand the motivations, needs, and interests of the universities. Acknowledging that the university must conduct some basic research has led some DOTs (e.g., Texas) to fund a small portion of this basic research in addition to its more pressing applied research. After all - all applied research began with some basic research somewhere in its history. This mutual understanding leads to improved communication between both organizations.

TECHNOLOGY TRANSFER (T2) PROGRAM

The Local Technology Transfer Program, or the T2 Program, is partly funded by the Local Transportation Assistance Program (LTAP) which began in 1982 as the Rural Transportation Assistance Program (RTAP). T2 centers were created by the Federal Highway Administration (FHWA) to provide technical training and assistance to governments, cities, and towns which had a population of less than 50,000 persons. In 1991, the program was expanded to include cities with up to one million in population, and the name was changed to LTAP.

Technology transfer is recognized by many states as an important part of its operations because research dollars are wasted if research clients are unaware of the results, unable to understand the findings, or unable to implement them. In addition to publishing research reports, the findings can be included in a national database so that research efforts are not duplicated. Finally, research results must be communicated to those users who can benefit from the findings. This is accomplished by conducting training through the T2 or LTAP Program (the names are used interchangeably).

T2 programs are not involved solely with the communication of current research results. They can also offer ongoing training and certification programs which are often required by state regulations. This centralization of a state's training needs makes the best use of training resources and funds, and provides training to small communities which may have difficulty conducting it themselves.

Training is accomplished in a variety of ways, often depending on the available funding. Many states offer workshops and classes which can be conducted at a central location or taken to the user in rural areas. Videos and various publications are also maintained in a central library for use by interested parties. Other states combine classes and workshops with technology to offer state-wide video conferencing (e.g., Iowa) and national satellite teleconferencing (e.g., Minnesota). Most training is offered to DOT staff, local governments, and private industry; however, some programs are now training international customers as well (e.g., Massachusetts Institute of Technology).

How many T2 programs are administered by universities and how many are administered by DOTs was not determined by ADOT's survey; however, of the 28 states with CUTC research

centers, 80% conduct T2 training through one of those universities. [4] Some T2 programs offer free training to local governments (e.g., Arizona), and others indicate the program is nearly self-sustaining through registration fees and workshop sponsorships (e.g., Florida).

Arizona's T2 program is currently administered by ADOT through the Arizona LTAP Center. The Center offers publications and the following classes/workshops:

- Value analysis/value engineering
- Highway plan reading
- Highway plans quantities
- Traffic signals and lighting
- Pavement management multi-year prioritization
- Basic survey
- Streetscape in urban and rural environments
- Effective disaster recovery techniques
- Project management
- Fundamentals of MicroStation
- Best management practices
- Work zone traffic control/flagger training
- Signing/pavement marking
- Integrating GIS and intelligent transportation systems
- Using asset management systems to protect your investment
- Roadway condition awareness
- Roadway condition awareness
- Traffic engineering fundamentals for non-traffic engineers

These workshops are conducted around the state and some can be down-linked to local community colleges. Workshop registration fees are \$50 to private industry, \$25 to ADOT staff, and free to local governments (except in the case of a no show when there is a \$50 “no-show” fee). The LTAP Center is currently creating a database of over 1000 workshops which are available. It is anticipated that the entire list will be accessible on ADOT's web page by the end of 1998.

RESEARCH CENTER LOCATION

The decision as to whether a transportation research center should be located at one in-state university or at more than one university is largely dependent upon what model is used to establish the DOT/university relationship. Successful programs have been established using both formats. Advantages and disadvantages of both situations are given below.

ONE UNIVERSITY RESEARCH CENTER

DOTs which conduct research primarily through one university fall into three main categories - the research center is a DOT entity, but is located on a university campus (e.g., Louisiana); the DOT has established an agreement with one university research center to administer the DOT's research program (e.g., Indiana, Minnesota, Pennsylvania, and Tennessee); or the DOT conducts research with only one university as in the "contracts with one university" model described earlier. The one university model is used in most cases due to limited engineering programs within the state rather than a choice to use only one university. If the research center is a DOT entity, it basically has control over the research conducted and procedures followed just as if the center were located in-house. Therefore, the following advantages basically pertain to the university research center as the administrator of the DOT research program.

- The DOT has one point of contact for all research projects so administrative tasks are minimized.
- A very close relationship is often developed between the DOT and the university.
- Requiring the university research center to be responsible for monitoring the status of all research projects (whether performed at their university or at another location) allows better research oversight for the DOT and minimizes its administration of projects.
- Administrative costs can be lower if DOT staff is minimized and this function is transferred to the university center for a negotiated contract amount.

Disadvantages with conducting most DOT research through one university location are as follows:

- The university research center can come to expect the bulk of DOT research to be conducted by itself.
- Unless the DOT and the university have a long-established relationship, the DOT may want to monitor where research projects are awarded to ensure the university is acting in the DOT's best interest.

- Strong relationships are difficult to maintain with other universities which may conduct research projects, but are not the main DOT contact.
- Other universities can feel that the university with the “DOT” center receives unfair advantage which can affect the overall DOT/university relationship.

MULTIPLE UNIVERSITY RESEARCH CENTERS

There is currently no example of a DOT maintaining research centers which are DOT entities at more than one university. DOTs which contract through multiple university research centers can be separated into two main categories - those which have formed a state research program (e.g., Washington's TRAC or Kansas's K-TRAN) which administers the DOT's research, but is in effect located at the DOT and the universities; and those states which have entered into basic agreements with multiple state universities (e.g., California, Florida, and Texas). The advantages of such a program are as follows.

- The DOT has a wide variety of expertise from which to choose when awarding research projects.
- The DOT can award research to the university center with the most expertise or available manpower for a particular project without resorting to the time-consuming RFP process.
- Multiple centers maintains a competitive environment regardless of whether awards are issued based on expertise or an RFP process.
- The proximity of centers located throughout the state can address the needs of those DOT agencies located nearby more quickly if not required to go through the administrative channels.
- Universities scattered in large states (e.g., California and Texas) which have differing environments throughout the state may be better able to address a research need relating to their particular geographic area.

Disadvantages with having multiple university research centers are as follows.

- Providing administrative funding for many locations can be cost prohibitive unless a nominal staff is funded in order to maintain a presence such as in Washington's TRAC.
- Several research center locations require more administrative time for the DOT to manage the ongoing research and may required more DOT personnel to be involved in project oversight.

ARIZONA UNIVERSITY LOCATIONS

Although none of Arizona's three universities currently operates a formalized research center, all three have a civil engineering (CE) department with a program specializing in transportation and faculty who conduct ongoing research. The number of current CE faculty and graduate students at each university are shown in Table 2.

Table 2. Arizona University Civil Engineering Faculty and Graduate Students

UNIVERSITY	# CE FACULTY	# GRADUATE STUDENTS
Arizona State University	12 *	25 *
Northern Arizona University	6	3 **
University of Arizona	8	30

* ASU totals are for those faculty and students in transportation-related fields. Additional CE faculty and graduate students are available in the structural, environmental, and geotechnical fields.

** NAU does not currently have a graduate program, but will begin one in fall 1998 with two or three graduate students expected.

In addition to the CE faculty and students available at each university, various other departments and disciplines would be available and interested in pursuing transportation-related research. For example, the 1994 ASU CATSR-affiliated faculty included 16 different departments and 42 faculty. Affiliated departments included civil engineering, electrical engineering, psychology, decision and information systems, geography, mechanical and aerospace engineering, biochemistry, computer science, aeronautical technology, planning, business, environmental research, exercise science, math, construction, and industrial and management systems engineering. All but two of those 1996 CATSR faculty are still at ASU; with the addition of at least three new faculty who have expressed an interest in transportation research. [8] All three CE departments have expressed the desire to have a transportation research center located at their university.

COOPERATIVE AGREEMENT

The Texas Transportation Institute (TTI) has provided their example of what a cooperative research program should include.

- The elements of a cooperative research agreement should include:
 - The research program should be developed jointly with input from all parties.
 - The sponsoring and performing agencies should share in the cost of the research so that each has a stake in the research and products produced.
 - Conduct of the research must have sufficient involvement from the sponsoring agency to assure that the original intent of the research objectives is being pursued.
- In a cooperative program, the DOT should expect:
 - That the contracted research will be performed on schedule and within budget in accordance with an approved work plan.
 - That the quality of the research and its resulting products will be of the highest professional quality.
 - That the university will have or can make available professionally qualified staff to address the identified priority problems in a timely manner.
 - That the facilities and equipment of the university will be available for use in the cooperative program.
 - That the university will develop a pool of graduate professionals qualified to become potential employees of the DOT.
- In return, the university should expect:
 - That the funding for the program will have continuity without major reductions from year to year so that top quality staff can be retained and expertise improved from year to year.
 - That the DOT/university relationship be considered a partnership rather than strictly a contractual arrangement, so that issues arising during the course of the research can be resolved effectively and efficiently.

- That the administrative requirements of the program be kept as simple as possible in order to minimize costs and program delays.

BASIC AGREEMENT

In states where a formal cooperative research arrangement exists between the DOT and one or more universities, a written agreement specifying the rights and responsibilities of each party is usually in effect.

In several cases, the authority for the cooperative research agreement is specified by a legislative act which authorizes state transportation research to be conducted by a particular university. Examples include Purdue University in Indiana and the University of Tennessee. In other instances, the agreement is entered into pursuant to general legislation authorizing interagency agreements. This is the case in Washington with the agreement between the Washington DOT, the University of Washington, and Washington State University. [1] An example of the interagency agreement which formed the Washington State Transportation Center (TRAC) is shown in Appendix G.

In every known case so far, DOT-university agreements are limited to public institutions. Those states which conduct research with non-state universities and private institutions do so on an individual contract basis. In the NCHRP 1996 study, 33 of the 42 states responding to the survey (79%) reported having some type of basic agreement with universities. [6]

A basic agreement is not a contract with the university, but rather an understanding between the state and the university of "boiler plate" terms. There are two types of basic agreement - a memorandum of understanding which is usually less complex and an actual basic agreement which is more detailed. Appendix E shows the memorandum of understanding which established the Colorado Transportation Institute (CTI) in 1992. Participants to this agreement were the Colorado Department of Transportation (CODOT), the Colorado School of Mines, the Colorado State University, the University of Colorado, the University of Colorado at Denver, and the University of Southern Colorado. Although the agreement was not renewed on its expiration date due poor response from the universities, it can provide an example to states of where to start when creating their own basic agreement, and perhaps as CODOT says, "an example of what didn't work".

An example of a basic agreement which is currently working is shown in Appendix F. This is the agreement including addendums between the Iowa Department of Transportation (IDOT) and Iowa State University's (ISU) Center for Transportation Research and Education (CTRE). The agreement spells out the responsibilities of each party and the addendums cover the development support and administrative elements of the agreement. This arrangement has proven very successful for Iowa to date, although they have come to realize that the funding provisions for the director of CTRE whose salary is split between IDOT and ISU, could make it difficult to recruit a successor to the current director when that becomes necessary.

Another example of a basic agreement is shown in Appendix H. This is the basic agreement between Washington DOT and the University of Washington. Again, this agreement details the responsibilities of each party, while taking care to state that it is not a guarantee that any specific number of research projects will be assigned to the university. The award of research projects is accomplished through a task order which is explained below. This basic agreement includes references to the format for writing the working papers and final and interim reports and the requirement to comply with Title 6 of the Civil Rights Act of 1964, although those portions are not shown in this report. As with Iowa, Washington's TRAC executive director and co-directors divide their time and salary between TRAC and their respective organizations; however, they have found no difficulties with the arrangement, and the relationship between all three organizations has been very successful.

TASK ORDER

Once the basic agreement is established between the DOT and the university(s), awarding research projects can be accomplished several ways. The two most common include issuing either RFPs or task orders. As reported earlier in this report, nearly two-thirds (57%) of states issue RFPs to universities only. Several of those states (e.g., Colorado, Florida, Minnesota, Washington, and Wyoming) also issue sole source awards in addition to the RFP process. Sole source awards allow the DOT to award contracts without solicitation of bids. This method has several advantages:

- This technique saves considerable time in the contracting process;
- Advantage can be taken of the beneficial experience that the DOT has had with a university in the past and the relationship can be enhanced over time;
- A search for additional contractors may not be warranted;
- Emergency investigations often cannot be handled any other way.

A sole source award is accomplished by issuing a task order to a university with which the DOT already has a basic agreement. The addition of the task order to the basic agreement forms a contract. The task order is usually only a few pages in length and could contain the scope of work or reference to an attached document, the budget for the research, the principal contacts at the DOT, the principal investigator, and reference to the terms of the basic agreement. [6] A copy of Washington's task order is shown in Appendix I.

BENEFITS

According to comments received from survey responses, establishing a cooperative agreement between ADOT and all three in-state universities could provide many benefits toward promoting transportation research and learning in the state of Arizona. These include the following:

- A cooperative agreement would promote a partnership and closer relationship between ADOT and the three universities while still allowing for competitiveness among the universities.
- An agreement including all three universities would allow for combining talents and expertise at the universities to form a consortium for appropriate projects which would increase learning and improve the product provided, as well as provide added manpower if necessary. A step in this direction has already been taken with the three Arizona universities establishing a transportation research partnership agreement. A copy of this agreement is shown in Appendix J.
- An agreement which is written with the joint consultation of ADOT and all three universities should provide a “win-win” situation with no university feeling left out of the research process.
- Adding a provision for appropriate funding from both ADOT and the universities within the agreement allows for stability of the research center(s) over the long-term.
- The knowledge that the university will be awarded ADOT projects (although not guaranteed of how many projects or how much funding) allows the school to attract top faculty and students which increases learning and improves the final product.

CHALLENGES

There were truly no disadvantages cited by survey respondents in establishing a cooperative agreement between ADOT and Arizona's state universities. However, there were challenges cited and several issues which other states have found must be included in the agreement in order to prevent future problems. These are as follows:

- Arriving at an agreement which is acceptable to all three universities and ADOT could be a long process, although it should prove to be a time-saver in the long-run.
- The agreement must be written to allow ADOT flexibility in awarding research projects to entities other than the universities if warranted.
- The agreement, while providing some funding for continuity or a “presence” as in the Washington case, must not allow the universities to feel they are “guaranteed” a specific amount of funding for research projects.
- The agreement must allow for competitiveness while maintaining harmonious relations between the universities in order to provide the best product for ADOT.
- The agreement should provide a means for ADOT to monitor the progress of research awards and contain an accountability clause for the universities.

CONTRACT MANAGEMENT

Over the years, state DOTs, although strongly believing in the benefits of maintaining partnerships with the universities, have continually complained about some difficulties experienced in contracting with these same universities. The most common problems stated have been difficulties monitoring the progress of the research, that universities have not been held accountable for meeting deadlines and maintaining the original scope of the project and implementation of research results is often difficult if not impossible to achieve. All of these problems can be avoided if the basic agreement is written properly as stated above, and a process for monitoring the progress of the research is established. A good resource in establishing such a process is available from the National Cooperative Highway Research Program (NCHRP). Their report "Synthesis of Highway Practice 231 - Managing Contract Research Programs" specifically targets these challenges and offers ways to avoid them, including chapters on selecting a contract program, negotiating a contract, monitoring the contract, and implementation of contract results. [6]

Entering into contract negotiations with a clear understanding of goals and the foresight provided by others should allow ADOT and the universities to arrive at a basic agreement which will prove only beneficial to all parties involved. In addition, allowing for flexibility in that agreement with modifications as needed, will ensure that it remains viable over the long-term.

PRIVATE SECTOR FUNDING

An effort to find sources of research funding in addition to the traditional state and federal funding programs, prompted ADOT to question survey respondents as to whether they solicit private sector involvement and funding in their research centers, and if they do, whether this additional funding allowed the center to be self-sufficient. Over 75% of the states responding to the survey (31 out of 41 responses) indicated they have some private sector involvement in their program. None of the states, however, receive enough funding from the private sector to be self-sufficient. Comments regarding this involvement were the same from all respondents.

- Most private sector involvement is unsolicited. The private sector firm generally approaches the DOT or university research center with research ideas.
- Few centers actively solicit private sector involvement except for occasional projects which would obviously benefit some area in the private sector.
- Few hard dollars are provided. Most private sector involvement is in the form of materials, equipment, and services which may be provided through serving on advisory boards or conducting research.

According to financial summaries in the "1995 CUTC Member Profile", contributions from private sources and industry ranged from less than 1% to as much as 18% (at Northwestern University in Illinois) for 1994. [4] Survey data reiterated these percentages. The Texas program at TTI is often approached by the private sector due to the success of their center. They receive the largest dollar amount (between \$1.5-3 million annually), yet this accounts for just 5-10% of their budget. Potential sources of private sector funding indicated by survey respondents include shippers and carriers (e.g., trucking, airlines, rail), and trade organizations such as the American Trucking Association or the automobile industry. Four of the responding states are making an attempt to increase the amount of private sector funding in their programs.

- The Center for Microcomputers in Transportation at the University of Florida's Transportation Research Center receives substantial support which allows this one segment of the center to be self-supporting. A large portion of the University of Florida's T2 program is supported through registration fees and private sector sponsorship of workshops. All research at the center, however, is publicly supported.
- Minnesota works closely with the private sector for its ITS deployment and field test ventures, but this funding source is not a major component for the rest of the research budget.

- The LTRC at Louisiana State University recently established the LTRC Foundation as a non-profit organization in an attempt to partner with the private sector for narrow, focused goals. They don't intend for this funding to be for their operational budget. At the present time, solicitation is being conducted to expand their training facilities.
- The Institute of Transportation Studies at the three University of California campuses have a corporate affiliate program with annual fees, industry internships, industry-sponsored research, and industry membership in research consortia. Even so, this involvement is "somewhat haphazard" and not as much as they would desire. They are attempting to rethink and redesign the partnerships.

One other university research center which has a corporate affiliate program is the Massachusetts Institute of Technology. Although MIT did not respond to ADOT's survey, an article describing their program was carried in Traffic World in the March 13, 1995 issue. MIT states that they began their corporate affiliate program in 1981 in order to establish an active partnership between the center and participating carriers and shippers. Affiliates provide annual financial support of \$15,000 per company which is used for student assistance, new research, and education programs for industry. The member companies take an active role in center programs, including participation in frequent seminars on "hot" topics and decision-maker forums for senior executives. The affiliate employees are also guaranteed a certain number of seats at the center's popular summer course on logistics. Top affiliate executives meet annually for an educational and discussion program. The article listed the 1995 members as follows: [9]

American President Lines	International Business Machines
AT&T	LogiCorp
Bose	Maersk
British Airways	Mars
British Railways	Norfolk Southern
Burlington Northern	NYK Line
Canadian National Railways	Procter & Gamble
Caterpillar	Roadway Services
Chemical Leaman Tank Lines	Ryder System
Conrail	Sea-Land Service
Consolidated Freightways	Sema Group
CSX Transportation	3M
Digital Equipment	Unilever
Dow Chemical	Union Pacific
Du Pont	United Parcel Service
Federal Express	U. S. Postal Service
Flota Mercante Grancolombiana	Volkswagen
Gillette	Yellow Freight
Goodyear Tire & Rubber	

Although this funding from the private sector amounts to over \$500,000, it still accounts for only approximately 12% of MIT's total expenditures according to the "1995 CUTC Member Profile".
[4]

One issue cited by several survey respondents regarding joint public and private sector research involves the issue of patent or copyright complications. The three Arizona universities are currently revising their intellectual property policy. A draft of the proposed policy is available on the internet at <http://researchnet.asu.edu/techcoll/policy/>. Those interested are requested to review the policy and submit comments. Once the universities are satisfied with the policy, it will be sent to the Board of Regents for ratification.

RESEARCH CENTER BUDGET

The cost to establish and run a transportation research center at one of the state's universities would be highly dependent upon the model used to establish the center. Since it has been seen, however, that the private sector does not appear to account for a large portion of a center's budget, funding sources must initially come from the legislature, the state DOT, and/or the university(s) (either directly or through various grants obtained). Many states indicated that the transportation research center is highly dependent upon the DOT to supply research projects for approximately the first five years. During that time, the reputation of the center is expanded and its ability to obtain funding and projects from other sources increases.

One feature which is constant among all states which have productive cooperative programs is the continuity of funding. This does not mean that the funding must be large (e.g., Washington DOT's annual \$60,000 contribution to TRAC) or even that a set amount is guaranteed from year to year. What it does mean, however, is that either by practice or written agreement, a commitment has been made by the state DOT to sustain a level of support sufficient to elicit a commitment on the university's part to devote sufficient faculty and other resources to meet the highway agency's needs. [1] Availability and stability of funding, therefore, are critical during the first years of a research center's existence.

The actual costs to establish a center must be negotiated with the university where the center is to be located. Space and personnel costs can range from nothing (where they are counted as a portion of the university's funding contribution) to a negotiated cost per square foot for rent or personnel salaries which the center pays to the university. The following information is provided in order to compare existing programs in other states and for use as a basis in establishing a similar program in Arizona.

DOT EXPENDITURES

Funding available to finance the research activities of a state DOT may be obtained from a variety of categories as listed below.

SPR (Federal) - The Federal-Aid Highway Act of 1962 requires that 2 percent of all federal aid apportionments to each state be available for planning and research. These funds are designated as SPR (State Planning and Research) funds, and must be matched by the state based on the matching ratio established by federal law. Most states' research efforts are aided by funds from this source.

State Funds - Some studies which have limited scope, local interest, or a shortage of federal funds are financed with state funds.

NCHRP - The National Cooperative Highway Research Program (NCHRP) is a pooled-fund program directed toward problems of national significance sponsored by the state DOTs

and the Federal Highway Administration (FHWA), and administered by the Transportation Research Board (TRB). The program is supported by individual state DOTs with SPR funds based on a certain percentage of their SPR program. These funds do not require a state match. Studies conducted through this program are usually high cost and are identified through an annual solicitation through the American Association of State Highway and Transportation Officials (AASHTO).

Pooled-Fund Projects - When widespread, regional or national interest is shown in a significant problem, research studies of major importance may be conducted on a cooperative basis by several states, the FHWA, and third parties (contractors, universities, etc.). These studies may be conducted using SPR funds without state matched funds. The FHWA generally acts as the contracting agency for the participating states. An advisory committee composed of representatives of each participating state and of the FHWA is established to provide overall project direction and permit consideration of the cooperating states' views.

R&D Management Option - Recent national research objectives include allowing the states more freedom in managing research activities. The R&D Management Option was created to encourage this. Upon approval by the FHWA, which is based on a satisfactory review by FHWA staff of a state's ability to operate independently and efficiently, the state DOT may initiate federally-funded SPR projects without prior FHWA approval. To obtain this approval, it is necessary to have an effective research advisory committee, an up-to-date research policy, and a detailed research manual.

Nationally Coordinated Program (NCP) - The NCP, created by the FHWA, focuses on subjects of highest national priority. These projects are coordinated by NCP management, and are usually long-term, pooled efforts. Current areas of interest include ITS, intermodal transportation systems, seismic research, commercial vehicle safety, international outreach, and education and training programs.

