PROJECT PROGRESS & INITIAL FINDINGS
Streamlining Transportation Corridor Planning Processes and Validating the Application of CRS&SI Technologies for Environmental Impact Assessments

Project Research Team

Charles O’ Hara, MSU
Roger King, MSU
Jeremiah Dumas, MSU
Bethany Stich, MSU
Sung-Jun Kim, MSU
Raviraj Sadasivuni, MSU
Rodrigo Nobrega, MSU
Colin Brooks, MTRI
Eric Keefauver, MTRI
Bob Shuchman, MTRI
Rick Powell, MTRI
Demin Xiong, ORNL CTA
Patricia Hu, ORNL CTA
Bill Knee, ORNL CTA
Partners

Consortia Partners:

GeoResources Institute, Mississippi State University
MichiganTech Research Institute
Oak Ridge National Laboratory, NTRC and CTA

DOT Partners:

Mississippi DOT
Tennessee DOT
Michigan DOT
Advisory Panel Structure

Initial Challenges and Opportunities Identified by Advisory Panel

- Executive Order 13274: Environmental Stewardship and Transportation Infrastructure Project Reviews and Associated Work Groups
- Ecosystem Approaches and Banking
- Watershed Approaches
- Cooperative Conservation
- Initial Scenario Planning

- GIS for Environmental Streamlining and Stewardship Workshops
- Programmatic Approaches to the Endangered Species Act
- Wildlife Crossings and Habitat Fragmentation
- Context Sensitive Solutions
- Green Highways Initiative
Background: NCRST-E Key Milestones

- Results were highlighted in NCHRP 25-22(2)
- Conducted multiple demonstration projects
- Partnered closely with DOTs in many projects
- Communicated needs to data vendors for products
- Applied multi-source remote sensing data
- Innovative uses of hyperspectral image data
- Innovative uses of LIDAR data
- Innovative data-fusion for wetlands modeling
- Validation of satellite and aerial image data
- Application of results to corridor planning projects
- Assisted with Hurricane Katrina response
- Compiled Katrina RS data for long-term use
- Regional data acquisition for cooperative research
The new US DOT RITA program has selected MSU for addressing corridor planning and environmental assessment in new and innovative ways that can be compared to traditional approaches.

Our primary focus is on the application and validation of new and innovative approaches that can be compared to results of the EIS recently completed for I-69 segment 9. The results of this will enable adoption of methods and accelerate the acceptance and technology transfer needed to deliver the new technologies.
Existing MSU CRS&SI
EIS Streamlining Project Summary

New and innovative approaches to streamlining environmental and planning processes in transportation corridors projects will be demonstrated by the application of commercial remote sensing data and spatial information technologies. A consortium of research institutions led by Mississippi State University shall collaborate with partner DOT agencies to compare and quantify benefits of new and innovative approaches versus traditional methods for completing planning tasks in the EIS process. A completed EIS for a planned segment of I-69 that traverses areas around Memphis, TN, and Northwest Mississippi shall serve as the research test bed to quantify benefits delivered by the technology deployment project.

In addition to streamlining research, the project shall also address Hurricane Katrina lessons learned to derive nationally significant considerations and motivations toward enhanced geospatial preparedness for application to transportation planning practices.
Traditional EIS: I-69 SIU 9

A Final Environmental Impact Statement (FEIS) is completed for a segment of proposed Interstate 69 (I-69). The selected study will focus on Segment of Independent Utility 9 (SIU 9). The study corridor begins at the Interstate 55 (I-55) and Mississippi 304 (MS 304) Interchange in Hernando, Mississippi and extends north through Memphis, Tennessee to the intersection of US Highway 51 (US 51) and State Route 385 (SR 385) in Millington, Tennessee. The project is located in DeSoto and Marshall Counties in northwest Mississippi and Shelby and Fayette Counties in southwest Tennessee.
I-69 SIU 9 Study: The I-69/269 Corridor Study

Different planning and environmental challenges were noted in various segments within the project area. These segments provide an ideal set of test beds for analysis and a basis for conducting direct comparative studies.
Project Activities and Coordination

- Twelve team tasks and activities are specified in the proposal.
- A kick-off meeting was conducted to initiate activities and refine plans and approaches for activities. An “Initial Findings” report has been prepared and submitted that addresses areas where additional resources would enable enhanced capabilities to meet national objectives.
- “Synthesis Reports” are being prepared to present the traditional approach to each task and describe how new and innovative methods and technologies may be adapted to the task. Sponsor and advisory panel input will guide refinement of activities to focus on areas of national importance.
- All tasks and activities will involve close coordination and collaboration among team members, the advisory panel, DOTs, and consultants.
- Data exchange and generated data analysis products will be shared with DOTs and project partners.
- Each technical task will involve developing final reports and preparation of materials for technical conference presentation and/or journal publication.
Project Tasks/Activities

**Team Tasks and Activities:** Directions for team tasks and activities are outlined in Table 1. Figure 5 provides research pathway for technical tasks. Details on tasks, activities, and deliverable products per BAA Guidelines. Attachments 4 and 5 are provided in appendices and supplemental word files.

