# CALTRANS PROBLEM STATEMENT
# FOR
# POTENTIAL NATIONAL INTEREST

## I. PROBLEM STATEMENT TITLE

Using Self Compacting Concrete (SCC) for CIDH shafts

## II. RESEARCH PROBLEM STATEMENT

How can anomalies in large diameter drilled shaft foundations be reduced or eliminated?

Self Compacting Concrete (SCC) is defined as concrete that can be compacted by means of self-weight only, without external or internal vibration. SCC has the ability to flow into and completely fill intricate and complex forms under its own weight, to pass through and bond to congested reinforcements under its own weight, and has high resistance to aggregate segregation. Potentially, SCC offers a solution to the problem of voids during construction of cast-in-drilled-hole (CIDH) piles. SCC will fill all congested spaces in the form with no aggregate segregation and without concrete vibration.

## III. OBJECTIVE

The objective of this research is to investigate the application of Self Compacting Concrete in construction of CIDH shafts.

## IV. BACKGROUND

Anomalies occur frequently in large diameter CIDH shafts, especially those cast under slurry displacement. Tests are required during construction for CIDH to be accepted. Construction delays are common in shaft construction because of the time needed to analyze anomalous shafts and perform the necessary repairs. A reduction in the number of anomalies could save both time and money for the project. This is where SCC could prove very useful. SCC was originally developed in Japan, and has been the subject of several research projects worldwide. In the US several DOT's are using SCC on a trial basis to assess its benefits in bridge construction.

## V. ESTIMATING OF FUNDING

Estimated Funding: $240,000

## VI. DURATION OF RESEARCH

Duration of Research: 24 months

## VII. URGENCY, BENEFITS AND EXPECTED RETURN ON INVESTMENT

It is common to find anomalies during the construction of CIDH piles. These anomalies often negatively impact the quality of the CIDH pile and can result in significant construction delays and increased support costs. Use of SCC in Japan has resulted in as much as 7% reduction in bridge construction costs as compared to conventional concrete. It is easily conceivable that this project will pay for itself a number of times from the first application.

## VIII. RELATED RESEARCH

a. NCHRP Research Project has been initiated to develop design and construction guidelines of SCC to supplement AASHTO LRFD.
b. South Carolina Department of Transportation (SCDOT) received an Innovative Bridge Research and Construction (IBRC) grant to study SCC for drilled shafts. Two SCC shafts and two conventional shafts are in the study.
c. Kansas Department of Transportation (KSDOT) received an Innovative Bridge Research and Construction (IBRC) grant to study fresh and hardened properties of SCC to be used in KSDOT pre-stressed concrete bridges. KSDOT built a 3-span bridge using SCC in one span only, and conventional concrete in the other two. The bridge is instrumented and will be monitored for five years to determine its performance.

**References:**


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## IX. Deployment Potential

SCC has been in development for about 10 years. It has been shown to save time and money on bridge projects, in addition to improving the quality of the final product.


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Please contact the Caltrans member of your committee, sub committee, or task force to express interest or contact Wes Lum at Caltrans (wes.lum@dot.ca.gov).