UTC PROJECT DESCRIPTION

PROJECT NUMBER:
01218

PROJECT TITLE:
Innovative Use of Flowable Fill for Local Roads Bridge Replacement

PRINCIPAL INVESTIGATOR:
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PROJECT OBJECTIVE:
Develop innovative uses of flowable fill as a structural infill and backfill material in the replacement of aging local roads bridges and culverts.

PROJECT ABSTRACT:
The need to replace local roads bridges and culverts in Alabama is beyond the point of crisis. A recent survey of 44 out of 67 Alabama counties indicated that there is currently around one-half billion dollars worth of near-term replacement needs for structurally deficient bridges under the jurisdiction of local governments. Furthermore, it has been estimated that 6,200 Alabama school buses run an extra 17,000 miles every day to avoid bridges that are posted too low for school buses to cross, costing taxpayers more that $7 million per year. In the replacement of these structures, there is always a significant amount of backfill required, and there are several very important advantages offered by the use of flowable fill as backfill material such as (1) cost efficiency, (2) expediency in returning traffic flow to normal, and (3) enhanced structural integrity and safety. However, before flowable fill can be widely used for this purpose, local governments much have guidelines for its use. This project therefore addresses the safety, replacement of aging bridges, management, and cost effectiveness aspects of the UTCA theme by developing expedient and cost effective methods for replacing aging local roads bridges using flowable fill as a structural backfill material in the replacement of local roads bridges. The project proposed involves developing innovative designs, demonstration of applications in conjunction with Shelby County bridge replacement (field-testing), laboratory testing of material, and development of preliminary guidelines and recommendations.

PROJECT TASK DESCRIPTIONS:
1. Background investigation and development of a detailed work plan.
2. Development of innovative designs and procedures.
3. Laboratory testing focused on developing mix designs for use in bridge replacement and quality control issues.
4. Field testing for replacement projects in Shelby County
5. Final Report and technology transfer.

TASK DESCRIPTIONS AND MILESTONES:
1. Written background review completed. Jan-Feb 2001
2. Detailed work plan developed. Feb 2001
3. Identify sources for fly ash. Feb 2001
5. Identify bridges for field-testing. Apr 2001

TOTAL BUDGET:
One-year project: UTCA $49,888; total budget $99,776.

STUDENT INVOLVEMENT:
This project is almost entirely accomplished by students interested in county management and transportation safety research. Over 60% of direct costs will go towards the support of graduate student education. At least one Master’s of Science theses will result. Additionally, Dr. Davidson hopes to involve undergraduate students, either as part-time funded or as part of team projects, to help collect field data since this project relates to such a fundamental aspect of the civil engineering profession.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
This project is closely related to the UTCA Project 00219 “Local Roads Bridge Prioritization Database Program” (ending January 2001) in that it continues the strong and productive relationship between UAB and Shelby County that was initiated by the "Local Roads" project. These two projects tightly join UAB with a local constituent to address both education and local government management needs. Furthermore, Drs. Richardson and Triche of the University of Alabama at Tuscaloosa are currently conducting UTCA Projects 99101 (Phase 1) and 00117 (Phase 2) investigating standard types of county bridges, which compliments the efforts of this project. This project will be used as another opportunity to grow a relationship with faculty at other UTCA campuses with common interests.

TECHNOLOGY TRANSFER ACTIVITIES:
Critical to the success of the project will be the effective dissemination of the results to end users such as county and municipal engineers. This one-year project will achieve the development of preliminary plans, procedures, and proof of concepts, but will not be able to complete the comprehensive set of guidelines and specifications needed by constructors. Therefore, in addition to disseminating the results of this project, the technology transfer activities will also include investigating potential sources for continued support. Support for subsequent phases of this work may come from ALDOT and/or professional associations such as ACI, the National Ready Mixed Concrete Association, and the Combustion Byproducts Recycling Consortium.
Furthermore, external reviewers and advisors may be instrumental in suggesting means of dissemination and potential sources for continued support.

POTENTIAL BENEFITS OF THE PROJECT:
This project can help Alabama counties address two of their most pressing infrastructure problems: (1) for the total of 12,981 bridges of all lengths, there is an estimated near-term replacement need of about $500 million, and (2) the amount of time that traffic must be diverted (frequently the detours are very lengthy in rural areas). By working with Shelby County, input can be taken firsthand to maximize the results of this project in developing an alternative to bridge replacement to fit Alabama conditions.

TRB KEYWORDS:
Bridge management, bridge replacement, concrete, infrastructure, inspection, local government, transportation safety.