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**National Conference on Transportation and
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Proceedings

**July 22–26, 2000
Pittsburgh, Pennsylvania**

National Conference on Transportation and Environment for the 21st Century

Proceedings

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INTRODUCTION

The Transportation Research Board's (TRB) National Conference on Transportation and Environment for the 21st Century, held in Pittsburgh, Pennsylvania, July 22–26, 2000, was attended by more than 650 individuals. The Conference was developed by the joint efforts of 13 TRB committees, FHWA, the Environmental Protection Agency (EPA), the University of Pittsburgh, and the other sponsors listed below. More than 2 years of hard work by many people went into bringing nationally acclaimed, forward-thinking transportation and environmental professionals together at the junction of Pittsburgh's "Three Rivers" (the Allegheny and Monongahela rivers meet at the point of Pittsburgh to form the headwaters of the Ohio River) to learn about and discuss the creation of innovative and imaginative practices to protect and enhance the quality of the environment.

The Conference comprised plenary overview and welcome sessions Sunday afternoon, followed by four sets of six concurrent workshops starting Monday morning through Tuesday morning. A total of 24 workshops were held, covering six basic themes. In addition, 47 posters were presented during three special time periods during the conference.

Conference workshop themes were:

- Air Quality and Energy;
- Communities, Neighborhoods, and People;
- Cultural Resources;
- Environmental Processes;
- Modal Environmental Issues; and
- Systems Preservation.

The close of the Conference was again devoted to plenary sessions featuring FHWA and EPA presentations on new tools for environmental analysis. This was followed by "Closing and Observations" delivered by Dr. Michael Meyer from Georgia Tech, and prepared with the capable assistance of 24 graduate student session-reporters recruited from the University of Pittsburgh, Carnegie Mellon University, and Pennsylvania State University, and supplemented with input from many session moderators. Tom Murphy, mayor of the city of Pittsburgh, delivered an enthusiastic closure of the Conference with an invitation for a return visit.

Social events included a Pittsburgh Pirates baseball game Saturday evening, a "meet and greet" reception Monday evening, and a Tuesday evening dinner–dance cruise on the "Three Rivers." The cruise featured a running narration of the history of Pittsburgh's bridges as provided by Walter Kidney from the Pittsburgh History and Landmarks Foundation. On Wednesday the Conference was devoted to field trips and tours. The Port Authority of Allegheny County provided complimentary tours of the Pittsburgh North and South Busway, and optional tours were available of the Frank Lloyd Wright Fallingwater House. Ronald D. Neufeld of the University of Pittsburgh and the Pittsburgh Convention Center prepared and distributed information on theater and local events occurring during the term of the conference.

This document comprises an edited review of all workshops and poster sessions prepared by Ronald D. Neufeld, Professor of Civil Engineering at the University of Pittsburgh, and Alex Farrell, Research Engineer at Carnegie Mellon University. The poster

session overviews are followed by short abstracts prepared for this purpose by poster presenters. Selected abstracts of workshop presentations are available from TRB.

We are indebted to the graduate students listed below who provided the “eyes and ears” and written summaries and critiques of the 24 technical workshops; to Michael Meyer, who, with their assistance, presented the final Conference workshop; and to Joseph Shalkowski of Michael Baker, Jr., Inc., for organizing the poster sessions. These Proceedings were prepared with financial support from Pennsylvania Department of Transportation (PennDOT) to the University of Pittsburgh.

The editors gratefully acknowledge the following graduate student session reporters: Shui Bin, Robert Cimarolli, James Corbett, Sara DeRoy, Eric Donnell, Kathleen Fahey, Luis Ochoa-Franco, Patrick Gurian, Jeff Lynn, Deanna Matthews, Anand Rao, Larry Ropelewski, Dave Stickers, John Stuart, Renyou Wang, and Henry Willis. We are sure that their experience in attending and participating with a national conference of this dimension added an immeasurable dimension to their graduate professional education.

The conference and these proceedings could not have been accomplished without the assistance of the following individuals and groups:

- The Sponsors of the TRB Conference: TRB, FHWA, EPA, Center for Transportation and Environment at North Carolina State University, PennDOT, Pennsylvania Department of Environmental Protection, Port Authority of Allegheny County, National Association of Environmental Professionals, Pennsylvania Association of Environmental Professionals, University of Pittsburgh, and Carnegie Mellon University;
- The Participating TRB Technical Activities Division: Inland Water Transportation (A1B01), Public Involvement in Transportation (A1D04), Transportation Energy (A1F01), Environmental Analysis in Transportation (A1F02), Transportation and Air Quality (A1F03), Historic and Archeological Preservation in Transportation (A1F05), Alternative Transportation Fuels (A1F06), Waste Management in Transportation (A1F07), Environmental Impacts of Aviation (A1J52), Physicochemical Phenomena in Soils (A2L03), Guided Intercity Passenger Transportation (A2M05), Women’s Issues in Transportation (A3B56), and Maintenance and Operations Management (A3C01);
- Wayne Kober, Transportation and Environmental Management Consultant and former Director of the PennDOT Bureau of Environmental Quality and chair of the Conference Steering Committee;
- Jon Williams, Reggie Gillum, and Mary Kissi of TRB;
- Tom Horne, project manager PennDOT Research Division Staff;
- The Pittsburgh Hilton Hotel management and staff;
- Mayor Murphy, city of Pittsburgh;
- The captain and crew of the Gateway Clipper, Pittsburgh, Pennsylvania;
- The Pittsburgh Historic Review Commission;
- Walter Kidney, historian and the Pittsburgh History and Landmarks Foundation; and
- The numerous moderators, speakers, and poster presenters listed in the program.

This document was peer reviewed for quality and content by Thomas Weck, chair of the TRB Section on Environmental Analysis, and Wayne Kober, Transportation and Environmental Management Consultant and former Director of the PennDOT Bureau of Environmental Quality.

OPENING PLENARY SESSIONS

Welcome and Introduction

Robert E. Skinner, Jr.

*TRB
Speaker*

August R. Carlino

*Steel Industry Heritage Corporation
Speaker*

The opening session, Sunday, July 23, set the stage for the Conference by sensitizing attendees to public conflicts between societal desires for open space, clean air and water, and ever-increasing mobility. Many people demand low-density housing and suburban living space along with high degrees of personal mobility. Others require urban living space with public transportation accessibility to all parts of the city and to airports. Robert Skinner suggested that research provide an opportunity to minimize conflict over the environmental impacts of transportation facilities and services, promote the stewardship of environmental resources, and foster appropriate regulations and procedures.

The Steel Industry Heritage Corporation is one of several Commonwealth-supported organizations devoted to preserving Pennsylvania's heritage for future generations. The corporation has the specific mission of preserving the rich steel-making history of the Pittsburgh region.

OPENING PLENARY SESSIONS

New Vision for Transportation and the Environment *State Perspectives*

Bradley L. Mallory

Pennsylvania Department of Transportation

James Seif

Pennsylvania Department of Environmental Protection

The citizens of Pennsylvania ask for swifter, smoother modes of public transportation along with cleaner air and water, wildlife habitat conservation, farmland and open space preservation, and more livable communities. Over the last several years, the Pennsylvania Department of Transportation (PennDOT) has become “customer driven,” so that now the expectation is that the agency “thinks beyond the pavement” and carries out transportation work as good stewards of the natural and human environment. The right thing to do is to meet both transportation and environmental improvement goals. This implies that transportation, social, and environmental concerns need to be balanced, thus improving the quality of life in Pennsylvania. PennDOT is moving toward adoption of ISO 14001 Environmental Management Standards throughout all aspects of the business of the agency. In addition, PennDOT will continue to work with AASHTO and other federal agencies in support of streamlining the regulatory and planning process and developing true partnerships based on creative problem solving and good debate.

Pennsylvania intends to be proactive in developing its future. The notion of sustainable development in Pennsylvania is analogous to a three-legged stool with the legs being economy, environment, and strength of communities. Therefore, to progress in one area, the state must strive for simultaneous excellence in all. This translates into a critical need for agencies like Pennsylvania Department of Environmental Protection and PennDOT to integrate decision-making processes and jointly to consider environmental, economic, and quality-of-life issues as part of agency work. This may be a new way of thinking since it challenges governmental agencies to take a more holistic and inclusive approach to actions and processes used to achieve goals. The notion of “community sustainability” is being used to reflect this new approach and it is an emerging important concept within both the transportation and environmental planning arenas. This is a trend that is happening not only in the United States on the state and federal levels, but also on the international front.

The Pennsylvania 21st Century Environment Commission was charged with developing a new vision for the state in the 21st century. The commission found that the need to change patterns of land use was the most pressing environmental issue facing Pennsylvania. The commission noted that urban sprawl causes environmental harm such as air pollution from cars and storm water runoff, an economic strain on public facilities and infrastructure and a loss of a sense of community.

OPENING PLENARY SESSIONS

New Vision for Transportation and the Environment *Federal Perspectives*

William Matuszeski

Environmental Protection Agency—Chesapeake Bay Program Office

Anthony R. Kane

Federal Highway Administration

The Chesapeake Bay Program is the premier watershed restoration effort in the United States. The program is not regulatory in nature, but rather develops interstate cooperative programs for water, air, transportation, and land use. Largely, this effort came about because of many state–state lawsuits focusing on aspects of the Clean Air Act, Clean Water Act Fish and Wildlife regulations, and National Environmental Policy Act of 1969. Most issues involved disputes of process. The program aims at encouraging frank and open discussions with the goal of cooperative decision making for the benefit of all.

Key trends in the transportation area include:

- Globalization of industry and E-Commerce, leading to the criticality of improving transportation to serve manufacturing;
- Information technology, allowing up-to-date intelligence on freight movement, allowing innovations in integrated toll collection techniques, improved public baggage handling systems, simulation of environmental modeling, and simulation and calibration of alternative transportation policies;
- Environmental quality of life concerns involving stronger environmental policies, more efficient transportation systems, and clean air and water; and
- Fundamental downsizing of the government role, including the notion of contracting out and privatization.

Federal highway goals include the protection of both the natural environment and community integrity leading to enhanced community and social benefits. Specific technical objectives include, but are not limited to, reduction of highway runoff pollution; air emission issues to include organics, CO and CO₂; advanced auto and truck technology; enhanced wetlands banking and replacement policy; and improved regulatory oversight and overview methods leading to “environmental streamlining.” Future trends include more global thinking on the federal level, a more comprehensive approach to the processes of planning through construction, and a societal trend toward less-density housing with increased demands for contemporary transportation. Current emphasis is on compliance issues. However, an increase in education and research is critical to develop and train transportation professionals to deal with future issues and trends.

TECHNICAL WORKSHOPS

The following presents workshop summaries centered on the six major themes of the conference. The six conference themes were

- Air Quality and Energy;
- Communities, Neighborhoods, and People;
- Cultural Resources;
- Environmental Processes;
- Model Environmental Issues; and
- Systems Preservation.

Each theme is followed by an overview, and a summary of each of the workshops taken from notes made by student reporters and the editors to capture the essence of the discussion.

Some workshops submitted abstracts of the presentations. These are included in an annex to this Circular available from Mary Kissi at TRB, phone: 202-334-3205; e-mail: mkissi@nas.edu.

TECHNICAL WORKSHOP

Air Quality and Energy

General themes within this group of workshops emphasized that communications, consistency, and cost-effectiveness concerning tradeoffs were keys to planning success. We are already seeing the integration of air quality issues and transportation planning in decision making and development of state implementation plans (SIPs). Some participants were concerned that there are different ground rules for transportation and non-transportation air emission sources, which perhaps should not be surprising since such a regulatory approach parallels that which exists in the water area. Indeed, the principal problem the speakers noted was that transportation emissions needed to be projected further into the future and compliance with air quality planning must be done for that planning period. This policy differed from emissions considerations from stationary sources. It was felt that this arrangement placed an inequitably high burden on the transportation sector as compared with other sectors. Some suggest that ground rules for all sources should be the same and cost-effectiveness of all possible control strategies should be consistently measured. Speakers mentioned that while progress toward air quality goals is monitored and SIPs are changed, policy enforcement is not done. It was suggested that transportation agencies should be included in SIP development from the earliest stages and should be specifically included in development and negotiation of motor vehicle emission budgets.

Integration of Transportation and Air Quality Planning

Sarah Siwek, Sarah Siwek and Associates

Key remaining issues include dealing with the 8-hour ozone standards and how nonattainment areas will be affected by transportation questions. Global climate change and the transportation system's role will continue to receive policy and planning attention. Research is needed in support of Clean Air Act mandates with particular emphasis on the understanding and policy significance of the differences in result between real-world conditions and those predicted using conventional modeling assumptions. Significant emission reductions will take time with strong policy and technological advancement. However, the linkage between actual environmental quality and SIPs must be better correlated.

Research is underway in areas relating to advanced fuels, hybrid electric drive trains for automobiles, strategies and hardware to increase fuel economy including direct injection cars, lightweight vehicles, fuel cells, etc. FHWA is developing its research needs for understanding particulate matter (PM) emissions from vehicle traffic, including understanding implications of both PM 10 (airborne 10-micron-diameter-sized particles) and PM 2.5 (airborne 2.5-micron-diameter-sized particles). This type of pollution is made up of a mixture of different particles containing silicates, sulfates, aluminates, organics, and other materials resulting from condensation and nucleation and thus are difficult to characterize from both a chemical and health point of view. Contemporary research

relates to the relative importance of actual particle size versus concentration of particles in the air versus chemical constituents of particles. Specific issues include identification of best practices for control, methods of data collection, developing procedures for process requirements, and developing new tools of evaluation that include a capability to predict impacts on microscales.

Particulate Matter Research and Data Collection

Richard Schoeneberg, *Federal Highway Administration*

In 1999, the National Research Council published a report citing many high-priority research needs for particulate matter (PM). Among these items were outdoor versus actual human exposures, exposure to toxic PM components, and emission characterizations. Additional research areas include mechanisms of toxicity (primarily from transition metals and polyaromatic hydrocarbons), susceptibility models, and dosimetry of fine particles to humans. Vehicle emissions are major contributors to ambient air PM, particularly during the startup and acceleration phases of vehicle operation. Field scale pilot testing and monitoring with strict quality controls are taking place that should lead to better methods of analysis and development of control strategies that make the most sense. Currently 1,100 monitoring sites have been established, with an additional 250 sites looking specifically at PM chemistry. PM standards are being evaluated, and it was reported that the Environmental Protection Agency is anticipating setting revised PM 2.5 standards sometime in the 2002–2005 time frame. PM is an important concern in air quality analysis and may become even more important in the future. Research continues on such things as data collection, new models and human exposure to toxic PM components, and emission factors for diesel and auto acceleration/deceleration.

Global Climate Changes

David Greene, *Oak Ridge National Laboratory*

Global warming and greenhouse gas (GHG) concerns may have a significant impact on environmental regulation of transportation. The transportation sector accounts for about one-third of all carbon emissions, with CO₂ emissions dominating over NO_x and CH₄ emissions. Light-duty vehicles are the largest emitters of GHG.

It is anticipated that use of lightweight aluminum in vehicles and alternative fuel sources such as fuel cells could provide a practical mechanism to reduce emissions. With little improvement forecasted for fuel economy, and the dramatic growth in light-duty vehicles on the roads, emissions are becoming a more formidable problem. It is noted that the market does not value fuel economy, and an alternative fuel infrastructure (modified fuel-filling stations) could be expensive. The market does promote vehicle size, power, luxury, and safety equipment, all of which may lead to increased vehicle emissions.

Proposed approaches such as vehicle weight reductions, hybrid automobiles, fuel cells, and alternative fuels are being evaluated for emissions reduction potential.

As examples of demonstration projects, several states and municipalities are promoting alternative fuel demonstration programs for bus fleets, with the most likely alternative fuel being natural gas for urban bus applications. It is estimated that replacement of diesel buses with natural gas will lead to 50 to 90 percent lower particulate matter, 30 to 60 percent lower NO_x and hydrocarbons, and 20 to 40 percent less GHG emissions.

Changes to alternative fuels are likely to result in emission decreases, but may also result in less liquid petroleum fuels being purchased. It is suggested that this may significantly reduce gasoline taxes collected in the future, with associated implications on future road funding capabilities in the United States.

Environmental Justice, Transport, and Air Quality

Gloria Shepard, *Federal Highway Administration*

The potential for some groups, often in minority or low-income communities, to suffer disproportionately large environmental and health impacts, termed environmental justice, has become a critical issue. This issue embraces a realization that changes to urban communities often have larger effects than traditionally realized. The legal authority for environmental justice concerns has been around for a long time and was formalized by Executive Order 12898 (1994). The basis for this order, couched in both the National Environmental Policy Act of 1969 and Title VI of the Civil Rights Act, requires both public participation in the decision-making process and prevention of disproportionate distribution of burdens and benefits for public projects. It was suggested that traditionally, minority and low-income community populations are more heavily affected by industrial expansion and infrastructure modifications. A better means of identification of the basis for addressing such concerns and enhanced public participation is required. A general suggestion is that community outreach efforts start early in the planning process and be conducted to positively assure that information is readily available and understandable to the general community. Note the distinction between environmental justice and the Civil Rights Act. The former focuses on communities, while the latter focuses on individuals. Transportation planning efforts might be sensitized to local community concerns and factor them in before final plans are carried out.

Communities, Neighborhoods, and People

It is suggested that the transportation community is the advocate of communities and the public interest. While the Environmental Protection Agency is the environmental advocate, and the United States Department of Agriculture the agriculture advocate, communities also require an agency advocate to consider community impacts of highway construction. Section 109h of the 1970 Federal Aid Highway Act includes this role in federal highway legislation. It is suggested that critical challenges of community impact assessments are

- Defining who the public is and how to identify the entire diversity of the community;
- Integrating public participation early in the planning process;
- Balancing the range of views from different stakeholders in the decision-making process;
- Measuring the importance of issues in a community;
- Obtaining support for the community impact assessment process from community members, elected officials, and transportation policy makers; and
- Overcoming community lack of trust, predominant apathy, and strong cynicism for the planning process.

Community Impact Assessment: A Planning Tool for Community-Based Sustainable Development

Louise Smart, *CDR Associates*, and
Wendy Travis, *Arcadis, Geraghty, and Miller*

Community impact assessments (CIAs) are not exclusively about low-income or minority populations. Rather, they are about affected people's lives and homes. Furthermore, management must agree CIAs are legitimate and must take their results seriously for them to be most successful.

Many techniques, methods, and strategies can be used to conduct a CIA, however, no single method works for all communities and stakeholders.

Transportation and the Impact of Urban Development

Steve Sawyer, *Carnegie Mellon University*

Estimating total costs of transportation is a continuing issue. Considerations must be given to environmental costs (emission controls, environmental justice, land, and remediation), social and transit costs, and secondary and tertiary costs. Such costs are difficult to assess, yet must be justified in the long term, especially if used as a significant factor in decision making.

While conference participants agreed that we can't always build out of congestion, new forms of analysis applied to urban development can probably suggest best solutions. Such solutions and transportation models need to accommodate transportation preferences by white- and blue-collar workers, use of public versus private transportation, sensitivity preferences to transportation, and fuel costs. Many contemporary models appear mathematically elegant and computer friendly, but are questionable in terms of validity. In any travel time model, the importance of getting stakeholders to have a common language in making decisions was underscored.

Innovations in Transportation/Land Use Planning and Growth Management

Susan McDonald, *Pennsylvania Department of Transportation*

“Smart Growth” and sustainable development are becoming important policy goals (at least in some areas), although many metropolitan areas still want growth at any cost. The Environmental Protection Agency presented their “Smart Growth Index,” a geographic information system sketch model for simulating alternative land-use and transportation scenarios, and evaluating their outcomes using indicators of environmental performance. By embodying land-use plans, transportation system information, growth projections, and infrastructure service areas, the model may be used to evaluate regional growth plans, land-use plans, transportation plans, Brownfield redevelopment and annexation plans, and estimates of travel demand changes from alterations in land use. It should be noted that such models may have dual uses; when coupled with vehicle emissions models, they may ultimately be useful to regulatory agencies for developing and meeting air pollution control strategies.

Leading-Edge Innovations in Community Impact Assessment and Public Involvement in Pennsylvania

Joe Shalkowski, *Michael Baker, Jr., Inc.*

The importance of sound land-use practices as intimately linked with transportation planning was an issue that resurfaced often. Quality of life is closely linked to transportation availability. Thus, both a publicly defined vision and environmental needs are important starting points for linking transportation and land use; such issues are best addressed consciously and directly throughout the planning process.

Examples were presented linking land use with transportation planning in Pennsylvania in accord with the state's 21st Century Environment Commission. While community growth desires are of chief concern in transportation planning, such planning still must accommodate environmental and endangered species issues. Examples of such issues include wetlands replacement and protection of endangered fish habitats in urban areas. It was recognized that the ultimate goal of effectively linking transportation and sound land-use decision-making be achieved through the early mutual and respectful collaboration and commitment of the federal, state, and local representatives. A lack of open and early communication can be a severe and perhaps permanent detriment to any proposed project or activity.

The communication challenge is to enhance public involvement and buy-in in a meaningful way. This means overcoming initial public complacency, apathy, and ambivalence and subsequent public skepticism, cynicism, and suspicion. If properly done, this can lead to community interest, and begin participation and public support of planning concepts.

TECHNICAL WORKSHOP

Cultural Resources

Transportation infrastructure rehabilitation and expansion involve changes in existing patterns of land use. Beyond pollution and community quality-of-life issues, questions arise concerning the impact of transportation modernization on existing and potentially historic structures. If it is accepted that community history has value, it follows that the affected community must have input on weighing the value of preservation, costs of adaptive use, and benefits of transportation infrastructure modernization. Section 106 of the National Historic Preservation Act and Section 4(f) of the U.S. Department of Transportation Act provide a regulatory impetus to make such considerations. Sometimes, community battle lines are drawn between those dedicated to historic and cultural preservation and others who question its significance, especially in relation to potential (community and regional) benefits of infrastructure modernization.

Preservation of Pittsburgh's Historic Transportation Resources

Eric DeLony, *National Park Service*

Many project-specific examples of successful preservation exist. The existence of protectable historic and cultural resources is often brought to light by conservation organizations such as the Historic American Engineering Record, the Pittsburgh History and Landmark Foundation, the New Jersey Historic Preservation Office, the Old Main Delaware Lackawanna and Western Railroad Historic District, and others. Often, such groups suggest facilities for inclusion in the National Register, and commonly funds are raised leading to adaptive reuse strategies and private investment for restoration.

Cultural Resources and Environmental Analysis: Open Dialogue on Integrating Section 4(f), Section 106, and NEPA

Lamar Smith, *Federal Highway Administration*

Cultural resource protection is codified in Section 106 and Section 4(f). Implementation of these requirements in the National Environmental Policy Agency (NEPA) process often are based on interpretation of case decisions. While few would disagree with the notion of preservation and protection of sensitive and important resources, the identification of “sensitive” and “important,” particularly as it relates to highly local issues, is subject to question (and perhaps litigation). There is a general consensus that the issues are complex at best. Many agreed that a need exists to pursue new mechanisms for reaching agreement when issues of enhancing

programs, preserving resources, and improving the overall integration of environmental laws are under discussion. Many agreed that the NEPA process and Section 4(f) procedural requirements should be subject to major revision. While streamlining opportunities for Sections 106 and 4(f) exist, there was no consensus at this time on how it should be done.

Secondary and Cumulative Impact Assessment

Fred Skaer, *Federal Highway Administration*

The secondary and cumulative impacts are becoming an increasingly important consideration and are difficult at times to assess. Some workshop participants suggested that there may be a general mismatch between the broad responsibility that begs for a broad investigation in geographical and temporal terms and the narrower focus inherent in advancing transportation projects. Participants generally seemed to support the notion that in this area, having broad-based agency and public input up front is critically important. This input embraces questions of how to scope issues that are candidates for a secondary and cumulative impact assessment analysis, and on the methodological approach to be used for that analysis.

Dimensions of the overall problem include:

- The different mind sets between project-oriented proponents and resource-oriented protectors;
- Differences that exist in perceived responsibility to disclose impacts and approaches to mitigate impacts;
- Delineation of “where do reasonable foreseeable actions and impacts” cross over into the “purely speculative” realm;
- How do responsibilities vary for small projects versus large projects;
- When are qualitative or expert opinions and assessment appropriate, and when are quantitative methods justified and sufficient;
- The need for policy and guidance clarification versus sharing of best practice information;
- Apparent differences between the general National Environmental Protection Act of 1969 (NEPA) responsibility to assess cumulative and indirect effects and resource-specific/law-specific (e.g., historic resources under the NEPA) responsibility; and
- Definitional issues of what is a direct effect versus indirect effect versus cumulative effect.

Complex Cultural Properties and New Cultural Resource Categories

Margaret Buss, *California Department of Transportation*

Complex cultural and historic resources present challenges of definition, understanding, and general appreciation of their historical context and import. The establishment of a legal framework to deal with such issues is difficult to carry out with consistency over time.

Environmental Processes

Changes and modernization of the transportation infrastructure are likely to have impacts on the physical environment with possible influences on both human and environmental health. Some natural resource agencies (state departments of environmental protection, agriculture, health, etc.) advocate that environmental and the planning processes must formally consult and seek approval from appropriate agencies. In addition, communities, community advocacy organizations, local governments, and tribal governments may be affected and these groups too have a role to play before projects are implemented.

Environmental Streamlining: Efficient Transportation Program and Project Delivery Through Environmental Protection

Mary Kay Santore, *Environmental Protection Agency*

The general themes of this workshop examined early involvement of affected agencies and local communities, methods of reducing the regulatory burden by “streamlining” the process, and national needs for education and training of environmentally oriented transportation engineering and science professionals and staff.

