Juillet 96

AASHTO / TRB

Réunions conjointes
et
Ateliers de travail
des Comités sur

- *AASHTO Research Advisory Committee*
- *Conduct of research (A 5001) - TRB*
- *Technology Transfer (A 5012) - TRB*

Princeton N.J.
Juillet 1996
J. Charland

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Gouvernement du Québec
Ministère
des Transports

NOTE

DESTINATAIRE : Monsieur Liguori Hinse, S.M.A.
Direction générale de la planification
et des technologies

DE : Jacques Charland, directeur

DATE : Le 11 septembre 1996

OBJET : Déplacement extérieur du Québec
Réunion du TRB / AASHTO
Princeton, New Jersey

Dans le cadre de mes fonctions, j'ai participé en juillet dernier à la réunion de travail des deux comités américains du TRB sur la recherche et le transfert de technologie. Vous trouverez ci-joint l'agenda de ces deux journées de rencontre.

J'ai également participé à une session conjointe avec le «*Research Advisory Committee de l'AASHTO*» qui tenait ses assises annuelles au même endroit. Cette réunion conjointe d'une demi-journée m'a permis d'assister à différentes présentations par des experts sur les sujets suivants :

1e Les défis rencontrés par les gestionnaires en recherche quant à l'application de principes permettant de générer un climat favorable au développement de la recherche. Le conférencier, M. Andy Lemer, est auteur d'un livre sur le sujet que l'on pourra se procurer prochainement au Service de la documentation et de l'information scientifique.

2e Une étude pour favoriser l'implantation des résultats de recherche a été présentée par Mme B. Harder. Le rapport, préparé sous l'égide du ***NCHRP*** (*National Cooperative Highway Research Program)* et parrainé par l'AASHTO constitue l'annexe A de ce compte rendu.

Direction de la coordination de la recherche et de l'information en transport
700, boulevard René-Lévesque Est, 21e étage
Québec (Québec) G1R 5H1

Téléphone : (418) 643-8326
Télécopieur : (418) 646-2343

3e Les transferts technologiques (annexe B) et comment en faire la promotion. Les choix judicieux des technologies et où vont nos priorités d'investissement.

4e Présentation de M. David Huft sur les mesures des résultats en recherche (annexe C).

5e Atelier de travail (annexe D) portant sur les moyens pour améliorer les liens ou l'arrimage entre la recherche et ses applications.

Le deuxième jour, la session comprenait quatre ateliers de travail:

- La mesure des résultats et des bénéfices de la recherche et des transferts technologiques.
- Le marketing de la recherche et des centres de transfert de technologie.
- L'arrimage entre la recherche et son application.
- Les efforts de partenariat avec le secteur privé.

Dans chacun de ces ateliers, des échanges ont eu lieu à propos du vécu, des connaissances et de l'expérience des participants, qui représentaient la majorité des États américains. Ces discussions ont porté sur les divers problèmes de l'heure en recherche et sur une stratégie potentielle pour arriver à des résultats probants.

Au cours de la plénière, les points suivants ont été retenus comme étant les principaux abordés lors des ateliers :

- La reconnaissance des efforts des chercheurs (récompense).

- Le regroupement des intervenants en recherche (universités, groupes de travail, gouvernements).

- Le rattachement de la technologie à la planification stratégique.

- Le profit de nos échecs.

- La publication d'un manuel sur la méthodologie de recherche.

- Les faiblesses dans l'évaluation des projets.
- Le «benchmarking» des résultats avec le secteur privé.
- La participation du secteur privé aux rencontres ou comités de recherche.
- L'établissement des modalités de partenariat.
- La diffusion des résultats de recherche.
- L'établissement d'un plan de communication concernant la recherche.
- La vulgarisation des résultats.

À la lumière de ma participation à cette réunion, je constate que les problèmes rencontrés par nos collègues américains dans le domaine de la recherche sont similaires aux nôtres et que de telles rencontres ne peuvent qu'être profitables aux participants.

Je joins également à la présente, différents documents concernant les actions prises par le TRB suite à la dernière réunion des comités en 1994 (annexes E et F), de même qu'un compte rendu de Ray G. Griffith à propos du Congrès mondial de la route de l'an dernier à Montréal.

Jacques Charland, ing.

P.J.
c.c.: Renée Michaud
Dominique Duchesne

Joint Mid-Year Meeting & Workshop

TRB Committee A5001, "Conduct of Research"
and
TRB Committee A5012, "Technology Transfer"
Princeton, New Jersey
July 31 and August 1, 1996

Agenda

Wednesday, July 31

Research Implementation (Held in conjunction with RAC Session 8)

9:00 a.m.	Establishing a Climate of Research Acceptance and Use - *Andy Lemer*
9:20 a.m.	Facilitating the Implementation of Research Findings - *Barbara Harder*
9:40 a.m.	BREAK
10:00 a.m.	Transferring Research Knowledge and Promoting Acceptance - *Norman R. Scott*
10:20 a.m.	Technology Screening: How to know Which Basket to Put your Eggs In - *Henry Honeywell*
10:40 a.m.	Assessing Research & Technology Programs - *David Huft*
11:00 a.m.	Breakouts on Implementation Issues - Mixed by Region A. Measuring and Targeting Research Effectiveness B. Improving the Bridge Between Research and Application C. Advancing Technology Development with the Private Sector
Noon	LUNCH

Perspective on Future Funding & Legislative Issues (Held in conjunction with RAC Session 9)

1:00 p.m.	National Perspective on Funding & Legislative Issues - *Robert Betsold*
1:30 p.m.	Discussion
2:00 p.m.	BREAK

TRB Committees Meeting Session

2:15 p.m.	Introduction and Opening Remarks - *Lynne Irwin/Denis Donnelly*
2:30 p.m.	Overview of RAC National Meeting Activities - *Denis Donnelly*
2:50 p.m.	Short Term Barriers/Long Term Plans for SHRP - *Neil Hawks*
3:15 p.m.	A Cooperative Effort - TRB Committees A5001 & A5012 - *Lynne Irwin* Round Table Discussion
4:00 p.m.	Conduct of Research Workshop, follow-up to 1994 meeting Program Development - *Richard Stewart* Research Methodology - *Robert Perry* Dissemination of Information/Information Exchange - *Ray Griffith* Research, Development & Technology Transfer Coordination - *Chris Hedges*
5:00 p.m.	Adjourn Meeting
6:00 p.m.	**Reception** (Cash Bar)

Joint Mid-Year Meeting & Workshop

TRB Committee A5001, "Conduct of Research"
and
TRB Committee A5012, "Technology Transfer"
Princeton, New Jersey
July 31 and August 1, 1996

Agenda (Cont.)

Thursday, August 1

Workshop Session

8:00 a.m. Welcome to TRB & RAC Attendees - *Robert Spicher*
8:15 a.m. Workshop Objectives - *Denis Donnelly & Lynne Irwin*
8:30 a.m. Workshop Assignments and Logistics - *William Carr*
9:00 a.m. Breakout Session A - Bridging the Gap Between Research and Implementation
Facilitator - *Bill Evans*
Recorder - *Maria Ardila-Coulson*

9:00 a.m. Breakout Session B - Measuring the Effectiveness and Benefits of R, D, & T^2
Facilitator - *David Huft*
Recorder - *Matthew Reckard*

Noon LUNCH

1:00 p.m. Breakout Session C - Cooperative Efforts with the Private Sector
Facilitator - *J. Peter Kissinger*
Recorder - *Laurie McGinnis*

1:00 p.m. Breakout Session D - Marketing the R, D, & T^2 Program
Facilitator - *Carolyn Goodman*
Recorder - *Robert Garber*

4:00 p.m. Wrap-Up/Discussion - *Denis Donnelly*
4:30 p.m. Adjourn Workshop

(Note: Breaks will be held during the morning and afternoon breakout sessions)

Friday, August 2

Committee officials will meet with workshop facilitators and recorders to summarize findings.

ANNEXE A

Facilitating the Implementation of Research Findings
National Cooperative Highway Research Program Project 20-33(1)

Sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration

Goals of the Study:

1. To locate a large number of successful implementation efforts in a representative range of user settings;
2. To identify and describe practices systematically associated with implementation success;
3. To learn whether and how successful practices are interrelated or are influenced by characteristics of organizational and institutional contexts or specific research subjects;
4. To recommend ways to create an "implementation friendly" environment.

Study Facts:

✓ The study is complete, a final report was submitted to the NCHRP project panel this Spring. The final deliverable is a main summary report with appendices containing major project components.

✓ Work progressed in two phases: Phase I identified factors affecting implementation of research findings, strategies expected to promote implementation, and themes for future research to test the more viable strategies (summarized in *NCHRP Research Results Digest Number 207*); and Phase II presents results from a nationally representative survey of state, county, and city transportation officials to determine what influences--positively and negatively--the transfer of research results into practice. Survey respondents provided quantitative data on implementation as well as qualitative data which was compiled as a synthesis of practice.

✓ The top 12 implementation boosters are: 1) Pilot projects done in real user settings; 2) Innovation matches the users' needs; 3) Strong commitment from senior management; 4) Adequate funding; 5) High degree of collaboration among users, researchers, and industry; 6) User participation in vital stages of the R&D process; 7) Champion for the project on-site; 8) Users possessing a high level of relevant technical skills; 9) Implementation package and continued support available for users; 10) Demonstrable advantages through application of the innovation; 11) Clear goals for the implementation effort; and 12) Targeted funding for the implementation.

✓ Synthesis of Practice Recommendations (tied closely to the implementation boosters): Plan for Implementation; Fund implementation; Commit the agencies best people to the job of implementation; Always address a genuine need; Demonstrable advantages of the product/process help early adoption; Make use of pilots, demos, or field test results (by others or the agency); Elicit strong support from senior management; Promote continuous collaboration between the user and researcher/developer; Choose researchers/vendors experienced with practical applications; Go do it.

✓ The study was performed by RAND Corporation, T. K. Bikson, principal investigator, S. A. Law, and M. Markovich with B. T. Harder, Inc., Barbara T. Harder.

Facilitating the Implementation of Research Findings
National Cooperative Highway Research Program Project 20-33(1)

Sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration

Overall Conclusions:

- Motivation to adopt and use new research results is high.
- Institutionalize effective strategies.
- Active encouragement of implementation is more important than previously understood.
- A window of opportunity for effective dialogue exists.
- Collaborating/pooling resources will leverage efforts.
- Targeted research leads to better implementation.
- Technically knowledgeable staff are critical for implementation success.
- Senior management/policymakers can and do play a critical role.
- Expand on high-quality groundwork.
- System-level changes are possible but require time.

The value of the conclusions are 1) they unquestionably lay the foundation for future research in this critical area, 2) they provide strategic and tactical implementation guidance to research managers, and 3) they provide foundational concepts about implementation for policy and decision-makers. These conclusions present solid evidence of the progress that can be made in implementation for those currently attempting to heighten its importance within their agencies.

IMPLEMENTATION PRACTICES CHECKLIST

NCHRP Project 20-33(1), Facilitating the Implementation of Research Findings

Project Title: _____

Project Technical Representative: _____

Date: _____

Type of Planning Performed (check one):

- ☐ Preliminary Implementation
- ☐ Final Implementation

IMPLEMENTATION PRACTICES (Listed in Order of Importance)

1. Pilot, demonstration or other field test done in real user/applications setting.
   - ✓ What pilot, demo, or field test would be most productive to further the implementation process?
   - ✓ Has an opportunity for such a real user test been incorporated into the project?
   - ✓ Have the prospective users been involved in planning this pilot?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

2. Innovation matches the users' needs.
   - ✓ Is the research result solving a genuine need?
   - ✓ Is there ongoing assessment that the project is continuing to match users's needs?
   - ✓ Does the potential user understand this research result will solve the identified problem?
   - ✓ Have criteria of success been identified so that there is a means of understanding that the problem was solved?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

3. Strong commitment from senior management to implement this product or process.
   - ✓ To what strategic objective of the organization does this research result contribute?
   - ✓ How will the results of this research be communicated to the senior managers so that interest is maintained and increased for implementation activities?
   - ✓ Who are the senior managers that have given their commitment to this project?
   - ✓ If no such commitment has been shown, what must be done to get the appropriate senior managers personally to commit to this project?
   - ✓ How can the senior managers' influence best be used to further the implementation of the research results produced by this project?
   - ✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

4. Adequate funding to implement the product or process.
   ✓ How much will it cost to implement the product or process and to what extent of institutionalization will the implementation funds be used?
   ✓ What is the source and amount of funding for implementation? Are users' funds contributing to the implementation efforts?
   ✓ When will the funding be available and are there any special requirements to be fulfilled to release these funds?
   ✓ Are the funds able to be used for all aspects of the implementation? (e.g. travel, equipment, materials)
   ✓ How will this activity be incorporated into the overall implementation plan?
   ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

5. Collaboration among the users of the implemented product or process, the researchers, and suppliers/contractors.
   ✓ Have all the "players" been identified and representatives of the various groups been asked to participate in some substantive manner?
   ✓ What provisions have been made to foster collaboration among researchers, users, and others involved in the implementation?
   ✓ What are the most probable impediments to collaboration and how can they be overcome early in the research effort?
   ✓ How will this activity be incorporated into the overall implementation plan?
   ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

6. User participation in vital stages of the research and development.
   ✓ What are the vital points in the course of the R&D where users could most contribute to bettering the research result?
   ✓ How early in the project should researchers and users collaborate?
   ✓ What structure exists to incorporate users? e.g. cross-functional team associated with the project?
   ✓ Are the selected participating users those that can positively influence early implementation efforts?
   ✓ Are the users selected representative of the universe of potential users?
   ✓ What mechanisms are in place to educate the researchers regarding the users' needs and the eventual implementation environment?
   ✓ How will this activity be incorporated into the overall implementation plan?
   ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

7. Is there a champion(s) for the research and research results on site where the products or processes are to be implemented?
   - ✓ Who is the champion, how much influence does the champion have and on what agency levels?
   - ✓ Is the champion one who is technically respected by peers and management, having high credibility?
   - ✓ In a case where an important champion may not be an agency employee, what provisions are being made to have that champion on site?
   - ✓ To what degree will the champion participate in the formal project activities and particularly in the implementation?
   - ✓ Is more than one champion needed, each directed to specific management levels or other groups involved in the project?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

8. Is there a high level of relevant technical skills in the organization that will be using the results of the research? (Considering the more the users know about the technical aspects of the new product or process being implemented, the easier is the implementation...)
   - ✓ What level of technical expertise do users have?
   - ✓ Is this a sufficient level for users to truly understand the advantages of the new product or process?
   - ✓ Will users be able to use the new product or process from the start? or by when?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

9. Implementation package available and appropriate continuing implementation and technical support for users.
   - ✓ What are the appropriate tools and materials to include in a package that will assist the users in adopting the new products or processes?
   - ✓ What do the users say is most helpful to include in such a package?
   - ✓ Is more than one such implementation package required -- each addressing different user groups? (e.g. department users and contractors)
   - ✓ What kind of administrative or technical support will be made available to users, and for what period of time?
   - ✓ How will this activity be incorporated into the overall implementation plan?
   - ✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

10. Demonstrable advantages of the innovation.
    - ✓ Have demonstrable advantages of the new product or process been identified clearly and early, perhaps through a pilot or demonstration, or initial implementation efforts?
    - ✓ Have these advantages been communicated to the appropriate stakeholder groups, users, senior

management, contractors, suppliers, or others? Have these communications efforts been tailored to fit each group?

✓ What opportunities have been identified to physically/in real-time show off these advantages to the various stakeholders?

✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

11. Clear goals for the implementation effort.

✓ Have clear, concise, achievable implementation goals been written?

✓ Have such goals been identified for the various stakeholder groups and then communicated to them in the most meaningful way so they will foster implementation?

✓ Were the stakeholders involved in defining the implementation goals?

✓ Do all participants understand their roles in achieving the goals?

✓ How will you know you have achieved the goals? (Are criteria of success established? See #2)

✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

12. Targeted funding for the implementation activities.

✓ Not only is there sufficient funding for implementation (#4), is it targeted to implementation for this project?

✓ What are the most productive uses for this targeted funding?

✓ Are there any responsibilities

✓ How will this activity be incorporated into the overall implementation plan?

✓ _____

Action: _____

_____

By Date: _____ By Whom: _____

IMPLEMENTATION SUMMARY

Prioritized Action Items:

✓ Determine what actions will bring the largest payback for implementation efforts within the given resources and capabilities.

Follow-up Review Date(s):

ANNEXE B

ARIZONA TRANSPORTATION RESEARCH CENTER

We are pleased to furnish the enclosed material. If we can be of further service please contact us.

Arizona Department of Transportation
206 S. 17th Avenue, Maildrop 075R
Phoenix, AZ 85007 (602) 407-3130

Screening Technology

Letterman's Top Five Reasons

- Chimpanzees Share 98.5 % of the Identical Genes As Humans
- May Have To A FHWA Peer Review
- May Have To Participate in Pooled Fund
- Abide By Certification Procedures
- Have Something to Justify Travel

Problem Statement

Technology is at the Center of the Profound Changes Transforming Society

- Netscape Offering
- Economic Growth

"Blue Sky" Projects Are Out

- Mission Oriented
- Customer Focused

"Scientific Progress On a Broad Front Results From the Free Play of Intellects Working on Subjects of their Own Choice, in a Manner Dictated by their Curiosity"---Science, the Endless Frontier

Increased Competition

- Ten Fold Increase in Publications
- Reduces Differentiation Between Leaders

Fewer Big Hits Occur

- Vaccine
- Cray 1
- Cray 4

Better Technology Does Not Always Win

- Windows Vs Macintosh
- RISC Vs Intel

Open Architecture

- **Data Compression**

Technology Advances Incrementally

- Moore's Law
- 25% Improvement = 6 Months

Increased Accessibility to Information

- Internet Doubled
- Every Year for Last Two Decades

Findings

- Product Oriented Research
- Greater Collaboration
- Deploy Technology Instead of Inventing It
- Customer Focused
- Short Term
- Technology Hunting

Conclusions

- **Only 1.5% Separates the Champs from the Chips**

ANNEXE C

Research Performance Measures

David Huft, SDDOT

Assessing Research and Technology Programs

David Huft
South Dakota Department of Transportation
AASHTO Research Advisory Committee
July 31, 1996

"Probably no aspect...

of the management of technology causes more discomfort than evaluating the effectiveness of the technical components. Quantitative measures tend to focus on what can be quantified, not necessarily what is important--'obscuring ignorance with arithmetic,' as one noted observer noted."

Lowell Steele

"Measuring the Productivity...

of your R&D division is like trying to catch butterflies while wearing boxing gloves."

Tingstad

Research Performance Measures

David Huft, SDDOT

Obstacles to Assessing R&D Productivity

- Long Lead Time
- Dependence on Operational Organizations
- Regulations
- Political Influences
- Good Luck & Bad Luck
- Technical Output is a Product of Trade-Offs

"The time has come...

to lay aside all the old excuses
for not measuring and baselining
R&D effectiveness and do it anyway--
because it is the right thing to do!"

Phillip Francis, Square D

Good Measures Can...

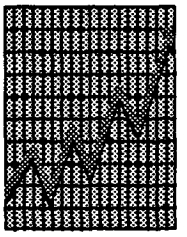
- Improve Management Practices
- Help Evaluate Programs
- Aid in Budget Development
- Give INSIGHT

Poor Measures Can...

- Waste Time
- Waste Effort
- Mislead Managers
- Frustrate the Staff
- Frustrate the Mission

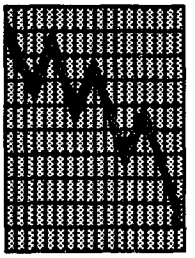
Measures Should Be...

- Significant to You
- Valued by Organization
- Linked to Responsibility
- Comprehensive
- Balanced
- Focused on Customers



Measures Should Be...

- Credible
- Timely
- Compatible with Existing Processes
- Cost-Effective
- Consistent Over Time
- Simple & Easy



Research Performance Measures

David Huft, SDDOT

My customers are...

- Chain of Command
- Operational Managers & Staff
- Consultants
- Other Agencies (State, Local, Federal)
- R&D Staff

"R&D is too complex

for any few generic measurements to suffice. We believe that one should first determine the market-driven objectives specific to the organization, and then determine the balance of internal and external measurements." *Paul Schumann*

"To create/sustain technological advantage...R&D must...

- defend and enhance the value of the corporation
- link to the corporation's strategic aims
- must be able to sustain the capability to produce useful output over the long term"

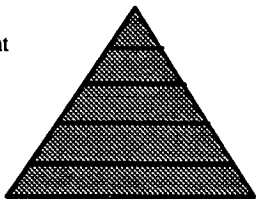
from Tipping, et. al.

Research Performance Measures

David Huft, SDDOT

Technology Value Pyramid

- Value Creation
- Portfolio Assessment
- Integration with Business
- Asset Value of Technology
- Practice of R&D Processes to Support Innovation

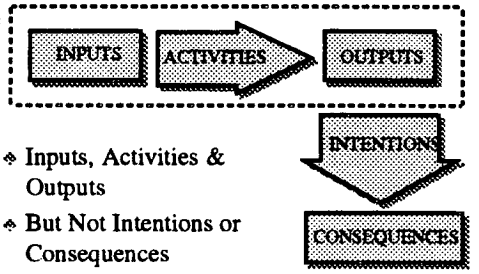


from Tipping, et.al.

Stakeholder Interests Vary

Factor	*Stakeholder*
Value Creation	CEO, Board
Portfolio Value	Business Management
Integration w/Business	Business Management
Asset Value	R&D Management
Practice of R&D	R&D Staff

Measures Apply to...



- Inputs, Activities & Outputs
- But Not Intentions or Consequences

Research Performance Measures

David Huft, SDDOT

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
New Sales Ratio	X				
Cost Savings Ratio	X				
R&T Yield	X				
R&T Return	X				
Comparative Mfg. Cost	X	X			
Projected Value of the R&T Pipeline	X			X	

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
Product Evaluation	X			X	
Product Defect Rate	X			X	
Gross Profit Margin	X			X	
Market Share	X			X	
% of R&T Portfolio on Corporate Goals	X		X	X	
% of Corporate Goals Addressed by R&T	X		X	X	

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
Technology Distribution		X		X	X

- reward vs. risk
- by product line
- maintenance vs new
- implementation time
- by tech service, basic, applied, development
- by project stage
- external vs. internal
- by technical discipline
- core or new competencies

Research Performance Measures

David Huft, SDDOT

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
# of Ways Exploited		X		X	
% of Endorsed Projects			X		
Use of Milestone System			X		X
% Funding by Op. Units			X		
Use of Cross Functional Teams			X		X
T^2 Rating (2-sided)			X		X

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
Product Rating vs "Best"	X			X	
Tech. Benefit-Cost	X			X	
Response Time				X	X
Cycle Time				X	X
R&D Investment				X	
Quality of Personnel				X	X

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
Technical Capability				X	
Patent Number/Quality				X	X
Proprietary Sales %	X			X	
Peer Evaluation				X	X
Customer Satisfaction				X	X
Milestone Achievement (% & performance level)					X

Research Performance Measures

David Huft, SDDOT

Potential Measures Include...

	VC	PA	IWB	AVT	PRD
Customer Contact Time					X
% Findings Reported					X
Cost/Successful Project		X		X	
Employee Morale					X
Goal Clarity					X
Project Ownership					X
Staff Perception of Management Support					X

Steele's Technology Evaluation Checklist

- Quality of Output
- Diligent Measurement of Output
- Adequacy of Technical Mgt. System
- Interactions with Other Functions
- Competitive Awareness
- Comparison with Peers
- Resource Management
- Fostering Innovation

from Steele

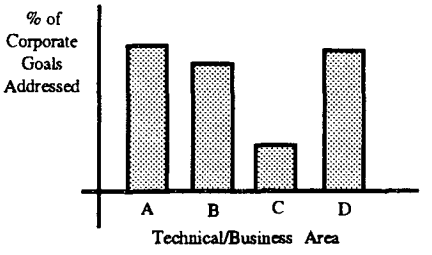
What about specific (one-time) measures?

- Useful for matching individual organizational strategic goals
- Not so useful for long-term assessments of trends, progress, or improvement

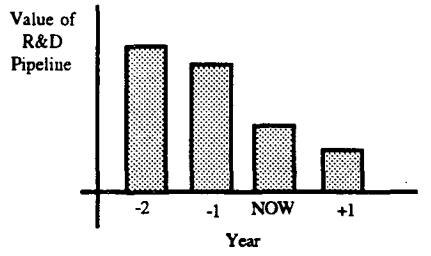
Research Performance Measures

David Huft, SDDOT

Look for Interactions



Look for Trends



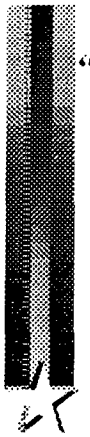
"Not all measurements are right

for all companies, or at all times, for describing or tracking the most important aspects of R&D. However, each company should be able to select a small set of metrics that are appropriate for assessing the value received from R&D and the likelihood of being able to sustain that value."

Tipping, et.al.

Research Performance Measures

David Huft, SDDOT



"The chief technical officer...

must work with the CEO and general management to determine which measures will be used to assess broader corporate responsibilities. Depending on particular needs of stakeholders and of decisions to be taken, different categories and factors should be examined."

Tipping, et.al.

Recommendations:

- Take the intiative to assess your program
- Select & establish a few measures that are:
  - significant to you and your customers
  - balanced across the Technology Value Pyramid
  - practical for your situation
- Do your best to be honest & open
- Avoid temptation to react hastily
- Act diligently within your abilities

Recommended Reading

- *Managing Technology--The Strategic View*, Lowell W. Steele, McGraw-Hill, 1988.
- "Assessing the Value of Your Technology", James W. Tipping, Eugene Zeffren & Alan R. Fusfeld, Industrial Research Institute, Inc., 1995.
- *How to Manage the R&D Staff*, James E. Tingstad, American Management Assn., 1991.
- "Measuring R&D Performance", Paul A. Schumann, Derek L. Ransley & Donna C. C. Prestwood, Industrial Research Institute, 1995.

ANNEXE D

IMPROVING THE BRIDGE BETWEEN RESEARCH & APPLICATION

Emphasis on Implementation-

Getting the results of research projects implemented into pratice is crucial in the long-term success of an R & D Program, and leads to continued support by management and funding agencies. Producing useable products and implementing them into operation should be a basic underlying philosophy in the program. The entire staff should contantly be aware of the need to move useable findings to the operating level. Some organizations tend to separate the phases of the study too much, and keep their implementation staff out of the loop until the research is completed. Once the products of the study are available, the implementation staff is given the task to market the work to the users. This is often a difficult or impossible task. Getting both the implementation staff and the end users involved throughout the study is an important process.

Technical Advisory Committees (TACs)-

The members of the TAC should be selected with implementation of the study findings in mind. A significant number, if not all, of the TAC members should be end users of the products of the research. This brings implementation into the planning phase of the study. The practical objectives of the work will be emphasized, more usefull products can be proposed, and funding can be allocated for tasks aiding the end user. Progress reviews by the TAC are crucial to keep the work on track, and steer the effort toward practical findings. A thorough review of the products is important to enhance the implementation effort. Much of the implementation will be immediate since the users are involved throughout the study. Also, they will have a better understanding of the technology, and more buy-in is achieved due to the ownership generated by the TAC.

Reports, Newsletters & Research Briefs-

Reporting the findings of research is an obvious tool required in the implementation process. This step is needed both within the agency conducting the research, and those from other agencies. It is important to report negative findings as well as successful research. Too often researchers undertake a nonproductive study because an agency is unwilling to publicize unsuccessful work.

Training-

A good working relationship with training personnel in the department is very important. The training program is a valuable asset to the implementation effort. Funding and manpower can be utilized from the training budget to enhance the effectiveness of the implementation program.

Specifications & Standards-

The adoption of sound specifications and standards is a formal method used to enhance the application of research results. These measures do not always insure the adoption of the technology, however. It is important to convey the reasons why the change has been made through training, reporting, or other methods. Staff members often find ways around specifications, such as the use of special provisions, if they are not convinced that the change is appropriate.

Experimental Projects & Demonstrations-

Often the best way to show that a technology is an improvement over existing methods is to place it in the field as part of an experimental project. This demonstrates that the technique is constructable, any materials can be transported and handled, traffic control can be accomplished, etc.

