

ALDOT – Bureau of  
Research & Development  
Project 930-808



**Research & Development**

ALABAMA DEPARTMENT OF TRANSPORTATION



2011 PEER EXCHANGE

FINAL REPORT

***Conducted at:***

***The University of Alabama at Birmingham***

***DoubleTree Hotel***

***and hosted by***

***The Department of Civil, Construction, and Environmental Engineering***

***May 10 – 12, 2011***



## 2011 PEER EXCHANGE

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## Research & Development

ALABAMA DEPARTMENT OF TRANSPORTATION



# 2011 PEER EXCHANGE

## INTRODUCTION

Research and development are key to safe and efficient transportation systems in our country. They have played a vital role in the advancements that have led to our current transportation system. Federal regulation (23 CFR 420 Subpart B) establishes the Peer Exchange process of Research, Development, and Technology Transfer Management for each state department of transportation. State Planning and Research funds are contingent upon the completion of a Peer Exchange. Peer Exchanges allow each state an opportunity to share the operation of its research program with peers from other states. The Peer Exchange teams are typically composed of state research managers, FHWA representatives and university personnel. From this positive exchange, all parties receive the benefit of best management practices and positive ideas that can be incorporated into their respective research programs.

Peer Exchanges are recommended every 3 to 5 years. Previous Alabama Department of Transportation (ALDOT) Peer Exchange meetings have been held as follows:

- 2001 – Conducted at the National Center for Asphalt Technology in Auburn, Alabama
- 2005 – Conducted at the University of Alabama in Tuscaloosa, Alabama
- 2011 – Conducted at the University of Alabama at Birmingham, in Birmingham, Alabama

The Peer Exchange documented in this report was hosted by The Department of Civil, Construction, and Environmental Engineering at the campus of the University of Alabama at Birmingham in Birmingham, Alabama. Thirty seven people attended the opening session of the Peer Exchange. Participants from ALDOT represented ALDOT senior management, the ALDOT Research Advisory Committee (RAC), state universities, and the Federal Highway Administration. Meetings held over three days produced fruitful discussions of the accomplishments and opportunities documented in this report.

## PEER EXCHANGE THEMES

University Collaboration  
Organization and Research Program Management – The Research Program  
in the Electronic Age  
Research Project Selection and Program Expansion  
Research Program Outreach and Marketing



## PEER EXCHANGE TEAM

North Carolina	Dr. Mrinmay “Moy” Biswas State Research and Analysis Engineer	(Team Leader)
Mississippi	Mr. James Watkins State Research Engineer	
FHWA - AL	Ms. Kristy Harris** FHWA AL Transportation Engineer and Research Liaison	
	Mr. Clint Andrews** FHWA AL Transportation Engineer and Research Liaison	
Alabama	Mr. Jeffrey W. Brown Bureau Chief, Bureau of Research and Development	
Alabama	Ms. J. Michelle Owens Assistant Bureau Chief, Bureau of Research and Development	
The University of Alabama at Birmingham	Dr. Fouad H. Fouad Professor & Chair, Department of Civil, Construction, and Environmental Engineering	

\*\* Unable to attend due to their roles in the emergency response for the April 27<sup>th</sup> Alabama tornadoes.



## **2011 PEER EXCHANGE**

### **EXECUTIVE SUMMARY**

This report documents the Peer Exchange conducted in the Spring of 2011 to examine the research activities of the Bureau of Research and Development of the Alabama Department of Transportation (ALDOT). The exchange was conducted with the participation of research managers from the Mississippi DOT, the North Carolina DOT, and the Alabama Division of the Federal Highway Administration. In addition, members of the ALDOT Research Advisory Committee and university representatives attended, bringing the total participation to 37 individuals.

This Peer Exchange is a federal requirement but has grown to encompass other areas. It has had a significant impact on State DOT research programs across the United States and has proven benefits. Across the nation, the participants now look forward to peer exchanges and to learning more about each other so that they can continually improve their operations for the benefit of their customers and stakeholders.

This Peer Exchange concentrated on four high-priority theme areas selected by the ALDOT Bureau of Research and Development. They included Theme 1: University Collaboration; Theme 2: Organization and Research Program Management – The Research Program in the Electronic Age; Theme 3: Research Project Selection and Program Expansion; and Theme 4: Research Program Outreach and Marketing.