It was agreed by many that early involvement in the transportation planning process by resource agencies often leads to early conflict definition and easier resolution. Integration of transportation and environmental decision making using interagency agreements and memos of understanding prepared in advance are desirable and can result in reduction of time spent for specific project approvals, and diminish the ultimate level of frustration between agency personnel. The need was stressed for early integration and advocacy for the National Environmental Policy Agency while balancing the public interest at large with a high degree of active local community involvement.

Better integration of watershed, transportation, and environmental planning is needed along with better approaches to balancing the ecological system and community impacts. Benefits and potential outcomes of taking such a proactive stance include better designs, environmental sensitivity, overall cost saving, and resolution of real and perceived conflicts. Unfortunately, and as agreed to by many, lack of funding and lack of physical space, and lack of trained personnel are key barriers that prevent substantial involvement by resource agencies in all but the most pressing of environmental issues. It was suggested by some that perhaps a state department of transportation (DOT) can fund a regional or federal agency for a dedicated environmental coordinator so that the DOT may get priority in the environmental review process.

From a technical point of view, it was agreed by many that better methods are needed to integrate land-use, watershed, wetlands, and remediation and environmental planning into constructed projects.

Documenting best practices in environmental streamlining processes could be a valuable topic for research. Once processes and problem-solving techniques are documented, performance measures should be developed and calibrated to models. Additionally, research is needed to understand the latest travel forecasting techniques and how they may be incorporated into the environmental streamlining process. It was pointed out that there are currently many “new” transportation and land-use planning techniques available or under development that should be considered when making transportation/environmental impact decisions. Better documentation on “best practices” is required along with enhanced mechanisms of “technology transfer” to other practitioners.

How to Equip the Transportation Professional of the Future

John Mason, *Pennsylvania State University*

Competency must be improved for both environmental and transportation personnel. Often, the educational background of the planner, environmental scientist, and environmental engineer have little in common, and the need exists to enhance both the breadth and depth of such transportation-oriented individuals. Key competencies required include understanding ecology as a science; the nature and quantification of physical, chemical, and biological environmental phenomena; statistics; communication skills; creative thinking; team learning; risk assessment, environmental stewardship, and public policy. Basically, “policy folks” need to become more science and engineering oriented, and “technical folks” need to become more “people oriented.” The usual university or college bachelor’s degree graduate is not equipped to handle the demands of transportation and environmental stewardship without additional or specialized training. An understanding of issues beyond the regulatory knowledge level is often required to work with the public, stakeholders, and environmental policy makers. Often, experience leads to on-the-job training but unfortunately, the time necessary to gain experience may not be available. This can lead to misjudgments in decision making and unsatisfactory results for both the project sponsor and stakeholders.

Suggested methods for developing young graduates include

- Agency and private sector sponsorship of undergraduate internships and co-op programs;
- Sponsorship of research, research projects, and graduate training grants leading to production of university-trained graduate students; and
- Sponsorship of continuing education activities for practicing transportation professionals.

The most cost-effective means of enhancing transportation education is at the graduate level. While undergraduate internships are relatively inexpensive, expenditures at the graduate level tend to foster professionalism and student commitment. In better university programs, full-time graduate students are required to develop, write, and ultimately defend a thesis or project. This activity teaches involvement in long-term work

efforts, teamwork, creativity in thinking and presentation, ability to withstand scrutiny of peers (and professors), and responsibility and ownership for one's own work. Such skills are exactly what are needed by contemporary transportation professionals.

Considering Environment in the Planning Process

Neil Pedersen, *Maryland State Highway Administration*

A number of examples were presented of how state departments of transportation (DOTs) make errors in incorporating environmental considerations into the National Environmental Policy Act of 1969 (NEPA) and transportation planning processes. Common themes expressed include:

- Failure to meet customer demands,
- Inability in obtaining permits or obtaining them in a timely fashion,
- Inability to balance natural system and community impacts,
- No link developed between land-use and environmental issues,
- Duplication of effort by involved parties,
- Public frustration and anger, and
- Staff frustration and anger.

North Carolina DOT (NCDOT) is attempting to mitigate such issues by implementing a series of three programs.

- **Phased Environmental Process** that brings environmental agencies [such as the state Department of Natural Resources, U.S. Army Corps of Engineers (USACE), etc.] into the process of planning a transportation corridor. It was reported that overall this approach has not worked to date, due to apparent lack of agency commitment and agency emphasis on natural systems.

- **Creation of a 404/NEPA merger team** that involved developing a signed Memorandum of Understanding between NCDOT, USACE, and FHWA to engage in environmental issues early and often. The agreement specified four points during the planning process where concurrence must be reached before moving to the next stage. This program has had problems with its inability to balance natural system and community impacts, lack of linkage to system planning issues, and public frustration.

- **Pre-Transportation Improvement Program planning.** This is a pilot program that attempts to replace the feasibility study with environmental screening at a level on which agencies will sign off. Its major advantage is that it deals with natural systems and community impact simultaneously.

One large advantage of all these programs is that they build trusting interpersonal relationships with agency partners.

Programs with similar intent were reported by representatives of the Association of Metropolitan Planning Organizations, TRANSCORE, and FHWA. General discussions

focused primarily on two issues: procedural issues that can serve as barriers to linking environmental permitting with planning, and the influence of the courts in discouraging linking the planning and NEPA process together.

Some commentators voiced concerns about obtaining agreement from environmental agencies based on “purpose and need” of the project before applying for permits. Others noted that most agencies do not feel a commitment to becoming involved in the project until permits are formally applied for and the NEPA process begins. It should be recognized that NEPA is a planning statute. Application of NEPA to the planning process would mean involving the public and generating data to back up planning decisions that could be used when the NEPA process begins.

Mechanisms encouraging appropriate community involvement are needed. Several individuals noted that resource agencies (such as departments of environmental protection, etc.) are typically reluctant to involve the public early on (contrary to the themes of major needs expressed at this conference) since the public was required to be present only at the environmental permitting stage. Another suggestion was that resource and transportation agencies should concur that if the public would enter early in the process, the transportation agency would agree in advance to withhold any preconceived alternatives it may have (such as building a new road with a specified corridor) and the resource agency would take the lead in managing public participation. No examples of this approach were presented since the legal framework to define it has not been formalized to date.

Transportation Environmental Stewardship: Moving Beyond Compliance and Mitigation

Denise Rigney, *Environmental Protection Agency*

The notion of environmental stewardship is the sharing of ownership of a project with elements of the public and/or the appropriate agency. It was agreed that building an environmental ethic in a contemporary transportation organization is critical. Environmental stewardship is a corporate goal and motivator of human action and interest. Environmental stewardship is taking actions that do more than follow regulations and “fix” the environment. Environmental stewardship requires looking for opportunities to avoid harming the environment in the first place coupled with actions leading to improvement where low-cost opportunities exist. Such suggestions may not necessarily originate from paid consultants, but can rather originate from non-traditional sources such as individuals in the community (perhaps even children) or from department of transportation (DOT) construction and other workers. DOT experiences encouraging environmental stewardship vary from state to state with factors of variability including flexibility and openness of state environmental agencies, acceptance of alternative ideas or remediation actions by DOT management and elected officials, and the institutional financial and labor resources available.

Presenters agreed that when the DOTs embrace environmental stewardship, the environmental impacts of transportation and both the cost and times of environmental projects tend to be reduced. Better management techniques are needed consciously to

build and support environmental stewardship in DOT management, staff, and program activities.

The “doing” brings home the message more than simple rhetoric. For example, construction teams in one state were allowed to stock wetland ponds with fish, and allowed to dig them a bit deeper than usual to allow the fish to survive the winter. In other regions, local students were invited to archeological digs, wetlands, and tree planting events as educational activities. These actions allowed people in the community to become vested in the process, and in doing so helped ingrain the notion of environmental stewardship in the DOT and served communities. Secondary benefits include promoting informal interactions between project developers, agencies, and the public. On the other hand, it was expressed that informal interactions may lead to potential law suits, especially in controversial projects, and possibly could cost more money in the end in terms of staff time and travel.

It was generally agreed, however, that real success comes when environmental ethics and mindsets are inculcated into organizational culture and when evidence of this mindset clearly is shown to the public and effected communities. Furthermore, the existing barriers to implementing such needed changes often reside within the highest levels of management. Acceptance and enthusiastic support by management are important for true environmental stewardship to take place.

TECHNICAL WORKSHOP

Modal Environmental Issues

Transportation systems considered herein include airplane/jet engine design and emissions, airport construction and maintenance, seaports and waterways, and rail transit corridor construction and maintenance. Important environmental issues relating to these facilities include contaminated sediments and sediment management to maintain ports and harbors, airport deicing facilities and substances, aircraft emissions and associated noise pollution and air pollution, and surface water/ground water pollution. In addition, potentially constraining issues exist concerning Maritime Law (which is governed internationally), conformance of air transit issues with FAA requirements, and management issues of scheduling departure and arrival times for aircraft, ships, and trains.

Trends in Environmental Impact Assessment for Airport Development Programs

Dan Wormhoudt, *Environmental Science Associates*

Major issues discussed were those of National Environmental Policy Act of 1969 (NEPA) documentation and general conformity requirements to airport development projects. The FAA will soon be examining issues of environmental justice, noise, air quality evaluation, and hazardous materials. Advancements in environmental evaluation technology are online, which include use of geographic information systems and satellite imagery.

Airport infrastructure modernization or new airport construction involves evaluation of air quality impacts, evaluation of landside improvements and supporting surface transportation corridors, and potential for water and storm water runoff and control. Such issues must be integrated with state implementation plans, and affected communities should be involved early in the air and environmental quality planning process. Matters of concern include aircraft emissions (ozone and ozone layer depletion), greenhouse gas emissions, local air quality, noise, and design of engines to reduce aircraft noise. A need exists to refine air quality models used in NEPA as applied to airports, however, application of air regulations to air transit is often done in a “piecemeal” fashion.

Wetland creation and banking mitigation (banking of wetlands) appear successful in meeting storm water requirements. It should be cautioned, however, that wetlands often act to attract migratory and other birds that may not be desirable near airports.

Environmental Issues Facing Ports and Waterways

Larry Daggett, *Waterway Simulation Technology*

Seaports and waterway issues include management of contaminated sediments (to reduce dredging requirements and to manage disposal or reuse of dredged materials), air quality, and indigenous/non-indigenous aquatic animal species. Many of these issues require a “systems” perspective, not only from a technical point of view, but also institutionally.

The maritime transportation sector is different from other transportation sectors in that international shipping policies and standards exist. The international aspects may limit and inhibit what can be accomplished and how solutions to environmental issues must be approached. Often, however, port facilities are not invited to the table even when discussing “their” issues. It was agreed that planners and regulators should be better trained with specific education concerning such issues so that international facilities may be better integrated into transportation/environmental planning.

Other issues raised by participants include

- Air pollution is an emerging issue for the maritime community;
- Improvements in water quality have opened the door for the invasion of certain aquatic species: both recurrence of indigenous species and infestation of non-indigenous species;
 - Marine transportation needs to be represented in developing environmental improvements and regulations;
 - Much of the marine transportation infrastructure is private, not public;
 - The marine transportation industry is mobile and can and will move if regulations and operational limitations become too restrictive and competitiveness is lost;
 - Most transportation related problems cannot be addressed as highly focused issues—a system approach must be taken accounting for interrelationships and interactions including tradeoffs that might result if the marine transportation mode is restricted or eliminated;
 - Methods for improving air quality involving marine transportation, including the mobile units (ships, tows, ferries, tugs, etc.) and the land-based units (stationary cranes, container lifters, trucks, etc.) will require more research as these contributors to air emissions become more involved in improving air quality, especially in areas currently not meeting standards;
 - The marine transportation community could benefit from educating the policy, regulatory, and rule makers and the public;
 - The marine transportation community could take a more proactive and aggressive role in solving their environmental problems and work in partnership with other transportation entities in developing solutions; and
 - Concerns exist about how the U.S. Army Corps of Engineers will handle their regulatory role as the key federal agency for marine issues in dealing with meeting environmental requirements, particularly in air quality general conformity requirements and invasive species control.

Next Millennium Tools for Rail Corridor Environmental Analysis

Marilyn Duffey, *The Duffey Company*

There are a number of new technology transfer tools available for passenger rail environmental analysis and high-speed rail corridor studies. Such tools include geographic information systems, Global Positioning System, computerized data management and visual imagery, digital photography, and websites. In relation to high-speed rail, the public is typically interested in vibration, noise, and potential for electromagnetic interference. Recently, the FRA published a new procedures manual with guidelines detailing noise and vibration levels for high-speed rail in the United States. The manual provides guidance and spreadsheet analytical techniques, provides noise and vibration criteria, provides a standard set of procedures for assessment, defines appropriate mitigation methods, and provides report preparation and documentation guidelines that will conform to National Environmental Policy Act of 1969 standards, and is based on research. Additional research is necessary to provide alternative treatments for high-speed rail corridors that can better reduce noise and vibration impacts. Current treatments are expensive and can interfere with maintenance practices.

Innovations in Transit Planning and Project Development

Marilyn Skolnick, *Port Authority of Allegheny County*

Application of geographic information system (GIS) technology has been highly instrumental in building consensus among agencies during corridor screening and has effectively replaced the traditional “overlay map” technique. This approach is integrally linked to streamlining. Furthermore, advances are made in the use of computerized data management systems to create the administrative record for National Environmental Policy Act compliance and simplify timely public input. The availability of such advances mandates additional training of agency personnel on the use and application of GIS.

Some participants suggested that doing effective transit planning without knowing funding levels and availability was difficult. Alternative sources of funding are required beyond that from the federal government, especially for public transportation in rural areas.

Systems Preservation

Environmental management systems (EMS) are a set of processes and procedures that allow an organization to analyze, control, and reduce the environmental impact of its activities and operate with greater efficiency and control. The Environmental Protection Agency views EMS as a tool to address the many non-regulated environmental pollution issues that may be necessary for ongoing decision making. The major growth area for EMS is in public agencies. However, lessons in the development and advanced use of EMS may be learned from the corporate sector and from European counterparts. There was a general sense that EMSs will become more widespread in the United States in the future, especially as familiarity grows through the use of pilot programs. In addition, it was suggested by some that the use of EMS be expanded to include elements of energy efficiency and environmental acceptability. Key barriers to implementation of EMS include employee commitment and marketing of the notion at all levels of the agency, additional costs of implementation, efforts in implementation, and sustaining day-to-day interest in maintaining and updating the EMS system.

Conceptual Planning and Design of an Environmental Management System

Robert Tatman, *Ohio Department of Transportation*

Overall, emergency management systems (EMS) are becoming a much more important tool for both the public and private sectors. This is driven by

- Customer or stakeholder expectations,
- Environmental management stewardship concerns,
- Potential cost savings, and
- Uniformity in management from project to project.

Implementation of EMS requires

- Need for top management support;
- Adequate reflection of the boundaries of the organization;
- Definition of legal implications for adopting EMS procedures;
- Identification of key players;
- Realistic time frames;
- Communication of benefits to workers, stakeholders, and the public at large; and
- Self-auditing and perhaps disclosure of noncompliance instances and issues.

EMS are being implemented at airports. Unlike many industrial sectors in the scale of operation airports face unique challenges such as the large variety of operations with many environmental issues, the significant number of tenants and contractors involved (the airport is

responsible for compliance, while the airlines do most of the activities), and the need to maintain good relationships with the local community.

Moving Toward Implementation of an Environmental Management System

Robert Tatman, *Ohio Department of Transportation*

A strategic environmental management program is being implemented by the Pennsylvania Department of Transportation (PennDOT). PennDOT, with more than 12,000 employees and 1,500 facilities, has been selected for the government's "lead by example" initiative with a goal of becoming ISO 14001 certified.

It was agreed that adoption of the emergency management system (EMS) is an approach to be followed to improve energy efficiency and prevent pollution by otherwise environmentally responsible activities. The "green image" is accepted by many in the manufacturing sector (especially in Europe). The concept of "green construction and sustainable development" is being adopted in the public sector as well. While many public sector agencies may initially find it difficult to implement because of the broad scale of their operations, such agencies may have adequate resources to get started at least in one initial area. Demonstrated successes in the initial area of endeavor may cause enhanced funding and modernization of government policy directives on EMSs. Furthermore, the adoption and use of EMS are excellent opportunities for the public sector and transportation agencies in particular to set examples for sister agencies and to build some better public images.

Best Management Practices for Environmental Issues Related to Road Maintenance

William Hyman, *Booz-Allen and Hamilton*

Best management practices (BMPs) relating to road maintenance are becoming popular and well utilized within state departments of transportation (DOTs). Observed benefits include facilitation of cooperation between those who design transportation projects and the subsequent implementation by maintenance workers and engineers. Underlying factors relating to development of BMPs in road maintenance include the necessity to use cross-functional capabilities within departments (planners and designers working on maintenance projects) and communication with other agencies and the community affected by the maintenance initiative.

Allowing DOTs to be seen by the public as a solution to the issue of environmental stewardship and as the connection with the many other agencies and organizations is critical. As an example, the New York State DOT actively encouraged community groups to become involved in environmental stewardship and worked with their lawyers to allow such groups access to land for activities such as planting of flowers.

DOTs need to be aware of possible negative consequences, however. For example, the Minnesota DOT found themselves in the position of having to test hazardous materials that companies would submit for potential recycling as an additive to concrete. The uses of BMPs are desirable, but DOTs are cautioned to examine legal implications before involving community participation in maintenance efforts.

Brownfields Redevelopment and Transportation

Joseph Chnupa, *Pennsylvania Department of Environmental Protection*

Brownfields (as opposed to “greenfields”) are previous industrial sites, usually within urban areas and connected to the city by existing roads, power lines, telephone links, and other utilities. Brownfield development usually makes economic sense since it can bring such unused properties back to the municipal tax rolls. Commonly, however, brownfield sites must be cleaned up or restored before being reused—often a time-consuming and costly process.

Issues of brownfield development and transportation are linked as follows:

- Access to transportation facilities is essential to brownfield redevelopment,
- Transportation of heavy equipment and contaminated soils is often connected to brownfield site development,
- Federal highway funds [available through the Transportation Equity Act for the 21st Century (TEA-21)] may be available to cleanups and create value along transportation corridors that transect contaminated sites, and
- New transit projects are often designed to accommodate new community redevelopment in the vicinity of brownfield sites.

Creative ways are needed to use transportation funding to help in the redevelopment of brownfields. A Kansas City project took advantage of the transportation planning and funding process to help redevelop brownfields. Bicycle and pedestrian trails linking several brownfields with the riverfront and a historical district were constructed. Suggestions for success exemplified by this project include

- Mastering the Congestion Mitigation and Air Quality and TEA-21 grant process administered at the regional level,
- Sound planning and concept design, and
- Designation of the entire trail as a single federal project by the FHWA and the local metropolitan planning organization.

It was suggested that it is desirable to reduce the complexity for obtaining funds; a “one-stop shopping” approach is needed. In addition, the liability for contamination is still a significant issue and states may have different standards for a “clean site.” Pennsylvania, for example, has developed the Industrial Land Recycling Act with associated regulations and guidance documents, which limits liability and develops a risk-based cleanup approach for former industrial sites.

FINAL PLENARY SESSIONS

The final plenary session, Tuesday, July 25, included presentation of transportation environmental analysis models as developed by the Environmental Protection Agency and FHWA.

New EPA Tools for Environmental Analysis

Marilyn Zaw-Mon, *Environmental Protection Agency, Moderator*

The Environmental Protection Agency (EPA) is developing tools for community use in examining growth alternatives. “Smart Growth” is a notion that can enhance both economic growth and the environment, keeping goals such as clean air and conservation of environmentally sensitive lands at the forefront of decision making. To help communities in making Smart Growth decisions, EPA has offered the “Smart Growth Index” model, which represents how certain changes could affect a community. While currently considered for planning purposes and not yet sophisticated enough to be a regulatory tool, the model requires geographic information systems (GISs) with proprietary ArcView coverage using a shapefile (an input file with coordinates of shapes or points). Information on land use, housing point data, employment point data, future and street center coverage, and other U.S. census data is required by the model. The model may be used to predict impacts of land-use changes on travel patterns and air pollution. It is suggested that use of the model can help community planners make choices and develop growth strategies that minimize traffic congestion leading to better air quality. It should be noted that the current model version only looks at criterion pollutants and greenhouse gases, and does not take into account toxic pollution at this point. The model is being calibrated in 20 selected communities as pilot scale projects.

One subset of the Smart Growth Index model is a spreadsheet model for estimating travel demand impacts associated with land-use changes. This model, developed from 27 selected transportation studies, uses the variables of population density, diversity, and design and correlates these values with vehicle miles traveled. Limitations of the model are that comparison of model outputs with actual “field” results have not been done, and the model did not directly take into account community and human behavior.

EPA’s Commuter Model was presented for assistance in developing multi-occupancy vehicle plans. The model predicts effects on air emissions resulting from policy incentives designed to change public behavior. Policy changes include “soft incentives” such as provision of information, encouragement, and impediment removal, and programs leading to changes in travel time and cost such as charging for parking, etc. This model is currently piloted in Houston and Chicago.

In response to audience questions, Eric Herzog observed that many air pollution problems in rural areas are associated with transported pollution—pollution that originates from outside the area. Rural areas should work with their closest metropolitan area with regard to land use and environmental planning to help address this problem.

New FHWA Tools for Environmental Analysis

Michael Savonis, *Federal Highway Administration, Moderator*

The FHWA presentations focused on developing better estimates of emissions from mobile sources, induced demand (additional transportation demand because of availability of new facilities), and how performance can better be modeled and assessed.

The TRANSIMS model is an FHWA computer program to model vehicle emissions during acceleration and deceleration on a microscale environment, using 30-meter increment blocks. Model outputs suggest that most significant levels of NO_x were emitted from the vehicle while the engine is under loads during acceleration, while most of the hydrocarbons are released upon braking. The presenter suggested that this model would be better able to deal with changes to given conditions than other models. A limitation of the model is that calculated emission values are used rather than actual onboard vehicle measurements. In addition, the current model does not include diesel particulates, but work is underway to develop a second-generation model that does.

FHWA developed the Spreadsheet Model for Induced Travel Estimation. The notion is that if additional carrying capacity is supplied to a transportation corridor, such as an extra travel lane or replacement of a two-lane road with a limited-access four-lane divided highway, additional demand for that corridor will be induced. Demand elasticity, a measure of increased traffic owing to the corridor improvement, will be greater in rural areas than in urban ones due to the development effects caused, in part, by the corridor improvement. Two types of induced demand will result.

- Diverted travel: traffic rerouted from other roads, and
- Induced travel: traffic resulting from new trips, existing trips going further, a shift of travel mode from mass transportation (bus, etc.) to automobile, and a shift in the time of day of travel (from off-peak to peak times).

The model can estimate costs and benefits of induced traffic change, enabling a planner preliminarily to judge the advisability of a proposed traffic improvement strategy. Examples of potential applications include predicting the effect of conversion of high-occupancy vehicle lanes to normal traffic lanes (which add extra carrying capacity to the traffic corridor) and prediction of the influences of new land-use developments. Indeed, perhaps half or more of induced demand is land-development related. The presenter suggested that one should consider short-term and long-term effects of corridor modification. In the short term, equilibrium in traffic patterns are reached in about a year or two, while long-term equilibrium takes about 10 years or so because of land use changes.

Tools are required for the measuring and assessment of environmental performance. The overall goal is to assess the current level of program environmental stewardship and ensure systematic improvement in state transportation projects.

Environmental performance involves issues of community impact assessment, environmental justice, public involvement, pollutant mitigation and environmental quality enhancement, multi-agency coordination, and the nature of the decision process. Scores of “low,” “medium,” and “high” are assessed against the various performance measures; the assessments being made by a multidisciplinary group of engineers, planners, and community relations experts.

CLOSING AND OBSERVATIONS

Dr. Michael D. Meyer, from the Georgia Institute of Technology, provided the final wrap-up session, “What Have We Learned at the Conference.” As indicated above, engineering graduate students from the University of Pittsburgh, Carnegie Mellon University, and Pennsylvania State University were the “eyes and ears” for Dr. Meyer. These young professionals sat in on all sessions and diligently (and intellectually) recorded and interpreted presentations, comments, and the thrust of follow-on questions and answers, much of which was used by Dr. Meyer in the creation of his wrap-up session and by the proceedings authors for their preparation.

Dr. Meyer offered a number of observations and general conclusions.

1. Many practitioners are moving from the design of individual transportation components (pavements, signals, etc.) to a more integrated basis of environmental systems design. Such a systems approach can account for geographic and community perspectives, institutional constraints, ecosystems, habitat management, and reporting/monitoring approaches. Substantial questions exist of how problems are defined and boundaries of problems, who is or should be involved, and strategies employed.

2. The environment and issues of sustainable development are becoming more important. Such issues require understanding of ecosystems, the notion of quality of life, and “smart growth.” These concepts are particularly useful in integrating transportation components into systems and designing transportation facilities to serve communities and the wider public.

3. Moving such issues to earlier points in the process to get agreement from all parties is critical, including the public, stakeholders, and affected agencies. This works best if it is open, inclusive, and flexible. Challenges exist about how to make such agreement meaningful so that it properly reflects the public interest. Flexibility implies responding to new problems as they come up. Not only could environmental issues be moved into the planning process, but planning agreements could be moved into the project design phase.

4. The “who” is critical since transportation planning is ultimately a quality of life issue that has long-term effects on individuals, communities, and the environment. Specifically, communities and demographic groups (e.g., low-income families) will no longer accept a greater burden of negative transportation impacts or substandard transportation services. Consequently, there is an increasing interest in developing equitable growth strategies for both urban and rural areas.