The "Synthesis of Highway Practice 231 - Managing Contract Research Programs" identified the 1994 funding sources of the state DOTs as shown in Table 3. [6]

Table 3. 1994 DOT Funding Sources

<i>STATE</i>	FUNDING SOURCE (in \$1000)			<i>STATE</i>	FUNDING SOURCE (in \$1000)		
	<i>SPR</i>	<i>STATE</i>	<i>OTHER*</i>		<i>SPR</i>	<i>STATE</i>	<i>OTHER*</i>
Alabama	1375	1000	81	Nebraska	922	231	
Alaska	330	82		Nevada	296	80	
Arizona**	1179	350		New Hampshire	410	60	
Arkansas	307	170	700	New Jersey	3238		710
California	7000	4260		New York	3116	1047	661
Colorado	2000	600		New Mexico	360	120	480
Connecticut	2288	554	316	North Carolina	1430	383	263
Florida	2600	2400	100	North Dakota	500	100	
Georgia	1898	475	967	Ohio	3128	622	
Idaho	217	26	48	Oregon	1026	415	271
Illinois	1690	1434		Pennsylvania	2900	750	275
Indiana	3120	1300	105	Rhode Island	449	112	
Iowa	1410	1850	1600	South Carolina	1036	155	
Kentucky	1710	1208	690	South Dakota	640	450	
Louisiana	2626	1262		Tennessee	1500	500	
Maine	280	260		Texas	8000	9000	5000
Maryland	1117	461		Utah	659	472	800
Michigan	2100	3800		Washington	2219	3126	608
Minnesota	1112	6009	1300	West Virginia	598	150	484
Mississippi	968	242	650	Wisconsin	1200	240	
Missouri	1750		67	Wyoming	560	124	270

Notes:

*Other sources of funds include: ISTEA, FHWA, Industry, State, IVHS, FAA, NSF, LTAP, Safety (402)

**Arizona data is for fiscal year 1998

Source: NCHRP Synthesis of Highway Practice 231 - Managing Contract Research Programs

Although Virginia DOT (VDOT) was not included in the above report, the Virginia Transportation Research Council (VTRC) 1994 Annual Report gives the income and expenditure information as shown in Figures 5 and 6. [10]

Figure 5

1994 Virginia Research Funding Sources

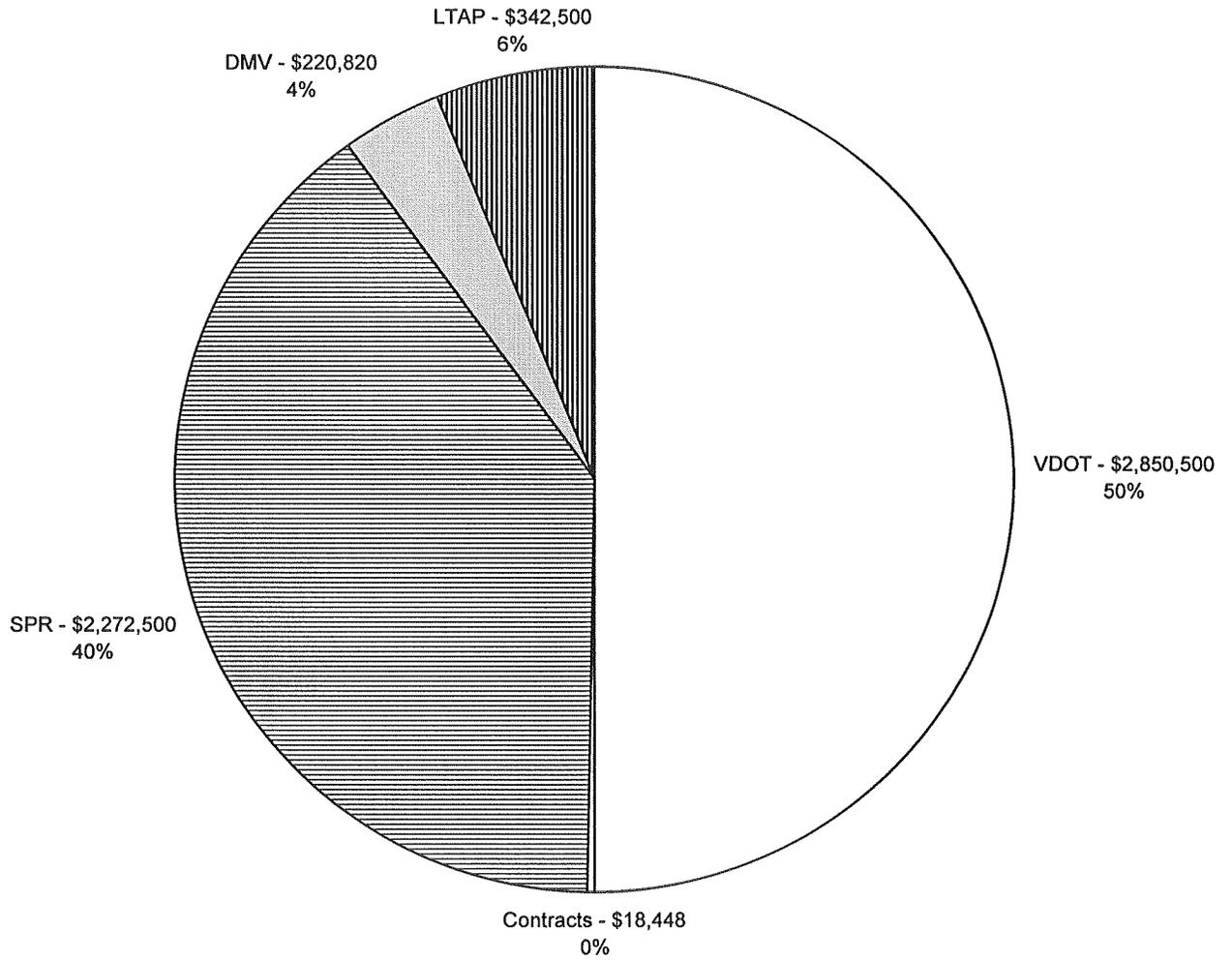


Figure 6

1994 Virginia Research Expenditures

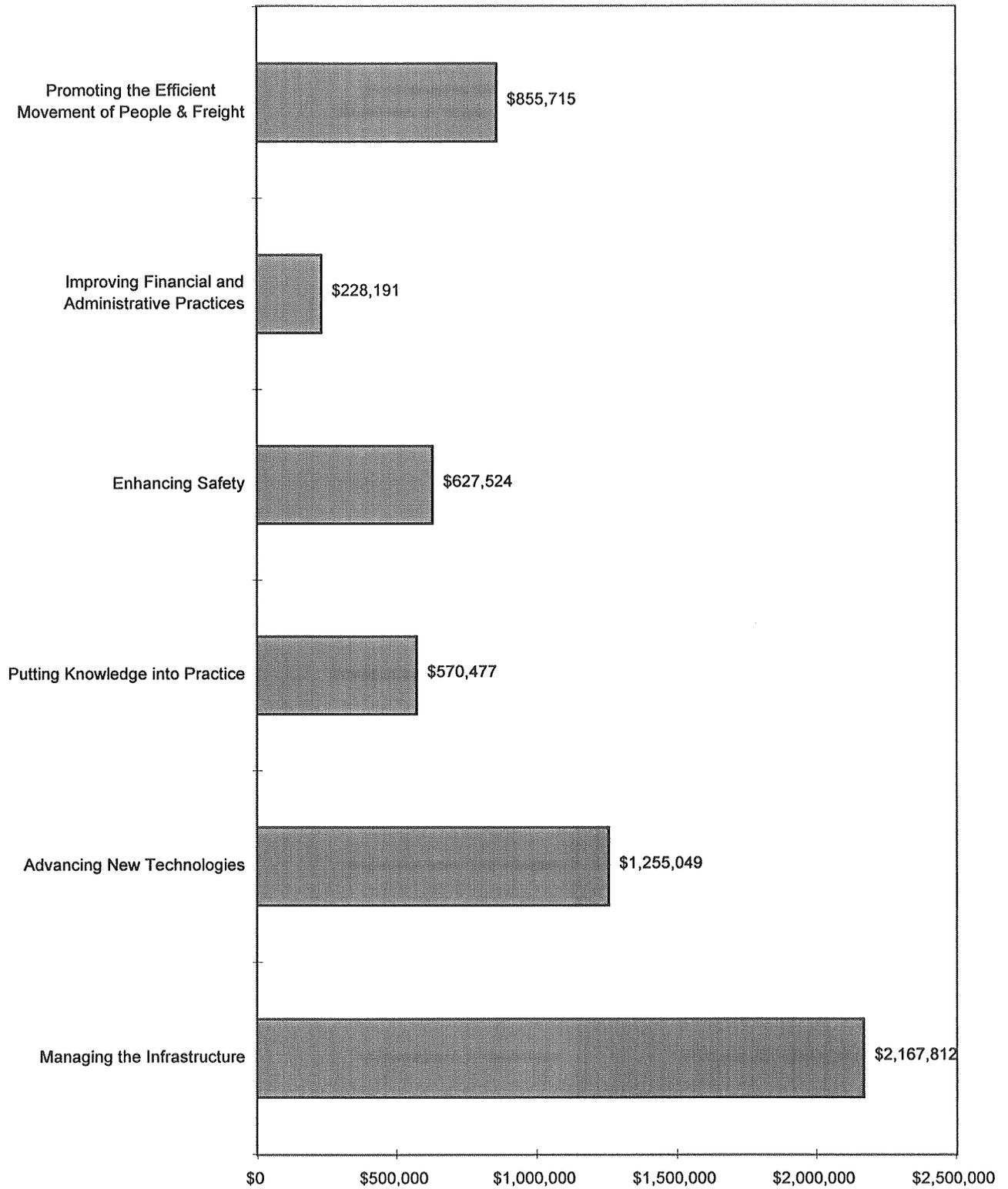


Figure 7

1996 Minnesota Research Funding Sources

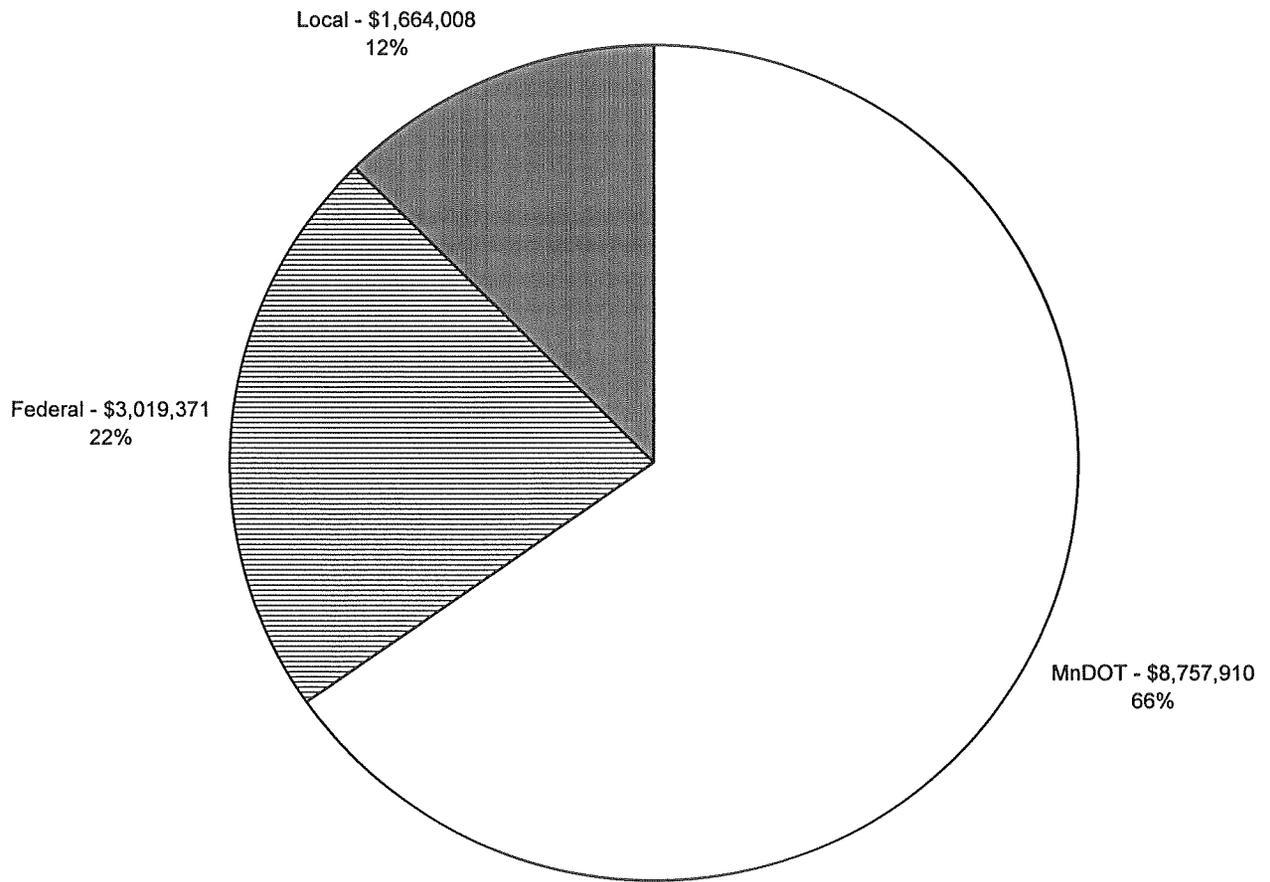
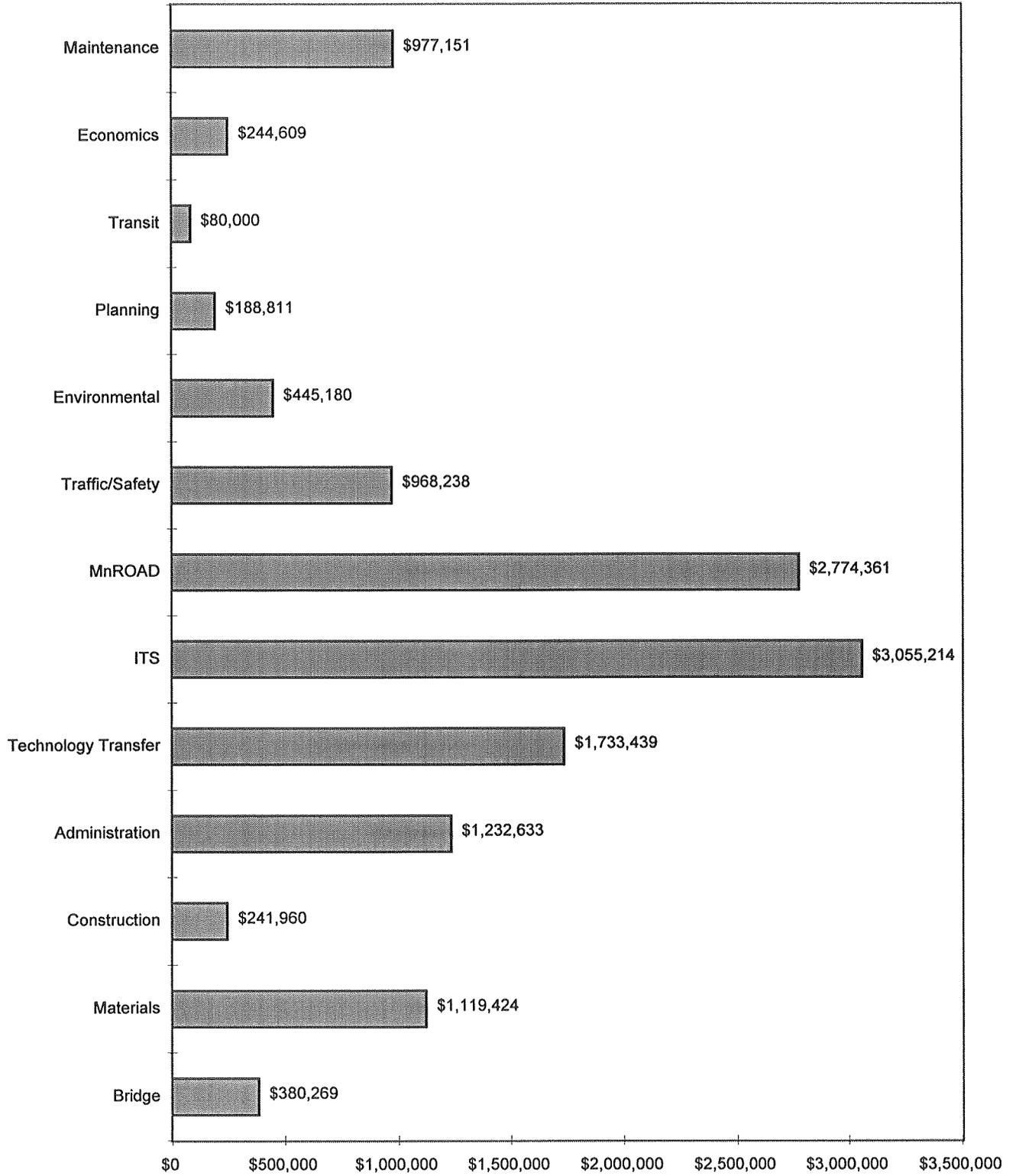


Figure 8

1996 Minnesota Research Expenditures



By comparison, Arizona's 1998 funding sources included a carry over SPR budget of \$3,176,580 plus an additional \$1,179,000 in new funding, for a total SPR budget of \$4,355,580. Expenses for the Arizona DOT's research center, ATRC, for the fiscal year through December 1997 are shown below in Table 4.

Table 4. 1997 ATRC Expenditures

Administrative	
ADOT-funded (6 personnel)	\$138,236
Federally-funded (3 personnel)	48,607
Subtotal	\$186,843
Research & Research-Related	
Professional Services(consultants, universities, student researchers)	\$1,374,815
ADOT	233,106
Federally-funded researchers	2,887
Subtotal	\$1,610,808
Total Research Expenses *	\$1,797,651
Note: These expenses do not include building overhead which is included in a different ADOT funding category.	

UNIVERSITY EXPENDITURES

The 1995 CUTC Member Profile provides the 1994 financial summaries of active CUTC institutions. The financial data is broken into five subheadings as shown below in Table 5. [4]

Table 5. 1994 CUTC Financial Summaries

STATE	UNIVERSITY	TOTAL GRANT & CONTRACT EXPENDITURES	DIRECT MONETARY SUPPORT FROM UNIVERSITY	LEGISLATIVE APPROPRIATIONS	PRIVATE/INDUSTRY CONTRIBUTIONS	MARKET VALUE OF EQUIPMENT/COMPUTER SOFTWARE DONATED
AR	University of Arkansas	\$1,166,595	\$260,307			
CA	University of California, Berkeley	\$8,000,000	\$827,000			
CA	University of California, Davis	\$4,040,176	\$73,837	\$46,700		\$20,000
CA	University of California, Irvine	\$6,000,000	\$314,000			
FL	University of Central Florida	\$350,000	\$12,500			
FL	University of Florida	\$2,027,054	\$21,812			
FL	University of Southern Florida	\$4,800,000		\$1,500,000		
GA	Georgia State University	\$110,000	\$90,000			
IA	Iowa State University	\$4,000,000	\$60,000			\$15,000
IN	Purdue University	\$1,744,754			\$120,000	
KS	Kansas State University	\$975,000	\$20,000		\$150,000	
KY	University of Kentucky	\$3,983,100		\$190,000		
LA	Louisiana State University	\$1,689,000				
MA	Massachusetts Institute of Technology	\$4,725,000	\$78,592		\$570,000	
MI	University of Michigan	\$10,957,183	\$692,609			
MI	Wayne State University	\$180,000	\$7,500			
MN	University of Minnesota	\$3,200,000		\$717,000	\$75,000	
NE	University of Nebraska, Lincoln	\$409,258	\$444,500			
NV	University of Nevada, Las Vegas	\$600,000				
NV	University of Nevada, Reno	\$696,000				
NY	The City University of New York	\$1,285,120	\$137,000			
NY	Cornell University	\$750,000				
NY	Polytechnic University of New York	\$600,000	\$25,000			
NY	Rensselaer Polytechnic Institute	\$1,200,000				
NC	Duke University	\$250,000	\$1,000			
NC	North Carolina State University	\$4,540,789	\$452,898			\$50,000
ND	North Dakota State	\$1,961,692		\$200,000		

	University					
OR	Oregon State University	\$1,500,000	\$42,421			
PA	Pennsylvania State University	\$6,254,340	\$433,741			
PA	University of Pennsylvania	\$260,000		\$40,000		
TN	Tennessee Technological University	\$108,935	\$4,800			
TN	University of Memphis	\$250,000	\$15,000			
TN	Vanderbilt University	\$864,000	\$17,000		\$6,800	\$12,000
TX	Texas A&M University	\$19,311,643		\$1,957,227		
TX	University of Texas	\$8,080,115	\$50,262			\$15,000
VA	VA George Mason University	\$1,800,000	\$100,000		\$30,000	
VA	University of Virginia	\$575,000				\$50,000
VA	Virginia Polytechnic Institute & State University	\$1,703,442	\$52,256		\$126,526	
WA	University of Washington	\$6,000,000	\$60,000			
WV	West Virginia University	\$100,000	\$10,000			
Source: 1995 CUTC Member Profile						

Arizona State University's research center, CATSR, reported 1994 total grant and contract expenditures of \$600,000 and direct monetary support from the university of \$150,000. [4] A breakdown of CATSR expenses is shown in Figure 6. [8]

Table 6. 1994 CATSR Expenditures

Personnel	\$35,449
Operations	20,378
Travel	12,095
Capital Equipment	4,255
Research & Projects	439,373
Total Expenses	\$583,727

POTENTIAL FUNDING SOURCES

In addition to the funding sources detailed above under the DOT Expenditures category, there are many other sources which provide funding for research projects. Many of these sources maintain a web site on the Internet which describes the program and lists projects for which they are currently requesting proposals. Several of these are listed below.

National Cooperative Highway Research Program (NCHRP) and Transit Cooperative Research Program (TCRP) project statements are available at <http://www2.nas.edu/trbcrp/rfps.html>. Research problem statements can also be submitted over the Internet to TCRP at <http://www.apta.com/tcrp/input.html>.

The Research and Special Programs Administration (RSPA) is one of nine major agencies of the United States Department of Transportation. RSPA is the Department's research, safety, and transportation systems administration, and is responsible for addressing transmodal issues relative to the safe, effective, and efficient transportation of people and goods throughout the world. In contrast to the other Department operation administrations which focus on specific sectors of the US transportation system, RSPA's mission concentrates on the system as a whole. A list of current RFPs can be found on the Internet at <http://www.rspa.dot.gov/contracts.html>.

The Federal Transit Administration is a possible source of funding for research related to transit issues. Their web site is <http://www.fta.dot.gov/>.

The National Transportation Products Evaluation Program (NTPEP) pools the professional and physical resources of AASHTO's member departments to test materials of common interest. Information on this program can be found on the Internet at http://www.aashto.org/prog_svcs/ntpep/.

The Institute of Transportation Engineers (ITE) lists requests for proposals at <http://www.ite.org/positions/rfp.htm>.

A list of ITS RFPs and Requests for Information (RFIs) can be found at <http://www.itsonline.com/rfp/>.

Other potential sources of research funding (although they often compete for proposals as well) include: the National Asphalt Pavement Association (NAPA) which represents the interests of the Hot Mix Asphalt (HMA) Industry; the American Trucking Association; and the automobile and air industries.

COMMENTS

The survey conducted by ADOT requested respondents to provide any additional comments which they felt would benefit Arizona in its research into the organizational/structural relationship between DOTs and state universities in conducting transportation research. The comments received were very similar in the advice offered. The following is a summary of those comments.

The effectiveness of a research program is related to the commitment to research by upper management in the highway agency. Upper management must see research as a means of building expertise and continuing education of staff and new employees in the long-term, as well as improving today's transportation problems. The most important expression of this is the personal involvement of senior management in the research policy board or executive committee which reviews and approves the agency's annual research program. Active participation by senior executives not only provides a ready communication channel between the research function and the policy and budgeting divisions of the agency, but it is also made clear to middle managers and their staff that research is considered by top management to be an important activity in fulfilling the agency's mission of providing safe, effective, and efficient highway transportation to the people of the state. [1]

No two states, DOTs, or universities are alike; therefore, the relationship must be tailored to local conditions and what works best for the organization and current management. How the research relationship is organized should not be the main issue since it must remain flexible in order to survive long-term. The main concern should be the development of a solid mission statement which can help the relationship remain true to its goals through personnel and organizational changes. Convening a meeting with several states with better-known research programs and including representatives from ADOT and the three universities should be considered in order to explore the "best" relationships in more depth.

The relationship must be a partnership which fosters mutual trust. All organizations which will be a part of the final relationship must be consulted and have input into the organizational structure from the beginning in order to have total commitment from all involved.

University participation on the research policy board (whether in voting or non-voting capacity) is a common feature of most of the programs surveyed.

Don't favor an exclusive arrangement where a university is "guaranteed" all DOT research. A competitive environment significantly strengthens the university's ability to propose and conduct research for the DOT and all other requesters of research. Neither the DOT nor the university(s) should fear a free, fair, merit-based competition.

The ultimate goal of a state transportation research program is to improve transportation either through the DOT or through local transportation programs. The DOT's primary goal is to conduct applied research. Since the DOT is funding this research, they must maintain program oversight in order to achieve this goal. Requiring the researchers to include an implementation plan in their proposal helps to keep the researcher focused as well.

Conduct periodic workshops at which the DOT, the universities, and private industry can discuss what research needs appear to be of utmost importance. Allow the universities (and private industry) to tell the DOT what they can do to solve tomorrow's problems, but don't promise which research (if any) will be conducted.

In a 1988 presentation at the National Workshop on Highway Research, current Texas Department of Highways Engineer-Director Raymond Stotzer provided the following elements which have contributed to making the Texas program successful. He called them the ten commandments of research, Texas-style. [7] These "commandments" are offered below.

1. Thou shalt not stray from the real world in selecting research problems. Texas uses 95 percent of its research budget to conduct applied research. Only five percent is used for basic research in areas such as materials properties or management and policy studies. All state DOTs mentioned the necessity of conducting applied research.
2. Thou shalt not duplicate. All similar research should be carefully coordinated, not only within the state, but also nationwide. This is where the T2 programs across the country come in. Research reports are disseminated nationwide and can also be entered into a computer system which has access to 120 different databases in all fields, including traditional transportation databases. This allows research to build on previous research rather than duplicating it.
3. Thou shalt monitor progress of research and redirect its course if necessary. Remember always that research must speak directly to a real problem. This issue is critical in ensuring the research meets the DOT's needs. Lack of monitoring by the DOT and the resulting dissatisfaction in the research product is one of the difficulties mentioned by many DOTs.
4. Thy results shall be timely. Although it is not always possible to set an absolute time limit on a project, the results do need to be obtained while they are still relevant to an existing problem. A project due date should be established and periodic updates by the researcher should keep the DOT informed as to its progress. Linking contract payment installments to completed research tasks helps in this regard.
5. Thou shalt ensure that results are simple and usable. The final research report must be understandable by those who must use the results.

