TRANSPORTATION RESEARCH BOARD
Business Meeting – ADC10
ENVIRONMENTAL ANALYSIS IN TRANSPORTATION
July 9, 2006

Prepared and Submitted by:

Susan Killen
Secretary ADC10

January 19, 2007
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TRB Environmental Analysis in Transportation (ADC10)
Committee Business Meeting
Sunday, July 9, 2006  2:00 – 5:00 PM
Crowne Plaza Hotel – Seattle

MINUTES

The meeting was called to order at 2:07 PM by Mark Kross, Committee Chairperson.

I. Introduction of Members and Friends of the Committee

Members and guests introduced themselves and stated their professional affiliation and their status related to the committee. Attachment A contains the meeting agenda and Attachment B contains the list of attendees.

II. Review and Approval of Minutes of January 23, 2006

The minutes of the Mid-Year Business Meeting held in Washington, DC were approved as distributed without discussion. Susan Killen indicated that she received one comment and it was incorporated.

III. Remarks by the Chair and Discussion – Mark Kross

a. Committee Membership 2006-2009

Mark Kross reported that membership rotation was very tough this year because TRB’s rotation requirements were adhered to and there was a high level of interest in being on the committee. There are many potential qualified members (around 65 individuals) that were interested in membership. All recommendations made were subject to TRB’s approval.

In the past the 9-year limit for membership had not been rigorously enforced. For example, Ron DeNadai was member of the committee for 18 years. Each rotation has to justify retaining members with more than 9 years of membership on a committee. This year TRB asked one-third of the membership to rotate off the committee. In addition, those with more than 9 years experience should rotate off a committee and may make up part of the one-third rotating off. (Note: Emeritus standing requires 18 years membership on TRB committees.) Mark said in some cases he requested that a member be retained. For example, Andy Fekete has more than 9 years as an active, contributing committee member and has been very valuable. Jim Bach is another key committee member and his membership was renewed as well. Jim Bach acknowledged his appreciation of this ongoing opportunity.

Kim Gambrill reinforced Mark’s report saying that there is a lot of interest in ADC10. It is a very full committee with 24 North American members plus the chair. All senior members of the committee wanted to stay on. Past participation in the committee as a Friend was a consideration in the selection. It is and has been a great committee.
Mark discussed the young member (age 30 years or less) membership. Based on the committee discussion Mark will raise the issue with TRB about raising the age limit for young members.

Mark added that there is guidance for committee chairs but not for committee members. TRB is working on more guidance for committee members.

Ron asked which members are at risk for the next cycle. Kim said only 3 or 4 members are going into their third term. However, with 14 new members there will be a large number rotating off the committee in 9 years. In addition, Kim noted, there will be some rotation as folks retire and so forth.

Jim Bach added that the ADC10 committee is a victim of its own success. There is a large turn out to meetings and it is a great committee.

Mark said he had members’ surveys and hoped to have list of particular areas of members’ interests for subcommittee membership consideration. There is also a turnover of subcommittee chairs. The current chairs need to mentor the incoming chairs. For example, Ron De Nadai stayed on as the Mid-Year Workshop Subcommittee Chair to help the transition.

Mark went on to explain what ADC10 stands for:

- A is the Technical Activities Division of TRB;
- D is the Group (planning and environment group under Marcy Schwartz of CH2MHiIl); and
- C is the environmental and energy section with 8 or 9 committees under that (Kate Quinn is the chair). Some other committees in the section are air, noise, ecology and transportation.
- 10 is the committee number;

This committee (ADC10) has spawned numerous committees such as ecology. This committee’s strength is the balance of numerous environmental factors.

Muggs Stoll stated that no matter how much specialization there is, there is still the need to come back to the generalists - “we can partner with our technical committees to work together”. Mark noted that he is working with other committees to find more opportunities for joint meetings and activities.

Shari Schaftlein reinforced that everyone can get the most value by being engaged with planning committees such as AFB50T Task Force on Context Sensitive Design/Solutions (CSD/CSS). Mark also noted involvement with Transportation Demand Management (ABE50) and Public Involvement (ADA60) committees among others.

Larry Barfield reported that the Florida Department of Transportation (FDOT) has completely revamped its procedures for planning transportation projects, conducting environmental reviews, and developing and permitting projects. They have implemented a program titled Efficient Transportation Decision Making (ETDM) process. Revamping the entire process required that a more efficient methodology be used to present project planning information and to
gather input from agencies and the affected community. As ETDM covers the entire spectrum of project development, he anticipates that more states will follow this direction. The ETDM Public Access site is located at http://etdmpub.fla-etat.org

b. Planning for the 2007 Annual Meeting

Mark reported that TRB has a large number of committees. In addition, TRB has just added six more committees. This affects the number of sessions for each committee. Therefore, there are only 2.3 sessions for ADC10 and then the committee must look to co-sponsor some sessions. For example if three committees agree to sponsor a session then it counts only as 3/10s of a session per committee rather than one full session. In addition, Sunday workshops are not counted against the committee’s allotment. Wednesday afternoon through Thursday many attendees at the Annual TRB Conference have left. Noise, for example, was covered on those days so they could have more flexibility and focus. For this same reason, ADC10 has been fortunate to get more sessions if bumped to Wednesday afternoon and/or Thursday.

One session will be reserved by ADC10 for papers and then the committee will look at other topics for sessions. One possibility is to reserve a session with InterCity Guided Passenger Rail Committee and environmental issues with Marilyn Duffey. Mark asked what other hot topics are for potential sessions.

Jeff Heilman suggested Linking Planning and NEPA as a topic, noting we may be able to have another committee share the session. Kris Hoellen said that it was difficult to get speakers for a similar session at this summer meeting. However, timing seemed to be the primary issue so it may be easier to get speakers for the TRB Annual Meeting.

Mark said that two workshops have been already approved: 1) Sunday morning on SAFETEA-LU with Shari Schaftlein and 2) Kris Hoellen and Dominique Lueckenhoff on green infrastructure. Joe Shalkowski asked Kris and Dominique to reach out to Metropolitan Planning Organizations (MPOs) on green corridors. Craig Casper said that Linking Planning and NEPA has an MPO focus, especially on coordination and potential mitigation. Craig suggested a conservation workshop on conservation and ecology. The Army Corps of Engineers (Corps) and Environmental Protection Agency (EPA) are working on compensatory mitigation and banking. Therefore, mitigation may be a good topic for a session.

Dominique reinforced the idea of a session on sustainable highways and green infrastructure. She emphasized looking at how to leverage resources; take on the weight of what communities say they need. She suggested that we address how we can look at polices that can be “tweakled” to provide more opportunity to leverage resources. (Note that LID is the acronym for “low impact development”.) Mark asked if they can accommodate this topic into the workshop. Kris said leverage was already addressed in the workshop session.
Shari Schaftlein said in her experience there is a need to remember to have some basics as well in the sessions. Andy Fekete noted that past sessions have looked at biodiversity.

Craig Casper reported that the National Association of Regional Councils (NARC) is doing training for its members starting in January. Craig said that the timing is good time as many MPOs are starting on Long Range Plans. Muggs Stoll noted that many properties will be funded for habitat conservation - this is how you turn planning into reality.

Joe Crossett suggested a session to examine environmental costs associated with mitigation. Other suggestions included: What money is being spent on mitigation and how effectively is it being used? Is ecosystem or watershed mitigation more beneficial? Is the new reader friendly document still worth bringing up? Joe Shalkowski was personally interested in performance measurements - could be broad measures or measures for individual projects.

Joe Shalkowski reported using the system called TERI for research database. TERI is the AASHTO Standing Committee on Environment's central storehouse for tracking and sharing new transportation and environmental research ideas. Shari noted that NCHRP 25-25 is getting a piece out on this.

Mark suggested a general environmental analysis session (usually four presentations) so we should look at which presentations we want to hear in the session by the end of July. The members should email Mark by July 19th with a presentation you like to see and who might be involved. If it could be a poster session make that suggestion as well.

Mark also said that ADC10 has a poster session where we can address some topics. The poster session usually lasts 3 hours. The author stands with the poster as a presenter during at least one of the 3 hours and responds to questions. If we get many presentations a poster session may be an option for presenters. Jim Bach noted that poster session attitudes have been changing and it is seen as a good forum. Overall, he said, feedback has been more positive. People are recognizing that the poster session is an opportunity to get more that just a paper. The poster has graphic representation and the author is available to answer questions.

Ron DeNadai said that he has a spreadsheet with at least 30 session ideas.

Dominique Lueckenhoff, referring to the performance measures topic, said that there are multiple benefits and multiple indicators of success. For example MPOs are identifying open space areas and using tax dollars for them. If other investments in open space such as mitigation programs can be coordinated with the MPO investments, the value and benefits increase for all parties concerned. Mitigation needs to be tailored to the watershed or ecosystem. The committee should look at where have been failures as well as successes in alignment of tools and implementation. Dominique suggested to broach this at the TRB Annual Meeting and to broaden for joint summer meeting.
As a further example, Larry Barfield said FDOT has funded 30 positions through transportation dollars. Are we getting our dollars worth and can we do in a timely fashion? We need to set up performance measures now. The discussion reconfirms this as an important topic.

Mark agreed with the overall topic “Being Stewards of Environmental Mitigation” with “Smart Mitigation” as the suggested title. This would include all aspects such as environmental, financial, and so forth.

Pat Trombly said topics get lost and could have records/suggestions organized as follows:

i. Paper session
ii. Conference session
iii. Cosponsored sessions
iv. Poster session (ADC10 poster)

v. Workshops

c. Planning for the 2007 Mid-Year Workshop with SCOE

AASHTO’s Standing Committee on the Environment (SCOE) is concerned that our joint Mid-Year Workshop site has not yet been selected. At SCOE Ed Zymanski suggested Rhode Island as a possible meeting site. Lynn Malbrough made an offer of Little Rock, Arkansas as a possible site in 2008 or 2010. Little Rock, Arkansas is the site for the International Conference on Ecology and Transportation (ICOET) meeting in 2007. Frank Pafko (MinnDOT) suggested Minnesota in 2009.

SCOE also favors moving the Mid-Year Workshop to an earlier date. SCOE wants to have the meeting in May but an earlier date is hard for ADC10 to accommodate.

Ron DeNadai and Muggs Stoll asked how resolution of this issue will be coordinated and resolved with SCOE. Carol Lee Roalkvam will be available before the closing session to discuss. Timing as well as past SCOE venues will be discussed in making the decision. Ron and Mark will pursue a decision. Ron is charged with talking to Carol Lee and “bird-dogging” this issue.

d. Early Planning for the 2008 Annual Meeting and Future Workshops

Some potential topics from January 2007 remain (see discussion above). In addition, future workshops with Lynn Malbrough in Arkansas were discussed. Kris Hoellen also looked at coordinating a meeting with the Association of Fish and Wildlife Agencies and/or others organizations.

Coordinating a meeting with National Association of Environmental Professionals (NAEP) may also be possible. NAEP is a multidisciplinary, professional association dedicated to the promotion of ethical practices, technical competency, and professional standards in the environmental fields.
Yates Oppermann (Colorado DOT) is on their conference planning committee. It would be an opportunity to present materials before a different audience.

**IV. Remarks from TRB Staff Liaison – Mark Kross for Christine Gerencher**

Mark noted Christie Gerencher will arrive later this evening. Christie has really stepped up to the plate for the committee and is very accessible.

Committee rotation was reported by Mark Kross at the beginning of the meeting (see previous discussion). Mark also reported that the 2007 Annual Meeting sessions need to be developed by July 19th as noted earlier in the meeting.

Mark Kross reported on STEP. The Surface Transportation Environment and Planning Cooperative Research Program (STEP) of SAFETEA-LU is a new cooperative research program for environment and planning research. SAFETEA-LU provides $16.875 million per year for FY2006 - FY2009 to implement this new cooperative research program. Due to obligation limitations, rescissions and the over-designation of Title V Research in SAFETEA-LU, it is anticipated that approximately $11.9 million of the $16.875 million authorized will be available each year. STEP will also be the sole source of SAFETEA-LU funds available to conduct all FHWA research on planning and environmental issues. Shari Schaftlein is our point of contact and if interested contact Shari to get more plugged into STEP.

Mark Kross reported on Mark Norman’s State of TRB 2006 Midyear Report. Unless Congress acts to address the unintended consequences of SAFETEA-LU on FHWA’s research budget and programs, FHWA’s level of support will be approximately $1.1 million per year less than called for in the TRB 2007-2009 triennium budget. Measures are being considered to reduce costs and increase revenues such as joint sponsorship of midyear meetings, revision of registration fees and budgets to offset costs, and so forth.

The TRB Executive Committee and its Subcommittee on Planning and Policy Review (SPPR) are updating the TRB Strategic Plan. Consider:

- What does TRB do best?
- What could TRB do better?
- What else can TRB do to meet your needs?
- What products, services or activities could TRB provide that would be of direct benefit to constituencies in your sector or area(s) of interest?
- Do you feel that your sector or area of interest is adequately represented?

There were 10,300 registered attendees for the 2006 Annual Meeting – a new record. Mark said the committee needs to consider the theme for 2007, "Transportation Institutions, Finance and Workforce: Meeting the Needs of the 21st Century", as we develop our sessions. TRB’s 86th Annual Meeting is in Washington, D.C., January 21–25, 2007. In 2008 the Annual TRB will go back to its traditional early dates in January, for two out of every three meetings, and the remainder later in January due to Presidential inaugurations and Martin Luther King birthday dates.
At its June 2006 meeting, the Technical Activities Council approved the applications of five existing task forces to become new TRB standing committees:

- National Parks and Public Lands
- Marine Environment
- Trucking Industry Research
- Ecology and Transportation
- Visualization in Transportation

TRB provides a significant amount of guidance materials for chairs of the standing committees. However, the same cannot be said for new committee members. TRB staff is now preparing additional guiding “do’s and don’ts” for committee members. This information will be included in all welcoming packets sent to new committee members, and will be made available to existing committee members on an ongoing basis as well.

Steps are being taken to improve access to Transportation Research Record (TRR) papers by researchers and other interested parties. Beginning last year, authors submitting papers to TRB were provided temporary access to a searchable database on the TRR website that includes more than 6,000 papers that have been published in the TRR since 1996 for background and referencing. TRB staff is now taking steps to make all or part of the TRR collection available on the web to all users on a full time basis through subscriptions and pay-per-view. (TRB sponsors would continue to have full access at no additional cost.)