Conferences & Meetings-

Opportunities to market new ideas are often available at conferences. The research staff should constantly be geered to take advantage of these opportunities. Regular meetings conducted by groups such as the Materials Engineers, Maintenance Engineers, Construction Engineers, Motor Carrier Personnel, Administrators, Aeronautics Staff, Community Relations Experts, Environmental Engineers, Geotechnical Engineers, Computer Experts, Planners, Structural Engineers, Traffic & Safety Personnel, should be utilized to inform staff members of new technology and receive input concerning the implementation of these products and processes.

ANNEXE E

TRANSPORTATION RESEARCH
CIRCULAR

Number 448 October 1995

Conduct of Research Workshop Proceedings

TRANSPORTATION RESEARCH BOARD / NATIONAL RESEARCH COUNCIL

TRANSPORTATION RESEARCH
CIRCULAR

Number 448, October 1995
ISSN 0097-8515

CONDUCT OF RESEARCH WORKSHOP PROCEEDINGS

COMMITTEE ON THE CONDUCT OF RESEARCH

Denis E. Donnelly, Chair

Gary R. Allen
Maria Ardila-Coulson
Robert J. Benke
Robert J. Betsold
William F. Brown
William P. Carr
Steven A. Davis
Arlene L. Dietz
David C. Esch
Barbara Thomas Harder
Eric E. Harm
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Arnold H. Mohlman
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FOREWORD

The identification of the requirements of effective and coordinated transportation research programs was the objective of a three-day workshop held during the week of July 24, 1994, in Vail, Colorado. The overall goal was to evaluate the following topics and identify shortcomings in their application within transportation research programs. Approaches were identified for the development of proper procedures and methods for conducting transportation research, and potential mechanisms for presenting these approaches to research sponsors were discussed.

Topics and specific issues addressed in each of four breakouts follow:

- Program Development
  - What Makes People Support Research?
  - Strategic Planning
  - Public/Private Partnerships
  - Personnel Development and Training in Research
  - What Makes a Program Effective?
- Research Methodology
  - A Methodology for Both Basic and Applied Transportation Research Studies
- Dissemination of Information/Information Exchange
- Research, Development, and Technology Transfer Coordination
  - Assessment of Future Transportation Research and Avoidance of Research Duplication Among Agencies
  - Assessment of Transportation Databases and Needs
  - Strategies for Networking Transportation Research
  - Identification of Opportunities for International Transportation Research Coordination and Cooperation

This report should be of interest to agencies that sponsor research and can implement the workshop findings through the identified mechanisms (e.g., research study, synthesis, etc.).

CONTENTS

CONDUCT OF RESEARCH WORKSHOP

BACKGROUND

The Transportation Research Board Committee on the Conduct of Research (A5001) serves the transportation research community by addressing issues related to the process of conducting research. In order to continue providing this service, the committee decided that a special forum was needed for the identification, discussion, and development of recommendations on the issues surrounding the research process. A mid-year meeting was held in July, 1994 for this purpose.

The Technology Transfer subcommittee of Committee A5001 also participated in the meeting. The 33 participants included representatives of state and federal transportation agencies, universities, private consultants, transportation institutes, and a Canadian transportation association.

The goal of the mid-year meeting of the committee was to identify topics related to the committee scope that need to be researched, marketed, and implemented by research agencies in the public and private sectors. This *Circular* presents the needs identified at the workshop for consideration by the TRB in the form of research problem statements or suggested research topics. This information is also provided for use by other transportation agencies including AASHTO, FHWA, FRA, FTA, and others.

RELATIONSHIP OF AASHTO RESEARCH ADVISORY AND TRB CONDUCT OF RESEARCH COMMITTEES

The first annual meeting of the Research Advisory Committee (RAC) of the American Association of State Highway and Transportation Officials (AASHTO) was also held in Vail, Colorado, during the week of July 24, 1994. The RAC membership is composed of state transportation research officials, and its meetings are also attended by federal and other transportation agency officials. Although primarily devoted to the concerns of state research programs, the RAC meeting provided an excellent introduction to the somewhat broader focus of the TRB committee meeting.

The RAC provides input and advice to the AASHTO Standing Committee on Research and participates in coordinating research programs at the national, regional, and state levels. Peer review and self evaluations of research programs are major emphasis areas of the RAC.

The scope of the TRB Committee on the Conduct of Research is as follows:

> To increase the quality and effectiveness of research through encouragement of better planning, management, and operational practices by organizations engaged in transportation research programs and to assist the Transportation Research Board in its role of stimulating research and serving as a national clearinghouse for research activities.

The scope of the TRB committee deals with the process associated with the conduct of transportation research; whereas, the scope of the AASHTO/RAC deals with the content and size of the research programs conducted by state transportation agencies. The related interests of the two committees prompted the scheduling of the committee meeting to follow the RAC meeting in order that RAC meeting attendees could also participate in the workshop.

WORKSHOP TOPICS

At the January 1994 Annual Meeting of TRB Committee A5001, a list of topics for the mid-year meeting was proposed. This list provided the basis for a follow-up survey to the membership regarding interest in these and other candidate workshop topics. Many of these topics were felt to be appropriate for attention by TRB, AASHTO/RAC, FHWA and other transportation agencies. As a result of the survey, the following list of workshop topics was developed for use at the mid-year meeting:

- Establishing guidelines for marketing/selling the research, development and T^2 program. Identification of methods to obtain resources including personnel and funding.
- Guidelines on establishing a research management program.
- Establishing uniform technology on information exchange: Information highway as it pertains to transportation research. Applying new technologies and user-based strategies so that the products are available and used.
- Prepare a manual on developing a research experiment. Establish a mechanism for state-to-state consistency.

- Prepare a manual for standardization of research data bases (e.g. using the SHRP protocols).
- International exchange of research activities, findings and training programs.
- Coordination of current research activities. Establish a mechanism for information exchange at federal, state, local, public and private levels with focus on work in progress.

BREAKOUT SESSIONS

The four topics covered in the breakouts were

- Program Development (Breakout A);
- Research Methodology (Breakout B);
- Dissemination of Information/Information Exchange (Breakout C); and
- Research, Development, and Technology Transfer (R, D, & T^2) Coordination (Breakout D).

Appendix A of this report contains the agenda as well as descriptions of the four assigned topics. Appendix A also contains a listing of names, affiliation, and phone numbers of those attending the workshop.

Appendix B contains the summaries from each of the four breakouts. The overall goal of the breakouts was to discuss the assigned topic and prepare suggested actions to resolve a given issue. The actions could be in the form of a research problem statement, study proposal, suggestion for implementation, etc. The suggested actions would be appropriate for follow-up by a national agency (TRB, FHWA, AASHTO, etc.) or groups of agencies.

Approaches were identified as to how proper procedures and methods for conducting transportation research should be developed and presented to the user agencies. Such activities as synthesis studies, research, training, marketing, and application of state-of-the-practice were considered candidates.

FINDINGS AND CONCLUSIONS

Program Development (Breakout A)

Transportation research has been considered as the essential cornerstone of effective transportation systems. The development of research needs is a critical element for programs to be efficient and effective. In addition, the identification of key issues within the transportation agency can shift the direction of research from a reactive role to a more proactive role with the involvement of all elements of the transportation agency work force.

Five identified topics that contribute to program development are

- What Makes People Support Research?
- Strategic Planning
- Public/Private Partnerships
- Personnel Development and Training in Research
- What Makes a Program Effective?

What Makes People Support Research?

It is essential that a transportation research program be sustainable and dynamic in the eyes of the user. Therefore, the fundamental reasons for supporting research must be explicit to the decision-makers and the public. A process of "enlightenment" needs to be established to build intellectual conviction regarding research and a sense of the value of research when products are implemented.

Organizational and cultural factors conducive to supporting research need to be identified. A study could be conducted by NCHRP or FHWA to identify these factors for consideration by research agencies at all levels.

Strategic Planning

The goals and mission of a transportation agency should be the basis for developing a short and long term strategic plan for the research program. This plan should be developed in concert with the agency management and users. It is important for the research program administrators and staff to recognize this plan when determining the direction and operation of their programs.

A strategic planning methodology is needed for use by public agencies at the federal, state, and local levels in developing transportation research programs. A method or guideline for establishing strategic plans would help ensure coordinated approaches in transportation research throughout the country and would assist in managing ongoing research programs.

A study should be conducted to develop a methodology for use by public transportation agencies interested in developing a strategic plan. The study would address the contributing factors identified in the workshop to provide an industry-wide uniform process. It is anticipated that the findings would be presented to FHWA and AASHTO for consideration.

Public/Private Partnerships

With the current complexity of the government-sponsored research agenda, contributions from the private sector are becoming increasingly important. Public/private partnerships can play an important role in defining the research agenda resulting in a program that will address needs of the entire transportation community. Current cooperation between public and private agencies is becoming increasingly effective. Therefore, this project is timely.

It is suggested that strategies for facilitating public/private partnerships in research program development be identified. Agencies from states, universities, military, federal government, and private industry should be interested in contributing to the development and implementation of these strategies.

Personnel Development and Training in Research

Personnel managing and operating within research programs must possess special qualifications, and it is important that these qualifications be recognized, developed, and rewarded. The goal of this activity would be to provide qualified transportation professionals for future research projects. This activity may include expanding existing programs, developing new training and education programs, and coordinating the activities with other transportation agencies.

Personnel qualification requirements, as well as development, training, and education needs, should be identified to support multi-modal transportation research programs. Once identified, these qualifications should be published for use by transportation agencies as well as educational institutions. A fact finding study could be conducted by NCHRP, FHWA, or CERF.

What Makes a Program Effective?

Several research programs have been recognized as leaders in the industry. The basic characteristics of these programs need to be identified along with details of how best to develop them in other programs.

A synthesis of effective research organizational structures is needed for use throughout the transportation community. This synthesis could be developed by TRB with the cooperation of FHWA, AASHTO, and other engineering organizations. Application of the findings would be made by state and federal transportation agencies, as well as other public and private organizations providing research services.

Research Methodology (Breakout B)

A systematic approach using valid methods of conducting research is essential. A goal should be identified and a plan developed to achieve it. Emphasis should also be given to determining and agreeing to a measurable objective or hypothesis with the appropriate experimental design or research approach. The following topic was identified for consideration.

A Methodology for Both Basic and Applied Transportation Research Studies

There exists a distinct difference between basic and applied research. As a result, different approaches are necessary in developing, sustaining, and implementing research studies or projects within these categories. A manual on transportation research practice needs to be assembled which would contain information concerning project planning and management. State-of-the-art procedures for all activities within a comprehensive research program would be included. The manual would address the differences between basic and applied research. Course instruction should also be developed in conjunction with this manual.

The development of the manual could be accomplished within TRB committees, NCHRP, and/or FHWA. It is anticipated that the manual would be of value to both basic and applied researchers and managers.

The format and topics to be covered in the proposed manual were prepared in the breakout and are outlined in Table 1 (page 20).

Note: The AASHTO Standing Committee on Research has since approved funding for this study under NCHRP Project 20-7.

Dissemination of Information/Information Exchange (Breakout C)

The transportation community at all levels is dependent upon good resource information. Unfortunately, the value of good information is difficult to quantify in a way that would support the need for research to improve information resources. The lack of information and/or bad information are very costly to the users.

There needs to be an improved awareness of the cost and value of information and of accessing that information. The cost of the lack of information should also be included. A blue-ribbon committee should be

appointed for a TRB special project to address the value issue and to identify the best approach for developing a better understanding of and appreciation for good information. This activity covers a broad spectrum and should be of interest to the entire transportation community. Information resources in private industry need to be included. The report should be strategic in nature and cover issues from a global perspective.

Research, Development, and Technology Transfer Coordination (Breakout D)

A major emphasis is needed on a coordinated effort to address administrative, technical, and funding requirements of R, D, and T^2. The exchange of information is needed to avoid duplication of efforts, maintain efficiency of operation, and maintain the state-of-the-art. Coordination is needed to pool resources across jurisdictional boundaries including national/international, public/private, and transportation/non-transportation industry sectors.

The breakout participants felt that a multi-level approach was needed to address these issues given the diversity of the topics. Therefore, the following four topics were identified for future action:

- Assessment of Future Transportation Research and Avoidance of Research Duplication Among Agencies;
- Assessment of Transportation Databases and Needs;
- Strategies for Networking Transportation Research; and
- Identifying Opportunities for International Transportation Research Coordination and Cooperation.

Assessment of Future Transportation Research and Avoidance of Research Duplication Among Agencies

Throughout the transportation community there is a very large menu of research activities being proposed or in the planning stage. Many of the topics being considered are duplicated by other agencies. It is therefore important that these planned activities be coordinated in order to avoid duplication of efforts throughout all stages of the research. Since a coordinated effort does not currently exist for planned research and future research, it is recommended that a database be developed to address such a need.

It has also been pointed out that databases do exist for research-in-progress and completed research. The success of these efforts has been limited, suggesting similar problems may be encountered in establishing a database for planned and future research. Therefore, the proposed effort must take into account existing barriers as well as identify alternative approaches to this information coordination. The system must also be flexible to respond to the dynamic and changing nature of research programs that often makes this information quickly out of date. However, the expected large payoff, along with the expected savings in time and funding, makes this effort a high priority.

A research study is suggested to examine potential mechanisms for establishing a database containing information on planned transportation research projects and issues being considered for future research efforts. This study should be conducted at the national level with direction and input from the user agencies. Users include transportation research agencies at all levels, public and private.

Assessment of Transportation Databases and Needs

There currently exists a wide variety of databases that provide information on research projects and reports. However, there is limited knowledge on how to access and utilize these databases along with the exact content of each. A better understanding of the nature, content, availability, and access technique is needed to ensure that they are used more effectively in transportation research programs.

A research study is recommended that would assess current transportation databases and future needs. The study would identify and examine current databases and define a future vision for using one-stop shopping. The identification of steps to accomplish this goal would also be made. This study should be conducted at the national level with direction and input from the user agencies. Users include transportation research agencies at all levels, public and private.

Strategies for Networking Transportation Research

Networking with other experts or peers is often the most effective means to obtain current information on the status and results of transportation research. In order to ensure that networking takes place, management of agencies and businesses must provide the needed support to their staff to participate in committees, conferences, etc.

TRB should explore ways to examine the issues and opportunities associated with expanding the networking capabilities in transportation research. This would benefit all groups interested in improving coordination

on research and development activities and technology transfer. TRB should involve other transportation agencies.

Identification of Opportunities for International Transportation Research Coordination and Cooperation

Transportation research conducted within North America is typically well known and publicized. Unfortunately, the transportation community is not aware of numerous projects underway throughout other parts of the world. This situation should be addressed to help ensure the timely sharing of information and to help coordinate transportation research on a worldwide basis.

A synthesis study should be conducted to examine current international research coordination and cooperation as well as to identify opportunities to expand and enhance these efforts. This information would be used to identify potential techniques and approaches to improve international coordination and cooperation efforts.

NEXT STEPS

The TRB Committee on the Conduct of Research will take the lead in advancing many of the recommended actions.

APPENDIX A AGENDA AND ATTENDEES

TRB COMMITTEE ON THE CONDUCT OF RESEARCH (A5001)
MIDYEAR MEETING WORKSHOP
July 27-29, 1994
Vail, Colorado

Agenda Outline

Wednesday, July 27

2:00 pm	NEW MEMBERS ORIENTATION, NON-RAC (Private Dining Room)	
	Introductions	Robert Spicher
	Committee Scope	Denis Donnelly
2:30 pm	NON-RAC MEMBER UPDATE	
	Research Advisory Committee (RAC) Activities	
	Coordination Between RAC and A5001	
3:30 pm	GENERAL SESSION WITH RAC MEMBERS (Arizona Room)	
	Regional Reports	
	Resolutions	
	Future Actions	
5:00 pm	RECEPTION — Cash Bar (Cafe Colorado Veranda)	
	Committee A5001 and Guests	

Thursday, July 28

8:00 am	GENERAL SESSION (Tucson Room)	
	Call to Order and Meeting Objectives	Denis Donnelly
8 – 10 am	Spouse/Guest Hospitality (Altitude Club)	
8:15 am	Welcome	Robert Spicher
8:30 am	Relationship of Committee, Subcommittee, and RAC Activities	Denis Donnelly
9:00 am	Breakout Assignments	Bill Carr
	Topics	
	Facilitators	
	Recorders	
	Attendees	
9:30 pm	BREAKOUT SESSIONS A (Tucson Room) AND C (Scottsdale Room)	
	Individual Workshops by Topic (Workshop Format)	
	Topic and Assignments	Facilitator
	Open Discussion	All Attendees
	Recommendations	All Attendees
	Action Items	All Attendees

Statement Development Recorder

Noon LUNCH BREAK (Cafe Colorado Veranda)

1:30 pm BREAKOUT SESSIONS B (Scottsdale Room) and D (Tucson Room)

4:00 pm CLOSING SESSION (Tucson Room)
Workshop Summaries and Discussion Facilitators

5:00 pm ADJOURN COMMITTEE MEETING

Note: Coffee breaks will be held outside the Tucson Room.

Friday, July 29

8:00 am PRODUCT DEVELOPMENT (Tucson Room)
(Meeting with committee officials, facilitators, and recorders to prepare outline for final product.)

BREAKOUT SESSIONS (Guidelines for Participants)

The overall goal of the breakouts is to discuss the assigned topic and prepare suggested actions to resolve a given issue. The actions may be in the form of a research problem statement, study proposal, suggestion for implementation, training needs, or other activities.

Following are the suggested topics for breakouts along with some examples of candidate discussion items:

Breakout A: Program Development

Program development to meet agency needs
Public/private partnerships
Responding to customer/user needs
Marketing the research program
Program organization and administration
Personnel development and training in research

Breakout B: Research Methodology

Manual on developing a research experiment
Standardization of research databases, etc.
Data collection—SHRP protocols
Quality control
Education and training

Breakout C: Dissemination of Information/Information Exchange

Technology transfer organization and operation
International exchange of research findings
Uniform technology on information exchange, etc.
Marketing research results

Breakout D: Research, Development, and Technology Transfer Coordination

At the state, national, and international levels
Requirements (funding, personnel, etc.)
Pooled-fund programs
International information exchange
Networking with other programs (AASHTO, TRB, industry)

TRB COMMITTEE ON THE CONDUCT OF RESEARCH (A5001)
MIDYEAR MEETING WORKSHOP

List of Attendees

NAME	ORGANIZATION	PHONE NUMBER	FAX NUMBER
Ariniello, Alex	Colorado State Univ.	800/262-7623	303/491-8671
Benke, Robert J.	Minnesota DOT	612/282-2267	612/296-6599
Bentenson, Wade	Utah DOT	801/965-4303	801/965-4796
Betsold, Robert J.	FHWA	703/285-2054	703/285-2379
Brach, Ann	Maryland Hwy. Adm.	410/321-3577	410/321-2208
Brown, William F.	FHWA	703/285-2774	703/285-2791
Carr, William P.	Washington State DOT	206/705-7802	206/705-6823
Dietz, Arlene	U.S. Army Corps of Engrs.	703/355-2071	703/355-0047
Donnelly, Denis E.	Consultant	303/985-2245	303/985-2245
Edwards, Paul	Utah DOT	801/965-4115	801/965-4796
Evans, Bill	FHWA	703/285-3081	703/285-2379
Griffin, Rich	Colorado DOT	303/757-9506	303/757-9974
Griffith, Ray	FHWA	202/366-9210	202/366-7909
Harder, Barbara	B.T. Harder, Inc.	215/735-2482	215/735-9586
Harm, Eric	Illinois DOT	217/782-6732	217/782-2572
Harrington-Hughes, Kathryn	Harrington-Hughes Assoc.	202/347-1414	202/347-6938
Hedges, Christopher	Trans. Assn. of Canada	613/736-1350	613/736-1395
Huft, David	S. Dakota DOT	605/773-3358	605/773-3921
Irwin, Lynne	Cornell University	607/255-8033	607/255-4080
Marti, Mike	Braun Intertec Corp.	612/942-3044	612/942-3059
McGinnis, Laurie	Univ. of Minnesota	612/625-3019	612/625-6381
McReynolds, Richard	Kansas DOT	913/296-7410	913/296-2526
Metcalf, John	Louisiana State Univ.	504/388-4911	504/388-4945
Moore, Beth	Colorado DOT	303/757-9220	303/757-9242
Perry, Robert	New York State DOT	518/457-5826	518/457-7535
Port, Roger	FHWA, Region 7	816/276-2740	816/363-3347
Reilly, Eugene	Consultant	908/549-5212	908/549-2262
Rothenberg, Morris	JHK & Associates	703/370-2411	703/823-8347
Schmiedlin, Robert	Wisconsin DOT	608/246-7950	608/246-4669
Shaffer, Douglas	TRB	202/334-2298	202/334-2003
Spicher, Robert E.	TRB	202/334-2935	202/334-2003
Strong, Pat	North Carolina DOT	919/733-9770	919/715-0137
Turnbull, Katherine	Texas Transportation Inst.	409/845-1535	409/845-6008

APPENDIX B BREAKOUT SUMMARIES

PROGRAM DEVELOPMENT (BREAKOUT A)

Opening Remarks

Transportation research along with the utilization and development of new technology is an essential cornerstone of effective transportation system management efforts. Many transportation agencies have a commitment toward research and development of new technology. A vital aspect of the transportation research and experimental process, as well as in the development of new technology, is in the identification of research needs. A needs identification process can be useful in development of top priority research projects for near-term start-up. Thus, needs identification is a key issue in the research development process.

The process can shift direction of research from a reactive role to a more proactive role with the involvement of all elements of the transportation work force. This process can identify the immediate practical research needs using minimal resources and staff. For the purpose of identifying transportation research needs, the process can be efficient and effective.

Topics Discussed

The originally assigned topics were

- Program Development to Meet Agency Needs;
- Public/Private Partnerships;
- Responding to Customer/User Needs;
- Marketing the Research Program;
- Program Organization and Administration; and
- Personnel Development and Training in Research.

After brainstorming, synthesis and prioritization by the workshop participants, five topics were identified as worthy of future attention. These were

- What Makes People Support Research?
- Strategic Planning
- Public/Private Partnerships
- Personnel Development and Training in Research
- What Makes a Program Effective?

Recorder Notes

What Makes People Support Research?

The management and operation of a research program can easily be carried on without clear direction of user needs. This condition frequently results in findings being "put on the shelf" with little, if any, implementation. Consequently, those outside the research program do not provide the support to maintain a sustainable and dynamic program. The following issues are in need of consideration in order to obtain support for the research program:

- CAO/top management issues;
- Legislative issues;
- Public issues;
- Internal issues;
- Communications issues;
- Champions; and
- Look beyond traditional transportation agencies.

Action Needed

There is a need to identify organizational and cultural factors conducive to supporting research. The topic could be submitted to the AASHTO Standing Committee on Research for consideration as part of the Work Plan for Task 9 of the AASHTO Reauthorization Initiative. This activity consists of a review and update of the 1989 AASHTO report *Innovation: A Strategy for Research, Development, and Technology Transfer.*

Interested Agencies

NCHRP, FHWA, or AASHTO could lead the effort in providing overall program guidance and encouragement to the user agencies.

Discussion/Justification

- How to get CAO to encourage/support research.
- Outreach programs to CAO/top management.
- How do we get and keep good people in research?

There is a need for making the fundamental reasons for supporting research more explicit. Researchers may have taken for granted the importance of these activities, neglecting to remind decision-makers and the public of the relationship of research to products they value. A process of "enlightenment" needs to be established to build intellectual conviction regarding research and a sense of the value of research when products are implemented. Side issues such as marketing, good writing skills, development of clear and attractive presentations, and other communication techniques also need to be addressed. The thrust of this effort is to identify barriers and how to break the barriers down.

Strategic Planning

A transportation agency's overall goal and mission should be the basis for developing a short and long term strategic plan for the research program. This plan should be developed in concert with the agency management and the principal program users. The research program administrators and staff should then use this strategic direction to address its future operation given the following factors:

- Mission of research organization;
- Integration within organizations;
- Resources and funding sources;
- User needs and involvement;
- Agency top management involvement;
- Integration with parent organization;
- Role of basic research;
- Changing technology;
- Problem identification and prioritization; and
- Technology transfer process and feedback.

Action Needed

A study should be conducted to develop a strategic planning methodology for research programs at the federal, state, and local levels. This would address the items noted above. The study would provide a uniform process and help ensure that resources for research activities are maintained and conducted. The methodology could be developed with a research or synthesis study. It is suggested that the study request be initiated by the AASHTO Research Advisory Committee with support from state and other transportation research organizations.

Interested Agencies

Any number of agencies could do this work. However, the main user would be AASHTO to provide uniform guidance to its member transportation agencies. Also, broad support of the project could result in funding from multiple sources. The final product should be submitted to the AASHTO RAC for their consideration and then included in the FHWA R & D Program Manual.

Discussion/Justification

There is a need to develop a strategic planning methodology that could be used by all groups interested in developing and conducting transportation research. This would include state and local agencies, universities, private sector groups, and federal agencies and organizations. As such, the methodology will help ensure coordinated approaches in transportation research throughout the country and will assist in managing ongoing research programs.

Public/Private Partnerships

A government-sponsored research agenda has developed into a complex process. One aspect of that process is the public/private partnerships that are developed to help define the research agenda. To define these partnerships, the following situations and factors should be considered and described:

- Identify partners;
- Identify opportunities;
- Identify barriers;
- Case studies;
- Enabling legislation; and
- Cultivate differences/similarities.

Action Needed

Activities currently underway through the Intelligent Transportation System program should be considered as a resource to develop strategies for facilitating public/private partnerships in program development. In addition, current state-of-the-practice activities should be considered. This could be sponsored by the AASHTO SCOR with consideration for development of a Research Digest or "quick synthesis" document. A national pooled

fund DOT/FHWA staff supported project could also be considered.

Interested Agencies

State DOTs should be encouraged to promote public/private partnerships within their agency seminars, conferences, and partnering activities. Legislators should also be invited to participate. AASHTO could work with national agencies such as the National Governors Association and political leaders on developing this concept.

Discussion/Justification

The cooperative efforts between the public and private sector is the "wave of the future" in the transportation industry. Therefore, the project is timely. The early completion of such a project will produce more effective and productive partnerships.

Funding for such a project could come from a number of sources close to the customers. These include the states, universities, military, federal government, and private industry.

Personnel Development and Training in Research

Personnel managing and operating within the research program should exhibit unique characteristics. These qualifications should be recognized and rewarded for their contribution to a successful research program. Items that should be considered in developing and training of personnel within the research program are

- Dual career path development;
- Skill needs assessment;
- Cross training;
- Training models (national training);
- Equitable compensation;
- Staff retention;
- Networking;
- Personnel qualifications and training requirements to support multi-model transportation research and development programs;
- Emerging technologies;
- University developmental curriculum;
- Organizational cultural factors conducive to research support;
- Communications with CAOs;
- Outreach programs to CAOs; and
- How to get and keep good people in research.

Action Needed

Identify personnel qualification requirements, personnel development, training, and education needs to support multi-modal transportation research and development programs. Identify existing programs and efforts to incite these needs. Determine where expanding existing programs, implementing new programs, or coordinating efforts with other groups is needed. These requirements should be clearly identified and published for use by transportation agency research administrators.

It is suggested that this topic be submitted to AASHTO SCOR for overall consideration, and perhaps to the AASHTO Personnel Committee.

Interested Agencies

All organizations who have research, management, operations, and construction responsibilities such as TRB, NCHRP, AASHTO, FHWA, local governments, universities, and others could be the main agencies with interest in this activity. The Civil Engineering Research Foundation (CERF) could also help address these qualifications.

It is also suggested that other TRB committees (i.e., Committee A1A02, Management and Productivity) or possibly the FHWA National Highway Institute program could undertake this topic as a task force activity. It is anticipated that the final product be included in the AASHTO RAC Manual and the FHWA R&D Guidelines.

Discussion/Justification

Ensuring that a pool of qualified transportation professionals continues to be available will be critical to the future success of the transportation system. The dramatic changes in technology and policy directives, as well as the evolving needs of system users, mandates that professional training and development also change. This project will assess the current and future needs for professional training and development for all types of transportation officials and will outline the best approaches to meet these needs. This may include expanding existing programs, developing new training and education programs, and coordinating the activities of other transportation groups.

This project should be coordinated with the development of a model university curriculum for educating tomorrow's researchers.

What Makes a Program Effective?