6. Thou shalt provide continuity in the research program. The constant use of university programs by the DOT ensures the university of a consistent level of funding. This allows research staff to be maintained in many fields. It allows the DOT to know the university's capabilities, and allows the university to understand the DOT's problems.
7. Thou shalt fully document reports for dissemination, and use them later as a beginning for further research. This relates back to preventing duplication of efforts. The final research reports should be disseminated to as many people and agencies as possible in order to aid them in advancing their knowledge of the subject as well.
8. Thy research shall have the potential to be cost beneficial. To be cost effective, research should do one or more things: increase safety, lower costs, reduce waste, increase personnel efficiency or production, eliminate unneeded work, improve working conditions, methods or equipment, improve operations, or extend service life. Many DOTs have found that the benefit-cost for research is from 20:1 to 30:1. Stotzer believes that Texas has had successful projects where the savings could endow the research program for perpetuity.
9. Thy research shall not only seek to solve problems, but also find cost-effective new methods. The research conclusions must be achievable. A solution which is very expensive cannot be implemented by a department with increasingly tightening budgets.
10. Thy researchers shall be available for assistance in implementation of the results. Many DOTs are coming to see that involving the researcher in the implementation of the research results benefits both the researcher in understanding the DOT's needs and the DOT employees who are not left to figure things out for themselves.

These ten commandments have helped the Texas program attain its many accomplishments because they have developed a system which puts them to use and has worked well for Texas for many years.

CONCLUSION

As state transportation departments have experienced staff reductions in their research programs, many have looked to the universities for contracting their research needs. Currently, over 50 percent of projects are conducted by universities with almost 30 percent conducted in-house and less than 10 percent contracted with private consultants. This increase in DOT/university relationships has led the DOTs to try many different organizational structures to achieve the “best” relationship. It has been seen that there is no “best” model to be used in establishing a relationship between the DOT and the university(s). Successful programs can be found in all six of the models reviewed. So which model is best? The answer is the one that is developed by the entire local transportation community to fit its needs and then refined through use.

Whatever their formal structure, successful collaborative relationships share many of the same characteristics which foster a strong, viable relationship. Among these characteristics are the following.

Joint participation by all parties concerned in the development of the collaborative program. If the relationship is to be a truly collaborative partnership, all agencies which will be expected to participate in the program must be included in its development. This ensures that the interests, concerns, capabilities, and limitations of each party are understood by the other and considered in the collaborative agreement. Participation by all parties at every step also engenders the sense of involvement which is vital to a successful working relationship.

A commitment by all parties to do whatever may be necessary to make the program work. For the university, this involves a willingness of the faculty involved in the research program to spend considerable time talking with the transportation agency in their terms and about their problems. It also requires the willingness of university administrators to support this research activity and reward it. For the transportation agency, this commitment involves the DOT personnel to devote their time and effort to establishing a meaningful means of communication with their university counterparts. It also requires support of the research effort by upper management within the transportation agency.

A collaborative rather than an arms-length relationship. Research is not a commodity or service which can be specified, let out to bid, and awarded to the lowest qualified bidder. The most productive programs are truly collaborative. Research problems are identified, refined, and prioritized through the joint efforts of the transportation agency and the university staff. It should only be in negotiating the specifics of a given contract where an arms-length position is taken.

Time, trust, and patience. Not one of the successful programs detailed in this report happened overnight. All required these three elements to be successful. Many programs

stressed the relatively little importance the actual written agreement has if there is an absence of these unwritten elements. At the beginning of the relationship, there must be sufficient trust by all parties in the potential benefits which can be obtained and the willingness of all to work to achieve mutual goals. Then, throughout the relationship, there must be patience to deal with the inevitable delays, frustrations, and setbacks which will occur in any cooperative relationship. Finally, allowances must be made to sufficiently sustain the program over the long-term until it can be well-established and more self-sufficient.

A successful research program must be cost-effective over the long-term. In order to be cost-effective, it must do one or more of the following: increase safety, lower costs, reduce waste, increase personnel efficiency or production, eliminate unneeded work, improve working conditions, methods, or equipment, improve operations, or extend service life. Many DOTs have found that conducting research through a collaborative program with a university can be highly cost-effective. The lower costs of student researchers and university overhead often leads to a more productive use of limited research funds.

Not only must the research be conducted cost-efficiently, but the quality of the research must be of highest standards. It has been found that a strong transportation agency research program is usually found in conjunction with a strong university research program, and vice versa. Benefits realized by the DOTs when conducting their research through a university include: access to a wide variety of up-to-date knowledge and research techniques; increased national exposure which allows the program to attract the best students, best faculty, and additional funding sources; and the flexibility and manpower to meet rapidly changing research needs. In addition, the most commonly expressed benefit is the opportunity for both organizations to become familiar with the other's motivations and needs when conducting research. Communication is stressed as the most important dimension of any collaborative program, yet only about 35 percent of the state DOTs hold regular meetings with their contractors. This indicates an area for improvement. Combining the strengths of each organization can only help to improve the program and offset the weaknesses inherent in either organization in order to produce the best research product available.

Maintaining a collaborative relationship within the state also increases the educational benefits experienced by both the transportation department and the university. Students have access to real world experience which they might not encounter in a traditional theory-based education. This allows them to be trained in the areas which the DOT (and in some cases private industry) feels are important and helps to create better-educated future employees. University faculty are given the opportunity to experience and understand the needs of the DOT and why applied research is so critical to the DOT's program. Finally, the DOT employees benefit from increased educational opportunities through technology transfer programs which pass on the results of research projects and provide continuing education to maintain and increase job skills.

Whether the DOT conducts its transportation research through one university location or several depends upon the model determined to best fit the local transportation community. Utilizing one university offers the advantage of having only one point of contact although

research may be conducted by other universities and consultants, as well. It can also allow the university to be responsible for monitoring the progress of all research projects and reduce the administrative duties which must otherwise be conducted by the DOT. On the other hand, contracting through multiple university research centers allows a wide variety of expertise from which to choose when awarding research contracts, awarding the contract to the center which has proven experience in that subject, and fostering a competitive environment within the state. Both scenarios have disadvantages which were cited by those DOTs involved in such a relationship; however, all cited disadvantages can be overcome once the local transportation community determines which model to use and anticipates those problems.

Establishing a cooperative agreement between the DOT and the university(s) offers only advantages to both parties. Developing a basic agreement which contains the contract requirements and uses task orders to award specific research projects saves considerable negotiation time and allows the project to begin sooner. Flexibility in the agreement can allow for either sole sourcing projects to a particular contractor if desired or issuing RFPs when competition is preferred. The cooperative agreement promotes a partnership among the DOT and university(s), leads to the development of closer relationships, and provides for ongoing, sustained funding which allows for stability on the center(s) over the long-term. An agreement among the ADOT and all three state universities also provides the basis on which to form consortiums for appropriate projects.

Increased competition among research proposals for limited funding has prompted DOTs to look for additional funding from the private sector. This funding to date, however, has not been adequate to allow the research centers to achieve any level of self-sufficiency. Private sector involvement has been primarily in the form of materials, equipment, or services, and is generally unsolicited by the research center. Hard dollars which are received from the private sector account for as little as 1 percent to as much as 18 percent of a center's research budget; however, several states are attempting to increase this involvement in specific areas such as ITS deployment or sponsorship of T2 workshops. One possible difficulty with private sector involvement in transportation research concerns the issue of patent or copyright complications which many universities are attempting to address with an intellectual property policy. Potential sources of private sector funding include shippers, carriers, and trade organizations.

The funding required to establish and maintain a transportation research center depends largely upon the model chosen by the local transportation community. The amount contributed by the DOT to the university research center ranges from \$60,000 annually (e.g., Washington State) to more than \$1 million in many states. What matters more than the actual amount, however, is the continuity of funding provided by the DOT (either by practice or written agreement) which must be sufficient to elicit a commitment on the university's part to devote its faculty and other resources to meet the transportation department's research needs. Funding is available from a variety of sources including federal, state, and private industry.

Arizona's Department of Transportation and its three state universities, NAU, ASU, and UA, are all desirous of improving their relationship with each other and working together to provide quality transportation research for the state of Arizona. They are currently in a position

where they can create the relationship model which works best for all four organizations from the ground up. It has been recommended by other state DOTs and universities that once preliminary dialogue between the four organizations has begun, representatives be invited from those states with programs in which Arizona is interested in order to obtain more detailed information relating to the model used. The Louisiana Transportation Research Center (LTRC) offers the diagram shown in Figure 9 of what role the LTRC should maintain. Although this model was created for the LTRC, it can be applied to any state and organizational model established.

Whatever model is ultimately chosen, maintaining constant communication between ADOT and the universities is critical. A successful relationship can allow ADOT and the universities to work together for the needs of Arizona's transportation community, as well as pool resources in order to be more competitive in pursuing federal research grants.

LTRC Research Role

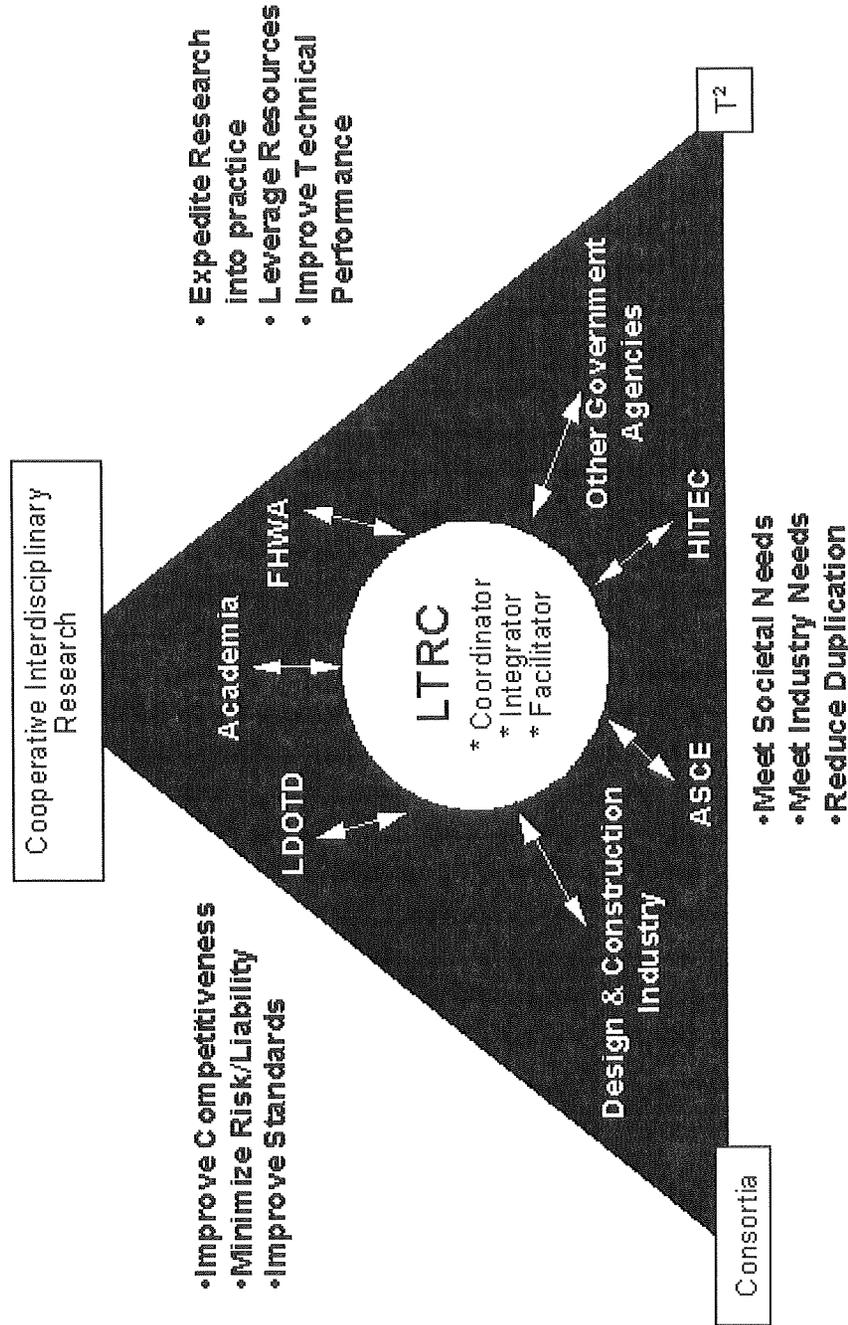


Figure 9. LTRC Research Role
Source: <http://www.ltrc.lsu.edu/>

APPENDIX A
SAMPLE SURVEY QUESTIONNAIRE

TRANSPORTATION RESEARCH CENTER

DOT QUESTIONNAIRE

Name of respondent: _____

State: _____

Phone: _____

e-mail: _____

1. What is the relationship/organizational structure between your state's DOT and the state's universities? (PLEASE SEND ORGANIZATION CHART, IF AVAILABLE.)

- DOT has a research center located at a university
- DOT contracts with one university for research
- DOT contracts with multiple universities for research
- DOT research is offered for competitive bids from universities and consultants
- DOT research is all done in-house with DOT personnel
- Other _____

2. What are advantages and/or disadvantages in the organizational structure your DOT uses for conducting research?

3. If you could change the organizational structure your DOT uses for conducting research, what would you change and/or keep the same?

4. Is there any private sector involvement and funding of your research program?

YES

NO

5. If there is any private sector involvement and funding please describe how the you solicit and obtain private sector involvement and funding. Does this funding allow your research to be self-sufficient? (PLEASE ENCLOSE BUDGET, IF AVAILABLE.)

6. Please add any additional comments you feel will benefit Arizona's DOT with its research into the relationship/organizational structure between a state's DOT and the state's universities for the purpose of conducting transportation research.

**THANK YOU FOR YOUR ASSISTANCE!
WE WOULD APPRECIATE YOUR RESPONSE BY DECEMBER 15, 1997.
FOR QUESTIONS CONTACT VICKI WALKER (602) 242-3965 OR vicki.walker@juno.com**

If you would like a copy of the final report on this project, please give us your mailing address:

**TRANSPORTATION RESEARCH CENTER
RESEARCH CENTER QUESTIONNAIRE**

Name of respondent: _____

Organization: _____

Phone: _____

e-mail: _____

1. What is the relationship/organizational structure between your state's DOT and the state's universities? (PLEASE SEND ORGANIZATION CHART, IF AVAILABLE.)

- DOT has a research center located at a university
- DOT contracts with one university for research
- DOT contracts with multiple universities for research
- DOT research is offered for competitive bids from universities and consultants
- DOT research is all done in-house with DOT personnel
- Other _____

2. What are advantages and/or disadvantages in the organizational structure your state's DOT uses for conducting research?

3. If you could change the organizational structure your state's DOT uses for conducting research, what would you change and/or keep the same?

4. Is there any private sector involvement and funding of your research program?

YES

NO

5. If there is any private sector involvement and funding please describe how the you solicit and obtain private sector involvement and funding. Does this funding allow your research center to be self-sufficient? (PLEASE ENCLOSE BUDGET, IF AVAILABLE.)

6. Please add any additional comments you feel will benefit us in our research into the organizational/structural relationship between DOTs and state universities in conducting transportation research.

THANK YOU FOR YOUR ASSISTANCE!
WE WOULD APPRECIATE YOUR RESPONSE BY DECEMBER 15, 1997.
FOR QUESTIONS CONTACT VICKI WALKER (602) 242-3965 OR vicki.walker@juno.com

If you would like a copy of the final report on this project, please give us your mailing address:

APPENDIX B
SURVEY RESPONDENTS

STATE	DOT	UNIVERSITY(S)
Alabama		
Alaska		
Arizona	N/A	
Arkansas	X	Univ. of Arkansas (MBNRTSC)
California	X	UC-Berkeley (ITS), UC-Davis (ITS), UC-Irvine (ITS)
Colorado	X	
Connecticut	X	
Delaware		
Florida	X	Univ. of Central Florida, Univ. of Florida (TRC), Univ. of So. Florida (CUTR)
Georgia		
Hawaii	X	
Idaho	X	
Illinois	X	Northwestern Univ.
Indiana		Purdue (JTRP)
Iowa		Iowa State Univ. (CTRE)
Kansas	X	Kansas State Univ.
Kentucky		Univ. of Kentucky
Louisiana		Louisiana State Univ. (LTRC)
Maine	X	
Maryland		Morgan State Univ. (NCTRMD)
Massachusetts	X	Univ. of Massachusetts
Michigan	X	
Minnesota	X	Univ. of Minnesota (CTS)
Mississippi	X	
Missouri	X	
Montana	X	
Nebraska	X	Univ. of Nebraska-Lincoln (MATC)
Nevada	X	Univ. of Nevada-Las Vegas (TRC)
New Hampshire		
New Jersey	X	
New Mexico	X	
New York	X	Rensselaer Polytechnic Inst. (CITS)
North Carolina	X	North Carolina State Univ. (ITRE)
North Dakota	X	
Ohio	X	
Oklahoma	X	
Oregon	X	Oregon State Univ.
Pennsylvania		Pennsylvania State Univ. (PTI)
Rhode Island		
South Carolina	X	
South Dakota	X	
Tennessee	X	Tennessee Technical Univ., Univ. of Memphis (TSI), Univ. of Tennessee (TRC)
Texas	X	Texas A&M (TTI), Univ. of Texas (CTR)
Utah	X	
Vermont		
Virginia		George Mason Univ. (TPP)
Washington	X	
West Virginia		
Wisconsin	X	
Wyoming	X	

Response Rate - DOT: 34/49 = 69%; CUTC: 28/52 = 54%

62/101 = 61% overall (responses from someone in 41/49 states = 84% representation)

APPENDIX C
SAMPLE SURVEY RESPONSE FORM

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE					
STATE		ORGANIZATION NAME			
RESPONDENT		PHONE		E-MAIL	
ADDRESS					
URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DESCRIPTION OF PROCESS					
ADVANTAGES OF CURRENT PROCESS					
DISADVANTAGES OF CURRENT PROCESS					
CHANGES TO CURRENT PROCESS					
PRIVATE SOURCE FUNDS					
<input type="checkbox"/>					
DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY					
ADDITIONAL COMMENTS					

APPENDIX D
SURVEY RESPONSES

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Arkansas	Arkansas Department of Transportation

RESPONDENT	PHONE	E-MAIL
Alan Meadors	501-569-2380	ALMP030@ahd.state.ar.us

ADDRESS
PO Box 2261, Little Rock, AR 72203

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>				

DESCRIPTION OF PROCESS
DOT research done in-house or competitive bid from Arkansas state universities

ADVANTAGES OF CURRENT PROCESS
Subcommittee good tool for guiding research.

DISADVANTAGES OF CURRENT PROCESS
Time required for project start. Project is approved, subcommittee assigned, and in-house or contract decision made. If contract, universities visit with subcommittee, then RFP issued.

CHANGES TO CURRENT PROCESS
Allow out-of-state universities or consultants to bid if no local expertise.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
University research not normally turn-key. Implementation of their work requires effort by DOT. DOT w/close relationship with one university may avoid that problem.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Arkansas	Mack-Blackwell National Rural Transportation Study Center, University of Arkansas

RESPONDENT	PHONE	E-MAIL
Jack E. Buffington	501-575-7957	jeb@engr.uark.edu

ADDRESS
4190 Bell Engineering Center, Fayetteville, AR 72701

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>				

DESCRIPTION OF PROCESS
DOT research done in-house and contracts with multiple universities (more done with universities than in-house).

ADVANTAGES OF CURRENT PROCESS
Seems well-balanced. University of Arkansas on close terms with the Arkansas Highway & Transportation Dept and almost consider themselves an extension of AHTD research dept.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Satisfied with way it runs now.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Have \$2 mil annual budget (\$1 mil from USDOT & \$1 mil matching funds). Universities make up most of matching funds (professors propose research). Some funding from trucking & waterways interests. Not self-sufficient. Considerable \$ from hwy depts.

ADDITIONAL COMMENTS
Welcome calls and can offer suggestions. Most of AHTD officials graduated from University of Arkansas and Head serves on Board of Directors.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
California	Institute of Transportation Studies, University of California at Irvine

RESPONDENT	PHONE	E-MAIL
Will Recker	714-824-5989	wwrecker@uci.edu

ADDRESS
330 Berkeley Pl., Irvine, CA 92717

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Provides both a stable level of funding and opportunity to entertain new initiatives.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
No change.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Work in partnership with industry to jointly propose. This funding alone is not sufficient for center to operate.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
California	California Department of Transportation

RESPONDENT	PHONE	E-MAIL
Tom Hoover	916-654-9454	thoover@trmx3.dot.ca.gov

ADDRESS
PO Box 942873, Sacramento, CA 94273-0001

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Multiple source bids/contracts with lots of participants provides good diversity and short-term availability of very specific expertise on specific projects. Most projects are interactive, not just contract management.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Continue process set forth in CA Research Manual. Discontinue deviations from the process.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Issue requests for bids on projects described in the request, soliciting partnering within the project. Cooperative work including resources provided by private sources.

ADDITIONAL COMMENTS
DOT must maintain program oversight, and in-house expertise to evaluate contract work, and flexibility in project funding.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
California	Institute of Transportation Studies, University of California at Davis

RESPONDENT	PHONE	E-MAIL
Daniel Sperling	530-752-7434	dsperling@ucdavis.edu

ADDRESS
2025 Academic Surge, Davis, CA 95616

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
DOT funds research centers located at universities. DOT has master agreements with universities.

ADVANTAGES OF CURRENT PROCESS
Use of master agreements and tasking facilitates funding. Creative and efficient mechanism.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Support for University Transportation Centers and PATH.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Have "corporate affiliate" program with annual fees, industry internships, industry-sponsored research, and industry membership in research consortia.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
California	Institute of Transportation Studies, University of California at Berkeley

RESPONDENT	PHONE	E-MAIL
Linda Howe	510-231-9590	lhowe@its.berkeley.edu

ADDRESS
1355 S. 46th St., #452, Richmond, CA 94804-4603

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Multiple institutional arrangements including University of California Transportation center, 3 Institutes of Transportation Studies, and PATH to administer and sort research proposals.

ADVANTAGES OF CURRENT PROCESS
Strong links between DOT and university in terms of funding. DOT knows where to go to access researchers.

DISADVANTAGES OF CURRENT PROCESS
Can be too much policy direction for research. Somewhat clunky system; lack of coordination (various arms of DOT contact university system, multiple points of entry and multiple department needs). Competition in academia for funds can be self-defeating.

CHANGES TO CURRENT PROCESS
Coordination within DOT so less overlap or competition. Annual agenda-setting conference involving all academic units and DOT units. Improved connections with stakeholders.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Somewhat haphazard and not as much as desired. struggling to rethink and design partnerships; academic-private partnership runs on different timeframes. Questions of intellectual property are difficult.

ADDITIONAL COMMENTS
Be flexible. Try to get everyone to talk together. Be intelligible. CA model has much to recommend it, but isn't perfect. Agencies using research outputs must be involved. Understand different needs/agendas of universities/government agencies/users.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Colorado	Colorado Department of Transportation

RESPONDENT	PHONE	E-MAIL
Richard Griffin	303-757-9973	richard.griffin@dot.state.co.us

ADDRESS
4201 E. Arkansas Ave., #A-100, Denver, CO 80222

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

DESCRIPTION OF PROCESS
Solicitation of bids from consultants

ADVANTAGES OF CURRENT PROCESS
Best of each achieved by having staff, staff and consultant research. Contracting research allows tapping into national expertise and focusing resources for fast turnaround. Maintaining quality staff researchers facilitates implementation and management.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Need more streamlined contracting process; cooperative agreement could be developed with state universities. More DOT staff would allow expert in each priority subject area.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Not significant.

ADDITIONAL COMMENTS
Remember ultimate goal of state transportation research program is to improve transportation either through DOT or local transportation agencies. Any university-based program must be closely linked to the DOT to assure this goal is achieved.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Connecticut	Connecticut Department of Transportation

RESPONDENT	PHONE	E-MAIL
James M. Sime	860-258-0309	james.sime@po.state.ct.us

ADDRESS
280 West St., Rocky Hill, CT 06067-3502

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Combination of processes

ADVANTAGES OF CURRENT PROCESS
Combination provides access to large number of transportation research personnel. In-house advantageous because DOT personnel very approachable/accessible (hear about problems) which results in more continuity during long duration implementation phases.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Present structure works well and anticipate maintaining current structure.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Program does not generally solicit PS involvement & funding. Occasional PS involvement in isolated projects. CTDOT considering proposal on segregation-resistant mix design & test methods which would be funded in part by Hot Mix Asphalt industry.