5. A challenge exists to inculcate environmental ethics and stewardship into department of transportation and resource agencies. There is a societal trend toward accountability, which leads to a need for cost-effectiveness considerations throughout the process and program monitoring throughout. This requires a move from being “checklist-oriented” to developing creative and analytical/communication skills.

6. Communications and education are important to success. Our higher education institutions have the challenge of producing young professionals with both the technical skills and communication/people skills necessary for the future.

7. Pilot studies, best practice examples, technology transfer, and case studies are considered more effective and more desirable than regulation by those who are subject to current regulatory processes. However, there is little evidence that such steps alone can provide adequate levels of environmental protection.

APPENDIX

POSTER SESSIONS AND ASSOCIATED ABSTRACTS

Joe Shalkowski

Michael Baker, Jr., Inc.

Organizer

Forty-seven posters were created for the conference, all of which were on display for the duration of the conference. These were organized into thematic “sessions.” The session titles were

- Environmental Stewardship,
- Best Practices in Environmental Resource Management and Mitigation,
- Leading Edge Information Management and Technologies,
- Environmental Streamlining,
- Innovation in Public Involvement, and
- Premier Modal Projects.

Each of these sessions are briefly summarized, followed by abstracts of each poster.

Environmental Stewardship

These posters discussed environmental management systems (EMSs) and environmental issues in transportation planning from various perspectives. Overall, these posters showed that EMSs are a relatively new, formalized means of introducing environmental concerns into transportation planning, mostly to comply with environmental regulations. Some EMSs (discussed below) clearly transcend this compliance focus, and the quality of EMSs also clearly varies considerably worldwide. As elsewhere in the conference, these posters emphasized improved communication and the importance of top-to-bottom acceptance of and support for environmental goals within transportation planning organizations.

At the most localized levels, some of the posters included descriptions of the EMSs used by local transportation planning organizations. At the most aggregate, one poster provided a sampling of EMS use worldwide. In the middle, several posters described environmental planning activities undertaken by the commonwealth of Pennsylvania.

The two local examples were New York City Transit's Capital Program Management (CPM) Department and the Pittsburgh International Airport (PIT). These posters provided a good contrast between EMSs focused on environmental goals (CPM) and one focused on the management of compliance with environmental regulations (PIT). The CPM manages a \$3-billion annual budget, which funds about 150 projects at any one time. This EMS started out as a simple checklist used to quickly evaluate projects, but this approach proved to be ineffective, sometimes requiring costly remedies after construction had started. Additional factors leading to an improvement in the EMS at the CPM include a capital budget which has grown significantly over the last several years, more complex environmental regulations, and greater public awareness of environmental issues. CPM determined that it should develop an ISO 14001-compliant process, which helped the organization realize it needed to address environmental issues both on a project level and organizationally. Thus, CPM uses a continuous improvement model for environmental planning, including semi-annual compliance audits by third parties. In addition, the entire New York City Transit organization is ISO 14001-compliant, as are all CPM vendors.

The EMS developed by PIT is somewhat different, it is not ISO 14001-compliant, it focuses much more on compliance and record keeping than on planning, and it includes financial goals. An important goal of this EMS is minimizing the costs of environmental controls by monitoring closely and seeking ways to reduce costs.

The Pennsylvania environmental planning efforts discuss several planning documents and the processes by which they were produced. The documents themselves deal with contemporary issues of sustainability, smart (or responsible) growth, and emphasis on cooperative planning between different governments (e.g., state-local or local-local). The processes described in the poster display an effort to involve the public significantly.

The Report of the 21st Century Environment Commission was created by a group appointed by the governor in 1997 to make recommendations to improve the environmental quality of the commonwealth and measure the results, while allowing for

enhanced economic and social progress. The report contained 240 recommendations, and the Pennsylvania Department of Transportation (PennDOT) was required to respond to all of the relevant items. PennDOT went through an extensive planning process that included multilevel review, interagency consultation, and focus group meetings. Eventually the State Transportation Commission approved several new initiatives in response to the report. In general, these initiatives tend to increase the number of extent land-use issues that are considered when new transportation projects are planned, and integrate environmental considerations more centrally in all PennDOT activities.

This emphasis on land-use issues in Pennsylvania was reinforced by the next poster, which was developed for the Governor's Center for Local Government Services. This poster described three reports the center had recently produced on land use, including the methodologies used to work with the public to develop them. An important part of these efforts is to develop new techniques for visualizing the impacts of transportation projects, which the poster described.

The final poster presented research on the use of EMSs, and in particular ISO 14001-compliant EMSs, around the world. The use of this standard is growing rapidly in business, but somewhat more slowly in the transportation sector than elsewhere. National legislation and efforts to harmonize standards in order to gain trade advantages are speeding the process, however. Moreover, the survey shows that the United States lags significantly behind other industrialized countries in the development and implementation of EMSs, and particularly in developing systems that comply with international standards such as ISO 14001. For instance, none of the 28 states with an EMS in place, under development, or under consideration are using the ISO standard. The poster makes the case that this trend should be corrected, and provides a number of essential ingredients for successfully doing so.

Building the 21st Century Mon/Fayette Expressway: Preserving the 19th Century National Road

Norene Halvonik, *National Road Heritage Park and Benatec Associates*

Norma Ryan, *Brownsville Area Revitalization Corporation and
National Road Heritage Park*

Robbi Matesic, *Benatec Associates and National Road Heritage Park*

The Pennsylvania Turnpike Commission (PTC), in recent years, has pursued the design of a new toll road facility, the Mon/Fayette Expressway, that will extend from Pittsburgh, Pennsylvania, to Morgantown, West Virginia, where it will connect with Interstate 68. Between Brownsville and Uniontown in Fayette County, the expressway will run parallel to and connect with the historic National Road, America's first interstate highway. The National Road was constructed in 1811–1820, from Cumberland, Maryland, to Wheeling, West Virginia. The 90-mile segment of the National Road in Pennsylvania was designated as a National Road Heritage Park (NRHP) by the Commonwealth in 1994. In 1999, the 11-mile section between Brownsville and Uniontown was determined to be eligible for listing on the National Register of Historic Places.

During the preliminary engineering and environmental investigation tasks of the Mon/Fayette Expressway, the PTC Management Team focused on design alternatives

that protected the integrity of the National Road and its resources. The PTC had recognized the National Road as a valuable cultural resource and maintained a close relationship with the NRHP during this time. Concurrently, the Fayette County Office of Community and Economic Development initiated an update to the Fayette County Comprehensive Plan addressing the potential development impacts of the proposed Mon/Fayette Expressway and assessing its consistency with the NRHP Management Action Plan through local zoning and land-use ordinances and subdivision regulations.

During the preliminary engineering phase of the Mon/Fayette Expressway, the PTC Management Team, working closely with the NRHP, focused on design alternatives that will protect the integrity of the historic roadway. Two alternatives have been advanced through the detailed preliminary engineering and environmental studies, both of which afford equal protection to the National Road and its viewshed.

- **Context Sensitive Design:** The proposed construction of an overpass to carry the National Road over the expressway requires a structure where one has never existed. To compensate for this change to the landscape, the PTC has proposed a structure design that provides an aesthetic treatment for the National Road travelers and meets current engineering design criteria for capacity and safety. The structure will be wider than the bridges that are typically constructed on principle rural arterials to include an area for aesthetic landscaping treatment, so that the visual continuity of travel along the National Road is not disrupted by a modern bridge and parapet.

- **Smart Growth:** The Mon/Fayette Expressway will require the construction of one connector road intersection on the National Road and two intersections that will utilize existing connector roads. The potential growth and secondary development associated with the expressway render the intersections of the connector roads particularly vulnerable to development. This could jeopardize the NRHP's goals to enhance the historical character of the National Road and its resources. Recognizing the need to effectively manage the growth and avoid inappropriate development, the PTC and the NRHP are working with the Office of Community and Economic Development (OCED) to update zoning and land-use ordinances that include overlay zones for the protection of the National Road. As the agency that actually enforces planning and zoning regulations in most of the communities located along the National Road, the OCED is in a particularly advantageous position to effect positive change.

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Past, Present, and Vision: Evolution of New York City Transit Capital Program Management Department's Environmental Management System

Collette Ericsson, Charles Abdallah, and Brian McLean,
MTA New York City Transit, Capital Program Management

The Environmental management system (EMS) of New York City Transit's (NYCT) Capital Program Management (CPM) Department has evolved from a checklist and procedure to an ISO 14001-certified system. Currently in its second year of certification, CPM's EMS provides the framework for capturing and responsibly managing the environmental aspects and impacts of NYCT's capital program valued at nearly \$3 billion a year.

NYCT manages and operates the bus and subway service for the five boroughs that make up New York City, serving over six million customers a day. CPM plans, designs, and manages the construction of capital work for the NYCT system. CPM typically has about 150 projects running concurrently, including projects for subway stations, bus depots, signaling systems, line equipment, shops and yards, structures, and power systems.

ORIGINS OF THE EMS

Historically, to launch a new capital project, CPM performed a brief evaluation of the environmental aspects of the project using a checklist. The results of this initial evaluation might trigger a more detailed environmental assessment. Environmental permits identified were procured and the project was constructed. This crude EMS was not entirely effective. Lacking adequate planning and implementation, some of the projects' environmental aspects were overlooked. Expensive remedies were sometimes necessary at the construction stage. NYCT was sometimes out of compliance with environmental regulations.

EVOLUTION OF THE EMS

The rapid growth of NYCT's capital program, the ever-increasing complexity of environmental regulations, and the rising community awareness of environmental issues have underscored the necessity of an effective EMS. CPM staff recognized that its existing EMS needed refinement and that the organization as a whole needed to be more competent in environmental aspects.

In the late 1990s, CPM determined that it would improve its EMS using the ISO 14001 standard. During CPM's struggle to refine its EMS and to become ISO 14001-compliant, a cross-functional team evaluated CPM's core business activities to determine which of these has environmental aspects. Because CPM is essentially a project management organization, the inclination was to focus on improvement goals and objectives at the project level rather than the organizational (global) level. After much internal debate and analysis, however, CPM staff realized that all of its projects have

common elements and that improvement efforts should be focused at an organizational level and be applied globally.

In March 1999, CPM underwent its ISO certification audit, performed by Underwriters Laboratories. This three-day audit confirmed that CPM's EMS was ISO-compliant. CPM gained its ISO certification and became the first public agency in the United States and the first mass transit organization in the world to do so.

Elements of ISO 14001-Compliant EMS

CPM's EMS incorporates the five elements of the ISO 14001 continuous improvement model.

Policy

CPM's Environmental Policy proclaims protection of the environment as one of the organization's highest priorities. The policy requires CPM to minimize its adverse environmental impacts and to go beyond compliance in meeting its environmental responsibilities.

Planning

At least once a year, a team evaluates CPM's significant environmental aspects and considers these in setting environmental performance improvement goals and objectives for CPM. A change in core business activities or a change in the regulations may trigger a re-evaluation of CPM's significant environmental aspects. For the year 2000 and beyond, CPM is working on incorporating sustainable or high-performance design into a few pilot projects.

Implementation and Operation

CPM has defined roles and responsibilities for its EMS and these are detailed in its EMS procedure. CPM has also dedicated resources to the implementation and control of its EMS, including existing and newly hired staff. CPM has identified awareness and competence training as key to the successful implementation of the EMS. CPM has introduced and explained the EMS at department-wide meetings and at smaller group settings.

Checking and Corrective Action

Quarterly, the EMS Director evaluates CPM's progress toward the environmental performance improvement goals by assessing which of them have been completed. Every six months, CPM undergoes a third party compliance audit. The audit results prompt corrective action and, perhaps, further refinement of the EMS. CPM is also embarking on a formal self-auditing process.

Management Review

CPM's EMS Coordinator conducts frequent reviews with CPM's leader, the department's Senior Vice President, to keep him informed of all activity and progress related to the EMS. The Senior Vice President endorses the continuous improvement goals and objectives and ensures that the necessary resources to carry out the EMS are provided. One of the strengths of CPM's EMS, as determined by the third party compliance auditor in March 2000, is CPM's management support of the process.

VISION

CPM's vision for its EMS is captured as follows:

- Environmental excellence is considered by every employee to be an integral part of the job,
- High-performance or sustainable design principles are incorporated in every capital project,
- CPM's high-performance design guidelines are the standard for the mass transit industry,
- Every one of CPM's vendor partners has an ISO-compliant EMS,
- CPM is trusted and supported by the communities it serves and its regulatory agencies, and
- NYCT is ISO 14001-compliant agencywide.

Environmental Management Systems: Level of Implementation in Transportation Agencies Worldwide

Geoffrey R. Forrest, *Transportation Services, Dresdner Robin*

Clare Sullivan, *Environmental Management Services, Dresdner Robin*

Environmental management systems (EMSs) have been strongly established in Europe since 1995 and, to date, to a lesser extent in the United States. This trend will change with the advent of the National Environmental Performance Track (NEPT) initiative announced by the Environmental Protection Agency (EPA) on June 26, 2000. The NEPT, via incentives and rewards, will make it more attractive for both public entities, such as transportation agencies, and private companies to implement EMSs.

The use of EMSs by public and private sector organizations is rapidly becoming best practice for improving environmental performance and for diligence in responsible environmental practices, pollution prevention, and environmental reporting. This trend is also being reflected in the adoption of EMSs by transportation agencies worldwide.

Today, most EMSs comply with the ISO 14001 standard or contain the major elements of this system. This standard was published in June 1996 by the International Organization for Standardization (ISO) based in Geneva, Switzerland. The underlying principles of this system are commonly referred to as "Plan-Do-Check-Act," which together provide for continual improvement. As of April 2000, there were 15,772

organizations worldwide that had certified/registered ISO 14001-based EMSs.

EMS implementation in transportation and highway agencies is occurring at different levels in different countries and is directly related to and influenced by regulatory and non-regulatory drivers. Drivers for EMS implementation within transportation agencies outside of the United States tend to be more advanced than in their sister agencies within the United States. European countries such as Germany, Sweden, and the UK and other British Commonwealth countries are well advanced with the establishment of EMSs—particularly within the private sector.

Federal agencies within the United States are already committed to EMS implementation through Executive Order No. 12856 and the Code of Environmental Management Principles, which has evolved from the Federal Government Challenge Program established under this order. This requires federal agencies to agree to the code that emphasizes pollution prevention, sustainable development, and “state-of-the-art” environmental management programs. However, with the new NEPT initiative, U.S. transportation agencies will be or should be looking at EMSs in a new light and there will be a big push towards the implementation of these systems. The U.S. transportation agencies will have a strategic business advantage in that they can draw on the experience and programs already established in Europe and benefit from the lessons learned to implement their own EMSs more cost effectively.

These lessons reveal that ingredients essential for the successful implementation of EMSs within transportation agencies include

- Upper management commitment to, and support of, a strong environmental improvement policy;
- Buy-in support at all levels (from senior management through to maintenance and operations) is imperative for the system to work effectively and efficiently;
- The placement of environmental officers at the operations (district) level is needed to provide the day-to-day reminder and application of sound environmental management practices; and
- The establishment of a demonstration project/district, with direct application of the organization’s EMS, to demonstrate to other districts the ease and benefits of implementation.

This study of selected transportation agencies worldwide has revealed that those with established EMSs contain common elements that are related to the main functions of planning, design, construction, maintenance, and operation of roads and highways, light rail, airports, and ports and harbors. For ISO-based systems they are required to contain the common principles and elements described in the standard and demonstrate continual improvement. By definition they include Policy and Planning, Implementation and Operation, Checking and Corrective Action, and Management Review and Improvement.

For informal systems that may or may not contain ISO elements, they are more often tailored to the operations level where the greatest cost benefits may be realized for pollution prevention and impact mitigation. Often they include best environmental management practices and assessment and guidelines for

- Noise and Air Quality,
- Water Quality,
- Erosion Control,
- Hazardous Waste Management,
- Cultural Resources,
- Ecology Studies/Ecosystem Integrity,
- Archaeological Studies, and
- Community/Public Participation.

The development of EMSs has also been paralleled by drivers for greater levels of environmental reporting (Table 5). While the ISO 14001 standard has at its core continual improvement and the need for management review, it does not emphasize the importance of stakeholder involvement and reporting. This has been recognized by many government policy makers around the world and many environmental ranking and monitoring organizations such as the Coalition for Environmentally Responsible Economies are pushing the importance of environmental reporting in keeping the public informed of improvement in environmental performance.

Future trends for transportation agencies in the United States will rapidly begin to reflect those trends for similar agencies around the world and will include regulations encouraging the implementation of EMSs, a greater level of stakeholder involvement and annual environmental reporting.

Developing and Implementing an Environmental System for the Pittsburgh International Airport

Richard Walsh, *Allegheny County Airport Authority*
Jim J. Yoon, *CH2M Hill*

The Pittsburgh International Airport has embarked upon a visionary program to guide the airport and the region into the next millennium. This program, called the Pittsburgh International Airport's 21st Century Environmental Conservation and Stewardship Program, utilizes the airport's unique position as a key regional economic driver and stakeholder to develop and promote initiatives and actions that are mutually beneficial to the economy and the environment. The program is guided by the Pittsburgh International Airport's Environmental Policy Statement, which states:

ACAA is committed to providing a clean and healthy environment to its customers, employees, stakeholders, and neighboring communities. ACAA will provide environmentally responsible services by managing its environmental activities, liabilities, and assets as an integral part of its overall airport operations. ACAA has adopted this environmental policy, and has begun implementation of an environmental management program, in order to foster environmental awareness and responsibility throughout the entire organization, and improve environmental performance in a cost-effective manner.

The airport's revolutionary program consists of a series of key initiatives designed to implement leading edge innovations and cutting edge technologies at the airport. These initiatives consist of the following:

- Development and implementation of an environmental management system (EMS) for the airport,
- Participation in the Multi-State Working Group on EMSs as a pilot project,
- Integration of environmental and planning functions, and
- Reclamation, conservation, and stewardship of environmental resources on-site.

The airport's EMS is a critical component of the airport's 21st century program. The airport's EMS is a unique, leading edge, business-driven approach to environmental management. The EMS addresses the negative environmental consequences of airport operations by

- Directing efforts to improve operational efficiencies,
- Integrating environmental considerations into airport operations,
- Reducing unit costs for airlines and tenants, and
- Continuously facilitating and encourage self-improvement.

Unique aspects of the airport's EMS include use of activity diagrams to summarize environmental aspects of PIT including

- Potential Environmental Liabilities,
- Operation and Management Procedures,
- Compliance and Permitting Information,
- Record Keeping and Documentation,
- Communication/Reporting Linkages,
- Personnel Involved/Responsible, and
- Interaction between ACAA departments such as Field and Terminal Maintenance, Planning, Engineering, and Environmental Affairs.

Activity diagrams may be integrated into an Information Management System and provide a basis for the following:

- HR–Job Descriptions/Employee Performance,
- Operations–Business Process Improvements,
- Finance/Purchasing–Life Cycle Cost Assessments, and
- Development and implementation of an Environmental Cost Management Program to accomplish the following:
 - Permits objective analysis of environmental costs and liabilities,
 - Quantifies environmental costs and allows cost savings in operations and maintenance to be measured,
 - Allows potential environmental actions to be prioritized, and

- Development of Facility-Specific Best Management Practices for Industry Operations such as deicing.

PennDOT's Implementation of the Report of the 21st Century Environment Commission

Kirk Stoner and Patrick Wright, *Gannett Fleming, Incorporated*

The Governor's 21st Century Environment Commission was established by Executive Order on July 1, 1997. The commission was directed to "recommend methods and policies to improve the environmental quality of the commonwealth and measure the results, while allowing for enhanced economic and social progress." The commission systematically addressed a wide range of environmental issues in ways that create a sensible balance with growth needs. The commission's efforts culminated with the issuance of the Report of the 21st Century Environment Commission in September 1998. The report advances a blueprint for Pennsylvania's future that will simultaneously support a healthy environment, a vibrant economy, and livable communities.

The report included 240 recommendations to address a wide range of environmental issues. As a major policy document, all state agencies were required to consider implementation of the report's recommendations. Pennsylvania Department of Transportation's (PennDOT's) Bureau of Environmental Quality estimates that the department's wide range of programs, projects, and operations impact the environment in 4,000 ways. The department, therefore, must carefully reconsider its policies and procedures and their associated impacts on the environment in light of the 21st Century Environment Commission Report. A concerted effort by PennDOT and the other state agencies to advance the report's recommendations will help to create a sustainable pattern of development for the future.

The State Transportation Advisory Committee (TAC), an independent committee with statutory authority to provide advice to the State Transportation Commission and PennDOT on transportation issues, authorized this study to determine what actions PennDOT should take to address the transportation issues raised by the 21st Century Environment Commission Report. Stakeholder involvement was a hallmark of the study as PennDOT and regional planning organization staff worked with the TAC to identify the most important transportation issues stemming from the report. The study process is described below.

The study followed a methodical process that systematically filtered the entire list of recommendations found in the report to those most relevant to PennDOT's activities. As a first step in the process, the report was carefully reviewed and the transportation-related initiatives in the report were identified. The initial review of the report yielded 30 recommendations that were directly related to PennDOT's operations.

Once the 30 transportation-related recommendations were identified, meetings with other state agencies were conducted to gain various perspectives on how PennDOT should prioritize the recommendations. Meetings were conducted with Department of Environmental Protection, DCNR, and Department of Community and Economic Development to learn how each agency prioritized and implemented the issues found in

report. These meetings provided best practice examples for PennDOT to follow as it considered how to establish its own environmental objectives.

Six regional focus groups were conducted to further assist in prioritizing the transportation recommendations. The focus groups were interactive forums whereby PennDOT district, central office, and regional planning partners met to discuss and prioritize the recommendations stemming from the report. Participants for each meeting were provided with an advance informational package that included a copy of the report and background information on the goals and objectives of the effort.

Each Regional Focus Group followed a two-phase agenda. In the first phase, participants divided into breakout groups to discuss the transportation-related issues in the report and to suggest other recommendations that may have not been included. At the end of the discussion session, participants were asked to prioritize their list of recommendations and identify the top five recommendations from their list. In the second phase of the meeting, participants developed implementation action plans for their identified top five recommendations. The implementation action plans outlined the elements, such as resource requirements and time considerations, that would be required to implement each recommendation. At the conclusion of the regional focus groups, over 60 PennDOT staff and their planning partners cooperatively developed a prioritized list of 30 transportation-related recommendations and a plan to implement each recommendation.

The 30 recommendations from the Regional Focus Groups were submitted to the TAC for further refinement. The TAC discussed the recommendations and used a set of criteria to identify the top eight recommendations. The benefits/impacts of the recommendation, implementation considerations (time, resources), and the consistency of the recommendation with other PennDOT policies and procedures were the criteria considered in narrowing and prioritizing the recommendation list. Using these filtering criteria, the TAC narrowed the list of 30 recommendations to a list 15. From this list of 15 recommendations, the TAC identified the eight highest priority recommendations. The TAC developed an implementation action plan that mirrored those developed as part of the Regional Focus Groups to accompany each of the eight recommendations.

The TAC presented the study methodology and results to the State Transportation Commission in October of 1999 for its subsequent review and approval. Following the STC's approval, the report's results were released to PennDOT for implementation consideration. Recently, PennDOT has undertaken several new initiatives that respond to the issues identified through their analysis of the 21st Century Environment Commission Report. Such initiatives as the Strategic Environmental Management System, PennPlan, the Statewide Greenways Plan, and Sound Land Use Strategies for Transportation respond to the needs identified in the 21st Century Environment Commission Report and exemplify PennDOT's commitment to total environmental quality.

Top 8 Recommendations		
Rank	Votes	Recommended PennDOT Action
1	9	Partner with municipalities and regional planning organizations to develop regional corridor plans—Transportation systems traverse municipal and regional boundaries. As such, the affected interests adjacent to transportation corridors should cooperatively plan for the development and use of that corridor.
T2	6	Augment the PennDOT Design Manual to include sound land use practices and concepts from the 21st Century Environment Commission Report—PennDOT projects can be completed in an environmentally sustainable manner by inclusion of sound land-use practices in the project design.
T2	6	Revise the Highway Occupancy (HOP) Permit Process—Currently, the HOP process examines only a single development and its associated access points, without considering the broader transportation/environmental impacts of the project.
T2	6	Promote the use of intelligent transportation systems (ITS) in combating congestion and air quality problems—ITS technology helps to forewarn drivers about traffic problems so that alternative modes/routes can be taken, thereby reducing congestion and air pollution.
T5	4	Support MPC reform efforts that require consistency between congestion management plans, the comprehensive plans, and the official map—Consistent planning documents establish a vision for municipalities that is not easily altered by development interests.
T5	4	Develop a natural resource conservation policy for all PennDOT offices—Water conservation, material recycling, energy conservation, alternative fuels, and commuting alternatives (flex time, transit passes, telecommuting, etc.) are policies that PennDOT can implement to decrease their natural resource consumption.
T7	3	Develop multi-modal alternatives to the single occupant vehicle—Minor changes or additions to the design of a transportation project can effectively accommodate alternative modes of transportation. Transit, high-speed rail, paved shoulders, bike lanes, and sidewalks are improvements that can increase the use of alternative modes and decrease the reliance on the automobile.
T7	3	Hold public involvement and community events to demonstrate PennDOT’s environmental stewardship role—Booths at community functions and roadway clean up days exemplify PennDOT’s commitment to total environmental quality and its role as an environmental steward. PennDOT District 1-0’s “Green Team” represents a best practice that should be followed departmentwide.

Sample Implementation Plan

Partner with metropolitan planning organizations (MPOs), local development districts (LDDs), and municipalities to develop regional corridor plans. Twenty-first century report issue area: promoting responsible land use.