For each theme, participants received overview presentations by ALDOT and Peer Exchange Team Members. For Theme 1: University Collaboration, the overview was expanded through presentations by seven of ALDOT's university research partners. Following each theme presentation a thorough discussion ensued, with Peer Exchange Team Members identifying and capturing good ideas and key thoughts. During the latter portion of the exchange, the Peer Exchange Team organized these key thoughts into two main categories: (1) Accomplishments of the ALDOT Bureau of Research and Development, and (2) Opportunities for Improvement. These are contained in the body of the report.

A measure of the success of this conference is that all Peer Exchange Team Members learned from it and identified enhancements for their organizations. These are reflected in the "Take Home" ideas recorded by each Peer Exchange Team Members as part of the conference.

In closing, the participants noted the enthusiasm generated during this meeting, the job-pride that ensued when accomplishments were highlighted, and the suggested methods to overcome challenges. The employees of the ALDOT Bureau of Research and Development express their sincere appreciation for the assistance rendered.

## PEER EXCHANGE WORKING SESSIONS

The 2011 Peer Exchange focused on four themes:

1. University Collaborations
2. Organization and Research Program Management – The Research Program in the Electronic Age
3. Research Project Selection and Program Expansion
4. Research Program Outreach and Marketing

Each theme was discussed by the Peer Exchange Team in separate sessions. The discussions were structured to highlight previous accomplishments by ALDOT and to identify opportunities for improving the research program in each theme area. Peer Exchange Team participants were thus able to benefit from past ALDOT experiences, as well as, provide suggestions for enhancements based on their own experiences. The results of these discussions are summarized in sections 1 through 4. Under each theme are listed recent ALDOT accomplishments in that area, as well as, opportunities for enhancing the research program as ALDOT moves forward. Section 5 documents the “take home” items, which are potential improvements the Peer Exchange Team Members said they will take back with them for consideration by their own research programs.

### **1.0 Theme 1: University Collaboration**

#### **1.1 Accomplishments**

The Alabama Department of Transportation Bureau of Research and Development (R&D Bureau) was noted for the following accomplishments:

1. It engages multiple universities in the research program.
2. It has established a collaboration workshop to help bring universities that have not shown a strong presence into the research program. The collaboration workshop has already produced joint-research projects between research institutions. It has also produced a matrix summarizing the expertise and capabilities available at the participating universities.
3. Its organization and scheduling of the “round-robin” tours of universities in Alabama every two years are very productive, as are the R&D Bureau’s efforts to meet and introduce new university faculty to ALDOT’s Research Program and staff. These tours have been quite instrumental in the faculty learning about the ALDOT R&D Program. Moreover, these tours provided ALDOT an opportunity to learn about the faculty expertise and research capabilities at the different Alabama universities.

#### **1.2 Opportunities**

The following opportunities for enhancing the ALDOT Research Program were noted by Peer Exchange Team Members. The R&D Bureau may consider exploring the following opportunities:

1. Increase efforts to have institutions leverage research funds (e.g., expanding on project scopes and budgets if research is beneficial to ALDOT).

2. Continue to support collaboration workshops among universities and talk to ALDOT personnel about using universities that to date have not shown a strong presence in the research program.
3. Use its knowledge of university capabilities to encourage new collaborations between universities and research entities when appropriate and when it would generate value for ALDOT.

## **2.0 Theme 2: Research Program Management and Organization – The Research Program in the Electronic Age**

### **2.1 Accomplishments**

The Alabama Department of Transportation Bureau of Research and Development (R&D Bureau) was noted for the following accomplishments:

1. It has developed a website highlighting the ALDOT Research Program.
2. It has a project selection process that is serving the needs of the ALDOT Bureaus, Divisions, and Districts.
3. It reviews and compiles information related to research proposals in preparation for the quarterly Research Advisory Committee (RAC) meeting.
4. It schedules the Project Advisory Committee (PAC) to meet with universities on an as-needed basis.
5. It utilizes a university project and contract management database that is serving the needs of the office.
6. It has instituted a mechanism for generating research ideas from within ALDOT to address the research needs of the Bureaus, Divisions, and Districts.
7. It has a very efficient and timely process for evaluating proposals and notifying PIs of the results.

