

INDIANA DEPARTMENT OF TRANSPORTATION
Research Program Peer Exchange
NOVEMBER 13-16, 2006

Indiana Department of Transportation
Office of Research and Development
1205 Montgomery Street
P.O. Box 2279
West Lafayette, IN 47906

December 6, 2006

Table of Contents

Executive Summary	1
1. Introduction	5
2. Need for Research	9
3. Strength of the Program	11
3.1 The INDOT Research Program is Vital, Well Managed, and Meets User’s Needs	11
3.2 Implementation of Research Results	12
3.3 Focus Group Process	12
3.4 Joint Transportation Research Program	13
3.5 Research Equipment and Facilities	14
3.6 Excellent Research Partnerships	14
3.7 Strategic Research Plan	14
3.8 Stable, Technically Skilled, and Experience INDOT Research Staff	15
3.9 Technical Summaries Useful and Helpful	16
4. Key Issues and Opportunities	17
4.1 Additional Commitment for Implementation	17
4.2 Other Factors Affecting Implementation	17
4.3 Focus Group Process	17
4.4 Joint Transportation Research Program	18
4.5 The Research Program would be Well Served by Having an Information Specialist and a Dedicated Implementation Engineer as Staff Resources	18
4.6 Help Drive Strategic Agenda and Critical Issues	18

4.7	Enhancing the Delivery of the Transportation Program in View Of Limited Agency Staff Resources	19
4.8	Pursue Analysis of Contract Extension Causes	19
4.9	Communication and Dissemination of Research Findings	19
4.10	Meeting Needs of New INDOT Commissioner	19
4.11	Support Indiana Planning Oversight Committee (IPOC) Decision Making	20
4.12	General Communication Options Listing Supplied as Information	20
5.	Peer Exchange Panel Member Reports	23
	Appendix A – Peer Exchange Emphasis Area	27
	Appendix B – Peer Exchange Agenda	29



EXECUTIVE SUMMARY

This report summarizes the outcomes of a Peer Exchange conducted at the request of the Indiana Department of Transportation (INDOT) on November 13-16, 2006. Peer exchanges are required of State Departments of Transportation as a condition of receipt of federal funding for research activities. This “exchange” was an opportunity for panel members from the Connecticut Department of Transportation, the Louisiana Department of Transportation and Development, a private sector transportation research management firm, the Federal Highway Administration (FHWA), and the Joint Transportation Research Program (JTRP) representatives to evaluate the INDOT Research Program and to share experiences and best practices with INDOT research staff. This is the third peer exchange conducted by the INDOT Research Program since 1998.

INDOT identified emphasis areas (Appendix A) to be used as primary topics to guide panel discussions and to focus panel’s fact-finding activities. Emphasis areas dealt with how the INDOT Research Program supports INDOT’s mission, goals and objectives, and programs, such as Major Moves; program administration and the JTRP structure and operations; Research Program support to INDOT Business Units; the relationship of the Research Program to its stakeholders; and more.

The peer exchange panel conducted over 20 interviews (Appendix B – agenda) and information gathering sessions with a broad spectrum of research program users and stakeholders including INDOT Central Office and District senior management; a variety of industry representatives, the FHWA, JTRP management, administration, and researchers.

The panel identified three significant areas to report its findings: The Need for Research; Strengths of the Program; and Key Issues and Opportunities.

The Need for Research

Research is needed at INDOT because it can enhance INDOT’s ability to deliver Major Moves with limited resources and fixed schedules through providing solutions associated with innovative financing, innovative contracting, accelerated construction, and workforce issues, among other items. Research can effectively increase INDOT efforts to be competitive, forward thinking, and future oriented; to produce rationally supported, confident decisions by supplying reliable data for data driven decisions, and to become a TOP DOT by providing

information to position the agency as a leader. Furthermore, research is needed at INDOT to address business unit and District needs; to pull in external resources for these business units to solve unique problems; and to provide a means to mitigate risk by conducting small-scale trials to avoid the consequences of large-scale failures. Finally, INDOT needs research to expand the knowledge base of its workforce to enable them to more effectively accomplish the agency's missions and objectives.

Strengths of the Program

The **INDOT Research Program** is vital, well managed, and meets users' needs. The panel found consistent, enthusiastic support and endorsement of the research program activities from the variety of users and stakeholders, as well as researchers.

Implementation of research results continues to be a primary research program activity. The research program takes its implementation role seriously and accomplishes this critical aspect of the research program through a clearly defined business process.

Each participant in the peer exchange fact-finding interviews, regardless of affiliation, INDOT employee, academic, or industry, strongly endorsed the **Focus Group process for needs identification and project development**. The process is enjoyed by participants, and was reported to identify the right projects, generate the highest quality problem statements and proposals, and provide a team-building environment among INDOT and its partners or stakeholders.

The **Joint Transportation Research Program** is a very valuable asset for accomplishing research for INDOT. Its management and researchers understand INDOT's needs. In fact, INDOT needs were the foremost theme during interviews with JTRP academics. The JTRP is an excellent outlet for disseminating INDOT research program results. The experienced and time-trusted research management group at JTRP provides an excellent venue to house additional transportation initiatives such as the new University Transportation Center (UTC) for Logistics and other programs like the Local Technical Assistance Program (LTAP). JTRP also presents an opportunity to address workforce recruiting through allowing INDOT exposure to undergraduate and graduate students.

The expanse and depth of **research grade equipment** housed by the INDOT research laboratories is a privilege shared by few state DOT Office of Research and Developments throughout the country. When the resources of the JTRP are added, the combined capability is second to none.

INDOT's research program has **fostered excellent partnerships** with the various stakeholders that perform the research and use the results. Benefits experienced as a result of these partnerships include more practical and implementable solutions, quicker and more comprehensive deployment, networking between various stakeholders, which facilitates continued problem solving and a culture of innovation. These partnerships have also been successful in attracting external funding from national programs to address Indiana's transportation research needs. In the last three years \$3.5 million in additional funding has

been awarded to the INDOT/JTRP Research Program.