PennDOT objectives:

1. Encourage local consideration of land use, transportation, and environmental impacts via participation in corridor analyses.
2. Provide resources and technical assistance to local governments/agencies.
3. Provide education/awareness of benefits of good planning.

Results, Benefits, and Impacts	Strategies and Actions	Coordination Issues	Resource Issues and Timing	Performance Monitoring
<p>Increased cooperation and awareness of transportation and land use planning between all levels of government.</p> <p>Local land use decisions are consistent with corridor plans.</p> <p>Improvement in land use controls related to transportation improvements.</p> <p>Decreased sprawl development and traffic congestion.</p>	<p>Implement the corridor planning approach outlined in PennPlan.</p> <p>Develop a coordinating committee responsible for assisting MPOs/LDDs to delineate the major transportation corridors in their respective regions.</p> <p>Partner with DCED and municipalities to achieve local involvement in the corridor planning process.</p>	<p>Need to establish technical teams or interagency support to provide a more integrated approach.</p> <p>Department of Community and Economic Development, Center for Local Government Services.</p> <p>Use of the Local Technical Assistance Program.</p> <p>MPOs/LDDs, municipalities, counties.</p>	<p>Training for MPO/LDDs and municipalities.</p> <p>Additional resources may be needed to fund/implement the corridor plans.</p>	<p>Number of corridor plans developed.</p> <p>Number of regional corridors identified.</p> <p>Number of municipalities adopting the corridor plans.</p> <p>Continued identification of transportation corridors as they develop in the future.</p>

Development of Land Use Strategies: Promoting Responsible Growth, Environmental Stewardship, and Fostering a Sustainable Future for Pennsylvanians

L. Bert Cossaboon and Steven F. Nieman, AICP

Robert A. Meredith, McCormick, Taylor, and Associates, Inc.

Mccormick, Taylor, and Associates, Inc. (MTA), in cooperation with the Pennsylvania Department of Transportation (PennDOT) and the Governor's Center for Local Government Services (the Center) of the Department of Community and Economic Development (DCED) is developing strategies to promote responsible growth, environmental stewardship, and to foster a sustainable future in Pennsylvania. These strategies are being developed in response to Executive Order 1999-1 issued by Governor Thomas Ridge. These strategies, when incorporated and considered in the transportation project development process, successfully incorporate all three cross-cutting topics of the conference by describing the trend to address and incorporate smart growth and land-use planning principles into transportation projects, incorporating key environmental goals on a regional basis, such as watershed planning, and describing how corridor planning as a transportation technology/policy can overcome the negative consequences and effects of sprawl.

The presentation displays the three documents prepared by the Governor's Center for Local Government Services in response to Executive Order 1999-1, signed by Governor Ridge on January 7, 1999. The three documents are Pennsylvanians Speak: Sound Land Use Forums Report, Land Use in Pennsylvania: Practices and Tools—An Inventory, and the Center's first Annual Report on Land Use. One prevailing theme among the three reports is the need for managed and coordinated planning with municipalities to anticipate and respond to growth associated with planned-for infrastructure.

The first document, Pennsylvanians Speak: Sound Land Use Forums Report—a summary of the 53 land-use forums conducted throughout the Commonwealth during the summer 1999—shares a summary of more than 4,000 residents thoughts on land use. These residents, from rural, suburban, and urban areas and all walks of life, describe complex issues about land use and make clear the call for change in the way land is used in Pennsylvania. Pennsylvanians call for more intergovernmental cooperation; protection of the environment and open space preservation, urban revitalization, and planning that coordinates infrastructure with land-use practices.

Land Use in Pennsylvania: Practices and Tools—An Inventory is designed to support municipal and local planning. The report identifies over 100 practices and tools that have been successfully used in Pennsylvania. These tools promote smart growth, and one section specifically addresses planning for infrastructure and growth. The Inventory recognizes that “for infrastructure, sound land use practice involves coordinating and integrating planning for infrastructure ... with all levels of government.” The report goes on to say, “Planning for infrastructure should be both multi-municipal and local. State agency action should be consistent with county and local planning, and local zoning and subdivision and land development regulations should also be consistent with such plans.”

The Annual Report on Land Use is required by Executive Order 1999-1 and responds to the public's interest in Pennsylvania's land resources and continued

economic growth. In the Executive Order the Center outlines recommendations for moving Pennsylvania forward toward smart growth and responsible land-use planning. Of the four recommendations made in the report, one specifically targets the ways state government can tailor its numerous programs to better support local planning. A study of interagency programs and policies and changes that can be made to support local planning and promote sound land-use planning at the local level is to be the subject of a supplementary report due in August 2000. Included among the discourse is an analysis of infrastructure-related agencies and their changing programs to meet the requirements of the Executive Order.

Current strategies being used and developed by PennDOT are highlighted in the presentation. With management assistance from MTA, these strategies presented in visual form demonstrate how transportation and local land-use planning employed on a regional or corridor level, supports and promotes planning, environmental stewardship (i.e., watershed considerations), and sustainable economic development.

Best Practices in Environmental Resource Management and Mitigation

These posters almost all discussed water in some way. Several of them discussed wetlands, both management and mitigation of wetlands destruction; other topics included acid mine drainage and local garden projects.

The wetlands-related posters ranged from case studies of specific mitigation projects to presentations of tools and techniques for planning to a conceptual discussion of the “big picture” of watershed management. It is clear that while wetlands mitigation is a complex endeavor, it is practiced quite widely across the United States. One poster described how to approach mitigation from a multi-objective perspective, giving examples from various sites in Pennsylvania. Another used the concept of “goal-based watershed management,” which included numerous different goals and objectives. This poster discussed a project sponsored by the Delaware River Basin Commission to study a 47-square-mile watershed. Several other posters described similar projects to enhance wildlife habitat in wetlands and terrestrial ecosystems. One of the most important techniques in these projects is fencing off streambanks (sometimes with electrified fence) to keep cattle and other domesticated animals out of these sensitive areas. Others included constructing various artificial shelters (i.e., Barn Owl boxes) that simulate natural nesting sites no longer available, planting food species, and improving water quality. Another poster emphasized the importance of selecting the best site for mitigation, and described how this could be done.

Several of the posters were more conceptual and these suggested that many advances in watershed management and mitigation are still needed, especially in adopting holistic approaches that treat hydrological resources as part of an integrated ecology, not as individual components. A wide variety of mitigation approaches across the United States were noted.

The acid mine drainage poster described a project to change the pH at the Coldstream Passive Treatment System in Philipsburg, Pennsylvania, from 2.6 to 7.3, including a discussion of both how acid mine drainage is created and what techniques were used to solve the problem. A poster from a local volunteer group in western Pennsylvania described how successful they had been over the last six decades in sponsoring hundreds of local gardens.

Goal-Based Watershed Management: A New Ball Game

Carol R. Collier, *Delaware River Basin Commission*

We know that transportation projects have potential environmental impact to water resources—wetlands and stream corridors. These impacts are usually addressed on a site-by-site basis. Now there is a new approach to water resource management—

goal-based watershed management. This approach emphasizes environmental outcomes and allows for creative and often cost-effective solutions.

Unfortunately, current law treats water management in a disconnected and piecemeal fashion; ground water and surface water are treated as independent and separate resources. In addition, primarily because of the way the federal water laws have been written, most states' environmental protection departments have separate bureaus or sections for each water issue—water supply, wastewater, stormwater, wetlands, floodplains, erosion and sediment control, and flood prevention design. In many states land-use management is performed through the separate roles of county and local governments, which further limits our ability to address water resource issues holistically.

We know that ground water withdrawals affect stream baseflow and increased impervious cover affects water velocity, erosion potential, and water quality. In addition physical changes (bridges, culverts, stormwater outlets, channelization) can have greater impact on some aspects of stream health than point source discharges.

The Delaware River Basin Commission (DRBC) is proposing goal-based watershed management that looks at the “big picture” by setting chemical, physical, biological, and flow criteria at the base of the watershed and working with the “stakeholders” to develop a plan to meet those standards. The object of this approach is two fold: (1) issues of water quantity and water quality are considered holistically, and (2) it is performance-based, not prescriptive, encouraging creative solutions.

All aspects of transportation projects can be involved. How is a proposed highway sited in a watershed context? Will it have greater impact if it is located in the upper headwaters? How will the increased impervious surfaces and proposed stormwater controls affect stream baseflow? Are there ways to design stream crossings using Rosgen techniques and other geomorphological tools to minimize physical and habitat impact downstream? Can transportation enhancements be part of a point/non-point pollution trading strategy?

DRBC had received a grant from the commonwealth of Pennsylvania to test the merits of goal-based watershed management. We have initiated a pilot study on Pocono Creek, a 47-square-mile watershed in northeast Pennsylvania. There is a partnership of federal and state agencies, the Monroe County Conservation District and Planning Commission, seven local municipalities, and the Brodhead Watershed Association. The Pennsylvania Department of Transportation (PennDot) is one of the state partners. This particular watershed has two major highways (Rt. I-80 and Rt. 611) running up the spine of the watershed.

This pilot study will provide an opportunity to evaluate the relative impacts of: (1) chemical contributions from point and non-point sources; (2) flow modifications due to increased impervious surfaces, water withdrawals (there is a major ski mountain in the headwaters), and stormwater control; and (3) physical changes to the stream corridor (bridge crossings, eliminating natural cover of stream corridors, etc.). Through socioeconomic analysis of possible management scenarios, the municipalities and key land owners will construct a watershed management plan that meets the in-stream environmental standards and addresses the land use and growth needs of the region. The most important aspect is that the local stakeholders, including PennDot, will have a say in shaping the watershed future.

Terrestrial Mitigation the Meyersdale Way

Kevin L. Mixon and **Stu Kehler**, *Pennsylvania Game Commission, Pennsylvania Department of Transportation*

Terrestrial mitigation for the Meyersdale transportation project was an innovative and cost-effective method used to offset the impacts to wildlife habitat as a result of project construction. A Memorandum of Understanding (MOU) was developed between the Pennsylvania Department of Transportation (PennDOT) and the Pennsylvania Game Commission (PGC). PennDOT would provide \$105,000 to the PGC to conduct wildlife enhancement activities. If traditional terrestrial mitigation activities were used it would have cost approximately \$350,000. Not only was there a substantial cost savings, but the mitigation was located in areas in need of enhancement and away from the immediate vicinity of the roadway.

The enhancement activities would be carried out on properties in the Game Commission's Farm Game Program (FGP) and State Game Lands (SGL). The voluntary FGP provides landowners with trees and shrubs, free subscription to the Game News, additional pheasant stocking (if appropriate), additional enforcement efforts, and technical advice on land management. In exchange, the landowner agrees to open their property to hunting and other recreational activities.

The original MOU established the following goals: 7 miles of streambank fencing, establishment of 150 acres of native warm season grasses, and 25 acres of field border edge cuttings with conifer seedling plantings.

The project has greatly exceeded the original goals and has accomplished the following:

Native Warm Season Grass/Forbes Planted	231 acres
Border Cuts on FGP	44 acres
Brush Piles Constructed on FGP	10
Border Cuts on SGL	43 acres
Brush Piles Constructed on SGL	21
Apple Trees Planted	265
Streambank Fence (6 strand non-electric)	21,400 feet
Streambank Fence (2 strand electric)	18,350 feet
Bluebird Boxes Constructed and Erected	97
Kestrel Boxes Constructed and Erected	13
Bat Houses Constructed and Erected	14
Barn Owl Boxes Constructed and Erected	10
Wood Duck Boxes Constructed and Erected	12
Tree Seedlings Delivered to Landowners	17,000
10-Pound Bags Wildlife Food Plot Mix Planted	41
Corn/Sorghum Food Plots Planted	8 acres
Buckwheat Food Plot Planted	5 acres
Winter Wheat Food Plot Planted	8 acres

The impressive accomplishments were made possible by partnering with the following groups: Somerset County Pheasants Forever, Tri-County Pheasants Forever, California University of Pennsylvania, Highpoint Ducks Unlimited, Natural Resources Conservation Service, U.S. Fish and Wildlife Service, FHWA, National Fish and Wildlife Foundation, Somerset County Conservation District, PA Trappers Association, Trent/Bakersville Sportsmen Club, Dark Shade Beagle Club, and volunteers from the Somerset County Federation of Sportsmen's Clubs.

The partners provided their labor, expertise, materials, equipment, and support that enabled the original goals to be greatly exceeded. The teamwork approach proved highly successful at getting habitat on the ground. The positive relations that have been developed among everyone involved has created a snowball effect of additional habitat work being done in the area.

Guidance for Selecting Compensatory Wetland Mitigation Options

Anne D. Marble and Xavier Riva, *A.D. Marble and Company, Inc.*

Since the signing of the 1990 Memorandum of Agreement Determination of Mitigation under Section 404(b)(1) Guidelines between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers (ACOE), wetland mitigation banking has been an issue for transportation agencies to consider when evaluating mitigation in the form of compensation per Section 404(b)(1) of the Clean Water Act. As a result, wetland banks have been built and used by transportation agencies and other public and non-public entities. However, a number of problems have arisen, calling into question the use of banks for transportation projects. These concerns have been raised by resource and regulatory agencies and, in some cases, by the state departments of transportation (DOTs) themselves. Concerns have included the quality of mitigation banks, funding and permitting issues, as well as whether consolidated mitigation provides the best option for the conservation of wetland functions and values.

One of the largest impediments to the implementation of banking and other consolidated mitigation is the lack of information regarding their performance compared to individual mitigation. It is not possible for agencies and state DOTs to select the most suitable mitigation option without information on the effectiveness of the options. The second largest issue is the absence of comprehensive case studies that outline the steps taken by agencies to successfully develop a variety of mitigation options for DOTs.

The combination of these factors with the passage of the Transportation Equity Act for the 21st Century (TEA-21), which will increase the volume of highway projects to a historic high, points to the need for better reference information on various wetland mitigation options and how states develop successful alternative options with the resource agencies. The purpose of this research is to update state DOTs with information about the performance of consolidated and individual mitigation wetlands and about the factors that affect their success. This study also provides information about states who have been successful in developing consolidated mitigation sites, such as banks and in-lieu fee programs. This information can be subsequently used by other states to develop their own programs and increase their compensatory mitigation options.

To develop guidance for the selection of wetland mitigation state DOTs provide case studies of successful mitigation efforts and effective mitigation banking programs and determine the reasons why some states have been unable to utilize all mitigation options, individual and consolidated (banking, in-lieu fee, nonadvanced multiproject consolidation).

Methods

Database, literature, and Internet searches were used in conjunction with an agency survey and personal interviews to compare the rates of success for individual versus consolidated mitigation and to determine the status of mitigation banking across the United States. Another objective of the study was to determine why some states have been more successful than others in utilizing multiple mitigation options.

Results and Conclusions

- Figure 1: States with Banks, DOTs and Private/Other Banking Entities.
- Figure 2: Survey Responses: Limiting Factors in the Use of Banks.
- Table 1: Survey Responses: Which Wetland Mitigation Option (Individual or Consolidated) Provides the Greatest Number of Benefits?
- Table 2: Timetable of Phase I and Phase II of Project.

Generally, data that definitively indicate better wetland values are obtained for various mitigation options does not exist. What does exist is the perception that wetland mitigation banking offers not only higher functional replacement value, but that it is a more efficient tool and more reliable in its outcome.

The number of mitigation banks (proposed, designed, and constructed) has increased from 100 in 34 states in 1998 to 278 in 34 states as of January 2000.

There are 26 state DOTs that have consolidated wetland mitigation as an option. The principal reason for DOTs to not have the option of consolidated mitigation is lack of a state enabling program or legislation, or specific state guidance or regulations specifically disallowing consolidated banking as an option. Conversely, states such as Florida, Minnesota, and Wisconsin, have been successful in large part due to their state legislation recognizing banking as an option, paving the way for statewide banking agreements or banking programs.

Regulatory agency are concerned about consolidated wetland mitigation development, specifically the ACOE. The ACOE is a decentralized agency relative to permitting decisions, which are left up to the individual districts. There are 38 Corps districts in the United States all of which operate autonomously in this regard. Decisions regarding mitigation options are left up to the Corps districts.

The perception is that the watershed-based requirement for banks does not afford enough flexibility for the highway projects that are planned. In many cases, the watersheds or the number of projects slated for a particular watershed are too small to warrant a bank.

Quantitative Approach to Wetland Mitigation Site Selection: Finding the Right Site

Steven A. Ott, *SmithGroup JJR*

One of the many difficult challenges airport and highway planners face is the need to responsibly address wetland impact and mitigation issues associated with planned transportation facility improvements. More specifically, identifying and securing sites for wetland mitigation is a time-consuming, yet critical element in many projects.

Wetland mitigation sites often link the environmental clearance process under the National Environmental Policy Act of 1969 (NEPA) to permit approvals under Section 404 of the Clean Water Act. Compounding this situation, increasing levels of detail are now often required in environmental documents to secure environmental approvals at the federal levels which are essential for a project to move forward into design and ultimately to construction.

THEME

The overall theme of this presentation is to illustrate, by example, an innovative approach to selecting wetland mitigation sites, where off-site (or off right-of-way) land acquisition is required. The poster will illustrate an information management approach to addressing both capability (physical criteria) and suitability (social/cultural criteria) for site selection. Examples of relevant attributes in the environmental analysis will be shown, stressing the efficiency and use of existing data through collection, analysis, and providing recommendations.

BACKGROUND

Selection of wetland mitigation sites involves consideration of many interrelated and complex factors. The poster will focus on a process developed at SmithGroup JJR for site evaluation that

- Incorporates the use of existing data,
- Addresses various criteria in site capability and suitability,
- Identifies respective site strengths and weaknesses,
- Provides for objective comparison of multiple sites, and
- Establishes the basis for documentation.

The success of wetland mitigation is dependent on a number of factors that can result in a quality mitigation, while minimizing risk. The process to be presented can function as an effective screen, elevating certain sites for further consideration, while dismissing others. It will be first described conceptually in its assembly (as a matrix), key elements of the matrix, and rationale for their use. It has also been successfully applied to both airport and highway projects, and examples will be shown where it resulted (among others) in the successful construction of a built wetland mitigation site in western lower Michigan. The 60-acre wetland mitigation project, constructed in 1996 and 1999, was the

subject of considerable review by federal (U.S. Fish and Wildlife Service and Environmental Protection Agency) and state (Michigan Department of Environmental Quality) agencies before final acceptance and approval.

PRESENTATION FOCUS

The poster presentation will outline the use of a quantitative approach to site selection based on a series of comparative criteria, which when scored, yields preferences in sites for wetland mitigation.

By viewing mitigation site selection in a larger context, this process can allow projects to more efficiently meet permit demands, while meeting or exceeding regulatory requirements, saving the project sponsor(s) time and money, and developing a successful and sustainable wetland mitigation component.

Washington State Department of Transportation's Eagle Harbor/Schel-Chelb Estuary Mitigation Project

Melany Vorass, Schel-Chelb Estuary, Washington Department of Transportation

OBJECTIVES

1. Meet mitigation requirements for displaced aquatic near shore habitat.
2. Achieve local community restoration goals by providing for coordinated, cooperative watershed-based mitigation.

METHODS

Washington Department of Transportation (WSDOT) engaged the local Bainbridge Island community, as well as local, state, and federal governments in all aspects of the Schel-Chelb construction process. WSDOT sought consensus-based decisions regarding the planning, project location, design, and construction of the mitigation project.

BODY

Schel-Chelb Estuary is located on the southern tip of Bainbridge Island, Washington. Schel-Chelb was reconstructed to mitigate the loss of 1 acre of marine habitat displaced as a result of contaminated sediment cleanup actions at the Eagle Harbor Superfund site located several miles north of the estuary. The site was a historic estuary that had been drained and filled at the beginning of the century. Estuary design and construction were a collaborative effort between the following entities: Washington State Ferries; WSDOT Environmental Affairs Office; Environmental Protection Agency; Hart Crowser, Inc.; KPFF Consulting Engineers; private property owners Gale and Marja Cool; the Suquamish Tribe; Northwest Archaeology; Trout Unlimited; U.S. Fish and Wildlife; Washington Department of Fish and Wildlife; and the city of Bainbridge.

The construction project restored the site to an estuary by clearing and excavating a

2-acre treed plot, diverting a freshwater stream to its original bed so that it would discharge to the estuary, installing a fish ladder, and adding a bottomless box culvert beneath the roadway to allow tidal flushing between Liberty Bay and the estuary.

High-quality construction was achieved by careful design and by allowing flexibility to improve the design in the field. Changes were made based on field identification of design and construction improvements. One example was minimizing natural plant colonization by stockpiling and using native topsoil versus importing topsoil. Another example was the field decision to leave remnant woody debris for habitat creation versus leaving the estuary sterile and uninhabitable until woody debris migrated in from the bay. The design was based on two area natural estuaries. The wide box culvert and streambed encouraged gravel, fine sediments, and shell fragments to immediately migrate to the floor and shores of the estuary. These design aspects created an estuary that is natural in appearance.

A key public safety feature was to place railings on each side of the culvert for viewers. The shoulder was widened to accommodate viewers and limited vehicle parking. Wingwalls and logs were used to protect the road bed from beach erosion, thus minimizing maintenance needs and providing driver safety.

According to the Suquamish Tribe, the Schel-Chelb Estuary was historically the tribal home of Kitsap and Wahalchu, who were counsel to Chief Sealth. The name "Schel-Chelb" means "Bringing It Home" in the Native American Salish language, and was the name used by the Suquamish Tribe for the historic estuary. Japanese farmers lived on and farmed the land at the beginning of the century through to World War II, when the Japanese were interned in eastern Washington. Due to the rich cultural history of the site, several archeologists assisted in identifying any cultural remains to be preserved. During construction, no Native American artifacts were identified, and although some remains of the Japanese farm were found, none were considered significant and/or they were too decomposed to consider preservable.

RESULTS AND CONCLUSIONS

The estuary was completed in June 1997, and the Suquamish Tribe formally dedicated the estuary on June 28, 1997. Schel-Chelb has now become home to spawning and fingerling chum and coho salmon, nesting kildeers, deer, greater yellowlegs, great white geese, ospreys, bald eagles, benthic invertebrates and insects, and a vast array of other wildlife. Tribes, resource agencies, and WSDOT did not anticipate that salmon would use the new estuary until it was artificially planted with salmonid fingerlings. In fact, many chum and coho salmon spawned in the restored stream immediately after construction was completed. The spawning was successful far beyond expectations, as demonstrated by outmigrating salmonids in the spring of 1998.

In addition to restoring habitat, the finished estuary restored the historical and current cultural value of the site. The estuary has created an unobstructed visual corridor from upland lots in private ownership to saltwater. Many island residents use the area regularly as a place to picnic and watch wildlife. School groups have visited the estuary to observe its wildlife. Bicyclists, joggers, and walkers make the estuary a regular stopping-off place.

The poster and video presentation given by the WSDOT Environmental Affairs Office provides a visual tour of all of the stages of Schel-Chelb, from preconstruction to

the first coho salmon migrating up the fish ladder and into the stream. We believe these successes were achieved as a result of collaborative decision making throughout the planning, design, and construction phases.

Garden Projects of the Western Pennsylvania Conservancy

Brian Polinsky, *Western Pennsylvania Conservancy*

The Western Pennsylvania Conservancy has worked for more than six decades to promote healthy and attractive neighborhoods. In response to overwhelming community demand, we annually facilitate nearly 400 separate garden projects with help from more than 5,000 volunteers. These projects can be found in Pittsburgh neighborhoods and schools, around Allegheny County, at gateways to towns and cities, and throughout the western Pennsylvania region. Our goal is to establish strategically placed planting sites in every medium-sized city in western Pennsylvania.

To encourage reinvestment in urban communities, we forge creative partnerships and seek local support through corporate, foundation, and government sponsorship. By helping to make communities more attractive, we can help reduce development pressures on undeveloped countryside.

If you have any questions, please feel free to call Brian Polinsky at 412-454-1337

Innovations in Mitigation: Cleaning Up Abandoned Mine Drainage

Dan Sammarco and Maggie Hall, *Pennsylvania Department of Environmental Protection*

Pennsylvania transportation agencies have worked cooperatively to address abandoned mine drainage problems in southwestern Pennsylvania. One innovative technology in use is the Vertical Flow System, also known as the SAP, or successive alkalinity producing system. The display covers the planning, design, and construction of a system. The Coldstream Passive Treatment System, located in Philipsburg, Pennsylvania, is shown as a case study. The system treated mine drainage with a pH of 2.6, acidity of 572 mg/l, aluminum of 57.6 mg/l, and iron of 146 mg/l. Water quality was improved to a pH of 7.3, alkalinity of 170 mg/l, aluminum of <0.20 mg/l, and iron of 0.173 mg/l. This interactive display will help attendees to understand mine drainage treatment.

Environmental Mitigation and Monitoring at SR-0322, Milroy, Pennsylvania

Cy R. Whitson, *Gannett Fleming, Inc.*

The “Missing Link” in Milroy, Pennsylvania, was a 5.6-mile segment of State Route 322 that had substantial traffic and safety problems for many years. Gannett Fleming, Inc., designed the new highway and performed the environmental analyses for the project’s final design phase. The Chapter 105 and Section 404 permits for the new highway construction required the development of complete stream restoration and compensatory wetland mitigation projects. The stream restoration project focused on a reach of Tea Creek approximately 3,500 linear feet in length, located on a dairy farm in Brown Township operated by Mr. Roger Parkes.

Tea Creek is a cold water, spring-fed tributary to Kishacoquillas Creek. In its lower reaches, Tea Creek sustains a population of reproducing brown trout. In the upper reaches, however, the stream suffered from degradation caused by bank erosion, sediment accumulation, nutrient overloads, and a lack of a riparian buffer. Our restoration plan focused on six major goals:

- Stabilization of the streambanks,
- Establishment of riparian vegetation,
- Reduction of nutrient loads and other direct impacts by dairy operations,
- Instream habitat and macroinvertebrate composition improvement,
- Replacement of original channel location and conditions, and
- Improvement of dairy farm pasture areas.