### **2.2 Opportunities**

The following opportunities for the enhancement of the ALDOT Research Program were noted by Peer Exchange Team Members. The R&D Bureau may consider exploring the following opportunities:

1. Acquire integrated library system (ILS) software to replace the existing catalog system for Bureau documents. Scan documents in the R&D Bureau's library and link them to the (ILS).
2. Develop an online proposal submission system that will allow the R&D Bureau to manage and track proposals and allow quarterly progress reports to be submitted electronically.
3. Explore opportunities to use social media.
4. Develop a formal process to obtain more research ideas from within the ALDOT Bureaus and Divisions. An internal version of the existing "round-robin" process could be useful..
5. Use the Southeast Transportation Consortium (STC) Pooled Fund Project to leverage research efforts.
6. Develop an interrelated database that will allow the R&D Bureau to better manage contracts, program development, and project management.

7. Establish a yearly formal meeting to introduce new university faculty and researchers to ALDOT personnel and provide an overview of the research process.
8. Produce an electronic newsletter.
9. Provide opportunities for research institutions to participate in ALDOT product evaluations.

### **3.0 Theme 3: Research Project Selection and Program Expansion**

#### **3.1 Accomplishments**

The Alabama Department of Transportation Bureau of Research and Development (R&D Bureau) was noted for the following accomplishments:

1. Its project solicitation and selection process is efficient and well documented.
2. Its literature review and project screening process is very thorough.
3. It makes proposal review and selection results available to Principal Investigators (PI's) in a very timely manner.
4. It gives proposers the opportunity to present their projects directly to the Research Advisory Committee (RAC).
5. It is very responsive to inquiries related to research projects.

#### **3.2 Opportunities**

The following opportunities for enhancing the ALDOT Research Program were noted by Peer Exchange Team Members. The R&D Bureau may consider exploring the following opportunities:

1. Develop a quick response process for high priority projects.
2. Implement a new procedure requiring that all travel be approved by the R&D Bureau before the travel occurs, even if it is part of the approved proposal.
3. Consider using the Southeast Transportation Consortium database for literature review and project selection.
4. Send IP (Internet Protocol) addresses to TRB for access to full text documents for R&D staff.
5. Use free online services such as [www.yousendit.com](http://www.yousendit.com) to transmit large files electronically. Security should be considered for sensitive materials.
6. Identify high level projects on national, regional, and local levels that will benefit ALDOT.
7. Recommend that each proposal has a "champion" within ALDOT to represent the proposal in Research Advisory Committee (RAC) meetings.

### **4.0 Theme 4: Research Program Outreach and Marketing**

#### **4.1 Accomplishments**

The Alabama Department of Transportation Bureau of Research and Development (R&D Bureau) was noted for the following accomplishments:

1. It has been actively involved in outreach and marketing and has developed a number of mechanisms to promote ALDOT research.
2. It recognizes the need for more outreach and marketing.
3. It is proactive in attending ALDOT professional conferences and marketing its program.
4. Its website is a good tool for marketing and outreach.
5. It has posted its mission statement on the Bureau website, which is beneficial to customers and stakeholders.

## **4.2 Opportunities**

The following opportunities for enhancing the ALDOT Research Program were noted by Peer Exchange Team Members. The R&D Bureau may consider exploring the following opportunities:

1. Distribute technical reports and journals (both external and internal) to appropriate ALDOT bureaus and personnel. For external reports, the cover, executive summary, and Table of Contents can be scanned and distributed via e-mail. For internal reports, a bulleted summary can be developed.
2. Encourage the University Transportation Center for Alabama (UTCA) to re-establish its semi-annual research conference and include the R&D Bureau as a partner.
3. Make personal contact with Bureau customers and be more proactive in developing potential research projects.
4. Develop a project to improve marketing of the research program. This would be a good opportunity to involve a university that has not shown a strong presence in the program or one without an engineering school.
5. Explore whether ALDOT conferences (such as the annual highway conference) can incorporate a session devoted to research.

## **5.0 Take Home Items**

### **5.1 North Carolina**

#### Theme 1:

1. Pursue mutual collaboration to engage universities that have not shown a strong presence in the program.

#### Theme 2:

1. Consider using a database to develop work programs.
2. Consider using online quarterly report transmittals.
3. Consider using online proposal submittals.
4. Establish a process to engage new researchers from all state universities.