Several research programs have long been recognized for their leadership in the industry and using state-of-the-art procedures. This recognition comes from within their agencies as well as from their peers. The following are items that should be considered by research program managers in order to help develop and maintain an effective program:

- Multi-modal;
- Customer involvement/satisfaction;
- Strategic plans;
- Multi-skilled staff; and
- Case studies.

Action Needed

A synthesis of effective research organizational structures is needed for use throughout the transportation sector. (Synthesis studies currently underway could be extended to include this topic). This document could provide guidance in developing a sustainable research program. Conditions for application would be for agencies developing or restructuring a research program or those agencies looking for guidance in making their research program more effective.

Interested Agencies

A synthesis could be developed by TRB with guidance or sponsorship from FHWA, AASHTO, and other engineering organizations. The primary user would become AASHTO, its membership, and those public and private organizations providing research services.

Discussion/Justification

A typical synthesis of state-of-the-practice could be developed which illustrates the basic requirements for an effective program. This could then be used as a starting point to identify the research requirements. However, it is anticipated at this stage that the synthesis would not get into details of how best to achieve the requirements.

RESEARCH METHODOLOGY (BREAKOUT B)

Opening Remarks

The chairman began the workshop discussion by indicating that a more up-front emphasis should be given to determining and agreeing on a measurable objective or hypothesis and an experimental design or research approach. If a goal is identified and a plan is developed to achieve it, generally the data issues become less of a problem. A message should be sent - do not collect data and then try to formulate the question. On the other hand, even with a well thought-out and planned project, the data issues are still significant.

Additional comments included:

- More emphasis on cost-effective data management resulting from ISTEA management systems.
- Data systems must be configured to save managerial, technical and non-technical needs while still adhering to standardization protocols.
- Shortage of professional expertise to skillfully develop and manage data bases.
- Clear impact of new technologies on data base development.
- Need for specialized training in transportation data base development and management.

Topics Discussed

This workshop developed one topic for future consideration:

- A Methodology for Both Basic and Applied Transportation Research Studies.

This topic was discussed and presented in a "report" format. Items to be covered in the "report" table of contents were identified.

Recorder Notes

A Methodology for Both Basic and Applied Transportation Research Studies

A distinct difference has long been recognized between basic and applied research. These differences require unique approaches to developing, sustaining, and implementing research studies or projects within these categories.

TABLE 1 MANUAL FOR SCIENTIFIC INQUIRY INTO TRANSPORTATION PROBLEMS: RESEARCH METHODOLOGIES

Table of Contents	
Chapter 1	Introduction (Need for Professional and Ethical Research Practices)
Chapter 2	The Principles of Scientific Inquiry
Chapter 3	Objectives (Quality, Methods, Results, etc.)
Chapter 4	Definition of Terms
Chapter 5	Experimental Design Approaches
Chapter 6	Data Collection, Management, and Reporting (Concepts and Issues)
Chapter 7	Analysis and Interpretation
Chapter 8	Presentation of Results (Data Presentation Techniques)
Chapter 9	Summary
Appendix I	Recommended Training and Development Courses
Appendix II	Peer-Review Issues Concerning Research Objectives, Experimental Design, and Data Analysis and Management
Appendix III	Case Studies of Data Analysis and Management Practices
Appendix IV	Literature Search and Review Principles
Appendix V	Non-Data-Driven Results: Policy Studies and Project Evaluation Studies
Appendix VI	Checklist: Quality Research Design and Project Design Parameters
Appendix VII	Bibliography and Other Recommended Readings

Action Needed

There is a need to assemble existing information concerning research project planning and management into a manual of transportation research practice. The manual will be of value to both basic and applied research practitioners and managers. This developmental activity should be titled, Manual for Scientific Inquiry Into Transportation Problems: Research Methodologies. Course instruction should be developed in conjunction with the manual. (Note: On April 23, 1995, the AASHTO Standing Committee on Highways approved $75,000 under NCHRP Project 20-7 for the proposed study.)

Interested Agencies

The Transportation Research Board, Task Force on Statistical Methods in Transportation (A3T51); National Cooperative Highway Research Program; Federal Highway Administration, National Highway Institute Training Program; and, the AASHTO Standing Committee on Research and the Research Advisory Committee.

Discussion/Justification

Transportation research managers and practitioners need one comprehensive source of information for proven methods of research, project planning, and execution. The proposed manual should advance state-of-the-art techniques for project planning, experimental design, research, data collection, management, quality control, analysis, and interpretation. Instruction that accompanies this manual should meet the specific needs of both the research principal investigators and research program managers. This instruction should emphasize state-of-the-art procedures for data quality control and

data interpretation. Throughout this process, consideration for implementation of the final product should be maintained.

The format for this manual was recommended by the workshop participants and is presented in Table 1.

DISSEMINATION OF INFORMATION/ INFORMATION EXCHANGE (BREAKOUT C)

Opening Remarks

The chair pointed out that the transportation sector is dependent upon good resource information at all levels, including administration, operations, and research. However, because of limitations in staff and funding, good data are often not available.

The value of good information is difficult to quantify in a way that would support the need for research to improve information resources. The lack of information or bad information is very costly to transportation organizations because inefficiencies result. The added value of new information (research) needs to be identified.

A previous TRB study identified the lack of commitment to research by the transportation community. As a result, the public sector became more aware of the need for transportation research, and Congress funded additional research including the Strategic Highway Research Program (SHRP), and major institutions devoted resources to transportation issues. The information resources and needs in private industry need to be identified and publicized in a similar way.

Topics Discussed

The top priority issue identified by this breakout is the need to market/recognize the value of information.

Recorder Notes

There is a need to market/recognize the value of information. Incremental improvements in access to information could lead to big payoffs for transportation agencies and industry. How can we effectively and efficiently link information resources with needs? There is a need to document the use and value of information in solving problems.

Action Needed

An NRC study is needed on the cost and value of information as a national resource. This study should be conducted by a blue-ribbon committee. The proposed report should be strategic in nature and cover issues from a global prospective.

Items to be studied include:

- Value to the nation's well-being (cost of information vs. cost of lack of information). Case studies should be included.
- Cultural issues — Public agency vs private organization's approach to information. Bottom-line orientation.
- Discussion of existing system of information exchange and suggestions for alternative models. Getting the right information in the right form to the right people at the right time.
- Dissemination via linking to information superhighway.
- Industry analysis of next steps/how to use the reported information.

It is anticipated that TRB Committee A5001, Conduct of Research, would seek ways to implement the study's findings.

Interested Agencies

This activity covers a broad spectrum and should be of interest to the entire transportation community. This includes industry, state DOTs, local agencies, FHWA, LTAP centers, academia, associations, and others.

The proposed NRC study could be commissioned by AASHTO, FHWA, Bureau of Transportation Statistics, National Institute of Standards and Technology, etc.

Discussion/Justification

Information is a valuable, but often untapped, national resource. The single largest problem faced by information-exchange agencies is the overriding lack of understanding of the value both of information and of access to that information. Research conducted and knowledge gained at laboratories and agencies around the country often go unrecognized by the transportation community as a whole, because of an unawareness of, and a lack of easy access to, the information. This lack of awareness and access is inefficient and costly, causing

agencies to unknowingly duplicate the work of others and fail to add others' experiences and findings to their knowledge base.

Even as the technology to aid in information exchange continues to improve (for example, the information superhighway, computer networks, CD-ROM interactive technology), budget constraints are prompting the closing of transportation libraries — the linchpin in the information retrieval and dissemination process — at both the state and federal levels. The result — problems getting new information into the system, accessing the information, encouraging local and global information exchange, and so forth.

The first step in overcoming the problem in the *process* of information exchange is overcoming the *perception* issue - there needs to be an improved awareness of the value of information - and especially the cost of the lack of information. Acquiring information can be costly, but it is often more costly in the long run to do without that information. A blue-ribbon committee, appointed by the National Research Council, should address this issue.

RESEARCH, DEVELOPMENT, AND TECHNOLOGY TRANSFER COORDINATION (BREAKOUT D)

Opening Remarks

A major emphasis needs to be placed on coordinated efforts to address the administrative, technical, and funding requirements of R, D, and T^2. These items should be well-identified for consideration by national agencies for inclusion in their research programs. The exchange of information is needed to avoid duplication of these efforts and to enhance effectiveness and to maintain efficiency of operations. Information exchange also is required to relay the state-of-the-art related to what is working and what can be enhanced in the research, development, and technology transfer process. Coordination is needed to pool resources across jurisdiction boundaries. This is also the case at the national/international, public/private, and transportation/non-transportation industry levels.

Topics Discussed

The four most important topics identified in this breakout were

- Assessment of Future Transportation Research and Avoidance of Research Duplication Among Agencies;
- Assessment of Transportation Databases and Needs;
- Strategies for Networking Transportation Research; and
- Identification of Opportunities for International Transportation Research Coordination and Cooperation.

In addition, a strategic plan for R, D, and T^2 transportation data coordination was discussed. Items identified for inclusion:

- What do we have?
- What do we need?
- Access.
- What new products and services are needed?
- One-stop shopping.
- Coordinating with existing studies and initiatives.

Recorder Notes

Assessment of Future Transportation Research and Avoidance of Research Duplication Among Agencies

There is a great deal of transportation research being planned and conducted by a wide range of groups. These include federal agencies, national organizations, state departments of transportation, universities, transit agencies, MPOs, and private sector groups. Although databases, such as TRIS, provide a good source of information on completed reports and ongoing studies, there is not a good source of information on research being planned, and major issues being considered for future research studies. A database containing this information is needed to help facilitate greater coordination among research programs and to help ensure that duplication of efforts does not occur.

Action Needed

Research Coordination Study: A research study would be conducted to examine potential mechanisms and methods for establishing a database containing information on planned transportation research projects and issues being considered for future research efforts. The study would examine the extent to which these topics are included in existing databases. Based on this review, alternative approaches would be identified and evaluated to improve existing databases or to establish a new database. The advantages, disadvantages, costs, and issues associated with each approach would be analyzed. Based on this assessment a recommended approach would be outlined. This would include a plan for developing the recommended system. It would include the steps necessary to implement the recommended approach, the costs and potential funding

sources, and procedures for updating and maintaining the database. The assessment would consider both public and private sector research activities.

One possibility would be to expand the TRIS data base to include information pertaining to all transportation agencies regardless of funding sources. This would include public/private partnership programs, private and other grants, and other sources such as NSF, ASCE, ASTM, CERF, and others. The expanded format would also include planned and future research issues.

Interested Agencies

A variety of agencies and groups across all modes of transportation would be interested in this research study. These include TRB, NCHRP, FHWA/NHI, FHWA/RTCC, NHTSA, FTA, ASCE/CERF, AASHTO, states, MPOs, local jurisdictions, universities, private sector groups, and others.

Discussion/Justification

It is difficult to maintain accurate, complete, and up-to-date databases on research which is underway or complete. The states, FHWA, and others are providing this information to TRB/TRIS, and the new SPR regulations should cause states to make greater use of the system, both on the input and output sides. However, the dynamic and changing nature of national, state, and local research programs makes this information quickly out of date.

Even more difficult, would be the inclusion of planned research and future issues in these systems. Nonetheless, the establishment of a database containing information on transportation research in-progress, planned research projects, and future issues would help enhance coordination of research activities and assist in ensuring that duplication of efforts does not occur.

This research study would be of benefit to all groups interested in enhancing coordination on research and development activities and technology transfer. At some point in time it might be appropriate for the principal agencies involved in the above, such as AASHTO, TRB, FHWA, etc., to address the issue of research program coordination by providing a strategic implementation plan.

Assessment of Transportation Databases and Needs

Currently, a wide range of databases provide information on transportation research projects and reports. Further, numerous databases are available containing additional information on transportation-related activities and information on other research fields. However, there appears to be limited knowledge about how to access and utilize these databases, along with the exact content of each. A better understanding of the nature, content, availability, and access techniques for these databases is needed to ensure that they are a useful part of the ongoing transportation research program. Further, enhancing the understanding and use of these databases will help facilitate communication and coordination of transportation research.

Action Needed

Research Study: A research study should be conducted to assess current transportation databases and future needs. This assessment would start with the identification and examination of all transportation databases, as well as those in related fields. This would include examining the content and focus, the methods for access—both entering information and obtaining information—quality control mechanisms, relevant issues, and potential areas for improvements and enhanced coordination. Further, the study would define the future vision for a one-stop shopping transportation database and identify the steps needed to accomplish this goal. A TRB Special Projects study, outlined by the Conduct of Research Committee, is recommended to accomplish this objective.

Interested Agencies

A variety of agencies and groups would be interested in this research study. These include TRB, FHWA/NHI, FHWA/RTCC, FTA, NHTSA, ASCE/CERF, AASHTO, states, MPOs, local jurisdictions, universities, private sector groups, and others.

Discussion/Justification

This research study would be of benefit to all groups interested in enhancing the use and quality of transportation databases. This would help ensure that all groups interested in transportation research and

improving the transportation system have access to the best available information on the results of past research projects and other efforts. This activity would help fulfill the objectives of the TRIS current efforts to enhance and further the use of TRIS in other transportation environments.

Strategies for Networking Transportation Research

Networking with other experts is often the best way to obtain current information on the status and results of transportation research. Information exchange is needed at the regional, multi-state, national and international levels. Waiting for research reports to be published, and to find their way into the appropriate databases, is often not an effective approach. In order to ensure that networking is a viable option, however, agencies and businesses must provide the needed support. This includes financial, as well as corporate, support from all levels. This support is not present in some agencies and organizations, and, thus, networking is not effective.

Action Needed

TRB should examine the issues and opportunities to be associated with expanding the networking capabilities in transportation research. The review should examine the value of networking, the cost associated with networking, the organizational and cultural factors needed to encourage and nurture networking, necessary policy and top administrative support, and the identification of specific strategies to support expanded networking capabilities. Opportunities to use new technologies to enhance networking would be identified and evaluated. Further, the potential to develop and maintain a listing of experts—both agency and individual—would be considered. A set of recommended strategies would be developed to enhance networking capabilities among all groups. The results of the review, perhaps conducted by the TRB Conduct of Research Committee, should be widely disseminated.

Interested Agencies

A variety of agencies and groups would be interested in this study. These include TRB, NCHRP, FHWA/NHI, FHWA/RTCC, NHTSA, FTA, ASCE/CERF, AASHTO, states, MPOs, local jurisdictions, universities, private sector groups, and others.

Discussion/Justification

This review would be of benefit to all groups interested in improving coordination on research and development activities and technology transfer. Enhancing networking opportunities would be of benefit to individuals and organizations responsible for conducting, sponsoring, and coordinating transportation research.

Identification of Opportunities for International Transportation Research Coordination and Cooperation

In addition to transportation research being conducted in North America, numerous projects are underway throughout the world. Current transportation research databases contain very little information about research activities outside of North America. This situation should be addressed to help ensure the timely sharing of information and to help coordinate transportation research on a worldwide basis.

Action Needed

Synthesis Study: A synthesis study should be conducted to examine current international transportation research coordination and cooperation as well as identify opportunities to expand and enhance these efforts. The study would document and review existing efforts—including those by FHWA, other U.S. DOT agencies, universities, and private sector groups. Participation in international activities sponsored by such organizations as the International Road Federation, the World Bank, and others would be assessed. Barriers to participating in these agency programs, meetings, and conferences would be identified along with recommendations to alleviate these barriers. This information would be used to identify potential techniques and approaches to improve international coordination and cooperation efforts. The costs and benefits associated with each method would be identified and analyzed. It would also assess methods to encourage greater participation and identify the steps and funding necessary to implement these techniques. This study will be recommended as a NCHRP Synthesis Study by TRB Conduct of Research Committee.

Interested Agencies

A variety of agencies and groups would be interested in this synthesis study. These include TRB, NCHRP,

FHWA/NHI, FHWA/RTCC, NHTSA, FTA, ASCE/CERF, AASHTO, states, MPOs, local jurisdictions, universities, private sector groups, World Bank, foreign countries, and others.

Discussion/Justification

This synthesis study would be of benefit to all groups interested in enhancing coordination on research and development activities and technology transfer, especially those interested in enhancing international coordination and cooperation. The synthesis would identify current methods of cooperation, techniques to improve this process, identify ways to expand participation, funding resource needs, and steps to undertake international cooperation. Chief administrative official (CAO) peer-to-peer contacts are suggested as one successful approach.

TRANSPORTATION RESEARCH BOARD
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

ADDRESS CORRECTION REQUESTED

NATIONAL ACADEMY PRESS

ANNEXE F

TRB Committee A5001 Conduct of Research

U.S. Department of Transportation
Federal Highway Administration

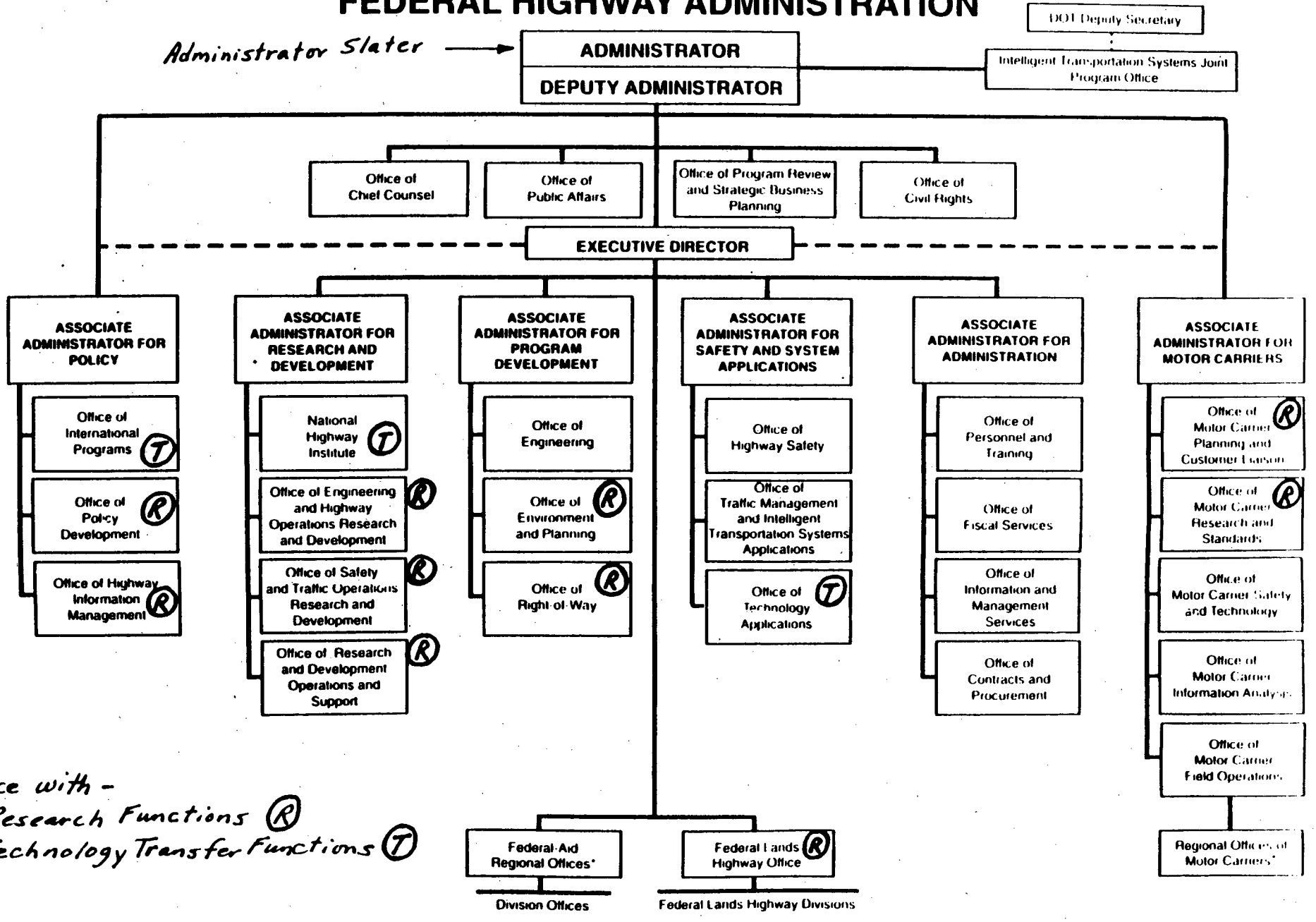
Bob Kreklau

January 9, 1996

Organization

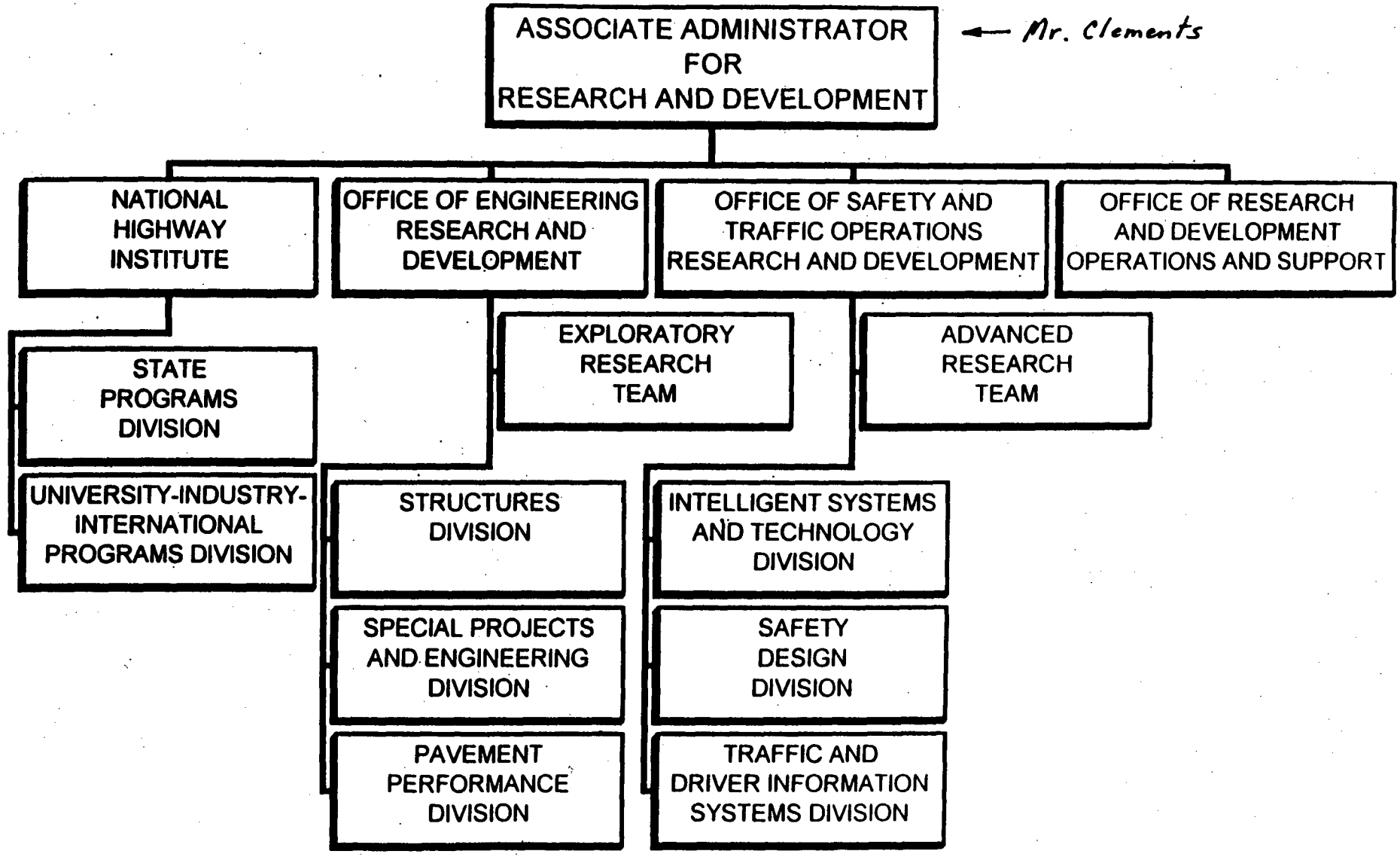
- FHWA Organization
- Turner-Fairbank Highway Research Center (TFHRC)

FEDERAL HIGHWAY ADMINISTRATION



Office with -
Research Functions (R)
Technology Transfer Functions (T)

OFFICE OF RESEARCH AND DEVELOPMENT



September 22, 1995

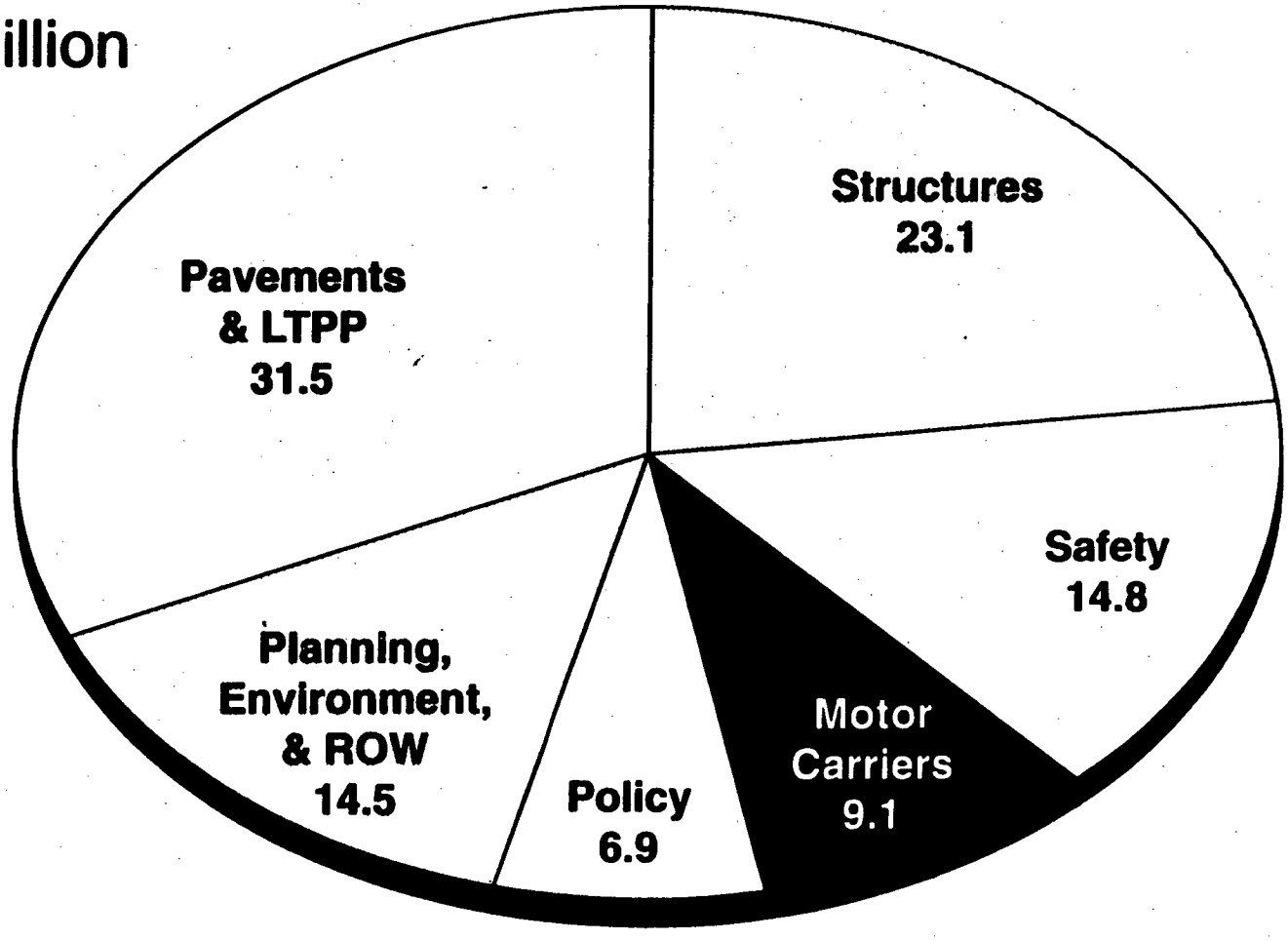
FY 1996 Budget & Programs

- Research & Technology Development
- R&T Development and Technology Transfer
- R&T Development and T^2 Programs
- ITS Program
- R&T Programs