The TRB Transportation Research Information Service (TRIS) and Research in Progress (RIP) provide databases that consolidate records on completed research and research in progress, respectively. The missing element for users is a consolidated collection of what the critical transportation research needs currently are in each area. At the same time, TRB standing committees are responsible for maintaining a collection of research problem statements for the most needed research in their topic area. However, currently there is not a central place where these can be housed and found. An opportunity exists to include a research needs database as part of enhancements that are being made to the RIP web tool during 2006.

Three new meeting attendees expressed interest in our committee. Mark will continue work with these folks and keep touch.

V. Steering Subcommittee Report – Kim Gambrill

Kim reported that the membership rotation is complete. He also reported that two sets of subcommittee goals were done last year and then two more were brought up to date this year. This year ADC10 will published goals and strategies for review and will send out to have Committee look. There were revised newsletter subcommittee goals and steering subcommittee goals. Earlier Kim distributed the subcommittee business report which had the draft liaison goals on the second page. All changes as described below
were passed unanimously and incorporated into the respective goals. See Attachment C.

a. Subcommittee Goals and Objectives
   i. Publications Subcommittee
      Kim added clarification of the procedures for authors and presenters. In addition, objective 5 should say “written report to business meeting mid-year and orally at annual meeting”. This was added.

      Jim Bach suggested that in 1C2 identify TERI and Research in Progress as RiP. Other sources to follow. This will also be added. See Attachment C.

   ii. Liaison Subcommittee – These subcommittee goals were expanded to include maintenance as well (also done in publications), adding more with SCOE and periodic review of organizations we relate to. See the notes Kim passed out. See Attachment C. Kim noted Gary McVoy has been the liaison to SCOE. There was comment to include more specific organizations but Kim’s thought was to leave more generic to reflect interests. This comment was from Kris and she ok’d leaving as suggested. She did suggest maybe suggested list and part of context. Jim suggested adding, “As we have volunteers”.

      Jim Bednar said that quality of liaison is actually only as good as those who foster interest in these organizations. Ron DeNadai suggested this as an opportunity to look at the liaison committee and ask if there is interest in joint sponsorship for summer meetings, but not needed in formal goals.

b. ADC10 Goals and Objectives
   These will be brought forward for adoption in January. At end of month Kim will send out and will send out electronic ballot.

VI. Other Subcommittee Reports – Subcommittee Chairs

a. Publications Subcommittee
   Jim Bach reported that the call for papers went out for the January meeting. This year there was requests in seven topic areas. The notice was also posted on website and sent to Friends, organizations and others. See Attachment D. Wetlands and wetland mitigation out of Wisconsin is one of two known. The update on dates for publications was circulated (see Attachment D). All papers are due to TRB on August 1st. This committee has received a lot of papers (up to 16 papers) and Jim looks at 4-5 reviewers per paper. TRB has a web-based review process.
Jim reviewed the review process, as many members are reviewers. Up to 40 members are usually involved in reviews. Jim will look at the list/survey to see those interested for this next year. Jim noted that the quality of the reviews is outstanding. Thanked all reviewers that result in good papers and presentations. Let Jim know if you are interested in being a reviewer. Encourage people to submit papers.

Muggs asked if others outside the committee can review. He said that as an agency representative he could let Jim know of someone that might be expert in subject area.

b. Research Subcommittee

Joe Shalkowski, incoming chair reported for the past chair, Dianna Noble. Dianna is no longer on the committee. Joe Shalkowski has been asked by Mark to chair this subcommittee. Joe noted how much Dianna Noble had done.

In 2004 they conducted a survey and reported on 2002 Research Needs Conference. Questions were raised by the committee on the status of research. At the 2005 meeting an idea was proposed to do research on the research and a proposal was sent out to accomplish this goal. The proposal was presented by Gary McVoy at the SCOE meeting in La Jolla in June. The research in the research has culminated in TERI [http://environment.transportation.org/teri_database/].

Joe Crossett provided additional information. TERI is SCOE’s central storehouse for tracking and sharing new transportation and environmental research ideas. See Attachment E. AASHTO's Center for Environmental Excellence (CEE) maintains TERI and keeps all content relevant. Suggestions for new ideas are welcome from practitioners across the transportation and environmental community. TERI provides a comprehensive list of research ideas to researchers as they make choices in forums such as NCHRP's 25-25 and 8-36 research programs about research priorities. Anyone can view the TERI database or suggest new research ideas. Use the tool bar at the top of each page to view TERI's organized and topical list of research ideas or find out how to share new research ideas with others.

As the best research ideas in TERI are implemented, you can search the Transportation Research Board's Research in Progress (RiP) database to find out more about their status. The Transportation Research Board's Research in Progress (RiP) website contains the Research in Progress (RiP) Database and a data-entry system to allow users in State Departments of Transportation to add modify and delete information on their current research projects. The RiP database now contains over 7,800 current or recently completed transportation research projects. Most of the RiP records are projects funded by Federal and State Departments of Transportation. University transportation research is also included. [http://rip.trb.org/]. After research is completed, you can search the US Department of Transportation and Transportation Research Board's TRISOnline catalogue ([http://ntlsearch.bts.gov/tris/index.do]) to find information about final reports and other research products.

Joe Crossett said the idea is for Shannon Eggleston and AASHTO’s Center for Environmental Excellence (CEE) to keep up the database. Joe Crossett noted interrelationships with other programs still need to be worked on but should be improving.
Joe Shalkowski said there are 568 projects in the databases. This is the first product. Secondly, SCOE is conducting their assessment of the products and research assessments. The assessment will identify those eliminated, modified (including combining) and new research statements and rankings. The potential for a Research Needs Conference is not known but the SCOE effort is expected to be complete by end of summer.

As noted, Joe Shalkowski is chair of the Research Subcommittee and Mark sent out a request for subcommittee participants. Mark also noted that Joe Shalkowski is becoming involved in SCOE. Joe Shalkowski has goals and objectives for the subcommittee on the website. Mark noted benefits of coordinating with SCOE.

Kris Hoellen asked how this relates to F-SHRP or to other committees that do not relate to SCOE. Joe Shalkowski and Shari Schaffelein noted coordination with NCHRP but SCOE should cover all research. The intent of TERI was to keep track of research and F-SHRP is more immediate funding.

James Martin commented that TRIS database has improved but does not capture what has been completed in areas such as state research. Joe Crossett noted AASHTO’s Research Advisory Committee (RAC) is a good contact. Therefore what is funded in states should be included as well. CEE is owner of TERI database.

Amy Phillips also said anyone could enter into TERI database to enter research project. Muggs brought example (see Attachment E). Send comments to Joe Shalkowski. Joe Crossett will be working with Joe Shalkowski to provide a response.

c. Newsletter Subcommittee

Craig Casper reported that he is looking for ideas for the newsletter. Mark Kross suggested that the newsletter is an opportunity for a co-chair to help. Mark asked for volunteers to assist Craig in this effort. Amy Phillips suggested the newsletter might give update on organizations that regularly give updates. Kris Hoellen also asked if companies may have some articles.

If you have an interest send expression of interest to both Craig and Mark.

d. Website Subcommittee

Chris Gesing reported that keeping the website up to date is his primary effort. See Attachment F. The goal was to upload presentations from various meetings such as Santa Fe and DC so there is more history of the past meetings, but this is a much greater effort than anticipated. Martin Palmer offered copies of the presentations from this conference. If we can get copies of past conference presentations send to Chris. Also put up Goals and Objectives.

e. Mid-year Workshop Subcommittee

Ron noted for next year there needs to be way to register through website and pay with a credit card. In addition, there needs to be a permanent list of vendors that support the committee. Ron pulled names from a list of over 100 members to solicit support. Mark said Ron will carry the list forward and appreciated how much work goes into the workshop.
Kim saw tremendous opportunity for a host agency to expose the staff to a national conference. Martin noted he was able to get to know everyone and was good for the state and personnel.

Martin Palmer reported that, although a late start in registrations, about 96 registered. Eighteen states were represented with one-third attendees consultants and balance agencies and organizations (11 state DOTs).

See Attachment G for the Meeting and Workshop Agenda. Martin briefed everyone on some logistics for the tour and dinner. He reminded the group that 13 years ago the subcommittee went to Kanai Lodge. WSDOT shifted agenda to accommodate dinner at Kanai Lodge again.

f. Liaison Subcommittee

Jim Bednar proposed to update goals and objectives. Four members are due for rotation off in four years. If anyone is interested in Liaison Subcommittee please see Mark and think of succession planning. In addition, if anyone has creative ways to improve the Liaison Committee activities/communication to any organizations. Send ideas to Jim Bednar with a copy to Mark Kross.

Andy Fekete reported that the AFB60 group has a strong relationship with ADC10; ADC10 is more on process and AFB60 is focused on technical issues.

g. History Subcommittee

Mark Kross asked if there is interest in a history subcommittee. A history subcommittee would be a new subcommittee. Jim Bach said it is a good idea so we do not lose institutional knowledge. Pat Trombly said that there are records all over the place and it would be nice to have the committee’s history in one place. Ron DeNadai added that there are books, presentations, and other contributions that would be available. Ron said a history committee could document the role of the committee in the environmental movement. Muggs added that the history committee could show all the research the committee has spawned. The committee unanimously voted to add a History Subcommittee. Mark suggested Pat Trombly as chair and she agreed.

VII. Report from FHWA Office of Project Development & Environmental Review

Shari Schaftlein reported that for the TRB Annual Meeting in January there are plans for a workshop to be sponsored by ADC10 – *Early Lessons Learned in Implementing SAFETEA-LU Environmental Provisions*. This workshop will focus on Sections 6001, 6002, 6004, 6005, and 6009. The workshop will end with an open-mike session to address other environmental process or funding issues. Anyone that is interested should “meet for breakfast Tuesday morning so we can get organized”.

VIII. AASHTO Report/Center for Environmental Excellence

A handout (Attachment H) was distributed describing the activities of CEE.

IX. CTE Activities
James Martin announced that CTE was reauthorized as a Tier 2 university transportation center, funded in part by the U.S. Department of Transportation and the North Carolina Department of Transportation. CTE is located on North Carolina State University's Centennial Campus. CTE conducts research, education, and technology transfer that seek to mitigate the impacts of surface transportation on the environment. Mark said that the relationship of CTE to this committee is very strong and CTE is always on the agenda. If there is an opportunity to assist CTE in what they are doing please do so as they have showed that they follow through. See Attachment I.

Mark noted that CTE is setting the tone for where the state DOTs are heading with Context Sensitive Solutions (CSS). The first conference on this topic, Thinking Beyond the Pavement, was held at the University of Maryland in May of 1998 several years ago. James updated the committee on the CSS training programs. CTE has developed Context Sensitive Solutions (CSS) Training for Professionals and is currently delivering training to North Carolina Department of Transportation staff (as well as practitioners outside the department) on the principles and applications of context sensitive solutions in all functional areas of transportation: from planning, to project development, to maintenance and operations. Undergraduates compete nationally to participate in the CSS Summer Academy. The CSS Summer Academy introduces students to the principles of context sensitive solutions. Moreover, it also illustrates how CSS concepts are being applied at various levels of transportation planning, project development, construction, operations and maintenance.

On the research side, James reported that several research projects have been funded by the DOT:

- Environmental Implications of Current Domestic Trends in Goods Movement
- Best Practices Guidebook for Greenhouse Gas Reductions in Freight Transportation
- FTA Air Quality Web-Based Training Course
- Integration of Context Sensitive Solutions in the Transportation Planning Process

CTE produces several broadcasts per year, available via the web. The broadcasts feature expert panels who discuss emerging policy issues, research innovations, and best practices in transportation and the environment. Programs are typically two or three hours in length and broadcast live. James noted the next one was an Overview of the Proposed Rulemaking on Planning. SAFETEA-LU Series: Part 3 of 3 on July 13, 2006. This broadcast was part of the Federal Transit Administration's public outreach efforts designed to discuss the Notice of Proposed Rulemaking (NPRM) on the metropolitan and statewide planning requirements outlined in the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

X. Environmental Research Needs Conference

See previous discussion.

XI. Generating ADC10 Research Idea Statements

See previous discussion.

XII. Recognition of WashDOT’s Efforts for 2006 Summer Workshop
Mark complimented Martin Palmer and WashDOT (round of applause). Martin also acknowledged all the other help that he received.

XIII. Open Discussion

Jim Bednar passed out results of NCHRP Project 25-22(02), Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions (see Attachment J).

Mark Kross reiterated that he is excited by new committee make-up. However, he further noted that it is tough to get a handle on how to operate as a committee. Mark also noted that he needs to look for a successor by 2009.

The Chairman adjourned the meeting at 6PM.
ATTACHMENT A – MEETING AGENDA
TRB Environmental Analysis in Transportation (ADC10)
Committee Business Meeting
Sunday, July 9, 2006  2:00 – 5:00 PM
Crowne Plaza Hotel -- Seattle
Final Agenda
(All are welcome!)

