# Environmental Process Subcommittee Recommendations

## 2008 NCHRP 25-25 Program Research Topic Suggestions

1. **Compilation of "Visualization" Techniques and Examples to Improve the Effectiveness of NEPA Processes and Documents - Delivered in DVD Format and Via Website Links and Downloads**

   The research would solicit, compile, analyze, screen, sort, present, and then distribute effective figures, tables, graphics, visual simulations, video, and other visualization examples for nationwide use and adaptation by practitioners. The deliverable would be a DVD designed to provide users with a menu of choices sorted by NEPA technical topic areas (alternative screening, air quality, Section 4(f), etc.)and a website source for related links and downloads. The DVD would include a narrated introduction that describes why visualization techniques are important, effective visualization strategies, how to find and obtain items of interest on the DVD and the project website. Users of the deliverables would be able to view visual presentation formats for a wide range of technical topics.

   The benefit of this research would be to help improve NEPA processes and documents by making them less reliant on lengthy written narratives, and more reliant on visual tools that are more compelling, accessible and informative than traditional presentations. At this time, practitioners do not have a resource to provide them with proven visualizations tools or an effective means of sharing innovations of this type with other practitioners. This research effort would create that tool and could create an ongoing means of collaboration for practitioners nationwide.

2. **Determining Mitigation Costs Early in Project Development**

   This research would identify best practices for early identification of environmental mitigation requirements and the cost of implementing such mitigation.

   The cost of environmental mitigation measures should be factored into the alternatives screening and selection process.

## 2008 NCHRP Research Idea Recommendations List

1. **Development of Performance-Based Environmental Mitigation Systems**

   The current practice for mitigating environmental impacts of transportation projects is to mitigate only specific impacts on specific resources without consideration of which produces the best environmental result. In many cases, significant funds will be spent by transportation agencies on marginal mitigation projects. Those same funds could be spent to much greater environmental benefit consistent with larger environmental and community goals. By changing to an environmental performance-based mitigation methodology, transportation investments can be used more effectively in achieving both transportation and environmental goals than under current regulatory structures. To achieve this change in paradigm, acceptable methods for setting regional environmental objectives, measuring environmental impacts, and measuring

environmental performance by its contribution towards the identified regional environmental objectives must be developed.

The proposed research is intended to explore methods of optimizing transportation-related environmental investments instead of the current piecemeal responses to mitigating specific project-related impacts. Toward this end, the following tasks should be initiated:

- Task 1: Determine the state of practice of environmental performance-based mitigation.
- Task 2: Decide what regulatory, legal, and policy barriers exist to performance-based environmental measurement and mitigation.
- Task 3: Establish what alternative regulatory structures can accommodate performance based environmental mitigation.
- Task 4: Develop common environmental performance measures across modes that can be accepted by resource agencies and other stakeholders.

**2. Increased Use of Environmentally Preferable, Green Seal, and other Non-Toxic Products to Reduce Costs, Liabilities, and Pollution at DOT Offices, Maintenance Facilities and Rest Stops**

Research would focus on replacing toxic materials with more benign products:

- Investigate and compile an inventory of existing toxic/hazardous chemical products purchased, stored, and used at highway maintenance facilities, operations facilities, and highway rest areas.
- Collect MSDS sheets, and interview DOT staff on how products are used.
- Estimate chemical product quantities used and purchased at these facilities through records reviews and interviews.
- Conduct a chemical product assessment to estimate chemical product quantities purchased and used at DOT maintenance, operations facilities, and highway rest areas.
- Identify alternative and equally effective non-toxic, low toxicity, Green Seal, Environmentally Preferable, and otherwise "green" products to substitute for toxic/hazardous products being used.
- Quantify the potential benefits of reduced toxic/hazardous chemical usage through the increased use of lower toxicity products.
- Research products that have the lowest total life-cycle cost, including all transportation supply chain costs.
- Review the Approved Products List and, if necessary, recommend revisions needed to allow and promote "green" products.
- Develop a web-based decision-making tool using a life-cycle cost model that can be used by procurement divisions of transportation sector companies.
- Produce a final report that documents the benefits of greater "green" product usage, to raise overall staff awareness of "green" product substitution, and to encourage and promote purchasing and use of these substitute products.

DOTs could reduce their toxic waste costs and liabilities in areas of worker health and safety requirements, compliance permitting and reporting, hazardous waste disposal and recycling costs, and necessary environmental protection controls by using less toxic Green Seal and other Environmentally Preferable products. This switch can help reduce: 1) Compliance permitting, reporting and inventory requirements. 2) Worker health and safety requirements, liabilities,

monitoring, and concerns. 3) Environmental impacts and protection requirements to carefully contain, manage, and properly dispose of hazardous materials. 4) Costs for regulatory fees and requirements, disposal and recycling fees, environmental protection measures, and worker protection.