The **INDOT Strategic Research Plan (SRP)** serves the research program well as it is proactively re-aligning the focus groups in the SRP to the business units in INDOT after the 2005 structural re-organization. The SRP is an excellent research program management tool that allows the research activities to contribute to accomplishing goals of the business units and Districts.

The research program enjoys a **stable, technically skilled, and experienced INDOT research staff**. The research staff is highly respected by INDOT management, industry partners, and university researchers. Peer Exchange participants and customers, frequently noted the benefits and utility of having consistent and technically qualified in-house research staff as a primary determinant in the successful completion and adoption of good research findings. In addition, the staff provides quality research administration and is a critical link bridging the research and practical application of innovations.

Technical summaries of completed research projects are useful and helpful. Technical summaries, a 2-page synopsis of project findings, are an important vehicle for technology transfer, for use in communicating innovations such as new specifications, technology, or procedures that will be adopted by INDOT. These summaries were universally endorsed by the users and stakeholders interviewed during the peer exchange.

Key Issues and Opportunities

A variety of key issues and opportunities were identified by the peer exchange panel. The primary opportunities for the INDOT research program to consider are as follows:

Additional commitment for implementation by INDOT– opportunities exist to enhance the impact of the successful research results through a stronger departmental commitment to implementation activities and through providing increased resources to accomplish implementation.

Providing more time for discussion and **strategic planning in the focus group process** will provide enhanced quality and performance of the already highly successful SPR process.

The JTRP has the administrative and fiscal management capabilities to **integrate the UTC** into its structure. By doing so the UTC will have an effective base from which it can serve INDOT business unit and Districts.

The research program would be well served by **having an information specialist and a dedicated implementation engineer as staff resources**. An information specialist will enhance the quality, timeliness, and content of the research effort. A dedicated implementation engineer will enable INDOT to more quickly and reliably adopt beneficial innovations into its operations.

The research program has an opportunity to play a major role in **support of critical and**

strategic INDOT needs in areas such as capital improvements (Major Moves), system optimization and traffic management (congestion and mobility), system preservation and asset management, and project delivery and organizational effectiveness. The research program also can affect the delivery of the transportation program in view of limited agency staff resources through providing solutions to quality and value issues.

The INDOT Research Program has the opportunity to **enhance its communications and the dissemination of research findings**. A host of innovative communication and dissemination approaches are available that can provide the message of research findings to an even greater number of users both within and outside the agency.

A unique opportunity is occurring; the research program should identify ways to **support the needs of the new INDOT commissioner**.

Upper management at INDOT already has indicated that the research program provides for data driven decisions by INDOT business units and which are defensible to fiscal planners and customers. There is a continued need and opportunity for the research (and specialized testing) programs to **provide IPOC with statistically viable data to accomplish its mission**. Specific data inputs related to economic development, mobility and transportation efficiency, safety, customer inputs, public-private-partnerships, and environmental best practices have been noted and recommended.



INTRODUCTION

BACKGROUND: This report summarizes the outcomes of a Peer Exchange conducted at the request of the Indiana Department of Transportation (INDOT) on November 13-16, 2006. Peer exchanges are required of State Departments of Transportation as a condition of receipt of federal funding for research activities. The Peer Exchange is an opportunity to evaluate the INDOT research program as well as an opportunity for panel members to learn about the program and to share experiences and best practices with INDOT staff. This is the third peer exchange conducted by the INDOT Research Program. The most recent past exchange was held June 17-20, 2002. Results of that exchange were well received and the recommendations resulting from that peer exchange have been implemented within the INDOT Research Program. The success of the prior peer exchanges provided a positive foundation for the conduct of this current exchange.

PARTICIPANTS: Peer exchange panel membership included the following:

- Barbara T. Harder, Principal, B. T. Harder, Inc., Chairperson
- Harold "Skip" Paul, Director, Louisiana Transportation Research Center, Louisiana Department of Transportation and Development (DOTD)
- James M. Sime, Manager of Research, Connecticut Department of Transportation
- David Unkefer, Planning and Research Engineer, Federal Highway Administration, Indiana Division
- Kumares C. Sinha, Director, Joint Transportation Research Program, School of Civil Engineering, Purdue University
- Barry K. Partridge, Director, Office of Research and Development, INDOT

The composition of the peer exchange panel was designed to provide continuity with the previous exchange as well as to introduce fresh perspectives into the research program. Dr. Sinha, Ms. Harder, a representative from Louisiana DOTD, and Dr. Partridge were members of the peer exchange held in 2002. In addition a representative from Connecticut DOT's research programs was invited to participate due to the similarity of its program with the INDOT Research Program. Louisiana and Connecticut programs were specifically chosen because of their close associations with joint (DOT, Academia, and Industry) transportation programs.

INDOT RESEARCH PROGRAM PEER EXCHANGE

Other Research and Development staff members participating in the exchange included:

- Tommy E. Nantung, Section Manager/Engineer, Pavement and Materials Research, and Peer Exchange Coordinator
- Scott Newbolds, Section Manager/Engineer, Structures and Construction Research

Additional peer exchange coordination was provided by Karen Hatke, Program Coordinator, and Dr. Bob McCullough, Research Scientist, Joint Transportation Research Program, School of Engineering, Purdue University.

OBJECTIVES: The Peer Exchange process is designed and intended to provide opportunities to improve the management of state DOT research programs and the research outcomes they deliver. Each state further identifies specific objectives or focus areas where they would like to concentrate efforts. INDOT identified emphasis areas for special attention:

1. How the INDOT Research Program supports into INDOT's mission, goals and objectives and major programs (e.g. Major Moves).
2. Research Program administration and project selection to support INDOT business units and Districts.
3. Fostering of Public, Private Partnerships, in particular to attract external funding.
4. Research Program performance measures.
5. Review of new initiatives, which were identified as opportunities in the 2002 Peer Exchange report.
6. Research Program support to the INDOT Districts in implementation support, and emerging technology
7. Research Program in-house staff support, attraction, retention and required skill levels.