Table 1. Corridor Planning Tasks and CRS & SI Approaches

<table>
<thead>
<tr>
<th>Corridor Planning Task</th>
<th>New and Innovative CRS &amp; SI Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1. Scope the project and develop the project work plan</td>
<td>Map corridor boundaries, highlight critical needs, and extract key decision points.</td>
</tr>
<tr>
<td>T2. Develop public participation plan</td>
<td>Create enhanced maps and data results with appropriate information content.</td>
</tr>
<tr>
<td>T3. Develop resource agency involvement plan</td>
<td>Improve maps and data sharing to identify and address specific resource agency concerns.</td>
</tr>
<tr>
<td>T4. Develop a data plan</td>
<td>Develop and deploy methods to share with partners all spatial data needed.</td>
</tr>
<tr>
<td>T5. Analyze current and future projected multimodal demand and performance</td>
<td>Improve linkage between demand forecasting models and CRS&amp;SI technologies to estimate long-term demand and map deficiencies.</td>
</tr>
<tr>
<td>T6. Document conditions</td>
<td>Map the characteristics and conditions of the existing transportation system.</td>
</tr>
<tr>
<td>T7. Document existing and projected environmental and land use conditions</td>
<td>Map current and planned land use and relevant characteristics and components of the corridor. Identify environmental factors to be addressed and mitigated in decision-making processes.</td>
</tr>
<tr>
<td>T8. Establish purpose and prioritize needs to meet goals (includes Katrina LL task)</td>
<td>Map deficiencies, inadequacies, and long-term planning factors to document needs and establish long-term goals for the corridor.</td>
</tr>
<tr>
<td>T9. Generate alternatives that meet goals</td>
<td>Automated generation of alternative alignments and tabulate impacts of alignment options.</td>
</tr>
<tr>
<td>T10. Identify feasible alternatives by evaluating all alternatives that achieve goals</td>
<td>Automate analysis of constraints and screening criteria to identify feasible alternatives and eliminate non-viable alternatives.</td>
</tr>
<tr>
<td>T11. Compare alternatives to generate preferred alternatives</td>
<td>Automate analysis to prioritize feasible alternatives and select preferred alternative(s).</td>
</tr>
<tr>
<td>T12. Compile results into a corridor plan document</td>
<td>Gather needed information and products for inclusion in a corridor plan document that includes all key findings, map-based and tabular data and information summaries, and implementation recommendations that include detailed map-based and tabular information.</td>
</tr>
</tbody>
</table>
EIS: “Special Environmental Commitments”
Remote Sensing Opportunities/Challenges

• TDOT and MDOT will coordinate the permitting process during the development of right-of-way and construction plans.
• TDOT and MDOT plan to use wetland mitigation banks to mitigate the unavoidable wetland impacts. The use of wetland banks versus on-site mitigation and wetland mitigation ratios will be further discussed with resource and permitting agencies in the design phase of the project prior to the permitting process.
• In the event on-site stream mitigation is not possible, TDOT will work through the Tennessee Stream Mitigation Program to mitigate stream impacts.
• During the design of the river and stream crossings, special attention will be given to minimize fill and extend bridge lengths to further avoid or minimize impacts to the floodplains and assorted wetlands.
• Sidewalks or shoulders for pedestrians and shoulders or wide curb lanes for bicyclists will be provided on all bridges that cross over the interstate, as well as sections of roadway that pass beneath the Interstate.
• Vegetation clearing for the project will be limited to the minimum area required for construction of the project and disturbed areas will be re-vegetated with native species as soon as practical to hold soil movement to a minimum and minimize impacts to wildlife.
Project Management and Directions

- An advisory Panel has been organized with assistance from RITA and FHWA. The kick-off meeting will provide a basis for plans moving forward for how that group will provide relevance, direction, and steering to the research direction of the project. Monthly Advisory Panel and project team teleconferences will be held on the 1st Wednesday of every month at 12:00 noon Central for the duration of the project, starting with January 2nd. Agenda’s will be distributed on the Monday before the call along with call-in information.