I. Introduction of Members and Friends of the Committee

II. Review and Approval of Minutes of January 23, 2006

III. Remarks by the Chair and Discussion – Mark Kross
   a. Committee Membership 2006-2009
   b. The Seattle Meeting
   c. Planning for the 2007 Annual Meeting (Session details due July 31 to TRB)
      i. Paper session
      ii. Conference session
      iii. Cosponsored sessions
      iv. Poster session (ADC10 poster)
      v. Workshops
   d. Planning for the 2007 Mid-Year Workshop with SCOE
   e. Early Planning for the 2008 Annual Meeting and Future Workshops

IV. Remarks for TRB Staff Liaison – Mark Kross for Christine Gerencher

V. Steering Subcommittee Report – Kim Gambrill
   a. Subcommittee Goals and Objectives
      i. Publications Subcommittee
      ii. Liaison Subcommittee
   b. Assessing the Subcommittees and Populating Them
   c. ADC10 Goals and Objectives

VI. Other Subcommittee Reports – Subcommittee Chairs

VII. Report from FHWA Office of Project Development & Environmental Review

VIII. AASHTO Report/Center for Environmental Excellence

IX. CTE Activities

X. Reports on NCHRP Projects

XI. Environmental Research Needs Conference

XII. Generating ADC10 Research Idea Statements

XIII. Recognition of WashDOT's Efforts for 2006 Summer Workshop

XIV. Open Discussion
ATTACHMENT B – MEETING ATTENDEES
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<td>412.375.3995</td>
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<tr>
<td>Dominique Luekenhoff</td>
<td>1650 Arch Street</td>
<td>(315) 814-5810</td>
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<td></td>
<td>Malade (WPfD) Philadelphia, PA 19115</td>
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<tr>
<td>Kris Hoellen</td>
<td>698 Conservation Way</td>
<td>204-876-7460</td>
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<td></td>
<td>Shepherdstown, WV 25443</td>
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<tr>
<td>Louise Smart</td>
<td>100 Arapahoe, Suite 12</td>
<td>303 918 9111</td>
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<td></td>
<td>Boulder, CO 80302</td>
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<td>303 442-7472</td>
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<tr>
<td>Martin Palmer</td>
<td>15700 Dayton Ave N</td>
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<td></td>
<td>PO Box 330310, Seattle, WA 98133</td>
<td></td>
<td>(206) 440-4805</td>
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<tr>
<td>Ron Deuterdorf</td>
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<td>Philadelphia, PA 19126</td>
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<tr>
<td>Joe Crossett</td>
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<td>202 628 6940</td>
<td>202 628 0222</td>
<td><a href="mailto:jcrossett@transtechnagement.com">jcrossett@transtechnagement.com</a></td>
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<tr>
<td>Paul Tufts</td>
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<td>708-283-3501</td>
<td><a href="mailto:paul.tufts@fhwa.dot.gov">paul.tufts@fhwa.dot.gov</a></td>
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<td>Jim Bednar</td>
<td>5775 PERIMETER DR, SUITE 190, DUBUN, OH 43017</td>
<td>614.734.7144, EXT 12</td>
<td>267.675.4596</td>
<td><a href="mailto:sbednar@ch2m.com">sbednar@ch2m.com</a></td>
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| Larry Barfield   | 605 SUNRISE ST, MS 329
Tallahassee, FL 32399-0450 | (850) 414-5260 | (850) 414-4443 | larry.barfield@dot.state.fl.us |
| Ken Stone        | PO BOX 47332
Olympia WA 98504-7332 | (360) 570-6642 | -6633      | stonek@wsdot.wa.gov          |
| Lynn Malbrough   | P.O. Box 2261
Little Rock, AR 72116 | 501.569.2281   | 501.569.209 | lynn.malbrough@arkansas.com   |

ADC10 Member: □ Yes □ No
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<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susan Killen</td>
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<td>206-382-5200</td>
<td><a href="mailto:killen@ppworld.com">killen@ppworld.com</a></td>
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<td>Name</td>
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<tr>
<td>Sheri Schaffer</td>
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<td>Kent E. Snyder</td>
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<td>360-694-2380</td>
<td>360-694-2311</td>
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<td>Jim Bach</td>
<td>100 Halsted St E. Orange, NJ 07018</td>
<td>973-678-1960 x 551</td>
<td></td>
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<td>Jeff Heilman</td>
<td>700 NE Multnomah Suite 1000</td>
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<td>Joe Shalkowski</td>
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<td>Patricia Trombly</td>
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<td>617-973-8038</td>
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<tr>
<td>Frank Brecaglia</td>
<td>101 Walnut St Watertown MA 02471</td>
<td>617-924-1770</td>
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</tbody>
</table>
TRB ADC10
Steering Subcommittee Report
Business Meeting Discussion Topics
July 9, 2006

A. ADC10 Committee Membership Report

B. Review and Adoption of Subcommittee Goals
   1. Liaison Subcommittee
   2. Publications Subcommittee

C. Schedule for Future Updates of Subcommittee Goals

D. Participation on ADC10 Subcommittees
TRB COMMITTEE ADC10
Liaison Subcommittee Goals, Objectives and Procedures
July XX, 2006

Goal:
Establish and maintain communication with Section C Committees, other related TRB Committees, and other transportation-related organizations for the purpose of information exchange related to relevant research, applied innovations in environmental analysis, and best practices in the development, operations, and maintenance of transportation projects.

Definitions:
Committee = Environmental Analysis in Transportation Committee ADC10
Chair = Chair of Committee ADC10
Subcommittee = Liaison Subcommittee of Committee ADC10
Subcommittee Chairperson = Chair of the Liaison Subcommittee

Objectives:

- Establish and maintain liaison with other TRB Committees. Promote joint activities, including mid-year Committee meetings, to the extent practicable.
- Establish and maintain lines of communication with state, federal, and international transportation and environmental agencies/organizations and with private sector groups with a similar focus.
- Maintain liaison with the AASHTO Standing Committee on Environment.
- Through the liaison activities identify emerging environmental issues, future areas of concern and opportunities for new research.
- Provide Committee members with information received through Subcommittee activities.
- Foster liaison across transportation modes.

General Procedures:

- Subcommittee chairperson is appointed by the Chair, ADC10.
- Subcommittee members are selected by the chairperson of the Subcommittee.
- Actively participate in mid-year and annual meetings of the Committee to the degree possible.
- Conduct business throughout the year by correspondence and telephone calls.
- Submit information of interest for publication in each Committee newsletter.
- Submit a written report of the subcommittee’s activities to the Chair at the annual and mid-year meetings.
DRAFT

TRB COMMITTEE ADC10
Publications Subcommittee Goals, Objectives and Procedures
July XX, 2006

Goal: To identify technically sound environmental research, applied innovations in environmental analysis, and best practices in the development, operations and maintenance of transportation projects in support of the scope and goals of ADC10. The intent is to work in conjunction with the ADC10 Research Subcommittee to solicit and review papers and possible poster-sessions for presentation at TRB meetings and publication in TRB journals.

Objectives and Procedures:

1. Encourage and coordinate the activities of all Committee members in identifying potential papers and/or poster-sessions for publication and presentation

   a. All ADC10 Committee members should make an effort to seek out planned or on-going research, applied innovations in environmental analysis, and best practices in the environmental transportation field and advise the chairperson of the Publications Subcommittee.

   b. Publications Subcommittee members should make a concentrated effort to seek out research being conducted within their agency or organization and from associated agencies or organizations and advise the chairperson of the Publications Subcommittee.

   c. ADC10 Committee members should utilize all available sources of information to identify papers for publication and/or presentation. These sources include:

      1) Listings and newsletter articles from the Research Topics Subcommittee.

      2) TRIS File Search of Subject Area Research in Progress (this can be obtained through TRB Staff Engineer).

      3) DOT/FHWA Federally Coordinated Program, Project Status Listing (check with the appropriate FCP Project Managers).


      5) Government Publications.

      6) National Technical Information Service.

      7) Case histories of applications, new methods, new designs etc.

      8) TRB poster sessions and displays.

      9) Recent court cases and litigation.

   10) Ongoing coordination with AASHTO’s Standing Committee on the Environment, FHWA and state DOT’s.
c. Reviewers must return the complete TRB electronic forms by the designated date. The Publication Subcommittee Chairperson will insure that the reviewers receive necessary materials, including instructions. If no response is received, additional reviewers will be contacted by the Publication Subcommittee Chairperson.

d. At the conclusion of the review period, the Subcommittee Chairperson makes recommendations to the Chair of Committee ADC10 regarding the disposition of each paper.

e. The Chair of Committee ADC10 makes a recommendation to the TRB Staff as to the disposition of each paper.

f. The Publications Subcommittee Chairperson will work with the Chair of Committee ADC10 to schedule and coordinate the TRB Annual Meeting presentations and/or poster sessions.

4. Inform ADC10 Committee Members of Subcommittee progress

At the conclusion of the annual search for papers, the Subcommittee Chairperson will forward a list of identified research topics to ADC10 Committee Members and Friends.

5. Report Publication Subcommittee Activities

a. At the mid-year business meeting the Publication Subcommittee will report in writing on the following topics:

   • Preceding annual program
   • Publications sponsored by the Committee
   • Status of subsequent annual meeting program
   • Potential research topics for the preceding TRB meeting.

b. At the annual business meeting the Publication Subcommittee activities will be reported orally.

   Adopted by the Committee
   July XX, 2006
   Seattle, Washington
ADC10
Subcommittee Goals and Objectives
Status Report
July 9, 2006

<table>
<thead>
<tr>
<th>Subcommittee</th>
<th>Chairperson</th>
<th>Date of Current Goals &amp; Objectives</th>
<th>Proposed Date for Draft Update</th>
<th>Proposed Date for Final Update</th>
<th>Proposed Adoption Date</th>
<th>Comments</th>
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<td>Steering</td>
<td>Kim Gambrill</td>
<td>July 2001</td>
<td>November 2006</td>
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<td>Liaison</td>
<td>Jim Bednar</td>
<td>July 2002</td>
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<td>Craig Casper</td>
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<td>Joe Shalkowski</td>
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<td>Chris Gesing</td>
<td>August 2004</td>
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<td>Environmental Stewardship</td>
<td>Andy Fekete</td>
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<td>Mid-Year Workshop</td>
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</table>
Mission Statement: This Committee is concerned with the protection and enhancement of the natural and human environment as an integral part of the planning, design, construction and operation of transportation systems and projects. Emphasis is placed on research needs identification; prioritization, completion and implementation of research projects; technology transfer (e.g., planning/geospatial technologies); process innovation; and information sharing in the following areas: environmental data collection and analysis; impacts assessment and documentation; regulatory compliance, mitigation and enhancement; systems planning, project development, operations and management; environmental stewardship and efficiency; performance measurement; and integration of these areas.

Committee Goals:

Goal #1: Provide a national forum for the continuing identification and prioritization of transportation-related environmental research needs and for the discussion, documentation, dissemination and implementation of research findings.

Strategies:

a) Assist the National Research Council in developing a prioritized listing of environmental research problem statements that address the emphasis areas identified for this Committee;

b) Encourage the active participation of Committee members and friends on NCHRP research panels for studies of interest to the Committee;

c) Recommend publication of significant environmental-related research papers in the Transportation Research Records;

d) Conduct at least one paper session at each annual meeting;

e) Task each Committee member with identifying emerging environmental issues, future areas of concern and opportunities for new research, and with sharing this information through the Committee’s communication network;

f) Monitor federal environmental laws, regulations and procedures and evaluate national trends to identify and promote research on significant transportation environmental issues;

g) Task each subcommittee with searching out state-of-the-art procedures, practices, processes and policies and sharing this information through the Committee’s communication network;

h) Publish at least two newsletters each year devoted to Committee activities and environmental research;
h) Copies of all minutes of the proceedings of the annual and mid-year business meetings shall be retained by the Steering Subcommittee Chair for use in preparation of the ADC10 Triennial Self Evaluation Report.

i) Business meetings, sessions at the TRB annual meeting and ones at the mid-year workshop are open to Committee members, friends of the Committee, other transportation environmental professionals and any interested persons.

**Goal #3: Maintain an active organization that supports the mission of TRB Section C and ADC10.** The Committee shall utilize one or more subcommittees to carry out its overall functions and responsibilities. Subcommittees will be created to address ongoing or emerging issues of importance to the Committee as a whole.

a) The Committee Chair shall be responsible for creating or dissolving subcommittees with input from the members present at the annual or mid-year business meeting;

b) The Committee Chair shall appoint a chairperson to oversee the activities of each subcommittee. The Chair will designate Subcommittee Chairs for each subcommittee from full members or Emeritus Members of the Committee. Subcommittee Chairs will identify Subcommittee members from members and friends of ADC10;

c) Each subcommittee shall be tasked with creating its own set of goals and objectives that support the overall goals of the Committee;

d) The Committee Chair shall ensure that the Committee members conduct Committee and key subcommittee business meetings at each annual and mid-year meeting;

e) Each subcommittee shall be tasked with reporting at the mid-year meeting on the accomplishments made through the preceding year and activities planned for the succeeding year.

**Goal #4: Maintain a geographically and organizationally diverse Committee membership of well-qualified, highly motivated individuals.** The Committee actively seeks diversity in its organization by striving to ensure the participation of diverse members drawn from a variety of federal, state and local government agencies, non-governmental organizations, academia, public interests, private enterprise (including the consultant sector), and the general public. Broad geographical distribution of members, including international participation, is an important element in achieving the desired diversity.
PUBLICATIONS SUBCOMMITTEE

TRB Paper Reviews Status
ADC10
July 9, 2006

• Call for Papers
  - Posted TRB Website
  - Sent to other Environmental Committees; Organizations; Newsletters
  - Distributed to electronic list of Committee Members, Friends, prior Authors and related contacts
  - 2 papers submitted to Committee to-date

• Need for Reviewers

• Key Dates
  - August 1st          Paper submission deadline
  - August 11th         Paper review by Chair for correct Committee submission
  - August 15th         Assign and forward papers to reviewers
  - September 19th      Reviews Due
  - October 1st         Preliminary Decision
  - October 19th        Notification to Authors of Paper Status
  - November 15th       Paper Revisions Due
  - January 25th        Committee Chair reviews revised papers
  - January 21-25th     TRB Meeting
  - February 1st        Re-submittals/re-reviews Due
  - April 1st           Final Publication Decision
Call for Papers
86th TRB Annual Meeting
January 21-25, 2007
Washington, DC

The Transportation Research Board (TRB) Committee on Environmental Analysis in Transportation, ADC10, is seeking papers on general topics relating to environmental analysis in transportation for presentation at the upcoming TRB Annual Meeting.

This Committee is concerned with issues relating to the environmental impacts of transportation projects and systems. Emphasis is placed upon planning, decision making environmental impact analysis, ecosystems and mitigation strategies, policies and processes. The Committee is calling for papers on environmental topics that would be of interest to individuals working in the federal, state, regional and local levels of environmental analysis in transportation. The Committee is engaged in ongoing research and discussions of such topics as:

Topics
- Green Highways: Materials, Practice3s and Case Studies
- Sustainability: Innovative Practices
- Design-Build and the Environmental Documentation Process
- Linking NEPA and the Transportation Planning Process
- Post-Hurricane Katrina and the Environmental Permitting Process for Transportation
- SAFETEA-LU and Change to Environmental Systems

Please indicate ADC10 on the Submission Review form to indicate that the paper is being submitted in response to this Call for Papers. Papers for the 2007 Annual Meeting may be submitted now, but no later than August 1, 2006. Papers cannot be accepted after August 1, 2006 because of the time required for peer review and program development. Paper submission information is posted on the TRB website http://www.trb.org/meeting. This site is updated periodically; authors should review all information on this site before submitting papers.