#### Theme 3:

1. Consider using free online data services such as [www.yousendit.com](http://www.yousendit.com) to transfer large files electronically.

Theme 4:

1. Consider implementing “round-robin” tours of the state universities.
2. Consider round-robin tours to NCDOT field divisions.
3. Attend NCDOT internal conferences.

**5.2 Mississippi**

Theme 1:

1. Provide the impetus for collaboration workshops between universities that would like to work together.
2. Try to encourage joint research between institutions where applicable.
3. Use Preliminary Engineering funds to fund research on specific construction projects.

Theme 2:

1. Develop a formal process to generate more research ideas from within the MSDOT Divisions and Districts.
2. Establish an annual meeting to meet new faculty and researchers and educate them about the research program.
3. Use NCAT (National Center for Asphalt Technology) for product evaluation.
4. Develop a “customer list” of key personnel within MSDOT.

Theme 3:

1. Provide a mechanism to perform quick turn-around research for the department.
2. Use the Southeast Transportation Consortium Pooled Fund Project database for literature searches.

Theme 4:

1. Do a better job of promoting the research program when speaking to MSDOT, FHWA, industry, or universities.
2. PI’s should provide 3 or 4 bullets summarizing their projects and send those with their final report when the research is complete.

**5.3 Department of Civil, Construction, and Environmental Engineering – The University of Alabama at Birmingham**

Theme 1:

1. Universities should encourage junior and senior faculty to visit with key individuals at ALDOT. Meetings should be arranged through the R&D Bureau.
2. Each university should create a summary of faculty research expertise and update it annually. This summary should be provided to the R&D Bureau.
3. Research universities that have been well represented in the program should consider hosting additional collaboration workshops.

Theme 2:

1. Discuss with the R&D Bureau opportunities for university researchers to participate in ALDOT’s Product Evaluation Program.
2. The R&D Bureau is considering plans to meet with new faculty at least once per year, but will continue to meet with new faculty on an as-needed basis.

3. The R&D Bureau will help researchers establish contact with ALDOT champion in different research areas.

Theme 3:

1. Requests for project cost extensions (additional budget) can be submitted to ALDOT with justification.

Theme 4:

1. Consider re-establishing an annual joint UTCA/ALDOT research conference.
2. Assist The R&D Bureau in promoting research sessions at ALDOT conferences.



**2011 Peer Exchange Team**

(l-r, Fouad H. Fouad, James Watkins, J. Michelle Owens, Jeffrey W. Brown, Mrinmay "Moy" Biswas)



**2011 Peer Exchange Team with ALDOT and UAB Staff**



**ALDOT Director John Cooper speaks at the opening session**



**ALDOT Bureau of Research and Development Staff**



## 2011 PEER EXCHANGE AGENDA

**Tuesday, May 10, 2011**

DoubleTree Hotel, The University of Alabama at Birmingham Campus

Large Meeting Room 10:00 a.m.	<p>Opening Session</p> <p>Welcome Messages</p> <p>Alabama Transportation Director, Mr. John R. Cooper FHWA Division Administrator, Mr. Mark Bartlett ALDOT Research Advisory Committee Chair, Mr. Mike Harper ALDOT Chief Engineer/Deputy Director, Mr. Don W. Vaughn UAB, Dean, School of Engineering, Dr. Linda C. Lucas UAB CCEE Department Chair, Dr. Fouad H. Fouad</p> <p>Introduction of Team and Participants</p> <p>ALDOT Research and Development Bureau Chief, Mr. Jeffrey W. Brown</p> <p>Introduction to Peer Exchange</p> <p>Team Leader, Dr. Mrinmay (Moy) Biswas, NCDOT</p> <p>Peer Exchange Themes, Goals, Expectation, and Program Plan</p> <p>Mr. Jeffrey W. Brown and Dr. Mrinmay (Moy) Biswas</p> <p>Theme 1: University Collaboration</p> <p>Alabama A&amp;M University* Auburn University The National Center for Asphalt Technology The University of Alabama The University of Alabama at Birmingham The University of Alabama in Huntsville The University of South Alabama Tuskegee University</p>
12:00 Noon	Lunch
1:00 p.m.	<p>Theme 1 Discussion: Peer Exchange Participants</p> <p>Mr. Jeffrey W. Brown, ALDOT Ms. J. Michelle Owens, ALDOT Mr. Clint Andrews, FHWA** Ms. Kristy Harris, FHWA** Mr. James Watkins, MSDOT Dr. Mrinmay (Moy) Biswas, NCDOT (Team Leader) Dr. Fouad H. Fouad, UAB</p>
3:00 p.m.	Break
3:15 p.m.	<p>Theme 2: Organization and Research Program Management – The Research Program in the Electronic Age</p> <p>Ms. J. Michelle Owens – ALDOT R&amp;D</p> <p>Theme 2 Discussion: Peer Exchange Team Participants (same as Theme 1)</p>
4:30 p.m.	Adjourn
5:00 p.m.	PEER EXCHANGE RECEPTION – OUTSIDE LARGE MEETING ROOM