- Meetings with project team members, sponsor agency managers, and advisory committee members will be coordinated and managed to ensure project directions and completion of all project technical tasks, activities, and deliverable products.
Project Deliverables

• A kick-off meeting was held to refine project plans for technology deployment and a refined project plan will be delivered to DOT within 3 months. An “Initial Findings” report presents results of the kick-off meeting as well as resources requested to meet identified objectives.

• Multi-source data collection and documentation will assemble data needed for the project and will be provided to all participants within 4 to 6 months.

• “Synthesis Report” guidelines are being refined. Initial plans called for outlines to be developed within 4 months, drafts within 6 months, and completed within 10 to 12 months. However, feedback calling for refined tasks, descriptions, and specific alignment with respect to NEPA context has resulted in revisions to initial schedules for preparation.

• Analysis methods will be developed and tested within 6 months. Analysis methods and data integration will result in reports detailing methods and preliminary results within the first year. Preliminary results and findings will be provided for verification, validation, and benchmarking within the 5th quarter.

• Results will be incorporated into draft final reports to be developed in the 6th quarter of the project.

• Final reports will be developed and presented at a DOT sponsored meeting in the 7th quarter of the project.

• Quarterly status reports will be provided and final reports will be prepared and submitted to sponsor.

• Technical papers will be prepared as well as conference presentations and journal publications.
Synthesis Reports: Describe Traditional Approaches in EIS Studies & Present Opportunities for CRS&SI Technology Application

Matrix of Impacts
Quantity of Displacements

**TABLE 1: SUMMARY OF ALTERNATIVES**

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>A-1</th>
<th>A-3</th>
<th>B-1</th>
<th>B-2</th>
<th>H-1</th>
<th>A-3—or B-1</th>
<th>A-3—or B-2</th>
<th>A-3—or H-1</th>
<th>A-3—or H-2</th>
<th>A-3—or H-3</th>
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<tbody>
<tr>
<td>Project Length (miles)</td>
<td>15.2</td>
<td>15.3</td>
<td>28.6</td>
<td>30.6</td>
<td>26.6</td>
<td>43.8</td>
<td>45.8</td>
<td>41.8</td>
<td>43.9</td>
<td>45.9</td>
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<tr>
<td>New Right-of-Way (acres)</td>
<td>739</td>
<td>796</td>
<td>1479</td>
<td>1522</td>
<td>1400</td>
<td>2218</td>
<td>2621</td>
<td>2145</td>
<td>2277</td>
<td>2500</td>
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<tr>
<td>Family Displacements</td>
<td>221</td>
<td>60</td>
<td>64</td>
<td>53</td>
<td>52</td>
<td>35</td>
<td>74</td>
<td>73</td>
<td>117</td>
<td>113</td>
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<tr>
<td>Business Displacements</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>11</td>
<td>11</td>
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<tr>
<td>Non-Flood Displacements</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Floodplain (acres)</td>
<td>128</td>
<td>95</td>
<td>435</td>
<td>497</td>
<td>253</td>
<td>703</td>
<td>625</td>
<td>381</td>
<td>530</td>
<td>592</td>
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<tr>
<td>Severance Costs</td>
<td>52</td>
<td>50</td>
<td>50</td>
<td>46</td>
<td>57</td>
<td>60</td>
<td>58</td>
<td>50</td>
<td>66</td>
<td>57</td>
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<tr>
<td>Potential Linear Feet of Stream (feet)</td>
<td>9,560</td>
<td>8,620</td>
<td>15,760</td>
<td>20,980</td>
<td>13,650</td>
<td>25,570</td>
<td>30,570</td>
<td>23,440</td>
<td>24,400</td>
<td>29,650</td>
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<tr>
<td>Wetlands (acres)</td>
<td>48</td>
<td>53</td>
<td>69</td>
<td>51</td>
<td>51</td>
<td>57</td>
<td>59</td>
<td>59</td>
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<td>56</td>
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<td>Historic Properties Impacted</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>Recorded Archaeological Sites</td>
<td>11</td>
<td>9</td>
<td>20</td>
<td>22</td>
<td>15</td>
<td>31</td>
<td>33</td>
<td>26</td>
<td>20</td>
<td>31</td>
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<td>Harvested Water Sites</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<td>Landfill Sites</td>
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<td>4</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>Construction Cost ($ million)</td>
<td>233.4</td>
<td>264.9</td>
<td>416.5</td>
<td>462.0</td>
<td>360.8</td>
<td>640.9</td>
<td>695.4</td>
<td>602.2</td>
<td>681.4</td>
<td>726.9</td>
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<tr>
<td>Right-of-Way Cost ($ million)</td>
<td>38.4</td>
<td>43.6</td>
<td>68.6</td>
<td>76.1</td>
<td>60.7</td>
<td>107.0</td>
<td>114.5</td>
<td>99.2</td>
<td>112.2</td>
<td>119.7</td>
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<tr>
<td>Utility Cost ($ million)</td>
<td>2.4</td>
<td>5.1</td>
<td>4.9</td>
<td>5.4</td>
<td>4.3</td>
<td>4.7</td>
<td>6.2</td>
<td>7.1</td>
<td>8.0</td>
<td>8.6</td>
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<tr>
<td>Total Cost ($ million)</td>
<td>274.6</td>
<td>316.6</td>
<td>490.0</td>
<td>543.5</td>
<td>433.8</td>
<td>704.6</td>
<td>781.5</td>
<td>681.4</td>
<td>765.2</td>
<td>825.2</td>
</tr>
</tbody>
</table>