Our design approach included the direct involvement of Pennsylvania Department of Transportation (PennDOT) Engineering District 2-0, Mr. Roger Parkes, Pennsylvania Fish and Boat Commission biologists and volunteers, the Dick Corporation, Pennsylvania Department of Environmental Protection, Pennsylvania Game Commission, U.S. Army Corps of Engineers (ACOE), Environmental Protection Agency, and the U.S. Fish and Wildlife Service.

Our compensatory wetland mitigation proposal included 17 acres of wetland restoration, creation, enhancement, and preservation. The Joseph Aumiller farm and the Gisewite property were selected based on their location adjacent to the new highway, and the opportunity for improving a degraded wetland system. Wetland hydrology was developed using a series of low earthen berms built on contours. Surface water from a highway drainage ditch and other overland flow was captured behind six low berms, providing shallow water habitat for hydrophytes and amphibians. The ponded water also produced saturation of additional soils up-gradient, adding hydric soils to the site. Traditional methods of grading to reach groundwater were cost prohibitive. Construction of the earthen berms saved time and money. After one full growing season, all three wetland parameters are clearly evident throughout the site, and the target wetland functions and values were replaced almost immediately.

The ACOE Section 404 permit contained unique special conditions related to environmental protection measures to be implemented during construction of the

highway. These measures included specific erosion and sediment control procedures and construction equipment restrictions in the Potlicker Flats area. To meet these conditions, PennDOT and Gannett Fleming used an Environmental Monitor who visited the highway construction site at least once per week for the duration of the project. A monitoring form was developed with a checklist of the permit special conditions, and on a weekly basis, the completed forms were transmitted to PennDOT and ACOE. This process used unique techniques and tools to comply with environmental requirements. It was also an invaluable method of gaining agency and public trust throughout the construction phase.

SUMMARY OF RESULTS

- Installation of 7,000 feet of high-tensile electric fence on both banks.
- Construction of three cattle crossings to provide safe, limited access for cattle.
- Relocation of 1,100 feet of stream channel to an original meander pattern.
- Installation of 24 log-flow deflectors for bank protection and instream habitat.
- Rock protection on erosion-prone streambanks.
- Installation of seed, live stakes, and bare-root vegetation in the riparian buffer.
- Grading and seeding of the main dairy pasture.
- Successful stabilization and restoration of a cold water, spring-fed trout stream.
- Restoration, creation, enhancement, and preservation of 17 acres of wetlands.
- Weekly monitoring of the construction process to ensure environmental compliance with permit conditions.

Leading-Edge Information Management and Technologies

Transportation planning has become much more complex over the last several decades as agencies have been charged with contributing to (or at least not detracting from) new national and local goals in environmental quality, fairness, and democratic processes. This has created an enormous increase in the need for information, more types are now needed in more detail, to be scrutinized by more people, than ever before. Thus, transportation planners have quickly taken up new information technology (IT) applications to facilitate and improve their work. The posters in this section presented a wide range of important issues.

The posters in this session covered a range of IT applications; Expert Systems, custom-built analytical models, geographical information systems (GIS), and the Internet. The Expert Systems application is designed to improve environmental planning by automating several procedural requirements (including preparation of forms) and by enabling these steps to be better integrated with the planning effort. An important element that allows this integration is the development of file-sharing and information-sharing protocols for communication between this application and other software. Of course, this actually allows the people using the various software applications to communicate better, which is the goal. This element is emphasized in most of the posters in this session.

The custom-built analysis application will enable planners to quantify the air quality benefits of transportation control measures (TCMs) and similar projects. These include steps such as transit improvements, improved signal timing, bus replacements, bike/pedestrian improvements, or turn lanes, which are often either too small or simply not easy to represent in existing transportation models. The application uses a small-scale travel demand model and then uses the Environmental Protection Agency's MOBILE model to calculate the emissions benefits.

Several posters describe how sophisticated GIS applications can be used within a planning agency to improve project development by providing additional analytical capabilities, speeding up analysis, and reducing the cost of analysis. Often, the GIS application provides an accurate, detailed, virtual reality representation of the proposed project, and thus allows many design alternatives to be investigated in detail at very low cost. The preservation of both environmental and historical resources can be managed. One GIS paper discusses the application of demographic data to investigate the implications of transportation projects on different racial and income groups. It raises important questions about the ability of planners to discover, and possibly to avoid, inequities or exclusionary decisions.

Several posters discuss using the World Wide Web to store and provide access to transportation project information. One describes placing important documentation up on an organization's Intranet to allow fast, easy, low-cost access to current information at every desktop in the organization. The other two discuss the use of specially created websites for individual projects that provide similar capabilities. These sites can contain substantial project information, allow for searches and file transfers, host discussion lists, and facilitate email communication. They can contain applications that allow visitors to query databases. Project-specific websites allow for improved

communication within and across agencies. Most importantly, perhaps, they may allow for greater public participation in transportation planning, but issues of differences in computer literacy and access among different demographic groups are not addressed.

Several key issues in the use of the Internet in transportation planning are discussed in a final poster, the primary one being the problem of quality assurance for data taken from the Internet. The authors provide a list of research documents and tools to help resolve this problem.

Utilizing GIS-Based Technology to Evaluate Endangered and Threatened Species Impacts for the Garden State Parkway Widening Project

Amy S. Greene and **Steven Balzano**, *Amy S. Greene Environmental Consultants, Inc.*

The New Jersey Highway Authority is proposing to widen the Garden State Parkway in southeastern New Jersey to accommodate additional travel lanes and increase in shoulder width. Endangered and threatened species presented a significant constraint on project design.

The project extends approximately 50 miles through both the Pinelands National Reserve and the New Jersey Coastal Zone Planning Area. As such, the project is subject to extensive review of impacts to endangered and threatened species under the Pinelands Comprehensive Management Plan and the Coastal Area Facilities Review Act. Additionally, the project falls under the jurisdiction of the New Jersey Freshwater Wetlands Protection Act and Section 404 of the Clean Water Act, necessitating review by the U.S. Fish and Wildlife Service for impacts to federally listed species in accordance with Section 7 of the Endangered Species Act.

To address agency requirements, the project needed to address the potential for impacts to 38 listed species of concern including 18 animals and 20 plants, four of which are federally listed or candidate species. The project goal was to demonstrate to the agencies that impacts to endangered and threatened species had been avoided or minimized during the early design phase. This is expected to facilitate permit review by minimizing the potential for agency comments that result in the modification of the preferred alternative.

Geographic information system (GIS)-based technology was used to address environmental constraints during project planning and design in order to facilitate timely analysis of impacts in accordance with regulatory requirements. The methods utilized relied on the preparation of detailed vegetation community maps of the project area. Each habitat type was prioritized according to its suitability for one or more species of concern. Preliminary conceptual plans were developed to avoid encroachments within priority habitat areas. Early development of a conceptual design that avoided priority habitats reduced subsequent field survey requirements. Regulatory agency review and confirmation of survey results was obtained prior to developing preliminary design plans for the preferred alternative.

GIS is a very useful tool for documenting environmental constraints and impacts for large regional transportation projects. GIS is particularly useful for projects, such as the Garden State Parkway, that traverse habitat for a wide variety of endangered and threatened

species. It can be used to demonstrate to the regulatory agencies that impacts have been minimized, substantially reducing the time and cost necessary to obtain agency approvals, and helping to meet transportation demands while preserving sensitive natural resources.

Project Streamlining Through the Use of GIS Predictive Modeling

Kristen Beckman, *Skelly and Loy, Inc.*

Geographic information systems (GIS) are tools developed to acquire, compile, analyze, and present computerized data sets traditionally represented on maps. By using GIS to predict the potential for the presence/absence of archaeological sites within a large study area, any number of transportation alternatives can be quickly and reliably analyzed early in the transportation planning process.

INTRODUCTION

Skelly and Loy, Inc., has 6 years of comprehensive experience in the development, testing and employment of GIS-based predictive models for prehistoric and historic archaeological resources. The models have been developed for numerous transportation projects, located in a variety of physiographic provinces and cultural areas. The innovative modeling process designed by Skelly and Loy, as described in the recent publication of *Practical Applications of GIS for Archaeologists: A Predictive Modeling Kit* (Duncan and Beckman, 2000), focuses on using generally available and consistent data sets, such as hydrology, bedrock geology, and elevation—filtered through a disturbance layer represented by modern roads, buildings, and other disturbances, such as mines—to produce a reliable but flexible predictive model of archaeological site locations. The modeling process can be easily augmented or refined for any geographic location.

SAMPLE PROJECTS

Mon/Fayette Transportation Project, I-70 to Route 51 Washington and Allegheny Counties, Pennsylvania

The Pennsylvania Turnpike Commission sponsored the earliest use of a GIS-based predictive model on such a large-scale project in Pennsylvania. The study area for the model was approximately 115,000 acres. The GIS model was originally developed to evaluate the use of an earlier model that was used for the project and proved to be much more reliable, practical, and powerful in its prediction of archaeological sites.

U.S. Route 35—St. Albans to Point Pleasant Mason and Putnam Counties, West Virginia

This 45-mile-long project passes through nine U.S. Geological Survey quadrangles in the Kanawha River valley of West Virginia, an area rich in prehistoric and historic occupation for the past 12,000 years. The development of a predictive model for prehistoric and historic site locations in this project utilized the technology of Global Positioning Systems to locate the sample test squares during predictive model testing. The predictive surface for archaeological site locations developed for the U.S. Route 35 project was applied to the Western West Virginia Regional Airport project during the site selection process for the airport, thus illustrating the versatility and utility of this type of modeling.

U.S. Route 15 Tioga County, Pennsylvania, and Steuben County, New York

This project, which will extend from northern Pennsylvania 6 miles into New York State, will rely on GIS to narrow the number of alternatives between preliminary and detailed studies, and will also serve to evaluate the alternatives for the Draft Environmental Impact Statement. A cost comparison during the proposal stage of the project showed that by using GIS rather than taking a traditional approach of field-testing three construction alternatives, approximately \$140,000 would be saved.

CONCLUSION

GIS predictive modeling streamlines the environmental compliance process by creating a large-scale archaeological sensitivity surface within which any number of construction alternatives can be studied. Rather than having to employ large field crews to test a number of design alternatives, and incur additional costs any time alternative shifts are made, potential impacts can be measured by the GIS at the workstation. In practical terms, the use of a GIS model can save the client (and, in a publicly funded project, the taxpayers) a considerable amount of money and can expedite the project by considering impacts to cultural resources earlier in the planning process.

ACKNOWLEDGMENTS

The development of GIS-based predictive models by Skelly and Loy over the past 6 years would not have come to fruition without the funding and encouragement of FHWA, the Pennsylvania Turnpike Commission, the West Virginia Department of Transportation, the Pennsylvania Department of Transportation, and the New York State Department of Transportation.

REFERENCE

Duncan, R. B., and K. A. Beckman. The Application of GIS Predictive Site Location Models within Pennsylvania and West Virginia. In *Practical Applications of GIS for Archaeologists: A Predictive Modeling Kit* (K. Westcott and R. J. Brandon, eds.). Taylor and Francis, London, pp. 33–58, 2000.

Distribution of Texas Department of Transportation's Hazardous Materials Guidance via Intranet

David L. Boswell, *Texas Department of Transportation*

Environmental Affairs has recently loaded the internally created Environmental Management for Maintenance Facility Supervisors Guidance Manual, Hazardous Materials in Project Development Guidance Document, and Spill Prevention Control and Countermeasures (SPCC) Guidance on Texas Department of Transportation's (TxDOT's) internal Internet site "Crossroads" (TxDOT's Central Intranet Server) to allow TxDOT personnel instant access to the most current hazardous materials environmental compliance guidance.

This action is a major accomplishment toward meeting the Hazardous Materials Management Section's objectives to improving communication and facilitating compliance, as well as forming a major component of the section's environmental management system for facility compliance.

The Environmental Management for Maintenance Facility Supervisors Guidance Manual provides specific instructions for use by our maintenance facility personnel regarding hazardous waste management, vehicle maintenance waste, housekeeping, vehicle and equipment washing, SPCC procedures, asbestos management and petroleum storage tanks. It also includes a facility compliance audit checklist and useful information downloaded from the Environmental Protection Agency and other relevant regulatory compliance sites.

The Hazardous Materials in Project Development Guidance Document offers detailed guidance on issues related to hazardous materials as they impact various stages of project development including advanced planning and the environmental review process, right-of-way acquisition, design, and construction.

The SPCC Guidance provides a summary of the SPCC requirements and how they affect TxDOT's maintenance facilities. It includes frequently asked questions, EPA guidance, and sample plans.

TxDOT realizes that successful communication depends upon providing accurate, current, and relevant information to the individuals performing the regulated activities. The intranet system is the perfect tool to deliver this information throughout the department.

OBJECTIVES

The purpose of putting the guidance on the agency's intranet site is to improve communication and facilitate compliance. The intranet platform allows individuals throughout the system access to a centrally maintained and continuously updated document. As people become more familiar with this format, time spent searching for information or implementing less than ideal procedures could be saved for performing core functions.

Improve Communication

A centralized, accurate document provides a strong foundation upon which to build a compliance program. The strength of the program depends upon the awareness of the location and contents of the guidance. Awareness of the recognized source document can be increased with other technology-based tools such as e-mails educating employees about the existence and location of the guidance as well as the contents. Other media forms such as newsletters, memos, and verbal references to the source document during audits may be used to reach employees that typically would not use a computer-based guidance manual. The same formats could be used to solicit feedback on the structure and contents of the guidance to continuously improve the process.

Facilitate Compliance

As communication and awareness increase, compliance will become the standard, thereby satisfying the primary objective of the program. Ultimately, our goal is to achieve compliance. By providing easy access to information, related training, and a system to audit facility compliance and follow-up on deficiencies, we are creating a culture of environmental awareness. TxDOT's intranet system provides the perfect tool to help meet these objectives.

CONCLUSION

Providing information that is accurate and timely is important but it is not the final step. Availability of information actually increases the importance of developing and maintaining positive relationships with district personnel. Visiting the maintenance sites to monitor their compliance status shows an active interest and concern for the environment and the employees that ultimately determine the department's compliance status.

Use of GIS to Assist in Environmental Assessment Analyses, Martinsburg Bypass, Martinsburg, West Virginia

Stephen E. Gould, GAI Consultants, Inc.

Over the past year, a geographic information system (GIS) has been used to aid in the assessment of environmental impacts for a proposed West Virginia Division of Highways (WVDOH) bypass project around Martinsburg, West Virginia. The environmental constraints associated with the proposed highway bypass are being assessed using the organizational and spatial analysis aspects of the GIS along with highway design files generated with Microstation software. The highway designs were initially developed using GIS-generated constraints data to assist in the avoidance of impacts at the earliest feasible stages of project development.

Fundamental to the success of this project is the access of GIS files from public websites (e.g., www.dep.state.wv.us); integration of various data sources (e.g.,

Microstation files, image files, and GIS files); strong communication between engineers, environmental specialists, and historians; and thorough data documentation. We have established protocols to improve data manipulation efficiency through the use of a multidisciplinary GIS project team, with the ultimate goals being minimization of impacts, reduction of overall project costs, and increased product quality. We have integrated a number of software packages to assist in reducing the amount of paper used to conduct the project.

Through the centralized storage and standard naming convention in the GIS, we have been able to capitalize on having reproducible results and have been able to share the project's data with multiple companies and numerous GIS analysts and project staff. We have been able to use these data to rapidly assess the impacts associated with potential project designs to facilitate decision making throughout project development. Systems and protocols that we have installed have assisted with:

- Data distribution to project management for data review and query,
- Data sharing with other firms,
- Rapid data revisions to evaluate modifications to the highway designs,
- Data capturing from georeferenced field maps to the GIS,
- Providing digital mapping for use on a project website to facilitate public awareness of the project, and
 - Providing mapping at a variety of scales for use in environmental and engineering documentation as well as for use in public presentations.

Data that has been collected from fieldwork along with map and literature review and assessed in the GIS includes

- Land use,
- Farmland soils,
- Active agricultural land,
- Large forest tracts,
- Streams,
- Wetlands,
- Floodplains,
- Prehistoric probability,
- Historic probability,
- Potential Section 4(f) resources,
- Hazardous waste sites, and
- Endangered species habitats.

Overall, through the establishment of data processing systems and deriving analyses from data stored in the GIS we have taken steps to make the environmental assessment process more efficient, accurate, and cost-effective.

How Can a GIS-Based Demographic Analysis Assist in Analyzing Environmental Justice Decisions?

Stephanie Kaselonis, *Wilbur Smith Associates*

ISSUE

Minorities and the poor are experiencing increased difficulty in gaining access to work, social services, and the community as a whole due to the shifting of population and political power to the suburbs. When the ability to participate in policy making decreases, the needs of those people are minimized. Inequitable and exclusionary decisions are sometimes made in the interest of the “greater good” of the people. This situation gained recognition due to the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and has become more focused with the passing of the Transportation Equity Act for the 21st Century (TEA-21), which includes more public participation in decision-making activities. By utilizing readily available demographic information, it is easy for decisionmakers and public interest advocates to see clear pictures of current population, historical trends, and future predictions.

METHODOLOGY

This poster presentation will discuss simple, yet effective ways to use demographic information to show if a project is environmentally equitable just using examples from projects in the Cleveland, Ohio, area. The poster will detail the complete process, from base data gathering to mapping components and environmental justice analysis. Emphasis will be given to the elements needed to document environmental justice issues for inclusion in an environmental impact statement.

RELATION TO STATED THEME

This poster session hits upon several of the major topics covered under the Call for Poster Session Presentations. This poster presentation will show the latest technologies for environmental justice analysis, as well as how environmental justice considerations are documented during the transportation development process. The Red Line Extension major investment study is one of the first draft environmental impact statement (DEIS) studies received by the FTA to employ geographic information system technology for the new environmental justice standards for DEIS analysis. This poster session also hits upon the theme of premier modal projects and initiatives. The ECTP project is a comprehensive multimodal project that employs bus rapid transit technology. It is also the first project of its kind in the United States.

Most of the large-scale projects currently being undertaken by the Greater Cleveland Regional Transit Authority are being expanded into areas that have smaller minority populations. However, the ECTP project will serve only large minority areas.

Online Site Characterization Project Website

Ray Wattras, Carol LaRegina, Angela Pompa, and Michael Emanuel,
Baker Environmental, Inc.

Baker Environmental, Inc. (Baker), developed a project website for the Mays/Phillips Lane Site in Allegheny County as part of a site investigation conducted for the Pennsylvania Department of Environmental Protection (PADEP). This technology can be used to supplement environmental site characterization projects related to transportation. This could apply to storage facilities with leaking containers, maintenance facilities with releases of hazardous substances, or any facility where permit monitoring is required. For example, a website for a highway corridor project could be organized by individual property or site type (gasoline stations, industrial properties, historical sites) and include the desired information for each site or group. Baker's poster presentation will be an online demonstration of interactive capabilities of the project website. Baker personnel will be available to discuss such topics as

- Costs for development,
- Customizing to specific applications,
- Typical problems and solutions, and
- Client feedback.

OBJECTIVES

The website was developed primarily to facilitate technology transfer efforts, ease project communications, reduce document dissemination costs, and increase access to project information for PADEP personnel. The features/applications allow project data (mapping, analytical results, schedule and budget updates, site photographs) to be served live via the Internet. For example, the mapping feature can be queried to produce displays of project data specific to the user's interest (e.g., analytical results by media, by sample date, by sample collection depth, etc.) using state-of-the-art point and click technology.

METHODS

The front-end splash page is a password protected virtual project website that was created using Microsoft FrontPage. Within the website are individual category websites that contain documents and a library of photographs. The geographic information system (GIS) was created and is maintained over the web using Autodesk Mapguide. Layer groups were created in the GIS to categorize layers that are used similarly. Reports can easily be created by querying database information through the GIS. Visual InterDEV was used to create the report formats.

POSTER HIGHLIGHTS

Project websites centralize project information and allow the information to be simultaneously real-time accessed by the project team regardless of their location (as long as Internet access is available). The websites are also interactive, which improves the efficacy of communication, reduces the need for meetings if cost and/or travel are concerns, and allows real-time review and comment of documents. The negative aspects of environmental enforcement and compliance can be reduced using this technology by shortening project life cycles by reducing document review and comment periods, helping to reduce costs, allowing continuous oversight of schedules and budgets, and providing easy public access to project information, if desired.

The website includes the following features:

- News—A page dedicated to “news” worthy events. Information is stored in a database thereby allowing for topic searches and real-time updating by select or all users.
- Team—This feature offers biographical and contact information best organized according to a project structure [examples could include project management, consultants, project support staff, and project regulator(s)].
 - Discussion—Allows all or select users to post comments. Comments can be searched and replied to so that an environment of open “discussion” can be replicated.
 - E-mail—Could provide alphabetical lists of important contacts, but not in the context or detail of “team” information.
 - FTP—Provides file transfer capabilities through a simple browser interface. The FTP application also offers the user the ability to forward single or multiple notifications to potential recipients of the transfer.
 - Search—An environment allowing users to search for information via multiple search engines’ queries internal to the site or across the Internet.
 - Send—Enables users to easily send website-specific comments or questions to the web administrators.
 - Map—Includes a comprehensive list of everything on the virtual project website (VPW) and where to find it. In addition, you will find links to easily access pages throughout the VPW.

CONCLUSIONS

How Can This Technology Be Applied to the Transportation Industry?

The website technology could also be used to more effectively manage broader environmental issues related to transportation. Specifically, program-customized websites can be designed to allow interaction among shareholders on complex planning and communication projects reducing turnaround time needed to take projects from conception through comment and feedback to design and implementation. This can allow quicker more far-reaching public communication of issues such as commuter reduction plans, mass transit improvements, major construction projects/plans and both provide information and receive input.

Web-Based Project Development and Engineering Data Management Tools

Joseph R. Seppi and Joseph Linden, Michael Baker, Jr., Inc.

PROJECT WEBSITE

As part of its standard method of engineering project management, Michael Baker, Jr., Inc., has developed a project website tool. We have the ability to rapidly deploy a project website with no programming effort required. The project website has the potential to be useful in streamlining project data flow and communication between client, prime, and subcontractors.

We developed this easy-to-use web-based tool called “Mpowr”—Multi-Project Organizing Web Resource. It consists of a relational database and a series of command files, structured such that it can be easily copied to form a new project management website in a matter of minutes. After deployment of a project website, a couple of hours may be needed for a project-level staff member (rather than information technology staff) to create user accounts and customized content areas for the particular project. The Mpowr development team consisted of programmers and analysts. It was conceived and designed by a team of transportation engineering project managers.

BENEFITS

The need to manage digital data on complex projects requires a strong data management strategy. For complex geographically dispersed project teams, the Internet has made real-time collaboration and centralized data storage a possibility. Complex engineering projects generate more digital data now than ever. Managing the hundreds, possibly thousands of computer-aided design development (CADD) files, spreadsheets, word processing, digital photographs, and databases is made much simpler with web-based project management tools. When a project website is used from the beginning of a project any related document or drawing can be quickly retrieved and effectively used in design or decision making. Even files that are 1 or 2 years old and long forgotten can be located through a sophisticated internal search engine. The potential to improve schedule and cost performance by eliminating rework is enormous.

An important benefit is the ability to store and index the administrative record. Letters and important memoranda may be scanned and indexed by author, date, subject, or a combination of searchable criteria.

SECURITY

Project websites are not public websites and they must reside on a secure web server maintained at a secure facility. The web server is still an Internet resource that is not behind a firewall. Username/password protection supplies a minimal level of security. Additional security measures like built-in software security controls, Secure Socket Layer, and advanced encryption are also needed. At the request of the client, a portion of the project website may be reserved for public access, or for greater security, a separate public website can be deployed.

FUNCTIONALITY

The project website stores and tracks all project data. It enhances team communication with functions like automatic e-mail subscription that sends team members e-mail when a new document is posted or changed. The project manager or task managers can post important messages-of-the-day directed at their teams. Team members can be assigned to groups, committees, or any functional unit required by the project. Groups may be granted compartmentalized access to files and directories. The project managers can monitor the website by group or by individual and may even further break down metrics into type of usage.

The website stores a complete audit trail of all actions that take place on individual files (upload, read, checkout, check-in, mark review, approve, mark final, mark draft). Files are never overwritten. When a file is checked out, worked on, and checked back in, a new version is created. Older versions are preserved as a precautionary measure. Metadata (information about the data) standards can be implemented for all types of data that are stored on the project website. For example, the project manager can require users to enter critical metadata for all CADD files that are uploaded to the site. Through a series of key-in boxes the user can be required to enter information like map/drawing source, scale, type of survey, file type, coordinate system, software version, 3-D/2-D, checked by, created by (if other than you), and so on.

Each team member has his/her own username and password as well as detailed information including e-mail address, project role, phone numbers, and address.

Special on-line collaboration tools allow for multi-user net meetings. Other specialized tools allow users to view and even edit CADD and geographic information system files online. A unique photograph gallery can store thousands of digital images that are tied to database records and are completely searchable.

EXTENSIBILITY

A very important feature is the ability to create mission-critical data entry forms called active server pages (ASPs). ASPs can be used to automate data entry into a single relational database. Our team has created ASPs for U.S. Army Corps of Engineers wetland data, RBP stream and water quality evaluation, cultural/historic resource identification, and Phase-I archaeological studies. Field technicians are able to upload Global Positioning Satellite data and field notes directly via modem. ASPs have greatly enhanced our team's National Environmental Policy Act of 1969 analyses and document preparation. Custom ASPs can be quickly implemented to support any given need. The core database is "open" to allow data to be directed to existing databases like Oracle Financials, ASP, or other database-driven applications like Microsoft Project and Primavera.