In addition, authors who have submitted papers in response to this call are requested to send the paper number and title by August 4 to jbach@louisberger.com.

If you have any questions related to this call for papers, please contact: Jim Bach at jbach@louisberger.com or 973-678-1960 extension 531.
ATTACHMENT E – TERI DATABASE EXAMPLE
Research Idea Details

ID    Title                                      Rating
79    Technical Tools to Support Land Use Compatibility Planning

Focus Area   Status   Cost           Timeframe
Noise        Unmet    $100,000-249,000  Unknown

Scope

Land adjacent to airports, highways, and rail transit lines needs to be developed so that noisesensitive uses prohibited and community development is planned, designed, and constructed in such a way that transport noise impacts are minimized. In the United States, the process used to support decision making regarding noise-sensitive land uses is referred to as land use compatibility planning. However, state and local governments often lack the technical capabilities necessary to successfully conduct noise compatible land use planning. Research is needed to develop capabilities that can be effectively applied to manage local growth and development with respect to transportation noise exposure. These tools should include educational materials, regulatory program guidelines, and the necessary technical and analytical capabilities required to properly conduct land use planning.

The objective of this research would be to develop technical tools and educational materials that could be used by state and local officials and environmental planners in performing noisecompatible land use planning. Examples of information to be incorporated as part of the envisioned toolkit would incl references to appropriate noise policies and American National Standards Institute (ANSI) standards regal allowable noise exposures for various land uses and presentation of current “best practices” used by communities around the country. Examples of analytical capabilities to be incorporated into the toolkit ink adequate noise-propagation models and Geographic Information System graphical representations of population distributions and existing land uses.

This proposed project would result in a prototype land use compatibility planning toolkit ready for an initi test case involving land use planning in several representative communities and for various categories of transportation noise sources.

Benefits

Suggested By
Transportation Research Board 2002 Environmental Research Needs Conference

Posting Date
April 28, 2006

Notes
6/8/2006
ENIRONMENTAL ANALYSIS IN TRANSPORTATION
ADC10 COMMITTEE BUSINESS MEETING
2006 SUMMER WORKSHOP

WEBSITE SUBCOMMITTEE REPORT

The following are the activities since the January 2006 Annual Meeting in Washington, DC:

1. Posted the September 2005 Committee Meeting Minutes approved at the January 2006 Annual Meeting

2. Attempted, without success, to obtain copies of the presentations made at the 2005 Summer Workshop and 85th Annual Meeting, for posting on the website

3. Update the Committee Member roster with the 2006-2009 membership contact information

4. Updated the Home Page with the announcement, registration and preliminary program information for the ADC10/ADC30 2006 Summer Workshop

5. Updated the Home Page with the 86th Annual Meeting Call for Paper announcement

Future Efforts
- Keep the website updated with current events/news
- Maintain the listserv
- Post the approved ADC10 business meeting minutes from the 2006 Annual Meeting
- Expand the website to include a link to the meetings and workshops. Beginning with the ADC10/ADC30 2006 Summer Workshop, collect all presentations during the workshop.
- Post the approved ADC10 Committee Mission Statement
- Post the approved Steering Subcommittee, Liaison Subcommittee, and the Publications Subcommittee Goals and Objectives
- Work with the Members and Friends to update and post the ADC10 Directory of State Transportation Agency and FHWA Environmental Officials
- Post links and information of interest to the Committee (e.g. AASHTO research) on the website

Please submit any suggestions for improving the website to cgesing@mbakercorp.com.

Prepared and Submitted by:

Christopher G. Gesing, P.E.
Chair, ADC10 Website Subcommittee
Michael Baker Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108
ATTACHMENT G – MEETING AND WORKSHOP AGENDA
Seattle

Transportation Research Board
Summer Workshop

Joint Meeting of the TRB Committee on
Environmental Analysis in Transportation
(ADC10) and the TRB Committee on Ecology and
Transportation (ADC30)
Seattle, WA, July 9-12, 2006
Crowne Plaza Hotel

Meeting and Workshop Agenda

Hosted by

Washington State
Department of Transportation
Sunday July 9

1:00 - 5:00 p.m.
Registration  Crowne Plaza Lobby

2:00-5:00 p.m.
ADC10 Business Meeting  Carlsbad Room
ADC30 Business Meeting  Yosemite Room

6:00 – 8:00 p.m.
Informal Reception  Patio

Monday July 10

7:00 a.m. – 5:00 p.m.
Registration  Crowne Plaza Lobby

7:00 a.m. – 8:30 a.m.
Continental Breakfast  Evergreen Ballroom

8:30 – 9:30 a.m.
Welcome  Evergreen Ballroom

Speakers:  

Martin Palmer, WSDOT NWR Environmental Office
Kevin Ward, FHWA Assistant Washington State Division Administrator

Conference Theme

The chairs share thoughts on the conference theme—“Plain Talk on the Environment and Transportation.” What it means to our business and what the future holds.

Speakers:  

Mark Kross, Missouri Department of Transportation, ADC10 Chair
Tom Linkous, Ohio Department of Natural Resources, ADC30 Chair

9:30 - 9:45 a.m.
Refreshment Break

9:45 – 11:00 a.m.
Washington DOT's Reader-Friendly Results  Evergreen Ballroom
Moderator: Carol Lee Roalkvam

Presentation and discussion about the evolution of WSDOT’s reader-friendly environmental documents and how it has helped to revitalize community discussions about public investments in transportation and environmental resources.

Speakers:  

Kimberly Farley, WSDOT
Charlie Raines, Director of the I-90 Wildlife Bridges Coalition
Stephanie Miller, Parametrix
11:30 a.m. – 1:00 p.m.
Lunch on Your Own

1:00 – 2:30 p.m.
National Status Report
Moderator: Martin Palmer

Evergreen Ballroom
A look at the hot national issues and a glimpse at the processes that take an idea from thought to action.

Speakers:
Carol Lee Roalkvam, SCOE Steering Group Chair
AASHTO SCOE
Rhonda Brooks, WSDOT Environmental Research Manager
National Research Initiatives
Shari Schafflein, Team Lead for Policy and Program Development,
Office of Project Development and Project Review, FHWA
FHWA Update

2:30 – 3:00 p.m.
Refreshment Break

3:00 – 5:00 p.m.
Linking Planning and NEPA
Evergreen Ballroom

This panel will focus on Linking Planning and NEPA from a variety of perspectives and will highlight on-the-ground approaches and tools

Moderator: Kris Hoellen

Speakers:
Jim Bartel, Fish and Wildlife
Riverside Habitat Conservation Plan
Aaron B. Willis, Transportation Planner and Co-Manager for STEP UP, Division of Transportation Development, Colorado DOT
Colorado’s STEP UP Program-Strategic Transportation Environmental and Planning Process for Urbanizing Places
Joe Shalkowski, NEPA Group Practice Leader, PBS&J
Transportation
Guidance for Assessing the Effects of Alternative Project Financing (Tolling) During the Planning and NEPA Project Development Processes
Kris Hoellen, Director, Conservation Leadership Network The Conservation Fund
Green Infrastructure as a Tool to Link Planning and NEPA
Tuesday July 11

7:00 a.m. – 5:00 p.m.
Registration
Crowne Plaza Lobby

7:00 a.m. – 8:00 a.m.
Continental Breakfast
Evergreen Ballroom

8:00 – 10:00 a.m.
ADC10 Breakout Session
Moderator: Jeff Hellman
Evergreen Ballroom

Speakers:
Milton Hill, Oregon Department of Transportation
Oregon Highways Sensitive Area Mapping Project
Rick Record, Principal and Project Manager, Balke American, Inc.
Ohio DOT Multimodal Tiered EIS on Hamilton Eastern Corridor
Mark Hellenbeck, Director, TRAC Program
University of Washington TRAC Program: DOTs and Universities
Partnering on Transportation Research
Paul Tufts, Environmental Program Specialist, FHWA Resource Center
New Section 4(f) Issues (De Minimus Impacts and Net Benefit Programmatic)

8:00 – 10:00 a.m.
ADC30 Breakout Session
Moderator: Mary Gray
Carlsbad Room

Speakers:
Jennifer Moyer, US Army Corps of Engineers
Eco-Logical FHWA Effort
Paul Wagner, Biology Program Branch Manager, WSDOT
Interstate 90 Wildlife Crossings
Jim Laughlin, Asst. Air/Noise/Energy Programs Manager, WSDOT
Update on Barotrauma Issues for Highway Construction
Mary Gray, Environmental Protection Specialist, FHWA
Web-Based Biological Assessments

10:00 – 10:30 a.m.
Refreshment Break

10:30 – Noon
ADC10/ADC30 Combined Session
Moderator: Jill Gurak
Evergreen Ballroom

Speakers:
Gail Terzi, Environmental Analyst, Regulatory Branch, US Army Corps of Engineers
Wetland Banking-New Rules
Jan Cassin, Parametrix, Inc.
Innovative Approaches to Wetland Mitigation and Habitat Conservation in the Northwest
Dick Gersib, Watershed Management Program Manager, WSDOT
Watershed Approach to Mitigation
Joe Crossett, Senior Manager, TransTech Management
What do Federal Environmental Mitigation Requirements Cost State DOTs? (A Review of Project Case Studies)
Noon – 1:30 p.m.
Lunch on your own

1:30 – 1:45 p.m.
Self-Guided Walking Tour to Smith Tower

1:45 – 3:15 p.m.
Transportation Tour
Chinese Room, Smith Tower

A retrospective of the development of Seattle’s downtown area since the late 19th Century and a look forward on the transportation front from the time of the damaging Nisqually earthquake of 2001.

Speakers: Chuck Russell-Coons, Director of Hospitality
John White, Engineering Manager, Alaska Way Viaduct

3:15 – 4:00 p.m.
Ride or walk Seattle’s Waterfront to Pier 55. Begin boarding the “Spirit of Seattle” to Kiana at 4:00 p.m.

4:00 – 4:30 p.m.
Board the Boat and Ready Way to Kiana Lodge. Everyone must board prior to 4:30 p.m.—the boat will not wait!

4:30 – 6:00 p.m.
Tour Boat to Kiana Lodge

6:00 – 8:00 p.m.
Salmon Dinner at Kiana Lodge

8:00 – 8:30 p.m.
Board the Boat and Ready Way to Seattle Pier 55. Everyone must board prior to 8:30 p.m.—the boat will not wait!

8:30 – 10:00 p.m.
Tour Boat back to downtown Seattle

10:00 – 10:30 p.m.
Ride or leisurely summer walk back to the Crowne Plaza Hotel
Wednesday July 12

General Sessions

7:00 a.m. – 5:00 p.m.
Registration
Crowne Plaza Lobby

7:00 a.m. – 8:00 a.m.
Continental Breakfast
Evergreen Ballroom

8:00 a.m. – 10:00 a.m.
Panel on Changes Being Proposed for the
Endangered Species Act
Evergreen Ballroom

Panel discussion about the changes various constituencies are offering to the Endangered Species Act.

Moderator: Tom Linkous

Speakers:
Gene Duverney, President, Cascade Land Conservancy
Janice Brown, FHWA Administrator, Montana
Craig Tuss, Field Supervisor, US Fish and Wildlife Service, Roseburg Field Office
Charlie Raines, Sierra Club Leader and Director of the I-90 Wildlife Bridges Coalition

10:00 – 10:30 a.m.
Refreshment Break

10:30 – 11:30 a.m.
Moderator: Chris Gesing
Evergreen Ballroom

Speakers:
Michele Deshotels, Louisiana Department of Transportation and Development, Environmental Impact Manager
After the Storm: Planning Louisiana’s Future
After the storms of 2005, the Louisiana state legislature established the Coastal Protection and Restoration Authority (CPRA) as the single state agency with the power to implement comprehensive coastal protection. The legislature directed state officials to coordinate development of the comprehensive coastal protection master plan. The master plan, due out later this year, is a collaborative effort that will achieve long-term protection for Louisiana’s coastline.
John Lenth, Senior Environmental Scientist, Hererra
Innovative Stormwater Mitigation

11:30 – Noon
Workshop Wrap up
Evergreen Ballroom

Speakers:
Mark Kross, Missouri Department of Transportation, ADC10 Chair
Tom Linkous, Ohio Department of Natural Resources, ADC30 Chair
The AASHTO Center for Environmental Excellence has many important resources and tools for transportation professionals.

**Center Services**

The services of the Center can be grouped into three broad categories:

- First, information exchange: primarily through the Center website.
- The second is training: through training materials, webcasts, workshops, conferences and problem-solving meetings.
- The third is providing environmental Technical Assistance to the states.

**Website:**

- [www.environment.transportation.org](http://www.environment.transportation.org)

- The Center website is designed to serve as a one-stop source of environmental information for transportation professionals.

- The website contains information about various specific environmental topics. Each topic contains an overview of the topic, recent developments, relevant documents, State DOT success stories and related links. The site also contains information on FHWA and resource agencies, environmental research, meetings and events and all of the Center’s original work products.

- There are several recent improvements to the site. First, we contacted all of the state DOTs to collect additional success stories for each of the environmental topics on the website and have now added over 50 additional success stories to the website - with more to come by the end of the summer. There are new success stories in each environmental topic. We also added new sections on invasive species, environmental justice and air toxics to the site. We will soon be working to develop a planning and environment section for the site. Finally, we added a weekly e-mail notifications of updates to the site - which you can sign up for online.

**Training:**

- **Practitioners Handbook:**
  - The Center is developing the Practitioner’s Handbooks to assist environmental practitioners by creating a series of documents that provide step-by-step advice on specific environmental topics.
  - Each document begins with a series of questions for the project management team to consider on a particular topic. For each of the questions, we list factors to consider in making those decisions and point to additional sources where more information is available.
  - We have three Handbooks available:
    - *Responding to Comments on a NEPA Document,*
    - *Preparing and Administrative Record, and*
    - *Evaluating Tolling Alternatives in NEPA.*
We also have three Handbooks under development:

- *Section 106 of the National Historic Preservation Act Consultation,*
- *Public Involvement in the NEPA Process and*  
- *Tracking Compliance with Environmental Commitments.*  

We anticipate publishing approximately one handbook each month and would greatly appreciate your input on additional topics for the Handbooks.

**Improving the Quality of Environmental Documents:**

- AASHTO, ACEC and FHWA undertook a cooperative effort to improve the quality of environmental documents.
- Work groups were established around each of the three identified priority areas of improvement: legal sufficiency, the quality and clarity of environmental documents and education and training. The legal sufficiency and quality and clarity of environmental documents work groups developed a joint report that is on the Center web site. The education and training work will be finalized in the near future and will be posted on the Center web site.