ADDITIONAL COMMENTS
CT currently serving as "lead state" for Regional Pooled Fund project supported by 6 New England states and administers research agreements with state universities that are members of New England Transportation Consortium.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Florida	University of Central Florida

RESPONDENT	PHONE	E-MAIL
Essam Radwan	407-823-2841	aeradwan@pegasus.cc.ucf.edu

ADDRESS
PO Box 162450, Orlando, FL 32816-2450

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Some contracts with multiple universities and competitive bids from universities (not consultants)

ADVANTAGES OF CURRENT PROCESS
Share the wealth among all universities. Gives experts opportunity to get continuous funding. Allows districts to work with researchers at universities to generate problem statements.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Keep same.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
Biased opinion about ATRC/ASU model because was member of CART at ASU during 84-90 and disappointed by course relationship took. Believes ADOT has great opportunity to tap talent of ASU faculty to carry on exciting research initiatives.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Florida	Florida Department of Transportation

RESPONDENT	PHONE	E-MAIL
Richard C. Long	850-488-8572	richardc.long@dot.state.fl.us

ADDRESS
Haydon Burns Bldg., 605 Suwannee St., Tallahassee, FL 32399-0450

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Some strength and materials done in-house

ADVANTAGES OF CURRENT PROCESS
Don't need to employ diverse staff of experts. Not internally affected by funding fluctuations. University students (future employees) exposed to FDOT issues and relationships are developed.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
No change.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
In-kind services and materials; no hard money.

ADDITIONAL COMMENTS
Do what works best for your organization and current management. How a research program is organized should not be an issue since it must remain fluid to survive. Be more concerned with development of a solid mission statement.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Florida	Transportation Research Center, University of Florida

RESPONDENT	PHONE	E-MAIL
Charles E. Wallace	352-392-7575 X228	cwallace@ce.ufl.edu

ADDRESS
512 Weil Hall, PO Box 116585, Gainesville, FL 32611-6585

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Both used; no fixed process. Decision is up to DOT staff as to process to use, but universities get vast majority which is spread among universities. University of Florida provides T2 services.

ADVANTAGES OF CURRENT PROCESS
Many projects awarded directly w/o need for competitive proposals. Avoids wasted time/money when competent researchers/proj mgrs comfortable w/each other. Avoids perceived need to "spread wealth" if institution has proven record. T2 prog doesn't compete.

DISADVANTAGES OF CURRENT PROCESS
Each contract is individual, requiring proposals (for some) and separate contract processing and administration (for all). Imposes much repetitive administration which could be eliminated by "master task-order contract".

CHANGES TO CURRENT PROCESS
Consider master contract. FDOT works under legislatively fixed budget that doesn't permit direct pass-through of fed funds and many projects could not be completed due to budget cap.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Substantial PS support for Center for Microcomputers in Transportation (self-supporting). Good portion of T2 program supported via registration fees and some workshop sponsorship. Research all publicly supported.

ADDITIONAL COMMENTS
Must have sense of partnership & mutual trust. Don't need formal "organizational" relationships. AZ has at least 2 great research facilities. DOT best served using best talent & expertise at both or elsewhere. Never fear free/fair/merit-based competition.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Florida	Center for Urban Transportation Research, University of Southern Florida

RESPONDENT	PHONE	E-MAIL
Edward A. Mierzejewsk	813-974-9797	mierzeje@cutr.eng.usf.edu

ADDRESS
4202 E. Fowler Ave., ENB118, Tampa, FL 33620-5350

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Allows each university faculty to compete.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
FDOT requires research proposals be submitted by FDOT employees to assure willing sponsor at DOT. Advantage so DOT staff don't have to wade through "ivory tower" proposals; disadvantage if DOT staff are too busy or unmotivated to sponsor good faculty idea

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Small amount of work as subconsultants to PS consultants. University of Southern Florida does not respond to competitive RFPs.

ADDITIONAL COMMENTS
Need to ensure research is applied, not "ivory tower".

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Hawaii	Hawaii Department of Transportation

RESPONDENT	PHONE	E-MAIL
Roland Louie	808-832-3406	None Given

ADDRESS
2530 Likelike Hwy, Honolulu, HI 96819

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Research also done by HDOT personnel.

ADVANTAGES OF CURRENT PROCESS
University offers expertise and equipment that DOT doesn't have in many areas of transportation research.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
No change.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE					
STATE		ORGANIZATION NAME			
Idaho		Idaho Department of Transportation			
RESPONDENT		PHONE	E-MAIL		
Robert M. Smith		208-334-8437	bsmith@itd.state.id.us		
ADDRESS					
PO Box 7129, Boise, ID 83707					
URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DESCRIPTION OF PROCESS					
No connection organizationally with univs. Research is 1 function of Materials Section in DOT. Research contracts predominantly w/Univ of ID NCATT under 1988 cooperative agrmt; small # go to other engineering univ in state; some RFPs to consultants/univs.					
ADVANTAGES OF CURRENT PROCESS					
With DOT's small number of people in research (1-1/2), this approach has worked well. University pays local match (soft).					
DISADVANTAGES OF CURRENT PROCESS					
None Given					
CHANGES TO CURRENT PROCESS					
For now, see little reason to change. Would like to develop better in-house capability to allow support/publication of some in-house projects being performed but currently undocumented due to lack of staff.					
PRIVATE SOURCE FUNDS					
<input checked="" type="checkbox"/>					
DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY					
INEEL has funded some work in-house. Other than this, do not receive any PS involvement or funding. Nowhere near self-sufficient.					
ADDITIONAL COMMENTS					
Idaho (shares with Wyoming & Montana) has only one bonafide engineering school. Two new schools have sprung up, but not yet capable of grad level work, so research capabilities limited.					

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Illinois	Illinois Department of Transportation

RESPONDENT	PHONE	E-MAIL
Eric Harm	217-782-7200	dotweh@cmswang.state.il.us

ADDRESS
126 E. Ash St., Springfield, IL 62703-4766

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Competitive bids from universities only.

ADVANTAGES OF CURRENT PROCESS
All universities within state have opportunity to submit proposals. All projects have well-defined scope and expected products.

DISADVANTAGES OF CURRENT PROCESS
Slower to get project started due to issuing RFP, reviewing proposals, etc. Difficult to respond to 6-mo or less projects. Scope & product of project must be identified in RFP. Diff. to develop expertise at univ since next similar proj may go to another.

CHANGES TO CURRENT PROCESS
Need to build in flexibility to allow ability to go to experts within a university and negotiate a \$2000-\$10,000 task that is done quickly to provide answers to time-sensitive problems.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
Allow univ opportunity to tell DOT what they could do in terms of solving tomorrow's problems. Provide forum, but don't promise or allow univ to determine what research is conducted. Require univ to provide at least 15% soft match for proj commitment.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Illinois	Northwestern University

RESPONDENT	PHONE	E-MAIL
Joseph Schofer	847-491-8795	j-schofer@nwv.edu

ADDRESS
2145 Sheridan Rd., Evanston, IL 60208

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Most of \$ goes to University of Illinois which has insider relationship with IDOT. About \$500K/yr goes to "all" universities in state as competitively bid contracts; not much, but better than nothing.

ADVANTAGES OF CURRENT PROCESS
Review committee is largely made up of university people.

DISADVANTAGES OF CURRENT PROCESS
State likes to "distribute" money, so ability to do work is not always paramount in process.

CHANGES TO CURRENT PROCESS
Put all \$ up for bids, rather than having a "sweetheart" deal with University of Illinois. Seek more \$. Push to make research more long-term.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Work closely with individual businesses (mostly shippers & carriers); not self-sufficient.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE**STATE**

Indiana

ORGANIZATION NAME

Joint Transportation Research Program, Purdue University

RESPONDENT

Kumares C. Sinha

PHONE

765-494-2211

E-MAIL

sinha@ecn.purdue.edu

ADDRESS

School of Civil Eng, W. Lafayette, IN 47907

URC**ONE UNIV****MULT UNIV****BIDS CONS/UNIV****DOT****OTHER PROCESS****DESCRIPTION OF PROCESS**

None Given

ADVANTAGES OF CURRENT PROCESS

Organizational structure that has evolved over years has worked well for Indiana. Advisory board of 9 Purdue representatives, 9 INDOT representatives, 1 FHWA (non-voting) & 4 highway industry representatives (non-voting) oversees program.

DISADVANTAGES OF CURRENT PROCESS

None Given

CHANGES TO CURRENT PROCESS

None

PRIVATE SOURCE FUNDS**DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY**

PS\$ through JTRP Advisory Board as well as research participation and membership in study advisory committees of individual projects.

ADDITIONAL COMMENTS

Basic arrangement between Purdue and INDOT based on state statute enacted in 1937. Other universities can also participate but all proposals are reviewed by the JTRP Advisory Board based at Purdue.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Iowa	Center for Transportation Research & Education, Iowa State University

RESPONDENT	PHONE	E-MAIL
Tom Maze	515-294-8103	tom@ctre.iastate.edu

ADDRESS
2625 N. Loop Dr., #2100, Ames, IA 50010-8615

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Bulk of DOT research done through CTRE.

ADVANTAGES OF CURRENT PROCESS
Flexibility to contract both with IADOT and any other DOT, public agency, private/business. CTRE is more flexible and can throw person power at a project very quickly.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Since CTRE is independent of DOT and DOT has 3 state universities to consider, CTRE tends to have arms length relationship; would like a more programmatic relationship.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
CTRE receives no support from IA state and must be self-sufficient. Work with PS all the time, but most contribute equipment and time (sometimes cash).

ADDITIONAL COMMENTS
Director of CTRE is a university professor, but 1/2 of salary is paid by DOT and he reports to both university and DOT. Says this works well mainly due to individual personalities involved.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Kansas	Kansas State University

RESPONDENT	PHONE	E-MAIL
E. R. (Gene) Russell	913-532-1588	geno@ce.ksu.edu

ADDRESS
Department of Civil Eng, Seaton Hall, Manhattan, KS 66506-2905

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>				

DESCRIPTION OF PROCESS
DOT contracts with 2 major state universities for \$500K/yr. K-TRAN is a joint KSU/KU/KDOT program.

ADVANTAGES OF CURRENT PROCESS
KDOT does not pay indirect costs to univ (state law). Records show 30:1 return on research \$ spent. KDOT controls research done. No bidding required. Each univ guaranteed \$100-\$250K/yr which funds grads & faculty release time; used as match money for feds

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Add some indirect or administrative costs. Get set amt guaranteed for grads and technicians. Increase funding to \$1 mil. Keep everything else same. Great "win-win" program.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None, but not prohibited. Accelerated pavement testing facility has some PS funding and was built with state and PS\$, but it is separate from other transportation research activities (contact Dr. Hani Melhem for details).

ADDITIONAL COMMENTS
Contact Dick McReynolds at Kansas DOT for details of K-TRAN program.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Kansas	Kansas Department of Transportation

RESPONDENT	PHONE	E-MAIL
R. L. McReynolds	785-291-3841	dick@dtmrc.wpo.state.ks.us

ADDRESS
2300 SW Van Buren St., Topeka, KS 66661

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
DOT contracts with 2 universities and does in-house RDT

ADVANTAGES OF CURRENT PROCESS
Needed RDT accomplished. Users of research results involved during proj & implementation. Grad students have knowledge of trans & DOT. Improved comm between KDOT & faculty. Synergy develops due to merging talents. Involvement of FHWA & Private Sector.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
In process of merging the K-TRAN Technical Committee & Research Steering Committee so 1 committee will oversee technical aspects of univ & in-house research (effective 3/98). New products review task placed into separate 3rd tier committee.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None Given

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Kentucky	Kentucky Transportation Center, University of Kentucky

RESPONDENT	PHONE	E-MAIL
Paul E. Toussaint	606-257-4513 X221	toussain@engr.uky.edu

ADDRESS
175 CD/KTC Bldg., Lexington, KY 40606-0281

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
KTC has a research coordinator who is liaison (currently asst to state hwy engineer) between Cabinet and university. Cabinet has research program and implementation advisory committee responsible for study selection and general oversight of program.

ADVANTAGES OF CURRENT PROCESS
Overall setup considered positive in all respects.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
No change recommended.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS agencies contract with KTC to conduct work for them. Funding by no means allows KTC to be self-sufficient. PS\$ may be 5% of yearly needs.

ADDITIONAL COMMENTS
Allow 1 university to be primary research agency. Assign DOT person (with authority to act) to coordinate all research. Have funding for center built into legislation if possible to enable more stable program. Assure adequate space arrangements at outset.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Louisiana	Louisiana Transportation Research Center, Louisiana State University

RESPONDENT	PHONE	E-MAIL
Joe T. Baker	504-767-9131	jbaker@ltrc.lsu.edu

ADDRESS
4101 Gourrier Ave., Baton Rouge, LA 70808

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
50% contracted with multiple universities; 50% done in-house. LTRC jointly administered by LADOT and LSU, but is budget entity of DOT. 7-instate universities address areas needing external expertise. LTRC staff is 67% DOT and 33% LSU employees.

ADVANTAGES OF CURRENT PROCESS
Works well in terms of merging resources of DOT & LSU. LTRC director is DOT (gratis LSU) employee which is considered essential to success in terms of targeting implementable applied research. Internal org structure based on strengths of staff & DOT needs

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Reporting relationship of LTRC director should be to Secretary of DOT. Would structure internal units to address ITS/Traffic, structures, & planning. Positions need upgrading to attract DOT personnel w/experience in operational areas.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Minor. Occasional research. Have recently established LTRC foundation in attempt to partner w/PS for narrow focused goals but don't intend to be for operational budget. DOT provides all funding except that obtained w/external competitive proposals.

ADDITIONAL COMMENTS
If SHA funds research function, SHA must control function via director. Permits targeting of applied research. Resolves potential conflict w/univ mgmt of funds in choosing needed research. Optimal prog includes mix of internal & contract (univ) research.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Maine	Maine Department of Transportation

RESPONDENT	PHONE	E-MAIL
Dale Peabody	207-287-5662	dale.peabody@state.me.us

ADDRESS
State House Station 16, Augusta, ME 04333

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Univ of ME conducted majority of SPUR research. They offer expertise in areas DOT is weak in & less expensive "brain power" through grad students vs consultants. Have built good relationship with univ. Developing ability to respond quickly to DOT.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
DOT ability to respond to research needs weak but improving; hope to build on success with univ by initiating co-op research program & establishing process to collaborate on trans. research needs.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Only a few projects with consultants. No process for solicitation and/or private funding exists. Have worked with agencies such as USGS and ORRIEL on projects with other funds than own.

ADDITIONAL COMMENTS
Make sure university is aware of DOT research needs and strategic plan. Don't blindly request research without giving them idea of what needs are.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE **ORGANIZATION NAME**

Maryland National Center for Transportation Research, Management & Development, Morgan State University

RESPONDENT **PHONE** **E-MAIL**

Z. Andrew Farkas 410-319-3666 zfarkas@moac.morgan.edu

ADDRESS

Baltimore, MD 21251

URC **ONE UNIV** **MULT UNIV** **BIDS CONS/UNIV** **DOT** **OTHER PROCESS**

DESCRIPTION OF PROCESS

None Given

ADVANTAGES OF CURRENT PROCESS

None Given

DISADVANTAGES OF CURRENT PROCESS

Have difficulty generating non-federal match for UTCP transportation center. DOT's research is too disaggregated and dissemination is limited.

CHANGES TO CURRENT PROCESS

Establish research center at a university (preferably ours).

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY

None

ADDITIONAL COMMENTS

None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE **ORGANIZATION NAME**

Massachusetts University of Massachusetts Transportation Center

RESPONDENT **PHONE** **E-MAIL**

William H. Highter 413-545-3970 highter@ecs.umass.edu

ADDRESS

224 Marston Hall, Box 35223, Amherst, MA 01003-5223

URC **ONE UNIV** **MULT UNIV** **BIDS CONS/UNIV** **DOT** **OTHER PROCESS**

DESCRIPTION OF PROCESS

None Given

ADVANTAGES OF CURRENT PROCESS

Most research contracted with UMass with a task order contract. Convenient for DOT because it simplifies contractual accounting function.

DISADVANTAGES OF CURRENT PROCESS

None Given

CHANGES TO CURRENT PROCESS

Keep same. Find this arrangement has same advantages for UMass as it does for DOT.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY

UMass frequently "partners" with PS for contracts. Gets little funding for research from private sector.

ADDITIONAL COMMENTS

None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Massachusetts	Massachusetts Department of Transportation

RESPONDENT	PHONE	E-MAIL
Debra Tucker	617-973-7884	debra.tucker@dpw@state.ma.us

ADDRESS
10 Park Plaza, #4145, Boston, MA 02116

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
The best entity suited for the project gets chosen.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
DOT did change it; recently chose NOT to renew blanket \$900K/year contract with state URC. Since university has 3 campuses, found DOT gets better results dealing directly with each campus individually rather than using URC as "middle man".

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None. Some research is done by private industry who may also have a stake in research results. In most cases this is due to technical advances limiting competition.

ADDITIONAL COMMENTS
MADOT policy very strict; only do research that will help solve a current problem/condition. Research funds getting tighter so policy of "applied research" has been enforced for last 3 years.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Michigan	Michigan Department of Transportation

RESPONDENT	PHONE	E-MAIL
Jon W. Reincke	517-322-1632	reinckej@mdot.state.mi.us

ADDRESS
PO Box 30049, Lansing, MI 48909

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
In-house DOT research done for short-term projects. Staff reductions/early retire @ DOT required move to univ. Stream-lined contracting procedure. Contracting research not all under one umbrella @ DOT which promotes competition for limited funds.

ADVANTAGES OF CURRENT PROCESS
Univ developing expertise to meet DOT needs. DOT project mgrs & tech advisory group oversee project to ensure useable, implementable product. Interaction encouraged between researchers & field staff to gain increased understanding of DOT problems/needs.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Established Research Centers of Excellence (ITS, Pavements, Transit, Traffic/Safety Operations) @ various universities. Pavements is a joint effort between three universities.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
In long run, department will benefit greatly from stronger ties with universities, especially in drawing new researchers/engineers to MDOT employment.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Minnesota	Minnesota Department of Transportation

RESPONDENT	PHONE	E-MAIL
Robert J. Benke	612-282-2267	rj.benke@dot.state.mn.us

ADDRESS
395 John Ireland Blvd., Stop #330, Rm 161, St. Paul, MN 55155-1899

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Combination in-house and multi-university via University of Minnesota Center for Transportation Studies as coordinator.

ADVANTAGES OF CURRENT PROCESS
Mult sources (internal & external) broadens scope of expertise avail, stimulates discussion/debate on research questions & min consequences of dependency on sole source. Flexibility & range of subject matter requires > investment in program mgmt support.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Keep same.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Initiated by PS or may be requested/required if potential benefits likely to be primarily private. Use of PS\$ not major component of budget except in ITS deployment/field test ventures.

ADDITIONAL COMMENTS
Caution against over-dependence on academia. Great value found in ensuring users of research participate throughout for mutual learning. In-house makes quick turnaround/provides staff for implementation/support. New knowledge expected of all staff.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Minnesota	Center for Transportation Studies, University of Minnesota

RESPONDENT	PHONE	E-MAIL
Robert C. Johns	612-625-9376	johns003@maroon.tc.umn.edu

ADDRESS
200 Trans & Safety Bldg, 511 Washington Ave. SE, Minneapolis, MN 55455

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
Also relationship with Iowa and Illinois universities.

ADVANTAGES OF CURRENT PROCESS
Only one research university in MN makes process simpler. Advantage of university-led center in relationships to faculty and understanding of academic culture. Strong checks/balances with DOT leadership on committees and contractual agreements.

DISADVANTAGES OF CURRENT PROCESS
Always challenge to make case for basic research.

CHANGES TO CURRENT PROCESS
No change.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Very challenging to get PS funding (mostly match funds for DOT-sponsored projects). \$7million budget (state, federal, local, small PS); \$800K/yr from legislature through MnDOT.

ADDITIONAL COMMENTS
DOT must value research and have multiple DOT champions. Need to see research as building expertise for continuing education of staff and new employees in long-term.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Mississippi	Mississippi Department of Transportation

RESPONDENT	PHONE	E-MAIL
Alfred B. Crawley	601-359-7650	acrawley@mdot.state.ms.us

ADDRESS
PO Box 1850, Jackson, MS 39215-1850

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
None Given

DISADVANTAGES OF CURRENT PROCESS
Not enough broad-based representation on research advisory committee.

CHANGES TO CURRENT PROCESS
None Given

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
No solicitation. PS generally approaches MDOT for cooperative research. Funding in form of donated services and materials.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE					
STATE		ORGANIZATION NAME			
Missouri		Missouri Department of Transportation			
RESPONDENT		PHONE	E-MAIL		
Jim Murray		573-526-8487	murray@mail.modot.state.mo.us		
ADDRESS					
PO Box 270, Jefferson City, MO 65102					
URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DESCRIPTION OF PROCESS					
DOT uses 2 state engineering universities for contract research on regular basis. Has not used competitive bidding. Request proposals and selects according to desired results/srvcs offered by univ. Has used other univs for non-engineering "soft" research.					
ADVANTAGES OF CURRENT PROCESS					
Allows substantial workload to be done by univ (profs/grads/undergrads) not requiring increased authorization within dept. DOT can match needs to univ with expertise/manpower.					
DISADVANTAGES OF CURRENT PROCESS					
DOT has depended on university to propose research problem statements applicable to DOT transportation needs. Currently changing to DOT presenting needs and university proposes research that will address those needs.					
CHANGES TO CURRENT PROCESS					
DOT and 2 state engineering universities working on partnership agreement allowing closer coordination/identification of research needs, research development, implementation, and technology transfer/educational opportunities for DOT employees.					
PRIVATE SOURCE FUNDS					
<input checked="" type="checkbox"/>					
DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY					
PS involvement primarily through partnering arrangements for research studies. No attempt made to provide self-sufficiency for department from PS involvement.					
ADDITIONAL COMMENTS					
Total division operating budget \$4,858,048 (\$2,805,577 for research)					

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Montana	Montana Department of Transportation

RESPONDENT	PHONE	E-MAIL
Robert A. Garber	406-444-6269	U2956@long.mdt.mt.gov

ADDRESS
PO Box 201001, Helena, MT 59620-1001

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

DESCRIPTION OF PROCESS
Collaborative agreement for a "minimum" relationship with university/CE departments. Contracts with some private sector firms.

ADVANTAGES OF CURRENT PROCESS
Freedom to seek out/enlist well-qualified researchers irrespective of affiliation. Moving toward some undefined part of program open to competitive bidding to all sectors. Would like to see in-state and out-of-state universities bid against each other.

DISADVANTAGES OF CURRENT PROCESS
Established, long-term university/DOT relationship causes university to begin to expect all of funding/attention. Research may not be addressing most pressing DOT needs.

CHANGES TO CURRENT PROCESS
Probably would not change anything.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Primarily project-level technical panels. Virtually no funding. Joint public/private research has patent/copyright/intellectual property complications. Some firms submit topics/offer assistance hoping to find "cash cow" which can lead to legal issues

ADDITIONAL COMMENTS
No 2 states, 2 DOTs, or 2 universities are alike or even similar so relational possibilities are very large. TXDOT/TTI model can't be reproduced in any other state, but beneficial for most states to have some connection with one or more universities.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Nebraska	Mid-America Transportation Center, University of Nebraska at Lincoln

RESPONDENT	PHONE	E-MAIL
Patrick T. McCoy	402-472-5019	pmccoy@unlinfo.unl.edu

ADDRESS
41335 Nebraska Hall, Lincoln, NE 68588-0530

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
DOT research program provides support for graduate students which enables MATC to compete more effectively with others for graduate students.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Keep same structure.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
MATC is FHWA Region 7 Univ Trans Ctr. MATC receives \$1 mil from USDOT & must match it w/\$1 mil from non-federal sources. Principal investigators receiving MATC support are responsible for finding matching partners. This approach very successful.

ADDITIONAL COMMENTS
Researchers should be required to include an implementation plan in their proposals. DOT must develop a means of identifying and prioritizing research needs.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Nebraska	Nebraska Department of Transportation

RESPONDENT	PHONE	E-MAIL
Ken Sieckmeyer	402-479-4519	dor5017@vmhost.cdp.state.ne.us

ADDRESS
PO Box 94759, Lincoln, NE 68509-4759

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Agrmt with UNL to pay 10% overhead on research projects. NE technical personnel involved with research have developed good working relationships with UNL profs. UNL has improved/expanded test facilities to accommodate wider spectrum research activities.

DISADVANTAGES OF CURRENT PROCESS
Research often academia driven rather than developed by NE personnel to address a need. Little accountability for quality on part of university researchers.

CHANGES TO CURRENT PROCESS
Stress to UNL that research must address need of transportation agency not just be a good topic to research or for graduate student thesis. Academia-driven research often not likely to be implemented.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Assume question intended to determine if program is influenced by private sector.

