

DEVELOPMENT OF SPECIFICATIONS FOR HIGH-PERFORMANCE FIBER CONCRETE FOR NEVADA

Key Points:

Project Number:
366-16-803

Start Date:
September, 2015

Duration:
24 months

Project Cost:
\$187,000

*Principal
Investigator:*
Dr. Jiong Hu

*Co-Principal
Investigator:*
Dr. Ying Tian

*Co-Principal
Investigator:*
Dr. Chungwook Sim

PROBLEM

Bridge decks typically last about 30 years while the design life of a bridge is about 75 years. This makes them the weakest component of a bridge. Decks are exposed to traffic and chloride elements which can reach reinforcing steel through various forms of cracks. Discontinuous fiber reinforcement can significantly improve crack mitigation by reducing the tensile stresses under restrained conditions.

OBJECTIVE

By using high-performance fiber concrete (HPFC) for bridge decks and connections, the service life of a bridge deck can be significantly improved by reducing premature distresses associated with various forms of cracks. NDOT could also benefit from the longer service life in other applications, such as concrete pavement, which will visit similar conditions. The fiber types, dimensions, dosage, design requirements, and material and construction specifications need to be developed to make HPFC more efficient and practical for the application in Nevada.



METHODOLOGY

Contact Information:

Nevada Department of
Transportation Research Division
Annex 14-15
1263 South Stewart Street
Carson City, NV 89712
(775) 888-7895

<https://www.nevadadot.com/doin>

The research is composed of six major tasks to reach the goal of the study. A comprehensive literature review will be conducted to collect and summarize the current state of knowledge regarding HPFC in task one. During task two, the team will coordinate with NDOT to determine performance testing methods. HPFC mixtures with locally available materials for both bridge deck panels and panel connections are then to be developed through a series of laboratory studies. Task three will be conducting field studies to evaluate the constructability and structural efficiency of HPFC mixtures. A cost analysis will be conducted for task four to justify the cost effectiveness of the application. The last task will be preparing and submitting a final report to NDOT documenting the process and conclusion of the study, along with recommendations.

IMPLEMENTATION POTENTIAL

The use of HPFC may provide a viable option for NDOT that is both structurally and economically efficient. The specifications developed by the study will allow NDOT to use HPFC to solve several of the durability issues that are currently experienced with traditional concrete mixes. The high durability of HPFC will require less maintenance and repair activities. The cost of implementing the proposed specifications is negligible compared to the benefits that the use of HPFC can bring.