Research & Technology Development

1996

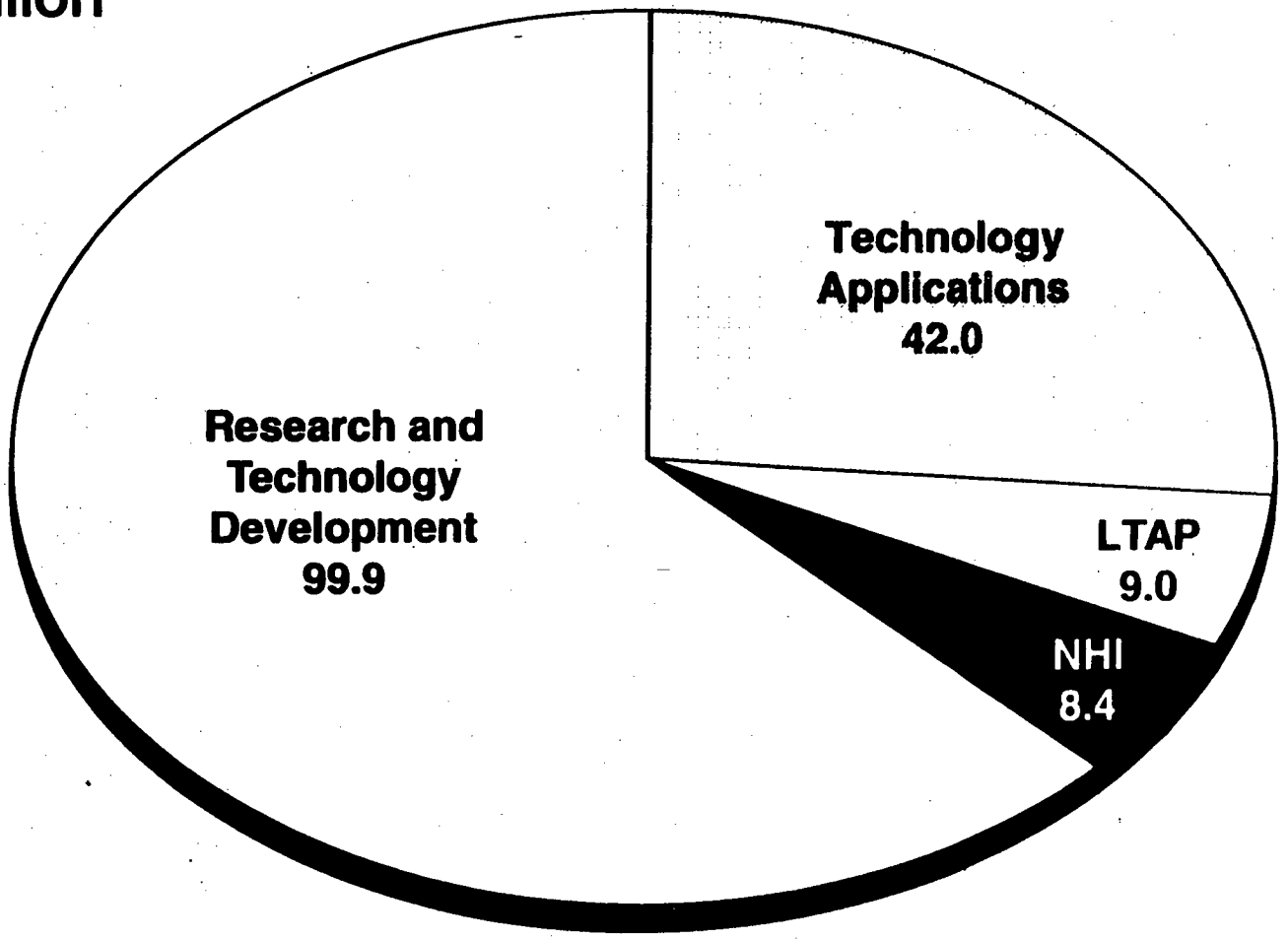
$99.9 Million



Research and Technology Development and Technology Transfer

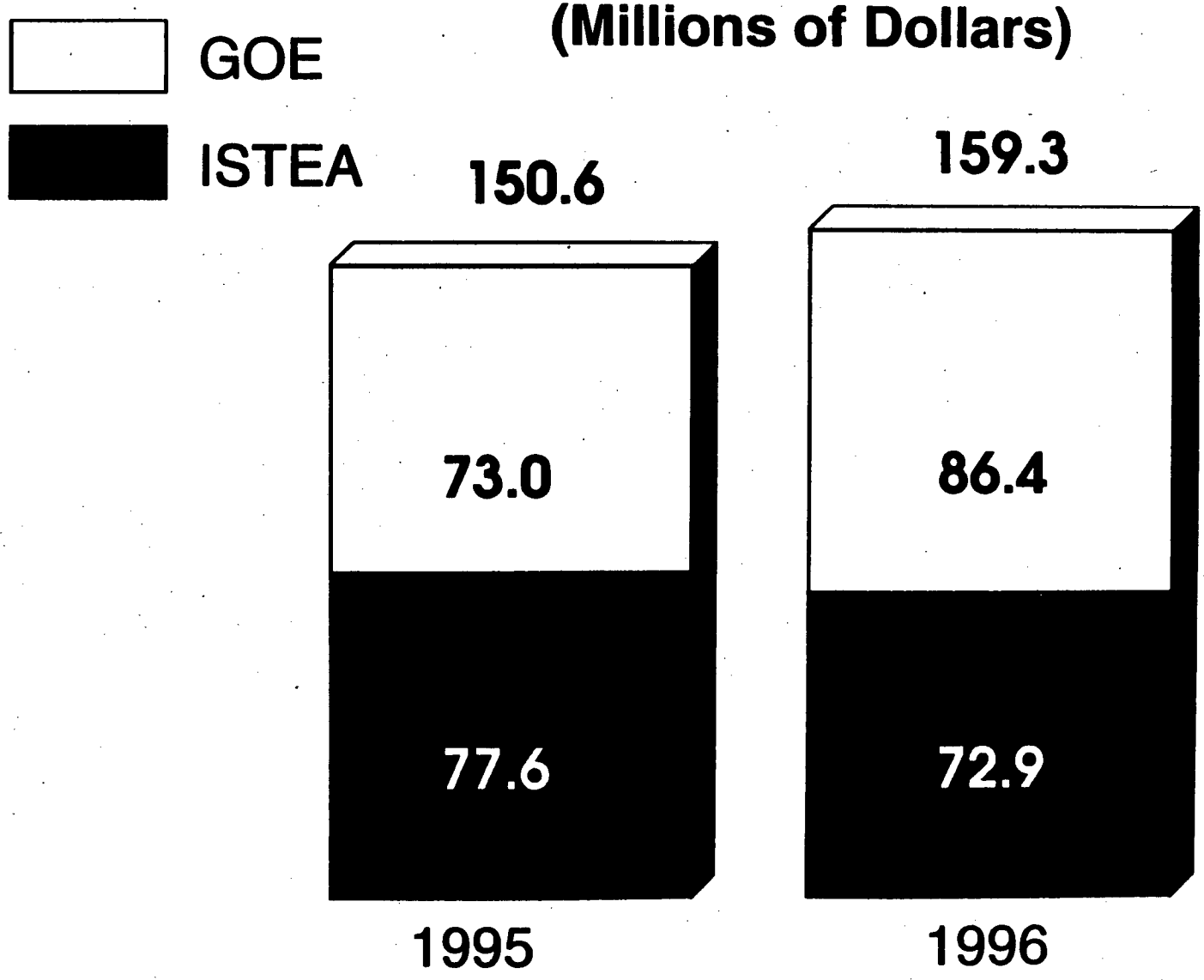
1996

$159.3 Million

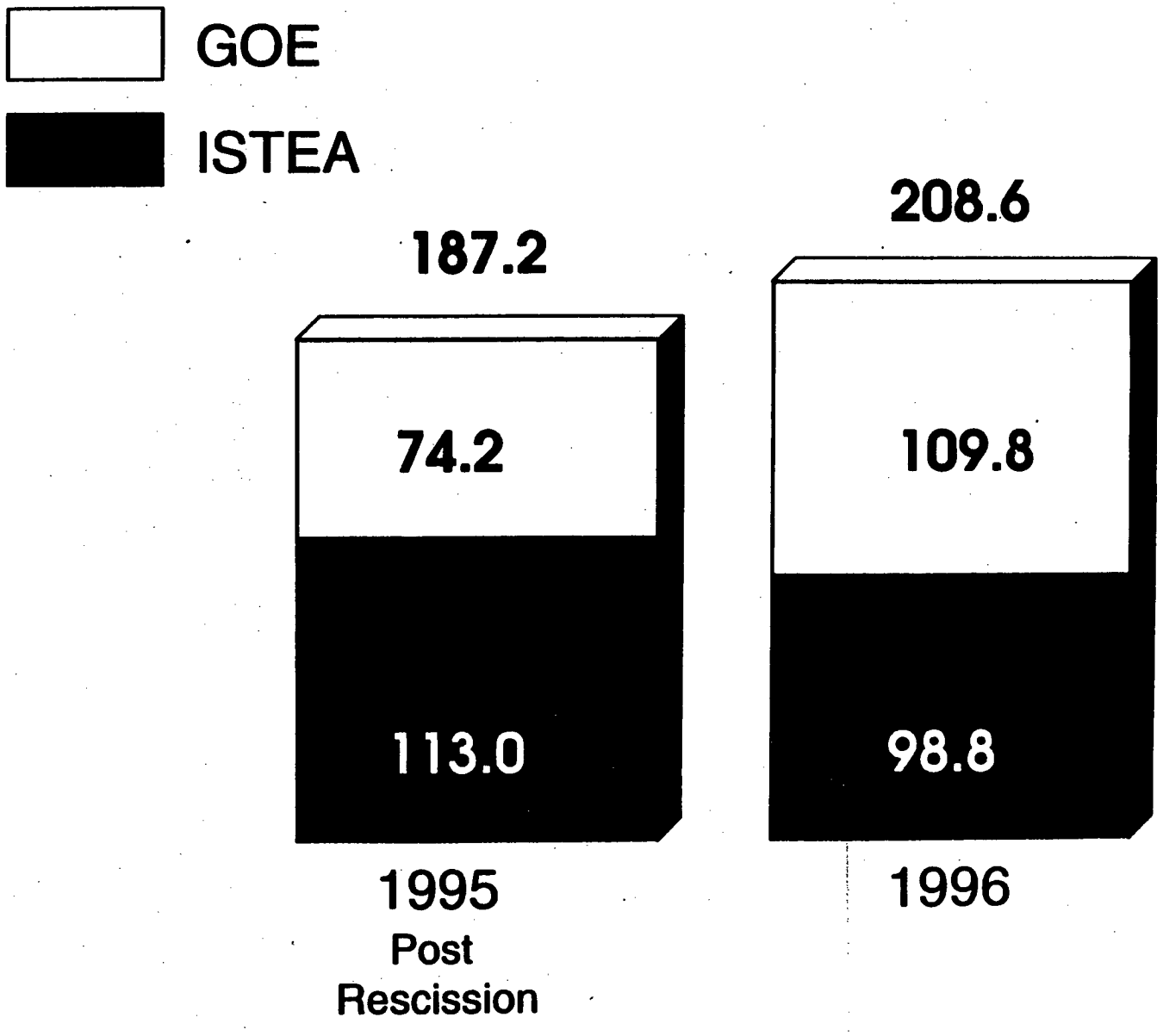


FHWA Research and Technology Development and Technology Transfer Programs

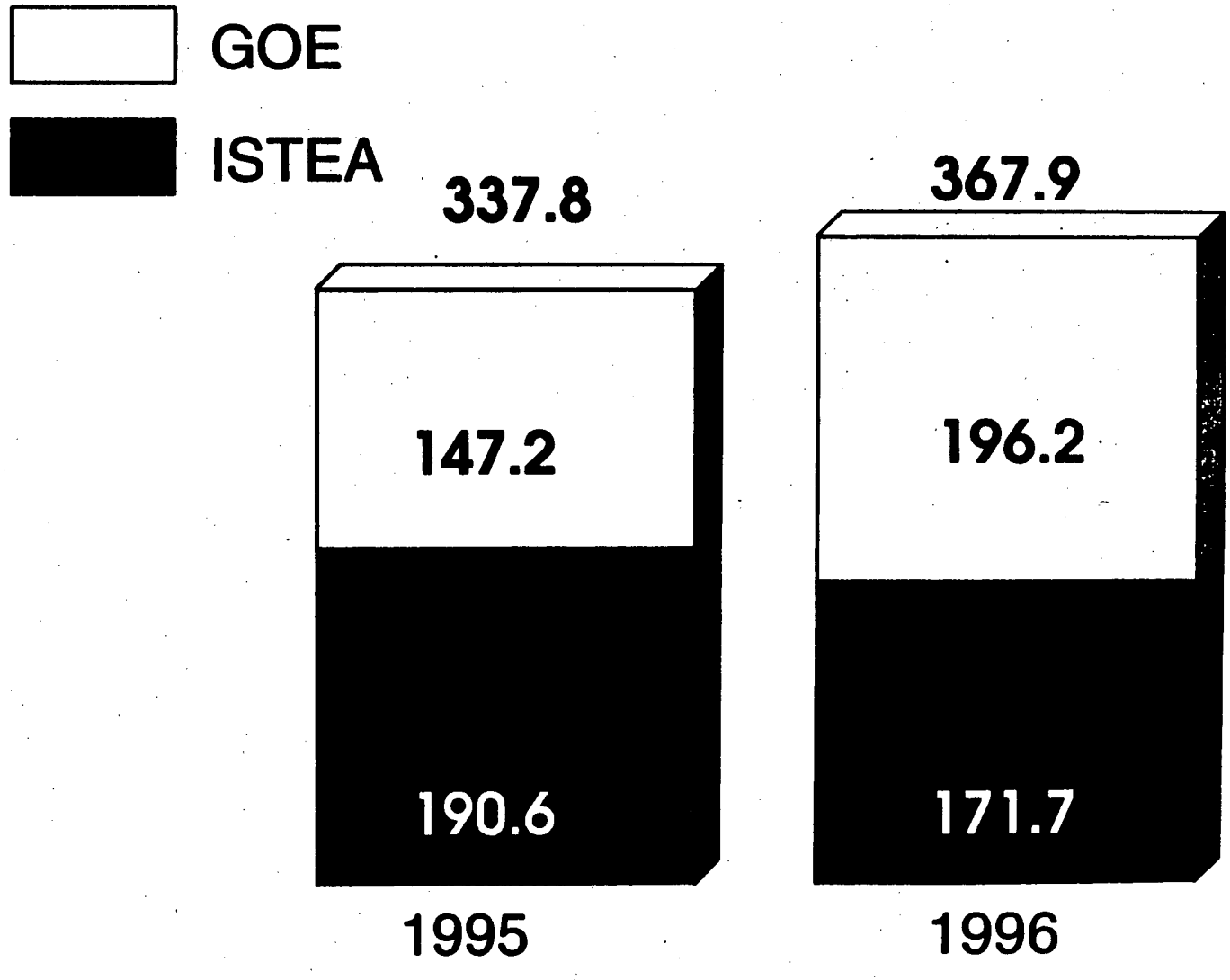
(Millions of Dollars)



FHWA ITS Program
(Millions of Dollars)



FHWA R&T Programs
(Millions of Dollars)



FHWA R&T Programs

- 1995 Research and Technology Program Highlights
- 1995 Achievements Report
- Internet -TFHRC Home Page

ATTACHMENT

U S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

HIGHWAY PLANNING AND RESEARCH
25% MANDATORY FOR RESEARCH
DEVELOPMENT AND TECHNOLOGY TRANSFER
FOR FISCAL YEAR 1996

STATES	TOTAL HPR	25% RD&TT	REMAINING AVAILABLE FOR HPR
ALABAMA	4,520,157	1,130,039	3,390,118
ALASKA	3,622,579	905,644	2,716,935
ARIZONA	3,165,143	791,285	2,373,858
ARKANSAS	2,879,921	719,980	2,159,941
CALIFORNIA	21,906,839	5,476,709	16,430,130
COLORADO	3,504,865	876,216	2,628,649
CONNECTICUT	4,668,423	1,167,105	3,501,318
DELAWARE	1,197,725	299,431	898,294
DIST. OF COL.	1,287,458	321,864	965,594
FLORIDA	9,800,988	2,450,247	7,350,741
GEORGIA	6,566,433	1,641,608	4,924,825
HAWAII	2,099,119	524,779	1,574,340
IDAHO	1,785,265	446,316	1,338,949
ILLINOIS	9,299,027	2,324,756	6,974,271
INDIANA	4,946,163	1,236,540	3,709,623
IOWA	3,502,237	875,559	2,626,678
KANSAS	3,196,722	799,180	2,397,542
KENTUCKY	3,723,521	930,880	2,792,641
LOUISIANA	4,183,046	1,045,761	3,137,285
MAINE	1,456,449	364,112	1,092,337
MARYLAND	3,954,871	988,717	2,966,154
MASSACHUSETTS	11,080,471	2,770,117	8,310,354
MICHIGAN	6,592,159	1,648,039	4,944,120
MINNESOTA	4,485,777	1,121,444	3,364,333
MISSISSIPPI	3,238,335	809,583	2,428,752
MISSOURI	6,142,617	1,535,654	4,606,963
MONTANA	2,705,211	676,302	2,028,909
NEBRASKA	2,414,041	603,510	1,810,531
NEVADA	1,763,499	440,874	1,322,625
NEW HAMPSHIRE	1,415,760	353,940	1,061,820
NEW JERSEY	6,678,772	1,669,693	5,009,079
NEW MEXICO	2,970,191	742,547	2,227,644
NEW YORK	13,662,901	3,415,725	10,247,176
NORTH CAROLINA	6,643,731	1,660,932	4,982,799
NORTH DAKOTA	1,719,892	429,973	1,289,919
OHIO	8,800,122	2,200,030	6,600,092
OKLAHOMA	3,414,585	853,646	2,560,939
OREGON	3,091,728	772,932	2,318,796
PENNSYLVANIA	9,996,688	2,499,172	7,497,516
RHODE ISLAND	1,416,716	354,179	1,062,537
SOUTH CAROLINA	3,445,766	861,441	2,584,325
SOUTH DAKOTA	1,893,855	473,463	1,420,392
TENNESSEE	5,493,079	1,373,269	4,119,810
TEXAS	16,937,744	4,234,436	12,703,308
UTAH	2,155,239	538,809	1,616,430
VERMONT	1,284,939	321,234	963,705
VIRGINIA	5,139,659	1,284,914	3,854,745
WASHINGTON	5,541,717	1,385,429	4,156,288
WEST VIRGINIA	2,767,574	691,893	2,075,681
WISCONSIN	4,904,636	1,226,159	3,678,477
WYOMING	1,894,320	473,580	1,420,740
PUERTO RICO	1,383,524	345,881	1,037,643
TOTAL	252,342,199	63,085,528	189,256,671
APPROPRIATION CODE		086	081

SHRP ASSESSMENT PROJECT

The $150,000 million expended on the SHRP program is the largest amount ever devoted to a single program of transportation infrastructure research. An analysis of this investment should be extremely useful to FHWA and state transportation agencies.

An assessment of the benefits of SHRP began June 1995. It is being funded by the Federal Highway Administration and guided by the TRB/SHRP Committee.

The SHRP Assessment project has the following objectives:

1. Demonstrate return on investment.
2. Develop tools for promoting technology transfer.
3. Develop information for national and state legislators.
4. Justify the need to continue performing research, development and implementation activities.
5. Develop information that can be used for public relations, marketing and information for the general public.
6. Develop a model for subsequent SHRP implementation evaluations.

The study investigates usage of SHRP products by product clusters, such as asphalt, highway operations, superpave, etc. It also examines usage of products that result in improved design and defines savings associated with improved methods.

The project is coordinated by the Nevada T^2 Center. There are three project teams and an Advisory Group. One team is composed of six T^2 Centers -- Florida, Indiana, Minnesota, Nevada, Pennsylvania and Texas -- which are collecting data on a regional basis. A second team, composed of engineers and economist at the Texas Transportation Institute under the direction of Charlie Wootan, is conducting an economic analysis of SHRP products using information collected by the T^2 Centers as well as information from other sources. A third team, which includes people knowledgeable about public relations, will put together a plan of action for communicating the findings to state legislators and the public. The Advisory Group consists of members from AASHTO, FHWA, industry, state DOTs, industry and the TRB/SHRP Committee.

One hundred and forty-three case studies from 42 states have been identified. The information collected will be useful to highway agencies and industry. For example, people will learn what others are doing and what their experiences have been. They will be better informed when making decisions on equipment purchases because they will have cost/benefits information.

The assessment has identified 23 states using superpave, 7 states using products to help them identify corrosion problems in concrete structures, 15 states using products related to safety and 13 states using products related to winter operations.

A cost-benefit analysis using a computer program called MICROBENCOST is underway. This analysis evaluates the potential cost savings due to SHRP product usage.

The findings will be published in the form of case studies, in the *Focus* publication, the SHRP information clearinghouse and at meetings and conferences. Informational packages for legislators, state CAOs, public information officers, state transportation engineers and the public are being development.

Maria Ardila-Coulson
University of Nevada-Reno

SHRP ASSESSMENT PROJECT

Maria Ardila-Coulson
University of Nevada, Reno

$150 MILLION RESEARCH PROGRAM

- Small Investment Could Lead to Big Payoff
  - Construction
  - Maintenance
- Ended in 1993

TRB/SHRP COMMITTEE

- FHWA to Assess
  - Return on Investment
  - Effectiveness of Research Programs
- Began June 1995

OBJECTIVES

- Return on Investment
- Assist Technology Transfer
- Need for Research, Development and Implementation
- Public Relations and Marketing to Public
- Information for Legislative Bodies
- Model for Future Assessment

TASK A

- Case Histories - T2 Centers
  - Texas, Nevada
  - Pennsylvania, Minnesota
  - Florida, Indiana
- Review Panel
  - FHWA, TRB
  - UNR, KHH

TASK B

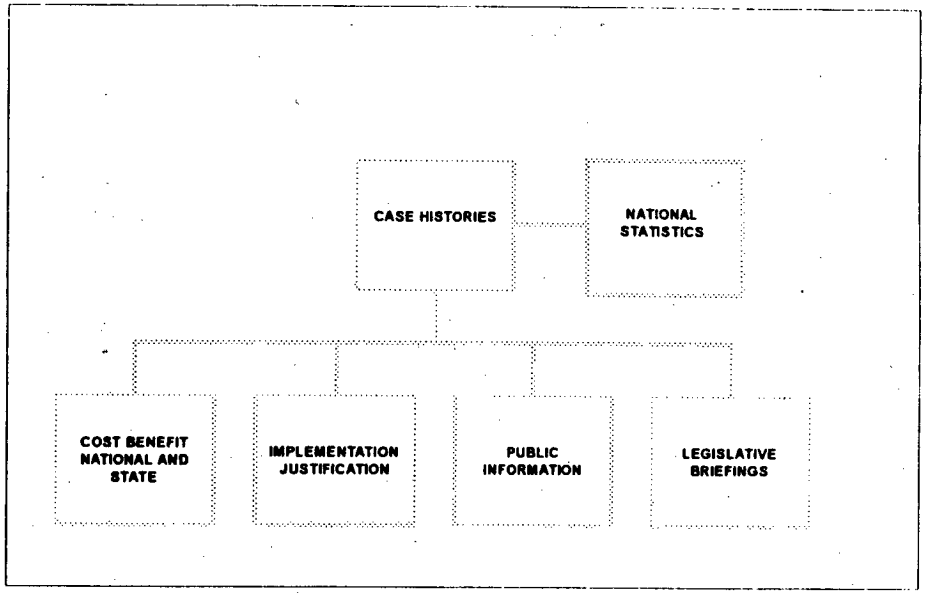
- TTI
  - Analysis
  - Report
- Technical Steering Group
  - ETG
  - TWG

TASK C

- PTI
  - Communications
  - Informational Materials
- Technical Steering Group
  - Public Affairs
  - Team Members

CASE HISTORIES

- 143 from 42 States and Puerto Rico



COLLECTED INFORMATION

- Useful to Highway Agencies and Industry
  - Avoids Reinventing the Wheel
  - Provides Cost /Benefit Analysis
  - Provides Data for CAOs, Legislators, PIOs, etc.

SUPERPAVE

- 23 States

  - High Initial Cost
  - Expected Reduced Maintenance
  - Good Performance
  - Life of High Volume Roads Expected to Increase

TEXAS

"A gross estimate of savings by implementation of the SUPERPAVE binder Specification is placed at $2.2 billion over 30 years."

HOT MIX ASPHALT

- Products - SUPERPAVE
  - Binder
  - Mixture
- Annual Expenditures
  - $12 to $15 Billion
- Extend Life 1 Year
  - Agency Cost ($250 Million)
  - User Cost

CONCRETE AND STRUCTURES (2000)

- 7 States

  - Corrosion
  - ASR
  - Several Tests

ALASKA

- Chloride Content Test
  - Savings of $1,400 per Bridge
  - Savings to Date $95,200
  - Initial Investment $2,200

HIGHWAY OPERATIONS (3000)

- Stop Slow Paddle
- 15 States
  - Easy to Handle
  - Increase Sense of Protection to workers
  - Useful for Night Work
  - Well Accepted by Workers
  - Difficult to put Cost Value on Improved Safety

HIGHWAY OPERATIONS (3000)

- RWIS

- 13 States
  - Effective in Scheduling Maintenance and Construction Work
  - Difficult to Obtain Cost/Benefit Data

WASHINGTON

- RWIS

  - Reduce Overtime Cost
  - Reduce Sand Cost
  - Reduce Environmental Impact
  - Total Savings in 3 Storms $6977

HIGHWAY OPERATIONS (3000)

- Anti-Icing
- 11 States

  - Reduce Overtime Cost
  - Reduce Sand Cost
  - Reduce Deterioration of Pavement Markings

COLORADO

- Anti-Icing

  - Savings of $2,700 per Lane Mile

HIGHWAY OPERATIONS (3000)

- Intrusion Alarm
- Opposing Lane Divider
- Multi-Directional Barricade
- Portable Rumble Strip

PAVEMENT ENGINEERING (4000 - 5000)

- FWD
- Distress Identification Manual

DATA BASES

- Reports
- State Contacts

TASK B

COST BENEFIT ANALYSIS

COST-BENEFIT ANALYSIS

- National Figures
- MICROBENCOST
  - Evaluates Potential Cost Savings

TASK C

COMMUNICATIONS

COMMUNICATE FINDINGS

- Case Histories
- Articles in *Focus*
- SHRP Information Clearinghouse
- Meetings and Conferences

AUDIENCES

- Legislators
- State CAOs
- Public Information Officers
- State Transportation Engineers
- Public

Extracted from
TCRP ANNUAL REPORT OF PROGRESS 1995

INTRODUCTION

The Transit Cooperative Research Program (TCRP) was established in 1992 to provide a continuing program of applied research on transit issues. The program is sponsored by the Federal Transit Administration (FTA) and carried out under a three-way agreement among the National Academy of Sciences (the Academy), acting through its Transportation Research Board (TRB); the Transit Development Corporation, an educational and research arm of the American Public Transit Association (APTA); and the FTA.

The TCRP focuses on issues significant to the transit industry, with emphasis on developing near-term research solutions to a variety of transit problems involving facilities, service concepts, operations, policy, planning, human resources, maintenance, and administrative practices. The TCRP is intended to build on a history of successful cooperative research programs including the National Cooperative Transit Research and Development Program (NCTRP), the National Cooperative Highway Research Program (NCHRP), and the Strategic Highway Research Program (SHRP). All of these programs have been managed by units of the Academy, with the NCTRP and NCHRP handled by the TRB.

The TCRP is a unique undertaking. In essence, anyone with an interest in public transportation may play a role in setting the research agenda for the program by submitting research problem statements to TRB at any time. Also, problem statements are solicited annually by means of a mailing to more than 1,300 individuals representing transit agencies, metropolitan planning organizations, universities, and federal agencies. The final selection of research projects is the responsibility of the TCRP Oversight and Project Selection (TOPS) Committee. The TOPS Committee consists of industry executives, representing the primary beneficiaries of TCRP research. It functions as the TCRP governing board and sets research priorities.

HOW TCRP PROGRAMS ARE FORMULATED

The annual research program is the foundation of the TCRP. Formulating the annual program, i.e., identifying the highest priority projects to be researched in a given fiscal year, is probably the most important duty of the TOPS Committee. Projects to be funded are based on the TOPS Committee's assessment of current problems facing transit agencies. The programming process encompasses a series of six steps.