ADDITIONAL COMMENTS
Research programs of state transportation agencies must be driven by agency needs. Although relying on contractual research, there must be clear accountability as to who is in charge and what is expected throughout agency.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Nevada	Transportation Research Center, University of Nevada at Las Vegas

RESPONDENT	PHONE	E-MAIL
Edward J. Neumann	702-895-1072	neumann@ce.unlv.edu

ADDRESS
4505 Maryland Pkwy, Las Vegas, NV 89154-4007

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Allows 2 state universities to participate. Both participate in setting research priorities. Each university has different areas of expertise.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Would like to see more research come to UNLV

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
Essential to survival of individual faculty and graduate programs that research support and publication opportunities be made available. DOTs could be #1 partner with university. Much could be gained on both sides from cooperation.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Nevada	Nevada Department of Transportation

RESPONDENT	PHONE	E-MAIL
Alan Hilton	702-888-7803	None Given

ADDRESS
1263 S. Stewart St., Carson City, NV 89712

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
None Given

DISADVANTAGES OF CURRENT PROCESS
Department has become over-reliant on university system to develop research problem statements and subsequent research proposals to the extent that program is driven by universities.

CHANGES TO CURRENT PROCESS
Develop process by which internally-proposed problem statements could be developed to extent that would allow for research proposal to be bid on by universities or private consultant.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
University contracted research has been convenient and mutually beneficial. Time has come for competition, depending on nature of proposed research project.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
New Jersey	New Jersey Department of Transportation

RESPONDENT	PHONE	E-MAIL
Nick Vitillo	609-530-5966	nvitillo@cpm.dot.state.nj.us

ADDRESS
CN 600, Trenton, NJ 08625

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Develop close relationship with university researchers and students makes it easier to assess capabilities and limitations of a given school.

DISADVANTAGES OF CURRENT PROCESS
Less in-house research staff to address immediate needs of department customers.

CHANGES TO CURRENT PROCESS
Add in-house research staff to form research teams with university staff. Bring together best of both organizations.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
University centers need to be responsive to DOT needs; familiar with DOT needs; flexible.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE					
STATE		ORGANIZATION NAME			
New Mexico		New Mexico Department of Transportation			
RESPONDENT		PHONE	E-MAIL		
David Albright		505-246-6410	albright@unn.edu		
ADDRESS					
1001 University Blvd. SE, #103, Albuquerque, NM 87106					
URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
DESCRIPTION OF PROCESS					
Some in-house research.					
ADVANTAGES OF CURRENT PROCESS					
Have co-located research bureau with research center (ATR Institute) which allows for quick exchange of information, address research issues, and respond to opportunities.					
DISADVANTAGES OF CURRENT PROCESS					
None Given					
CHANGES TO CURRENT PROCESS					
Program has evolved over past 6 years; would keep it as is including intentional openness to change.					
PRIVATE SOURCE FUNDS					
<input checked="" type="checkbox"/>					
DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY					
Form pre-competitive teams under state University Research Park Act. Industry Advisory Board works with Research Center.					
ADDITIONAL COMMENTS					
See published Partnership Model (FHWA-HPR-NM-92-03)					

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
New York	New York Department of Transportation

RESPONDENT	PHONE	E-MAIL
Robert J. Perry	518-457-5826	rperry@gw.dot.state.ny.us

ADDRESS
1220 Washington Ave., Albany, NY 12232

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Partnership with academia allows DOT to benefit from their expertise and exposes academia to real life problems faced by practitioners.

DISADVANTAGES OF CURRENT PROCESS
Academic/DOT driven by different issues. University attracted to projects exploring something new to generate publication. DOT address real issues of practice, responsiveness, timeliness, and functionality.

CHANGES TO CURRENT PROCESS
Implement mechanism where academic researchers and DOT personnel share real life experience in other's work (internship). Facilitate understanding of others' motivation, needs, interests. Lead to strengthening collaborative agreement.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
New York	Center for Infrastructure & Transportation Studies, Rensselaer Polytechnic University

RESPONDENT	PHONE	E-MAIL
George F. List	518-276-6362	listg@rpi.edu

ADDRESS
4052 Jonsson Eng. Center, Troy, NY 12180

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
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DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
None Given

DISADVANTAGES OF CURRENT PROCESS
Current relationship thwarts/frustrates academic involvement. Most research done by NYDOT directly or through consultants, national organizations (NCHRP) or pooled fund studies. Very little spent on academic endeavors.

CHANGES TO CURRENT PROCESS
Encourage NYDOT to establish an energetic/vibrant multi-school research consortium.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Partnerships.

ADDITIONAL COMMENTS
Top level support. ASU & UofA (be inclusive). Long-term and short-run research balance. Multi-year funding.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
North Carolina	North Carolina Department of Transportation

RESPONDENT	PHONE	E-MAIL
M. P. Strong	919-715-2464	mpstrong@swp.dot.state.nc.us

ADDRESS
PO Box 25201, Raleigh, NC 27611

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

DESCRIPTION OF PROCESS
Master agreement with universities. Some research performed in-house.

ADVANTAGES OF CURRENT PROCESS
Provides access to university expertise at 15 state-supported univ & 1 private univ. Balance between univ contract/intramural research. Flexibility to consult w/more than 1 prospective principal investigator re proposal (competitive bid process not used).

DISADVANTAGES OF CURRENT PROCESS
Spirit of Master Agreement precludes use of out-of-state universities and private research consultants as primary principal investigators.

CHANGES TO CURRENT PROCESS
Full-time professional staff is limited; more full-time professional staff would permit more intramural investigations.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS involvement through use as subcontractors. No specific funding set aside for PS involvement. Needs requiring PS research consultant involvement are identified, discussed, and negotiated during proposal development and review phases.

ADDITIONAL COMMENTS
Important to tap variety of research disciplines (engineering, environmental, business) when forming agreement w/univ. Provision to utilize various univ faculty for investigations short of formal research contract helpful; access to out-of-state univ.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
North Carolina	Institute for Transportation Research & Education, North Carolina State University

RESPONDENT	PHONE	E-MAIL
Gorman Gilbert	919-515-8030	gilbert@eos.ncsu.edu

ADDRESS
Centennial Campus, Box 8601, Raleigh, NC 27695-8601

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>				

DESCRIPTION OF PROCESS
DOT contracts through ITRE for all universities in state.

ADVANTAGES OF CURRENT PROCESS
NCDOT has one university contract ("one-stop shopping").

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
NCHRP-type procurement process. As is, NCDOT solicits one-page research ideas, which are reviewed and winner selected. No 2nd stage competition among universities to propose on selected ideas.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
University (ITRE) sits as ex-officio members of NCDOT selection committee.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
North Dakota	North Dakota Department of Transportation

RESPONDENT	PHONE	E-MAIL
Jeff M. Richter	701-328-6911	ccmail.jrichter@ranch.state.nd.us

ADDRESS
300 Airport Rd., Bismarck, ND 58504-6005

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
All research done in-house, but also contract with Upper Great Plains Research Center at North Dakota State University and eligible to submit projects for funding.

ADVANTAGES OF CURRENT PROCESS
Most of research in materials has been done in-house. A Research Advisory Committee gives NDSU opportunity to participate and suggest/submit research projects for inclusion in DOT budget.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
May include more dialogue between NDSU and NDDOT to allow better understanding of type of research NDDOT can utilize.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS involvement primarily in transportation planning (not self-sufficient). Little involvement in materials except for vendor/supplier/manufacture donation/product for testing in field.

ADDITIONAL COMMENTS
Need extensive dialogue (univ not real world). Academic interests don't always mesh with DOT needs. Poor continuity with grad students (1-2 yr). Univ wants to start from scratch while need is for continuance of prior work from DOTs/other univs.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE					
STATE		ORGANIZATION NAME			
Ohio		Ohio Department of Transportation			
RESPONDENT		PHONE		E-MAIL	
Roger Green		614-275-1381		rogreen@odot.dot.ohio.gov	
ADDRESS					
1600 W. Broad St., Columbus, OH 43223					
URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DESCRIPTION OF PROCESS					
Almost all research conducted by universities/consultants.					
ADVANTAGES OF CURRENT PROCESS					
Makes more knowledge/equipment available. Decreases DOT staffing/operating cost. Students exposed to practical eng problems. Low cost of student labor decreases cost of labor-intensive research.					
DISADVANTAGES OF CURRENT PROCESS					
Sometimes researchers don't understand problem. Difficult to change direction of research. Difficult to monitor progress. "Hands on" knowledge stays w/univ/consultant. Problems/errors may go unreported. Consultant profits don't benefit research.					
CHANGES TO CURRENT PROCESS					
Have 13 in-state universities with engineering programs which allows competition and reasonable prices. Not difficult to find expertise in any area. Would like more DOT involvement for technology transfer and implementation.					
PRIVATE SOURCE FUNDS					
<input checked="" type="checkbox"/>					
DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY					
Solicit transportation-related research needs from trade organizations when developing program. PS usually provides materials or cost of constructing test sites. If PS provides funds, done under separate contract with university.					
ADDITIONAL COMMENTS					
Small problems which need immediate solution is done through "special student studies" (\$10,000 max cost and 12 months duration).					

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Oklahoma	Oklahoma Department of Transportation

RESPONDENT	PHONE	E-MAIL
Lawrence J. Senkowski	405-521-2671	None Given

ADDRESS
200 NE 21st St., Oklahoma City, OK 73105

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
Contract research limited to universities offering PhD programs in engineering (University of Oklahoma and Oklahoma State).

ADVANTAGES OF CURRENT PROCESS
Projects directed to university with best expertise for project.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Recently instituted a competitive bid process and allow private consultants to submit proposals. Has increased scope of services and reduced overall costs. Nature of project determines process used.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Oregon	Oregon Department of Transportation

RESPONDENT	PHONE	E-MAIL
Galen McGill	503-986-2845	galen.e.mcgill@odot.state.or.us

ADDRESS
2950 State St., Salem, OR 97310

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

DESCRIPTION OF PROCESS
Some research done in-house with DOT personnel.

ADVANTAGES OF CURRENT PROCESS
Choose method for conducting research that best matches person to project - university contract, RFP (consultant/university), DOT, or temporary employee (retired DOT, grad student, other).

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Have good relationship with universities, but need to find way to have them deliver projects on schedule.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS involvement but no funding. Consultants donate time to serve on project technical advisory committee. Have hired PS firms and private universities to perform projects.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE Oregon **ORGANIZATION NAME** Transportation Research Institute, Oregon State University

RESPONDENT James R. Lundy **PHONE** 541-737-4979 **E-MAIL** lundyj@enr.orst.edu

ADDRESS
202 Apperson Hall, Corvallis, OR 97331

URC **ONE UNIV** **MULT UNIV** **BIDS CONS/UNIV** **DOT** **OTHER PROCESS**

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
None Given

DISADVANTAGES OF CURRENT PROCESS
Until this year, only DOT could submit project statements. This bottom-up approach identified "real" problem, but tended to be narrow in scope. Available DOT and research expertise were not well matched.

CHANGES TO CURRENT PROCESS
Expert task group (researchers and DOT) was brought together to identify trends, needs to address those trends, and prioritize research needs within topical areas. Very beneficial to all concerned.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS involvement is handled on case-by-case basis; no consistent (dependable) source of PS\$.

ADDITIONAL COMMENTS
DOT and universities began work outlining form/function of quasi-public/private trans research entity. "Center" would coordinate all trans research in state & solicit private funds. Ultimately killed for political reasons, but many felt idea had merit.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Pennsylvania	Pennsylvania Transportation Institute, Pennsylvania State University

RESPONDENT	PHONE	E-MAIL
James H. Miller	815-863-9765	jm7@psu.edu

ADDRESS
201 Research Office Bldg, University Park, PA 16802-4710

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
Until 5 yrs ago PennDOT bid all projects. Since 1993, PennDOT entered into partnership agreement with Penn State where DOT matches grants (~\$300K per year for PennDOT & \$300K for Penn State).

ADVANTAGES OF CURRENT PROCESS
None Given

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Effective early 1998, PTI will become "single point of contact" to coordinate all university-based research, education and T2 activities sponsored by DOT. PTI will do ~75% of work and universities outside PA do rest. New agrmt value \$15 mil over 5 yrs.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS\$ sought on a limited basis to match other contracts.

ADDITIONAL COMMENTS
Evolution of Penn State-PennDOT relationship over past 5 yrs might be of interest. Contact Robert Garrett, Manager PennDOT Research Division (717-787-0800).

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
South Carolina	South Carolina Department of Transportation

RESPONDENT	PHONE	E-MAIL
Mike Sanders	803-737-6691	None Given

ADDRESS
PO Box 191, Columbia, SC 29202

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Can advertise research projects or can contract directly with an in-state university with approval of State Budget and Control Board which provides flexibility.

DISADVANTAGES OF CURRENT PROCESS
Organization structure too far from top to get support needed (nothing to do with universities).

CHANGES TO CURRENT PROCESS
Keep university relationships and PI selection process same. Work closer with in-state universities to expand their use into other areas than in past. Move research up in DOT's organizational structure.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
No funding. PS included in research topic solicitation and steering committees on projects impacting work they do for DOT.

ADDITIONAL COMMENTS
Difficulty with time universities take to complete projects (due to PI teaching). On long-term projects, grad students leave project resulting in longer project duration.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE		
STATE	ORGANIZATION NAME	
South Dakota	South Dakota Department of Transportation	
RESPONDENT	PHONE	E-MAIL
David L. Huft	605-773-3358	daveh@dot.state.sd.us
ADDRESS		
700 E. Broadway, Pierre, SD 57501-2586		
URC	ONE UNIV	MULT UNIV
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BIDS CONS/UNIV	DOT	OTHER PROCESS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DESCRIPTION OF PROCESS		
Half of research done in-house. Part of remaining awarded through competitive proposals to universities/consultants. Sole-source some projects if specialized expertise needed. Some collaborative projects (joint DOT/university or consultants).		
ADVANTAGES OF CURRENT PROCESS		
Flexibility.		
DISADVANTAGES OF CURRENT PROCESS		
SD universities not large, so expertise not available in all disciplines.		
CHANGES TO CURRENT PROCESS		
None anticipated.		
PRIVATE SOURCE FUNDS		
<input checked="" type="checkbox"/>		
DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY		
Seek private partners in individual projects but only when clear private interest is identified. Do not obtain sufficient funding to be self-sufficient (by a long shot!).		
ADDITIONAL COMMENTS		
Relationship must be tailored to local conditions. Don't favor exclusive arrangement where university "guaranteed" all DOT research. Competitive environment significantly strengthens university's ability to propose/conduct research for DOT.		

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Tennessee	Tennessee Department of Transportation

RESPONDENT	PHONE	E-MAIL
Mike Presley	615-532-9838	mpresley@mail.state.tn.us

ADDRESS
505 Deaderick St., #300, Nashville, TN 37243-0345

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
DOT has a basic agreement with University of TN that allows DOT to contract with anyone. Gives DOT flexibility in awarding contract. Puts burden of developing RFPs and writing contracts on university.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Keep as is.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Tennessee	Transportation Research Center, University of Tennessee

RESPONDENT	PHONE	E-MAIL
Stephen H. Richards	423-974-1812	stever@utk.edu

ADDRESS
600 Henley St., #309, Knoxville, TN 37996-4133

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input checked="" type="checkbox"/>				

DESCRIPTION OF PROCESS
Formal agrmt (state law) for UT to administer research program. Advisory committee made up of DOT div. head level consider problem stmts then forward to UT to develop RFP, select winner, execute contracts, handle financial/technical matters, meet deadline

ADVANTAGES OF CURRENT PROCESS
UT transportation center has full-time staff member who oversees functions and works closely with TDOT research coordinator, university and TDOT business offices.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Formalize procedure to solicit/consider resrch problem stmts generated outside & independent of DOT. Restrict award to TN state-supported univ if capable. Estab sched for generation/evaluation/award of proj for max input/involvement by DOT & researchers.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Approx 5% sponsored by PS; unclear as to whether funds or materials provided.

ADDITIONAL COMMENTS
Council of University Transportation centers (CUTC) can be great resource for your study.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Tennessee	Transportation Studies Institute, University of Memphis

RESPONDENT	PHONE	E-MAIL
Martin E. Lipinski	901-678-3279	mlipinsk@cc.memphis.edu

ADDRESS
Herff College of Engineering, Memphis, TN 38152

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
Bulk of research conducted through University of Tennessee-Knoxville (land grant school).

ADVANTAGES OF CURRENT PROCESS
Permits access to all university researchers.

DISADVANTAGES OF CURRENT PROCESS
Individual schools "court" TDOT people to get contracts on non-competitive basis. Project needs an "angel" within TDOT to get funding.

CHANGES TO CURRENT PROCESS
Structural change to enhance status of research supported by TDOT of a program whereby researchers from various schools could work together on project.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None at this time.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Tennessee	Tennessee Technical University

RESPONDENT	PHONE	E-MAIL
Roy C. Loutzenheiser	931-372-3546	rloutz@tntech.edu

ADDRESS
PO Box 5015, Cookeville, TN 38505-0001

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
URC at UT-Knoxville

ADVANTAGES OF CURRENT PROCESS
None Given

DISADVANTAGES OF CURRENT PROCESS
No "research dept". Contracts are handled through UT-Knoxville Transportation Center. TNDOT pays for limited staff at Knoxville. Research (other than maybe materials) has little or no part in TNDOT goals.

CHANGES TO CURRENT PROCESS
Create "research dept" with limited budget (and increase budget with "age").

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Limited to materials research. Contracts infrequent/unsolicited. Usually less than \$10,000.

ADDITIONAL COMMENTS
The centers, all state schools & state DOT do need to work together. Trying to change TN's current research efforts (lack of) and attitude.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Texas	Texas Transportation Institute, Texas A&M

RESPONDENT	PHONE	E-MAIL
C. V. Wootan	409-845-1713	c-wootan@tamu.edu

ADDRESS
College Station, TX 77843

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Known structure that allows major needs of TXDOT to be addressed in a continuous fashion.

DISADVANTAGES OF CURRENT PROCESS
Opening program to dozen or more universities does serious damage to cooperative aspects of program. To serve TXDOT most effectively, must be close partnership which can be done with 1 or 2 universities, but not everyone.

CHANGES TO CURRENT PROCESS
Revert to arrangement where TXDOT has cooperative partnership with the 2 major universities and a true partnership can be maintained.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS provides 5-10% of budget (\$1.5-3 mil) annually. Have several national centers from PS. PS\$ generally comes to TTI rather than being solicited.

ADDITIONAL COMMENTS
Documents regarding cooperative research program, organization structure, expenditures, presentation enclosed w/questionnaire.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Texas	Texas Transportation Institute, Texas A&M

RESPONDENT	PHONE	E-MAIL
Dennis L. Christiansen	409-845-9356	dennis@ttiadmin.tamu.edu

ADDRESS
College Station, TX 77843-3135

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
Program restricted to state universities.

ADVANTAGES OF CURRENT PROCESS
Stability/continuity in funding. Active involvement at all levels of TXDOT. Support for students. Financial/resource commitment to program by university. Formal procedures for program development/oversight. Research pursued as a partnership.

DISADVANTAGES OF CURRENT PROCESS
Research tends to be very applied and short range.

CHANGES TO CURRENT PROCESS
Commitment to future funding levels. Reassessment of whether contracts with 22 state universities is best way to run program in long-run. Basic relationship in place for 50 yrs with proven record of success and should continue into future.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
Issues many and complex. Might consider convening a meeting with several states with better-known research programs to explore your questions in more detail.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Texas	Texas Department of Transportation

RESPONDENT	PHONE	E-MAIL
Jon Underwood	512-465-7403	junder1@mailgov.dot.us.state.tx

ADDRESS
Box 5080, Austin, TX 78763

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Allows for competition, improved product, and brings real world problems to all universities.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Have research report directly to Executive Director which would remove any perceived bias (research currently reports to Asst Executive Director for Field Operations).

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
Cooperative agreements with universities very helpful.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Texas	Center for Transportation Research, University of Texas

RESPONDENT	PHONE	E-MAIL
Frank McCullough	512-232-3141	bfmccullough@mail.utexas.edu

ADDRESS
3208 Red River, #200, Austin, TX 78705-2650

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
Cooperative agreement advantageous to both parties. Univ works at lower overhead. Univ gets funds for student/faculty research; DOT gets future employees w/advanced degrees. Research can chg direction as needed w/simple agrmt betwn researchers & monitors.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Keep cooperative work.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Utah	Utah Department of Transportation

RESPONDENT	PHONE	E-MAIL
Doug Anderson	801-965-4377	srcfso1.danderso@state.ut.us

ADDRESS
4501 S. 2700 W., PO Box 148410, Salt Lake City, UT 84119

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
See advantages below.

ADVANTAGES OF CURRENT PROCESS
Can contract with any university, a consultant, or do study in-house. Have 2-year contracts with universities and write work orders for each study. \$100K earmarked for local schools. Conduct annual workshop to identify topics.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Have to do different contracts with private schools (BYU); contracts with state-owned schools much easier.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
PS contributions usually materials or labor (often offered for DOT evaluation). These contributions less than 15% of DOT budget.

ADDITIONAL COMMENTS
Universities often bring matching funds and offer labs/other facilities. Good balance between in-house, universities and private sector has enhanced UTDOT's program.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Virginia	Transportation Policy Program, George Mason University

RESPONDENT	PHONE	E-MAIL
Roger R. Stouger	703-993-2281	rstough@gmu.edu

ADDRESS
Fairfax, VA 22030-4444

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
All universities have access to funded research. DOT has access to researchers throughout state university system; has fostered a DOT/university council to promote/synthesize different centers of expertise.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
Keep same

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Mostly contract research or subcontractor to large transportation consulting firms. Some donations from airlines for work conducted on aviation policy.

ADDITIONAL COMMENTS
None Given

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Washington	Washington Department of Transportation

RESPONDENT	PHONE	E-MAIL
Marty Pietz	360-705-7974	None Given

ADDRESS
PO Box 47370, Olympia, WA 98504-7370

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
Agrmt between WDOT/UW/WSU forms TRAC. Majority of research done by UW, but some RFPs issued.

ADVANTAGES OF CURRENT PROCESS
Project solicitation process every 2 yrs to select projects. DOT task orders executed quickly due to existing agrmt. Long-term relationship of DOT/univ helps understanding of each other.

DISADVANTAGES OF CURRENT PROCESS
None Given

CHANGES TO CURRENT PROCESS
None anticipated.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
Limited funding.

ADDITIONAL COMMENTS
DOT sponsor/monitor keeps projects on track. Ongoing communication essential.

TRANSPORTATION RESEARCH CENTER QUESTIONNAIRE RESPONSE

STATE	ORGANIZATION NAME
Wisconsin	Wisconsin Department of Transportation

RESPONDENT	PHONE	E-MAIL
Steve Shoher	608-246-5399	None Given

ADDRESS
3502 Kinsman Blvd., Madison, WI 53707

URC	ONE UNIV	MULT UNIV	BIDS CONS/UNIV	DOT	OTHER PROCESS
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DESCRIPTION OF PROCESS
None Given

ADVANTAGES OF CURRENT PROCESS
DOT uses expertise/facilities of all universities. Research stays focused and applicable to DOT. Better DOT control.

DISADVANTAGES OF CURRENT PROCESS
Affords limited grad student development. A lot of DOT time required to manage program. Research focus tends to drift without DOT input.

CHANGES TO CURRENT PROCESS
Exploring use of a research center located at a university.

PRIVATE SOURCE FUNDS

DESCRIPTION OF PRIVATE SOURCE FUNDS/SELF-SUFFICIENCY
None Given

ADDITIONAL COMMENTS
None Given

APPENDIX E
COLORADO MEMO OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING

THE COLORADO TRANSPORTATION INSTITUTE

I. Sponsors:

This Memorandum of Understanding establishes the Colorado Transportation Institute (CTI) and is made between the Colorado Department of Transportation, and:

Colorado School of Mines
Colorado State University
University of Colorado-Boulder
University of Colorado-Denver
University of Southern Colorado

II. Purpose:

The Colorado Transportation Institute is a joint public-private-university cooperative transportation research unit initially underwritten by the Colorado Department of Transportation. The purpose of the CTI is the conduct of research in all modes of transportation to provide the knowledge and technology base to improve the capacity to meet the present and future mobility needs of individuals, industry, and commerce of the state of Colorado. An important aspect of all CTI research efforts is awareness of and sensitivity to the environmental and socioeconomic dimensions of transportation-related problems and their solutions. In particular, transportation's changing political climate as evidenced by the ISTEA legislation, the Clean Air Act Amendments of 1990, and the CDOT-creating legislation in Colorado in 1991 will continue to influence the type and scope of transportation research and technology development conducted by CTI.

It is anticipated that CTI may become a separately-incorporated, non-profit, tax-exempt organization at a future date. This interim organizational step is intended to enable CTI to initiate its own organizational efforts through the establishment of an organizing executive committee, appointment of an interim CTI President, and the establishment of initial policies, procedures, and operating practices.