\* *Invited but unable to attend*

\*\* *Unable to attend due to their roles in the emergency response for the April 27<sup>th</sup> Alabama tornadoes.*

**Wednesday, May 11, 2011**

DoubleTree Hotel, The University of Alabama at Birmingham Campus

Large Meeting Room

7:00 a.m.	Breakfast
8:00 a.m.	Documentation / Report Writing - Themes 1 & 2
9:00 a.m.	Theme 3: Research Project Selection and Program Expansion Ms. J. Michelle Owens, Asst. Bureau Chief, Bureau of Research & Development and Ms. Kidada C. Dixon, Transportation Research Manager
9:30 a.m.	Theme 3 Discussion: Peer Exchange Team Mr. Jeffrey W. Brown, ALDOT Ms. J. Michelle Owens, ALDOT Mr. Clint Andrews, FHWA** Ms. Kristy Harris, FHWA** Mr. James Watkins, MSDOT Dr. Moy Biswas, NCDOT (Team Leader) Dr. Fouad H. Fouad, UAB
11:00 a.m.	Break
11:15 a.m.	Documentation / Report Writing - Theme 3
12:00 Noon	Lunch
1:00 p.m.	Theme 4: Research Program Outreach and Marketing Ms. J. Michelle Owens, Asst. Bureau Chief, Bureau of Research & Development
1:30 p.m.	Theme 4 Discussion: Peer Exchange Team Participants (same as Theme 1)
2:30 p.m.	Documentation / Report Writing – Theme 4
3:00 p.m.	Visit to the UAB Engineering VisCube 3-D Display & Modeling Laboratory
5:00 p.m.	Return to hotel & Adjourn
6:30 p.m.	PEER EXCHANGE DINNER (Day 2 Peer Exchange Participants & Support Staff)

\*\* Unable to attend due to their roles in the emergency response for the April 27<sup>th</sup> Alabama tornadoes.

**Thursday, May 12, 2011**

DoubleTree Hotel, The University of Alabama at Birmingham Campus

Large Meeting Room

7:30 a.m.	Breakfast
8:30 a.m.	Review of Documentation – Theme 1 – 4  (Comments and Recommendations) Mr. Jeffrey W. Brown, ALDOT Ms. J. Michelle Owens, ALDOT Mr. Clint Andrews, FHWA** Ms. Kristy Harris, FHWA** Mr. James Watkins, MSDOT Dr. Mrinmay “Moy” Biswas, NCDOT (Team Leader) Dr. Fouad H. Fouad, UAB
10:45 a.m.	Break
11:00 a.m.	Closing Comments Mr. Jeffrey W. Brown, ALDOT R&D Bureau Chief Ms. J. Michelle Owens, ALDOT R&D Assistant Bureau Chief
11:30 a.m.	Administrative Tasks – Expense Reports, Travel Forms, etc. Ms. Mischell Massey, UAB, Financial Officer
12:00 Noon	Box Lunch (Depart)

*\*\* Unable to attend due to their roles in the emergency response for the April 27<sup>th</sup> Alabama tornadoes.*