Evaluation of Impacts
Context of Displacements
Quantity/Context/Intensity/Value
Initial Findings Report Summary

Initial findings include advisory panel and program manager suggested refinements for project directions in areas that include:

1) Improved alignment and definition of project tasks for maximizing the value and transferability to the transportation practitioner community of results for specific aspects of NEPA and pre-NEPA planning processes

2) Increased participation of traditional engineering and planning practitioners in the research process to strengthen consideration of the human and built environment as well as to provide apt comparisons of traditional EIS processes against the research results, and

3) Support for the continued participation of an advisory panel in regularly scheduled teleconferences and annual meetings with the research team as well as research team participation in appropriate national practitioners’ meetings.
Sponsor/Advisory Panel Input, Questions, and Suggestions

- Refine task descriptions to define specific phases of the corridor planning process? Are we looking at planning, NEPA, location, design, etc.
- Can we provide tools and data to early planning process that can feed into the NEPA process and be supplemented by additional tools and data?
- Enhanced data utilized in the NEPA process feeds back to planning and can enable improved long-term / future planning activities.
- Pre-NEPA consultation is a ripe area for RS data and tools that can be linked into pre-NEPA activities. This is a critical gap that can be addressed / filled. This is specific focus of SAFETEA-LU.

**Action Items**

- Rework the task list and refine task descriptions to more aptly indicate process phase.
- Action Item: Provide improved NEPA diagram to comply w/ 6002.
Observed NEPA Linkages & Program Opportunities

• Improve travel demand – inject technologies into simulation models for enhanced predictive capabilities
• Enhance visualization techniques for planning and EIS audiences
• Consider linkage and integrated applicability of tools and technologies to varying project processes and organizational entities of practitioners
• Include qualitative measures in results
• Identify benefits for saving costs
• Reducing processing time and costs
• Improve quality of product
• Readily accessible data in usable format

• Develop generic/transferable tools such as wetlands and archaeological site probability
• Delays increase overall project costs mainly in row costs and lost mitigation opportunities
• NEPA is a risk management process that may be enhanced by products of RS
• Identify low-hanging fruit for injecting data/tools/technologies into pre-NEPA processes that will enable enhanced screening/constraints analysis as well as identification of avoidance areas that are mutually understood by DOT and resource agencies.

• Develop strategies/methods for communicating, visualizing, exchanging specific resource agency issues of concern for a given project and collection of resource agencies so that key resource agency concerns can be rapidly quantified and mitigation options presented.

• Look at things like the 20 year plan to identify opportunities to “get ahead” of environmental issues that can not be easily minimized and develop basis for common agreement with resource agencies that these are viable directions.

• Provide data to enable an informed conversation. Other issues will be raised and documented as they arise, but these “data enabled” decision processes may benefit significantly from appropriate injection of data/tools/and applicable products.

• Injecting qualitative attribution to the matrix of impacts as well as contextual basis for evaluating relative impacts for alternative assessment – “context and intensity.”
Key New Activities: Linking Planning and Environmental Processes

- A system approach is proposed to integrate transportation, economic, environmental, and policy analysis approaches with RSSI technologies and transportation project development activities to deliver enhanced consideration of the built environment and enhanced overall streamlining benefits.

- Integrated use of new technologies within a RSSI technology framework will demonstrate the benefits of integrating the use of advanced tools and spatial data, and will provide key providing connections between system-level planning and project-level decisions. A key aspect of this demonstration will be to show that it provides DOTs the ability to integrate statewide and metropolitan transportation planning with the NEPA process to streamline project delivery.
Systems Approach

- Traffic simulation results based upon proposed project alternatives will be used to feed environmental simulation models such as new air quality models, to provide enhanced mobility/congestion data, and to provide improved data to policy and economic analysis models.

- The policy and economic models may provide insight about population dynamics which in turn may be used to update traffic simulation results. Through an iterative “feedback” process, analyses results will converge for a selected alternative to better quantify the overall impacts on the human and natural environments.