The research conducted by the CTI shall include short-term applied research in support of member needs. It shall also include more basic research aimed at providing or testing new tools, technology, materials, and analysis techniques for the solution of current and emerging problems in Colorado's transportation environment.

CTI recognizes the importance of supporting the transfer of research findings and/or products into field use as quickly as possible. Where appropriate, each research effort undertaken by CTI will include technology transfer recommendations.

III. Objectives:

- A. To identify Colorado's transportation research and technology priorities, conduct research related to those needs, and facilitate the transfer of technology.
- B. To provide for expansion of transportation research and educational opportunities among Colorado colleges and universities at both the undergraduate and graduate levels.
- C. To stimulate cooperative research efforts among CDOT, colleges and universities, and the private sector, and to act as a voluntary clearing-house for transportation research conducted outside CDOT while seeking to fund such from multiple state, federal and private sources.

IV. Management:

The management of CTI flows from the cooperative nature of the institute. Each sponsor (party to this Memorandum of Understanding) will participate in the direction and operation of CTI through membership in the Executive Committee and its appointed Research Committee. Each sponsor will have a voice in setting CTI's research and technology priorities and ensuring responsiveness to sponsor needs. Each sponsor will have equal access to the product(s) of the activities conducted under CTI auspices.

A. Executive Committee:

1. Membership:

- a. Each party to this Memorandum of Understanding will be a member of the Executive Committee. Additional members from non-sponsoring agencies/organizations may be appointed upon the recommendation of the Executive Director and with the approval of a majority of members of the Executive Committee.
- b. Each sponsor will designate a representative and an alternate to serve on the Executive Committee.
- c. The Executive Director, Colorado Department of Transportation will serve as chairperson.
- d. The President of CTI will be an ex-officio member of the Executive Committee.
- e. Each member of the Executive Committee shall have one vote.

- f. Unless otherwise specified in this document, committee actions require approval of a majority of voting members.
 - g. The CDOT Research Engineer will serve as an ex-officio, non-voting member of the Executive Committee and will serve as Secretary to the Executive Committee.
2. Duties/Responsibilities: The Executive Committee shall have the following duties and responsibilities:
- a. Provide overall policy direction for CTI.
 - b. Appoint an interim head of CTI, to be known as the interim President of the CTI.
 - c. Within six months of its formation, appoint two additional members to the Executive Committee, one of whom shall represent private organizations' interests in transportation Issues, and the other who must represent local (government) interests in transportation issues.
 - d. Appoint the members to the Research Committee based on sponsor nominations. The Executive Committee may add members to the Research Committee at its discretion, up to a total membership of twenty.
 - e. Meet at least annually to approve the research priorities and the following year work program recommended by the Research Committee. It will also review ongoing research.

B. The CTI President:

- 1. The CTI President is the chief administrative officer of CTI. The President is appointed by and reports to the Executive Committee. The Executive Committee will appoint an interim CTI President.
- 2. Duties of the Interim CTI President:
 - a. Opening the CTI office and establishing CTI operating policies and procedures for approval by the Executive Committee.
 - b. Together with the Executive Committee, establish the selection procedures and initiate the selection process for the permanent CTI President.

- c. Perform all duties of the permanent President until one is appointed.
3. Duties of the CTI President:
- a. Perform CTI market analysis and market development to determine in what areas the CTI can best meet transportation needs and secure additional funding.
 - b. Identify CTI research and technology resources, including identification of capabilities of sponsoring organizations.
 - c. Expand private sector involvement in CTI research activities.
 - d. Identify CTI long-term research and technology needs.
 - e. Examine other transportation institutes across the country and propose an optimum long-term CTI organizational structure to meet Colorado needs and program objectives.
 - f. Attend each Executive Committee and call/chair each Research Committee meeting.
 - g. Generate requests for specific research ideas consistent with identified research priority areas. It is anticipated that research proposals would come primarily from Colorado universities and CDOT. However, research proposals from other potential grantees and agencies with interest in transportation shall be given equal consideration. One need not be a CTI sponsor to submit a proposal.
 - h. Establish a technical assessment process for research proposals, utilizing technical experts and ultimate users, to provide the Research Committee with an objective assessment of the value of the proposed research for Colorado's transportation.
 - i. Recommend the annual work program reflecting the priority needs of all modes of transportation in the state for both basic and applied research.
 - j. Create a technical review panel, coordinated by a CDOT project monitor, for each funded research project.
 - k. Suggest and promote teaming between researchers who can respond to research opportunities or address specific research needs.

4. Support Service by CDOT:

During the initial phases of CTI, the President will work with the CDOT Research Engineer's Office, through which administrative support will be provided. Such support will include, as needed, any and all of the following:

- a. Provision of office space, furniture and equipment (phone, computer), and a support person.
- b. Assistance with assembly and distribution of various informational needs of the Institute.
- c. Taking action to have payments made against approved invoices covering conduct of approved research and administrative support costs.
- d. Solicitation of research needs from the sponsors, other Colorado colleges and universities, industry, and local transportation agencies.
- e. Preparation and distribution of requests for proposals (RFP's).
- f. Coordination of review of research proposals by the Research Committee and provide assessments of research proposals for the Research Committee through its Technical Research Oversight Teams.
- g. Preparation of contracts to be executed by CDOT for conduct of research. Contracts will conform to department and state standards.
- h. Coordinate submittal, review and approval of progress reports and invoices for payments.
- i. Monitor progress and completion schedules.
- j. Other support services as jointly agreed upon.

C. Research Committee:

1. Purpose: The purpose of this committee is to help insure that priority transportation research needs are addressed in all aspects of transportation in Colorado.

The CTI Research Committee is intended to reflect the complexity and diversity of the Colorado transportation community. Its broad-based composition will ensure the transportation research needs of Colorado citizens will be identified.

2. Membership:

a. Initially, representatives from several of the following organizations will be Invited to serve on the Research Committee:

- 1) Colorado Municipal League
- 2) Colorado Counties, Inc.
- 3) Regional Transportation District
- 4) Grand Junction/Mesa County MPO
- 5) North Front Range Transportation and Air Quality Planning Council
- 6) Pikes Peak Springs Council of Governments
- 7) Pueblo Area Council of Governments
- 8) Denver Regional Council of Governments
- 9) Colorado Consulting Engineers Council
- 10) Colorado Contractors Association

b. In addition, there will be six members from CDOT as follows:

- 1) The Director of the Division of Aviation, CDOT
- 2) CDOT's Chief Engineer or designated immediate deputy
- 3) CDOT's Staff Materials Engineer
- 4) Two of the CDOT Regional Transportation Directors (for one or two-year terms)
- 5) CDOT's Research Coordination Engineer

- c. Finally, there will be two representatives from the sponsoring universities selected by the Board from a pool of volunteers who are not expected to participate in CTI studies.
- d. Each member of the Research Committee shall have one vote.
- e. The CTI President shall initially chair this committee serving as a non-voting member. The Committee may subsequently establish its own organizational structure which will best meet its objectives and elect appropriate officials. Further, on a meeting-by-meeting basis, the Committee may select one member to represent the Committee at each Executive Board meeting.

3. Duties/Responsibilities:

- a. Provide input to the Executive Committee as it establishes general Colorado transportation research needs.
- b. Recommend priorities of research problems and proposals to the Executive Board.
- c. Meet regularly at the initiation of the CTI President or the Executive Committee.
- d. Utilize technical experts to assess problems and proposals submitted for prioritization.

V. Funding:

Initially, funding for the operation of the CTI will come from available funds within the Colorado Department of Transportation. It is anticipated that as CTI develops, funding will come from state funds for research, private funds received in conjunction with Institute and university matching contributions, and direct federal, state, and/or private support of research proposals.

VI. Period:

The period of this agreement shall be from July 1, 1992 through June 30, 1994, when the then Executive Committee shall either have completed the organization of the separate corporation, voted to extend this Memorandum of Understanding for an additional period, or voted to dissolve the CTI.

VII. Termination:

A sponsor may withdraw from the Institute, upon 30-day written notice to the Executive Committee, at its sole discretion and for any reason whatsoever. However, any contractual commitments to complete research must be fulfilled.

Notwithstanding the withdrawal of a sponsor, the remaining sponsors have the right to continue the Institute without the withdrawing sponsor.

VIII. Additional Sponsors:

Any four-year college or university located in Colorado, private organization or transportation-related agency may petition the Executive Committee to become a sponsor of the Institute. The petition will be in the form of a written request to the chairperson of the Executive Committee. The petitioner must demonstrate how its participation will be beneficial to the successful continuation of the Institute. The Executive Committee will be the sole judge as to the merits of the petition. A unanimous decision is required for the acceptance of the petitioner.

IX. General Provisions:

- A. Relationship of Sponsors. The Colorado Transportation Institute is neither a unit of government nor an arm of the state. Voluntary sponsorship and participation in CTI activities does not grant authority to any sponsor to assume or create any obligation on behalf of or in the name of any other sponsor or CDOT.
- B. Expenditure of Transportation Research Funds. The responsibility to contract for transportation research is, by law, specifically vested in the Colorado Department of Transportation. Therefore, nothing contained in this memorandum shall be construed to create a contract between and among sponsors and the CDOT, a joint venture, a partnership or any agency relationship. Contracts for research binding the State of Colorado may be executed only by the Executive Director, Colorado Department of Transportation, in accordance with the law and policy of the CDOT.
- C. Notice. My notice or other communication required or permitted hereunder shall be given in writing to each of the other sponsors. Written notices of withdrawal by any sponsor, as required under Section VII, shall be sent via certified or registered mail, return receipt requested.
- D. Modification. An affirmative vote of at least two-thirds of the Board (including the Chairperson) is necessary to change this agreement. These changes do not become binding to each sponsor unless in writing and signed by their duly authorized representative. If a sponsor cannot accept the changes, it may then drop out of the Memorandum of Understanding without impacting ongoing contracts.

- E. Option Participation. This document is not intended to prevent sponsors from entering into contractual agreements on transportation studies outside the procedures established in this Memorandum of Understanding.
- F. Discrimination and Affirmative Action. The parties agree to comply with the letter and spirit of the Colorado Antidiscrimination Act of 1957, as amended, and other applicable laws respecting discrimination and unfair employment practices, and with the spirit and intent of Executive orders 11246 and 11375 regarding Equal Opportunity and Affirmative Action. The parties agree to provide equal opportunity to all applicants and employees in all terms and conditions of employment without regard to race, color, religion, sex, national origin, age, handicap, or veteran status.
- G. State Laws. The laws of the State of Colorado and rules and regulations issued pursuant thereto shall be applied in the interpretation, execution and enforcement of this Memorandum of Understanding.

The signatories hereto aver that they are familiar with C.R.S. par. 18-8-301, et seq., (Bribery and Corrupt Influences) and C.R.S. par. 15-8-401, et seq., (Abuse of Public Office), and that no violation of such provisions is present.

- H. Conflict of Interest. The signatories aver that, to their knowledge, no state employee has a personal or beneficial interest whatsoever in the arrangement described herein.

IN WITNESS WHEREOF, the sponsors have caused this Memorandum of Understanding to be signed and delivered by its duly authorized officer or representative as of the date set forth below.

Colorado School of Mines Colorado State University

University of Colorado University of Colorado-Denver

University of Southern Colorado

Colorado Department of Transportation

DATE

APPENDIX F
IOWA BASIC AGREEMENT

*AGREEMENT FOR MANAGEMENT OF RESEARCH CONDUCTED BY
IOWA STATE UNIVERSITY FOR THE IOWA DEPARTMENT OF
TRANSPORTATION*

This agreement entered into by the IOWA DEPARTMENT OF TRANSPORTATION, hereinafter referred to as the "IOWA DOT" and IOWA STATE UNIVERSITY, hereinafter referred to as "ISU," is for the purpose of providing research management support to the IOWA DOT.

ISU's Center for Transportation Research and Education, hereinafter referred to as "CTRE," will administer for the IOWA DOT the activities provided for in this agreement.

Witnesseth

WHEREAS, CTRE, an official center of ISU, will support the IOWA DOT in the management of research being undertaken by ISU for the IOWA DOT, and

WHEREAS, ISU is prepared to provide said research assistance as outlined from time to time in accordance with Section II below. Individual project scope of work and estimated cost will be attached hereto as addenda at the mutual agreement of the IOWA DOT and ISU; and

WHEREAS, the IOWA DOT and ISU desire to formally agree upon the basic terms applicable to said research projects to be performed by ISU for the IOWA DOT.

IT IS, THEREFORE, AGREED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

- I. **AGREEMENT PERIOD:** The effective date of this agreement shall be January 1, 1997. The period for performance of individual research projects conducted under this agreement shall be as agreed to in addenda to this agreement. This agreement shall continue in effect until terminated according to the provisions of Section XIV, or until the period for performance of all research project addenda have been concluded.
- II. **SCOPE OF WORK:** The objectives, scopes, and budgets for individual research projects will be stated in individual addenda to this agreement. ISU shall conduct the research described therein, shall employ the personnel necessary to carry out the work plan, and shall provide all services, facilities, equipment, supplies and materials required to complete the project, except as otherwise specifically provided in this agreement or its addenda.
- III. **TECHNICAL DATA:** Upon written request, copies of all technical data prepared in the performance of the agreement by ISU shall be delivered to the technical office of the IOWA DOT at the termination of the research. Technical data shall not include personnel records, administration files, financial reports, cost analyses, and other information incidental to agreement administration. Data from the research shall be made available to the technical office of the IOWA DOT at its request prior to the termination of each research project; however, conclusions obtained therefrom by the IOWA DOT shall not be attributed to ISU prior to submission of the final report.

IV. LIABILITY: ISU shall assume all risks in connection with the performance of its portion of this agreement and shall be responsible for all claims, demands, actions or causes of action of whatsoever nature or character arising out of or by reason of the execution or performance of the work provided herein, to the full extent permitted by Chapter 669, Code of Iowa, and the Constitution of the State of Iowa.

V. ASSIGNABILITY: Once a principle investigator or lead professional staff have been identified as a part of an approved individual Scope of Work addendum, ISU shall not replace such personnel without the prior approval of the IOWA DOT.

VI. REVIEW OF RESEARCH: The IOWA DOT reserves the right to review and observe, at all reasonable times, completed work and progress on the research covered by this agreement.

VII. REPORTS AND OWNERSHIP OF DATA

A. An abstract, not more than one page in length, shall be required for all reports containing more than five pages. The abstract shall include the conclusions and recommendations of the final report and summarize suggested or proposed implementation of the research findings.

B. Final reports shall be submitted on computer disks (or other electronic media) and in printed form. Other requirements will be identified on a case by case basis and identified in the project addendum.

C. Originals of all documents including, but not limited to computer disks, video or audio tapes, tracings, drawings, estimates, samples, specifications, field notes, investigations, studies, etc. developed by, or acquired by ISU for services under terms of this agreement are to be the joint property of the IOWA DOT, and ISU. All such material shall be retained by ISU for a reasonable period following the completion of each project. ISU shall preserve and maintain all such materials and make them readily available to the IOWA DOT for use or duplication. ISU shall not damage or dispose of such materials without the prior written approval from the IOWA DOT. Should written approval be withheld, ISU may determine to hold and maintain the materials for a longer period of time or to provide notice and deliver them to the technical office of the IOWA DOT which sponsored the research.

VIII. PUBLICATIONS OR RELEASE OF INFORMATION

A. All reports and other documents completed by ISU for distribution as part of this agreement, other than documents exclusively for internal use within ISU or IOWA DOT, shall carry the following notation on the front cover or title page containing the name of Iowa State University:

The preparation of this (report, document, etc.) was financed in part through funds provided by the Iowa Department of Transportation through its research management agreement with the Center for Transportation Research and Education.

B. Prior to acceptance of the final report by the IOWA DOT, ISU shall publish neither the final report nor any interim report, nor shall ISU register the copyright of any report, document, form or other material developed from this research project without the prior, express, written consent of the IOWA DOT. Both oral and written releases are deemed to be publications.

C. Copies of theses or dissertations, based on research performed under this agreement, shall not be classed as publications when they are distributed solely in compliance with the requirements for award of an academic degree.

- D. After acceptance of the final report by the IOWA DOT, the IOWA DOT and ISU shall be free to publish or use the data and results with the only restriction being that ISU may not register the copyright of the final report without the prior, written consent of the IOWA DOT.
- E. Publication by either party shall give credit to the other party. However, if the IOWA DOT does not wish to subscribe to the findings or conclusions of the study, the following statement shall be included on the credit sheets:

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Iowa Department of Transportation.

- F. In the event of failure of agreement between the IOWA DOT and ISU relative to the publication of any reports during the period of this agreement, each party reserves the right to publish independently upon completion and acceptance of the work provided for by an individual addendum. In the event of such failure of agreement, the nonconcurrences of the disagreeing party shall be identified and included in all publications referencing the conclusions, if requested.

IX. PROPRIETARY INFORMATION

- A. It is agreed and understood that all data, records and information of a commercial, financial or proprietary nature provided by the IOWA DOT to ISU or any subcontractor in the furtherance of this agreement shall be the sole property of the IOWA DOT, and may not be quoted, reproduced, or disseminated in any form, nor damaged or disposed of in any manner without the express written consent of the IOWA DOT. It is further agreed and understood that the provisions of 49 CFR 7, especially 7.59, regarding nondisclosure of commercial, financial, or other proprietary information collected, assembled, or otherwise utilized in the course of this agreement shall be an integral part of this agreement.
- B. It is further agreed and understood that ISU shall have the right to utilize such data as may be generated for whatever purpose ISU may want to use it, provided, such utilization is in full and complete accordance with part A of this clause and all applicable provisions of law.

- X. **PROMOTION OF PUBLICITY:** No party to this agreement shall use the name of the other for advertising, promotional or publicity purposes without the prior, express, written consent of the other.

- XI. **PATENTS:** If patentable discoveries and inventions result from a research project covered by an addendum or addenda to this agreement, all rights accruing from such discoveries or inventions shall be the sole property of the Iowa State University Research Foundation, except the IOWA DOT, agencies of the State of Iowa, and Iowa city and county governments shall have an irrevocable, nonexclusive, nontransferable, royalty-free license to practice such invention in the manufacture, use and disposition, according to law, of any article or material and in the use of any method that may be developed as a part of the work done under that research project. Wherein there are federal funds involved, the standard federal patent language will flow through to ISU.

- XII. **COMPENSATION:** The IOWA DOT shall reimburse ISU for the actual and necessary costs incurred by ISU in the conduct of the research contained in the addenda. However, total reimbursement shall not exceed the dollar amount as indicated in the addenda. Except as otherwise identified in any individual Scope of Work Addendum, the IOWA DOT shall make interim payments upon submission of claims by ISU. Final payment reconciliation shall be made when copies of all technical data, if requested as described in Section III above, have been delivered to the technical office of the IOWA DOT.

- XIII. **AUDIT:** The IOWA DOT shall have the right to audit ISU's records of expenditures made on behalf of the research. Such audit shall be made in accordance with both State of Iowa and FHWA regulations and instructions applicable on the date this agreement is signed by ISU. ISU shall maintain records, documents, and other evidence in support of all direct and indirect costs incurred for the performance of individual project addenda. ISU shall make said records available for inspection by the audit representative of the IOWA DOT at all reasonable times during the period of performance of individual addendum projects and for three years following the completion of any individual project addendum, and provide copies of accounting and cost records to the same upon request.
- XIV. **AMENDMENTS AND TERMINATION**
- A. This agreement or any individual addendum may be amended due to changes in rules, regulations or laws which conflict with any terms or Scope of Work agreed to.
- B. Any individual addendum may be terminated before the completion date by the IOWA DOT or ISU. Termination shall be effective thirty days following receipt of written notice thereof. During said thirty day period, ISU shall prepare and deliver to the technical office of the IOWA DOT a draft report summarizing the research performed to date and the results obtained to date, together with supporting data. ISU shall be reimbursed for costs incurred, including costs incurred but not yet paid, to the effective termination date.
- C. Termination of this agreement shall include consideration of each active project addendum for separate continuation or termination. Within 90 days of the termination notice, ISU shall submit a report summarizing all remaining interests and issues that require further resolution. Resolution shall be as mutually agreed to and shall include disposition of any ownership. No costs shall be associated with termination of this agreement, except as provided for by individual project addendum.
- XV. **CONTINGENT FEES:** ISU warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for ISU, to solicit or secure this agreement, and that it has not paid or agreed to pay any company or person, other than a bona fide employee working solely for ISU, any fee, commission, percentage, brokerage fee, gift, or any other consideration, contingent upon or resulting from the award or making of this agreement. For breach or violation of this warranty, the IOWA DOT shall have the right to annul this agreement without liability, or in its discretion to deduct from the agreement price or consideration, or otherwise recover, the full amount of such fee, commission, percentage, brokerage fee, gift, or contingent fee.
- XVI. **INDIRECT COSTS:** The indirect cost rate shall be consistent with HHS approved rates for the fiscal years of the agreement or as otherwise established by individual addendum provisions.
- XVII. **CIVIL RIGHTS ACT:** During the performance of this agreement, ISU, its assignees and successors in interest, shall comply with the provisions of the Title VI of the Federal Civil Rights Act of 1964.

IN WITNESS WHEREOF THE PARTIES HERETO HAVE CAUSED THIS AGREEMENT TO BE EXECUTED.

For Center for Transportation Research and
Education

For Iowa Department of Transportation

Tom Maze
Director

Date

C. Ian MacGillivray, Director
Engineering Division

Date

For Iowa State University

Richard E. Hasbrook
Contracts and Grants Officer

Date

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ADDENDUM One
to the
Agreement for Management of Research Conducted by Iowa State University
for the Iowa Department of Transportation

Project title:	
Principal investigator and project information:	
Project amount:	
Term for performance:	
Iowa DOT technical office representative and contact information:	
ISU project identification:	Iowa DOT project identification:

This addendum is issued under the authority of the Agreement for Management of Research Conducted by Iowa State University for the Iowa Department of Transportation. It is subject to all applicable provisions and covenants of that agreement which are incorporated herein by this reference.

ISU agrees to furnish and deliver all supplies and perform all services set forth in the attached Scope of Work and Budget.

Approved for
Center for Transportation Research and Education

Approved for
(Iowa DOT sponsoring division or unit)

_____ Tom Maze Director	Date	_____ <i>(Name & title)</i>	Date
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Approved for Iowa State University

Approved for
Iowa Department of Transportation

_____ Richard E. Hasbrook Contracts and Grants Officer	Date	_____ C. Ian MacGillivray, Director Engineering Division	Date
--	------	--	------

Project Title

(Suggested) Scope of Work and Budget

Background:

Objectives:

Scope:

Work plan:

Deliverables:

Key personnel:

Project schedule or time table:

Project Evaluation:

Research Implementation:

	Iowa DOT	ISU or other partner(s) (if applicable)	Total
<i>Budget:</i>			
Salaries and Fringe benefits: ¹			
Wages: Fringe benefits:			
Travel: ²			
Contracted services:			
Supplies:			
Other: ³			
Subcontracts ⁴			
Subtotal:			
Indirect cost:			
Total:			

¹ Key personnel named

² Travel must be identified and all out-of-state travel itemized and justified. No out-of-state travel will be allowed unless agreed to by this addendum or in writing prior to travel.

³ Other: telephone, photocopying, printing, equipment rental, etc.

⁴ Separate budget for named subcontractor must be included

WORK PLAN:
DEVELOPMENT SUPPORT ELEMENT
OF THE BASIC AGREEMENT BETWEEN
THE IOWA DEPARTMENT OF TRANSPORTATION AND
THE CENTER FOR TRANSPORTATION RESEARCH AND
EDUCATION

Prepared for
The Engineering Division
Iowa Department of Transportation
800 Lincoln Way
Ames, Iowa 50010

Prepared by
The Center for Transportation Research and Education
Iowa State University
2625 N. Loop Drive, Suite 2100
Ames, Iowa 50010-8615

May 9, 1997

Approval for the Center for Transportation
Research and Education

Tom Maze
Director

Approval for Iowa State University

Richard E. Hasbrook
Contracts and Grants Officer

INTRODUCTION

This document is the work plan for the Development Support Element of the Iowa Department of Transportation's basic agreement with the Center for Transportation Research and Education (CTRE). The purpose of this element is to support the Iowa Department of Transportation in the development of plans, projects, programs, and other new initiatives. This may include the development of proposals for new initiatives; performing literature reviews on new subjects; consulting with Iowa Department of Transportation staff on issues involving new technology, research, or education; and supporting the Iowa Department of Transportation's participation in research activities with the federal government, other states transportation departments, the Transportation Research Board, the American Association of State Highway and Transportation Officials, and ITS America. Tasks to be conducted under the administrative element of this agreement are identified and described below.

WORK TASKS

All work tasks under this work plan are to be conducted continuously throughout the entire fiscal year (July 1, 1997 - June 30, 1998). Additional tasks may be added through negotiation between the Engineering Division of the Iowa Department of Transportation and the director of CTRE and added at the discretion of CTRE's director. All reasonable requests for expansion of the scope will be accepted.