(See Appendix A – Peer Exchange Emphasis Areas for more thorough discussions)

PROCESS: Appendix B contains the Peer Exchange agenda. The exchange process began with a pre-exchange meeting on Monday, November 13, attended by Drs. Partridge and Nantung and Ms. Harder, the panel chairperson. This pre-meeting or orientation was held to review the agenda, review interview approaches and areas of inquiry, and discuss the expected outcomes of the exchange with the panel chairperson.

The initial activity for the full Peer Exchange panel was a dinner Monday evening, which provided an opportunity for members of the panel to get acquainted or to renew prior professional relationships. Dr. Partridge presented a short overview of the INDOT Office of Research and Development operations and distributed a briefing folder for the panel members which included:

- Peer Exchange Agenda

- INDOT 2006 Peer Exchange Potential Emphasis Areas listing
- INDOT Research Program Peer Exchange Report, June 17-20, 2002
- Focus Group Guidelines Strategic Research Plan (SRP) Process FY 2007- FY 2009
- INDOT/JTRP Research Program CD
- INDOT Research Program, November 2006 User's Manual for Research and Implementation, Draft 11/06/06
- INDOT Research & Development Research Project Schedules, October 26, 2006
- Sample pages from the JTRP website -- <http://rebar.ecn.purdue.edu/JTRP/>

Ms. Harder facilitated a discussion with the panel on the areas of inquiry and questions that would be appropriate for interviews during the conduct of the peer exchange. Panel members shared expectations of the kind of information anticipated from the interview process.

The first series of interviews was conducted at the INDOT Central Office on Tuesday morning. The travel time to Indianapolis provided an opportunity for the panel to discuss INDOT research program practices and share a variety of Connecticut, Louisiana, and other program methods and processes. The interviews on Tuesday comprised the customer/user fact-finding activities for the panel including Central Office senior managers, industry representatives, and the FHWA Indiana Division Office representatives. The panel briefly summarized major themes and opportunities that emerged from the day's interview discussions. In addition, the travel time back to West Lafayette allowed further successful practice discussion and sharing of program management methods.

Wednesday morning the panel toured the Office of Research and Development research laboratories including its accelerated pavement testing. Interviews and discussions were held at Purdue and included the director of the Joint Transportation Research Program (JTRP) and researchers in traffic operations, structures, and construction. In addition, the panel toured the Bowen Laboratory for Large Scale Civil Engineering Research and discussed several JTRP projects being conducted at that laboratory.

Following the return to West Lafayette, panel members conducted a preliminary debriefing and began outlining their observations and suggestions for inclusion in the first draft of this report.

The first draft was compiled and distributed at the start of the Thursday morning activities. Panel members reconvened in a work session for the purposes of refining the draft report before meeting with INDOT, JTRP, FHWA, and research program staff for the final discussion. The summary draft report was submitted to the INDOT Office of Research and Development at the end of this session.

The following chapters summarize the panel's observations and suggestions for consideration by the INDOT Office of Research and Development as well as the ideas that panel members will consider for application in their respective programs.

2

NEED FOR RESEARCH

"You can't solve today's problems using the same thinking that created the problem"

Albert Einstein

Throughout the various meetings with users and researchers, and with stakeholders from both within and outside INDOT, the peer exchange panel encountered over and over again, the reasons why the Department needs research. Research was often expressed as a driver for accomplishing important strategic objectives and as a critical link to future agency successes.

Participants (customers and stakeholders) noted research is effective to enhance INDOT efforts to be:

Competitive – The agency must be forward thinking and future oriented. Research prepares the agency to take advantage of emerging issues and leverages the agency to be more effective and efficient.

Data Driven for Decision Making – Research provides the opportunity for rational, confident decisions versus decisions based on trial and error.

TOP DOT –The research program contributes to accomplishing primary initiatives such as "Major Moves" and for positioning of the agency as a leader.

On-Time and On-Cost – Research provides products, tools, methods, and procedures to facilitate efficient production while receiving the expected quality.

Mitigate Risk – Small-scale trials accomplished through research activities avoid the risk of large-scale failures.

Facilitate Introduction of New Technology – Research efforts attract and allow the introduction of innovative processes and tools into INDOT operations and procedures while allowing acceptable risk levels.

Document How Things Work – The research process provides impartial assessments and data that provide credible information for decision making and provides basis for sound financial management decisions.

Address Business Unit and District Needs – Research provides direct support and solutions

INDOT RESEARCH PROGRAM PEER EXCHANGE

to INDOT business units and Districts. It was noted by INDOT decision makers that the research program provided support and resources not otherwise available to them in addressing their needs.

Pull in External Resources – The Research Program provides unique talent, extension of INDOT capabilities and other resources to apply to agency challenges.

Expand its Knowledge Base – The results of research assist in creating a more knowledgeable workforce that can be more effective in accomplishing the agency’s mission and objectives. Examples include technology transfer, technical training, seminars, webinars, etc.

Research can enhance INDOT’s ability to:

Deliver Major Moves With Limited Resources – Major Moves provides a variety of opportunities for research to positively affect the delivery of this critical initiative. Relevant areas where research has potential to enhance efficiencies are:

- Innovative financing
- Innovative contracting
- Accelerated construction
- Contractor acceptance testing
- Low cost versus best bid
- Workforce issues: with potentially less available expertise for supervisory responsibilities in the future, research can provide solutions to maintain quality, especially in construction

3

STRENGTHS OF THE PROGRAM

Following the completion of the interviews with program staff, department managers, academic partners, FHWA representatives, and industry representatives, the panel members discussed their observations about the information that had been shared. Following are key points that reflect the panel's consensus based on the interviews conducted:

3.1 THE INDOT RESEARCH PROGRAM IS VITAL, WELL MANAGED, AND MEETS USERS' NEEDS

The INDOT research program is exceptional. It has benefited from stable, astute management and by a strong and adaptable JTRP partnership structure. The program is organized well and includes flexible research tools and products to provide services to its users. In particular, the program addresses users' needs through a balance of short-term problem solving activities and longer-term in-depth studies.