## PEER EXCHANGE PARTICIPANTS

Transportation Director	Mr. John R. Cooper
Chief Engineer/Deputy Director	Mr. Don W. Vaughn
UAB Dean, School of Engineering	Dr. Linda C. Lucas
Assistant Chief Engineer, Operations, Research Advisory Committee Chair	Mr. Mike Harper
Assistant Chief Engineer, Administration	Mr. Lamar S. Woodham
FHWA AL Division Administrator	Mr. Mark Bartlett
ALDOT Research & Development, Bureau Chief	Mr. Jeffrey W. Brown
ALDOT Research & Development, Assistant Bureau Chief	Ms. J. Michelle Owens
State Research Engineer, Mississippi	Mr. James Watkins
State Research & Analysis Engineer, North Carolina	Dr. Mrinmay "Moy" Biswas
Auburn University	Dr. Anton Schindler
The National Center for Asphalt Technology	Dr. Buzz Powell
The University of Alabama and UTCA	Dr. Steven Jones
The University of Alabama at Birmingham	Dr. Fouad H. Fouad
The University of Alabama at Birmingham	Mr. Andrew Sullivan
The University of Alabama in Huntsville	Dr. Houssam Toutanji
The University of South Alabama	Dr. James Laier Dr. Kevin D. White
Tuskegee University	Dr. Heshmat Aglan
ALDOT Fourth Division Engineer	Mr. DeJarvis Leonard
Transportation Research Manager	Ms. Kidada C. Dixon
Assistant Research Manager	Mr. Marlon Perry
Research Administrative Support Assistant	Ms. Teresa P. Briers
Research Administrative Support Assistant	Ms. Edith T. Turner
Research Engineering Assistant	Mr. Chris Ward
UAB Financial Officer, CCEE Department	Ms. Mischell Massey
UAB CCEE Department, Peer Exchange Administrative Support	Ms. Jennifer Vinson

# 2011 PEER EXCHANGE

## ACKNOWLEDGEMENTS

The Alabama Department of Transportation's Bureau of Research and Development would like to acknowledge the following individuals for their outstanding support to our Research program and the 2011 Peer Exchange:

Mr. John R. Cooper, Transportation Director  
Mr. Don W. Vaughn, Chief Engineer/Deputy Director  
Mr. Mark Bartlett, FHWA Division Administrator

### **The Alabama Department of Transportation Research Advisory Committee:**

Mr. Mike Harper, Assistant Chief Engineer, Operations - Chairman  
Mr. Jeffrey W. Brown, Bureau Chief, Bureau of Research and Development – Co-Chairman  
Mr. Don W. Vaughn, Chief Engineer/Deputy Director  
Mr. Lamar Woodham, Assistant Chief Engineer, Administration  
Mr. Don T. Arkle, Assistant Chief Engineer, Policy and Planning  
Mr. John F. Black, Bridge Engineer  
Mr. William Adams, Design Engineer  
Mr. George Conner, Maintenance Engineer  
Mr. Buddy Cox, Materials and Tests Engineer  
Mr. Robert Jilla, Transportation Planning and Modal Programs Engineer  
Mr. Ron Newsome, Assistant Maintenance Bureau Chief, Roadways  
Mr. DeJarvis Leonard, Fourth Division Engineer

### **The 2011 Peer Exchange Team Members:**

Dr. Mrinmay "Moy" Biswas, State Research and Analysis Engineer, Team Leader, NCDOT  
Mr. James Watkins, State Research Engineer, MSDOT  
Mr. Clint Andrews, FHWA AL Transportation Engineer and Research Liaison  
Ms. Kristy Harris, FHWA AL Transportation Engineer and Research Liaison  
Dr. Fouad H. Fouad, Chairman and Professor, Civil Construction & Environmental Eng. Dept., UAB

### **The University of Alabama at Birmingham and UTCA:**

Dr. Linda C. Lucas, Dean of Engineering  
Mr. Andrew Sullivan, Research Engineer  
Ms. Mischell Massey, Financial Officer  
Ms. Jennifer Vinson, Administrative Associate

### **Research Program University Partners:**

Alabama A&M University  
Auburn University  
The National Center for Asphalt Technology (NCAT)  
The University of Alabama  
The University of Alabama at Birmingham  
The University of Alabama in Huntsville  
The University of South Alabama  
Tuskegee University

### **Bureau of Research and Development – Research Section**

Ms. J. Michelle Owens, Assistant Bureau Chief, Bureau of Research Section Head  
Ms. Kidada C. Dixon, Transportation Research Manager  
Mr. Marlon Perry, Assistant Research Manager  
Ms. Teresa P. Briers, Research Administrative Support Assistant  
Ms. Edith T. Turner, Research Administrative Support Assistant  
Mr. Chris Ward, Engineering Research Assistant