TASK I. PROJECT INITIATION AND STARTUP In this task CTRE staff will assist the Iowa Department of Transportation in the development of new initiative, projects, activities, and programs. This may involve developing project work plans from concepts defined by Iowa Department of Transportation professional staff and managers, developing or promoting concepts to external sponsors on the behalf of the Iowa Department of Transportation, as well as to conduct other supporting activities while research activities are still in development stages and prior to their becoming a sponsored activity.

TASK II. PROJECT TEAM BUILDING Once a research concept has been developed to a research project or program and sponsorship has been defined, the director of CTRE will develop a team of researchers to conduct the project. The most qualified team may be identified through a competition, but most teams will be developed through negotiation. Investigators consider for inclusion in a team will include faculty and staff at Iowa State University and those at other universities in the region, and staff members from the Iowa Department of Transportation, other public agencies (inside and outside of Iowa) business, industry, and consultants.

TASK III. QUICK-RESPONSE RESEARCH OF POLICY AND TECHNICAL ISSUES FOR IOWA DOT MANAGEMENT At the request of Iowa Department of Transportation management staff, CTRE staff and graduate students will perform quick-response and quick turn-around research on policy or technical issues. This may involve literature reviews, brief telephone or written surveys, and summaries of technical or policy issues. Requests to perform quick-response studies will be accepted so long as resources are available and assignments mesh with the expertise of available human resources.

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TASK IV. CTRE STAFF SERVING AS AN EX OFFICIO MEMBER ON IOWA DOT TASK FORCES AND COMMITTEES When requested, CTRE staff members will serve as ex officio members of Iowa Department of Transportation task forces and committees.

TASK V. CTRE STAFF SUPPORTING THE IOWA DOT'S INVOLVEMENT IN PROFESSIONAL AND AGENCY ASSOCIATIONS, OTHER GOVERNMENTAL JURISDICTIONS, AND PRIVATE BUSINESSES CTRE staff will support the Iowa Department of Transportation involvement in organizations like ITS Enterprise, ITS America, the American Association of State Highway and Transportation Officials, or the Transportation Research Board. This may also involve assisting the Iowa Department of Transportation in the organization of meeting and promoting joint research and demonstration initiative with other state departments of transportation, private business and industry.

MANAGEMENT PLAN

The development support element will be led by the director of CTRE, Tom Maze. Other CTRE senior staff may also participate, including Bill McCall, associate director for advance transportation technology and other as necessary. A portion of Zach Hans' time has been put on the budget because Zach current services request from the Iowa DOT in the area of GIS on an as need basis. In addition, a graduate student will assist in this element and perform other tasks.

BUDGET

The budget attached includes an overhead rate that has been reduced from the full overhead (44%) to 24.5%. The reduction is equivalent to the departmental administration portion of the overall overhead rate. The Maintenance of Core Competencies element of the Basic Agreement will bare the full overhead rate. The department of civil and construction engineering is sharing part of Maze's. It is anticipated, that one half of the graduate research assistant's salary will originate from the U.S. Department of Transportation's University Transportation Center at the University of Nebraska, the Mid-America Transportation Center (MATC).

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Personnel	BUDGET			
	Iowa DOT	CCE	MATC	Total
T.H. Maze, Director				
10% Percent for One Year	\$5,818	\$5,818	\$0	\$11,636
Fringe Benefits, 24.55%	\$1,428	\$1,428	\$0	\$2,857
Bill McCall, Associate Director				
15% Percent for One Year	\$11,916	\$0	\$0	\$11,916
Fringe Benefits, 30.8%	\$3,670	\$0	\$0	\$3,670
Reg Souleyrette, Associate Director				
15% Percent for One Year	\$5,786	\$5,786	\$0	\$11,571
Fringe Benefits, 24.55%	\$1,420	\$1,420	\$0	\$2,841
Secretary/Account Clerk				
15% for One year	\$3,750	\$0	\$0	\$0
Fringe Benefits, 39.45%	\$1,479	\$0	\$0	\$0
Graduate Research Assistant				
One Year, One Half Time	\$7,500	\$0	\$7,500	\$0
Fringe Benefits, \$625	\$313	\$0	\$313	\$0
Total Personnel	\$43,081	\$14,452	\$7,813	\$65,345
Other Direct Cost				
Copies, Supplies, Misc.	\$1,112	\$0	\$0	\$1,112
Travel	\$4,000	\$0	\$0	\$4,000
Total Direct	\$5,112	\$0	\$0	\$5,112
Total Direct	\$48,193	\$14,452	\$7,813	\$70,457
Indirect 24.5%	\$11,807	\$3,541	\$1,914	\$17,262
Grand Total	\$60,000	\$17,993	\$9,727	\$87,719

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ADDENDUM A
WORK PLAN:
ADMINISTRATIVE ELEMENT
OF THE BASIC AGREEMENT BETWEEN
THE IOWA DEPARTMENT OF TRANSPORTATION AND
THE CENTER FOR TRANSPORTATION RESEARCH AND
EDUCATION

Prepared for
The Engineering Division
Iowa Department of Transportation
800 Lincoln Way
Ames, Iowa 50010

Prepared by
The Center for Transportation Research and Education
Iowa State University
2625 N. Loop Drive, Suite 2100
Ames, Iowa 50010-8615

May 2, 1997

Approval for the Center for Transportation
Research and Education

Tom Maze
Director

Approval for Iowa State University

Richard E. Hasbrook
Contracts and Grants Officer

INTRODUCTION

This document is the work plan for the Administrative Element of the Iowa Department of Transportation's basic agreement with the Center for Transportation Research and Education (CTRE). The purpose of this element is for support and administration of activities conducted for the Iowa Department of Transportation and managed through the CTRE. Tasks to be conducted under the administrative element of this agreement are identified and described below.

WORK TASKS

All work tasks under this work plan are to be conducted continuously throughout the entire fiscal year (July 1, 1997 - June 30, 1998). Additional tasks may be added through negotiation between the Engineering Division of the Iowa Department of Transportation and the director of CTRE.

TASK I. MAINTAIN THE RESEARCH MANAGEMENT AGREEMENT To maintain the research management agreement with the Iowa DOT, CTRE will perform several subtasks. They include:

Subtask I.A Management of Agreement and Agreement Addenda This subtask involves the maintenance of the agreement and the development of agreement addenda. The agreement is to be renewed annually and CTRE develop and modify the agreement as necessary so that it may be renewed annually. CTRE will also process all agreement addenda for project principal investigators.

Subtask I.B Management of Quarterly Progress Reporting All principal investigators of projects under the management agreement will be required to complete a standard quarterly report. Standard report will ask the principal investigator to identify the progress made on each project task during the just completed quarter and ask the principal investigator to identify expected progress in the next quarter. These quarterly reports will be compiled by CTRE staff in a program wide report. The report will contain a statement by the director of CTRE summarizing the program progress made to date. The quarterly progress report will be delivered to the Engineering Division 30 day following the end of each calendar quarter. Individual project progress reports will be sent to each project's technical monitor.

Subtask I.C Principal Investigator Administrative Support CTRE will provide principal investigators with administrative assistance. This will include such activities developing appointment paperwork for graduate assistants, establishing advanced accounts, processing institutional endorsements of proposals, etc.

Subtask I.D Report Preparation Although each project budget is expected to include the costs of development of graphics and printing, CTRE will support project principal investigators with copy editing and desktop publishing of reports. CTRE will also coordinate printing and distribution of reports. All reports will also be published on the world wide web on CTRE's web site.

The director of CTRE will also be responsible for administering the Iowa Department of Transportation's research in progress disclosure requirements and the attribution of Iowa Department of Transportation sponsorship in all papers, presentation, or other scholarly media

developed as a result of the Iowa Department of Transportation sponsorship. Release of information to the popular media from research in progress will only be conducted with the written consent of the Iowa Department of Transportation. Any information released to the popular media on past research will be administered with appropriate precaution and where ever possible, will be conducted jointly with the Iowa Department of Transportation.

TASK II. MAINTENANCE OF CORE COMPETENCY The director of CTRE will support the Iowa Department of Transportation maintenance of competency in areas key to the Iowa Department of Transportation's business. For example, in 1997 the Iowa Department of Transportation, CTRE, and Iowa State University's Civil and Construction Engineering Department collaborated on the hiring and requirement of a jointly supported materials engineer. CTRE will provide support assistance to individual hire and work with the Iowa Department of Transportation to identify means to maintain competency in other key business areas. As part of this task CTRE will perform the following subtasks.

Subtask II.A Development of Competency Maintenance Work Plans For each individual charged with the maintenance of core competencies will be required to develop a work plan. The work plan will involve two elements. The first is a annual work plan identifying a plan for work activities to be conducted in the next year. The purpose for this document is to identify specific work activities for accomplishment directing the current year. The second is a three year work plan to be used a planning tool identify areas of work to be conducted within a three year period. both document will be develop and presented to the Iowa DOT's competency area technical monitor.

Subtask II.B Administrative Support for Competency Maintenance Elements CTRE will provide administrative support necessary to support the individuals charge with maintaining core competencies. For example, CTRE will provide all secretarial support, financial management, computer staff, and personel administration necessary to support the newly hired Transportation Materials Engineer.

Subtask II.C Identifying Core Areas and Development of Competency in These Areas The director of CTRE will work with Iowa Department of Transportation staff to identify areas which require the generation of competency and defining methods for developing competency in core business areas.

TASK III. ANNUAL REPORTING CTRE will prepare an annual report documenting activities conducted under the Iowa DOT's Basic Agreement and throught the Reserach Administration Agreement. The annual report may also include CTRE activities which are sponsored by other organizations other than the Iowa Department of Transportation, however, Iowa Department of Transportation sponsored projects, programs, or activities will be clearly identified. Copies of the annual report will be prepared and distributed to Iowa Department of Transportation professional staff, Iowa cities, counties, and consultants, and related organization outside of the state of Iowa.

TASK IV. NEWSLETTER CTRE will publish a semiannual newsletter. The focus of the newsletter will be to publicize activities taking place under the basic agreement and the umbrella agreement, however, the newsletter may cover broader topic. For example, the newsletter may

ADMINISTRATIVE ELEMENT BUDGET

	Iowa DOT	ISU	CCE	Total
Personnel				
Tom Maze, Director				
20% for One Year	\$7,600	\$7,600	\$7,600	\$22,800
Fringe Benefits, 24.55%	\$1,866	\$1,866	\$1,866	\$5,597
Jan Graham, Assistant to the Director				
35% for One Year	\$7,006	\$7,006	\$0	\$14,012
Fringe Benefits, 30.8%	\$2,158	\$2,158	\$0	\$4,316
Marcia Brink, Publications Editor				
25% for One Year	\$4,422	\$4,422	\$0	\$8,843
Fringe Benefits 30.8%	\$1,362	\$1,362	\$0	\$2,724
Sharon Prochnow, Office Manager/Coordination				
30% for One Year	\$4,662	\$4,662	\$0	\$9,323
Fringe Benefits 30.8%	\$1,436	\$1,436	\$0	\$2,872
Vicki Gray, Secretary to the Director				
50% for one Year	\$7,258	\$7,258	\$0	\$14,515
Fringe Benefits, 39.45%	\$2,863	\$2,863	\$0	\$5,726
Pam McColley, Computer support				
10% for one year	\$2,912	\$0	\$0	\$2,912
Fringe Benefits 30.8%	\$897	\$0	\$0	\$897
Total Personnel	\$44,440	\$40,631	\$9,466	\$94,537
Other Direct Costs				
Travel	\$0	\$9,369	\$0	\$9,369
Copies, Printing, Postage, Supplies	\$3,753	\$0	\$0	\$3,753
Total Other Direct Costs	\$3,753	\$9,369	\$0	\$13,122
Total Direct	\$48,193	\$50,000	\$9,466	\$107,659
ISU Indirect, 24.5%	\$11,807	\$12,250	\$2,319	\$26,376
Grand Total	\$60,000	\$62,250	\$11,785	\$134,035

APPENDIX G

WASHINGTON STATE INTERAGENCY AGREEMENT

INTERAGENCY AGREEMENT

Washington State Transportation Center
at the
University of Washington
and
Washington State University

Pursuant to Chapter 39.34 RCW (Interlocal Cooperation Act), this Agreement is entered into by and between the UNIVERSITY OF WASHINGTON, hereinafter referred to as the UW under the authority of Chapter 28B.20 RCW; WASHINGTON STATE UNIVERSITY, hereinafter referred to as WSU, under the authority of Chapter 28B.30 RCW; and the WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, hereinafter referred to as WSDOT, under the authority of Chapter 47.01 RCW.

Witnesseth

WHEREAS, WSDOT, UW and WSU joined in a written agreement in March 1981, to establish the Washington State Transportation Center (TRAC) on the campus of UW to bring together the resources and capabilities of the two institutions of higher education with those of WSDOT, the Washington State Legislature and other appropriate institutions and organizations to bear on all aspects of transportation research,

WHEREAS, TRAC is instrumental in meeting the research needs of WSDOT,

WHEREAS, TRAC provides opportunities for the faculty, staff and students of UW and WSU to gain important knowledge and experience in transportation research,

WHEREAS, TRAC enhances the research programs of WSDOT, UW and WSU, and provides opportunities for WSDOT employees to expand their knowledge and training in transportation matter,

WHEREAS, the June 16, 1983, WSDOT Final Report on Research Program Review recommended an expansion of TRAC and revision of its role within WSDOT's research and development activities,

WHEREAS, WSDOT, UW and WSU have entered into revised INTERAGENCY AGREEMENTS in 1983 and subsequent years, each of which superseded the preceding agreement,

WHEREAS, WSDOT, UW and WSU have mutually agreed to certain revisions represented by this new agreement,

NOW, THEREFORE, all parties hereto agree as follows:

ARTICLE I
THE WASHINGTON STATE TRANSPORTATION CENTER

The WASHINGTON STATE TRANSPORTATION CENTER (TRAC) will hereafter operate under the terms and conditions of this Agreement which cancels and supersedes Agreement Y-2292, dated March 1981, Agreement Y-2811, dated September 1983, Agreement Y-3591, dated December 1985, agreement GC8295 dated July 1, 1987, Agreement 9230 dated July 1, 1991, and Agreement 9904 dated July 1, 1993, except for the Task Orders under Agreements Y-2811, Y-3399, Y-3400, GC8286, GC8287, GC8719, GC8720, GC9233, GC9234, GC9902, and GC9903, which are incorporated as part of this agreement by reference and made subject to the terms of this agreement. The organization structure is shown in Figure 1, attached hereto.

ARTICLE II
PURPOSE

TRAC brings together the resources and capabilities of UW, WSU, WSDOT, the Washington State Legislature and other appropriate institutions and organizations in a cooperative program of basic and applied research related to the full range of transportation systems and issues. This research will include, but not necessarily be limited to, investigations with respect to administration and management; design and construction; operations and maintenance; planning and programming; and the environmental, social and economic effects of transportation systems. The objective of this type of research is to provide for effective, efficient, safe, and energy conserving transportation of persons and

goods. TRAC will provide technology transfer, training, continuing education and technical assistance for a full range of transportation systems and issues.

ARTICLE III
MEMBERSHIP

Membership in TRAC will include UW, WSU, and WSDOT. Other organizations may be admitted to membership if unanimously approved by the Operations Committee (defined below) and subject to any terms it specifies.

ARTICLE IV
TRANSPORTATION RESEARCH OPERATIONS COMMITTEE

TRAC shall have an Operations Committee, consisting of the Principal Research Officers of the UW and WSU, and the Secretary of WSDOT, or their designates. The Division Administrator of FHWA will participate as ex-officio members of the Operations Committee. The Operations Committee shall provide policies and oversight for the budget, operation, support and administration of TRAC and shall select the Executive Director. The Secretary of Transportation will permanently chair the Operations Committee.

ARTICLE V
EXECUTIVE AGENT

UW will serve as Executive Agent for TRAC and thus employ or arrange for the employment of its UW Director and staff, submit its research proposals and accept its awards, issue its subcontracts, and provide its accounting and budget monitoring systems, all within the uniformly applied policies and procedures of UW.

WSU shall act as agent for projects where its faculty are principal investigators. As agent WSU shall submit proposals and accept awards, issue subcontracts, and provide its accounting and budget

monitoring systems, recruit and hire personnel, including a WSU Director in accordance with Article VI, all within the uniformly applied policies and procedures of WSU.

Any proposed change of executive agent will be considered by the Operations Committee and its recommendations will be transmitted to the appropriate authorities at the universities for subsequent action.

ARTICLE VI EXECUTIVE DIRECTOR

The Executive Director of TRAC will be appointed by the Operations Committee. The overall organization structure is shown in Article I, Figure 1. The person holding this position will divide his/her time between Seattle, Olympia and Pullman and in the field so as to effectively interact with faculty, WSDOT employees and persons in other public organizations and the private sector involved in the WSDOT or TRAC research programs. As to TRAC, the Executive Director shall:

1. Nominates TRAC Directors, in consultation with the Administrative Boards of the respective universities, and consistent with the policies and procedures of the Executive Agents or other employing organization;
2. Coordinates the programs and various interactions within and through TRAC so as to assure that they achieve the greatest possible mutual benefit, produce a balanced overall effort, and eliminate unnecessary duplication of activity;
3. Maintain and safeguard the official records of TRAC, including policy statements, resolutions and other appropriate documents;
4. Interact with the WSDOT management in planning and conducting the WSDOT Research Program.
5. Appoint representatives to act on his or her behalf to various Boards, Committees, and similar groups.

6. The Executive Director may be designated from any of the three parties to this agreement (UW, WSU, and WSDOT). The position will be a part-time activity for the designated individual.

ARTICLE VII DIRECTORS

Directors at UW and WSU will be selected by the Executive Director, with the concurrence of the TRAC Administrative Boards for their respective universities, and approved by the Operations Committee. The persons holding these positions will perform the following functions:

1. Direct the day-to-day operations of the TRAC offices at their respective Universities to include fiscal affairs and personnel actions.
2. Interact with the Principal Investigators working through the appropriate TRAC office on matters relating to research management.
3. Interact with the university community, as appropriate, on matters of broad transportation oriented research.
4. Seek to develop sources of funding beyond the WSDOT research program to diversify the topics and funding base.
5. The Directors will have authority to sign TRAC research contracts at their respective Universities. At WSU, the Director must have the concurrence of the Vice Provost for Research.

ARTICLE VIII
ADMINISTRATIVE BOARDS

Administrative Boards will be created at both UW and WSU to oversee the local operation of the TRAC offices, and to provide University management oversight and advice into transportation research and related matters. The composition of the Administrative Board will include but not be restricted to:

- TRAC Executive Director
- TRAC Director (UW or WSU)
- WSDOT Research Director
- Dean, College of Engineering (or designated representative)
- Vice Provost for Research (or designated representative)

Appointment of additional members to the Administrative Board at either of the Universities must be approved by a majority of the existing Administrative Board for that University.

The Administrative Boards shall provide policies, oversight, assistance and support for the specific, local TRAC office not otherwise under the authority of the Operations Committee.

ARTICLE IX
AREAS OF RESEARCH AND ACTIVITIES

The overall objectives common to all research areas are to provide technical assistance and training, technology transfer and research implementation. The TRAC research effort should be focused on the following activities, but shall not be limited to these alone:

1. Bridge and Structures
2. Construction and Materials
3. Planning and Multimodal
4. Design and Environment
5. Intelligent Transportation Systems (ITS)
6. Maintenance
7. Marine

8. City and County Transportation

TRAC may engage in other related activities within the general guidelines approved by the Operations Committee. The following activities support TRAC's objectives:

1. Encouragement of research through such means as: (1) seed money grants and research assistance to develop potential projects: (2) conferences between faculty resources and potential clients or users: (3) liaison with federal and state funding agencies: and (4) administrative assistance in proposal preparation, review and management.
2. Administration of research grants and contracts in all areas of transportation.
3. Publication of research results and research needs, and discussions of transportation issues through a newsletter and/or research reports.
4. Enhancement of knowledge and training through the use of conferences, workshops and continuing education.

ARTICLE X
FACILITIES

Space will be made available by UW for the TRAC Executive Director's and Director's office, staff and graduate students as required by administrative program needs consistent with UW policy. Space will be provided in Olympia by WSDOT for a TRAC Executive Director's office and required support staff. Both UW and WSU will provide, or arrange for, the necessary space to conduct the research programs and projects proposed by them to be carried out through TRAC with funding from WSDOT and other sponsors.

ARTICLE XI
BIENNIAL COMMITMENTS

In addition to this Agreement, each biennium an Addendum will be negotiated between UW, WSU and WSDOT to provide specific commitments of funding, staff, faculty, schedules, space, programs, training, and other appropriate TRAC related items. The purpose of the addendum is to provide program continuity and management review.

ARTICLE XII
FUNDING

TRAC will participate in WSDOT's research program and other agency- and State-sponsored research, planning, and training programs as identified in the Addendum. The actual dollar amounts will be determined after approval of the research program and other budgets by the WSDOT Secretary of Transportation.

TRAC will match needs with resources and seek broad financial support for research. TRAC will use such resources as provided by the UW, WSDOT, WSU, the legislature, and other sources both public and private. In-kind services, in the form of office space, equipment, staff assistance, and professional, technical and student services are recognized as substitutes for funds.

In addition, TRAC will seek other funding to provide continuity between projects from year to year. This funding will be utilized to pay salaries for the Directors, administrative staff, graduate students (Research Assistants), revolving fund, travel, equipment, and other miscellaneous items required to operate the Center exclusive of funded projects.

The sustaining funds will be sought from several sources, including:

1. The Legislative Transportation Committee
2. Overhead sources paid by WSDOT to UW and WSU
3. Any present or future legislation provided for direct funding from Federal funds

4. Any present or future legislation provided for direct funding from State General Funds
5. Any other relevant sources.
6. WSDOT awards will provide for recovery of direct and indirect cost by UW and WSU consistent with their policies.

The Office of Management and Budget Circular A-102 uniform requirements for assistance to state and local governments and Circular A-110 relating to university involvement, determine and establish the definitions and applicable standards for this Agreement and payment hereunder, and by this reference are incorporated hereby and made a part of this Agreement for all intents and purposes as if fully set forth herein. Applicable minimum cost principles are specified in 48 CFR Part 31.

The parties to this Agreement shall not proceed with any items of work under this Agreement until receipt of a fully executed task order document for specific items of work.

ARTICLE XIII CIVIL RIGHTS

It is agreed that all activities undertaken by TRAC shall comply with Title VI of the Civil Rights Act of 1964, as amended, 49 CFR Part 21 and related statutes and regulations as stated in 23 CFR Part 200.

ARTICLE XIV PERIOD OF AGREEMENTS

This Agreement is effective upon execution by all parties, and will remain in effect through June 30, 1999, with the mutual agreement of the parties it may be extended periodically thereafter. This Agreement may be terminated at any time by mutual agreement of the parties, and by any party upon ninety (90) days written notice to the other parties.

IN WITNESS WHEREOF the parties hereto have executed this Agreement this 1st day of July 1997.

Concurrence:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

By: 7/17/97 
Date Signature

Sid Morrison
Typed Name

Secretary of Transportation
Title

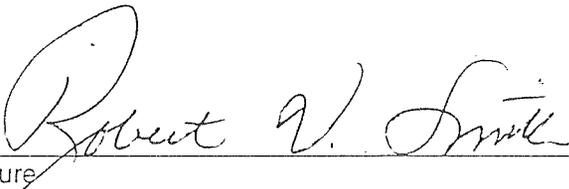
UNIVERSITY OF WASHINGTON

By: 7-7-97 
Date Signature

Alvin L. Kwiram
Typed Name

Vice Provost for Research
Title

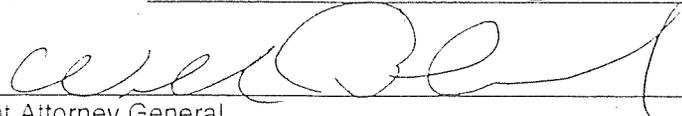
WASHINGTON STATE UNIVERSITY

By: 6/27/97 
Date Signature

Robert V. Smith
Typed Name

Vice Provost for Research and Dean of the Graduate School
Title

Approved as to form June 23 1997.


Assistant Attorney General

1997-99 BIENNIAL ADDENDUM
TO INTERAGENCY AGREEMENT FOR THE
WASHINGTON STATE TRANSPORTATION CENTER (TRAC)

This addendum outlines the specific commitments made to TRAC by the UW, WSU and WSDOT for the 1997-99 biennium (July 1, 1997, through June 30, 1999).