First, research statements are solicited periodically by TCRP staff, but they may be submitted to TRB by anyone at any time. Research problem statements describing problems in the industry are typically submitted by individuals representing

- Transit Agencies
- APTA Committees
- TRB Staff/Committees
- Federal Transit Administration
- Universities
- Consultants

Table 1 shows the origin of problem statements submitted during 1993, 1994, and 1995.

Second, FTA reviews problem statements and submits comments. One of the criteria used by FTA in the review is support of the FTA Vision Strategies in the FTA Strategic Plan. The eight Vision Strategies are:

1. Maximize security and safety of transit systems for service users
2. Foster customer-oriented public transportation
3. Foster industry adaptability to enable the industry to respond to changes in transportation patterns, technologies, and needs
4. Maximize a multimodal approach to transportation
5. Ensure quality organization that emphasizes mutual respect
6. Ensure highest level of transit service assistance delivery
7. Promote linkages between transit needs and community needs
8. Foster a positive image for public transportation and FTA

Third, screening workshops are conducted to evaluate candidate problem statements and to recommend problems for consideration by the TOPS Committee.

The screening panels consider, in addition to the FTA Vision Strategies, four strategic priorities adopted for the 1996–1997 TCRP Strategic Plan:

1. Place the customer first
2. Improve transit productivity
3. Make ISTEA work
4. Streamline transit agencies

The problem statements are screened to determine the following:

- If the problem supports the FTA Strategic Plan and the TCRP Strategic Plan
- If the problem is important to transit agencies
- If the problem is researchable
- If the contemplated research is timely
- If successful research will produce significant benefits
- If the probability of success of the proposed study is sufficiently high

- If the proposed study can be designed to avoid undesirable duplication of other completed or ongoing research
- If the proposed study is appropriate for TCRP or if it should be performed elsewhere

Fourth, FTA reviews and comments on the problem statements after screening, and then a short list of problem statements is presented to the TOPS Committee for consideration in formulating each year's program.

Fifth, the technical merits of the problems that survive the screening by FTA and the screening workshops are further evaluated by the TOPS Committee at an annual meeting held for this purpose. Based on all of the comments and discussions, the TOPS Committee selects the program of projects for the next program year.

Finally, each year's program is referred to the TRB for review, acceptance, and execution.

In addition to this process, in some years, prioritized problem statements are submitted to TCRP from specialty conferences or from TCRP project panels.

TABLE 1 ORIGIN OF PROBLEM STATEMENTS

	Second Round (Mar '93)		Third Round (Dec '93)		Fourth Round (Feb '95)		Fifth Round (Dec '95)	
ORGANIZATION	NO.	%	NO.	%	NO.	%	NO.	%
Transit/Local Agency	36	24.1	61	48.8	88	39.6	67	41.9
State DOT	17	11.4	13	10.4	7	3.2	13	8.1
FTA	19*	12.8	1	0.8	18	8.1	9	5.6
APTA Committees/Staff	6	4.0	10	8.0	13	5.9	9	5.6
TRB Committees/Staff	29	19.5	4	3.2	14	6.3	11	6.9
Industry	4	2.7	10	8.0	0	0.0	0	0.0
University	20	13.4	15	12.0	14	6.3	11	6.9
Consultants	12	8.1	9	7.2	48	21.2	26	16.3
Other	6	4.0	2	1.6	21	9.4	14	8.7
Totals	149	100.0	125	100.0	223	100.0	160	100.0

* Second Round also includes FHWA submissions

RESEARCH PROGRAM

To initiate TCRP's first studies, the TOPS Committee authorized an "Early Start Program." This program began as a result of a 2-day workshop that was held in November 1991 in Washington, DC. During this workshop, 250 problem statements were considered. A consensus was reached on 49 problem statements to be recommended to the TOPS Committee for the Early Start Program. The TOPS Committee considered these recommended problems at its meetings in April and July 1992 and formulated the initial round of 32 research projects and syntheses.

In calendar year 1993, 149 problem statements in the second round were considered by screening panels and 125 in the third round. From the second round, the TOPS Committee selected an additional 17 research projects and 8 syntheses for the fiscal year 1993 program. From the third round, the TOPS Committee selected 15 research projects for the FY 1994 program and allocated sufficient resources to fund 6 synthesis topics, which were specified by the J-7 project panel. Two hundred twenty-three problem statements were submitted for the 1995 program year. Additional problem statements were also generated by the TCRP H-5 workshop, *Identification of Research Needs to Increase U.S. Transit Ridership*, which was held November 18–19, 1994. TCRP Project Panel H-4, *Transit Policy Studies*, met November 2, 1994, and submitted problem statements in the area of transit policy research. One hundred sixty problem statements were submitted for the 1996 program year.

Research projects involve original research, which includes data collection, analysis, and preparation of materials for use by the transit industry. Syntheses search out and assemble useful knowledge from all available sources, especially from practitioners, and report on current practices in the subject area.

To date, the TCRP includes 144 authorized study activities: 72 research projects, 28 syntheses, 13 IDEA (Innovations Deserving Exploratory Analysis) investigations, 18 legal studies, and 13 quick-response studies.

FINANCING THE PROGRAM

ISTEA provided for TCRP funding to be derived from a formula-based drawdown on federal appropriations for transit. Up to $88 million was authorized by ISTEA through fiscal year 1997. A total of $8.92 million was appropriated for TCRP in fiscal year 1992, $7.75 million for fiscal year 1993, $8.475 million each for fiscal years 1994 and 1995, and $8.25 million is anticipated for fiscal year 1996.

HOW THE TCRP IS ORGANIZED TO ADMINISTER RESEARCH PROGRAMS

Nine research fields and 44 problem areas are used to classify TCRP research (refer to Figure 1). The distribution of all projects and syntheses through fiscal year 1995 is shown in Table 2. Those projects (listed below) that do not conveniently fit under one of the first eight subject fields are assigned to the ninth one, Special Projects:

- J-1: *Dissemination and Implementation of Research Findings*
- J-2: *TCRP Strategic Planning Process and Strategic Plan*
- J-3: *International Transit Studies Program*
- J-4: *Innovations Deserving Exploratory Analysis—The Transit IDEA Program*
- J-5: *Legal Aspects of Transit and Intermodal Transportation Programs*
- J-6: *Quick Response for Special Needs*
- J-7: *Synthesis of Information Related to Transit Problems*

Problem Areas		
RESEARCH FIELD A **Operations**	**RESEARCH FIELD B** **Service Configuration**	**RESEARCH FIELD C** **Engineering of Vehicle and Equipment**
11 Scheduling 12 Vehicle Operations 13 Control Systems 14 Fare Collection 15 User Information Systems 16 Safety and Security	21 System Planning 22 Specialized Service Planning 23 Service Performance 24 Marketing	31 Buses 32 Vans 33 Heavy Rail Cars 34 Commuter Rail Vehicles 35 Light Rail Cars 36 People-Mover Vehicles 37 Vehicle Components
RESEARCH FIELD D **Engineering of Fixed Facilities**	**RESEARCH FIELD E** **Maintenance**	**RESEARCH FIELD F** **Human Resources**
41 Buildings 42 Rail Operating Facilities 43 Passenger Stations and Terminals 44 Bus Stop Facilities	51 Vehicle Servicing 52 Vehicle Inspections and Maintenance 53 Vehicle Corrective Repairs 54 Overhaul and Rebuilding 55 Non-Vehicle Maintenance 56 Maintenance Management	61 Recruitment 62 Training 63 Employee Reviews 64 Job Classification 65 Salary Administration 66 Labor Relations 67 Performance Improvement Programs
RESEARCH FIELD G **Administration**	**RESEARCH FIELD H** **Policy and Planning**	**RESEARCH FIELD J** **Special Projects**
71 Financial Management 72 Procurement and Inventory Control 73 Risk Management 74 Law 75 Management Information Systems 76 Transit Organizations	81 Policy Analysis 82 Planning 83 Economics 84 Environmental Analysis	91 Areas not covered elsewhere.

Figure 1. TCRP Classification System.

TABLE 2 DISTRIBUTION OF PROJECTS AND SYNTHESES BY FIELD THROUGH FY 1995

Research Fields	Number of Projects	Number of Syntheses
Operations	14	8
Service Configuration	11	2
Engineering of Vehicles and Equipment	9	5
Engineering of Fixed Facilities	6	2
Maintenance	4	1
Human Resources	6	4
Administration	4	5
Policy and Planning	15	1
Special Projects	7	0

PROJECT PANELS

Each project is assigned to a panel appointed by the TRB. Members are drawn from the organizations listed in Table 3 and to comprise a well-balanced group in terms of professional qualifications as well as geographic, age, gender, and ethnic considerations as listed in Table 4. Nominations for members of new panels are solicited through a mailing to more than 1,300 individuals, including representatives of women's and minority organizations. For most panels, more than four nominees are received for each available slot. Emphasis on selection of well-balanced panels has resulted in membership that reflects the diversity in the transit industry.

Panels have four important responsibilities:

1. Defining the scope of the study in a Research Project Statement (Request for Proposals);
2. Selecting a contractor from among the agencies submitting proposals;
3. Monitoring the research over the duration of the contract; and
4. Reviewing the final report.

HOW THE PROJECTS ARE PLACED UNDER CONTRACT

TCRP is intended to concentrate on low-risk, applied research projects with relatively quick turnaround. The program is directed at problems of an immediate, near-term nature that can be undertaken with moderate research funds. TCRP project-funding levels are typically less than $400,000. As the TCRP gets each year's program under way, the project panels meet to write Research Project Statements (Requests for Proposals) based on the research problems referred by the TOPS Committee.

These statements are then sent to the approximately 5,000 individuals and research agencies on the TCRP mailing list. In 1996, Research Project Statements will also be available on the Internet. Proposals are submitted according to fixed deadlines; extensions are not granted. Submittals have ranged from 3 to 25 proposals per project.

It is important to note that the opportunity to propose is open to anyone. Agency selection is based on the following factors: (1) the proposer's demonstrated

understanding of the problem; (2) the merit of the proposed research approach and experiment design; (3) experience, qualifications, and objectivity of the research team in the same or closely related problem areas; (4) the plan for ensuring application of results; and (5) the adequacy of the facilities. Staff and panel members evaluate all proposals based on these criteria.

The funds available for a specific project are specified in the Research Project Statement, and contract awards cannot exceed this amount. Cost-proposal line items are examined to determine the reasonableness of the allocation of funds and staffing to the various tasks. The unit costs of the research proposed and such elements as compensation for key personnel, distribution of effort for key tasks, overhead rate, size of any fixed fee, and those expenditures included in direct costs are evaluated.

At a second panel meeting, typically held about 30 days after the panel members have received the proposals, agency selection is made. Panel members candidly discuss all aspects of each agency's known performance on other research projects. These panel deliberations are privileged. Agency selection is made by a formal vote of all panel members excluding staff and liaison representatives. Successful proposals are retained by the panel members for use in monitoring the research.

Following the selection meeting, TCRP staff notifies the first-choice organization of its selection. After the Academy's Office of Contracts and Grants completes the financial investigation, a contract between the Academy and the research agency is executed, and the research commences.

The policy of the TCRP is to provide a debriefing to unsuccessful proposers on request. The debriefing is intended to indicate to the proposers the technical areas in which their proposals were judged weak and deficient.

The Academy's research contract is normally one of the following types:

- Cost Reimbursement (CR)
- Cost Reimbursement plus Fixed Fee (CRPFF)
- Fixed Price (FP)

The Academy decides, in agreement with the agency, which type of contract will be signed in each case. The research agency's proposal is made a part of the contract with the Academy. Thus, in addition to the specific objectives outlined in the contract, the research agency's cost estimates are also recognized as being part of the agreement. However, the principal investigator does have flexibility in conducting the research, if it is consistent with the general scheme of the proposal.

MONITORING RESEARCH IN PROGRESS

Once research begins, the TCRP staff monitors the administrative and technical progress of the project in accordance with the approved proposal and amplified work plan, to ensure conformance with contractual obligations. The project panel maintains control over the research process during execution of the study. Its first involvement is the approval of the researcher's amplified work plan. This amplified plan is due 15 days after the contract start date. It provides a detailed expansion of the research plan and furnishes a complete description of the activities to be pursued in conducting the research. Its purpose is to assist the staff in its monitoring activities and to provide further technical panel guidance to the researcher.

TABLE 3 RESEARCH PROJECT PANEL COMPOSITION BY AFFILIATION

Affiliation	No. of Panel Participants	%
Transit System	295	49.6
State Gov't	42	7.0
Local Gov't	29	4.9
Federal Gov't	19	3.2
Academia	79	13.3
Industry/Consultants	102	17.1
Other	29	4.9
Total	595*	100.0

* Approximately an additional 300 volunteers serve on synthesis and other special project panels.

TABLE 4 RESEARCH PROJECT PANEL COMPOSITION BY RACE AND GENDER

Composition	No. of Panel Chairs	%	No. of Panel Members	%
RACE				
White	52	76.5	450	81.2
Minorities	16	23.5	104	18.8
Total	68	100.0	554**	100.0
GENDER				
Male	47	69.1	449	75.5
Female	21	30.9	146	24.5
Total	68	100.0	595	100.0

** 41 abstentions

The TCRP staff review quarterly progress reports and monthly progress schedules, and maintain telephone contact with the principal investigators. TCRP project managers visit their assigned research agencies throughout the contract periods and discuss with each principal investigator the project's status to learn if the research is being pursued in accordance with the approved research plan. Finally, the project manager and the corresponding project panel evaluate the completed research to determine the degree of technical compliance with the contract.

PROMOTING DISSEMINATION AND APPLICATION OF RESEARCH RESULTS

In an applied research program such as the TCRP, it is expected that research results are not only accurate but also usable. In the TCRP brochure, *Information and Instructions for Preparing Proposals*, proposers are encouraged to include a section in their proposals on "Applicability of Results to Transit Practice." This section should clearly describe how the anticipated research results can be used to improve transit practices and indicate the

expected audience for research results. This measure is taken to help ensure that final research reports are presented in language that is understandable to transit managers, professionals, and administrators.

Thus, research agencies for the TCRP are required to report their results in a form that succinctly summarizes the findings for the busy administrator and likewise informs the transit practitioner of the application of the findings. These objectives are accomplished through a summary of findings and a chapter on "Interpretation, Appraisal, and Application of Results." The detailed research techniques and analyses, which are of interest primarily to other researchers, are presented in appendices that do not have to be read by practitioners to extract the findings. The Program specifies style and organization of all reports to guide the researchers in their writing so that the maximum use by the practitioner may be obtained.

In addition to publication, measures are taken to ensure that useful research results are made immediately available to the appropriate personnel. One means consists of advance distribution of the researcher's draft final report to selected potential users. Another consists of publishing TCRP research results digests. Digests promote early awareness of project results to encourage implementation. For the most part, digests are brief summaries of specific findings—they do not deal with research methodology—and require the reader to expend very little time in determining how the research results may be of use. The contents are organized in terms of the problem and the solution to it, the findings, and the applications.

After publication, products are distributed widely through TRB's distribution system. Copies are sent directly to at least 2,000 TRB members who request transit publications as well as to about 100 libraries, 50 TRB transit representatives, and more than 150 university-liaison representatives. As a further means of disseminating the research reports, announcements of their availability are sent to the trade press. FTA personnel automatically receive copies of each published report providing an additional conduit through which direct contact with possible users can be initiated. TRB also maintains warehouse copies, and lists products annually in the TRB catalog.

Further dissemination of the reports and support products is carried out according to the Dissemination Plan developed by APTA under TCRP Project J-1, *Dissemination and Implementation of Research Findings.* APTA selects a target audience for the products of each research project and ensures that these individuals receive the material. Between 1,000 and 2,000 copies of each document are distributed in this manner in additional to those distributed directly to TRB members. Announcements of products are routinely published in *Passenger Transport* and *TRNews.* APTA is also including sessions on research in its conferences, and researchers are encouraged to present findings at APTA and TRB conferences. APTA is also developing a plan for presenting selected research results in formats more accessible to practitioners, e.g., workshops, handbooks, videos, and training aids. A TCRP Home Page on the Internet has been implemented to aid in the dissemination of findings.

Under TCRP Project J-1, a TCRP "fellows" program is being established with the assistance of the Conference of Minority Transportation Officials (COMTO). COMTO will assist APTA in creating a network of geographically distributed fellows who will be briefed on TCRP products and will then represent the TCRP at regional seminars and conferences.

CURRENT STATUS

In the period from August 1992 when the first TCRP grant was received through December 1995, 142 study activities have been initiated:

- 69 Research projects
- 3 Special projects (J-1, J-2, and J-3) in addition to those listed below
- 13 Transit IDEA investigations (J-4)
- 18 Transit legal studies (J-5)
- 13 Quick response studies (J-6)
- 28 Transit syntheses (J-7)

Eighteen research projects have been completed as of December 31, 1995. (See Tables 6 through 10 for a summary of project status.) Project completion means that the panel has reviewed the draft final report and the research agency has submitted a final report that incorporates the panel comments. Before publication, the editorial staff of the Cooperative Research Programs checks the document thoroughly for accuracy and then oversees typesetting and publication. Table 5 lists all TCRP publications, including eight published reports resulting from completed research projects. The agency final report for TCRP Project F-2, *Innovative Labor-Management Practices*, is available on a loan basis, and 7 projects are in the publication process:

A-1: *Fare Policies, Structures, and Technologies*
A-5: *Integration of Light Rail Transit into City Streets*
A-8: *Rail Transit Capacity*
B-1: *Transit Operations for Individuals with Disabilities*
C-5: *Impact of Radio Frequency Refarming on Transit Communications*
E-1: *Innovative Maintenance Procedures for Transit Buses*
E-3: *Inventory Management for Bus and Rail Public Transit Systems*

Fourteen syntheses, seven research results digests, four legal research digests, and three IDEA investigations have also been published as shown in Table 5.

In addition to reports, some projects lend themselves to products like video presentations, software, or manuals. For instance, the research agency for TCRP Project C-3, *Wheel/Rail Noise Mitigation*, produced software to assist in analyzing noise mitigation strategies and costs. The software also includes sample noise files (e.g., wheel noise on an 80-ft radius curve), so analysts can demonstrate to managers the problems they are addressing in the field. The research agency for TCRP Project G-3, *Tools for Transit Risk-Exposure Identification and Treatment for Bus Systems*, developed software to assist transit agencies in analyzing their risk exposures and the cost of insurance or other risk-mitigation measures. TCRP Project B-3, *Demand Forecasting for Rural Passenger Transportation*, produced software to implement the demand-forecasting methodology, and TCRP Project A-2, *Service-Delivery Systems for Rural Passenger Transportation*, produced software containing extensive operating statistics and performance measures for rural transit systems of various sizes and classes. TCRP Project D-4, *Visual Impact of Overhead Contact Systems for Electric Transit Vehicles*, produced a report to aid designers and planners in reducing the visual impact of overhead contact systems. TCRP Project F-3, *Total Quality Management In Public Transportation*, produced a video on TQM, and TCRP Project A-5, *Integration of Light Rail into City Streets*, contains information to update the *Manual on Uniform Traffic Control Devices* on light rail operations. TCRP Project H-1, *An Evaluation of the Relationships Between Transit and Urban Form*, is developing a handbook to aid practitioners in addressing land-use issues that affect public transportation. Products like these help to make research results useable.

ACCOMPLISHMENTS—INCEPTION TO PRESENT

In its 3 years, the TCRP has produced the reports and products described above, and these products are being used, sometimes even before the research is finished. Examples of the use of TCRP research results are described below.

TCRP Project C-2, *Applicability of Low-Floor Light Rail Vehicles in North America.* A number of transit systems, e.g., NJ Transit, SEPTA, and Santa Clara County, have used a TCRP database on available low-floor light rail vehicle (LFLRV) technologies and their characteristics as input into the development of potential LFLRV specifications. Santa Clara County reports that the project highlighted the low risk of 70% low-floor vehicles and the advantages for ADA compliance. This influenced its decision to plan for low-floor LRVs. Santa Clara County staff estimate savings on the order of $20 million, because low-floor vehicles provide access by the disabled without having to build expensive ramps. Low-floor vehicles accommodate persons with disabilities, please the general public because the ramps would have detracted from the architectural aesthetics of a downtown transit mall, and save money. This was a win-win decision. The TCRP research project was completed in January 1995, and results were published in TCRP REPORT NO. 2, "Applicability of Low-Floor Light Rail Vehicles in North America."

TCRP Synthesis Topic SC-1, *Safe Operating Procedures for Alternative Fuel Buses.* NJ Transit and several bus manufacturers report that they have used TCRP SYNTHESIS NO. 1, "Safe Operating Procedures for Alternative Fuel Buses," as a planning tool. The Chief Operating Officer of the Flxible Corporation, a bus manufacturer, reported that he made copies available to his staff to inform them of safe handling procedures. At two recent conferences in Pennsylvania on alternative fuel buses sponsored by the Rural Transportation Assistance Program, most of the attendees (approximately 40) reportedly had this document with them or had read it. The majority of knowledge that these operations personnel had about alternative fuels at this point reportedly came from TCRP SYNTHESIS NO. 1. Fuels like methanol, compressed natural gas, and liquified natural gas have characteristics very different from diesel fuel or gasoline and are dangerous if handled incorrectly. This synthesis provides information on safe procedures for handling alternative fuels.

TCRP Project J-6, Task 11, *FCC Proposal to Institute User Fees or to Auction Radio Frequencies.* In June 1995, the Federal Communications Commission (FCC) issued a Further Notice of Proposed Rulemaking (FNPRM) that proposed the possible institution of user fees or the auctioning of radio frequencies to encourage radio spectrum efficiency. Through TCRP Project J-6, *Quick Response for Special Needs,* assistance was provided to APTA to summarize the FNPRM; identify issues; outline feasible alternatives for APTA response; and, through a transit system survey process, assist APTA in developing transit-industry consensus comments to be provided by APTA to the FCC.

TCRP Project E-4, *Guidelines for the Development of Public Transportation Management Systems.* The Intermodal Surface Transportation Efficiency Act of 1991 requires the states to implement a Public Transportation Management System (PTMS); however, the National Highway System Designations Act of 1995 makes the PTMS optional rather than mandatory. TCRP Project E-4, published in October 1995 as TCRP REPORT NO. 5, "Guidelines for Development of Public Transportation Facilities and Equipment Management Systems," produced guidelines for developing a PTMS. The guidelines will facilitate cooperation among state DOTs, transit properties, and other interested parties in developing management systems. The guidelines will still be useful for states that choose to implement a PTMS.

TCRP Project A-5, *Integration of Light Rail Transit into City Streets.* A draft version of a new light rail chapter for the *Manual on Uniform Traffic Control Devices* (MUTCD) has been completed. The TCRP contractor has been working closely with the LRT Subcommittee of the MUTCD Committee on Railroad-Highway Grade Crossings to incorporate a new LRT chapter into the 1997 edition of the MUTCD. The MUTCD is the document that contains nationally accepted standards for roadway signing and signaling, a critical element of traffic safety. Practitioners report that they are anxious for guidelines before embarking on system expansion or major reconstruction projects.

TCRP Project D-4, *Visual Impact of Overhead Contact Systems for Electric Transit Vehicles.* The Assistant General Manager for Engineering and Construction of the Greater Cleveland RTA used the results of this project in planning an RTA extension. The findings of this project—published as TCRP REPORT NO. 7, "Reducing the Visual Impact of Overhead Contact Systems,"—are particularly significant, because citizen opposition to overhead wire is one of the primary roadblocks to LRT acceptance.

TCRP Project J-3, *International Transit Studies Program.* As part of the fall 1994 study mission to Europe, participants found solutions to problems at home. NJ Transit reports that information gathered by staff who participated in the study mission greatly increased NJ Transit's confidence in low-floor light rail cars and helped support the decision to purchase low-floor cars. Also information on transit's contribution to liveable communities in Europe is being used as part of a transit-friendly land use initiative in New Jersey. NJ Transit also reports that information obtained in Europe about contactless smart cards is being evaluated for possible application in New Jersey. European applications have gone beyond testing to implementation. The London Docklands LRT is using moving block signal technology, and American transit agencies that are considering this technology found it reassuring to see that it works in practice as well as in theory. Participants were also impressed with improved transportation efficiencies achieved in Britain through increased use of private contractors and increased competition.

TCRP Synthesis Topic SG-3, *Management Information Systems.* TCRP SYNTHESIS NO. 5, "Management Information Systems," describes the state of automation in public transit agencies, and discusses successful attempts at integration of management information systems. This synthesis provides good examples of applying a systems approach to resolving interface problems between information systems. NJ Transit reports that the synthesis has been useful.

TCRP Project F-3, *Total Quality Management in Public Transportation.* Total quality management (TQM) has not been applied in the public transportation industry to the extent that it has in other industries. TCRP Project F-3 investigated what it would take to apply TQM principals to transit. There was sufficient demand for the findings that TCRP RESEARCH RESULTS DIGEST NO. 3 was prepared, summarizing the results of the first phase of the project. More than 3,000 copies of this document have been distributed. Numerous copies of the full interim report have been requested by public transportation agencies that received the research results digest, and a total quality management guidebook has been published as TCRP REPORT NO. 8, "The Quality Journey: A TQM Roadmap for Public Transportation." Pilot TQM initiatives at four transit agencies were part of the project; the research agency provided technical assistance to advance TQM activities at these sites. The Pee Dee Regional Transportation Authority, for example, reports that with the assistance of the TCRP researchers, an "Employee Customer Code" was developed, which focuses attention on improving performance, increasing quality,

reducing cost and fostering a customer-focused culture. The Spokane Transit Authority, another pilot site, reports that early results and successes are beginning to become apparent, and that Spokane Transit envisions a long-term commitment to TQM. In Chicago, the project coincided with the implementation of the Committee on Shared Interests, a joint union-management initiative to become more customer-focused at the Chicago Transit Authority. All four pilot agencies have found the technical assistance and study findings beneficial.

FY 1996 PROGRAM

In December 1995, the TOPS Committee selected 12 new research projects for fiscal year 1996. In addition, continuation funds were provided for 8 existing projects. (See Table 11 for project titles and allocations.)

SUMMARY

The TCRP focuses on issues significant to the transit industry, with emphasis on developing near-term research solutions to a variety of transit problems involving facilities, service concepts, operations, policy, planning, human resources, maintenance, and administrative practices.

TCRP processes ensure maximum exposure of the research efforts while they are in progress in the hope that research results will, in fact, more quickly find their way into practice in the form of policies, procedures, and specifications by the transit industry.

TABLE 5 TRANSIT COOPERATIVE RESEARCH PROGRAM (TCRP) PUBLICATIONS

No.	REPORT Title, Project, Pages, Price
1	Artificial Intelligence for Transit Railcar Diagnostics (Proj. E-2), 64 p., $20.00
2	Applicability of Low-Floor Light Rail Vehicles in North America (Proj. C-2), 174 p., $31.00
3	Workbook for Estimating Demand for Rural Passenger Transportation (Proj. B-3), 124 p., $28.00
4	Aids for Rail Car Side-Door Observation (Proj. A-3), 130 p., $30.00
5	Guidelines for Development of Public Transportation Facilities and Equipment Management Systems (Proj. E-4), 56 p., $22.00
6	Users' Manual for Assessing Service-Delivery Systems for Rural Passenger Transportation (Proj. A-2), 240 p., $49.00
7	Reducing the Visual Impact of Overhead Contact Systems (Proj. D-4), 90 p., $26.00, in press
8	The Quality Journey: A TQM Roadmap for Public Transportation (Proj. F-3), 80 p., $25.00

No.	RESEARCH RESULTS DIGEST Title, Project, Pages, Price
1	Transit Operations for Individuals with Disabilities (Proj. B-1), 4 p., $10.00
2	Synthesis of Information Related to Transit Problems (Proj. J-7), 4 p., $10.00 (out of print)
3	Total Quality Management in Public Transportation (Proj. F-3), 40 p., $11.00
4	Transit Ridership Initiative (Proj. J-6), 48 p., $12.00
5	Electronic On-Vehicle Passenger Information Displays (Visual and Audible) (Proj. A-4), 6 p., $6.00
6	Research Agenda for Increasing Transit Ridership (Proj. H-5), 16 p., $12.00
7	An Evaluation of the Relationships Between Transit and Urban Form (Proj. H-1), 56 p., $14.00

No.	LEGAL RESEARCH DIGEST Title, Project, Pages, Price
1	Strategies to Facilitate Acquisition and Use of Railroad Right of Way by Transit Providers (Proj. J-5, Topic 1-06), 16 p., $12.00
2	Successful Risk Management for Rideshare and Carpool-Matching Programs (Proj. J-5, Topic 1-07), 24 p., $12.00
3	State Limitations on Tort Liability of Public Transit Operations (Proj. J-5, Topic 1-04), 18 p., $12.00
4	Transit Labor Protection—A Guide to Section 13(c) Federal Transit Act (Proj. J-5, Topic 1-01), 32 p., $12.00

TABLE 5 (cont.)