Research program excellence is accomplished through application of many research management and conduct of research best practices. Several of these best practices are noteworthy. The INDOT research program has external as well as internal review of research proposals. The external peer review of research proposals raises the quality of the proposal through fostering a more diligent initial effort by the prospective researcher who knows peers will be reviewing, and through incorporating the expert peer reviewer comments into the proposals. Additionally, the research program utilizes defined performance measures including benefit cost analysis. Furthermore the activities of the research program, e.g., research needs identification, project selection process, commitment to implementation, provide a strong vehicle that engages INDOT staff and researchers and produces valuable enhancements to the department's professional capacity.

An especially important outcome of the research program is its ability to produce reliable research results that enable data driven decisions. What is particularly critical is that such data driven decisions are acceptable by financial decision makers.

3.2 IMPLEMENTATION OF RESEARCH RESULTS

The exchange team recognizes the emphasis that the INDOT Research Program continues to place on the implementation of research results. While it is recognized that business units and Districts generally control the pace and priority of implementation efforts, the Research Program takes its role seriously and backs up its commitment by making various resources available. Depending on the project, implementation may begin during the research phase based on interim results, and implementation begins in earnest during the concluding months of the research and continues through the implementation process.

INDOT has a well defined implementation business process, including a Principal Implementor (PIM) role and a research project implementation form (strategy) that is used to define the structure, goals, resources and timeline for a focused implementation effort.

Clearly written INDOT guidelines define the role of the PIM and the relationship with the Principal Investigator and the Study Advisory Committee (SAC). Reporting requirements are very reasonable and do not appear to be particularly burdensome or time consuming tasks for the PIM. In summary, the exchange team commends INDOT on its implementation business practices and can offer only the following for consideration:

- Continue to focus on implementation and usable results
- Continue to use formal implementation plans (form)
- Continue using periodic progress reporting to document results of implementation efforts
- Recognize the importance that industry places on implementation
- Continue document benefits of research program (e.g. benefit-cost analysis)

3.3 FOCUS GROUP PROCESS

Each participant in the peer exchange, regardless of affiliation, INDOT employee, academic, industry strongly endorsed the Focus Group Process within the Strategic Research Plan (SRP). It is clearly seen by these people as the backbone of a robust research program that is responsive to the needs of INDOT. It was made very clear to the exchange panel that the initiation of this process was a great improvement and that it has continued to improve with successive iterations. Beyond the fact that to a person they expressed enjoyment in participating in the process, they expressly noted that the process through its quantitative nature identifies the right projects, generates the highest quality problem statements and proposals and provides a team building environment amongst all stakeholders – DOT, academic, industry, which has lead to a large percentage of successful and implemented solutions to transportation problems in Indiana.

A number of participants indicated that these focus groups often draw as many as 60 – 70 participants from all phases of the transportation industry, which is way beyond the appointed and voting INDOT membership and the appointed JTRP faculty. Such interest

and participation fosters a research culture that naturally extends into the implementation of research findings. This is truly a strength of the program that many state DOTs are not privileged to have. While the faculty members interviewed were committed to applied research, the answering of questions associated with thematic or strategic longer-term goals could address some basic research needs of the academic community.

3.4 JOINT TRANSPORTATION RESEARCH PROGRAM

Similar to the Focus Groups, the JTRP is seen in nothing but the most positive terms by the entire community. The JTRP researchers were very enthusiastic of INDOT and INDOT personnel were not only supportive of JTRP research but expressly pointed out the continued focus of JTRP studies to applied research solving their practical problems. In fact, INDOT administrators eagerly sought positions on the Advisory Board and those that had left, expressed a desire to re-affiliate.

Solving INDOT problems was a foremost theme when interviewing the academic representatives in the peer exchange. The research was seen as very productive and the strong review of research proposals by the JTRP advisory board, along with external peer review of proposals was highlighted as a best practice. The result was that INDOT administrators felt confident that they could employ JTRP solutions, new technologies, and materials in their decision making. The interaction of JTRP faculty and INDOT administrators has led to a better understanding of department needs and helps faculty produce results suited for specification development.

The frequent JTRP meetings to review proposals and the exit briefings by principal investigators on completed projects not only improves the final product but fosters continued communications between faculty and INDOT personnel throughout the year, such that INDOT personnel call faculty for technical assistance beyond formal research studies. Meanwhile, the faculty sees this process as improving the quality of their research product and permits them to be recognized through publication of research results in premier research journals and forums and this in turn raises INDOT's visibility on the national scene. Again, this is a strength that many other agencies do not enjoy, but has become intrinsic to the INDOT/JTRP process.

In addition to the research process, the JTRP also provides service to the research program far beyond just reviewing and conducting research. The JTRP is an excellent outlet for disseminating research results. Several of the faculty interviewees stated that they have received inquiries about their work shortly after posting on the web site, with many continuing requests. Technology transfer of research results is paramount for these solutions to be of value and the JTRP web site helps fulfill this role.

Also as an experienced and time trusted research management group, the JTRP provides the perfect venue to house additional transportation initiative organizations such as the new UTC and the LTAP programs. The administrative services of the JTRP serve to reduce administrative overhead for these organizations while providing an oversight of management and fiscal practices.

INDOT RESEARCH PROGRAM PEER EXCHANGE

A side benefit of the close cooperation and communication between INDOT and JTRP is the exposure to INDOT for undergraduate and graduate students. This is a perfect opportunity to recruit to meet workforce development needs.

3.5 RESEARCH EQUIPMENT AND FACILITIES

The expanse and depth of research grade equipment housed by the INDOT Office of Research and Development is a privilege shared by few state DOT research programs throughout the country. When the resources of the JTRP are added, the combined capability is second to none.

From research grade materials test equipment and pavement NDT evaluation equipment, the research program is fully capable of responding to both research and forensic needs of the department. The incorporation of the Superpave Center within the laboratory multiplies this capability. When combined with the accelerated pavement test facility, INDOT Research provides premier services for the delivery of Major Moves with respect to the employment of new materials and technologies. It was noted (and envied) by the Peer Exchange panel that the research program has been provided funding by the legislature and INDOT Executive Staff to enlarge the Pavement Research Laboratories which is seen as recognition that they are doing the right thing and providing quality solutions to Indiana transportation problems.