PART A — UNIVERSITY OF WASHINGTON

1. The UW will make available Mr. Mark E. Hallenbeck for a period of two years to be Director of TRAC at UW as defined in Article VII, subject to Article VI, Item 1, for an annualized commitment of at least 33 percent of his time to provide oversight of the UW TRAC operations. Mr. Hallenbeck will direct the UW TRAC office staff and be responsible for the production of the TRAC biennial report, the TRAC newsletter, and the progress reports for both the UW and WSU. In addition, he will help WSDOT identify the appropriate UW and WSU faculty to perform WSDOT research, assist UW and WSU faculty in the identification of potential WSDOT (or other) sponsors that might fund promising transportation research, and provide guidance and council to WSDOT for the continued development of their research program. The UW shall be reimbursed by WSDOT for these direct salary and benefit costs but not indirect costs. Normal university overhead will apply for specific research contracts where the Director has direct charges.
2. The UW will arrange for office space for the Executive Director and Director, staff and graduate students according to University Policy.
3. Under the approval by OFM which allows the UW to return to its schools and colleges part of the indirect cost recovered on sponsored projects, the UW will return some indirect cost recovery to TRAC in accordance with UW policies.
4. From indirect cost recovery or other sources, the UW will provide a cash contribution for TRAC administration totaling \$30,000/year. This shall not be used for the Director's salary.

WSDOT Copy

5. The UW will apply its off-campus indirect cost rate (does not include facility related costs) to TRAC's administration budget funded by WSDOT, the Legislative Transportation Committee or other State agencies. In this context, "administration budget" means TRAC overhead costs not charged to funded projects. For project activities, the UW indirect cost rates for on-campus and off-campus activities shall apply, as appropriate, under UW policy.
6. The UW shall coordinate a continuing involvement of WSDOT staff and others in UW seminars. This would be done by the WSDOT staff working with faculty and staff at the UW on specific seminars and classes.
7. The UW will provide periodic information to TRAC on seminars, short courses, lectures, etc.
8. The UW plans to provide continuing education classes based on the cost to provide those services or on established University rates as negotiated.
9. The UW may provide opportunities for qualified WSDOT and local personnel to teach classes ranging from a single lecture to an entire class — normal compensation (zero to a few thousand dollars) would be provided by the UW, with prior approval of the appropriate Department chairs.
10. It is not the intention of this addendum to authorize and work or the expenditure of any funds. The statements herein are for the information of, and action by, the signatories to the Interagency Agreement.

PART B — WASHINGTON STATE UNIVERSITY

1. WSU will make Dr. Rafik Y. Itani available for a period of at least two years to be Director of TRAC at WSU as defined in Article VII, subject to the terms of Article VI, Item 1.
2. WSU will provide office space for the Director. This space will be provided at no direct charge by WSU.

3. WSU will arrange university wide meetings for TRAC to solicit information on research interests and capabilities for TRAC and WSDOT.
4. WSU will provide periodic information to TRAC on seminars, short courses, lectures, etc.
5. WSU will provide a cash contribution totaling \$30,000/year. Depending on the availability of University resources, the participating departments will assist with the travel needs of their faculty members who will be presenting papers at the annual TRB meetings in Washington, D.C. Shared funding is for the 1997-99 biennium.
6. WSU will participate in continuing education classes based on the Education Services Agreement.
7. It is not the intention of this addendum to authorize any work or the expenditure of any funds. The statements herein are for the information of, and action by, signatories to the Interagency Agreement.

PART C — WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

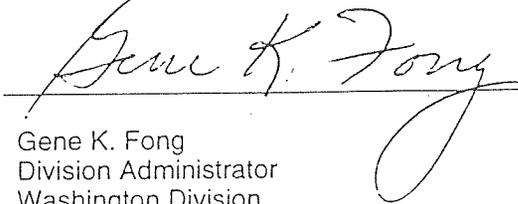
1. WSDOT will make available Mr. Martin D. Pietz for a period of two (2) years to be the Executive Director of TRAC subject to the terms of Articles IV and VI. This will constitute a part-time activity (approximately 25 percent) for Mr. Pietz.
2. WSDOT will contribute to the administrative costs of TRAC each biennium and these funds will be budgeted by the TRAC Executive Director and approved by the Operations Committee. This amount shall not exceed \$60,000 per annum, matching the funds contributed by UW the WSU, respectively.
3. WSDOT will provide seminar leaders or instructors for research seminars or classes that may be given under TRAC sponsorship, and also encourage attendance and participation by staff of the Department at these and other seminars.
4. WSDOT will encourage members of its technical staff to seek higher education opportunities and, in doing so, participate directly in TRAC research projects.
5. WSDOT's Research Office will support the activities of TRAC when the need arises in Olympia.

6. WSDOT will, as appropriate, make the facilities and staff of WSDOT Materials Laboratory and other units available for TRAC research projects.
7. It is anticipated that at least 60 percent of WSDOT research funds available for research projects will be administered through TRAC. For the current biennium, the preliminary amount assigned to TRAC projects is in excess of \$4,000,000.
8. WSDOT will work with TRAC to initiate a process which will allow all participants to this Agreement equal opportunity in research proposal development and subsequent project selection.
9. WSDOT will endeavor to finalize research project selection far enough in advance to allow the universities to appoint necessary faculty, students, and other staff within the necessary academic time frame.
10. WSDOT may, through TRAC, obtain the services of university faculty and other staff to assist in the development and operation of its technology transfer program.
11. WSDOT will make available its Technical Library in support of research projects and other TRAC activities.
12. It is not the intention of this addendum to authorize any work or the expenditure of any funds. The statements herein are for the information of, and action by, the signatories of the Interagency Agreement.
13. The terms of this Agreement and addenda must conform to the policies, procedures and requirements of FHWA and such conformity will be verified by an attached statement to that effect, signed by the Division Administrator of FHWA.

WASHINGTON STATE TRANSPORTATION CENTER
FEDERAL HIGHWAY ADMINISTRATION ENDORSEMENT

The Federal Highway Administration (FHWA) endorses the Washington State Transportation Center (TRAC) as instrumental in meeting the research needs of the Washington State Department of Transportation (WSDOT). FHWA supports the WSDOT research program by annually approving a work program (funding) and individually approving projects. TRAC is instrumental in producing research and reports which meet the objectives approved by WSDOT and FHWA for the individual projects. As a catalyst, TRAC also encourages funding and support of highway research which is in addition to the regularly apportioned Federal-aid highway research funds.

Approved:



Date: 7/21/97

Gene K. Fong
Division Administrator
Washington Division
Federal Highway Administration
Olympia, Washington

WSDOT Copy

IN WITNESS WHEREOF the party hereto has executed this 1997-99 Biennial Addendum to the TRAC Interagency Agreement GCA0938.

Concurrence:

UNIVERSITY OF WASHINGTON

By: 7-7-97 _____
Date Signature

Alvin L. Kwiram _____
Typed Name

Vice Provost for Research _____
Title

WSDOT Copy

IN WITNESS WHEREOF the party hereto has executed this 1997-99 Biennial Addendum to the TRAC Interagency Agreement GCA0938.

Concurrence:

WASHINGTON STATE UNIVERSITY

By: 6/27/97 Robert V. Smith
Date Signature

Robert V. Smith
Typed Name

Vice Provost for Research and Dean of the Graduate School
Title

WSPOT Copy

IN WITNESS WHEREOF the party hereto has executed this 1997-99 Biennial Addendum to the TRAC Interagency Agreement GCA0938.

Concurrence:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

By: 7/17/97 Sid Morrison
Date Signature

Sid Morrison
Typed Name

Secretary of Transportation
Title

Approved as to form June 23, 1997.

[Signature]
Assistant Attorney General

WSDOT Copy

APPENDIX H
WASHINGTON STATE BASIC AGREEMENT

BASIC AGREEMENT

THIS AGREEMENT, made and entered into this 30th day of June, 1993, between the State of Washington, Department of Transportation, acting through the Secretary of Transportation, hereinafter called the "State," and the University of Washington through the Washington State Transportation Center (TRAC), hereinafter designated as the "Research Agency."

WHEREAS, the Research Agency has the qualified personnel able to conduct Transportation Research and,

WHEREAS, the State desires the Research Agency to conduct specified Research Tasks,

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein or attached as exhibits and incorporated and made a part hereof, the parties hereto agree as follows:

Section I Coordination of Contract Documents

The execution of this Basic Agreement shall not in any manner provide for or imply any agreement on the part of the State to assign any specific number of Research Tasks to the Research Agency.

A Task Order (Exhibit A) shall be issued separately for each Research Task assigned to the Research Agency.

The provisions of this Basic Agreement, Task Orders, and Research Agency's Proposals for research are intended to be mutually complementary. In case of any discrepancy between provisions, the Basic Agreement shall prevail over the Task Order and the Task Order shall prevail over the Research Proposal.

Section II Purpose, Scope, and Methods

The purpose, scope of work, and the method of study for a Research Task shall be as described in the Task Order.

Section III Reports

The Research Agency shall submit to the State copies of a narrative progress report as specified in the Task Order. Report format and reporting period will be as prescribed by the State. The report is to be concise but in sufficient detail to enable an evaluation of the progress of the Research Task.

A final report of the findings and results of the research, including interim and task reports which provide documentation of technical data and their analysis, shall be prepared by the Research Agency. As a requirement for fulfillment of the Task Order, the Research Agency shall furnish to the State the number of copies of the draft and approved final report as specified in the Task Order. Interim reports, working papers, manuals, and other items are to be submitted as required in the Task Order. The "WSDOT Research Report Requirements" shall be used by the Research Agency as a guide for writing final and interim reports and working papers (Exhibit B).

Section IV Term

The term of this Basic Agreement shall be continuous through June 30, 1995, or until a written notice of termination has been issued, whichever occurs first. The term of this Basic Agreement may be extended upon the mutual, written consent of the State and the Research Agency.

Research Tasks, final and other reports and items pertaining thereto shall be completed on the date specified in the Task Order.

Section V Cost

The total aggregate amount authorized for payment through the Task Orders during the term of this Basic Agreement shall not exceed Four Million (\$4,000,000) Dollars.

The estimated cost for each Task Order shall be specified by major budget category and the total price in the approved project proposal. The Research Agency shall notify the State of any changes in the cost of major budget categories when such changes may affect the performance and/or product of a task. The State may request a revised budget at its discretion. No notice is required for budget adjustments made for close out and final billing of a Task Order.

Any claim for a change in the total price of this Basic Agreement or a Task Order shall be in accordance with Section XVI and issued as an amendment.

Section VI Payment

Payment to the Research Agency shall be as specified in the Task Order and will be for actual direct costs and related indirect costs incurred in the performance of the work and services authorized. The Research Agency shall use their approved accounting practices and procedures for determining salaries and wages that are charged to a Task Order. Labor and associated costs shall be in general conformance with the progress of the work; if this is not the case, the State may stop payment to the Research Agency until the progress improves to the State's satisfaction.

Reimbursement for indirect overhead attributable to a study will be made in an amount not to exceed the percent of the direct costs specified in the Task Order. The indirect costs authorized shall be in accordance with the current "Federal Rate Agreement for Colleges and Universities" on file at the Research Agency. Reimbursement shall be limited to the maximum amount authorized by the Task Order.

The Research Agency shall pay all costs incurred in conducting a Research Task and shall be reimbursed upon approval by the State of the Research Agency's billings. Claims for reimbursement shall be supported by the Research Agency's records. Invoices detailing the charges and expenses by major budget category incurred shall be submitted to the State for payment as specified in the Task Order. Progress billings shall be identified by the word "Progress." The final billing shall be identified by the word "Final." Audits will be made in accordance with current State Law and Federal OMB Circular A-128.

Section VII Source of Funds

Unless otherwise indicated in the Task Order, funds made available under 23 U.S.C. Section 120, with the appropriate proportion of State matching funds, will be used in payment.

Section VIII Subcontracting

The services of the Research Agency are to be directed by the Principal Investigator identified in the Task Order. The Research Agency shall not assign, subcontract, or transfer any of the work other than as specified in the approved Task Order without written approval from the State.

The Research Agency shall comply with all Federal and State laws and regulations, including Title 6, Civil Rights Act of 1964 (Exhibit C), that pertain to the work being performed and including affirmative action when retaining a subconsultant.

Section IX Patent and Invention Rights

Should patentable discoveries or inventions from work described herein, the Research Agency shall maintain effective procedures to adhere to the provisions of Public Law 96-517 and the implementing regulations of Circular A-124, including but not limited to the following:

1. The Research Agency may elect to retain title to any invention conceived or first reduced to practice by Research Agency personnel in the course of work performed under this Agreement.
2. The State and the U.S. Government reserve a nonexclusive, nontransferable, paid-up license for the practice of any such invention in the United States, its territories, and throughout the world.
3. The Research Agency shall include the following statement in the second paragraph of the specification of the application for any patents issued on a subject invention: "The United States Government and the State of Washington have rights in this invention pursuant to the Agreement between the University of Washington and the Washington State Department of Transportation dated this ____ day of _____, 19 ____."
4. The Research Agency shall provide the State with a list of all subject inventions or certification that there were no such inventions at the time of filing the final report as required by this Agreement.

Section X Inspection of Work

The State and the Federal Highway Administration shall at all times be accorded proper facilities for review and inspection of the work hereunder and shall at all reasonable times have access to the premises, to all data, notes, records, computer programs, correspondence, instructions, and memoranda of every description pertaining to the work hereunder.

Section XI Records

The State will exercise general supervision over each Research Task. The Research Agency shall maintain accounting records and other evidence pertaining to the cost incurred on each Research Task. These records will be made available for inspection by the State, Federal Highway Administration, or any authorized representative of the Federal Government at all reasonable times at the office of the Research Agency. The minimum retention time of these records shall be in accordance with the U.S. Department of Transportation, Federal Highway Administration Common Rule 49CFR18 and/or the Research Agency's Federal Auditor approved policy and procedures on record retention. Copies thereof shall be furnished if requested.

Section XII Ownership of Data

The ownership of the data collected under a Task Order, together with computer programs, summaries, and charts derived therefrom, shall be vested in the State.

Section XIII Equipment and Instrumentation

All apparatus and equipment purchased or manufactured for which reimbursement is sought shall be used exclusively on an assigned Research Task and shall remain the property of the State; however, the Research Agency shall be the custodian and will be responsible for maintaining current inventories of nonexpendable items until disposition has been made by the State.

The Research Agency shall comply with all Federal and State laws and regulations, including Title 6, Civil Rights Act of 1964 (Exhibit C), that pertain to affirmative action when purchasing materials, supplies, and equipment for a Research Task.

All Major items of equipment and apparatus for which reimbursement is sought and which are not identified specifically and approved as part of the Task Order require written approval by the State prior to purchase. A major equipment or apparatus item is one costing \$1,000 or more and has a life expectancy of one year or more.

The Research Agency shall maintain an inventory of all major equipment or apparatus items. The inventory shall also include "small and attractive" nonexpendable equipment items with an acquisition cost less than \$1,000, as specified in O.F.M. A88-09, 3.1.2.2.6 (7-88).

A complete inventory of all nonexpendable equipment and apparatus acquired by the Research Agency for research and other assigned tasks shall be submitted to the State on or before July 1 of each year until notice of disposition has been issued. The following shall be furnished for each inventory item: (a) item name, (b) date of acquisition or manufacturer, (c) serial number, (d) make/model identification, (e) Research Agency's identification number, if different than "C," (f) physical location, and (g) total cost.

Upon completion of a research task, arrangements for the equipment's further use on approved research or for its disposal will be made by the State.

Section XIV Travel

Any out-of-state travel which is not identified specifically, by purpose or event, date and location, in the approved Task Order, must have prior written approval of the State to be eligible for reimbursement. Current State travel regulations and rates shall apply to all in-state and out-of-state travel for which reimbursement is claimed during the term of the Task Order.

Section XV Publication

The Research Agency shall, after acceptance and publication of the final report for a Research Task, be free to copyright any material, including computer software, that is a part of a Research Task, with the provision that the State and the Federal Highway Administration reserve a royalty-free, non-exclusive and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, the material for government purposes.

The Research Agency shall not release, either orally or in writing, information or other material developed during a Research Task prior to publication of the final report except with written or verbal approval of WSDOT. However, there is no intention to limit discussions of the Research with small informal technical groups or lectures to employees or students. Lectures to other groups that describe the plans but disclose neither data nor results are permissible without advance approval by WSDOT.

Nothing in this Agreement shall be construed to affect the preparation and filing of theses by students working on a Research Task in accordance with the practices normally followed or required by Research Agency regulations.

All reports published shall contain the following statement on the Credit Sheet: "The contents of this document reflect the views of the author(s), who is (are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Transportation Commission, Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification or regulation."

The final document must include one of the following statements, depending on the funding source, on the cover or frontispiece:

Prepared for
Washington State Transportation Commission
Department of Transportation

or

Prepared for
Washington State Transportation Commission
Department of Transportation
and in cooperation with
U.S. Department of Transportation
Federal Highway Administration

The state will notify the Principal Investigator of which statement to use prior to delivery of the reports.

Section XVI Amendment

The Task Order may be amended to extend the term, change the cost, or to change the area of topics or phases designated for a Research Task. Amendments will be mutually agreed upon in writing prior to undertaking any work under the changes or incurring additional costs. No amended or actual change to the Basic Agreement or a Task Order shall be made by any

individual employed by the Research Agency or the State without an approved Agreement/Task Order Modification.

Section XVII Termination of Contract

If it is considered to be in the best interests of the State, the State may terminate this Basic Agreement upon giving thirty (30) days' notice in writing to the Research Agency. The Research Agency may also terminate this Basic Agreement by giving thirty (30) days' notice in writing to the State. Upon termination of this Basic Agreement, all Task Orders shall be automatically terminated.

The term of each Research Task issued under this Basic Agreement shall be specified in the Task Order agreement. Should a Task Order be terminated prior to fulfillment of the terms stated therein, the Research Agency shall be reimbursed only for actual expenses and noncancelable obligations, both direct and indirect, incurred to the date of termination.

Section XVIII Legal Relations

The Research Agency shall comply with all Federal, State, and Local Laws and Ordinances applicable to the work to be done under this Basic Agreement and Task Orders issued, as allowed by State of Washington statute. The Research Agency shall also comply with Title 6, Civil Rights Act of 1964 (Exhibit C).

Each party to this Basic Agreement shall be responsible for damage to persons or property resulting from the negligence on the part of itself, its employees, its agents, or its officers. Neither party assumes any responsibility to the other party for the consequences of any act or omission of any person, firm, or corporation not a party to this Agreement.

Section XIX Exhibits

Exhibit A. Task Order

Exhibit B. WSDOT Research Report Requirements

Exhibit C. Title 6, Civil Rights Act of 1964

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

UNIVERSITY OF WASHINGTON

By *Donald W. Allen* JUL 16 1993
Donald W. Allen, Director
Grant And Contract Services

STATE OF WASHINGTON
WASHINGTON STATE DEPARTMENT OF
TRANSPORTATION

By *James P. Toohey*
JAMES P. TOOHEY
Assistant Secretary
Transit, Research, and
Intermodal Planning

WASHINGTON STATE TRANSPORTATION
CENTER (TRAC)

By *Mark Hallenbeck*
Mark Hallenbeck
Director

Approved as to form

June 30, 19 *93*
By *[Signature]*
Assistant Attorney General

GC9903
T9903-00

WSDOT Copy

APPENDIX I
WASHINGTON STATE TASK ORDER

RESEARCH TASK ORDER			Page _____ of _____
TASK ORDER NO.	IDENTIFICATION NO.	ACTIVE DATE	
BASIC AGREEMENT NO.		TERM Previous _____ New _____	
PROJECT TITLE		ESTIMATED COST	
PRINCIPAL INVESTIGATOR (name, phone)		RESEARCH AGENCY	
PROJECT MANAGER (name, phone)		TECHNICAL CONTACT (name, phone)	
<p>CONSIDERATION AND PAYMENT</p> <p>THE RESEARCH AGENCY AGREES TO PERFORM ALL THE SERVICES SET FORTH IN THE ATTACHED PROPOSAL FOR THE CONSIDERATION THEREIN, WHICH BY THIS REFERENCE BECOME A PART OF THIS TASK ORDER AGREEMENT. THE OBLIGATIONS AND RIGHTS OF THE PARTIES TO THIS AGREEMENT SHALL BE SUBJECT TO AND GOVERNED BY THIS TASK ORDER AGREEMENT AND THE BASIC AGREEMENT.</p> <p><input type="checkbox"/> THE ATTACHED "SPECIAL PROVISIONS" BY THIS REFERENCE BECOME A PART OF THIS TASK ORDER AGREEMENT. <input type="checkbox"/> COMPLETION DATE: ORIGINAL _____ REVISED _____</p> <p>THE STATE AGREES TO REIMBURSE THE RESEARCH AGENCY FOR ACTUAL DIRECT COSTS AND RELATED INDIRECT COSTS AS SPECIFIED IN THE FOLLOWING SCHEDULE:</p> <p><input type="checkbox"/> TOTAL REIMBURSEMENT FOR DIRECT AND INDIRECT COSTS SHALL NOT EXCEED \$ _____ <input type="checkbox"/> THIS MODIFICATION <input type="checkbox"/> INCREASES <input type="checkbox"/> DECREASES THE TOTAL FUNDS FOR THIS TASK ORDER BY \$ _____ <input type="checkbox"/> REIMBURSEMENT FOR RELATED INDIRECT COSTS SHALL NOT EXCEED _____ PERCENT OF THE ALLOWABLE DIRECT COST CHARGEABLE TO THE PROJECT. <input type="checkbox"/> BILLINGS DETAILING CHARGES AND EXPENSES INCURRED SHALL BE SUBMITTED FOR PAYMENT _____ <input type="checkbox"/> THE FINAL BILLING MUST BE IDENTIFIED BY THE WORD "FINAL" <input type="checkbox"/> OTHER FINANCIAL REQUIREMENTS SPECIFIED IN SPECIAL PROVISION(S) NO. _____</p>			
<p>EXAMINATION OF TASK ORDER</p> <p>THIS TASK ORDER AGREEMENT MAY BE TERMINATED BY THE STATE OR THE RESEARCH AGENCY BY GIVING _____ DAYS NOTICE IN WRITING.</p>			
<p>DELIVERABLES</p> <p><input type="checkbox"/> PROGRESS REPORT: _____ COPIES, DUE DATE: _____ <input type="checkbox"/> INTERIM REPORT: SEE SPECIAL PROVISION NO. _____ <input type="checkbox"/> FINAL REPORT: DRAFT _____ COPIES, DUE DATE: _____; FINAL _____ COPIES & ORIGINAL, DUE DATE: _____</p>			
<p>RESEARCH AGENCY SIGN AND RETURN ONE OF THE ORIGINAL TASK ORDERS TO THE STATE.</p>			
RESEARCH AGENCY ADDRESS		WASHINGTON STATE TRANSPORTATION CENTER (TRAC)	
Office of Grant and Contract Services 22 Administration Bldg AD-24 University of Washington Seattle, WA 98195		4507 University Way N.E. Suite 204 JE-10 Seattle, WA 98105	
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION		Transportation Building Research Office Olympia, WA 98504	
BY: (signature)	DATE:	BY: (signature)	DATE:
NAME AND TITLE (type)		NAME AND TITLE (type)	
		G. Scott Rutherford, Director	
		James P. Tooney Assistant Secretary Planning, Research and Public Transportation	
THIS TASK ORDER AGREEMENT IS APPROVED AS TO FORM BY WSDOT ASSISTANT ATTORNEY GENERAL		BY: _____ DATE: _____	

APPENDIX J

**ARIZONA UNIVERSITY TRANSPORTATION
RESEARCH PARTNERSHIP AGREEMENT**

Transportation Research Partnership Agreement

The mission of the Transportation Research Partnership is to foster and promote transportation research in the State of Arizona. The Partnership is an alliance of Arizona's three public universities -- the University of Arizona, Arizona State University, and Northern Arizona University. Together, these three institutions will contribute their expertise to the solution of transportation problems confronting state and local government agencies and the private sector in Arizona. By so doing, the Partnership helps to create a transportation system that provides for the safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods.

The initial activity of the Partnership will be to advise the Arizona Department of Transportation on establishment of a university transportation research center in Arizona.

Signatures to this agreement dated December 9, 1997.

University of Arizona Arizona State University Northern Arizona University

[Handwritten signatures]

 Dean Dean Dean

<p><i>[Handwritten signature]</i> James James Hart Elizabeth K. Sevier Emmanuel Owen-Agyei Nelson A. Matthews Mary R. Kike Edwin D. Hulman Edward A. Nowatzki M. Buelter [Handwritten signature] [Handwritten signature]</p>	<p><i>[Handwritten signature]</i> [Handwritten signature] Jonathan Vachon Han Zhu [Handwritten signature] Michel Kelly [Handwritten signature] [Handwritten signature] [Handwritten signature] [Handwritten signature] [Handwritten signature] [Handwritten signature]</p>	<p><i>[Handwritten signature]</i> [Handwritten signature] M. S. Mamlouk [Handwritten signature] M. OSASNER [Handwritten signature] [Handwritten signature]</p>
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2. "Arizona Department of Transportation FY '98 Research Program", Phoenix, AZ, 1997.
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