ASP development is at the request of the client. It is a customization, which, depending on the client's requirements, can be quite simple or very complex.

CONCLUSIONS

The project website enhances project performance by

- Improving project management,

- Improving team communication,
- Reducing rework and data redundancy, and
- Speeding data transfer.

A project manager must be able to feel the pulse of the project. When multiple organizations with multiple office locations are involved, there are many barriers between him/her and the vital information being assembled. A project website gives the project manager the control to centralize data storage and to enforce an appropriate, consistent data management standard.

The project website serves as a virtual office for teams that simply cannot be physically together at all times. The project website transcends the differences between organizations and their local/wide area networks (LAN/WAN).

In large complex projects we often rely on team members at all levels to “know” what data are important for a given task. The reality however is that during the course of the project many team members may enter or leave the project. With metadata (information about the files we maintain), team members will always know the relative and absolute value of the data, even if they are new to the project.

Team members should not have to wait for days to get valuable digital data on CD-ROM or diskettes. E-mail systems should not be taxed by sending large attachments of data. Data transfer via the project website uses the standard file transfer protocol and generates the equivalent of a letter of transmittal. Even prepress plot files may be sent to a plotting device that is closer to those who need it.

Use of a Project-Specific Website to Facilitate International Stakeholder Understanding and Involvement Within a Combined NEPA/Provincial Transportation Project Development Process

William M. Plumpton, *Gannett Fleming, Inc.*

The Maine Department of Transportation (DOT) and the New Brunswick DOT, together with their respective stakeholders, propose to replace the existing international border crossing between Calais, Maine, and St. Stephen, New Brunswick, Canada. Each DOT owns, operates, and maintains their respective approach and one-half of the bridge. The U.S. General Services Administration provides an inspection facility in Maine that is used by the U.S. Customs Service, U.S. Immigration, and the U.S. Border Patrol. Public Works Canada provides an inspection facility for similar Canadian entities in New Brunswick. The New Brunswick DOT may seek federal funds for the construction of the project from Transport Canada.

The Calais–St. Stephen border crossing is the eighth busiest crossing along the U.S.–Canadian border. In 1997, more than 3.1 million vehicles, including more than 196,000 heavy trucks, traveled through this crossing. On an average summer day, more than 14,000 vehicles, including 800 trucks, are processed through this crossing. Approximately 40 percent of the exports from the maritime provinces are trucked through this crossing. During the summer tourist season, the traffic queues leading to the inspection facilities can extend for several miles in each direction through the two border

towns, adding extensive delays to through trips and making local trips almost impossible during the day. The towns of Calais and St. Stephen represent a combined 7,000 people.

METHODS

The two DOTs, together with their stakeholders, are committed to the planning, design, and construction of a new border crossing facility within the next 5 years. The National Environmental Policy Act of 1969 (NEPA) requires the consideration of impacts from federal actions that extend beyond the limits of our border. To facilitate the understanding of the respective planning processes used and the involvement of a large and geographically diverse group of stakeholders, a project-specific website was developed: www.nbdot-mdot-bordercross.com.

This website was developed as a single, easy-to-use mechanism to

- Bridge the gap between terminology and the two respective planning processes: NEPA and the provincial regulations governing the protection of the environment in New Brunswick;
- Provide consistent and timely information on the study to the general public and other stakeholders regardless of location or time zone;
- Provide a simple mechanism to monitor the progress of the study;
- Provide a central location for electronic versions of the study and its supporting documentation as they are generated; and
- Provide a mechanism for the public and other stakeholders to ask questions and give feedback.

A site map was provided to help the audience navigate the website and get to a specific section quickly. In addition to the home page, the site includes the following pages and items:

- News and Announcements: an online form to subscribe to receive automatic notification of updates to the website, news, announcements, and a newspaper archive.
 - Study Overview: explaining the goal of the study, who is involved, how the study is being conducted, and the overall schedule for the study.
 - Study Background: a description of the history of the project as well as a description of the current phase of the study.
 - Get Involved!: contact information, an online comment form to submit comments to the study team, a summary of the public meetings, and a summary of the project advisory committee meetings.
 - Frequently Asked Questions: A section updated throughout the study that gave answers to frequently asked questions.
 - Project Location: an interactive map with photos and videotape linked to locations in the study area.
 - Publications: copies of the reports produced during the course of the study in .pdf.
 - Links: websites maintained by agencies and organizations involved in the study
 - Glossary: a list of terms and acronyms commonly encountered on this website and in the documents prepared for this study. Terms used in the website are linked to the glossary.
- It is intended that the website be frequently updated throughout the study. At the

conclusion of the combined NEPA–Provincial transportation project development process, it is envisioned that the website will contain .pdf versions of all products generated during the study.

RESULTS AND CONCLUSIONS

This website is an example of innovation, at the project level, designed to

- Foster an understanding of the combined international planning process being used to satisfy our two countries' regulatory requirements, and
- Provide a simple, easy-to-use, and cost-effective mechanism to advance the involvement of a large and geographically diverse group of stakeholders.

ACKNOWLEDGMENTS

This website was provided for and prepared under the guidance of the Maine DOT; FHWA, Augusta; the U.S. General Services Administration, Boston; and the New Brunswick DOT.

Customized Assessment Tool for Analyzing Individual or Synergistic Combination Effects of Transportation Control Measures: PAQONE

James A. Frazier, Kim L. Chan, and Mark E. Roskin, *Michael Baker, Jr., Inc.*
Mike W. Baker, *Center for Program Development and Management*

The state of Pennsylvania, like other states with ozone non-attainment areas subject to transportation conformity, relies on transportation control measures (TCM) and TCM-like projects that have air quality benefits to meet the emissions budgets of state air quality plans. The Pennsylvania Air Quality Off-Network Estimator, PAQONE, was developed to assist the Pennsylvania Department of Transportation and associated metropolitan planning organizations across the state in providing rapid, consistent analyses of these types of projects.

Customized for Pennsylvania, PAQONE is a Windows-based transportation and air quality analysis model that analyzes individual projects that are not well represented in a regional travel demand model. These projects are typically analyzed outside the four-step modeling process for one of two reasons. First, a given project may not be amenable to physical representation in a network. Examples are transit improvement programs, area-wide or employer-based incentive programs, and bus replacements. Second, a project may be too small for the regional network such as signal timing and signal progression projects, bike/pedestrian improvements, park-and-ride lots, and turn lanes. Projects with air quality benefits can collectively play a significant role in demonstrating regional conformity in its transportation plans and improvement programs with state air quality goals and emissions budgets.

PAQONE uses two distinct modules to estimate the traffic and emissions impacts of projects based on a combination of project-level data and area-wide and national default data.

The transportation module calculates the traffic impacts by using project-level data to assess current travel conditions, computing changes resulting from the individual projects, and estimating the effect of the change on the transportation system. The emissions module runs Environmental Protection Agency’s MOBILE model to create emission factors based on the local planning assumptions (e.g., vehicle age distribution, I/M program, fuels) for the county where the project is located and calculates the emissions impacts and presents the results in a summary report.

Figure 1 below shows the main program screen, which displays the 25 project types that can be evaluated using PAQONE. Figure 2 shows the scenario builder, which allows the user to group the projects for analysis by geographic location, project type, and analysis year.

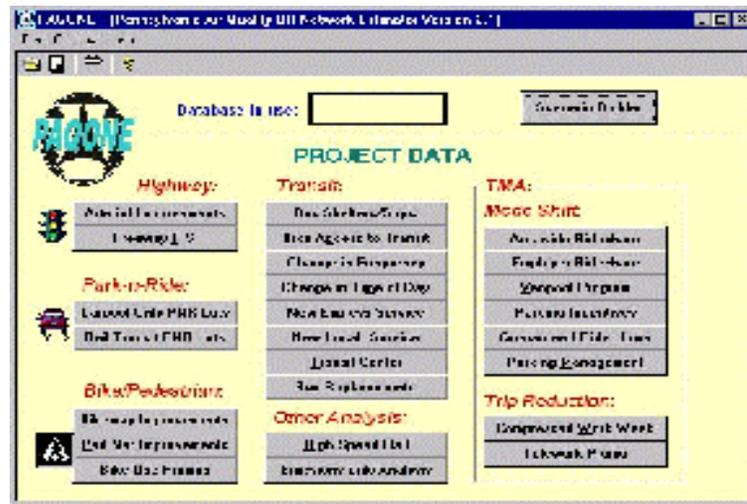


FIGURE 1 Project Data Screen.

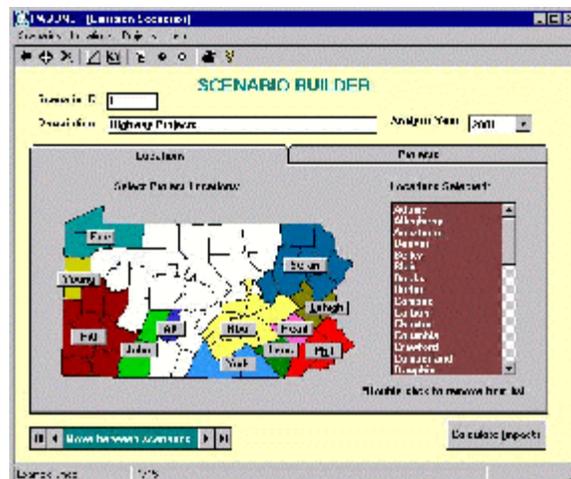


FIGURE 2 Scenario Builder.

Innovative “Expert System” Offers Leading-Edge Technology for Categorical Exclusion Evaluations

Richard C. Shannon, Jr., *McCormick, Taylor, and Associates, Inc.*

Jeffrey L. Brent, *Information Services Group, Inc.*

Mccormick, Taylor, and Associates, Inc. (MTA), and its information technology partner, Information Services Group (ISG), in cooperation with the Pennsylvania Department of Transportation (PennDOT) and FHWA, is developing a computer-based “Expert System” for the completion of Categorical Exclusion Evaluations (CEE) for transportation projects in the commonwealth of Pennsylvania. The Collaborative Engineering (CE) Expert System is intended to fully and completely automate the CEE process through the utilization of a computerized “smart form” and work flow logic. This technological advance will facilitate the environmental clearance process for CE-level projects through process automation and allow for reduced errors and redundancy in the preparation of project documentation. Further, the automated approval process allows for electronic transmission of all project documentation and incorporates the use of electronic signatures, eliminating the need for traditional paper copies and U.S. mail transmission of documents.

The initial goals of the effort were to

- Improve the quality of the CEE process and resulting analyses,
- Standardize CEE forms for National Environmental Policy Act of 1969 (NEPA) documentation,
- Streamline the environmental clearance effort,
- Share available data and enhance coordination with partners,
- Integrate existing internal PennDOT functions (planning, funding, etc.), and
- Reduce time, effort, and cost.

The anticipated benefits of the system include:

- Significant time reduction for preparation of NEPA documentation,
- Significant cost savings over manual process,
- Higher quality documentation resulting from standardization,
- Electronic information sharing, and
- Improved process compliance resulting from process focused interface.

The form and evaluation is based completely on the existing CEE form and requirements as detailed in PennDOT Publication 294, *The Categorical Exclusion Evaluation Handbook* (December 1999). When fully functional, the system will utilize web-based access to obtain information from other databases (e.g., threatened and endangered species data, cultural resources databases, water quality databases) and incorporate that information directly into the form. An extensive help system has been developed to walk the user through the preparation of the CEE. The help system includes not only frequently asked questions, but includes a detailed glossary and acronym listing, as well as hyperlinks to external sites for

all regulatory references. The actual CEE Handbook as well as other PennDOT and FHWA policy and reference documents are similarly accessible.

The CE Expert System has been adapted to address not only the preparation of the actual CEE (two possible levels of evaluation in Pennsylvania), but also address the project scoping process. All information gathered and developed during the scoping process is automatically saved and converted to the CEE format when a CE project is initiated. This information transfer eliminates the need for redundant data entry and reduces opportunities for errors.

The CE Expert System will allow the user to take a laptop computer into the field to gather all necessary information and directly input that information into the form. The system will be process focused and will walk the user through the entire process. It also includes a validation system to ensure the accuracy and consistency of information and that no information has been omitted. The CE Expert System generates messages for Errors, Warnings and Other Messages to assist the user in completing the NEPA documentation correctly. The system was designed so that additional rules can be added as the system matures.

The field-based flexibility of the system, in addition to the electronic data acquisition capability, is expected to result in significant time saving for the user. The computer-based logic will reduce errors and omissions and enhance consistency. Further, the system is designed to allow for electronic approval and transmission, hence eliminating the delays typically associated with paper transmission.

The system was developed using the PennDOT standard Lotus Notes platform (R5.0). Lotus Notes is a software package that supports CE. With Lotus Notes, custom database applications can be developed that allow groups of users to easily work together through the use of e-mail to share technical data and other information. The CE Expert System Version 3.0 prototype is currently scheduled for limited user testing during Summer 2000, with full implementation and statewide deployment by the end of 2000.

Future application of this system technology may include the environmental assessment and environmental impact statement processes. In addition, expert systems can be developed to address permit processes as well as other process-oriented applications.

Using Information Technology to Source Best Practices and Cutting-Edge Information on Environmental Issues in Transportation

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Constance Hill, *FHWA Environmental Research Program*

Bonnie A. Osif, *Pennsylvania State University*

Barbara Post, *Transportation Research Board*

Timely and efficient access to accurate, verifiable information is universally recognized as a cornerstone of quality research and decision-making. Not many years ago timely and efficient might have referred to preprints, conference papers, and those high-quality journals that reviewed and published research rapidly. In the last dozen years, with the almost exponential growth in the quantity of publications, timely and

efficient has come to mean web-based information, which is only a mouse click away on the researcher's desk top.

This change in access has resulted in both a number of benefits and related challenges. The benefits include fast and easy publication via the web and the ease of desktop HTML; almost invisible updating of information, graphic interfaces which expand the flat, static graphics of print to include real-time, 3-D, interactive graphic options; almost instant communication with authors and other information creators; and links to related or supplementary resources.

However, with these benefits are related challenges, which must be acknowledged. Many of these are very closely related to the essential issue of evaluation. Evaluation has always been an information issue and includes such factors as reliability, validity, authority, and appropriateness. These issues are compounded in the web environment since some of the "tried and true" criteria may be missing or suspect in a web document. Specific evaluation criteria include vita and reputation of the researcher and their host institutions, publisher, date, the refereeing process, citation analysis, subsequent reviews, and evaluations of other researchers. Many of these criteria are missing with Web publication. The ease of web publication means almost anyone can publish. The host URL does not necessarily guarantee the same level of confidence that a particular print publisher can. Last, the exceptional usefulness of almost instant editing, revision, and updating of the web texts can mean the text, fact, or graphic needed has been overwritten with new information and purged from the official record, something that does not happen with new editions of printed works.

Another two-sided issue is finding the information. A number of excellent search engines allow web searching but even the most sophisticated searcher has relatively imprecise searches, missing a pertinent site or finding more than can realistically be examined. For this reason, guides to the subject, evaluated virtual libraries, and pathfinders have become increasingly important to control the vast flood of information.

One last point cannot be overemphasized. While there is a proliferation of quality, free web texts, databases, and archives, a number of critical resources are not free. Some resources are not available yet in electronic format. While the later is changing at an increasing rate due to the benefits of web publishing, the former may well remain for a number of reasons, copyright and financial issues being the major points.

The importance of these resources has been documented in a variety of resources. One specific to transportation is Value of Information and Information Services (FHWA-SA-99-038, Susan Dresley and Annalynn Lacombe, 1998). A bibliographic essay on this subject ("The Value of Information and the Value of Librarianship," *Library Administration and Management*, Vol. 14, No. 3, pp. 172-177, 2000) emphasizes the positive results of pro-active information utilization.

All of these issues reinforce the need for well-versed information professionals and their role in the creation, location, organization, evaluation, and utilization of the myriad resources available.

The subject of transportation and the environment is addressed in a number of databases, many of which are available free of charge. The most ambitious project is the National Transportation Library (NTL) (<http://www.bts.gov>) a clearinghouse for full text electronic documents, databases, web links and more. One of the major transportation databases, TRIS (Transportation Research Information Services) from TRB, is available from the NTL website (<http://www.bts.gov>), and for a fee through DIALOG and as part

of the SilverPlatter Web and CD ROM product, Transport. Other web databases of importance include TRIS-RIP (TRIS Research in Progress), EnvRIP (Environmental Research in Progress) (<http://itre.itre.ncsu.edu/cte/envrip.html>), and FHWA-ERP (Environmental Research Programs).

While there is increasing attention and documentation concerning the value of information, both anecdotal observation and statistical studies indicate access to the literature is still problematic. The NTL is an excellent electronic resource, but still represents only a small part of the information pool. A number of reports are not available in electronic format and the print resource is difficult to locate and borrow. International resources are generally copyrighted and not available on the web. Many are extremely difficult to borrow and purchase can be expensive and difficult. Last, language is an issue as many reports are not available in English.

Efforts have been made to develop coordinated, systematic access to transportation literature, both in the United States and internationally. The NTL focuses on U.S. information, but the need for international information has been recognized in the FHWA project International Guide to Highway Transportation Information, a five-volume web resource (<http://www.international.fhwa.dot.gov/>). NCHRP 20-48, "Accessibility of Non-English Language Transportation Information," focuses on both the availability of the resources and on translation. Last, TRB created Library and Information Science for Transportation (LIST) Committee A5017 in 1999 to serve as a forum on information and transportation, monitor new resources, define critical issues and promote new capabilities. A TRB Circular, *Studies on the Availability of Transportation Literature*, is forthcoming.

Overall, information in the field of transportation, and more specifically, transportation and the environment, is being recognized as a key feature in quality research. Access to a wide range of quality information, regardless of point of origin, is an important goal which will save money, time, and effort, and result in better use of our resources and protection of our environment. The use of the new technologies, linked with well-planned organization, easy search capabilities, and evaluative skills will greatly enhance this goal.

Environmental Streamlining

The posters in this session discuss methods used by transportation planners to improve information management in developing transportation projects. The primary goal is to comply with environmental and public participation requirements, but to do so more quickly than in the past, and less expensively. This is called streamlining. The posters presented examples of studies, management techniques, and step-by-step processes that achieved these goals.

Three of the posters each presented a case study. The first case was the application of new public participation requirements in the development of the Maine Turnpike Authority's Portland Jetport Interchange. The poster describes the process of initial evaluation, development of alternatives, detailed analysis, selection of an alternative, and final design. The Interchange project was presented as an example of successful streamlining by the state of Maine and the New England District Army Corps of Engineers. The second case study was a poster describing a study of improvements to bridges carrying I-75 over the Peace River in Florida. This area is very environmentally sensitive, presenting significant engineering challenges, while the process used in the study departed from traditional transportation planning in the state, presenting significant management challenges. The poster focused mainly on the methods that were used to complete the study. The third case study looked at the first use of new "Concise Environmental Impact Statement" guidelines developed by Pennsylvania. These guidelines are meant to allow planners to create documents that are more easily used by individuals and organizations interested in a proposed transportation project. In this case, a Community Advisory Committee was an important part of the project and a key factor in its successful completion.

The other two posters in this session presented management techniques and step-by-step processes that have been developed to implement environmental streamlining. One looked at the Integrated Transportation Decision-making framework that has been developed by the state of Maine over the last several years. It allows planning, design, construction, and maintenance to proceed in compliance with multiple governing laws (both federal and state) and under the supervision of multiple regulating agencies. One poster in this session looked at several environmental planning tools used by the Ohio Department of Transportation, including a nine-step decision-making process designed to accommodate review by the public and regulatory agencies, a training course for use at the district level, and the use of geographic information system technologies in a major road-building project.

Transportation Development and the Environment

Jim Bednar and **Rhonda Mears**, *Parsons Brinckerhoff Ohio, Inc.*

Parsons Brinckerhoff Ohio, Inc.'s poster session, in conjunction with the Ohio Department of Transportation (ODOT), showcases current ODOT projects involving innovative tools used to enhance environmental compliance and the transportation development process in Ohio. The poster highlights three items: Preliminary Development Process Guidelines, District Training, and the U.S. Route 24 project.

PRELIMINARY DEVELOPMENT PROCESS (TDP) GUIDELINES

ODOT utilizes a nine-step decision-making process, which is designed to accommodate citizens and agencies in the review and development of projects. This nine-step process is an interdisciplinary approach that is systematic and reproducible. A 2-week National Environmental Policy Act of 1969 (NEPA) course is currently offered and is required to be pre-qualified to perform environmental work for ODOT. These guidelines compliment the course and are designed to facilitate and educate ODOT employees, consultants, and local public agencies specifically on the nine-step process. The ultimate goal of the guidance is to provide a consistent approach to identifying and addressing environmental issues, obtaining public and agency comment, and making project decisions. The TDP Guidelines are available in hard copy, on CD, and on ODOT's website at www.dot.state.oh.us.

DISTRICT TRAINING

ODOT has recognized the need to educate employees who have an effect on the success of the department's ability to meet environmental commitments and compliance. A District Training course has been developed in a Microsoft Project Power Point presentation. This course provides training to district production, maintenance, and construction personnel on environmental issues that concern ODOT. The course is designed to identify and clarify issues of concern that will help improve communication between the district environmental coordinator and district production, construction, and maintenance personnel. The course also focuses on ways to improve coordination of project timing with delivery of environmental documents and permits. The on-time delivery of projects for effective management and fiscal control is emphasized throughout the course.

U.S. ROUTE 24

The U.S. Route 24 project involves a major east-west transportation corridor through the Midwestern United States, linking Michigan and Colorado. The eastern portion of the corridor traverses northern Indiana and northwestern Ohio, and it provides the most direct access between Fort Wayne, Indiana, and Toledo, Ohio. ODOT is proposing to improve the operational characteristics of U.S. Route 24 in this eastern portion through a major transportation project. The transportation development process has incorporated

Transportation Development Process

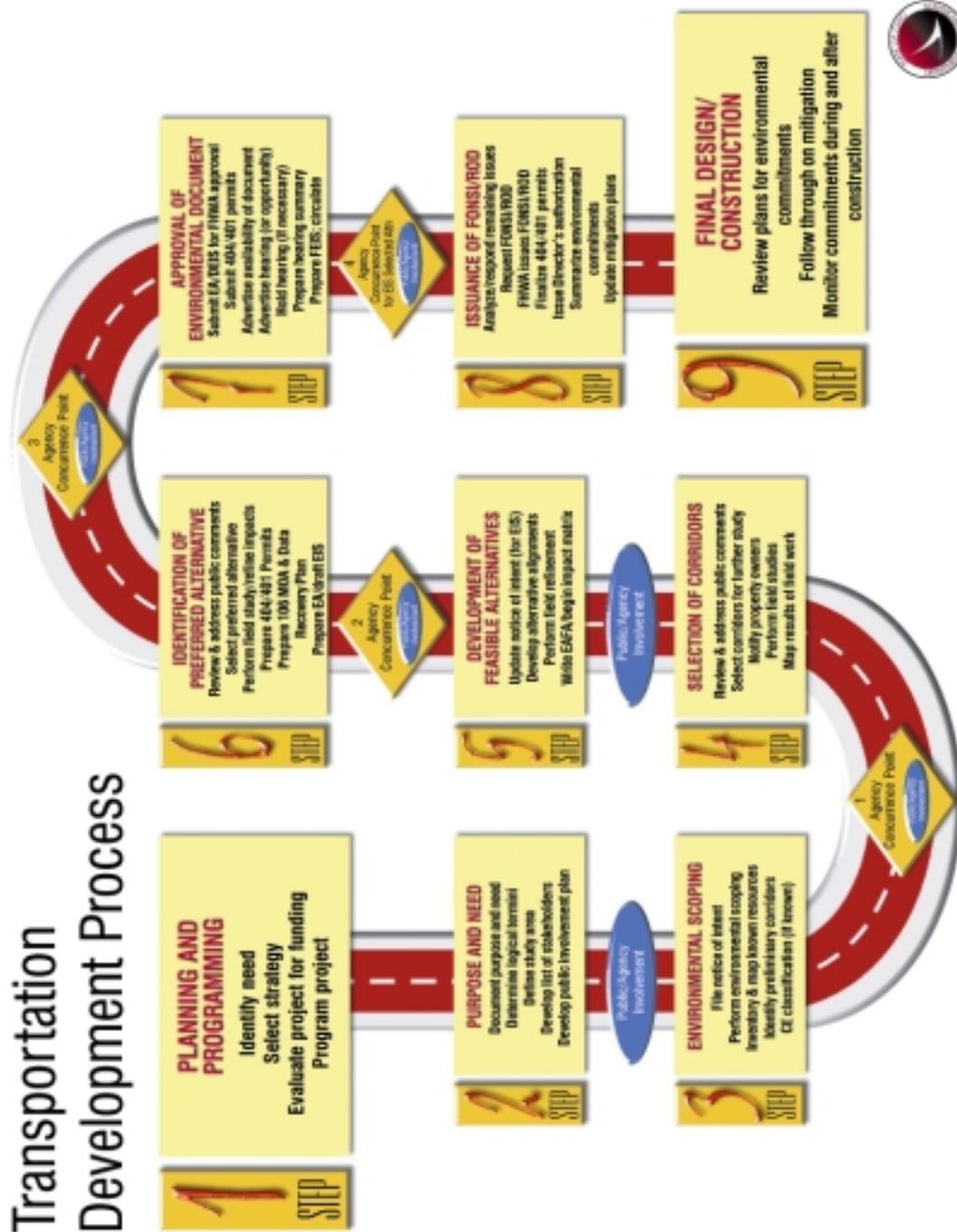
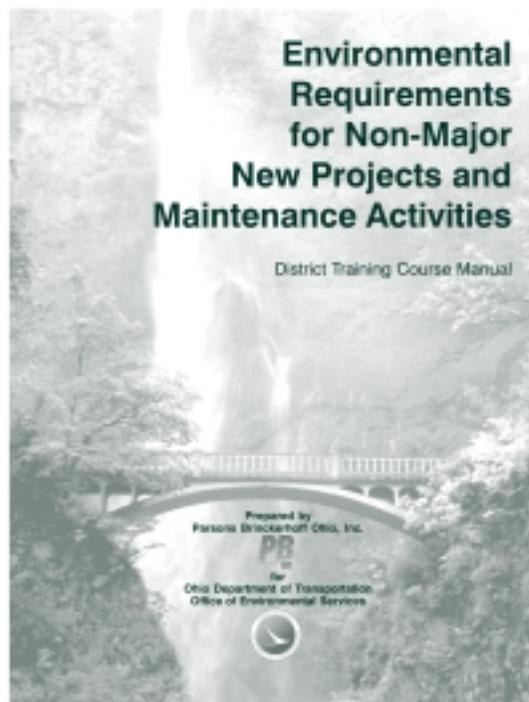


FIGURE 1 ODOT's nine-step decision-making process.

geographic information system (GIS) technology to organize and analyze environmental impacts on natural and human resources at the preliminary corridor level and is also being used for site-specific alignments. This system encourages environmental and engineering constraints to be analyzed simultaneously. GIS enables the project team to download primary data obtained from field delineation and to analyze and integrate the existing secondary source data obtained from federal and state agencies. In addition, GIS can help to speed regulatory compliance and permitting and facilitate a more effective and defensible decision making process. To enhance public participation the project has incorporated a website, a toll-free hotline, newsletters, and public involvement meetings. The website allows for a systematic approach to tracking areas of concern by allowing website visitors to choose a category applicable to their specific comment. By choosing a category, the comment is automatically directed to the individual on the project team with the appropriate expertise to provide a reply. This process provides for consistent and prompt responses. You can visit the U.S. Route 24 website at www.us24.org.