In the short time we had to visit, it was clear that the JTRP program broadens the range of equipment and facilities to conduct top quality research. The traffic management laboratory is currently investigating leading edge technology in the area of traffic signals and congestion management. Delivery of such research and capability for future work will be a plus for decision making with respect to Major Moves. Similarly, the structural laboratory is one of only four labs in the country (three universities and one industry) capable of testing full-scale structural components. Current work on FRP decks and integral abutment structures will lead directly to improved and longer lasting INDOT assets.

3.6 EXCELLENT RESEARCH PARTNERSHIPS

INDOT's research program has fostered excellent partnerships with the various stakeholders that perform the research and use the results. This comment was consistently made by representatives of INDOT production, industry, and academics during our interviews. These stakeholders are included in the focus groups and on the JTRP Board (which selects and approves research), on the study advisory committees that perform the research, and in implementation plans for deploying it. Benefits experienced as a result of these partnerships include more practical and implementable solutions, quicker and more comprehensive deployment, networking between various stakeholders which facilitates continued problem solving and a culture of innovation.

3.7 STRATEGIC RESEARCH PLAN

The current INDOT Strategic Research Plan (SRP) was modified in September 2005 and implemented in the FY 2006 research program. It included a proactive effort to re-align the focus groups in the SRP to the business units in INDOT, after the 2005 structural re-

organization. All the participants that were interviewed in this peer exchange agree that the SRP is very successful in:

- Prioritizing research needs resulting in needs driven research projects addressing INDOT's strategic needs
- An outreach for participation and partnering in the focus groups from transportation stakeholders (governmental agencies, academia, industry, customers to formulate research needs and partnering efforts to solve common problems
- Clear and concise documented guidelines and process that resulted in better research needs identification and timely programming of research needs
- INDOT Executive management is very pleased with the results and outcomes of the SRP process and value participation of agency personnel in the process
- SPR plan and process correctly identifies and addresses the needs from the business units and the Districts and allows for data driven decisions by the department
- Emphasizes and facilitates implementation of viable research results by users and fosters development of implementation plans for completed research to incorporate research findings into INDOT operations
- Provides good facilitation (viable and timely process) to address specialized needs of the Department
- The SRP focus groups process provides an excellent forum to discuss departmental needs, develop networking and partnerships amongst stakeholders and is very effective in formulating a strategic approach to address departmental needs

3.8 STABLE, TECHNICALLY SKILLED, AND EXPERIENCED INDOT RESEARCH STAFF

The INDOT Office of Research and Development currently has seven (7) research engineers and support staff with PhD degrees and two (2) PhD candidates. Peer Exchange participants and customers, frequently noted the benefits and utility of having consistent and technically skilled and qualified in-house research staff as a primary determinant in the successful completion and adoption of good research findings. This has resulted in:

- Staff that is highly respected by the INDOT management and staff, industry partners, and university researchers. In-house researchers are viewed as a valuable resource for information and a way to, "get things done"
- Quality Project Administrators (PA) are critical in assuring research remains focused on INDOT needs and objectives; facilitates timely networks and strong partnerships between INDOT, researchers, and industry; and fosters viable research findings which are more readily implemented in INDOT operations
- Critical link in bridging between research and practical application that the research results can be implemented
- More effective research products and outcomes

3.9 TECHNICAL SUMMARIES USEFUL AND HELPFUL

Technical summaries are prepared by the Principal Investigators (PI) and the Study Advisory Committee (SAC) members. At the end of a research project, a research summary is developed addressing the research need, research findings, deliverables, contact and resource information, and is distributed to respective users and customers. Technical summaries help provide the basis for developing implementation plans and strategies to incorporate research findings into INDOT operations. Technical summary dissemination includes appropriate INDOT Offices and Districts, JTRP web pages, Industry Associations, University Libraries - FHWA depositories, FHWA, and various other agencies, national research affiliations and State DOTs in the distribution list. Formats of the technical summaries include web pages, electronic (PDF and MSWord), and printed versions.

Technical summaries are not only viewed by users, in particular the industry associations, as a vehicle for technology transfer, but also as a communication tool to their members about new specifications, technology, or procedures that will be adopted by INDOT. INDOT upper management and supervisors frequently noted forwarding technical summaries to staff members to make them aware of research results and for use in implementing results in their daily operations.

4

KEY ISSUES AND OPPORTUNITIES

The following key issues and opportunities are presented for consideration as recommendations for further enhancing the relevance, performance, and quality of the Office of Research and Development activities throughout INDOT.

4.1 ADDITIONAL COMMITMENT FOR IMPLEMENTATION

The team observed a high level of commitment to the research program within INDOT, but noted that for various reasons, the same commitment does not always extend to implementation, which requires the commitment of time and resources of affected business units and Districts.

4.2 OTHER FACTORS AFFECTING IMPLEMENTATION

There appears to be adequate programmable financial resources within the Research Program for implementation efforts by business units and Districts, so it appears that affected units are making reasoned decisions not to undertake implementation of some research products and findings due to other factors.

It is recommended INDOT explore, through an internal survey, current impediments to implementation within INDOT, as well as examine published reports on this subject and the general subject of change management.

4.3 FOCUS GROUP PROCESS

In general, the Focus Group Process is overwhelming seen as providing the right research at the right time to meet the goal of Major Moves and the other transportation problems confronting Indiana.

Some minor tweaking that was suggested included providing more time for discussion and strategic planning. In addition to considering individual research needs statements and problems, perhaps some time could be used to brainstorm strategic interests beyond the three year span such that research themes encompassing a department goal might be considered and planned. An example provided was set around a goal of moving towards full implementation of FRP bridge decks within ten years. Long range planning would identify questions of importance and research that would need to be accomplished in order to bring the goal to

fruition.

4.4 JOINT TRANSPORTATION RESEARCH PROGRAM

The JTRP has the administrative and fiscal management processes to integrate the new UTC to meet the department's needs. The UTC theme of logistics speaks directly to a number of areas of interest to INDOT administrators discussed during the interviews such as economic development, Major Moves, freight and intermodal research needs. Integrating the UTC into the Focus Group process in particular and JTRP program in general should enhance the research undertaken by UTC researchers.