**Problem Solving Meetings:**

- The Center is having problem solving meetings with resource agencies State DOTs and others on the Endangered Species Act Section 7 Consultation Process and the National Historic Preservation Act Section 106 Process.
- The purpose of these meetings is to discuss the problems states are confronting with these processes and potential administrative solutions to those problems.

**Technical Assistance:**

- The Center Technical Assistance Program offers a team of experienced experts ready to assist state DOTs on a variety of environmental matters on either a project or system-wide level. Each expert’s biography is listed on the Center’s webpage. The benefit of working with the Center is that AASHTO has sole-source agreements with all of the states which enables a faster procurement process. The Center is in the process of recruiting additional experts in a variety of environmental topics so that we will be able to comprehensively cover any environmental issue the states may have.

**EMS:** The Center is using its Technical experts to implement its Environmental Management System Technical Assistance Program for state DOTs. The pilot phase was recently completed in which three state DOTs were provided on-site technical assistance to support the planning phase of EMS development and implementation. The knowledge, experience, and information gained in the pilot phase is being used to develop the technical assistance program that will be offered to all of the states.
Major Initiatives:
The Center is involved in several initiatives that span across more that one of the categories of services the Center provides. The first is CSS.

- **Conference:** The Center is holding a National AASHTO/FHWA CSS Peer Exchange on September 6-8 in Baltimore, MD.
  - The goals of the conference are to:
    - revisit and reaffirm the existing CSS definition and principles;
    - share State DOT successes in CSS implementation;
    - identify the issues and challenges to CSS implementation; and
    - establish a recommitment to moving forward and advancing CSS implementation.
  - Based on the snapshot of State DOT progress with CSS implementation gathered at the conference, an AASHTO action plan will be developed to further advance CSS implementation. Each state is encouraged to send at least four representatives from various disciplines, including planning, environment, design, maintenance and construction. We intentionally structured the meeting with very few plenary sessions to provide time for state DOTS to share and learn from one another in peer to peer sessions.

- **Competitions:** The Center also held a 2005 Best Practices in Context Sensitive Solutions Competition. A report profiling the entries is posted on the Center website and available at the Center display in the lobby. In addition, the Center announced its 2006 Best Practices in CSS competition. Applications were due today, May 5th, we received 62 applications from 31 states. The winners will be announced at the AASHTO annual meeting on October.

Research
The Center created an online Environmental Research Database that is hosted on the Center website.

- We reviewed a wide variety of materials to establish a comprehensive list of environmental research needs. The database contains the research needs and links to completed reports and the status of ongoing research. The database is searchable by environmental topic, key word, timeframe or researcher.

- The research needs list will soon be prioritized through input from the Standing Committee on Environment.

- This database will provide a strategic foundation for environmental research for AASHTO, TRB, FHWA, state DOTs and other transportation professionals.

Compendium
Environmental Stewardship Practices in Construction and Maintenance Compendium:
- This is a compilation of approximately 7,000 State DOT environmental practices and contains practices from every state. The Compendium is posted on the Center web site.
• NCHRP is currently funding an effort to vet the compilation of practices to produce a library of best practices -- so please look for this on the Center website next year.
• The Center is also providing regular updates to this document.

Coming Attractions

Programmatic Agreements Library: The Center is undertaking an effort to produce a web-based library of programmatic agreements. The types of agreements to be included in the library, include:
• Categorical Exclusions
• Section 106
• Endangered Species
• Section 4(f)
This will be a great resource for agencies trying to establish their own agreements. We expect to have the library posted on the web site by the end of the summer.
ATTACHMENT I – CTE IN MOTION
Located within the Institute for Transportation Research and Education at North Carolina State University, CTE is a national university transportation center funded in part by the U.S. Department of Transportation. CTE's mission is to help transportation and environmental agencies and stakeholder groups collaborate on the design and implementation of solutions that improve transportation systems while preserving the integrity of the environment.

CTE works in close cooperation with state transportation departments and environmental resource agencies; universities and non-governmental organizations; the planning and environmental committees of the Transportation Research Board and the American Association of State Highway and Transportation Officials; and the Federal Highway Administration, Federal Transit Administration, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and USDA Forest Service. Current activities include:

RESEARCH SOLUTIONS
- Environmental Implications of Domestic Goods Movement
- Guidebook for Greenhouse Gas Reductions in Freight Transportation
- Context Sensitive Solutions (CSS) in Planning
- Impacts of Global Climate Change on Hydraulics, Hydrology, and Transportation
- Exploratory research and literature survey on linkages between social well-being and transportation

RECRUITING THE NEXT GENERATION OF PROFESSIONALS
- Context Sensitive Solutions (CSS) Summer Academy for Undergraduate Students
- CSS Graduate Civil Engineering Course
- Outstanding Graduate Student of the Year Program: 2006 Student of the Year – Liza Runey (NC)

WORKFORCE DEVELOPMENT
- Context Sensitive Solutions training (~1,200 professionals trained to date) (3 days)
- CSS training in Stakeholder Involvement in Construction, Operations, and Maintenance (1 day)
- CSS training in Stakeholder Involvement in Pre-Construction (3 days)
- FHWA Community Impact Assessment (CIA) training (AK, IL, MD, UT, NC, PA, and WA) (2-1/2 days)

CONFERENCES & WORKSHOPS
- 2006 TRB Meeting Presentations: "Defining Context in Self-Discovery of Quality of Life Attributes Linked to Transportation Effects," "Integrating Planning and NEPA: Linking Transportation and Land Use Planning to Indirect and Cumulative Impacts," and "CIA Practice: Where We've Been, Where We Are, Where We're Going"
- AASHTO Context Sensitive Solutions Conference, September 6-8, 2006 in Baltimore, MD
- Field Course on Wildlife Crossing Structures (Banff, Alberta, Canada; and Payson, AZ, USA)
- Deer-Vehicle Crash Reductions: Setting a Strategic Agenda (Madison, WI)
- Workshops to integrate planning/project development and environmental management processes (NC, LA, and TN)

PUBLICATIONS
- Results of the 2005 FHWA Domestic Scan Tour of Successful Wetland Mitigation Programs
- Two CSS papers accepted for publication in Transportation Research Record No. 1904, Highway Facility Design

UPCOMING BROADCASTS
- CTE National Teleconference Series – 2006 topics in development: planning and environmental provisions of SAFETEA-LU, bicycle/pedestrian/school transportation issues, and results of the FHWA scan of successful wetland mitigation programs
- Beginning March 28, CTE is co-producing the Izaak Walton League of America 2006 Web broadcast series on alternative stormwater management practices for transportation agencies and private landowners
- CTE webstreams other agency broadcasts (e.g., EPA's Air Toxics Now and Air Futures programs, and NCA tool OPENnet)
Overview

The Center for Transportation and the Environment (CTE) at North Carolina State University, in cooperation with the Federal Transit Administration (FTA), is pleased to present the national satellite and Web broadcast: Overview of the Proposed Rulemaking on Planning.

This two-hour live broadcast is part of FTA’s public outreach efforts to discuss the Notice of Proposed Rulemaking (NPRM) on the metropolitan and statewide planning requirements outlined in the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The 90-day public comment period for the NPRM opened on June 9th. In addition to the broadcast, six outreach workshops to discuss the NPRM are planned in FTA’s region cities (see www.fta.dot.gov for more information). The workshops and July 13 broadcast will provide valuable information for FTA and FHWA division and regional staff, state DOT and MPO staff, local planners, and other transportation decision-makers and stakeholders. Participants are encouraged to submit their comments to the Federal Docket for inclusion in the public record.

This program will include an interactive question and answer session between the panel and national audience. Questions or comments may also be submitted in advance for the panel’s consideration at cte_email@ncsu.edu. After the broadcast, discussion of key topics may continue through CTE’s “After The Program” Web-based discussion forum.

Overview of the Proposed Rulemaking on Planning

July 13, 2006
1:00 - 3:00 pm, EDT

Presented By
Center for Transportation and the Environment
NC State University
USDOT
University Transportation Center

CTE is a national university transportation center funded in part by the U.S. Department of Transportation. For more information: http://cte.ncsu.edu
Who Should Attend

This teleconference is designed primarily for FTA and FHWA division and regional staff, state transportation department and metropolitan planning organization staff, local planners, and other transportation decision-makers and stakeholders. All interested parties are invited to attend.

How to Participate

You can view the live broadcast by going to one of the satellite downlink sites or by watching it on the Web (RealPlayer or Windows Media Player). You can also interact with the panel by phone, fax, or email. A phone bridge for audio transmission only is also available by dialing (919) 733-2441 on the day of broadcast.

By Satellite. Participating satellite downlinks are found at http://cte.ncsu.edu/cte/TechTransfer/Teleconferences/downlink_info.asp. If one of these sites is near you, please contact the site coordinator to confirm its availability and to reserve a space for viewing this broadcast.

By the Web. To participate via the Web, please go to http://cte.ncsu.edu/cte/TechTransfer/Teleconferences/web_register.asp. This page provides access to the webcast registration and login, live webstream, tech support, and other resources.

Satellite Downlink Registration

This program will be received by EPA's Air Pollution Distance Learning Network and is also available via satellite on C Band (see URL above for list of participating downlinks). If you wish to open your facility for this broadcast, please complete the enclosed form and mail/fax to: Katie McDermott, CTE, NC State University, Box 8601, Raleigh, NC 27695-8601. Fax: (919) 515-8898.

Program Materials

The program materials related to this broadcast are available in PDF format from CTE's Web site at least one week prior to the broadcast date.

CTE National Broadcast Series

Overview of the Proposed Rulemaking on Planning
July 13, 2006 (1:00 - 3:00 pm, EDT)

Meet the Panel

- Victor Austin (Moderator), Community Planner, Federal Transit Administration Region V Office (Chicago, IL)
- Charles (Charlie) R. Goodman, Director, Systems Planning, FTA Headquarters (Washington, DC)
- Larry Anderson, Planning Oversight and Stewardship Team Leader, Federal Highway Administration Headquarters (Washington, DC)

For More Information
http://cte.ncsu.edu

Satellite Downlink Registration Form

Proposed Rulemaking on Planning
July 13, 2006 (1:00 - 3:00 pm, EDT)

[NOTE: "Permanent" CTE downlinks are already pre-registered and need not submit this form, unless to indicate changed information.]

Where is the location of the downlink site?
Agency: ________________________________
Street Address: __________________________
City: __________________ State: __________ Zip: ____________
Phone: __________________ Fax: __________
Name of downlink technician: _____________

This broadcast will be transmitted on C Band. Check here to confirm your facility accepts this signal. (The satellite coordinates will be sent to you upon receipt of this form.)

What is the seating capacity of this site? (check one)
0-10 11-20 21-50 51-100 100+

If this site is part of a regional/statewide network, how many total sites comprise the network? ______

Will ALL of these sites be participating in this program? Yes___ No___ (If no, how many______)

The site(s) is equipped with (check all that apply):
Phone Fax Internet Access

Who will act as the downlink site coordinator? 
Name: __________________________
Title: __________________________
Agency: __________________________
Street Address: ______________________
City: __________________ State: __________ Zip: __________
Phone: __________________ Fax: __________
Email: __________________________

PLEASE NOTE
If you would like to receive all of CTE's broadcasts (4-6/year) at your facility, please check here: _______ CTE will send you advance notice of its programming schedule.

* Downlink site coordinators typically promote the broadcast locally, register people for the site, duplicate the CTE program handout for distribution to registered participants, and assist people as needed during the broadcast. For more information: Katie McDermott, (919) 515-8034; kpm@ncsu.edu.
ATTACHMENT J – RESULTS OF NCHRP PROJECT 25-22(02)
Research Results Digest 304

TECHNOLOGIES TO IMPROVE CONSIDERATION OF ENVIRONMENTAL CONCERNS IN TRANSPORTATION DECISIONS

This digest presents the results of NCHRP Project 25-22(02), “Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions.” The study was conducted by CH2M Hill; Marcy Schwartz was the Principal Investigator.

SUMMARY

This digest describes eight technologies that can be used by transportation agencies to improve the consideration of environmental concerns in transportation decisions (T). These technologies have been applied by agencies, using tools developed by the agencies themselves or others, to support their business processes. The digest presents the results of work conducted in the second, final phase of NCHRP Project 25-22, “Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions.” The objective of that project was to identify, critique, and showcase current and emerging technologies that support the integration of environmental considerations into transportation planning, design, construction, maintenance, and operations. The underlying purpose of the research is to accelerate innovation by encouraging application of such technologies by transportation agencies. By effectively applying these technologies, departments of transportation (DOTs) can reduce project development time, reduce costs, and enhance environmental quality, by improving the ability to implement transportation decisions, reducing the number of projects in litigation, reducing paperwork, increasing public understanding of the process, and increasing public trust.

In NCHRP Project 25-22(02), the research team polled DOTs and other agencies to develop an initial list of 70 applications illustrating the use of technologies identified as promising in the project’s first phase. These 70 applications met three criteria: they were (1) in use by at least one state DOT or other public agency in the United States, (2) focused on reducing environmental impacts or improving visibility of environmental concerns, and (3) related to one or more business processes of transportation agencies. The research team prepared brief descriptions of candidate applications, categorizing the applications by the business process where the application occurred; some applications were included in multiple categories. The research team then used three additional criteria to select the 20 more promising applications: (1) broad applicability of the application to the work of other DOTs or public agencies within the United States, (2) ease of implementation, considering particularly schedule and budget resources, and (3) innovation inherent in the application. These
20 technology applications were documented in greater detail.

Using this documentation and the help of expert panels, the research team assessed these tools and applications for their broad applicability, adaptability to other agencies’ use, opportunities for and barriers to implementation, and major cost considerations. The eight technologies highlighted in this digest were chosen based on these assessments. Additional information and demonstrations of the use of specific software and equipment used in applications of these eight technologies are available in videos produced by the research team; these videos can be accessed from the project description web page [http://www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+25-22(02)].

The digest is organized into four sections and two appendixes. The introduction describes the scope and limitations of the research project. The second section gives brief descriptions of the technologies and their applications, as well as factors leading to their developments. The third section discusses issues involved with implementing these technologies in other applications. The last section summarizes the research team’s recommendations on how to achieve broader adoption of these technologies. Appendix A lists resources who can be contacted for more information about the highlighted applications. Appendix B contains the profiles of the 20 more promising applications.

