

Transportation Pooled Fund Program

Project Title: Accelerated Bridge Construction (ABC) Decision Making and Economic Modeling Tool

Project Number: TPF-5(221)

Reporting Period:

Project Start Date: 12/23/2009

Expected Project End Date: 6/30/2011

Percentage of Work Completed:33%

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Progress:

Since the last quarterly report, the team has focused on Tasks 2 and 3. The focus of Task 2 was to analyze a number of ABC projects, completed under the Highway for Life (HfL) program. To help perform this analysis, a data collection template was developed using Microsoft Excel and Visio. The research team used this template to summarize key information on completed projects under HfL. The data collection template was presented and approved by TAC team members in April 2010. Depending on the results of Task 3, additional review of archival records and/or interviews may be conducted to collect additional information on these HfL projects. Details related to Task 2

At the April face-to-face meeting with the TAC team, held in Portland, a summary of Task 1 and Task 2 results was presented, and new TAC members from Montana and Texas were introduced. The research team also used the meeting to get input from the TAC team needed to initiate Task 3. In a series of brainstorming sessions, TAC members discussed the criteria currently considered by their states in the decision-making process for determining if conventional or ABC techniques would be used. The focus of the brainstorming was to identify a complete list of any/all factors affecting decisions on the type of construction techniques used for a bridge replacement/rehabilitation project. The outcome of this effort was the creation of a comprehensive list of factors that enter into the decision-making process.

Since the last quarterly report, the research team has also spent a significant amount of time reviewing the literature to identify different decision-making techniques. From the brainstorming work of the TAC team as well as this review of the literature, it was determined that bridge construction decisions are based on both quantitative and qualitative data. In addition, it was determined that some of the factors that enter into the decision-making process are difficult to

fully quantify at the point in which decisions must be made. Having these diverse types of decision criteria make finding a suitable technique difficult, since many decision-making techniques are not able to integrate both qualitative and quantitative criteria simultaneously. After a comprehensive literature review, the research team recommended that a tool called Analytical Hierarchy Process (AHP) be considered for this project. AHP is technique that aids decision makers in prioritizing multiple criteria, and the outcome from an AHP analysis is a ranking of various design alternatives. Overall, AHP is well-suited for multi-criteria decision-making. AHP was introduced by Saaty (1977 and 1994), and its application in other domains is well-documented in the literature.

To support the development of an AHP decision model, the decision criteria generated from the TAC team were converted into a structured hierarchy and this was used to develop a survey, which could be used to complete pairwise comparisons between the various criteria. This survey can now be used by the research team to collect data, specific to bridge projects, to test and validate the structured hierarchy created for this study. The research team presented the hierarchy and survey to several experts at ODOT Salem, OR in face-to-face meetings in early July. These experts provided feedback on both the hierarchy, as well as the criteria that will be used to further refine the AHP structure. Moving forward, the research team will test the updated structure using data from on a number of bridge construction projects, leveraging the states currently participating in the pooled fund study. These data will be collected either by phone, video-conferencing, face-to-face meetings or via e-mail. The next stage of development is focused on refining the model and using “test cases” of bridge projects to ensure that the model fully captures the necessary breadth of decision criteria.

In July 2010, a tele-conference was held to provide the TAC members with project updates, primarily related to data collection and the AHP model development (Task 2 and 3). The AHP model was applied using data from a HfL report and was used to showcase the proposed approach to TAC members. TAC members are currently reviewing the hierarchy as well as the current list of decision criteria and will be providing feedback to the research team by the end of July. The project continues to be

Problems:

None noted.

Work Planned for Next Quarter:

The research team will continue to develop and test the model and the use of AHP to provide a decision recommendation. Feedback from TAC members will be used to refine the model. The research team will also continue searching the existing literature for other useful tools and models.

The team will use the refined model to update the AHP data collection survey. A number of completed bridge projects will be analyzed using an AHP model. For this reason, the team will work with appropriate DOT personnel at other states to collect this data through face-to-face meetings, video conferences, teleconferences, or e-mail as needed.

Funds Obligated: *\$120,000.00*

Expenditures: *\$22,966.00*

As of June 30, 2010, OSU expenditures on this project have totaled approximately \$15,760, which represents approximately 17% of the total budget. These expenditures have been for GRA salary, student wages, fringe benefits, GRA tuition, teleconferencing fees, travel to the two TAC meetings, and F&A.

Funds Remaining: *\$97,034.00*

As of June 30, 2010, OSU remaining funds for this project total approximately \$75,292.