No.	SYNTHESIS Title, Project, Pages, Price
1	Safe Operating Procedures for Alternative Fuel Buses (Proj. J-7, Topic SC-1), 48 p., $16.00
2	Low-Floor Transit Buses (Proj. J-7, Topic SC-3), 44 p., $12.00
3	Employee Incentive Programs to Improve Transit Performance (Proj. J-7, Topic SF-2), 46 p., $16.00
4	Integration of Bicycles and Transit (Proj. J-7, Topic SB-1), 54 p., $12.00
5	Management Information Systems (Proj. J-7, Topic SG-3), 78 p., $19.00
6	The Role of Performance-Based Measures in Allocating Funding for Transit Operations (Proj. J-7, Topic SG-4), 52 p., $11.00
7	Regulatory Impacts of Design and Retrofit of Bus Maintenance Facilities (Proj. J-7, Topic SD-1), 50 p., $12.00
8	Retrofit of Buses to Meet Clean Air Regulations (Proj. J-7, Topic SC-4), 48 p., $12.00
9	Waste Control Practices at Bus Maintenance Facilities (Proj J-7, Topic SC-2), 26 p., $10.00
10	Bus Route Evaluation Standards (Proj. J-7, Topic SA-1), 54 p., $12.00
11	System-Specific Spare Bus Ratios (Proj. J-7, Topic SA-2), 46 p., $12.00
12	Transit Bus Service Line and Cleaning Functions (Proj. J-7, Topic SE-1), 48 p., $14.00
13	Risk Management for Small and Medium Transit Agencies (Proj. J-7, Topic SG-1), 32 p., $13.00
14	Innovative Suburb-to-Suburb Transit Practices (Proj. J-7, Topic, SB-2), 50 p., $14.00

No.	TRANSIT IDEA Title, Project, Pages
1	Customer Satisfaction Index Developed and Trial Tested in Five Transit Districts to Provide Uniform Yardstick for Measuring and Comparing Customer Satisfaction with Mass Transit (Proj. J-4, IDEA 1), 2 p., no charge
3	High-Speed Laser Scanning Device for Automated Rail-Wheel Wear Data and Safety Inspection (Proj. J-4, IDEA 3), 2 p., no charge
7	Pneumatically Operated and Flexible Wheelchair Restraint System (Proj. J-4, IDEA 7), 2 p., no charge

TRB Committee A5001, "Conduct of Research"
Tuesday, January 9, 1996, 9:00 a.m.
Military Room, Hilton Hotel

AGENDA

Introduction & Welcome — Denis Donnelly

Report on TRB Activities — Robert Spicher

FHWA Organization & Programs — Bob Kreklau

Technology Transfer Committee A5012 Report — Lynne Irwin

Reports on Research Program Activities

- SHRP Research at the Regional Levels — Maria Ardila-Coulson
- Using the Internet for SHRP Product Status — Bill Carr
- Southeastern Transportation Center's Program Development Approach — DiAnna Flinchum
- Facilitating the Implementation of Research Findings — Barbara Harder

Follow-up of A5001 Mid-Year Meeting (1994)

- Synthesis - Conduct of Research Workshop Proceedings — Denis Donnelly
- Manual for Scientific Inquiry into Transportation Problems: Research Methodologies - NCHRP Project 20-7, Task 74 — Bob Perry
- Follow-Up on Other Recommendations, FHWA & Others — Ray Griffith

Planning for 1996 Mid-Year Meeting

- RAC Meeting Program — Richard Stewart
- Committee A5012 Plan — Lynne Irwin
- Committee A5001 Involvement & Topics — Denis Donnelly
  - "A View From The Outside"
    - Marketing R, D & T^2
    - Measurement of Program Effectiveness
    - Performance Based Budgeting
    - Partnering/Peer Review

1997 Session Committee

Other Business

Adjourn

NATIONAL RESEARCH COUNCIL
TRANSPORTATION RESEARCH BOARD
2101 Constitution Avenue Washington, D.C. 20418

COMMITTEE CORRESPONDENCE

ADDRESS REPLY TO

7920 W. Harvard Pl.
Lakewood, CO 80227
303/985-2245

DATE: April 15, 1996

TO: Members, TRB Committee A5001
"Conduct of Research"

FROM: Denis E. Donnelly, Chairman

SUBJECT: Meeting Minutes

Attached are minutes of the annual meeting held on January 9, 1996. A special thanks to David Huft for taking notes at the meeting as well as doing an excellent job of preparing the formal minutes.

Due to the "Blizzard of 1996" attendance was down from normal, however; the agenda topics were covered by those who were able to attend as well as those pinch hitting for the scheduled speakers. Associated with the reduction in attendance was an increase in the amount of good discussion that took place. For the most part I was able to get copies of the presentation and discussion topic visual aides and these have been added to this years minutes.

A similar experience was observed in Session No. 151, "Cooperation Between R&D Programs Pays Off In New Technologies", which was sponsored by our committee. A special thanks goes to Maria Ardila-Coulson who organized this session. Because of the weather-related circumstances surrounding this meeting, it was decided to publish the papers prepared for this session, probably in a TR Record.

A major topic of discussion at the committee meeting was the planning for the mid-year meeting/workshop scheduled for July 31 - August 1, 1996 in Princeton, N.J. (see **Early Announcement** enclosed). This meeting/workshop will be held in conjunction with TRB Committee A5012, "Technology Transfer", and will follow the Research Advisory Committee (RAC) meeting which is being held earlier in the week. It is anticipated that this years meeting will be similar to the 1994 mid-year meeting. The tentative schedule includes a joint meeting with RAC (Wednesday a.m.), a general meeting (Wednesday p.m.), and a series of workshop sessions (Thursday). Members and affiliate members from both committees, RAC members, and others interested will be invited. Registration materials and other information on the meeting will be mailed out in the near future so mark you calendars now.

Finally, we should be thinking about topics for our session at the TRB 1997 Annual Meeting. Bob Benke along with Laurie McGinnis have volunteered to organize the session and suggestions should be given to them.

Thanks to all the committee members and affiliate members for their interest and participation in the committee activities. Hopefully, we will see all of you at the mid-year meeting in New Jersey.

Attachment

cc: Robert E. Spicher
Affiliate Members

PRIVILEGED INFORMATION—Minutes of all TRB Meetings are regarded as privileged and not for public release without prior approval of the Executive Director.

MINUTES OF COMMITTEE MEETING
TRB Committee A5001 on Conduct of Research
January 9, 1996 9:00 AM
Military Room, Hilton Hotel

Introduction and Welcome . . . . . Denis Donnelly

Denis Donnelly called the meeting to order at 9:00. He asked members to sign attendance sheets and check their status as members and friends of the committee. Self-introductions followed. Attendance was as follows:

Members Present

Bob Benke . . . . . Minnesota DOT
William F. Brown . . . . . NHI
William P. Carr . . Washington State DOT
Denis Donnelly . . . . . Research Consultant
Barbara Harder . . . . . B.T.Harder, Inc.
Eric Harm . . . . . Illinois DOT
Kathy Harrington-Hughes . . . . . Harrington-Hughes Associates
Chris HedgesTransportation Assn. of Canada
David Huft . . . . . South Dakota DOT
Lynne Irwin . . . . . Cornell U
Richard Stewart . . . South Carolina DOT
Pat Strong . . . . . North Carolina DOT

Guests Present

John A. Clements . . . . . FHWA TFHRC
Rod Diridon . . . . . San Jose State U.
Debra Divine Reaves Planning Consultants
William C. Evans . . . . FHWA Region 8
DeAnna Flinchum . . . . . U of Tennessee
Rich Griffin . . . . . Colorado DOT
Amir N. Hanna . . . . . TRB
William Jacobs . . . . . Kansas DOT
Peter Kissinger . . . . . HITEC
Richard C. Long . . . . . Florida DOT
Keith Martin . . . . . Oregon DOT
Laurie McGinnis . . . . . U of Minnesota
Babak Naghavi . . . . . Lousiana TRC
Matt Peckard . . . . . Alaska DOT
Roger Port . . . . . FHWA Region 7
Bob Raths . . . . . FHWA Region 10
Glenn Roberts . . . New Hampshire DOT
Fred Rogers . . . . . FHWA Federal Lands
Robert B. Schmiedlin . . . Wisconsin DOT
John E. Sweek . . . . . FHWA Region 6
Joe Toole . . . . . FHWA OTA
Pierre Toupin . . . . . Transport Quebec

Report on TRB Activities . . . . . Denis Donnelly

Denis reported that Pat Waller of Michigan Technical University, formerly chairman of Group 5 council, had resigned and been replaced by Alan Pisarski.

In consideration of the snow storm preventing many from attending, Denis said he would ask presenters unable to attend the Committee meeting and presentation sessions to provide printed materials for distribution. He said he would work with Lynne Irwin and Barbara Harder to decide whether it would be appropriate to assemble a circular.

Denis reported that Paul Mentz of the Maritime Commission has become a member of the committee. Group rotation will be due next year, so new members will be added. The last rotation was in 1994.

Bob Spicher said he was thrilled at the attendance at the A5001 meeting. He encouraged the Committee to maintain an intermodal emphasis. He reported that the Bureau of Transportation Statistics had been added as a TRB sponsor, that John Williams had replaced Ken Cook, and that Linda Corson will be TRB's conference coordinator.

TRB is doing a strategic plan, focusing mostly on Group A activities. Possible changes include poster sessions, more strictly enforcing the August 1 deadline, reviewing abstracts rather than full papers, and shortening session lengths. Poster sessions would have to be of the same quality as other sessions.

FHWA Organization and Programs . . . . . John Clements

John said Bob Betsold could not attend because of a conflicting meeting, and because of the storm, neither could Bob Kreklau. He said Bob Kreklau will provide notes (attached) of his report to include in the minutes of the meeting.

Denis asked John Clements and Joe Toole to comment on developments in FHWA and USDOT.

John reported that, at last year's meeting, USDOT had envisioned creation of an Intermodal Transportation Administration. Congress advised that restructuring was not on its 1996 agenda, and instead focused on budget reduction. Because of combining budgets, Congress developed their own budget with rescissions and the new appropriations. USDOT has not been shut down.

FHWA had begun a multi-year process for reexamining its structure and function in light of ISTEA. Research, technology, and training was identified as a core strength. FHWA's effort to "reinvent" itself has been complicated by uncertainty in USDOT restructuring. It has been difficult to discern direction. Congress still appears to support research and technology. Representative Wolf, who addressed AASHTO, was critical of many things but supportive of RD&T. AASHTO and others need to articulate the need for research. States feel we need to pool resources for research efforts. If that concept can be articulated, support may be possible. We need to emphasize importance of applied science in the government sector, especially in transportation. The "customer" for research is government agencies. Times are challenging as Congress continues to look for means of deficit reduction. FHWA has an active group working

on authorization. Reauthorization may not be on the 90-day fast track, because it's likely that at least one congressman will object to including transportation on fast-track.

Joe Toole said he felt progress has been made on RD&T programs, and sensed the need to coordinate research, development and technology delivery activities. Operational programs need to be included to ensure that needs are addressed; training needs must also be identified and addressed. FHWA is considering technology delivery teams to deliver specific products. The first team will be for SUPERPAVE to show measurable results. Gary Henderson will head the team.

Joe said that to bring private sector innovations into use, FHWA has begun dialog with private enterprise. Current efforts include Highway Innovative Technology Evaluation Center (HITEC) and the Priority Technologies Program. We need to improve adoption of technology and overcome barriers to moving from experimental to routine use. He asked for suggestions of how to make the process more effective.

Finally, we need to move from an infrastructure based organization to a knowledge based organization. Information needs to be delivered, evaluated more quickly. Old mechanisms for knowledge delivery may not be fast enough. He suggested that the Committee examine ways to speed information delivery and make it more effective.

John mentioned that FHWA will have a World Wide Web home page, including icons for Research and the Office of Technology Applications. By March at the latest, the page should be set up. He also suggested that Committee members tour the SHRP and ITS exhibitions at the meeting. FHWA would like to use the National Highway System as a research and technology test bed, to apply federal technology first. John said the international community is using Internet as a primary technology transfer mechanism, and the transportation community should use it too.

John Sweek said state research has been reinvented by turning State Planning and Research over to the states, and that FHWA field staff are concerned with how to be involved in SPR research effectively. John Clements responded that there is a trend for application of technology and that effectiveness depends on local accessibility of expertise and help.

Denis thanked the FHWA speakers and commended their emphasis on coordination of research and technology transfer.

Rod Diridon noted the transit community's increasing emphasis on research, particularly through the Transit Cooperative Research Program. The politically powerful TCRP board could be an ally for research during reauthorization. Rod expressed concern that the Federal Transit Administration was not represented at the Committee meeting or strongly involved in the TRB meeting in general. TCRP is investing substantially in research, and their efforts should be coordinated with others'. He suggested that the Committee act as a forum for interaction between the highway and transit communities.

John Clements responded by noting support for intermodal (rather than highway and transit) transportation, and mentioned cooperative research. He said amalgamation is being slowed by the question of where the money comes from. The challenge is to how to preserve esprit de corps and individual constituency groups. Rod said fears between modes are diminishing, and that future cooperation should strengthen.

Joe Toole suggested taking a proactive role to inform the Federal Transportation Administration of A5001 and A5012 activities. He also said agendas should include transit related topics and issues. He said he and John Clements would help identify contact persons. Denis said states could individually reach out to other modes within their own Departments. The Committee could help promote the concept.

Amir Hanna said he would provide a short description of TCRP (attached) for the minutes.

Committee A5102 on Technology Transfer Report . . . . . Lynne Irwin

The Committee was established last year, after being a subcommittee and an informal group for over ten years. Its emphasis will be on the process of technology transfer, not on specific programs. The Committee has 22 members from the United States, 5 from outside the country, and forty friends. The committee would like to broaden base into other modes.

At last year's meeting, the Committee sponsored its first session, and will sponsor Session 221 this year.

Denis mentioned Minnesota's Research Program report circulating through the meeting and encouraged members to contact Bob Benke for copies.

Reports on Research Program Activities

SHRP Research at the Regional Levels . . . . . *Maria Ardila-Coulson*

Kathy Harrington-Hughes briefly described the project, which will include case studies of successes in state and local agencies throughout the country. (Attached are notes on the projectæèÃm Maria Ardila-Coulson who was unable to attend the committee meeting)

Using the Internet for SHRP Project Status . . . . . *Bill Carr*

Bill said the motivation for the project was to make it easy to track progress of SHRP implementation. States have primary responsibility for SHRP implementation. The system is on Washington State DOT's home page. It includes:

Vendor Directory
Personnel Directory
Product Evaluations
General Pavement Study Test Sites
Special Pavement Study Test Sites
Links to Other Transportation Information
SHRP Literature
Discussion Groups for Product Groups

Bill said the system depends on the help of all, and thanked Colorado DOT and Minnesota DOT for help early in the project. Over 30 states have agreed to participate so far. Input can be on line. The site address is http://www.wsdot.wa.gov/fossc/ota/shrp. Bill distributed a one-page handout (attached). Denis asked how much effort was invested. Bill said work was done by an executive intern with an advanced degree; two years of his time will be used. Financial assistance may be needed to maintain the system in the future. Fred Rogers said the technology is not overly difficult.

Southeastern Transportation Center's Program Development Approach . . DeAnna Flinchum

DeAnna, who is program manager of the Southeast Transportation Center, said it does research, education, and about 5% technology transfer. Budget is $1 million with 100% local matching. The research approach is for many small ($20,000 to $50,000) projects, and a few large scale projects of $500,000 to $1 million over 3 years. Seed projects of $5,000 to $15,000 must have regional or national significance. STC requested topics from regional and federal DOT agencies, TRB committees and university researchers, and the private community in southeast.

The planning meeting included regional, state and federal transportation representatives, as well as representatives from private and university communities. Sixty-five research project statements were generated, 4 secondary evaluation criteria (timely issues, implementable, data sources available, transit and highway balance) were defined, and 6 candidate projects were identified. A survey asked all meeting participants to rank the projects according to the evaluation criteria. Survey results will be provided to participants, projects will be selected and project selection will result in requests for proposal. A principal investigator from the University of Tennessee will head each project.

Funding match comes from waiver of indirect costs and contribution of intern wages.

Joe Toole asked how the research community decides where a given topic should be addressed, at state, university transportation centers or the national level. Pat Strong said the four states represented understood that some of the projects developed in the meeting could be addressed by other research mechanisms. He commended the conduct of STC's planning meeting. Denis asked if the Center funded the selection process; DeAnna replied yes. Eric Harm said when states brainstorm, they sometimes generate statements of potential regional or national interest. He said better methods for sharing needs and interests would be useful. Bob Benke said delivery times for national cooperative efforts is longer than direct state action. Denis said level of needed funding also affects the decision. Bob said examining TRIS is important. Barbara Harder said this might be good application for Internet because it does not require a lot of overhead. Bob Schmiedlin said the Wisconsin Department of Transportation is pursuing some projects on a dual track—locally because of availability of construction and interest, and by pooled fund study to gain support of other states.

(Attached are overheads from Ms. Flinchum's presentation)

Facilitating the Implementation of Research Findings . . . . . Barbara Harder

Barbara distributed a one-page synopsis of the project NCHRP 20-33 (attached) and cited its goals. A preliminary draft report was distributed to the NCHRP panel in October. A final draft will be delivered to the NCHRP panel January 15. The report will consist of a main summary report with major appendices.

Phase I was to identify factors that promote implementation of research findings. Findings were published in NCHRP Research Results Digest 207. State agencies returned 76% of surveys, indicating high interest. Local governments returned 40% and expressed strong support for their accomplishments. Twelve distinct implementation boosters were identified.

A synthesis of practice recommendations was prepared. How the process moves from research to the user is of critical importance. There is no single answer or technique; instead a variety of methods are usually needed.

Amir Hanna said report publication could be expected by the mid-year. He said the emphasis of the project was facilitating the use of research, not disseminating technical materials. Bill Carr suggested the Committee promote dissemination of the report. Bob Benke said it would be good to have the report before the Committee's mid-year meeting.

Follow-Up of A5001 Mid-Year Meeting in 1994 . . . . . Denis Donnelly

Denis briefly reviewed the outcome of the Committee's 1994 mid-year meeting, documented in Transportation Research Circular 448. The four topics addressed were program development, research methodology, dissemination of information, and coordination of research, development and technology transfer. A manual for methodology for transportation research is under development by David Manning as Task 74 of NCHRP Project 20-7. Work has informally begun, but a contract is not yet in effect. A first draft is expected in June, with final publication in January 1997.

Joe Toole and Ray Griffith are looking at ways to follow up on recommendations concerning dissemination of information and recommend how they can be implemented. Denis asked for volunteers to assist. Christopher Hedges, Bill Carr, Bob Schmiedlin, Barbara Harder, and Cathy Harrington-Hughes volunteered. Lynne Irwin said the emphasis was on getting recognition and appreciation for research results in agencies' culture.

Bob Benke noted that the manual of scientific inquiry will target "hard" research, by necessity of scope and funding. He suggested that another manual on soft or policy research might be useful and that the topic be discussed at the Committee's mid-year meeting. Denis asked Bob to lead follow-up at the summer meeting. Denis commended Bob Perry for efforts on the Manual.

Planning for 1996 Mid-Year Meeting . . . . . Denis Donnelly

Richard Stewart, Chairman of the AASHTO Research Advisory Committee, explained plans for the RAC's second national meeting. He said RAC will meet in Princeton, NJ July 28-31. The planning committee is putting together an agenda of eight general topics:

SHRP	R&D Management
Implementation	Funding & Legislation
Peer Exchange	Pooling of Funds
Information Management and Systems	National Issues

The Steering Committee met after the joint of RAC and the Standing Committee on Research, during which a number of comments were received. The agenda will be revised and published in April.

The Steering Committee discussed possible involvement of A5001 and A5012. The RAC will invite both committees to attend the implementation session on Wednesday morning of the meeting. If A5001 or A5012 would like to help with sessions, they should work with session chair. Planning will proceed immediately so the program can be completed by March.

Pat Strong asked what the motivation for the mid-year meeting was. Denis replied that there was no specific emphasis area, but rather a desire to produce useful products. Pat asked if this was follow-up to 1994; Denis replied yes, but also provide service to the RAC. Bill Carr said unless Committee had its own mission and role, the meeting would have no purpose. He said the Committee has avoided making A5001 an offshoot of the RAC, and suggested avoiding setting agenda in response to RAC. He said most people who stayed for Committee meeting were committee members, not necessarily RAC members. Eric Harm said the meetings are separate, and Committee A5001 needs to identify the product of its meeting. Denis said he and Lynne have wanted to tack on to RAC because of concerns about funding for travel. Lynne Irwin said he viewed the occasion as an opportunity for interaction, but not an obligation. He said TRB encourages its committees to be active and focus on technical interests.

Denis Donnelly appointed Bill Carr, Joe Toole, Chris Hedges, Eric Harm, David Huft, Lynne Irwin, Bill Brown, and himself to plan the mid-year conference.

1997 Annual Meeting Session . . . . . Denis Donnelly

Denis appointed Laurie McGinnis and Bob Benke to plan a conference session for the 1997 Annual Meeting.

Adjourn

The meeting adjourned at 11:45 am.

ATTACHMENT 1

A5012 - Committee on Technology Transfer
Lynne Irwin, Chairman
Maria Ardila-Coulson, Secretary

75th TRB Annual Meeting
Wednesday, 10 January 1996
Military Room, Washington Hilton

AGENDA

9:00 am	Meeting Convenes	
	Self-Introduction of Members, Friends and Guests	
	Committee Business	
	Approval of Minutes of the 1995 Meeting	Maria Ardila-Coulson
	Comments from TRB Staff Liaison	Bob Spicher
	Report on Session #221 (see attached abstracts)	Mike Marti
	Plans for 1997 Annual Meeting Paper Session	Cheri Trenda
	Plans for 1996 Summer Meeting (report attached)	Joe Toole & John Metcalf Denis Donnelly, Chm., A5001
	Suggestions and Plans for 1998 Annual Meeting Paper Session	
	Brief Reports	
	TRB SHRP Committee Benefits Study	Maria Ardila-Coulson
	WSDOT SHRP Internet Database Project (report attached)	Bill Carr
	Metric Clearinghouse T^2 Model	Susan Lancaster
11:45 am	Adjourn	

Transportation Research Board
Committee A5012 on Technology Transfer

Scope

This committee is concerned with information exchange and research on the processes and methods for technology transfer, and assisting the Transportation Research Board and other TRB committees in their role as an agent for technology transfer.

Mission Statement

To act as a forum through which individuals and institutions involved with technology transfer can --

- exchange information about the processes and methods for technology transfer
- encourage research and development on new and improved methods for technology transfer
- identify and communicate effective ways that have been used to put research into practice

Brief History of the Committee

This committee came into existence with the approval of the TRB Executive Board at their meeting in May 1995. It had previously been constituted as a Subcommittee on Technology Transfer, initially under Committee A5002 on Low-Volume Roads in 1993 and later under Committee A5001 on the Conduct of Research in 1994 and 1995.

A group of the leaders of the FHWA-sponsored Local Technical Assistance Programs (LTAP) from various states began meeting informally during the evening at TRB Annual Meetings as far back as January 1986. Initially only a few states were involved in the LTAP program, and the gathering was small. By 1990 most of the states had an LTAP program, and the group began to number 60 to 80 at each meeting.

At the suggestion of several LTAP center leaders, and with encouragement from the FHWA, the idea of having a formal committee within TRB to focus on issues related to technology transfer was advanced in mid-1991. A meeting was held during the January 1992 TRB Annual Meeting to discuss the feasibility of the idea and to identify possible activities that such a committee might conduct. The 1992 meeting was attended by nearly 125 people.

It was decided at the 1992 meeting to form the group along the lines of a TRB committee, recognizing the need for a broadly based panel with common interests in the process of technology transfer from all areas of transportation. Scope and mission statements were discussed and refined at the 1993 and 1994 meetings. The first Summer Meeting was held in conjunction with Committee A5001 in 1994 in Vail, Colorado at which time plans for future activities on the conduct of research and in technology transfer were made. The subcommittee organized its first formal paper session for the 1995 Annual TRB Meeting.

PRIVILEGED INFORMATION - The minutes of all TRB meetings are regarded as privileged and not for public release without prior approval of the Executive Director.

MINUTES OF COMMITTEE MEETING
A5012 TECHNOLOGY TRANSFER

January 10, 1996 - 9 a.m.
75th TRB Annual Meeting
Military Room, Washington Hilton

Lynne Irwin, Chair
Maria Ardila-Coulson, Secretary

Attendance

The list of attendees is shown in attachment 1.

Agenda

The agenda is shown in attachmnet 2.

Introductions

The meeting was called to order at 9 a.m. by Chairman Lynne Irwin.

Irwin asked Subcommittee members, friends and guests to introduce themselves. A sign-in sheet was circulated with the request that e-mail addresses be included. Irwin noted that Maria Ardila-Coulson was marooned in Dallas/Fort Worth by the Washington D.C. snowstorm. Sharon McLeod-Everette filled in as substitute Secretary.

Acceptance of 1994 Meeting Minutes

Joe Toole handed out additional copies of the minutes from last year's subcommittee meeting. The minutes had been mailed out by Maria Ardila-Coulson April 1995. The minutes were approved unanimously.

Comments from TRB Staff Liaison

Irwin announced that Bob Spicher was not able to attend this meeting because he was at another TRB Committee meeting. Irwin said there is a new TRB Conference Coordinator on board and that there will be changes in the format of future annual meetings. Poster sessions will be added, and the paper session probably will be shortened, aiming at 1 1/2 hours rather than the existing 2 1/2

hours. Deadlines will continue to be adhered to, which means that the 1997 deadline for papers is August 1, 1996.

Irwin indicated that this Committee consists of 25 members, 40 friends, five international members and four slots reserved for multi-modal representatives. He asked that others wishing to be part of the committee see him after the meeting. He said committee members and friends will work together on committee activities.

Report on Session 221

Michael Marti reported on Session 221, sponsored by this Committee. Marti said the session is in order but that two presenters were delayed because of the weather: Steve Jenkins from Utah and Ray Filipiak from Alberta. Filipiak's paper will be presented by someone else, and Jenkins was still trying to come in.

Marti said that Session 221 offers broad-based coverage of technology transfer. He thanked Lynne Irwin and Bill Evans for their assistance with the program, and the authors for their work. Irwin thanked Marti for his efforts and noted that paper preprints are available in the preprint room.

Plans for 1997 Annual Meeting Paper Session

Last year during the subcommittee meeting, two committees were formed. One to act as liaison for a summer 1996 meeting with AASHTO RAC and TRB's Committee on the Conduct of Research, the other to develop the 1997 paper session.

Cheri Trenda reported on the 1997 paper session. Trenda provided handouts (see attachment 3) on the two options: Adult Learning, and Partnerships in Technology Transfer. After Trenda presented the two options, Irwin opened the floor for discussion. The following comments were made:

The options are not mutually exclusive, they are complimentary. The session could incorporate both.

The session on partnerships would need to recognize the international members on this committee. Some international partnerships have been implemented for quite a while.

There is a need to develop public/private partnerships, as well as public to public partnerships.

Partnerships are good, but adult education is the most exiting thing to come out of Technology Transfer.

Both topics are important. Creative things are going on with adult education. Partnerships offer more opportunity to

stretch the envelope. Leveraging funds are on many people's minds now.

Partnerships have many aspects: single purpose, short-term, long term. Could offer keys to success, getting started on the right foot.

There are concerns about adult education. It requires dealing with specific relationships and technology transfer needs.

Prefer partnerships, could link into work done by other units like the National Science Foundation. Should add information on unsuccessful partnerships. Provide mission statement, think of a long-term plan and focus on activities to achieve the specific goals.

A specific item of interest for T^2 Centers advisory boards is partnerships: federal, state, industry, locals.

It may be possible to work with the Conduct of Research Committee on a session for next year. They may be talking about multi-modal, public and private relationships and international technology transfer.