As stated, participation on the JTRP Advisory Board is eagerly sought by INDOT administrators both because they enjoy participating in the process and the assistance it provides in their decision making. During the interview process, the Chief Engineer was explicit in his desire to become a member. His concerns with delivering Major Moves is certainly inherent in his request and his addition to the Advisory Board can only be seen as positive for implementing solutions.

The addition of a construction engineering faculty member was also discussed as improving the composition to the board. Again, with workforce development issues, the need to hire program and project managers in order to deliver Major Moves, this addition would prove fruitful.

4.5 THE RESEARCH PROGRAM WOULD BE WELL SERVED BY HAVING AN INFORMATION SPECIALIST AND A DEDICATED IMPLEMENTATION ENGINEER AS STAFF RESOURCES

The Office of Research and Development accomplishes a remarkable amount of work with its current staff resources. However, there is a high return opportunity for INDOT if the research program were to augment staff resources with expertise that would provide efficiencies in two high value activities: information services and implementation.

Incorporating an information specialist into the research process would enhance the quality, timeliness, and content of the research effort. The services of an information specialist will provide a substantially high return in benefits compared to the cost of support.

Implementation of research results is critical for the research program to create value for INDOT. A dedicated implementation engineer having implementation as his or her primary responsibility would enable INDOT to more quickly adopt and apply research results at less cost. Such implementation expertise would be a resource available department wide. This resource would provide tools and techniques to facilitate implementation and would serve as an accountability measure to increase the likelihood of user's following through on commitments to implement beneficial research results and other innovations.

4.6 HELP DRIVE STRATEGIC AGENDA AND CRITICAL ISSUES

The research program should play a major role in support of critical and strategic INDOT

needs in areas such as:

- Capital improvements (e.g. Major Moves);
- System optimization and traffic management (e.g. congestion and mobility issues);
- System preservation and asset management (e.g. decisions using life cycle costing, time value of money/transportation benefit);
- Project delivery and organizational effectiveness (e.g. organizational performance indices).

4.7 ENHANCING THE DELIVERY OF THE TRANSPORTATION PROGRAM IN VIEW OF LIMITED AGENCY STAFF RESOURCES

Research should provide support for development of innovations and quality control/quality assurance systems that will help to overcome the anticipated skills gap at INDOT and its partners. These are needed to ensure the public gets the best transportation value given the major increase in INDOT's program with limited increase in staff, and possibly with less experienced staff. It will be important to deliver Major Moves and other projects on time, on budget, and at the specified quality. Research has the ability to quickly evaluate innovation and potential benefits. They also have strengths in data analysis, statistical and risk related evaluation, and with training which INDOT could use to help production become more data driven and to develop better QC/QA methods and processes.

4.8 PURSUE ANALYSIS OF CONTRACT EXTENSION CAUSES

JTRP needs to evaluate the number of time extensions and determine if more proactive management of research by the PI is necessary. LTRC's project tracking system may be applicable for providing ongoing project management information.

4.9 COMMUNICATION AND DISSEMINATION OF RESEARCH FINDINGS

Communicating and disseminating research findings can be in traditional and non-traditional forms. The INDOT Office of Research and Development already has implemented a combination of both traditional and non-traditional methods, such as technical summaries (printed and electronic), identified users and champions in the Study Advisory Committee, industry representation, peer meetings, web pages, and final report distribution. Non-traditional channels and formats for dissemination of research findings are also encouraged. Examples include push e-mail targeting potential users in INDOT Offices and Districts, training videos, seminars, conferences, web-casting, "trading cards" to highlight viable research results, and infomercials of selected projects in CD and DVD formats.

4.10 MEETING NEEDS OF NEW INDOT COMMISSIONER

A new INDOT Commissioner will soon take a leadership role with an existing and new set of expectations from the Department, including the INDOT Office of Research and Development. New leadership typically requires quick and tangible results and a means to

quickly proceed on the learning curve of the departmental needs, priorities and capabilities. INDOT Research and Development needs to position itself to make new leadership aware of the significant resource tools within the research program to address their needs. This includes an opportunity to proactively introduce the program's capability, operations, accomplishments, efficiency/effectiveness, benefits, and performance to new leadership. This opportunity will help to foster early and strong support for the INDOT Research Program capabilities and functions. In addition, INDOT Research and Development should try to identify and facilitate new initiatives from the new leadership.

4.11 SUPPORT INDIANA PLANNING OVERSIGHT COMMITTEE (IPOC) DECISION MAKING

The mission of IPOC is to develop and implement a decision making process to direct the Major New Capacity investment decisions of INDOT, resulting in fiscally constrained program that optimizes INDOT's investments. Upper management at INDOT already has indicated that the research program provides for data driven decisions by INDOT business units and which are defensible to fiscal planners and customers. There is a continued need and opportunity for the research (and specialized testing) programs to provide IPOC with statistically viable data to accomplish its mission. Specific data inputs related to economic development, mobility and transportation efficiency, safety, customer inputs, public-private-partnerships, and environmental best practices have been recommended.

4.12 GENERAL COMMUNICATION OPTIONS LISTING SUPPLIED AS INFORMATION

The following communication options may enhance INDOT's capability to "get the word out" on both in-progress and completed projects; as well as, implementation efforts, public outreach related to new research findings, to communicate internally and for training purposes. On-demand streaming media is particularly powerful communication technology and should be explored by the research program.