INTRODUCTION

Scope of the Research

NCHRP Project 25-22, “Technologies to Improve Consideration of Environmental Concerns in Transportation Decisions,” was begun in March 2000. The project’s objective was to identify, critique, and showcase current and emerging technologies that support the integration of environmental considerations into transportation planning, design, construction, maintenance, and operations. The underlying purpose of the research was to accelerate innovation by encouraging application of such technologies by transportation agencies. By effectively applying these technologies, DOTs can reduce project development time, reduce costs, and enhance environmental quality by improving the ability to implement transportation decisions, reducing the number of projects in litigation, reducing paperwork, increasing public understanding of the process, and increasing public trust.

NCHRP Project 25-22(02), the subject of this digest, is a continuation of the earlier work, focused on investigating emerging technologies in geospatial databases, remote sensing applications, transportation impact modeling, decision science tools, and visualization and simulation tools. This second phase of work was undertaken to showcase innovative applications of new technologies by state DOTs and other public agencies. The applications considered in this project represent all transportation agency business processes. The research team explored the drivers behind agency decisions to implement new technologies, opportunities for and barriers to implementation, major cost considerations, and the lessons that can aid other agencies interested in similar applications.

The research team used a five-step process to select and document the technologies described in this digest:

1. **Compile an initial list of candidate technologies and applications.** The research team used information gathered in the project’s first phase and additional communication with DOTs. To qualify, candidate applications had to be (a) in use by at least one state DOT or other public agency in the United States, (b) focused on reducing environmental impacts or improving visibility of environmental concerns, and (c) related to one or more business processes of transportation agencies. A total of 70 candidates qualified. The research team prepared a brief description of each candidate application, categorizing the applications by the business process where the application occurred; some applications were included in multiple categories.

2. **Conduct first-level screening.** The research team further assessed the 70 candidates to identify those that exhibited (a) broad applicability to the work of other DOTs or public agencies within the United States; (b) ease of implementation, considering particularly schedule and budget resources; and (c) innovation inherent in the application. This screening identified the 20 more promising applications for further consideration. The research team documented these 20 technology applications in greater detail.
3. Develop application profiles. The research team prepared more detailed descriptions and assessments of the 20 screened applications by considering eight sets of questions:
   • What is the primary function of the example application?
   • What are the performance capabilities of the example application; how is it applied?
   • Who are the main users of the example application; what are the interactions among groups of users?
   • Was the example application developed in-house or outsourced?
   • What are the main hardware and software requirements for the example application?
   • What data requirements are necessary for the example application to operate?
   • How are data managed, including data entry, maintenance, and archiving?
   • What were the necessary interactions among the main users of the technology and with other agencies or organizations in the example application?
   Appendix B presents the resulting profiles of the applications in a standard format.
4. Conduct second-level screening. The applications profiles were reviewed individually and compared to others in the group. The research team assessed the candidates in terms of five factors to select a set of technology applications to be highlighted:
   • Availability of a successful example that could be showcased
   • Applicability to more than one transportation agency business process
   • Usefulness to many DOTs
   • Portability and adaptability to use by other agencies
   • Representation of all transportation agency business processes within the selected set
   The research team initially recommended 11 of the 20 candidates to the NCHRP project panel. The panel and research team subsequently selected the eight technologies highlighted in the next section.
5. Evaluate selected technology applications. To consider matters related to the adoption of the selected technologies, the research team formed three practitioner focus groups: (a) planning and project development, (b) environmental analysis, and (c) construction and maintenance. Focus group members were recruited from DOTs or other transportation agencies. Groups met via conference call twice during the fall of 2004; each group considered two or three technology applications. During the first call, participants heard a presentation on the selected applications. Between the first and second calls, participants completed an online questionnaire requesting opinions on the appropriateness of the application for their agencies and factors that would affect implementation. During the second call, participants addressed the following questions:
   • How did you like the application?
   • Could it be implemented in your agency?
   • What information should be included in the final project report to present the technology to potential users?
   Observations from the focus group discussions were used to supplement descriptions of the selected technology applications.

Limitations of the Research

The research project was not designed to make a comprehensive survey of all applications of new technologies under development and in use to improve consideration of environmental concerns in transportation decisions. In several instances, the research team and NCHRP project panel were aware that other developers in public agencies or private enterprise had tools or applications similar to those selected to be highlighted in this project. Alternative tools—e.g., hardware, software, procedures, practices—may be available for any of the particular applications reviewed in this project and used to describe the eight selected technologies. DOTs, municipal planning organizations (MPOs), and other potential users of these technologies may find it advantageous to investigate alternatives before committing themselves to adopting specific tools mentioned in this digest or other project documentation. The opinions and conclusions expressed or implied here regarding selection of specific technologies, applications, and tools are those of the research team and not necessarily of the NCHRP panel members, the NCHRP as a whole, or TRB.
THE EIGHT SELECTED TECHNOLOGIES

The limitations of this research notwithstanding, the eight technologies highlighted in this digest can improve consideration of environmental concerns in transportation decisions. These eight technologies are summarized in Table 1.

Each of the technologies was observed in a specific application. That is, there was a particular agency that had a problem to solve and particular developers who used particular tools to solve that problem. Table 2 identifies the agencies that applied each technology and the business process(es) in which the application occurred.

This section presents further information on the eight technologies and their applications. Following a brief description of each technology and application is a discussion of lessons learned in that application regarding cost and implementation of the technology.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Regional Scenario Analysis</td>
<td>Uses long-range forecasting to create and evaluate alternative growth scenarios. Tools using this technology allow public participants to explore quickly how their value choices may influence future growth and livability in a region, thereby helping to create a feeling of ownership in consequent decisions.</td>
</tr>
<tr>
<td>Integrated Aerial Data Collection</td>
<td>Gathers and analyzes data from multiple sources in a single aerial flight to produce an information-rich 3-D model of a study area. The multilayered information may be combined with existing GIS layers to create a robust base of environmental analyses.</td>
</tr>
<tr>
<td>Road and Rail Alignment Optimization</td>
<td>Uses advanced computational algorithms and computing power to quickly generate and screen very large numbers of alignment alternatives, computing cut-and-fill estimates to find optimal alternatives. The technology represents a major advance in the comprehensiveness and efficiency of route-location studies.</td>
</tr>
<tr>
<td>Web-Based Environmental Screening</td>
<td>Database software supports web-based presentation of project information and management of the environmental analysis and review process. Tools provide links to base documents and prompt reviewers to provide commentary, thereby encouraging earlier engagement of stakeholders and identification of issues to be resolved in project development decision making.</td>
</tr>
<tr>
<td>NEPA Document Preparation and Review Expert System</td>
<td>&quot;Smart&quot; form analysis and data management software facilitates web-based preparation of documentation for categorical exclusion and environmental assessment decisions meeting FHWA requirements. Software prompts reviewers to provide needed information, guides the input of their responses, and creates a central repository for documentation, significantly reducing processing time and facilitating data sharing among agencies.</td>
</tr>
<tr>
<td>Restricted Activity Zone Mapping</td>
<td>Software guides highway maintenance staff on types of maintenance activities that are restricted on specific road segments. Tools draw on data from several sources to produce color-coded route linear maps showing areas where environmental regulations impose constraints on maintenance actions.</td>
</tr>
<tr>
<td>Electronic Asset Management System</td>
<td>Database software establishes repository of information on transportation infrastructure assets and facilitates access to that information for management decision making. Tools integrate information from multiple sources to characterize individual assets and asset groups and their condition, facilitate updating with field inspection data, and support preparation of maintenance work orders.</td>
</tr>
<tr>
<td>Life Cycle E-Engineering</td>
<td>Applies GPS information and data management software to integrate project data by development phase. Tools capture data from site survey, design, and construction, maintaining data accuracy and reducing duplication of data collection efforts over the course of a project's development.</td>
</tr>
</tbody>
</table>
TABLE 2 Applications examined in the research

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Application Host Agencies</th>
<th>Agency Business Process to Which Technology Was Applied*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Regional Scenario Analysis</td>
<td>Idaho Transportation Department</td>
<td>Planning/Project Development</td>
</tr>
<tr>
<td>Integrated Aerial Data Collection</td>
<td>Alabama, Iowa, North Carolina, Mississippi, Virginia, and Washington DOT's</td>
<td>Planning/Project Development</td>
</tr>
<tr>
<td>Road and Rail Alignment Optimization</td>
<td>Transportation Corridor Agencies (Orange County, CA)</td>
<td>Planning/Project Development</td>
</tr>
<tr>
<td>Web-Based Environmental Screening</td>
<td>Florida DOT</td>
<td>Planning/Project Development</td>
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<td>NEPA Document Preparation and Review Expert System</td>
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<td>Restricted Activity Zone Mapping</td>
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<td>Life Cycle E-Engineering</td>
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*This table lists only those processes for which the technologies were most relevant; however, several technologies can be useful in all business processes.

Interactive Regional Scenario Analysis

Interactive regional scenario analysis uses long-range forecasting to create and evaluate alternative growth scenarios. Tools using this technology allow public participants to explore quickly how their value choices may influence future growth and livability in a region, thereby helping to create a feeling of ownership in consequent decisions.

In 2000, Idaho Transportation Partners (ITP), a partnership of the Idaho Transportation Department and other stakeholder groups, wanted to determine the long-term needs of Idaho’s transportation system. The agency wanted to assure the public that the state’s transportation system would be able to meet demands and to share information with the public. ITP’s strategy included holding an internal symposium to determine what approach to take; holding regional and statewide workshops and distributing surveys to get the public’s input; using scenario planning, mapping, and town hall polling to help the public see the different possibilities for Idaho’s future; and presenting results of the public outreach effort in various plans. ITP used interactive regional scenario analysis to support a town-hall polling style of scenario planning in which participants are able to vote for different options and see the results immediately in a computer-generated image. The images helped participants understand the likely consequences of various decisions and move toward consensus.

The Idaho agency applied interactive regional scenario analysis using MetroQuest, a tool for long-range regional growth forecasting developed as a joint effort between the University of British Columbia’s Sustainable Development Research Institute and Envision Sustainability Tools, a private company based in Vancouver, British Columbia. This tool comprises a number of interconnected submodels for demographic forecasting, urban growth and land use, transportation, economic activity, infrastructure costs, energy and water use, solid waste, and air quality. The submodels all contain data either collected during previous projects (e.g., household travel surveys, economic surveys, land information surveys, or environmental quality models) or compiled as part of the project at hand.

Once submodels have been created and calibrated for a given region, the tool’s interface allows nontechnical users to make value choices and evaluate and compare the resulting scenarios. The scenarios graphically illustrate the consequences of different
policy options. The interface for choosing values and creating scenarios requires only minimal customization to be applied to different areas and can be customized to show the scenario choices, results, and images that best reflect local issues. The tool can be used over the Internet as well as in public meetings; because computation for alternative scenarios is not instantaneous, users might typically process potential scenarios before public meetings so that participants are not kept waiting.

Data required for MetroQuest and other interactive regional scenario analysis tools are entered during model development, typically using spreadsheets and geographic information system (GIS) software. The data used to run the models include population and historical population trends; employment and historical employment trends; transportation network characteristics; existing zoning and tax lots; household size, income, and other socioeconomic variables; and tax structure.

Software and hardware requirements for MetroQuest are a PC with at least Pentium IV, 1 GHz processor, 256 MB RAM, approximately 10 GB of free hard drive space, a DVD-ROM drive, Microsoft Windows 2000 (with service pack 4) or newer operating system, and a monitor capable of a display resolution of 1024 × 768 pixels and a color depth of 24 bits. MetroQuest can be accessed over the Internet on any computer equipped with Internet Explorer Version 5.0 or higher.

Interactive regional scenario analysis provides quantifiable outputs specific to the study region. However, these outputs are based on assumptions, embedded in the specific tools used, about how policy changes affect travel behavior and energy use. The specific tools must be calibrated to reflect observed regional behavior. For example, the tool used by Idaho was originally developed in Canada and had to be adjusted by the Idaho agency to reflect behaviors more typical in the United States.

Integrated Aerial Data Collection

Integrated aerial data collection gathers and analyzes data from multiple sources in a single aerial flight to produce an information-rich three-dimensional (3-D) model of a study area. The multilayered information may be combined with existing GIS layers to create a robust base for environmental analyses.

Research at the National Consortium on Remote Sensing in Transportation Environmental Assessment (NCRST-E) sponsored by the U.S. DOT’s Research and Special Projects Administration (RSPA) was the basis for development of this technology. The NCRST-E is based at the Mississippi State University Remote Sensing Technology Center (RSTC); the research was conducted in collaboration with Earthdata Corporation, ITRES, Digital Globe, and the DOTs of North Carolina, Iowa, and Mississippi.

Integrated aerial data collection incorporates multispectral satellite imagery, color infrared (CIR) and black and white digital ortho-rectified imagery, light detection and ranging (LIDAR) data, and hyperspectral image data—technologies that have been available for some time. However, increased computing speeds and relatively inexpensive data storage have made it practical to integrate these components and use them together on transportation-project applications. These integrated components gather several layers of data from an aerial flight or satellite digital data acquisition. Data can then be integrated to yield such information products as land cover classification, wetland maps, potential corridor alignment plans, field work maps, and 3-D digital terrain models. Compared with conventional field data collection, the integrated applications reduce costs and streamline the project development process, particularly for large projects. In areas that are remote or otherwise difficult to access physically, this technology can also enhance data accuracy.

Specific applications have been undertaken for DOT’s in Alabama, Iowa, North Carolina, Mississippi, Virginia, and Washington. These applications include remote sensing for wetlands mapping, analysis, and impact mitigation; multisensor data analysis for streamlining National Environmental Policy Act (NEPA) processing; remote sensing for land-use and land-cover assessments for transportation planning; development of regional GIS databases for multimodal transportation planning; and corridor planning for economic development and rural communities impact analysis.

Because aerial data sets are usually acquired through private vendors that do not serve all states and projects may be located at a significant distance from a vendor’s home base, the cost of acquiring data is highly variable. However, the marginal costs associated with adding data sources to a flight service hired initially for one purpose may be low. Efficient
data gathering generally will involve interdepartmental coordination, which can be a challenge.