Partnering is FHWA's middle name. The concept is good. Include adult learning.

Partnering is vital, but do not lose adult learning. Do adult learning as a poster session and partnering as a paper session.

Irwin said that at last year's meeting, Lois Richards Means spoke about tapping into the experience the military had with adult learning.

Irwin suggested that we look at 1998 so that the Committee could do both (partnering and adult education). He indicated he won't know until later this year what TRB's rules will be for next year. We don't know if poster sessions will be implemented.

By a show of hands, it was decided that the 1997 paper session will be about partnering. It was suggested that the session title could be: "Opening Avenues for Cooperation in Technology Transfer."

Irwin agreed to pursue the potential for a poster session for Adult Education. Barbara Hardner said that a poster session may not be a good way to portray adult learning because it is an interactive activity. Perhaps it would be better to do a workshop on Sunday. Joe Toole said that there was a number of competing interests already on Sunday.

Other comments:

Poster sessions are particularly good at communicating success stories. We could do a 1 1/2 hour paper session followed by a poster session. Adult learning could also be a summer session topic.

Other TRB committees want to get information out to people but are not aware of LTAP. Other committees may not come if adult learning is presented in a Sunday workshop. A problem with Sunday sessions is that TRB charges for them separately. Although Sunday sessions are not advertised, enthusiasm has grown over the years for them.

Adult learning is important. Education, development, knowledge and the skill to apply technical information are key elements of technology transfer. The way adults learn is changing, new learning tools are being used. Satellite distance learning is increasing. Need to focus on the human side and the equipment side.

Be careful about preaching to the choir. Some of the partnership success stories succeeded because of principles involved in adult learning. Get the market ready for a future session. Unless training is set up right, it must use adult principles. Packaging is as important as the message.

There are a lot of technological advancements and deciding now what should happen in 1998 may not give us the best opportunity.

Irwin summarized the above comments: We decided to select partnerships as the theme for the 1997 session. We suggested an adult education theme for a poster session, a Sunday workshop, or a summer workshop, which will include advanced technology to adult education.

Irwin suggested we wait to see what a poster session is before doing one. Also, regarding adult education, several noted that it will not work as a poster session given the principles involved in adult learning. We could have adult learning in 1998 with advanced technology for adult learning as a sub-theme.

Irwin asked for volunteers to work with Cheri Trenda. The following people volunteered: Nelda Bravo, Lousia Ward, Kathy Harrington-Hughes, Slim Saidi, Alejandra Medina, Mike Marti, Chris Hedges, Juan Morales, Bill Evans and Mike Moravec. It was suggested that Lois Richards Means and Tora Bixon be contacted because they noted interest last year.

Bill Carr complemented the committee on its work, noting it is building a good group and suggested developing this into a brain trust.

Slim Saidi said Trenda did a great job for the 1997 session, and that we need to keep in mind that adult learning is a wide topic.

Irwin asked Mike Moravec for information about technological advances coming in the near future.

Irwin briefly outlined the steps in developing a paper session: Identify names of people to contact. Contact people through March. Get at least 12 people to submit papers. Select eight papers. Continue to communicate with possible speakers through spring and summer. Get a 200-word paragraph about the paper for the paper session committee's review. Submit paper by August 1. Review papers by peers. Make revisions by mid-November. Irwin will send paper author forms to the paper session committee chair.

Cheri Trenda suggested the sequence of due dates and tasks be attached to the scope and mission statement of the committee.

Plans for 1996 Summer Meeting

Joe Toole and John Metcalf described AASHTO's Research Advisory Committee (RAC) and provided a handout (see attachment 4). The RAC summer workshop will be held in Princeton, New Jersey on July 28-31, 1996. RAC is happy to work with A5012 and A5001 in the format of their meeting, speakers, ideas, panelists, etc .

AASHTO/RAC and the TRB Committee on the Conduct of Research did not object if Technology Transfer held a workshop on Thursday. Bill Carr noted that there is space available at the hotel. We should be able to negotiate the same rates.

Charlie Wallace said there is a partnership between the three committees (Conduct of Research, Technology Transfer and AASHTO/RAC), and it should not be tied too closely to LTAP. He said that Region four T^2 center's had a meeting with Region two RAC. The T^2 centers explained what their needs are and asked RAC to explain what their needs are.

David Huft, RAC vice chair, clarified that the Implementation Session scheduled for Wednesday morning could be a joint session with A5012 and A5001. It is targeted toward technology transfer. It's possible that sessions of RAC business could be closed.

Denis Donnelly noted that the first priority is to serve customers. The first step is to ask what they want. They need to decide how A5001 and A5012 fit it.

Bill Evans applauded tying the meetings together but noted that two weeks creates burnout (the LPAP meeting will be the first week in August). He suggested that other committees meet at separate sessions and look for a future time to do a three-day meaningful meeting with sessions and workshops.

Joe Toole concurred, reminding us this is our first year. With appropriate marketing, we can find a niche very well. Developing workshops is a way.

Irwin said there is a model for what we are fostering here. It occurred at Vail, Colorado in 1994. The Conduct of Research Committee and the Technology Transfer Subcommittee focused on topics based on what was learned in the RAC meeting. When laying the cornerstone for the future, it was known that for 1996's RAC meeting, A5001 and A5012 would be involved.

RAC meets regionally every two years. Based on the 1994 model, we have reached out to RAC to ask how can we help. At the LTAP meeting in Kansas City (1995), T^2 centers talked about how to evaluate effectiveness of technology programs. The goal is to improve and strengthen the bridge between research programs and application of the research.

Dennis Donnelly suggested that we not negate any idea. Vail had multi-track meetings. He added that we need to come out of the summer workshop with a product: a report, or tasks for the future. TRB Circular 448 was based on the 1994 meeting.

John Metcalf added that assessing the benefits of technology transfer is the key, noting that Cheri Trenda did some good work on that effort.

Trenda asked for clarification: Are we talking about assessment or collecting success stories and evaluations? Joe Toole responded that assessment can provide us with the evaluation of tools and processes. The idea is to look at products and outcomes.

Toole suggested establishing a committee jointly with A5001 to work on logistics. It could be an opportunity (getting back to Bill Evans' comment) to more fully explore topics.

Ray Griffith noted that FHWA can make office space available for resources and presenters. He added that there are two areas of research coming on line that should be available in time for fall 1996: NCHRP study on facilitating implementation of research results and work that Barbara Harder is completing on assessing the benefits of research.

For LTAP people, there will be a need to transfer the outcome of what happens in New Jersey to the LTAP annual meeting in New

Orleans. Bill Bowmaster said he would forward information about the meeting to the coordinator of the meeting in New Orleans.

David Huft clarified that the Implementation Session deals with encouraging acceptance and use of research, so evaluation would fit.

Irwin asked for volunteers to work on the summer meeting to look at assessing benefits, evaluating the effectiveness of technology transfer and bringing together research and application. The following people volunteered: Bill Carr, Mary Stringfellow, Barbara Harder, Debbie Hall, Michael Moravec and Peter Kissinger.

Bill Carr said we need to decide on a timeframe today because New Jersey needs to get the contract signed. How many days, and how many people? Initially, the response was Tuesday night through Thursday night. Bill Carr, Mary Stringfellow, Barbara Harder and Lynne Irwin decided to meet immediately after this meeting to make some decisions.

Suggestions and Plans for 1998 Annual Meeting Paper Session

The following comments were made:

It could be a session that focuses on high technological methods with an emphasis on how to transfer knowledge to customers.

In adult education, we don't talk much about the receiver of the education. The paper session could deal with adult education and the process.

Customers are often ignored. We need some mechanism for getting County Road Advisors to TRB.

The whole basis of LTAP is to get information to the small counties. Our audience for the session is researchers who attend to identify who the users are.

Irwin noted that Trenda's model focuses on making others aware of the processes involved in adult learning.

Joe Toole reminded the committee to look strategically at the role of this committee while considering the focus of the paper presentation for 1998. This may be the only opportunity for non-LTAP members to provide and experience change.

There are many other TRB committees. We need to get other committees involved, get them to see exchange as part of their mission. Long term we may be a service unit to the rest of TRB to help them do their job better and to help us do our job better.

The World Wide Web could be a future direction/opportunity. We should look at the WWW with respect to this committee's goals. WWW can be a vast wasteland or a trove of information. It would be up to us to pack it with information. We need to consider how to put the WWW to work for technology transfer.

Harder noted that A1A02, "Management Productivity," deals with adult learning. She suggested we tap that committee's resources.

Irwin called for volunteers to develop the general theme of adult education and to inform this committee and others about the processes of adult learning. They will need to report on the progress for 1998 at the 1997 TRB meeting.

The following people volunteered: Nelda Bravo (chair), Jim Sime, Devorah Reeves Divine, Cheri Trenda, Bill Evans, John Sweek, John Hopkins, Alejandra Medina.

Brief Reports

TRB SHRP Committee Benefit Study

Irwin said there would be no report on the TRB SHRP Committee Benefits Study because Maria Ardila-Coulson was marooned in Dallas/Fort Worth.

Washington DOT SHRP Internet Database Project

Bill Carr discussed the WSDOT SHRP Internet Database Project. SHRP Evaluation information is now on the World Wide Web. There is a SHRP Evaluation and Implementation database. There are discussion groups set up with the SHRP functional groups, such as highway operations, asphalt, etc.

General Comments

Dick McComb announced that the FHWA Research and Development Coordinators meeting for tomorrow is canceled.

Dave Fluharty said he attended A3C03, "Committee on Maintenance Operations." This Committee may do a session on training. It is looking at effectiveness and benefits of training, evaluating strategies for training, particularly for firsttime line supervisors. He asked that if anyone has any comments or thinks they could contribute to that effort, please see him after the meeting.

Bill Bowmaster asked T^2 centers participants to remain after the meeting so everyone could get briefed on business that did not get discussed yesterday because the meeting was canceled.

Michael Marti reminded everyone to attend the paper session in the afternoon, noting that one paper is particularly intriguing, especially for those who are on an international border.

The meeting adjourned at 11:38 am.

ATTACHMENT 2

A5012 - Committee on Technology Transfer

75th Annual TRB Meeting
9:00am Wednesday, January 10, 1996
Military Room, Washington Hilton

ATTENDANCE ROSTER

Name	Affiliation
Kathy Harrington-Hughes	Harrington-Hughes & Assoc Inc
Fred H. Rogers Jr	FHWA
John Hopkins	Arizona State University
Rebecca Davis	Arizona State University
Elizabeth K. Burns	Arizona State University
Patty Gunderson	Montant LTAP
Louisa Wawrd	Institute of Transportation Engineers
Nelda Bravo	FHWA
Bob Eaton	CRREL
Cheri Trenda	Center for Transportation Studies
Deborah Divine	Reaves Planning Consultants
Charles Wallace	University of Florida
William C. Evans	FHWA
John E. Sweek	FHWA
WM P. Carr	Washington State DOT
William Heitman	University of Florida
Robert B. Schmeidlin	Wisconsin DOT
Roger Port	FHWA
Pat Weaver	Kansas Transportation Center
William Jacobs	Kansas DOT
G.J. Gaulke	Wyoming DOT
Skip Coghlau	USDA Forest Service
Deniz Sandhu	NYSDOT
Charlie Goodspeed	Univ of New Hampshire/T2 Center
Paul Shuldiner	Univ of Massachusetts/T2 Center
Ray Benekohal	Univ of Illinois
Jarmo Ikoneu	Finnish T2
Juan M. Morales	J M Morales & Assoc
Michael M Marti	Braun Intertec Corporation
Michael M Moravec	FHWA
Benita H. Gray	Consultant
Toni Rosenbaum	Cornell Local Roads Program
Mike Blankenship	West Virginia T2 Center

Name	Affiliation
Keith Martin	Oregon DOT/LTAP
David Huft	South Dakota DOT
Zach Zacharia	Univ of Tennessee
Bill Bowmaster	Nebraska T2 Center
Richard McComb	FHWA
Pierre Toupin	Transport Quebec
Chris Hedges	Transportation Assoc of Canada
Denis Donnelly	Research Consultant
Benjamin Colucci	Puerto Rico T2 Center
Ray G. Griffith, PE	FHWA
Joe Szyliowicz	Denver University
Slim Saidi	Bishop's University
David H. Fluharty	Univ of New Hampshire/T2 Center
Joe Toole	FHWA
James M. Sime	Connecticutt DOT
Peter Kissinger	CERF-HITEC
Alejandra Medina	ASU PIH
Lynne Irwin	Cornell Local Roads Program
Sharon McLeod Everette	Alaska DOT/T2
Barbara T. Harder	B T Harder Inc
John Metcalf	LSU
Bob Raths	FHWA
Mary Stringfellow	FHWA
Nelson Evans	Texas LTAP

ATTACHMENT 3

1997 TRB Session Alternatives: A5012 - Committee on Technology Transfer
January 10, 1996

Committee Discussion Tasks:

- Determine 1997 session topic
- Determine preferred format (e.g., papers, workshop)
- Brainstorm suggested speakers or potential sources for speakers
- Solicit volunteers for planning/presenting

Option #1: Adult Learning Principles Influencing the Technology Transfer Process

A. Characteristics of Adult Learners

B. Models of Adult Learning

C. Readiness for Learning
   1. Situational factors (external):
      Job requirements: expectations, mandates, priority
      Convenience: time, travel
      Organization: funding, materials/equipment, support

   2. Personal factors (internal):
      Perceived value (benefit vs. investment)
      Consequences of participation
      Learning attitude and the expectancy of success
      Experience with prior opportunities

   3. Adult learning motivation theory

D. Phases of Adult Learning and the Technology Adoption Process

E. Formulating a Plan for an Effective Learning Experience (i.e., assessment of need, climate, instruction, content, timing, methodology, planning for evaluation, etc.)

F. New Technologies for Adult Learning (i.e., computer-aided, distance technologies, etc.)

G. Role of the T^2 Agent in the Learning Process

Option #2: Partnerships for Effective Technology Transfer

A. Definition and Characteristics of Successful T2 Partnerships
   - Mutual benefit/reliance/compatible goals
   - Trust
   - etc.

B. Analysis of Potential Partnerships
   - Identifying Key Partnership Opportunities
   - Expected payoffs
   - Existing assumptions
   - Factors promoting/inhibiting success

C. Successful T2 Models/Examples (i.e., SHRP, DOTs/Universities, Industry, etc.)
   - Partner contributions and needs
   - Mechanisms/processes developed (i.e., decision-making, agreements/contracts)
   - Challenges (i.e., sharing of risk/revenue)
   - Results

1997 TRB Session Planning Committee:

Cheri Trenda, Chair	Mike Marti
Tora Bikson	Mike Moravec
Bill Evans	Lois Richards-Means

ATTACHMENT 4

A5012 COMMITTEE ON TECHNOLOGY TRANSFER
Lynne Irwin, Chairman
María Ardila-Coulson, Secretary

1996 Summer Meeting
in conjunction with
AASHTO Research Advisory Committee

Discussion Facilitators:

John B. Metcalf
Freeport-McMoRan Professor of
Engineering
Institute for Recyclable Materials
Louisiana State University

Joseph S. Toole
Director
Office of Technology Applications
U.S. Federal Highway Administration

Discussion Points:

I. Cosponsoring July workshop with RAC and TRB Committee on Conduct of Research.

A. Workshop would follow RAC annual meeting which will be held in Princeton, New Jersey, Sunday July 28 - Wednesday July 31.
B. LTAP annual meeting will be held following week in New Orleans, Sunday August 4 - Wednesday August 7.
C. Feasibility of organizing national workshop in remaining months.

II. Possible topics for the summer workshop.

A. Tools and Approaches for Assessing the Benefits of Technology Programs.
B. Improving the Bridge Between Research and Application.

III. Planning Committee.

A. If the TRB Committee on Technology Transfer agrees to cosponsor a summer workshop, a planning committee must be formed to take the lead on developing the workshop.

IV. Planning a long-term partnership with RAC.

A. Objectives, goals, and participants.
B. Coordination and feedback issues.

Attendance List
Joint Mid-Year Meeting & Workshop
July 31, 1996 thru August 1, 1996

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Transportation Research Board
Committee A5012 on Technology Transfer

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Research
Innovation for Transportation

AASHTO Reauthorization Policy Statement

The American Association of State Highway
and Transportation Officials
444 North Capitol Street, Suite 249
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Table of Contents

TABLES

GRAPHS

Key Findings

- **Transportation Research** needs are national in scope and local in impact. Programs and funds must address these research needs at both levels.

- **Federal Leadership** and funds *are essential ingredients* in developing efficient, effective technical solutions to the challenges of overburdened and aging transportation systems.

- **State Governments** have demonstrated a commitment to transportation research and a willingness to share in the funding of local, regional, and cooperative research programs.

- **State Planning and Research** funds, provided through this exceptionally effective mechanism for federal/state partnership, ensure continued investment in transportation innovation.

- **Multiple Research Programs** are warranted and effective in attacking transportation technology needs when emphasis is given to national and international coordination of efforts and information exchange.

- **Coordination of Modal Research** is a critical requirement for efficient use of limited funds best accomplished by cooperation among modes while retaining modal "ownership" where applicable.

- **Private Industry** should be freed of current institutional restraints on innovation but is unlikely to be the major contributor to research investments for innovation on our government-owned and government-operated transportation systems.

- **ISTEA** has provided valuable benefits to technological advancement in the transportation community. Along with ensuring funding, ISTEA has helped to improve the focus and coordination of transportation research.

- **Future Federal Programs** to encourage implementation of new technologies by the states should provide for federal sharing with the states of early maintenance and operations costs for complex, sophisticated new systems.

- **Human Resources** are as important as the physical assets of our transportation systems. Investments in training, equipment, and facilities for advancing technology are essential for development of future transportation leaders and experts.

PARTICIPANT WORKBOOK

PEER EXCHANGE

FOR

STATE DOT RD&T MANAGEMENT PROCESSES

A TRAINING PROGRAM OF THE USDOT,
FEDERAL HIGHWAY ADMINISTRATION

SNI International Resources, Inc.
Phoenix, Arizona USA

Scope

This course is designed to assist State, FHWA, university and private sector research managers in developing skills to actively participate in a peer exchange and to help guide the peer exchange activities. This course will:

1. Train participants to operate in a team environment.
2. Prepare participants to effectively communicate with and question each other, and customers, managers and staff of the host State.
3. Train participants in the peer exchange process.
4. Provide techniques for presenting the results of the peer exchange.

The course will provide comprehensive coverage in each of the following major areas:

- Peer Exchange Process
- Sensitivities in Conducting Peer Exchanges
- Communications Skills in Conducting Peer Exchanges
- Peer Exchange Report Preparation

Behavioral Objectives

Upon completion of the course, the participants will be able to:

Objectives: Technical Process

1. Recognize & Describe how each State agency may be unique and "what works" for each is likely to be very different.

2. Explain some of the many ways there are of conducting and managing research through examples of some of the current State research programs.

3. Participate as a team member in a peer exchange, and describe the crucial components of positive team membership.

4. Establish and maintain a comfortable environment for participants involved in the peer exchange, including the customers, managers and staff of the host State.

5. Identify individual communications styles, and be able to interact positively with other members of the team and those being interviewed.

6. Utilize listening, interviewing and consulting skills in order to promote a positive relationship between the team and all individuals involved in the change.

7. Present oral and written conclusions of the peer exchange activity.

Target Audience

Course participants are managers from State transportation agencies, FHWA, universities and private sectors responsible for research, development and technology transfer programs. The candidates for this course will be:

1. Experienced in transportation research related activities.
2. Experienced in research management.
3. Knowledgeable and experienced in research planning, funding, documentation and technology transfer.

The course will accommodate approximately 30 participants.

Course Length

One (1) day, with approximately 8 hours of instruction over the one day period.

Training Aids/Instructional Material

1. Instructor Guide
2. Visual Aids
3. Participants Workbook

AGENDA

8:00 a.m	Introduction/Course Overview • Instructor and Group Introductions • Housekeeping Chores • Course Scope, Objectives, and Format	Dr. Ahmad Habibian, American Society of Civil
8:30 a.m.	Background • Purpose • Overview • Historical Development • Role of the FHWA • The Peer Exchange Team Member • Training Procedures	
9:30 - 9:45 a..m	Break	
9:45 a.m.	Communication Skills in Peer Exchange • Staff Consulting Roles • Communications Styles	Ms. Pat Santilli, SNI International Resources, Inc.
12:00 noon	LUNCH BREAK	
1:00 p.m.	• The Consulting Model • Entry Into the Organization • Contracting • Data Collection • Diagnosis • Feedback and Decision to Act • Guidelines to Effective Feedback	
2:45 - 3:00	Break	
3:00 p.m.	Administrative Processes • Scheduling a Peer Exchange • Assignment of Peer Exchange Participants • Identifying Team Leaders • Expenses Related to the Visit • Maintaining the Peer Exchange List	Dr. Habibian

AGENDA

3:15 p.m.	Pre-Peer Exchange Activities	
	• SHA Research Manager Responsibilities • Review Team Preparation • Team Leader Preparation • Actions by the Host Transportation Agency	
3:45 p.m.	The Peer Exchange	Dr. Habibian
	• The Peer Exchange Team Meeting • Discussion of RD&T Programs • Example Projects • Interviews/Discussions • Report • Close Out Session • Follow-up Activities	
4:30 p.m.	Post-Exchange Activities	Dr. Habibian
	• Quality Control and Assurance **[marie need two more:]** • •	
4:45 p.m.	Conclusion: Questions and Answers	Dr. Habibian and Ms. Santilli
5:00 p.m.	Adjournment	

National Cooperative Highway Research Program Fact Sheet

5/1/96

Concept: Applied research on practical problems common to the highway and transportation community, principally the State departments of transportation.

Manager: Transportation Research Board

Start: 1962

Sponsor: Member departments of the American Association of State Highway and Transportation Officials

Oversight: The AASHTO Standing Committee on Research formulates each year's program and monitors the Program's progress.
The TRB Executive Committee Subcommittee for the NCHRP provides guidance in matters of policies and procedures.
FHWA, through liaison representation on NCHRP panels, contributes its knowledge of ongoing federal research projects in order to eliminate undesirable duplications.

Funding:

FY '68	$3.5 million	FY '92	$15.3 million
FY '81	$4.6 million	FY '93	$17.3 million
FY '82	$4.2 million	FY '94	$17.2 million
FY '83	$6.8 million	FY '95	$17.5 million
FY '88	$6.8 million	FY '96	$13.8 million*
FY '89	$8.1 million	FY '97	$15.5 million*
FY '91	$8.5 million	*anticipated	

Authorization: By annual agreement, each state contributes 5½% of its State Planning and Research Funds.

Staffing: 15 Full-Time Employees—Assigned only to NCHRP
10 Employees (6.5 Full-Time Equivalents)—Split NCHRP/TCRP

Projects: 620 through FY '96 (114 active, 434 closed out)
$140.5 million contracted or allocated through FY '95

Problems: More than 200 problem statements were considered in each of the last two years.

Proposals: 152/year (6.9/project) in 1995.

Contractors: In calendar year 1995, of 102 proposers, 36 (35%) never submitted before and 56 (55%) never were contractors.
Of the 22 agencies contracted, 8 were never before NCHRP contractors.
Distribution of contracts among several classifications of agencies follows:

Educational Institutions:	35%
Research Institutions:	15%
Industry and other for-profit	46%
Others (includes State DOTs)	4%

Panels: 1292 positions are held by 1110 people on 142 panels.
Composition of the FY '96 panels reflects 11.7% minority representation and 14.5% women.

Products: Solutions to problems common to state highway agencies (often in the form of recommended guidelines or specification provisions for consideration by the American Association of State Highway and Transportation Officials). The following are examples of NCHRP research results that have been adopted and are in widespread use: the 1985 "Highway Capacity Manual", the "AASHTO Guide for Design of Pavement Structures", the "AASHTO Manual of Subsurface Investigation", the new AASHTO green book—"A Policy on Geometric Design of Highways and Streets", the internationally recognized "Procedures for Safety Performance Evaluation of Highway Features", the "AASHTO Guidelines on Bridge Management Systems", the "AASHTO Guidelines on Pavement Management Systems", the "AASHTO Guide on Metric Conversion", the new "AASHTO LRFD Bridge Design Specifications", and the new Seismic Design section and numerous other improvements to individual provisions in the AASHTO standard Specifications for Highway Bridges.

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Cooperative Research Programs WWW Homepage

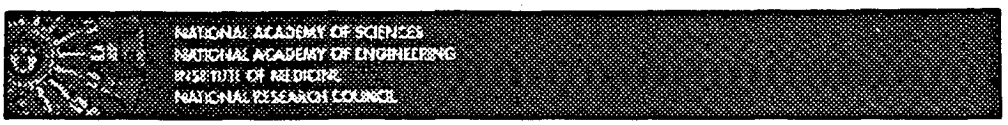
http://www2.nas.edu/trbcrp

The Cooperative Research Programs Division of the Transportation Research Board, responsible for administering the **National Cooperative Highway Research Program (NCHRP)** and the **Transit Cooperative Research Program (TCRP)**, announces a new world-wide web homepage. Some of the features include:

- Information on the history, mission, and procedures of NCHRP and TCRP
- Information on the objectives and status of all research projects since 1988, project statements (requests for proposals (RFPs)), and anticipated projects
- An easy-to-use search engine that covers all projects
- Up-to-date information on CRP publications and how to order them
- Access to a form for submitting TCRP problem statements
- Registration form for receipt of electronic notification of RFPs
- Form for documenting successes based on CRP research projects

With the addition of project statements (requests for proposals) to the world-wide web site, NCHRP and TCRP **will discontinue** sending project statements by mail in 1997. Electronic mail will be used to notify prospective proposers of new project statements.

Please send comments and recommendations on this site to rderr@nas.edu.



Transportation Research Board

Cooperative Research Programs

The Cooperative Research Programs (CRP) division of the Transportation Research Board (TRB) administers two cooperative research programs:

- The **National Cooperative Highway Research Program (NCHRP)** is sponsored by the member departments of the American Association of State Highway and Transportation Officials (AASHTO) in cooperation with the Federal Highway Administration (FHWA). Click here for more information on NCHRP, including information on preparing proposals.

- The **Transit Cooperative Research Program (TCRP)** is a joint program between the Federal Transit Administration; the National Academy of Sciences, acting through the Transportation Research Board; and the Transit Development Corporation, Inc., a nonprofit educational and research organization established by the American Public Transit Association. Click here for more information on TCRP, including information on preparing proposals.

Use this search bar to search the project information for all CRP Projects.

	NCHRP	TCRP
Project Information	Anticipated Projects **Project Statements (Requests for Proposals)** Active Projects Completed Projects All Projects	Anticipated Projects **Project Statements (Requests for Proposals)** Active Projects Completed Projects All Projects
TRB Bookstore	Reports Syntheses of Highway Practice Research Results Digests Legal Research Digests	Reports Syntheses of Transit Practice Research Results Digests Legal Research Digests NCTRP (predecessor of TCRP)

Look here for information on:

- **Staff Contacts**
- **Delivery Information**

To get on our mailing list to notify you when new project statements (requests for proposals) are available, click here.

If you've had success using a CRP product, please tell us about it.

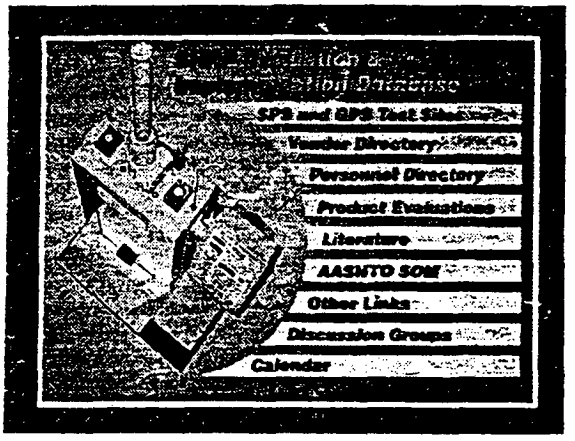
Please send any comments on the CRP home page to rderr@nas.edu.

You are visitor # 1408 to this page since April 29, 1996.