- In-person
 - Discussions and meeting
 - Presentations
- Telephone discussion, including teleconferences
- Video Conference
 - Discussions and meetings
 - Presentations (not recorded)
- Mobile email (Blackberry, etc.)
- Fax Communication
- Videotape and DVD
- Video on CD-ROM

- Web Pages
- Print (paper and electronic -PDF)
 - 2-page briefs
 - Full reports on research
 - Summary of activity administrative reports
 - Brochures
 - Trading Cards
- Mobile email
- Streaming media - audio
- Podcasting - audio
- Streaming media - video
- Podcasting - video



PEER EXCHANGE PANEL MEMBER REPORTS

The Peer Exchange Panel Member reports are as follows:

Barbara T. Harder, B. T. Harder, Inc., Panel Chair

Observations:

- The INDOT research program is remarkable in that it is highly respected and universally supported by a wide variety of users and stakeholders. The focus group process, research needs identification and problem selection, serves as an extraordinarily effective means to promote knowledge of and participation by decision makers within the department. Such a process engages these decision makers so that they can understand the value of research to the department and in turn support the research function. As I come in contact with other states that are less sophisticated in their research activities, I will encourage use of the best practices exhibited by the INDOT Research Program. Several of the practices that I believe are key to the program's success are the JTRP institution and its legislated mandate; the three year horizon for the Strategic Research Plan and the problem identification (focus group) process; the ability to raise research funds from sources other than federal state planning and research federal-aid monies (based on expertise and capability); the value of internal research expertise; and the excellence in research program management.
- There is substantial value in having the JTRP incorporate the variety of INDOT research program elements within its umbrella structure – including LTAP, UTC, research activities and other items. In particular, the close association of the UTC with the research program activities will serve to create synergies rather than competition for funding.
- The research facilities at both the INDOT Office of Research and Development and Purdue are highly valuable resources for not only INDOT but the transportation research community at large. Good stewardship of these resources will position INDOT as a national leader.

Planned Actions:

- Review the cost benefit methodology for research results that can be quantified and determine if there is applicability to other research program evaluation activities in which I am involved.
- Louisiana's semi-annual research progress reports have two areas that allow comment by 1) the technical project manager -- provides input or feedback on the contents of the report and 2) the implementation engineer regarding relevancy to implementation of work performed during the reporting period. Such additional information for research progress reporting is a valuable enhancement for project management and for facilitating implementation. Determine if there is applicability of such additions in the work that I do for other states. Get a copy of the progress reporting template from Skip Paul.
- Investigate the applicability of using the research function within state DOTs to facilitate forums for generating more forward thinking, strategic agenda setting. Such an activity is a value-adding function for research and allows the research unit to get a jump-start on identifying emerging issues of importance to senior management requiring research.
- If applicable, incorporate information about workforce issues and difficulty of recruiting and hiring discussed during the exchange (among the DOT representatives) in the NCHRP work that I am doing.
- Learn more about the integration of training into the Louisiana research program, especially as it relates to training being more of a focus area for PennDOT research program implementation activities.
- Review the JTRP website to determine if there is content it contains that might provide ideas for adding similar types of content to the PennDOT implementation website.
- Promote a higher level of implementation funding from SP&R monies for research programs with the state DOTs with which I do work. Emphasize the necessity for a greater level of implementation funding.

**Skip Paul, Director of Research, Louisiana Transportation Research Center, Louisiana
Department of Transportation and Development**

Planned Actions:

- Consider additional meetings of the Research Advisory Committee (JTRP) beyond the biennial solicitation rating process. Benefits could include communication of research findings, improved knowledge of research findings to improve implementation.
- Similar to the composition of the JTRP, consider adding LTRC Policy Committee members to the RAC as non-voting members. Such integration will lead to a better understanding of department needs which can be communicated to their researchers.

- Go forward with the establishment of a traffic management laboratory at LTRC to explore the utility of the data collected by the Traffic Management Centers in Baton Rouge, New Orleans, and Lafayette. The ITS system data is currently only used for incident management and is quickly discarded. Use of this data is essential to answer questions of congestion management caused by population dispersion due to Katrina.
- Align research problem statements to the LA DOTD strategic plan during the conduct of the RAC meeting.
- Consider forming our Research Problem Identification Committees before the biennial solicitation process so they can meet in advance and develop additional problem statements as a community, thus fostering community communication, buy-in, and enhanced implementation of completed research.
- Approval of INDOT proposals is at the JTRP/INDOT R&D level. Continue to pursue shifting (delegating) LTRC proposal approval to either the Director of Engineering or the LTRC Policy Committee Chair through the on-going LA DOTD change management program on contact processing.
- Travel for delinquent PIs can be disapproved.
- Zero F&A costs. This may be a negotiating point, which could lead to additional funding for LSU.
- Provide B/C methodology to my Implementation Engineer

James M. Sime, Manager of Research, Connecticut Department of Transportation

Planned Actions:

- Examine patterns in late-completion performance of researchers on UConn and NETC projects. There are some restrictions in place now, but explore other options for progressive disincentives in response to various degrees of lateness. For example, a PI with one approved project extension is doing better than a PI with three approved project extensions, i.e., late projects. Consider restricting submissions of new research need statements, pre-proposals, travel and/or full proposals based on PI's degree of lateness.
- Review the recent use of project close-out presentations to identify projects we may have overlooked; schedule presentations for those projects, as needed. Ensure that the original research-need submitter is invited to the presentation.
- Record project close-out presentations for subsequent on-demand access via ConnDOT's streaming media server.
- Explore how ConnDOT web site might accommodate on-line draft report reviews. Also, review markup capabilities of Adobe Acrobat and its possible utility for research project reviews versus MS WORD markup capabilities.
- Explore relationship options between ConnDOT, existing research and technology transfer programs and the new UTC at UConn, while it is still in its formative stages.

INDOT RESEARCH PROGRAM PEER EXCHANGE

In this regard, send CEE Department Head the recently published white paper by Washington DOT on eligible federal matching funds available to UTC under current law and regulation.

- Explore receptiveness of UConn to accepting submissions by ConnDOT of Research Need Statements (RNS) in their new University Transportation Center.
- Send Scott Newbolds (INDOT) the new ConnDOT proposal on development of a Digital Design Environment.