Analyzing and converting the data into useful information represents a separate cost that also can be highly variable. Developing algorithms to identify habitat, in particular, is a complex use of the data that would likely require significant expense. Hardware requirements for data gathering are met by the vendor. Multisensor remote sensing acquisition platforms include LIDAR, digital cameras, multispectral sensors, hyperspectral sensors, and global positioning system (GPS) inertial measurement units. Raw data are processed using standard industry methods to yield input for GIS and computer-aided design and engineering (CAD/CAE) software. Substantial data storage capacity and engineering graphics workstations are needed to accommodate typical work flow.

Some early applications of integrated aerial data collection have encountered problems. For example, LIDAR has sometimes read tree tops or fence posts as ground level, skewing the results of the survey. Computerized methods to calculate quantities of different types of vegetation based on CIR digital photography have not been widely tested. Using hyperspectral data for habitat identification in transportation projects is still in its infancy, and hyperspectral signatures are not yet available for a wide range of vegetation. The technology thus is still a rapidly evolving area for research as well as a practical tool for DOT use.

Road and Rail Alignment Optimization

Road and rail alignment optimization uses advanced computational algorithms and computing power to quickly generate and screen very large numbers of alignment alternatives, computing cut-and-fill estimates to find optimal alternatives. The technology represents a major advance in the comprehensiveness and efficiency of route-location studies.

When the Transportation Corridor Agencies in Orange County, California, became involved in a dispute between two stakeholder factions regarding the route of a new tollway, route optimization was used to examine many possible routes within a very short period of time and to provide alignments, impact measurements, and cost estimates to help identify viable alignment possibilities. The agency relied on a proprietary tool initially developed by Australia’s Commonwealth Scientific and Industrial Research Organization (CSIRO) and further developed and marketed by Quantr Ltd., a private firm established in 2000 and headquartered in Australia. Other agencies (e.g., the Louisiana Department of Transportation and Development) have developed and used other route optimization tools for other applications.

These tools use advanced algorithms and high-powered computing capability to test millions of possible alignments for any defined set of constraints, including engineering parameters and costs. “Best fit” routes are provided to the project team for further consideration. In the Orange County case, these results were made available to the project team within 48 hours of data entry for each scenario defined. Use of this technology enables rapid testing of alignment variations and greatly reduces the time to develop and screen alignment options. This capability in turn creates a more transparent project development process in which assumptions are known and logically applied by the project team.

Such tools can be used for both realignment and new alignment projects but are more useful for corridor and new alignment analysis because alignment alternatives developed by the route optimization tool typically are limited to mainline segments; the software does not model interchanges or intersections but can impose clearance factors on the alignment and include interchanges as a cost factor. This restriction may compromise the tools’ usefulness for alignment projects focused on the placement and geometric features of interchanges.

The tools encourage an iterative approach in which users can easily consider “what if” scenarios involving changes to alignment constraints such as adding zones to be avoided or changing design standards. The tool used in Orange County allows import of pre-existing or proposed alignments from other packages or input using point-and-click technology. The tool shows cost changes and earthworks and structures and can identify such alignment issues as grades that are too steep or requirements for large cut-and-fill sections. These alignments can also be used as the basis for “seeded” optimization, where the system restricts the investigation to alternatives close to the defined alignment. Alignments can also be constrained by mapping areas that must be avoided or by assigning costs to the use of certain areas, thereby providing a method to reflect environmental or other “fatal flaw” constraints.
Route optimization tools can use coarse or refined data; the characteristics of the input data depend on the required level of accuracy and the cost of data to achieve each level of accuracy. Input data include a digital terrain model, cost information, and design rules.

In the Orange County application, the software tool was provided under a use agreement. Quantum trained agency staff to use the front-end software to input data, define scenarios, and submit scenarios to the firm for analysis with the proprietary software engine. Hardware requirements for the agency (for data input) are a Pentium IV with 512 MB of RAM, Windows XP/2000/NT4, Internet connection with the ability to transfer files up to 3 MB, 4 GB of free hard drive space for data files, and 64 MB of RAM on the graphics card. These requirements are apparently typical, although this study did not undertake a comprehensive comparative analysis of route optimization tools.

Agency personnel in Orange County reported that the cost to use the route optimization tool compared favorably with traditional methods for conducting route alignment studies. Participants in the Orange County application estimated that use of the route optimization tool reduced project planning time by between 6 and 12 months and cut construction costs by more than $100 million, while allowing the team to significantly reduce environmental impacts as well.

Web-Based Environmental Screening

Web-based environmental screening entails database software that supports web-based presentation of project information and management of the environmental analysis and review process. Tools provide links to base documents and prompt reviewers to provide commentary, thereby encouraging earlier engagement of stakeholders and identification of issues to be resolved in project development decision making.

The specific application of the technology reviewed in this project was developed by the Florida DOT (FDOT) with the URS Corporation, in partnership with the University of Florida’s Florida Geographic Data Library (FGDL), to respond to the environmental streamlining element of the federal transportation authorization legislation of 1998, TEA-21. Environmental streamlining calls for early NEPA reviews and approvals, full and early agency participation, and the integration of review and permitting processes. Following passage of TEA-21, FDOT’s Central Environmental Management Office sought changes to the agency’s planning, project development, and permitting processes to shorten total project development time. The effort led to the Efficient Transportation Decision-Making (ETDM) methodology for presenting project planning information to facilitate early and efficient gathering of agency and public input. FDOT’s Environmental Screening Tool (EST) was implemented as part of the ETDM process.

The EST is designed as a “smart,” electronic process management tool that guides reviewers through the process and provides links to base documents. It also automatically prompts reviewers to provide online feedback at appropriate points in the review cycle, thereby helping agencies and stakeholders to assess potential project impacts between the time projects are proposed in a long-range transportation plan and when they are scheduled in the State Transportation Improvement Program (STIP). An Internet-enabled GIS application composed of several modules, the EST allows users to define project locations and concepts and identify potential environmental issues. It is capable of screening projects for either early identification of critical flaws (the planning screen) or NEPA scoping requirements (the programming screen) when analyzing alternative scenarios. Data for the application are drawn from more than 300 geographic layers in the FGDL.

Using the EST involves four steps:

1. Data are entered into the FGDL, the underlying database. Data typically come from MPOs and the DOT, which provide information on the project and characteristics of the community where the project will be located, and resource agencies, which provide relevant environmental resource data.

2. Buffers around the project site are established, within which possible environmental impacts are identified. The number of acres directly impacted is recorded as well as the percentage of the overall resource involved.

3. A review is conducted by Environmental Technical Advisory Team (ETAT) members and community liaisons and is made accessible to the general public for comment via a public access site. The ETAT comprises representatives from 23 federal and state re-
source agencies. Each reviewer recommends a degree-of-effect designation and issues for further review. Elements to be reviewed during the programming screen include the project purpose and need, expected direct impacts, recommended avoidance/minimization, recommended mitigation strategies, agency involvement (continue or no further action), degree of effect, class of action, and comments.

4. A report is created by ETDM Coordinators at both the MPO and the DOT that summarizes effects, commitments, and responses. A variety of environmental factors such as air quality, floodplains, noise, and archaeology are rated by individual reviewers to determine the degree of effect that the proposed transportation project may have on the resource being reviewed. The designations for degree of effect range from “enhancement” to “potential dispute.” “Enhancement” indicates the transportation project is likely to enhance the resource, and “potential dispute” indicates that the project is contrary to a state or federal resource agency’s program, plan, or initiative. When reviewers designate degree of effect, they must also provide supporting commentary to identify the impacted resources and describe the perceived impact. The reviewers are also provided areas to suggest avoidance, minimization, or mitigation strategies. Reviewers apply similar criteria to each resource they manage, which allows the ETDM Coordinators to review a variety of reviewer comments on one screen.

The EST’s tracking element records when a project is submitted for review and indicates the number of days that remain before a decision is required. To support the review, GIS layers provide the project footprint as well as the location and types of nearby human and natural resources. Detail about the project (including a description, purpose and need statement, and summary of public comments) is included in the system, and reviewers are able to comment on the screen where the project information is presented.

Applying the EST requires that reviewers be trained to provide objective, consistent comments across projects and across environmental disciplines. Training materials that have been prepared include ETDM Guidelines, ETDM Technical User Guide, Public Involvement Handbook, Sociocultural Effects Handbook, agency operating agreements, agency and public websites, and hands-on and web-based training. This NCHRP study found that 164 projects had been reviewed using the EST process, and another 200 projects were under review. More than 400 participants are using the tool for the review process.

The EST server is ORACLE 9i running on a UNIX platform. The tool uses ESRI ArcIMS and ArcSDE for Internet functionality. A dedicated portable document format (PDF) writer is included in the report generator. Other major cost elements associated with the EST include data acquisition, customization of the Internet-based GIS tools (e.g., to address such details as format, availability, and organization of data; agency-specific standard reporting requirements; reviewer log-in and security provisions; and comment tracking), and software and data maintenance and updating.

FDOT’s application was developed with the University of Florida and this experience suggests the academic setting is ideally suited to meeting the needs of the application. Each participating resource agency has an agreement with the University of Florida outlining data acquisition and update requirements. All data are managed by the University of Florida. Data access is granted by permission and secured through password controls. All data sets are documented using at least the minimal Federal Geographic Data Committee (FGDC) metadata standards.

NEPA Document Preparation and Review Expert System

The technology for the NEPA Document Preparation and Review Expert System uses “smart” form analysis and data management software to facilitate web-based preparation of documents for categorical exclusion (CE) and environmental assessment (EA) decisions that meet FHWA requirements. The software prompts reviewers to provide needed information, guides the input of their responses, and creates a central repository for documentation, significantly reducing processing time and facilitating data sharing among agencies.

In an effort to save time and money in processing and documentation, the Pennsylvania Department of Transportation (PennDOT) in association with McCormick Taylor, Inc., and Ciber Inc. developed the tool reviewed for this study. This project
control, development, documentation, review, and approval tool is for projects that require a CE or EA document under NEPA. The tool streamlined PennDOT’s CE documentation and approval process and reduced the time required for preparing and approving CEs by an average of more than 32%.

The PennDOT’s NEPA Document Preparation and Review Expert System presents the user with a series of questions about the project. If the user indicates that a particular resource is not present, no additional questions will be posed about that resource. If a particular resource is present, additional detailed questions regarding that resource will be posed until the user has provided sufficient information. Upon completion of the form, the user submits the CE and the review process is initiated. The system automatically generates sequential email notifications to the individuals in the review chain until the CE is approved.

The tool also supports the project scoping process; scoping forms are completed in the system and become the basis for the CE evaluation. All reviews and approvals are conducted electronically. The tool guides users through the series of questions and actions to produce FHWA-ready documentation (the underlying forms were developed in cooperation with the FHWA Division Office).

The system can also be used to assemble, review, and approve EAs and serves to archive both the EA and the supporting research reports. Because development of CEs and EAs relies on basic project information, this system serves as the central project control and repository for information other than environmental data. The system includes provisions for downloading the application to a laptop, enabling a user to enter information from the field without having to first take notes and then transfer notes to the system in the office. Upon return to the office, the user can synchronize the data collected on the laptop with the main database, transferring the collected data directly from the laptop to the server.

The PennDOT application uses the Domino web platform from IBM, but the developers stressed that the application could be developed using other platforms. The application also required software to handle internet forms (with the ability to implement "smart" form features), large amounts of data, attachments (for computer-aided design and drafting [CAD] drawings, maps, photographs), and the opening and querying of GIS databases if these latter are to be used as resources.

Agency staff estimated that the more than 32% average time reduction for preparing and approving CEs translated into an annual cost saving of approximately $5.9 million for CE-level projects. Added benefits included consistency and improved quality in CE and EA documents; creation of a central, electronic repository for project documentation; opportunities for data sharing within and among agencies; and significant improvement in data availability to interested stakeholders.

Restricted Activity Zone Mapping

Restricted activity zone mapping uses software to guide highway maintenance staff on the types of maintenance activities that are restricted on specific road segments and when these restrictions are in effect. This technology draws on data from several sources to produce color-coded linear route maps showing areas where environmental regulations impose constraints on maintenance actions.

In the 1990s, several salmonid species were proposed to be listed as threatened or endangered species in Oregon. The Oregon DOT (ODOT) recognized that highway maintenance staff would need to understand, without having to consult a field biologist, when certain maintenance activities would be restricted as threats to the species’ habitat. ODOT worked with Mason, Bruce and Girard, and Pacific Meridian (now Sanborn) to develop the restricted activity zone (RAZ) map system, an enhancement of the straight line chart tool familiar to maintenance staff.

Using a variety of electronic data, some of which are readily available, the RAZ map system maps environmentally sensitive areas and indicates what maintenance actions can be taken on a mile-by-mile basis. The top half of each RAZ map is a U.S. Geological Survey map of a 3-mile road segment. The bottom half is a common straight line chart showing road features along the segment; below that are bar charts representing various types of maintenance activities such as mowing or spraying. The bars are color-coded to indicate whether activities are permitted along the segment and under what conditions. Hard copy and electronic map sets are available for every maintenance district in the state; hard copy materials are often carried around in maintenance vehicles for easy reference.

The RAZ maps draw on a sophisticated database and a second set of maps identifying wetlands, drainages, riparian zones, likelihood of archaeological sites,
endangered species sites, and habitat. These resources are mapped similarly to the RAZ maps and include resource bars in place of the activity bars. The resource maps are used by planning staff and region environmental coordinators as a quick reference guide to the environmental character and features of an area.

Underlying both map products is a database containing digital, CIR aerial photography of all state roadways, including 500 feet on either side of the centerline. Various methods of photograph interpretation are used to identify and map habitat. The final compilation of data also includes the analysis of other GIS data sets. For example, the likelihood of archaeological sites is calculated using slope and river confluence databases.

This application uses desktop and laptop computers; ArcGIS, ArcView, and ArcPad GIS software; Erdas Imagine software; Trimble GPS software; laser range finders; and custom GIS data processing routines. In addition, MicroStation CAD software, a custom tool to draw data “ribbons” on maps, and Microsoft Access are required. The main data requirements are GPS-registered digital, CIR photography; data from existing agency data sets; GIS roads data; and National Wetlands Inventory data. Land cover, riparian zone, and additional potential wetlands data are derived from the CIR imagery; contiguous riparian area and fill slope data are modeled from existing data. All of these data feed into a linear referencing model; the output is delivered to ODOT as a text file that is input to a CAD program to display data on resource maps. The resource maps are then used to generate a map indicating where designated maintenance activities can and cannot be performed. ODOT’s cost to develop this tool has exceeded $2.2 million.