**3. Smart Growth Strategies for Rural Communities with a Focus on Secondary & Cumulative Effects Associated with Interchange Projects**

1. Provide an overview of FHWA procedures for determining the secondary & cumulative impacts of interchange locations specially in suburban and rural America.
2. Review "smart growth" literature and initiatives in ten (10) case studies across America.
3. Study three completed limited access highway projects.
4. Review mitigation sections of NEPA EIS for each project.
5. Compare projected impacts to what actually occurred as a result of highway & interchange location and construction. [Recommend this stage is skipped]
6. Develop a normative model to quantify impacts such as land conservation, water pollution etc. Compare impacts against certain realities of land use planning and control devices.
7. Qualify a risk level for municipalities. Basically document why some municipalities had success in controlling impacts while others haven't.
8. Predict and discuss what could happen to places that have little state of planning and regulations.

The challenge of developing a smart growth model and initiating smart growth strategy in rural areas are not as well understood, because widely accepted principles of smart growth are perceived as most amendable to areas of relatively dense population. A fundamental challenge and benefit to smart growth in a rural setting is the considerable pressure which can be placed on landowners to sell large, contiguous areas of open space to developers, both to avoid rising taxes and reap capital gains. Such transfers can rapidly erode the quality of rural life by decimating scenic vistas, destroying resource based economies centered on family farm, forestry, and the loss of rural main street to commercial areas. The secondary and cumulative consequences and effects of increased traffic, increased impervious surfaces, and increases in water and air pollution can combine to have significant impacts. Smart growth models are proliferating in urban and suburban communities. The need for smart growth planning initiatives in rural areas surrounding rapidly developing urban and suburban regions is quite obvious. One only need to drive the fringe outside developing areas, examine the land use changes in and around interstate interchanges and realize the need for smart growth in rural areas. Developing a model for smart growth in rural areas is important. Sprawling rural development doesn't mean the rural economy is healthy. There is a tremendous need for rural municipalities to recognize their economic and cultural attributes can attract support for development while fostering the sense of community which as been so important to rural America.

**4. Improve FHWA's Traffic Noise Model to Expand its Acoustical Capabilities**

Develop acoustical improvements to the FHWA TNM and noise-analysis techniques that address the following requirements:

- **Effects of Engine Compression Brakes on Trucks.** Effects of engine compression brakes on trucks traveling in the downhill direction, and those slowing down on level roadways, often use noisy engine compression brakes. However, heavy trucks traveling in the downhill direction are treated in the FHWA TNM in a manner similar to those on level roadways at constant speeds; that is, there is no correction to account for the noise increase due to the use of such brakes. The research will develop new REMELs in the TNM database to account for the influences of these engine compression brakes and examine new techniques for modeling use of engine compression brakes on roadway segments.

- **Effects of Structure-Reflected and Generated Noise Receptors Adjacent to Bridge Structures.** Effects of structure-reflected and generated noise receptors adjacent to bridge structures are often subjected to undesirable noise levels, even after noise barriers are constructed on the structure. The cause of such noise is unclear; for example, does the noise result from vibration of the structure deck, does the noise result from factors related to different structure designs (open beam, box girder, reinforced concrete slab, etc.), or are other factors involved? The FHWA's TNM model includes a reflections module that is not turned on. A Pooled Fund study is underway to de-bug the reflections module. The research should examine state-of-the-practice solutions that are being used to address reflected noise prior to completion of the TNM and ways to mitigate reflected noise. Another issue relates to the degree of influence that may exist due to the open median area between parallel bridges and how this may influence overall noise levels. The research will determine the source or sources of noise/vibration emissions from bridge structures and quantify the differences that may be associated with various bridge designs. Feasible mitigation measures and design approaches to minimize structure noise will be evaluated.

- **Noise Associated with Weigh Stations, Rest Areas, Service Plazas, and Toll Facilities Traffic and Activities in Areas That Affect Adjacent Property Owners.** The FHWA TNM does not include a module to address noise generated by these sources, but some states have developed their own modeling techniques to address this issue. A state-of-the-practice review should be conducted to gather examples of techniques for modeling noise-producing activities, such as truck idling, express lanes, tollbooth activities (including associated acceleration and deceleration), etc. The research will develop measurement and modeling techniques that accurately address noise associated with these activities and which ultimately can be included in the FHWA TNM.
- **Effects of High Volumes of Trucks.** The FHWA TNM may over-predict noise levels adjacent to multilane roadways with high volumes of heavy trucks since some truck noise may actually be shielded by trucks traveling in the lane nearest to the receptor. In coordination with the Volpe Center, existing and future data should be evaluated to determine whether modifications to traffic noise-analysis techniques are necessary. Improvements will allow for a more accurate and efficient analysis of noise impacts and development of more cost-effective noise mitigation.

- **Effects of Safety Rumble Strips.** The FHW TNM does not currently include consideration of noise generated by rumble strips.