Streamlining in New England: Using the Highway Methodology to Permit Maine Turnpike Authority's Portland Jetport Interchange

Marcia Bowen, *Normandeau Associates*

Joe Grilli, *HNTB*

Stephen Sawyer, *TY Lin International*

In 1987, the New England District Army Corps of Engineers (ACOE) developed its Highway Methodology, a process designed to merge highway planning and design with Corps permit requirements, National Environmental Policy Act of 1969 (NEPA) needs, and FHWA funding approvals. Its goal was to achieve regulatory consensus at key decision points and prevent costly and time-consuming backtracking. In 1991, the state of Maine passed the Maine Sensible Transportation Policy Act (MSTPA), mandating public participation for all transportation projects and requiring preferential consideration be given to alternatives other than highway construction. These two processes were first tested together at Maine Turnpike Authority's Portland Jetport Interchange, opened to the public in 1999.

METHODS

The Highway Methodology incorporates the following decision points requiring agency approval:

- Define overall project purpose, consistent with Environmental Protection Agency (EPA) 404(b)1 guidelines;
- Develop all possible alternatives and evaluate impacts on natural resources;
- Eliminate alternatives as not practicable or too environmentally damaging;
- Detailed environmental investigation of practicable alternatives, with public input; and
- Selection of the Least Environmentally Damaging Practicable Alternative (LEDPA).

This process parallels the NEPA process; however, it is unique because once consensus is achieved at each decision point, that phase is not revisited. Since no federal funds were used in the project, the Turnpike Authority did not prepare any NEPA documents.

RESULTS

The Turnpike Authority formed its public advisory committee (PAC) in 1991 for the Jetport Interchange project, consistent with MSTPA. All interested stakeholders were involved, including municipal officials, area businesses, truckers, abutters, regulators, and interested parties. Individual meetings were held with special interest groups to solicit input, along with a series of public informational sessions. Using a consensus-based process, the PAC developed a detailed project purpose, along with a set of goals and

measurable objectives for analyzing alternatives. The goals included such items as reduced congestion, efficient movement of goods, quiet enjoyment of neighborhoods, safety, enhanced economic development, and minimizing impacts to natural resources. Federal and state agencies concurred with the process and developed a broad project purpose consistent with EPA 404(b)1 guidelines.

The engineering team and the PAC developed a series of build alternatives to address the varied goals of the project. Transportation system management and demand management, along with upgrade of the existing roadway, were also assessed, consistent with MSTPA. A matrix evaluation process allowed us to compare alternatives in terms of how well they met the project purpose using the measures of effectiveness. Impacts to natural and human resources were evaluated in a screening-level review, relying upon existing information. In an iterative process, seven alternatives were initially evaluated and two were abandoned as not adequately meeting the project purpose. Airport safety issues required the elimination of another two alternatives, replaced by a new alternative. The Turnpike Authority then elected to convert to a closed-barrier toll collection system, requiring development of three new alternatives, with one declared as feasible. Altogether, five alternatives were carried forward for further review. ACOE concurred with the list of practicable alternatives.

A more detailed environmental analysis was conducted to better evaluate the feasible alternatives. This included further design, mapping and design at 1:400 scale, and wetland mapping from a combination of aerial photographs and field review (wetlands are delineated for the LEDPA only). Collaboration between designers and resource specialists allowed minimization of impacts to natural resources. The Highway Methodology dictates that the Corps will grant a permit for the alternative that is the least environmentally damaging, consistent with 404 regulations. During this process, an improved design was developed with public and stakeholder input. Although it had slightly higher wetland impacts, it was far superior in meeting the project purpose. Ultimately, federal and state agencies agreed that this alternative clearly best met the project need even though it was not the least environmentally damaging alternative. A comprehensive wetland mitigation plan was developed in tandem with the alternative analysis to facilitate acceptance of the preferred alternative.

The interchange planning process culminated in the simultaneous selection of a locally preferred alternative and ACOE's designation of the LEDPA. This alternative established the location and configuration of the proposed alternative as well as a wetland mitigation plan to compensate for unavoidable impacts. The project then seamlessly moved into a parallel track of final interchange design with wetland impact minimization, final environmental permitting along with final design of the wetland mitigation package, and construction.

CONCLUSIONS

The Highway Methodology hardly seems unique considering standard environmental process today. However, this project demonstrates that New England and Maine have been successfully streamlining the environmental process for over a decade. The Jetport Interchange successfully integrated public participation and the regulatory process. Furthermore, the process allowed additional alternatives to be integrated into the process, resulting in a better design that balanced costs, benefits, and impacts.

Integrated Transportation Decision Making

Duane Scott, *Maine Department of Transportation*

During 1997, the Maine Department of Transportation (MDOT) began to develop a new framework for integrating environmental and transportation decision-making throughout the department. In January 1998, an Environmental Leadership Workshop was held for MDOT executives and managers to create an environmentally conscious organization; institutionalize an environmental ethic in the organizational structures; establish an organizational culture that integrates environmental concerns in daily decisions; seek new stakeholders and partners through the use of collaboration, problem-solving, consensus building, and negotiation skills; and balance transportation infrastructure development, environmental protection, and community/neighborhood preservation through shared decision making. An MDOT working group was formed to refine a conceptual framework. This framework interfaces planning, location, design, right-of-way, construction, maintenance, and environmental operations by fully integrating the decision-making processes of the state of Maine Sensible Transportation Policy Act (STPA), federal National Environmental Policy Act of 1969 (NEPA), and state and federal environmental permitting, especially the U.S. Army Corps of Engineers, New England, Highway Methodology. Work products include written guidance on the merger of NEPA and STPA into a single decision-making process and the completion of a database system to support that decision-making, related documentation, and “cradle-to-grave” project coverage.

The overall goals of MDOT’s Integrated Transportation Decision-Making (ITD) process are to express well-defined environmental policies and statements; protect the human and natural environment; establish an environmentally conscious organization with an institutionalized environmental ethic that directly influences daily decision making; encourage broader use of collaboration and consensus building, both internally and externally, through stakeholder cooperation and participation; seek balanced transportation infrastructure development; and promote environmental accountability throughout MDOT for actions that affect environmental quality.

To date, several major projects, requiring environmental assessments and impact statements, have been utilizing this process with much success. An integral component of ITD is education and training, both internal to MDOT and for external customers, partners, and stakeholders.

Concise Environmental Documentation: The SR-0119 South Improvement Project, Indiana County, Pennsylvania

Scott Sternberger and Gretchen Yarnall, *KCI Technologies, Inc.*

KCI prepared the draft and final environmental impact statements (EISs) for this project using Pennsylvania Department of Transportation's (PennDOT's) recently adopted Concise EIS Task Force Guidelines. The project was selected as a pilot project to test these guidelines. KCI developed creative strategies and employed innovative document preparation techniques, which resulted in a more approachable and reader-friendly EIS for the public and the environmental resource agencies. The latter circumstance resulted in reduced review time and contributed to maintaining an accelerated project schedule.

A SR-0119 South Improvement Project website was developed for PennDOT. The site contains general project information, history, and mapping, as well as construction status and commuter information, and also allows the public to comment directly to PennDOT and receive responses to project specific questions directly from district personnel.

A key factor in the success of this project was the Citizens' Advisory Committee (CAC). Throughout the process, the CAC was actively involved in project development, and provided valuable input concerning local transportation needs and preliminary design recommendations. The KCI team fostered an interactive relationship with the CAC members, encouraging them to carefully evaluate the preliminary design concepts, take project plans back to other members of the community, and return to the project team with suggestions for consideration and implementation.

We submitted the document to FHWA in both hard copy and CD-ROM electronic format, making the document not only the first concise EIS submitted to the department, but also the first prepared in CD-ROM format for compliance purposes. The quality of the graphics and stability of the electronic document is superior to standard printed format, and storage space is significantly reduced.

We feel that by presenting the SR-0119 South Improvement Project at the TRB Conference, we can share this innovative technology with others in the transportation industry and foster an exchange of ideas among our peers. These new standards for improved environmental documentation throughout the commonwealth and beyond are in keeping with the workshop theme of Transportation and the Environment for the 21st Century.

The project was recently highlighted in national professional magazines, including a feature in the Spring 1999 AASHTO Quarterly, and a write-up in the Engineering Showcase of Excellence Marketing Section of the May/June 1999 *American Consulting Engineer*. The project received statewide recognition by the Consulting Engineers Council of Pennsylvania with its 1999 Honor Award for Studies as part of their Diamond Awards for Engineering Excellence Program and was nationally recognized by the American Consulting Engineers Council as a finalist in their Engineering Excellence Awards Competition. In 1999, AASHTO also recognized the project and the project teams efforts by awarding the project management team their Trailblazer Award for Quality Team Achievement. The Trailblazer Award recognized only 25 teams nationwide.

Interstate 75 over the Peace River Project Development and Environment Study

Phillip W. Stevens, *Parsons Brinckerhoff Quade and Douglas, Inc.*

The Tampa office of Parsons Brinckerhoff Quade and Douglas, Inc., has recently conducted a Project Development and Environment (PD&E) study for the Florida Department of Transportation (FDOT) to investigate options for the deck replacement and widening of the Interstate 75 (I-75) bridges over the Peace River in Charlotte County, Florida. The purpose of a PD&E study is to document information necessary to confirm the need for the project and develop and evaluate various improvement alternatives after consideration of socioeconomic, cultural, and environmental impacts. The general objectives of a PD&E study are

1. Identify, research, and analyze the various factors that will be instrumental in the formulation of a design concept for the proposed improvement;
2. Analyze alternate preliminary engineering concepts;
3. Document the public involvement program; and
4. Document the recommendation of a specific preliminary engineering concept and specify why the recommended concept was selected.

The I-75 over the Peace River PD&E study is unique in that it involves changes to the traditional FDOT transportation development process. The traditional FDOT process normally allows 2 years for the PD&E study, 2 years for design, 2 years for right-of-way acquisition, and 2 years for construction. Given that phases are funded as soon as possible, this equates to an approximate 8-year time frame to see a project constructed. However, the FDOT functions under a 5-year funding umbrella. Therefore, it is difficult to get all four phases of a project funded within the 5-year work program. Because there is no need for additional right-of-way, this project consists of only two phases: a PD&E phase and a design-build phase.

A design-build project combines the design and construction phases into one step, which can allow the improvements to be made approximately 18 months earlier than the traditional process. Because of the design-build phase, which immediately follows the PD&E study, the traditional process has been modified to better serve the needs of the users of the facility, the environment, and the FDOT. These modifications allow for unique partnering opportunities among the FDOT, various permitting agencies, conservation groups, FHWA, consultants, contractors, and the public. This partnering is especially important and valuable because of the need for safeguarding the environment. This portion of the Peace River is environmentally sensitive with the presence of manatees, eagles, bats, seagrasses, extremely mature mangroves, pristine salt marshes, and other flora and fauna. This portion of the river is also designated an Essential Fish Habitat. In addition to partnering, the FDOT has provided for increased sensitivity and protection of the environment in their preparation of the request for proposal and the Scope of Services for the design-build project and in the selection process for the Design-Build Team. This consideration takes the form of specific contractual language that precludes certain materials and methodologies that may be detrimental to the natural

environment, which under normal circumstances would be allowed. This is an unusual instance of environment taking precedence over engineering.

This project is a demonstration of a union of transportation development process streamlining and environmental protection. These changes are being made possible by the inventive and energizing approach taken by the FDOT's Project Manager, Marlon Bizerra, P.E., and Environmental Project Manager, Gwen Pipkin. Without their proactive perspective on improving the transportation development process, this innovative approach to environmental protection would not have been possible.

Innovation in Public Involvement

The main focus of this session was the mitigation of historical and archeological impacts, that is, reducing or accounting for the damage or destruction of historical or culturally important sites and features due to transportation infrastructure construction. Several posters noted that traditionally mitigation included an archaeological research effort that documented the site and its contents, and a report of these findings that would be filed with the appropriate transportation agency. This approach is no longer considered adequate, and instead outreach to both the lay public (especially to the local community) and to professionals is required. The posters describe several efforts in this direction.

One poster in this session described the efforts of Pennsylvania to go beyond the legal requirements for public participation by involving the public earlier and more frequently than it has typically done in the past. This approach is expected to both improve the influence the public has on transportation projects and to reduce the time and cost of public participation. The poster describes a process designed to accomplish these goals in several different projects in Pennsylvania. Another poster presented some of the recent developments of integrating public interests and concerns into cultural resource studies of transportation projects. It focused on Internet communication techniques and methods designed to improve public participation. A third poster in this session addressed the importance of active public outreach efforts in the preservation of historical and cultural resources, including examples that have worked in the past and examples of approaches that have not been successful.

A poster of local interest described the conversion of an old industrial infrastructure in Pittsburgh, the Hot Metal Bridge, into transportation links. This bridge was built at the opening of the 20th century to move molten pig iron from a local firm's smelters on one side of the Monongahela River to its Bessemer steel converters and rolling mills on the other side. The poster describes the historic value of this site, and the engineering and construction that was required to convert this structure to a roadway and passenger bridge while maintaining its integrity.

The last poster in this session described a new approach to mitigating the destruction of archaeological sites. Traditionally, transportation planners were required to conduct excavations and other research in order to develop and record any valuable information at archaeological sites, and then submit reports to the sponsoring agency about what was found. However, this information rarely went any further and was largely unavailable to either the public (including the local community) and the professional community. The poster described creative mitigation measures that solved this dilemma, including the development of interpretive exhibits, publication of booklets designed for the public and schools, and the presentation of research results at professional meetings and in professional journals. Several examples were given.

Public Outreach Associated with the Tunkhannock Bypass

Kristen Beckman, *Skelly and Loy, Inc.*

Jamie McIntyre, *Pennsylvania Department of Transportation, Engineering District 4-0*

Mitigation of adverse effect to cultural resources on the Tunkhannock Bypass project was designed to include extensive public education. Involved publics include both the non-professional and professional communities. Effects to both historic and prehistoric resources were mitigated through public education.

INTRODUCTION

The Tunkhannock Bypass was placed on the list of top-priority projects in Pennsylvania, when Governor Ridge pledged to carry through with a campaign promise to begin construction of the highway in 1998. An archaeological survey, which was conducted in the proposed construction right-of-way of two construction alternatives, resulted in the discovery of eight sites. Two of the sites—a prehistoric site and a tannery complex—were determined to be significant for the information which they contained. Because the highway could not be redesigned to avoid them, the effect of proposed highway construction on the two sites had to be mitigated.

PUBLIC OUTREACH AS MITIGATION

- Objective: Disseminate information that was gathered during project studies to the public
- Solution: Creative Mitigation Measures

Traditional methods of mitigating the effects of construction of a project on significant cultural resources consist of data recovery excavations on archaeological sites and recording information about extant historic properties to standards developed by the National Park Service.

One of the shortcomings of traditional approaches to mitigation is that information from archaeological sites and historic properties, garnered as a result of mitigation efforts rarely entered the public realm. For example, large amounts of money could be spent on excavation to mitigate the effect of a project on an archaeological site and, once the last excavation unit was backfilled, mitigation was considered to be complete. Information from the excavated site would, at best, be processed and incorporated into a technical report submitted to the sponsoring agency and the Pennsylvania Historical and Museum Commission. For the Tunkhannock Bypass project, however, a Memorandum of Agreement drafted by Skelly and Loy dictated that information gathered during Phase III research and excavations be conveyed to the public and to the professional community. These mitigation commitments will make sure that all of the effort and money which has gone into excavations and concomitant research will be broadly disseminated—thus maximizing the research benefits of the project.

Mitigation commitments for archaeological sites excavated for the Tunkhannock Bypass project include

- Development of an interpretive exhibit at the Wyoming County Historical Society;
 - Publication of a booklet geared toward the public, which describes the archaeological studies undertaken for the project;
 - Presentations at professional society meetings and in professional publications;
- and
- Installation of a permanent exhibit in Riverfront Park in Tunkhannock describing the industrial history of Tunkhannock and its importance in the community's and county's historical development. Signs in the park will incorporate industrial archaeological information from excavations at the Tunkhannock Tannery and information on the timbering industry.

Mitigation commitments for historic resources include

- Historic American Building Survey documentation of the three historic properties determined to be contributing elements to the Tunkhannock Historic District; and
- Creation of a brochure of a walking tour of the Tunkhannock Historic District, to be distributed to the public.

This type of creative mitigation is on the leading edge of cultural resource studies, and has engendered support both from the agencies and the public.

RESULT

Through meetings between Skelly and Loy, PennDOT Engineering District 4-0 and members of the Wyoming County Historical Society, and local citizens who collaborated on public outreach products, a very positive response from the public has resulted. An enthusiastic response from the professional community was also expressed at a symposium organized for the Eastern States Archaeological Federation meetings, and following presentations at the Society for American Archaeology and Transportation Research Board meetings.

ACKNOWLEDGMENTS

The public outreach efforts associated with the Tunkhannock Bypass project would not have been as successful without the creativity and enthusiasm of Jamie McIntyre of the PennDOT, the members of the Wyoming County Historical Society, and the PHMC.

Bridging the Past and the Future

Christine Davis, *Christine Davis Consultants, Inc.*

In the midst of a city of constant change, the Hot Metal Bridge across the Monongahela River spans two important brownfield sites now transformed by companies specializing in technology, research, and design. Most Pittsburghers observe the bridge across the Monongahela River as a single structure known as the Hot Metal Bridge. The structure is composed of two parallel, but separate bridges, which share the same stone piers. The Hot Metal Bridge served the purpose of transporting molten iron from Jones & Laughlin Steel Corporation's (J&L) Eliza Furnaces across the river to the Bessemer Converters and open hearths of J&L's South Side mills. Steel ingots went back across the river to be rolled or fabricated into sheets, wire, rails, and other products.

The bridge symbolizes a powerful change in the city of Pittsburgh, one that links the Steel Valley with the next millennium of new technology. Just as Benjamin Franklin Jones, principal partner in J&L, sought to incorporate the latest research and design into heavy metal production in the opening years of the 20th century, technology symbolizes Pittsburgh's continuing journey to the 21st century.

The Main Railroad and Hot Metal Bridges are eligible for the National Register of Historic Places, the list of properties important to the nation's history. The unique function of the bridges and the way the structures integrated J&L's blast furnaces and open hearth Furnaces link more than a century of history in Pittsburgh. J&L designed the bridges and used steel made in their open hearths to build them.

The partnership between Jones and Laughlin combined the skills of an older financial genius with a brilliant young entrepreneur. Benjamin Franklin Jones was only 29 years of age when he joined in partnership with a respected Pittsburgh banker, James Laughlin. Before the Civil War, Jones established a rolling mill on the South Side and Laughlin subsequently built an iron furnace across the river. The two firms eventually joined to form the Jones & Laughlin Company.

J&L began as a family business with the principal partners training their sons and brothers to take over executive positions and to form partnerships in subsidiary firms such as the Monongahela Connecting Railroad. Jones based the company's management on "vertical combination," the concept of owning raw material supplies, fuel, transportation, and other needs leading to the creation of a finished product. To this end, J&L owned iron ore mines near Lake Michigan, coal mines in Washington and Greene Counties, and the Blair Limestone Company in Blair County. J&L established the Interstate Steamship Company, owned docks on Lake Erie, and drilled gas wells to supply the mill.

In 1882, J&L formed a separate company—the East End Bridge Company—to build a railroad bridge across the Monongahela River. Five years later, J&L expanded the East End Bridge Company into a short-line railroad known as the Monongahela Connecting Railroad. Eventually, the Mon-Con became a multimillion dollar subsidiary of J&L and served many industries along the Monongahela River.

On January 1, 1900, the first day of a new century, J&L made a momentous decision to shift their operations exclusively to the new "high technology" of steel production. Although the Eliza Blast Furnaces continued to smelt iron used to make steel, J&L no

longer made iron rolls, bars, sheets, or any other iron products. A few months later, the Hot Metal Bridge was built and plans made for a new railroad bridge to replace the earlier 1882 bridge. J&L continued to expand and before World War I built the Aliquippa Works on the Ohio River in Beaver County. J&L grew to become the largest steel company in Pittsburgh and the employed thousands of workers.

When J&L closed their operations, the Hot Metal and Railroad Bridges were abandoned. Today, the Railroad Bridge has been converted for automobile traffic while the adjacent Hot Metal Bridge will be readapted for bicycles and pedestrians. Structural modifications necessary to convert these century-old railroad bridges involved the demolition of two steel spans and a stone abutment. The process used to maintain the historic integrity of the bridge while accommodating the re-use of the structures is the subject of this poster session. The session was part of an historic engineering study conducted under state regulations.

Giving Something Back: Public Outreach in Archaeology as an Important Part of Transportation Planning

Stephen Hinks, Jonathan Glenn, Patricia Mulligan, and Martin Fuess,
Michael Baker, Jr., Inc.

In recent years, public outreach has become an increasingly important component of departments of transportation (DOTs) fulfilling their cultural resources requirements. The rapid proliferation of technology has transformed the approach for educating the public about archaeological studies conducted as part of transportation planning. With growing numbers of people gaining access to the World Wide Web, the Internet has emerged as an exceptional educational tool. Interactive and regularly updated websites can provide outstanding opportunities for educating the public about archaeological and historical research, and field excavations, while providing opportunity for public input. Video presentations, which can be viewed via the Internet, or distributed via videotape or DVD, also provide a valuable tool for educating the public. This poster presentation discusses the development of two websites and a video presentation that are devoted entirely to the historic archaeology of the Reed Farmstead Site (46Hy287), a rural antebellum through early postbellum period (ca. 1803–1883) farmstead located near Baker, Hardy County, West Virginia.

Teaching the public about cultural resources studied as part of major transportation projects provides numerous benefits to DOTs and the public. These benefits include

- Illustrating the commitment of DOTs to preserve important parts of a community's heritage,
- Developing excellent interaction with the public affected by transportation projects,
- Providing a means for public participation, and
- Using the Internet as a cost-efficient and accessible means for distributing the results of research to the public.

This poster presentation illustrates some of the modern, efficient techniques that should be incorporated into major transportation-based cultural resource studies, such as Phase III excavations, as a means of “giving something back” to the public. The professional development of public outreach opportunities such as Internet websites and video presentations provides outstanding means for illustrating the sensitivity of DOTs toward balancing the needs of modern development and the public’s desire to preserve our heritage.

This presentation focuses on two of the topics featured at the Conference: (1) leading edge web-based communication, and (2) applied public involvement and project stakeholder participation approaches and innovations. This is accomplished using on-site availability of two interactive websites; one (www.reedfarmstead.com) is focused on educating adults, while the other (www.kidsdigreed.com) is tailored toward children. The children’s website was recently selected as Yahoo’s children’s “Hypersite of the Week.”

These two websites are used to illustrate several factors that should be considered when developing cultural resources educational websites.

- Websites should be graphically oriented, since people are less engaged by a website that is dominated by text. Portions of the website that have less widespread appeal or are more text-oriented should be buried within the site.
- Use a digital camera during field investigations and take an abundance of interesting “action” images. Ensure that both the subject and the background are visually pleasing and professional in appearance.
- Website text needs to be succinct and tailored to fit the understanding and interest level of the intended audience. The text should focus on essential points and generally avoid using technical terms unless they are clearly explained.
- The better websites, especially those designed for children, will be at least somewhat interactive.
- Regularly updated websites will draw a larger number of repeat visits than more static sites.
- The homepage sets the stage for the rest of the website. If it does not draw the reader into the rest of the site, the quality of the rest of the site becomes irrelevant.
- Once a website is ready to be launched, it is critical that the site is linked to a range of search engines and other related websites. Depending on the nature of your website, it can be linked to archaeological and historic preservation sites, relevant history and genealogical sites, etc.