David Unkefer, Planning and Research Engineer, Federal Highway Administration, Indiana Division

Planned Actions:

- Learn more about Louisiana's training program as we work on INDOT's "Training Needs Assessment" to see whether INDOT Research might take a greater role in technical training and workforce development to address the anticipated critical needs for skilled staff in transportation.
- Work with Barry to use the new National Partnership for Highway Quality subcommittee on "rapid deployment of innovation" as a vehicle for research and market ready technology implementation.
- Work with Barry on more proactive research project management by PIs and SACs to instill a greater urgency for receiving the benefits of research results in a timely manner.
- Work with Barry and Scott Newbolds to move to the next level with regard to evaluating the value of research and performance measures to demonstrate success to our customers.
- Work with Barry to consider further ways to strengthen the overall strategic approach to INDOT's research (e.g. balance of short term and long term research), while regularly considering emerging issues such as:
 - Freight/intermodal research/logistics/weight enforcement
 - Congestion & system reliability
 - Economic development
 - Innovative contracting/best value contracting/design-build-operate/warranties
 - Performance specs
 - New materials
 - Human factors - Aging population
 - Reducing risk for stakeholders
 - Lack of skilled labor



PEER EXCHANGE EMPHASIS AREAS

The Indiana Department of Transportation (INDOT) in conjunction with the Joint Transportation Research Program (JTRP) will be initiating its third Peer Exchange of the INDOT Research Program, as mandated by Federal statute. The emphasis of the Peer Exchange will be directed towards evaluation and recommendations for improvements and enhancements in the following areas of the INDOT Research Program:

Objectives

The Peer Exchange process is designed and intended to provide opportunities to improve the management of state DOT research programs and the research outcomes they deliver. Each state further identifies specific objectives or focus areas where they would like to concentrate efforts. INDOT identified the following focus areas for special attention.

1. How the INDOT Research Program fits into INDOT's mission, goals and objectives and organization. Identify program contributions to major INDOT initiatives such as 'Major Moves' and how the program's role can be best optimized
2. Program administration and project selection, including,
 - a. Effectiveness of the Strategic Research Plan (SRP) in identifying customer needs, in particular INDOT Business Units and Districts
 - b. Effectiveness of research proposals and the resultant research in meeting customer needs, in particular INDOT Business Units and Districts.
3. Fostering of Public, Private Partnerships, in particular to attract external funding.
4. Performance measures in the future, re-alignment with the NCHRP performance measures.
5. Review of new initiatives, which were identified as opportunities in the 2002 Peer Exchange report, including
 - a. Effectiveness of the initiatives
 - b. How they could be enhanced.
6. Research Program support to the INDOT business units and Districts, implementation support, and emerging technology
 - a. Effectiveness of the support

INDOT RESEARCH PROGRAM PEER EXCHANGE

- b. Satisfaction of the executive staff, business units and Districts with the research support provided.
- 7. Research Program in-house staff support, including recommendations to attract and retain qualified research scientists/engineers and professional staff.



PEER EXCHANGE AGENDA

Tuesday, November 14, 2006				
Time	Place	Room	Meeting with	Session
8:00 - 9:30	Travel to Indianapolis, Central Office			Travel
10:00 - 10:30	Bay Window Conference Room, IGCN, Indianapolis	N-755	Mike Byers , Director, American Concrete Pavement Association, Indiana Chapter	Interview
10:30 - 11:00	Bay Window Conference Room, IGCN, Indianapolis	N-755	Phelps Klika , INDOT Deputy Commissioner on Planning and Production, and Jim Poturalski , INDOT Deputy Commissioner on Highway Management	Interview
11:00 - 11:30	Bay Window Conference Room, IGCN, Indianapolis	N-755	Mark Miller , INDOT Chief Engineer	Interview
11:30 - 12:00	Bay Window Conference Room, IGCN, Indianapolis	N-755	Bill Rinard , District Manager, INDOT Greenfield District	Interview
12:00 - 1:00	Lunch			
1:00 - 1:30	Bay Window Conference Room, IGCN, Indianapolis	N-755	Bob Tally , Division Administrator, and David Unkefer , Planning and Research Engineer, FHWA Indiana Division	Interview
1:30 - 2:00	Bay Window Conference Room, IGCN, Indianapolis	N-755	Bernie Seel , INDOT Deputy Commissioner of Finance	Interview
2:00 - 2:30	Bay Window Conference Room, IGCN, Indianapolis	N-755	Lloyd Bandy , Director, Asphalt Pavement Association of Indiana	Interview

INDOT RESEARCH PROGRAM PEER EXCHANGE

2:30 - 3:00	Bay Window Conference Room, IGCN, Indianapolis	N-755	John Morton , INDOT Director of Contract Administration, Dennis Kuchler , INDOT State Construction Engineer	Interview
3:00 - 3:30	Bay Window Conference Room, IGCN, Indianapolis	N-755	Gary Mroczka , INDOT Director of Production Management	Interview
3:30 - 5:00	Travel to West Lafayette			Travel

Wednesday, November 15, 2006

Time	Place	Room	Meeting with	Session
9:00 - 9:30	INDOT Research and Development Office	Lab	Dr. Samy Noureldin , INDOT Research and Development	Lab Tour
9:30 - 10:00	Travel to Purdue			Travel
10:00 - 10:30	Purdue University, School of Civil Engineering	CIVL Room 4144	Darcy Bullock , School of Civil Engineering, Purdue University	Interview
10:30 - 11:00	Purdue University, School of Civil Engineering	CIVL Room 4144	Kumares Sinha , School of Civil Engineering, Purdue University	Interview
11:00 - 11:30	Purdue University, School of Civil Engineering	CIVL Room 4144	Robert Frosch , School of Civil Engineering, Purdue University	Interview
11:30 - 12:00	Purdue University, School of Civil Engineering	CIVL Room 4144	Dulcy Abraham , School of Civil Engineering, Purdue University	Interview
12:00 - 1:30	Lunch and travel to Research and Development Office			
1:30 - 2:00	INDOT Research & Development Office	Conf. Room	INDOT R&D Section Managers: Tommy Nantung, Samy Noureldin and Scott Newbolds	Interview
2:00 - 2:30	INDOT Research & Development Office	Conf. Room	Ms. Karen Hatke, Program Coordinator, JTRP	Travel Expenses
2:30 - 5:00	INDOT Research & Development Office	Conf. Room		Peer Exchange Working Session

Thursday, November 16, 2006

Time	Place	Room	Meeting with	Session
8:00 - 10:00	INDOT Research & Development Office	Conf. Room	Peer Exchange Close-Out Meeting and Report Preparation	Close-out
10:00 - 11:00	Adjourn			