NAS Home Page | TRB Home Page

Washington State Department of Transportation
Office of Technology Applications

SHRP Evaluation & Implementation Database
http://www.wsdot.wa.gov/fossc/OTA/SHRP



When the Strategic Highway Research Program (SHRP) concluded in 1993, few products were ready for immediate implementation. Though FHWA is responsible for the implementation of SHRP products, much responsibility rests with the individual state transportation agencies which must conduct the necessary testing and evaluation before implementation can occur. An effective communication tool to facilitate the sharing of SHRP evaluation experiences is needed if states are to complete this immense task. This need has been acknowledged at various levels, by FHWA, AASHTO, TRB, and the individual states, and has led the Washington State Department of Transportation to develop a comprehensive, interactive resource via the Internet.

The objectives of the SHRP Evaluation & Implementation Database are to:

- facilitate the objective evaluation and eventual implementation, or rejection of SHRP products
- coordinate the exchange of product evaluations, SPS & GPS test site histories, meeting minutes, and questions, answers and comments between the individual states; and,
- provide international, federal, state, local and private partners with access to the most comprehensive SHRP resource available.

Items found in the SHRP Evaluation & Implementation Database include:

- evaluations of individual SHRP products,
- directories of key federal, state and local personnel and vendor contacts,
- moderated discussion groups for each of the four program areas,
- a complete searchable listing of SHRP publications and periodical articles,
- information regarding SPS and GPS pavement performance test sites, and
- a calendar of upcoming events.

The individual state transportation agencies are invited to contribute information regarding the above items. Without the support of these agencies the database will not be successful.

WSDOT plans to evaluate the effectiveness of the database by monitoring its use. Of particular interest will be the identification of: the database user, the length of a visit to the database and the specific item(s) accessed.

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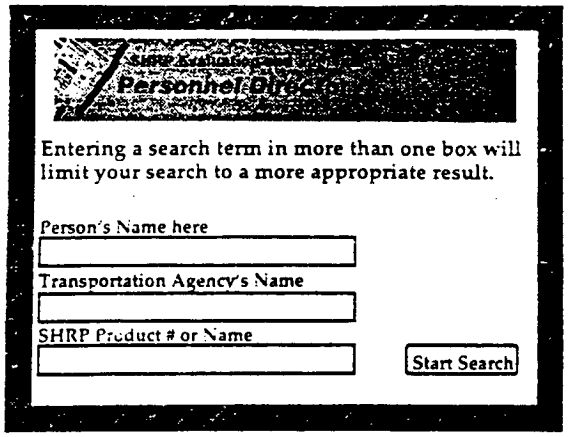
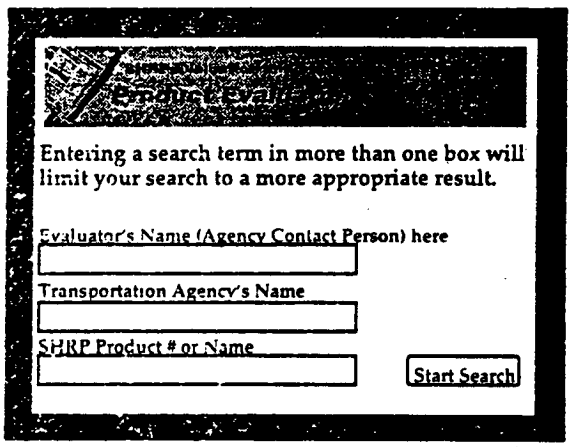
Personnel Directory



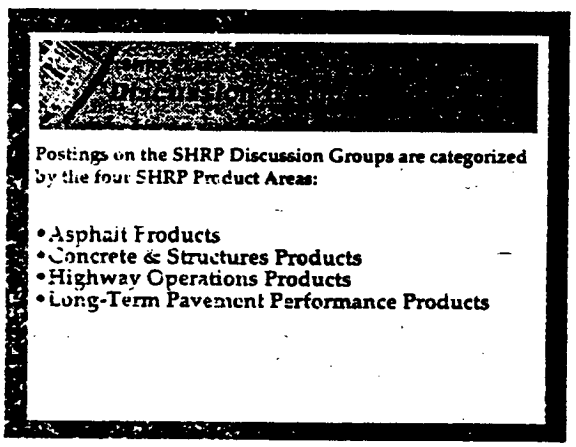
The SHRP Personnel Directory contains the names of individuals currently involved in the development, evaluation and implementation of SHRP technologies. Individuals found in this directory include personnel from: AASHTO, FHWA, TRB, individual transportation agencies, academia, specific user-producer groups, and others. To search this directory, you need only enter one, or more of the following: Person's Name (first and/or last), Agency's Name, or SHRP Product # or Name. All individuals engaged in SHRP related activities are encouraged to submit their name and title, organization name, street and e-mail addresses, telephone and fax numbers, and a brief biography outlining various dealings, participation, and affiliation with SHRP committees, task forces, organizations and the like.

Product Evaluations



The SHRP Product Evaluation Database was created to facilitate the exchange of information vital to the successful development, evaluation and implementation of SHRP products. Product evaluations found in this database were completed by personnel from state transportation agencies, local agencies, FHWA, TRB, AASHTO, industry and academia. To search this directory, you need only enter one, or more of the following: Evaluator's Name (first and/or last), Agency's Name, or SHRP Product # or Name. All individuals engaged in SHRP related activities are encouraged to download a blank copy of the product evaluation form (or request one via e-mail or postal mail).

Discussion Groups



The SHRP Discussion Group is a moderated system that enables transportation professionals and researchers to pose questions to their international, federal, state and local counterparts and openly discuss issues related to SHRP. All individuals engaged in SHRP related activities are encouraged to submit questions, or respond to questions when appropriate. Since the Internet is an open public-forum, all postings are reviewed by the Database Administrator to ensure applicability and eliminate pranks. Any reader may reply directly to the individual posing the question, or to the Database Administrator for posting on the Database.

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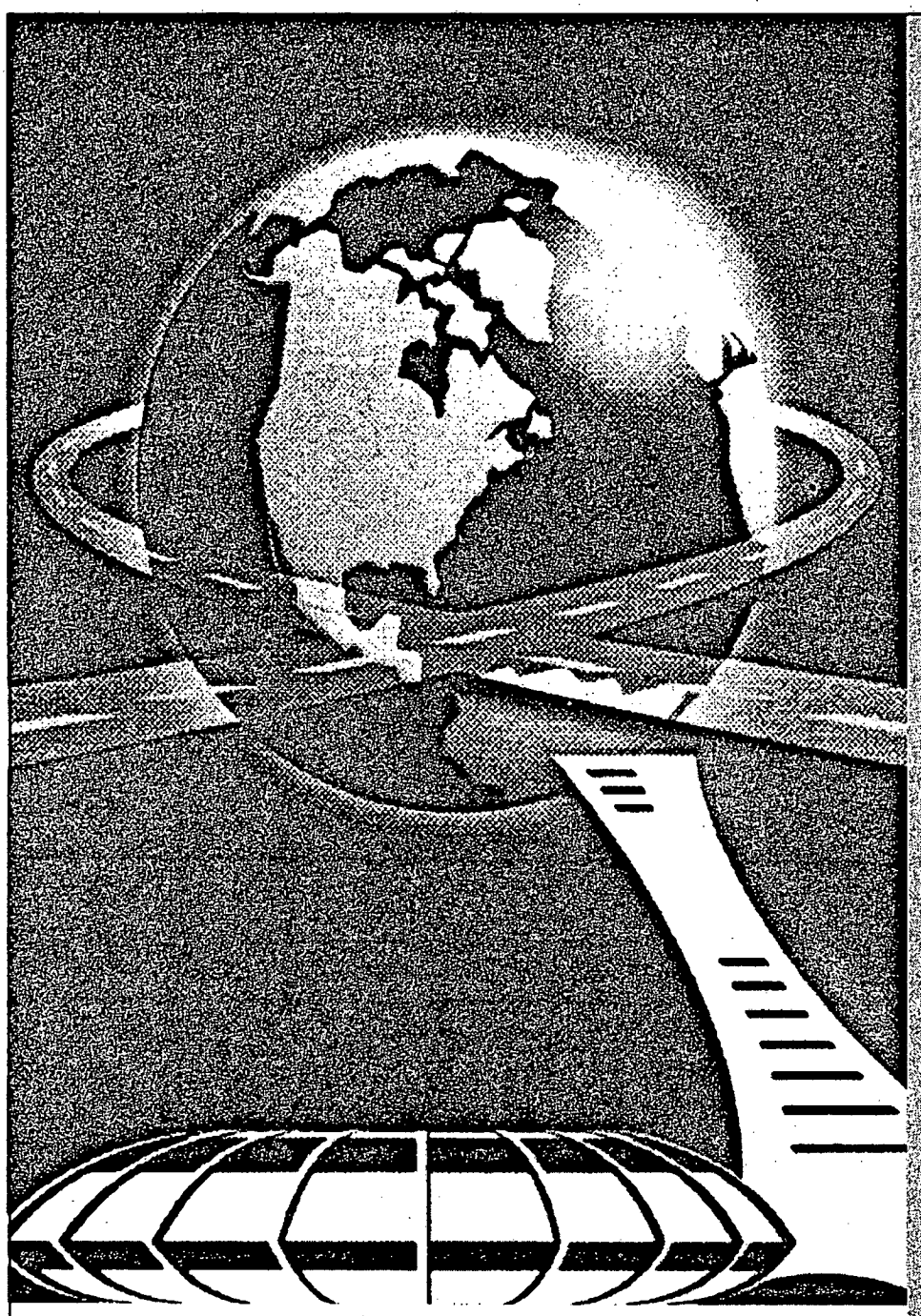
ANNEXE G



Montréal 1995

XX^th WORLD ROAD CONGRESS

DEAR COLLEAGUE,

In September 1995, Montreal hosted the XXth World Road Congress of the Permanent International Association of Road Congresses (PIARC). At the 1995 quadrennial congress, more than 3,000 delegates and guests from governments, regional authorities, public organizations, and associations from 93 countries joined this world transportation forum for 6 days of seminars, meetings, and exhibits.

This XXth Congress, as with those before it since the organization was created in 1907 at the Paris Conference, had a variety of notable features that once again reflected the strength and the diversity of the global highway transportation community. Among the most visible was PIARC's changing its name to the World Road Association (WRA). While the organization's name changed, it remains committed to its international platform of formulating road transport policies; the planning, construction, improvement, and maintenance of road systems; and the operation and maintenance of road systems.

Overall, the WRA has served and continues to serve as a technology transfer organization. The quadrennial process of developing and holding Congresses results in accomplishments from permanent committees, working groups, and ad hoc groups. Each Congress is defined by a series of "Questions" that are established at the previous Congress. Questions established in Marrekech in 1991 that framed the Congress in Montreal in 1995 were performance management of road administrations; transportation and urban space planning; achieving quality in roadwork; and new technologies for pavement strengthening and maintenance. During the Congress, 320 reports and papers were presented at 75 sessions and meetings. In addition, technology was showcased and exchanged at 250 exhibits, many of which were housed in 14 large national pavilions.

Another notable accomplishment launched at the Congress in Montreal was the World Interchange Network (WIN), a global information exchange network. Through WIN, experts can be identified by a client in need and follow up with the expert on the transfer of transportation information with a speed and ease that far exceeds that of traditional means—whether the two are in adjoining villages or on opposite sides of the globe. WIN is an exciting addition to the international transportation community and has the potential to significantly improve access to international experts for individuals throughout the community.

United States participation in 1995 included the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials, the Transportation Research Board, the Institute of Transportation Engineers, and others from States, universities, associations, and industry.

Readers are invited to contact Donald Symmes (202/366-9627) in the FHWA Office of International Programs, or Ray Griffith (202/366-9210) of the FHWA Office of Technology Applications for more information on the Congress and on the WRA.

Ray G. Griffith

Ray G. Griffith, P.E.
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PARTICIPATION IN THE WORLD ROAD ASSOCIATION ENSURES U.S. INVOVEMENT WITH WORLDWIDE HIGHWAY TECHNOLOGY

The United States has played an active role in the World Road Association (formerly Permanent International Association of Road Congresses—PIARC) from its formation at the 1907 Paris Conference to its suspension during World War II. In fact, Washington, DC was the site of the VIth World Road Congress in 1930.

For international political reasons, the U.S. did not rejoin PIARC when it resumed activities after the War. In the 1970s and 1980s, however, the U.S. highway community in general and the FHWA in particular became increasingly conscious of the need for better access to world highway technology developments. Efforts were begun to rejoin the Association and in late 1989, the FHWA secured approval from the Department of State to renew membership in PIARC.

Since rejoining, the U.S. has been active on PIARC technical committees. Although the FHWA plays the lead role in representing the U.S., the American Association of State Highway and Transportation Officials and its member State DOTs, as well as the Transportation Research Board, also are very active participants. The AASHTO and TRB involvement is crucial in ensuring that knowledge of developments abroad is disseminated throughout the U.S. and in enabling U.S. experts to represent the technological strengths of the U.S.

READ ALL ABOUT IT!

Several publications that supplement the events of the Montreal Congress are available in English and French, the official languages of the Association. These include:

- Documentation on each of the four questions that framed the Congress;
- Separate small reports for each of the committees and ad hoc groups;
- A volume of individual papers sponsored by the committees and working groups; and
- A document of complementary contributions toward the publications.

For more information, contact any committee or group member, or call Don Symmes (Office of International Programs) at 202/366-9627, or Ray Griffith (Office of Technology Applications) at 202/366-9210.

MONTREAL HOSTS XXTH WORLD (CLASS) ROAD CONGRESS

The Tradition of Transportation Excellence Continues

In September, more than 3000 delegates and guests representing governments, regional authorities, public organizations, associations, and individuals from 93 countries gathered in Montreal for the XXth World Road Congress sponsored by the Permanent International Association of Road Congresses. Held every 4 years in a different city, the Congress is a forum where the world's transportation community addresses road technology and the broader issues encompassed in transportation policies.

The 1995 Montreal gathering continues a Congress tradition that began in December 1907, when 1600 officials representing 33 nations met in Paris. These visionaries understood that roads are more than connections among people and places; roads are the lifelines that foster economic growth at home and abroad. The group also understood the value of an international fellowship dedicated to improving worldwide cooperation concerning transportation policies and road technology.

The result of the Paris conference was to officially organize the Permanent International Association of Road Congresses. The name was officially changed at the Montreal meeting to the World Road Association (WRA); however, its mission remains true to its original intent. The WRA is the international platform to address:

- The formulation of road transport policies.
- The planning, construction, improvement, and maintenance of roads.
- The operation and maintenance of road systems.

The need and value of such an organization is demonstrated by its growth through the last 8 decades. In 1907, 28 governments sent official delegates and 107 papers were read. In 1995, members of the World Road Association represented 81 governments and 2100 nongovernment organizations. During the 6-day Montreal Congress, members took part in more than 75 sessions or meetings and the Congress published 320 reports or papers that totaled 4300 pages.

U.S. FHWA Well-Represented in WRA Leadership

The World Road Association is the oldest international organization whose only focus is the exchange of information and expertise on roads and road technology. The Association is administered by the **Permanent International Commission (PIC)**, an assembly of delegates appointed by the member governments. **First Delegates** head each national delegation. FHWA Administrator **Rodney Slater** is the U.S. First Delegate and PIC member. The PIC elects a number of its own members to serve on the WRA **Executive Committee**, which manages the Association. FHWA Associate Administrator **Gloria Jeff** is a member of the Executive Committee.

Additionally, numerous committees and working groups (see article "World Road Association Mission is Technology Transfer") ensure that state-of-the-practice technology and forums on emerging transportation issues and policies are at the heart of each quadrennial World Road Congress.

Although its governing organization is comprised of officials who represent their nations' road administrations, the World Road Association remains a nonpolitical, nonprofit organization whose members represent countries from every continent, every political persuasion, and every level of technical achievement.

WORLD ROAD ASSOCIATION MISSION IS TECHNOLOGY TRANSFER

Although the international transportation community assembles for a World Road Congress every 4 years, preparation for the Congresses is a WRA permanent activity. The 4 years between Congresses are devoted to planning and developing the technical program that is crucial for road administrators responsible for establishing and implementing national road policies. Additionally, the host country uses the time to plan the logistical aspects of the Congress, including technical tours, exhibits, protocol, promotion, and interpreting proceedings in WRA's official languages of French and English.

The technical program reflected the last 4 year's accomplishments of 13 permanent committees, 4 working groups, and 4 ad hoc groups. The priority issue for each of these groups is commitment to roads that serve balanced and sustainable socioeconomic development and the need to integrate national roads with international road systems.

"Questions" Help Set the Congress Agenda

Each Congress defines key priority issues by selecting **Questions**, topics designated by the WRA Permanent International Commission that are submitted to the member countries. Questions addressed during the Montreal Congress resulted from conclusions of the 1991 World Congress in Marrakech, a survey of national First Delegates, and discussions among Executive Committee members. Questions framing the Montreal Congress were:

- Performance management of road administrations.
- Transportation and urban space planning.
- Achieving quality in roadworks.
- New technologies for pavement strengthening and maintenance.

Because it would be impossible to manage the response to these questions from 100 member countries, an **ad hoc group** is appointed by national First Delegates. Each ad hoc group specifies the issues and scope of the question. **National Reporter-Coordinators**, also appointed by their nation's First Delegate, have approximately 1 year to organize and draft that nation's response, or national report, which must be submitted at least 1 year before the next Congress.

After analysis of the reports, the ad hoc groups produce a **General Report**, which is distributed before the Congress. The National Report is recognized as an invaluable reference collection. Another acknowledged benefit of the national reports is that they encourage experts to appraise their national policies and practices, which also compels them to examine their daily activities in a more global context.

The U.S. did not prepare a national report for the Montreal Congress, rather, AASHTO invited two states to present exemplary "State" reports on *Permanent Management of Road Administrations* and *Achieving Quality in Road Works*.

Each Question also is the subject of a session at the Congress.

Permanent Committees

The World Road Association maintains permanent committees of 30 to 50 members whose mission is to investigate transportation-related matters that are of general interest to the Association's member countries and to inform decision makers in the field of road policy about the emerging issues.

The committees are hard at work between Congresses. At the Congress, each committee holds a plenary session, and more importantly, the committees' work sets the stage for many controversial issues that will be addressed during sessions at the Congress. The committee structure changes to meet emerging issues, but committees at work for the Montreal Congress included the subjects of:

- Surface characteristics.
- Technological exchanges and development.
- Interurban roads.
- Road tunnels.
- Road management.
- Concrete roads.
- Flexible roads.
- Economic and finance,
- Urban areas.
- Road bridges.
- Earthworks, drainage, and subgrade.
- Road Safety.
- Environment.

Two other committees on performance of road administrations and intelligent transportation systems have been created for the 4-year work cycle that culminates with the 1999 Congress in Kuala Lumpur.

Working Groups

Working groups function much like committees, but their work is of limited duration and focuses on specific topics. Four working groups emerging from the 1991 Congress were:

- PIARC Winter Road Congress.
- Natural disaster reduction.
- Modern traffic control and management.
- Heavy freight vehicle issues.

A Tour is Worth a 1000 Words

One entire day of the Montreal World Road Congress was devoted to technical tours that enabled Congress goers to see how local engineers and specialists meet the challenges of road engineering work. Using the City of Montreal as a case study in intermodalism, Congress participants enjoyed a busman's holiday touring a bridge-tunnel, the Port of Montreal, an underground expressway that cuts across downtown Montreal, a manufacturer that specializes in hot and cold pavement recycling and materials recovery, the Canadian Pacific Railroad intermodal services center, and the Canadian National operations management center. There were also trips to a snowmobile manufacturing plant, the Hydro-Quebec Research Institute, a cement plant, the vehicle test center, and Montreal's computerized traffic management center.

A Congress for Communicating Issues

A gathering of world road administrators is invaluable because individuals and nations come together to share common concerns, examine priority issues, and discover new technologies that can enable them to work smarter and better. All of this, of course, is technology transfer on a global scale. It is also essential where the rapidly changing world context is forcing road administrations to rethink the strategic role of roads and the substance of road policy.

WRA STRATEGIC PLAN IS BLUEPRINT FOR SERVICE

The WRA Charts Its Future

The World Road Association has been a leader in the worldwide transportation community for almost a century, but the environment in which it operates is changing dramatically as road engineers address the challenges of managing road networks, ensure the safety of roadway users, and respond to environmental concerns.

To ensure that the WRA is able to serve its members by identifying and addressing current and emerging road and road technology issues, the World Road Association undertook a year-long self-study, which was prompted by a 1992 survey. While revealing general satisfaction with the organization as a forum for discussing transportation issues, the survey identified deficiencies in WRA's organization and operation. In 1994, the WRA began to develop a strategic plan to ensure the organization not only remain the leader in road technology transfer, but also that it continue to be of value to the members it has pledged to serve. In that spirit, the WRA self-evaluation resulted in a detailed, dynamic strategic plan that reaffirms WRA's traditional mission but also presents strategies to permit it to respond more quickly to the changing needs and environment in which it operates.

The WRA strategic plan is designed specifically to give purpose and direction to the organization and to produce measurable results. The Permanent International Commission of the WRA approved the plan during the Montreal World Road Congress.

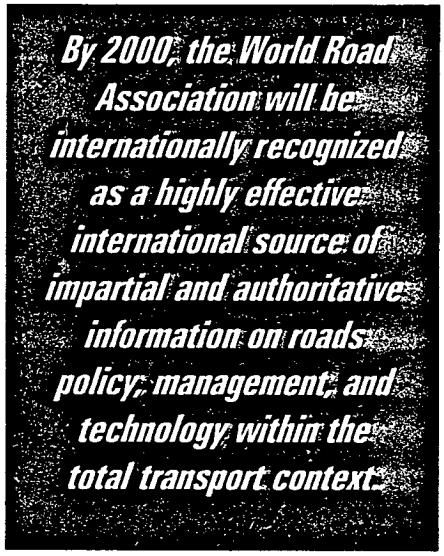
The WRA Strategic Plan

The evaluation process produced two separate documents to guide the WRA: a *Strategic Plan* and a *Report on the Implementation of the Strategic Plan.*

The strategic plan defines the WRA's role, presents road and road transport goals, defines organizational objectives, and identifies strategies to achieve each goal and objective. Underlying these is the vision statement, which commits that by 2000, the World Road Association will be internationally recognized as a highly effective international source of impartial and authoritative information on roads policy, management, and technology within the total transport context. The WRA will be instrumental in providing the best international contact network for professionals in the field.

The vision is supported by a mission statement that describes the organization, its members, and eight organizational objectives that will enable the WRA to realize its mission. The plan also defines the WRA's values and commitment to

- Provide quality service to its members.
- Remain a leader in international technology transfer and cooperation.



- Develop an intermodal approach that will surmount international/organizational borders.
- Emphasize the needs of developing nations and those in transition.
- Address transportation issues in the context of environment protection, safety.

The WRA strategic plan is issues-based and defines nine road and road transport goals that are grouped in six broad topic areas:

- Road technology.
- Road management.
- User's perspective.
- Sustainable development and the role of roads in the transport system.
- Value for money.
- Technology transfer.

Within these areas are specific goals, corresponding strategies, and desired results. Eight other organizational objectives focus on member service areas that enhance information and technology exchange and improve communication within WRA's organizational structure.

The report also is a comprehensive document that defines administrative actions and management procedures for improving communication and organizational performance.

To ensure that the strategic plan and the implementation report become procedure, members of the WRA Executive Committee have been designated as topic area coordinators. In this role, they will work directly with the chairpersons of relevant technical committees and work groups to ensure that work plans address specific topic goals and strategies.

The Future is Now

The World Road Association, through its adopted strategic plan, has committed itself to improving its own organizational efficiency and the effectiveness of its working relations with its members and other transportation organizations. The WRA has also pledged that the strategic plan will be a dynamic one that can respond to emerging issues of transportation and meet the needs of its members in the worldwide transportation community.

According to WRA President Victor Mahbub (Mexico), "...the strategic plan is not set in concrete. It must build on 8 decades of success while being flexible enough to respond to future challenges. Through the World Road Association, we learn from each other. And through the WRA, we will benefit from the experience acquired over many years to be of service to future generations."

U.S. Pavilion Showcases *NEW WAYS TO MANAGE HIGHWAYS*

Creativity and technical ingenuity were hallmarks of more than 250 exhibits at the XXth World Road Congress that featured world class road technology. The exhibit hall, which covered more than 300 square meters, housed 14 large national pavilions ranging from hi-tech futuristic displays to geodesic domes and a romantic Malaysian temple. The Montreal Congress also featured a permanent demonstration of WIN, the World Interchange Network for the Transfer of Road Technology (see article on WIN).

The Montreal gathering represented only the second time in World Road Association's 8-decade history that a World Road Congress has been held in North America, and the FHWA and other U.S. companies and associations took advantage of the opportunity to showcase state-of-the-practice products, technology transfer projects, demonstrations, and activities.

The FHWA, through its Office of Technology Applications (OTA), demonstrated new technologies and products that improved advanced asphalt and concrete pavements, structures, geotechnology, hydraulics, global information system (GIS), safety, motor carrier operations, the environment, and traffic management. Also prominently featured were highway products developed under the 5-year SHRP and other examples of public/private partnerships that are enhancing the U.S. transportation system.

The U.S. pavilion also emphasized FHWA outreach efforts. Materials about National Highway Institute satellite training opportunities and updates on technologies developed by the Turner-Fairbank Highway Research Center helped visitors become more familiar with FHWA technology transfer programs and opportunities. There was also an exhibit for McTRANS (short for the Center for MicroComputers in Transportation, based at the University of Florida Transportation Research Center).

Evidence of the U.S. road technology public/private sector partnership were industry exhibits by engineering and construction equipment firms, manufacturers of profiling and testing instruments, and software developers. There were also displays by the American Road and Transportation Builders Association (ARTBA), the American Association of State Highway and Transportation Officials (AASHTO), and the Minnesota Department of Transportation.

According to one exhibitor with the U.S. pavilion, "We have the world's best engineers and the Montreal Congress was our opportunity to demonstrate that to the world transportation community. It was a tremendously successful international marketing opportunity."

WORLD INTERCHANGE NETWORK— WIN —EXPANDS THE TRANSFER OF ROAD TECHNOLOGY

The heart of technology transfer is the ability of experts and practitioners to communicate with each other. This exchange of expertise is particularly important in the road field because road systems must exist in specific environments, be adapted to local materials, and provide levels of service appropriate to the needs and resources of those it serves. Information networks have become indispensable tools in this exchange, and revolutionizing the ability to access those networks is the World Interchange Network (WIN), which was developed by the World Road Association and demonstrated successfully at the Montreal Congress.

The concept behind WIN is deceptively simple: establish a network of as many subscribers as possible to reach out to those in need of technology and expertise, particularly those in less developed or newly industrializing countries. In June 1993, a World Road Association committee set out to do just that. By June 1994, institutions in 49 countries and 13 international or regional organizations declared themselves "founders" and announced their intent "...to improve the flow of technical, managerial, and policy-related information and knowledge among road experts worldwide."

WIN—A Network of Networks

WIN operates on the premise that the best way to share information is for individuals to interact cooperatively on the level that best suits the situation—local, regional, national, or international. Using common characteristics of climate, terrain, and economy, WIN connects existing technical exchange networks to match those seeking information with technical experts.

The institutions involved in WIN cover the spectrum of public, private, academic, and nonprofit sectors. An individual site, or location, is designated a *node*. The function of the nodes is to analyze the request and, based on local conditions, identify a technical contact(s) within their node or within another node. The node then locates the technical expert(s). Once the referral is made, the initiator and the technical expert communicate in the manner most convenient (e.g., phone, letter, fax, Internet) and determine the appropriate way to exchange information. The nodes do not deliver technical data.

As of September 1995, there are 25 active nodes worldwide and others are scheduled to join.

The World Interchange Network is currently undergoing a 3-year trial period, but its future holds the promise of enhancing both the speed and development of new ideas throughout the international road community.

U.S. PARTICIPANTS INTEGRAL TO COMMITTEES AND GROUPS PREPARING FOR MONTREAL WORLD ROAD ASSOCIATION (PIARC) CONGRESS

The 4 years between World Road Congresses are busy ones for the transportation professionals who serve as chairmen, experts, and members of the WRA's committee, as members of ad hoc groups formed to respond to specific questions posed for each Congress, and as active members of the WRA's Permanent International Commission and Executive Committee.

The U.S. was well-represented in the activities that culminated in events and programs at the productive XX[th] Congress in Montreal. The following is a list of individuals who represent a variety of public and private U.S. transportation organizations involved in the Montreal Congress. With the exception of the Permanent International Commission, the membership of the World Road Association is reviewed following each Congress; however, these individuals can be contacted for information about the respective committees and groups.

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