In addition to the websites, this poster presentation highlights other aspects of public education that have been used in association with the Reed Farmstead site excavations. A professionally prepared video presentation about the excavations will be shown. This 40-minute video has been broadcast via the Internet and distributed for use in the West Virginia public schools. A nearly 60-minute long version also has been approved for broadcast on West Virginia Public Television. Color brochures summarizing the Reed Farmstead excavations also will be available at the poster session; these brochures have been distributed to the West Virginia public schools and to the public. Finally, the session’s poster will summarize modes of public education that are available in our modern, technology-driven world, and illustrate those forms through the Reed Farmstead site public education efforts.

Incorporating Public Outreach Activities on Transportation-Related Archaeological Projects

Diane B. Landers and **Benjamin Resnick**, *GAI Consultants, Inc.*

People have a key role in the decisions that shape the kinds of transportation activities that will be a part of their communities. These activities can be identified early in the project development process so that public participation becomes a proactive issue rather than a reactive one. For example, those communities fortunate enough to have historical and archaeological issues associated with their transportation projects are often left out of the exciting and educational opportunities that exist for them when archaeological sites or significant historic structures are identified early in the decision-making process. The treatment of those properties is one transportation-related area in which the public can truly and actively contribute. Public involvement also helps state and local transportation agencies assure that the colorful patchwork that comprises the history of an individual neighborhood is not lost in favor of the benefits that a transportation artery may provide to that community's future.

This poster addresses the importance of actively integrating historic resources and public outreach in the transportation project-development process. It discusses the growing trends and consequences affecting issues of historic preservation and the public as they relate to transportation projects in Pennsylvania and in other states. It provides current creative examples and approaches from actual projects that have worked, and those approaches that have not. The poster also presents ideas for increasing public involvement from merely informing the public to including them as active participants in archaeological and historical projects. Examples of how to broaden public involvement beyond the immediate local arena to other communities in the state are presented. Finally, the poster provides thoughts on future trends in public outreach and how public involvement is a crucial element that affects the future of the historic preservation program on a national level.

GAI designed a double-sided, three-hole-punched informational flyer for public distribution during early and final stages of archaeological projects, especially for use by departments of transportation (Figure 1). The flyer is written in a non-technical format, with illustrations. Historical background information especially appeals to the general public, as does archaeology areas of curiosity and interest to community members of all ages. This method of public outreach also affords transportation departments the opportunity to let the community know that they care, and that they are protecting and preserving their valuable heritage.

Information flyers can be updated, revised, and reformatted into a color, tri-fold glossy brochure that provides more detailed information on archaeological discoveries (Figure 2). Photographs may depict ongoing archaeological investigations and historical photographs. The tri-fold can be hand delivered or direct mailed to community residents and interested groups. They also serve as invitations to promotional gatherings, such as an Open House, a Kids Dig, or an Archaeology Field Day.

When safe, approved, and within schedule, a Kids Dig or Archaeology Field Day brings the community to the forefront of the project as involved participants. These activities provide a platform for agency communication, education, and family fun (Figure 3). Assistance is often readily available through local community groups or historical societies.

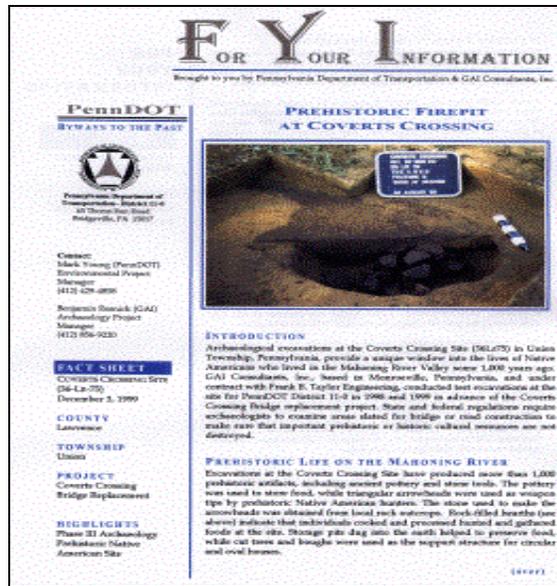


FIGURE 1 Double-sided, three-hole-punched informational flyer for public distribution during early and final stages of archaeological projects.

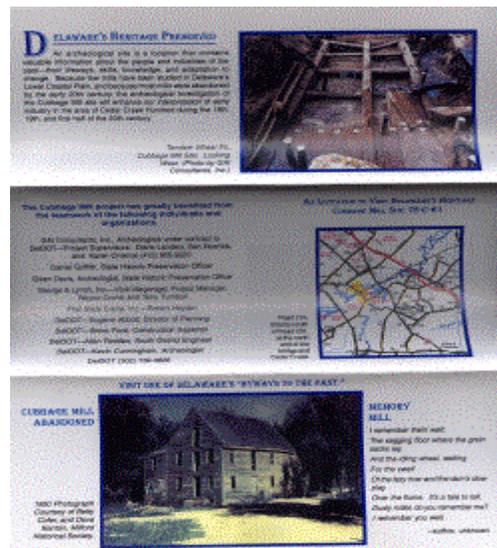


FIGURE 2 Information flyers can be updated, revised, and reformatted into a color, tri-fold glossy brochure that provides more detailed information on archaeological discoveries.



FIGURE 3 A Kids Dig or Archaeology Field Day brings the community to the forefront of the project as involved participants.

Integrating and Educating: Community Involvement from Planning to Construction

Leanne Doran and **Ken Rich**, *McCormick, Taylor, and Associates, Inc.*

The Pennsylvania Department of Transportation (PennDOT) has gone beyond the requirements of the National Environmental Policy Act of 1969 (NEPA) in the area of public involvement. Typically, the public is only required to be involved at specific points, after Project Needs and the Alternatives Analysis are completed. PennDOT has found that the timing of required public involvement opportunities has historically resulted in lengthy project delays and corresponding cost increases. By understanding the “spirit” of NEPA, PennDOT is taking steps to deal with the public early and often to identify concerns as soon as possible and involve the public in finding solutions. By involving the community in planning, design, and construction, community needs are integrated with engineering expertise and result in a contact sensitive design that the community is proud to take ownership of after construction. PennDOT has committed to intensive public involvement on numerous high-profile projects. McCormick, Taylor, and Associates’ (MTA) Road to Project Development will be highlighted as part of the poster session. Numerous examples of public involvement tools and techniques will be available for projects including the A-15 Project (Kittanning Bypass on Route 28/66 in Kittanning), West 38th Street Realignment Project, South Central Centre County Transportation Study, and the Route 119 South Improvement Project.

MTA has developed programs and techniques to demonstrate PennDOT’s desire to integrate, educate and involve the public in the transportation decision-making process, from planning to construction. By doing so, transportation projects better fit the goals of the community while maintaining sensitivity to the environment and engineering feasibility.

In the past, integration of citizens' goals and objectives came in the form of surveys through newsletters and public meetings at key points in the preliminary design of a project. Today, individual citizens not only want to be heard throughout the decision-making process—they have come to expect it! They are better educated in transportation matters, thanks to PennDOT's help, and realize the value of having a voice in the development of project needs and objectives. The integration of public Performance Measures or Project Objectives into the Project Needs Analysis is one technique that will be displayed at the poster session. Other techniques that are used to form a sense of ownership between the public and study team include school logo contests and establishing speakers bureaus.

Tools to educate the public will also be displayed as part of the poster session.

Premier Modal Projects

The posters in this session discuss exemplary current projects for advanced transportation concepts in a variety of modes: traditional rail, magnetic levitation rail (Maglev), air, and road. Each focuses on the planning process used to develop the project, which all contain important elements that ran through the entire conference: public participation, integration of environmental concerns in the planning process, and inter-agency communication and cooperation to meet all regulatory requirements and the intent of these requirements.

One poster in this session described the development of a programmatic environmental impact statement for seven potential Maglev projects currently under consideration. This is only the first such evaluation, after a particular site is selected, a project-specific environmental impact will also be conducted. The poster introduced the concept of Maglev and described the basic parameters of each of the seven potential projects. A second poster described the Pittsburgh-area project in greater detail, including the process that was used to identify alternative corridors for the guide way. This process involved extensive public input and a general environmental overview. Another rail-oriented poster described the planning process used to design a new rail station designed to serve local residents and tourists as well, and thus reduce current growth in automobile use.

Two posters of local interest described an airport-wide approach to assessing the environmental impacts of projects at the Pittsburgh International Airport, and two very large road-building projects in the Pittsburgh area. The airport assessment process uses a holistic approach to both environmental issues and development by looking at all projects related to the airport. The road-building poster described the extensive planning process used to develop the project.

Magnetic Levitation Transportation Technology Deployment Program Environmental Assessment for the Pennsylvania High-Speed Maglev Project

Max L. Heckman and **Tracey S. Cullen**, *Michael Baker, Jr., Inc.*

The history of Maglev technology in Pennsylvania dates back to January 1987 when Carnegie Mellon University established a High-Speed Ground Transportation Center (HSGTC), funded by grants from the commonwealth of Pennsylvania. In completing a database and exploring different technologies, HSGTC recognized the potential of Maglev technology. HSGTC initiated a working group of various entities with regional interests and ties to explore the concept of a high-speed ground transportation system in more detail. At the time, the working group included

- AEG Westinghouse Transportation Systems, Inc. (now Adtranz)—shareholder and board member;
- Allegheny County—board member;

- Michael Baker Corporation—shareholder and board member;
- Carnegie Mellon University—shareholder and board member;
- Duquesne Light Company—shareholder and board member;
- Reed Smith Shaw and McClay—board member;
- Tri-State Conference on Steel—board member;
- Union Switch and Signal, Inc.—original member of working group, no longer a member of MAGLEV, Inc.
- United Steelworkers of America—shareholder and board member;
- Urban Redevelopment Authority of Pittsburgh—board member; and
- USX Corporation—shareholder and board member.

Through the mid-1990s the development of the technology evolved and political support for a high-speed Maglev system in the United States grew. Funding for a demonstration project was included in Transportation Equity Act for the 21st Century (TEA-21) legislation. As part of the funding initiative, FRA sought applicants to participate in a demonstration project. Pittsburgh was selected to compete with other cities to pursue the Maglev Demonstration Project for Pennsylvania. MAGLEV, Inc., in cooperation with PennDOT and the Port Authority of Allegheny County, completed a System Definition Report, including an environmental assessment, and submitted it to the FRA on June 30, 2000. The study area extends east from Pittsburgh International Airport (PIT) to the city of Greensburg, passing through the city of Pittsburgh's downtown section and the municipality of Monroeville along the way. Stations, or MAGports™, will be located at PIT, Downtown Pittsburgh, Monroeville, and Greensburg.

METHODS

As part of the environmental assessment, the Pennsylvania team developed a series of alternative corridors. To develop these corridors in an orderly fashion, the study area was first divided into three segments, each approximately 15 miles in length. The three segments are

1. Airport to Downtown,
2. Downtown to Monroeville, and
3. Monroeville to Greensburg.

The corridors, 4,000 feet in width, generally follow existing or proposed transportation corridors in the region. The Maglev system proposed as part of each alternative has been developed by Transrapid International in Germany.

Following the identification of the corridors, more specific alignments were developed for each corridor. To provide a more representative estimate of potential impacts to the natural and man-made environments, one preliminary potential alignment was developed for each 4,000-foot corridor.

To identify potential environmental impacts within the corridors and preliminary alignments, secondary source data and geographic information systems mapping was obtained from the Southwestern Pennsylvania Commission, the local metropolitan planning organization. The data and mapping were supplemented with information from

additional sources to produce a very general environmental overview of the corridors, addressing categories specified under the National Environmental Policy Act of 1969, as well as categories specifically requested by the FRA.

RESULTS AND CONCLUSIONS

The corridors and preliminary alignments have been reviewed and commented on by agencies, stakeholders, and the public through the course of the project development process. The Pennsylvania Maglev Demonstration Project's Plan for Agency and Public Involvement is intended to foster communication and feedback that will yield strong coordinated support and understanding of the project.

Through development of the Maglev Demonstration Project for Pennsylvania, it is clear that the Pittsburgh region is an optimum location for a Maglev Demonstration Project because

- Pittsburgh is centrally located in the northeastern portion of the United States and will support the development of a regional system in and around Pennsylvania and a national Maglev system from the Midwest to the East Coast. Pittsburgh's central location places it within 500 miles of 67 percent the nation's population.
 - Improved access is needed between PIT, Downtown Pittsburgh, and outlying communities located east of the city.
 - PIT is a key transportation facility in the region, but has poor ground connections to much of the region. A Maglev system would provide improved access to the airport.
 - A Maglev system could potentially link PIT in Allegheny County and Arnold Palmer Airport in Westmoreland County, providing an alternative mode to move people and goods between the two facilities.
 - It will provide an alternative to the region's most highly congested highway corridors (I-376 and I-279), relieving congestion in these corridors.
 - The mix and capability of local industry and technology will provide ease in technology transfer and create high technology industries needed for the region's economic future.
 - It will foster orderly transit-oriented development in the region and promote related land-use policies.
 - Pittsburgh's varying climatic conditions and terrain provide optimum test conditions for demonstration of the system.
 - There is very strong local and agency support for the Pennsylvania Maglev Demonstration Project.

Airport-Wide Environmental Assessment for Aviation and Non-Aviation Development Projects: Pittsburgh International Airport

Richard S. Walsh, *Allegheny County Airport Authority*

Douglas L. Abere, *CH2M Hill*

In the fall of 1999, the Allegheny County Airport Authority (ACAA), with cooperation from the FAA, commenced development of a unique comprehensive or “holistic” environmental assessment (EA), pursuant to the National Environmental Policy Act of 1969 (NEPA). The Pittsburgh International Airport’s (PIT) Airport-Wide EA (which is now in the FAA review–approval–publication phase) is designed to set the foundation for the airport’s highest priority airport development projects. Thus, it is organized to avoid the pitfalls of separate NEPA processing. CH2M Hill has provided technical assistance to the ACAA in preparing PIT’s Airport-Wide EA and to facilitate the required reviews.

Mr. Walsh and Mr. Abere have developed a presentation that shows how this comprehensive approach to NEPA approvals can facilitate positive action and achieve a more complete assessment of environmental impacts. The airport-wide EA uses a holistic approach rather than a traditional NEPA “tiering” approach, and thus achieves more in terms of project approvals. The information presented in the poster layout illustrates these advantages and notes lessons learned and the potential for similar applications to other NEPA projects.

The benefits of this holistic approach include the following.

- The EA is focused on setting the foundation for the highest priority airport development projects.
- The EA provides a global perspective, and thus avoids the pitfalls of separate NEPA document processing.
- The EA provides valuable lessons, e.g., project controls, scheduling, comprehensive coordination among concerned and/or reviewing regulatory agencies, and an example that may be applied to other EA or environmental impact statement projects.

The airport-wide EA facilitates several independent projects with one document and is responsive to PIT’s unique land issues.

- More than 10,000 acres of airport-owned land in total makes PIT one of the largest major U.S. airports in terms of land area.
- More than 75 percent of that land remains undeveloped.
- There are now several opportunities for specific private developments to move forward.
- There is a need for aviation operations/improvements and the non-aviation developments to be coordinated

Examples of the specific developments to be addressed in the EA are

- **Aviation-Related Development Projects**—These include a proposed new US Airways maintenance facility and several other airport capital improvement projects that are within the airport’s 5-year plan.
- **Non-Aviation Development Projects**—These include a proposed major auto racing (spectator) complex, three office or mixed-use development projects, and a proposed park-ride lot.

The airport-wide EA provides the advantages of having one overall NEPA document and approval process that will allow multiple on-airport projects to proceed, as well as ensure a more complete assessment of the Airport Layout Plan and airspace issues. This EA concept also specifically addresses projects that are now ripe for decision and helps the airport and stakeholders to effectively assess system-wide impacts of the numerous proposed developments. Lastly, the ACAA envisions this primary document as the “base-plate” for future environmental review relative to NEPA, thereby facilitating the NEPA process by compressing review time and limiting overall cost to the airport.

Environmental Assessment for the New Paradise Train Station

John A. Nawn, Michael K. Wong, and Jane Mork Gibson,
Valley Forge Laboratories, Inc.

The proposed Paradise Rail Station will be located on Amtrak right-of-way where Pequea Lane crosses under the Philadelphia–Harrisburg line about 1,200 feet north of S.R. 0030 in Paradise Township. Increased use of rail transportation is an answer to the increasing use of automobile travel on Lancaster County highways. The proposed project will provide a rail stop in eastern Lancaster County approximately equidistant from existing stations in Lancaster City and Parkesburg, which are 24 miles apart. This will be useful for residents who own automobiles and also for the Amish community. There would be an estimated average of 102 daily boardings at the proposed Paradise Station.

By providing access to an alternative method of travel and reducing vehicle miles on the highways, the project will address the air quality issue in the Lancaster metropolitan area, which has been classified as a marginal non-attainment area for ozone based on the number of exceedences that have occurred, two as late as in the summer of 1999. A No-Build Alternative would permit the continuing increase in automobile, truck, and bus traffic, and would result in a continued increase in unacceptable air quality for the entire region.

The proposed project will promote tourism in an area that is one of the principal tourist destinations of the commonwealth of Pennsylvania. Major attractions are the Old Order Amish Community, the Strasburg Rail Road, the Sight and Sound Theatre, the American Music Theatre, and extensive discount retail outlets. These generate considerable non-resident traffic and numerous tour buses to various sites. Combining rail transportation with existing Red Rose Transit Authority Bus Route 14 and future connections made at the proposed station can alleviate much of this.

The Strasburg Rail Road is a major tourist attraction in the area, operating a steam locomotive on a restored short line from Strasburg to Kinzer. The company plans to extend its rail line to the new Paradise Station if built, enabling passengers to transfer from Amtrak to the local Strasburg Rail Road.

The proposed project will involve three separate areas along the Amtrak railroad tracks: a service area, and eastbound and westbound station platforms. Construction will consist of station platforms for eastbound and westbound traffic, a passenger drop-off location and bus boarding area, a 26-space parking lot, a pedestrian bridge over the roadway, and a raised pedestrian walkway alongside the roadway underpass, together with pedestrian pathways that link the various parts of the site. The largest area on the southwest side of Pequea Lane will serve as the entrance and exit to the site.

Results of this study indicate no adverse environmental impacts. No mitigation is required other than temporary measures during construction. This project has been a joint effort of the Red Rose Transit Authority and the Lancaster County Planning Commission. The proposed project is consistent with local comprehensive plans and has been reviewed in public meetings. The project will not cause any displacements and no neighborhood or community boundaries will be split as a result of the project.

Environmental Considerations for Super-Speed Transit: U.S. Maglev Deployment Program

David Valenstein, *Federal Railroad Administration*

Paul Valihura, *Volpe National Transportation Systems Center*

As authorized by Congress in the Transportation Equity Act for the 21st Century (TEA-21), the Maglev Deployment Program encourages the development and construction of an operating transportation system employing magnetic levitation, capable of safe use by the public at a speed in excess of 386 km/h (240 mph). Magnetic levitation (Maglev) is an advanced transportation technology in which magnetic forces lift, propel, and guide a vehicle over a specially designed guideway. Utilizing state-of-the-art electric power and control systems, this configuration eliminates contact between vehicle and guideway, and permits cruising speeds of up to 483 km/h (300 mph), or almost two times the speed of conventional high-speed rail service.

As directed by the enabling legislation, the FRA has initiated a competition to select a project for the purpose of demonstrating the use of maglev technology to the American public. After receiving and evaluating 11 initial applications, the secretary of transportation announced financial assistance grants to seven states and authorities (California, Florida, Georgia, Louisiana, Maryland, Nevada, and Pennsylvania) for pre-construction planning for Maglev high-speed ground transportation. FRA entered into cooperative agreements with each of the selected states. These agreements required each participating state or authority to prepare and submit to the FRA a technical review of environmental considerations affecting their proposed project. The participants incorporated the results of these technical reviews into individual environmental

overview documents. The purpose of these technical documents was to provide the baseline environmental data to be used by FRA in the preparation of a Programmatic Environmental Impact Statement (PEIS) as part of the Maglev Deployment Program's National Environmental Policy Act of 1969 (NEPA) compliance process. FRA has recently completed a Draft PEIS and is initiating a public review and comment period at this time. It is planned that after completing the Final PEIS and issuing a Record of Decision to proceed, FRA will administer a selection process to pick a project for authorized construction funding. At that time, FRA plans to consider a project-specific NEPA process for any maglev system proposed for construction. The poster session will provide an overview of this challenging NEPA process now underway for the Maglev Deployment Program.

Building New Roads for the New Millennium

Lisa A. Yackovich and **Lou Washowich**, *Pennsylvania Turnpike Commission*
Joseph S. Shalkowski, *Michael Baker, Jr., Inc.*

With the passing of Pennsylvania Act 61 in 1985 and Pennsylvania Act 26 in 1991, Pennsylvania State lawmakers authorized the Pennsylvania Turnpike Commission (PTC) to undertake the planning, design and construction of several new limited-access toll road projects in the Pittsburgh metropolitan area. The resulting projects, the Mon/Fayette Expressway and Southern Beltway, represent two of the nation's largest transportation programs with an estimated final cost in excess of \$3 billion. Upon completion, these major transportation programs will create about 100 miles of new limited-access roadway.

Collectively, the Mon/Fayette Expressway and Southern Beltway Transportation Programs consist of seven separate projects, which are being developed and advanced to form a cohesive network of new toll road facilities that integrate intermodal components to better serve the Pittsburgh metropolitan region in conjunction with the economically depressed Monongahela River Valley.

The size and magnitude of these projects dictate that the PTC follow the guidelines and federal mandates that require projects which involve federal funds to comply with the National Environmental Policy Act of 1969 (NEPA). As part of the NEPA process the PTC is required to prepare environmental impact statements (EIS) for each project. An extensive pro-active public involvement campaign has been implemented to complement the NEPA process as well as to satisfy the provisions of Environmental Justice and Title VI of the Civil Rights Act of 1964. Under the NEPA umbrella, the PTC has effectively dealt with a host of regulatory requirements and leading edge issues including Section 4(f), Section 106, Integrated NEPA/Section 404, NAAQS conformity, NPDES compliance, Congestion Management System (CMS) Analysis, Major Investment Studies (MIS), Transportation Needs, Concise EIS Principals, and Secondary and Cumulative Impact Analysis, not to mention Environmental Justice.

Once completed the four separate projects of the Mon/Fayette Expressway will stretch south from the city of Pittsburgh through the Monongahela River Valley to meet Interstate 68 near Morgantown, West Virginia. This facility would improve access to

brownfield development sites in the economically depressed Mon River towns where the U.S. steel industry once flourished. The Southern Beltway projects will provide much needed east–west mobility between the Mon Valley and the growing areas of northern Washington County and the Pittsburgh International Airport in Allegheny County.

As part of this overall program, the PTC is committed to providing assistance to affected communities in developing comprehensive plans that prepare for and accommodate projected secondary development in an environmentally sensitive manner. The hope of the PTC is to have the entire Mon/Fayette Expressway and Southern Beltway links open to traffic by the year 2012.

METHODS

The PTC has implemented a series of innovative processes, or what can be termed “Best Practices” to develop and advance the Mon/Fayette Expressway and Southern Beltway Projects. These “Best Practices” encompass the following.

- Integrated NEPA/404 Process,
- Concise EIS Format,
- PennDOT’s 10-Step Transportation Project Development Process,
- Proactive Public and Agency Involvement Program,
- Environmental Justice Evaluation Approach,
- Community Cohesive Planning and Support,
- CMS Analysis Approach,
- MIS Approach,
- Intelligent Transportation System Program,
- Post-NEPA Phase Impact and Mitigation Tracking, and
- Interdisciplinary EIS and Final Design Management Teams.

By applying these “Best Practices,” the PTC has optimized its effectiveness in developing transportation projects that responsibly address the diverse needs of the region ensuring that all environmental impact avoidance, minimization, and mitigation commitments are fulfilled.

RESULTS AND CONCLUSIONS

Mon/Fayette Expressway Projects

- California/Toll 43 Project: Part of the early design of the Mon/Fayette Expressway system included the California/Toll 43 project. This project was opened to traffic on October 12, 1990.
- I-68 to PA 43 Project: A Record of Decision (ROD) was received on September 23, 1994, and was opened to traffic on March 1, 2000.
- Uniontown to Brownsville Project: A Draft EIS (DEIS) has been prepared and circulated. This project is currently in Step-6 of Pennsylvania Department of Transportation’s 10-Step Transportation Project Development Process.

- I-70 to PA Rt. 51 Project: A ROD was received on May 19, 1994. Construction began in 1995 and is slated for completion in 2002.
- PA Rt. 51 to I-376 Project: Integrated CMS, Analysis/MIS and a Preliminary Alternatives Analysis Report has been prepared and approved for this project as part of Step-4 of the 10-Step Transportation Project Development Process. This project have advanced to Step-5 (Development and Review of Detailed Alternatives). A DEIS is in the process of being prepared.

Southern Beltway Projects

- An Integrated CMS Analysis/MIS has been prepared and approved for the entire Southern Beltway Program of Projects.
- PA Route 60-to-U.S. Route 22 Project: A ROD was received on May 11, 1998. The Turnpike Commission has begun final design of the selected alignment. It is scheduled to open 2005, pending funding availability.
- U.S. Route 22 to I-79 Project: Currently is in Step-5 of the Transportation Project Development Process (Development and Review of Detailed Alternatives). A DEIS is in the process of being prepared.
- I-79 to the Mon/Fayette Expressway Project: The project is being advanced into Step-5 of the Transportation Project Development Process (Development and Review of the Detailed Alternatives). Detailed field investigations and study are commencing.