Electronic Asset Management System

Technology for electronic asset management uses database software to establish a repository of information on transportation infrastructure assets and facilitates access to that information for management decision making. Tools integrate information from multiple sources to characterize individual assets and asset groups and their condition, to facilitate updating with field inspection data, and to support preparation of maintenance work orders.

The Maryland State Highway Administration (SHA) owns and maintains more than 100,000 storm drainage structures and about 1,700 stormwater management facilities. In 1999, the agency became one of the first state transportation agencies to be regulated under the National Pollutant Discharge Elimination System (NPDES) permit program, an element of the Clean Water Act that regulates point and non-point sources of pollutant discharge into waters of the United States. SHA—in association with Greenman Pedersen, KCI Technologies, and Enterprise Information Solutions—developed an electronic asset management tool that can be used in the field to collect a range of information on these stormwater management facilities.

The tool is used for stormwater facility inspections, which are performed at least every 3 years to produce ratings on each facility. All inventory and inspection data are stored in the SHA’s central Drainage Infrastructure Database, which includes stormwater facility attributes. The system produces outputs useful for preparing maintenance schedules and generates work orders with a description of the facility, picture, and map.

The core of the system—which could be used to manage any type of transportation asset—is a facility database that integrates information such as condition assessments, photographs, monitoring reports, and field inspections. Using a handheld computer, inspectors can view data, easily update it, and quickly upload it into the central database. The tool also includes features to quickly combine and compare data from all or subsets of the facilities, format and present data in reports, and cut and track maintenance work orders. The application also allows for the collection of descriptive information about assets in the field using a Personal Digital Assistant (PDA) handheld computer device.

The application is used to conduct three main functional activities: office planning, field inventory, and inspection and maintenance. During office planning, relevant existing information is assembled and entered into the relational Stormwater Facilities Database. Each facility is designated as a certain type, such as ponds (e.g., retention ponds, detention ponds, extended detention ponds), swales (e.g., wet swales, dry swales), shallow wetland marshes, underground storage, infiltration (e.g., trenches, basins), and low-impact development practices (e.g., bioretention, tree filters). Each facility is given spatial coordinates to tie it to a GIS. The relational database allows inspectors and data collection personnel in later activities to enter information specific to the type of facility,
providing for detailed, consistent information to be collected in the field. When complete, the information is uploaded to a PDA with an ArcPad GPS unit for the field inventory.

During field inventory, data collection personnel visit each of the stormwater facilities with a PDA with ArcPad GPS unit in hand, to verify data previously collected and to supplement this with additional data. Inventory personnel confirm the facility’s existence, type, and measurements and identify potential public hazards. Digital photographs are collected for each facility and attached to facility files in the database. The application contains a voice recording element that allows inspectors to record audio notes. This element is provided for safety reasons—many stormwater facilities are located on the edge of roadways and the agency wants to minimize the time inspectors are exposed to the potential safety hazard of passing vehicles. The voice recording option allows inspectors to make comments more quickly than by transcribing them on paper or typing them into a PDA, thus reducing field time at the site. Upon returning to the office, agency staff upload information into the Stormwater Facilities Database, creating a central storage location for all information related to the stormwater facilities.

Inspection and maintenance activities, subject to NPDES permit requirements, are based on a 3-year cycle. Field inspectors use the same PDA units to enter data on facility condition and maintenance issues. Maintenance to correct minor issues is done at this time, and facility deficiencies are identified. Data can be exported directly from the database for report generation and used for prioritization of repairs. The SHA Stormwater Facilities Database can output such reports and recommendations as priority ratings for repairs and improvements and reports to Maryland Department of Environmental Quality for compliance with the NPDES permit program.

The SHA asset management tool is implemented as a program written in Visual Basic that runs on an Oracle database server. The software runs on a personal computer. Other required application software includes Microsoft Access, ArcView/ArcInfo GIS, graphics display software, and Microsoft Excel. Other necessary field equipment includes PDAs, GPS units using Coast Guard differential corrections, digital cameras, and field water-testing kits. The amount of equipment required is determined by the number of inventory and inspection crews in the field.

Life Cycle E-Engineering

Life cycle E-engineering technology applies GPS information and data management software to integrate project data by development phase. Tools capture data from site survey, design, and construction, maintaining data accuracy and reducing duplication of data collection efforts over the course of a project’s development.

The leadership of the Minnesota State Department of Transportation (Mn/DOT) sought to integrate data throughout the project life cycle, thereby increasing the value of the agency’s investments in data collection and information management. Under the agency’s life cycle E-engineering concept, data are collected in the planning phase to be used during design, construction, and maintenance. Similarly, details from the design phase remain available during construction, enabling inspectors to access all project information with handheld computer devices in the field and contractors to use planning and design data in location and terrain models for machine control. Mn/DOT developed this application with support from Bentley Systems, Inc.

The tool integrates Mn/DOT technology investments made in data collection, CAD design, and GIS analysis to support all project phases—including planning, permitting, design, construction, and operations and maintenance—within a handheld computer. The tool supports a work flow process that informs surveyors, inspectors, and contractors during construction about their physical locations in relation to critical environmental areas.

Mn/DOT tested the tool on the Willmar Project, a complex 2.5-year construction effort. GIS data on contours and the location of area wetlands were overlaid onto aerial photography and integrated with the project design model. Environmental permit data, standards, specifications, and other non-graphical data were also included. The data downloaded to handheld computer devices or Trimble GPS units included the project design, drainage information related to structures and pipes, and pay items with associated quantities and locations. Field tests were conducted for electronic staking and inspection for drainage structures and curb- and gutter-based pay items; testing involved using the GPS unit to verify information already collected by survey crews. The results were within mandated tolerances.

Changes made to the design in the field were uploaded at the construction field office at the end of
each day. Field records and information regarding review of pay items, quantities, and locations were also included in the handheld units. Contractors used the design information—3-D location and terrain models of ponds, wetlands, and roadway surfaces—for machine control during construction. The models were transferred to GPS units mounted on the excavation equipment. This information enabled avoidance of environmentally sensitive locations and helped assure that commitments made during the permitting process were met.

The Mn/DOT application used Bentley Systems, Inc.'s MicroStation and GEOPAK software packages, ESRI's archive, and Trimble Navigation GPS software (for machine control). Hardware requirements included standard CAD, CAE, and GIS support infrastructure and handheld mini-tablet or another type of mobile computer. Trimble GPS units are required for surveyors doing stakeout or inspectors collecting GPS information while inspecting. Programming was done with C/C++, Java, Visual Basic, and the NET framework.

Mn/DOT staff credited the technology's use on the Willmar Project for an improved understanding of environmental issues during design, a result of integrating GIS data with MicroStation. The agency also was able to reassign survey crews from the construction site to other locations because using machine control to build ponds did not require traditional staking. Contractors, realizing the advantages of machine control on the Willmar Project (faster construction and, in the case of computer-driven hydraulics, the ability to assign less skilled operators), encouraged the agency to adopt the technology for other projects.

TRANSFER AND USE OF THE SELECTED TECHNOLOGIES

The eight technologies documented in NCHRP Project 25-22(02) have potentially wide applicability to other agencies and applications beyond those for which they were developed. The experiences of agencies in developing and using these eight examples offer lessons for implementing applications that would improve consideration of environmental concerns in transportation decisions.

Limited Initial Implementation

Limited initial or incremental implementation is recommended for applications of all eight technologies. Implementation can be limited to a region or metropolitan area with the necessary resources (e.g., data quantity and quality, committed leadership) or to a single application of the technology (e.g., types of reviews, a single project). For technologies that rely heavily on data collection (e.g., integrated aerial data collection, RAZ mapping, electronic asset management), data can be collected incrementally by geographic region and/or by area critical to the agency's overarching goals.

Data Availability and Standards

Four of these technologies—interactive regional scenario analysis, integrated aerial data collection, web-based environmental screening, and NEPA document preparation—depend on the availability and quality of necessary data inputs. Implementing agencies will need to clearly identify what data are available at the local level, what national data can be used, and whether any additional data should be collected at the local level. In addition, standards on minimum data quality and guidelines on data sharing, use of data, and responsibility for updates to data will need to be established early in the implementation.

Buy-in of Agency Staff and Stakeholders

For these technologies to be implemented successfully, key players—whether the users, the leadership of the users, the users' support staff, or the public—must buy into their usefulness. For interactive regional scenario analysis, representatives of government, public, industry, and environmental interests should be consulted to guide development of models and scenarios. For road and rail alignment optimization, agency project managers and team members should become familiar with the technology and how it can be used efficiently through software demonstrations and agency discussions with agencies or consultants who have used it previously. For technologies that require coordination among many resource agencies and jurisdictions and data collection from numerous sources, strong leadership support is needed to push the implementation forward. For NEPA document preparation, DOTs will need to coordinate their efforts not only with FHWA, but also with their internal information technology departments, who need to understand that control of the approval process is where the time savings can be
gained and that this part of the application should not be compromised.

Multiple-User Involvement

Use of a technology by multiple agencies can be cost effective and can create richer databases that will support broader data analysis opportunities. Interactive regional scenario analysis, web-based environmental screening, and electronic asset management are most conducive to use by multiple agencies. To facilitate implementation of these technologies, cross-user working teams, established at the start of the tool development process, may be a useful mechanism to ensure the tool is developed so that it meets the needs of all participating agencies.

RECOMMENDATIONS FOR PROMOTING USE OF THESE TECHNOLOGIES

Applications highlighted in this research involve proven tools that support the integration of environmental considerations into transportation planning, design, construction, maintenance, and operations. As a set, they offer innovative approaches for DOTs and other transportation agencies to explore when addressing their business line issues. On an individual basis, the applications may illustrate solutions to particular problems faced by individual agencies.

The aim of this research is to accelerate innovation by promoting the use of such tools to improve consideration of environmental concerns in transportation decision making. Toward that end, the research team has developed a series of generic recommendations for encouraging adoption of any of these tools, as well as a set of particular recommendations for each application or group of applications. The recommendations are also grounded in the understanding that the current operating climate for DOTs and other transportation agencies, as well as the rapidly changing nature of GIS technology, makes difficult any investment in new GIS-based approaches to meet environmental goals.

General Recommendations

A number of strategies should be pursued to encourage further application of the technologies and tools highlighted in this digest:

- **Showcases.** The applications herein can be showcased not only by distribution of this digest, but also through presentations by the various tool “champions” at conferences and other professional meetings.
- **Peer exchanges.** One- or two-day informal dialogues among state DOT practitioners could be arranged to include representatives from states that have experimented with these tools and representatives from other states interested in adopting them. Peer exchanges can be initiated through various FHWA offices or by TRB committees that can seek FHWA funding. Electronic circulars are often produced to capture the results of peer exchanges; broad distribution of these through TRB networks extends the sharing of information beyond those who participated in the face-to-face meeting.
- **Demonstration projects.** Requests from state DOTs or other transportation agencies for FHWA funding of demonstration projects could provide opportunities for establishing these applications as business line best practices.
- **Technical assistance.** At the request of state DOTs, AASHTO’s Center of Environmental Excellence and a number of the university centers for transportation research can assist agencies in implementing innovative tools that promote environmental stewardship and streamlining.

The new Future Strategic Highway Research Program provides for time-specific, concentrated, short-term, results-oriented research focused on solving the problems of highway safety, reliability, capacity, and renewal. The “capacity” problem area includes research on tools for systematically integrating environmental requirements into the analysis, planning, and design of new highway capacity.

Application-Specific Recommendations

In addition to these general strategies, the research team recommends other strategies that may encourage the application of particular technologies and tools highlighted in this study.

**Integrated Aerial Data Collection**

Further application of multisensor aerial remote sensing will rely on the continued development of spectral profiles for additional plants and habitat
communities to allow their recognition in analysis of photogrammetric imagery. As more plant "signatures" become available, the application of this technology will be possible in more locations and for more diverse purposes. Developing these plant profiles would seem to be an appropriate subject for research funding. Neighboring states, or regions within states, could propose such research to state DOT research institutions, academic communities, or TRB's Cooperative Research Programs. Partnerships between transportation agencies and private-sector geospatial data development and analysis companies could also be developed.

NEPA Document Preparation and Review Expert System

The broad applicability and documented benefits of PennDOT's expert system make this type of application a good candidate for AASHTOware. Although one DOT has developed such a system, no off-the-shelf software is available. Pooled-fund research could be directed at developing methods for linking and formatting commonly available resource data, incorporating analytic tools, designing customizable work flow and tracking elements, and creating customizable regulatory and reference library functions.

Electronic Asset Management

Agencies interested in developing electronic asset management systems can tap into recent NCHRP research, including an interim report summarizing existing software products appropriate for assessing transportation assets (NCHRP Project 20-57, "Analytic Tools to Support Transportation Asset Management"). Agencies could also seek assistance from FHWA's Office of Asset Management, whose mission is to promote asset management, leverage resources, and develop collaborative efforts supporting asset management. This type of application is also very well suited for development of a pooled-fund AASHTOware project.

Life Cycle E-Engineering

DOTs interested in pursuing life cycle E-engineering applications, especially for implementation in construction activities, could seek support from FHWA's Highways for Long Lasting, Innovative and Fast Construction of Efficient and Safe Highway Infrastructure (LIFE) program. The program components include funding assistance for highway construction projects that demonstrate innovative approaches to achieving the Highways for LIFE goals, partnerships with both the highway industry and other industries to accelerate the advancement of proven innovations into routine practice, extensive technology transfer, and training. Joint applications for support from facility owners and construction contractors might be especially attractive.

Pooled-fund studies would also be a likely source of support for further development of life cycle E-engineering applications led by FHWA or a state DOT. Large CAD software companies and survey equipment companies may also be suitable technical assistance partners.

NOTES

1. The Transportation Research Board of the National Academies, FHWA, and AASHTO do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this digest.

APPENDIX A—RESOURCES FOR HIGHLIGHTED APPLICATIONS

Interactive Regional Scenario Analysis
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Integrated Aerial Data Collection
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Road and Rail Alignment Optimization
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Web-Based Environmental Screening
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NEPA Documentation Preparation and Review Expert System
Charles Campbell, Pennsylvania Department of Transportation, (717) 772-2563, chacampbel@state.pa.us
Restricted Activity Zone Mapping
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Electronic Asset Management System
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Life Cycle E-Engineering
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