UNIVERSITY TRANSPORTATION RESEARCH CENTER

RESEARCH BRIEF

PROJECT TITLE: MODERN LOW COST MAINTENANCE OF CONCRETE BRIDGES USING EFFECTIVE NDT TEST DATA

PRINCIPAL INVESTIGATOR: DR. RIYAD S. ABOUTAHA

SPONSOR: RESEARCH AND INNOVATIVE TECHNOLOGY ADMINISTRATION / USDOT

INSTITUTION: SYRACUSE UNIVERSITY

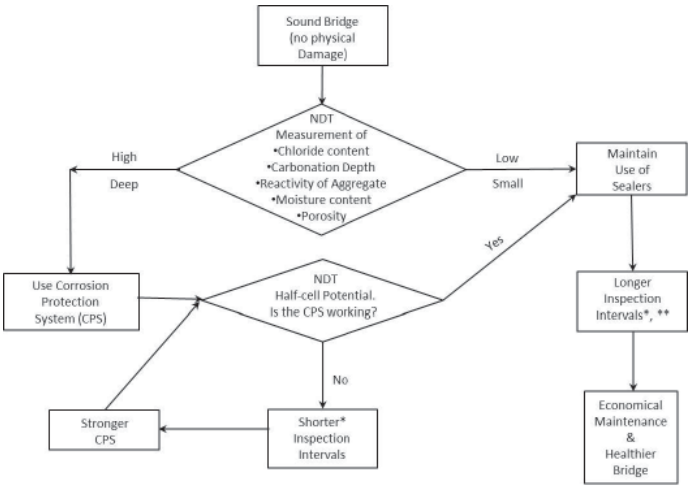
COMPLETION DATE: SEPTEMBER 30, 2012

According to the U.S. Department of Transportation, as of today, of the 607,380 bridges 66,749 (11%) were categorized as structurally deficient (SD) and 84,748 (14%) were categorized as functionally obsolete (FO), (FHWA, 2013). The high numbers of SD and FO bridges should not be allowed to remain at this high level. Given the current state of the US economy, smarter bridge management policies should be adopted, as we cannot afford the high cost of conventional maintenance of our huge transportation civil infrastructure. In addition, there is a need for a more scientific approach for setting bridge inspection frequency based on safety, chemical and physical condition, design, age of the structure, and engineering judgment.

Practical experience coupled with non-destructive test (NDT) data produce good assessment of bridge condition. The question is how to utilize NDT data to develop a cost-effective preventive maintenance policy for highway bridges. NDT data should not only be used for assessing current condition of bridges, but also to predict its deterioration rate and its future maintenance needs. Half-cell potential NDT data of the likelihood of corrosion in a bridge component is a very good indication of its future deterioration rate in the following few years. If implemented, low cost maintenance measures would stop or slow the deterioration rate resulting in lower maintenance cost over the service life of the bridge.

There is fundamental problem with the current NDT/inspection procedures, as they focus on identifying/measuring physical defects/damage through visual inspection complimented with NDTs. An alternative approach would be an active NDT chemical measurement approach, which is less expensive and more effective in detecting potential problems before they even start.

This report presents a new approach for evaluation and maintenance of existing concrete bridges; an active preventive maintenance approach, which costs just fraction of the current passive approach. Such an active preventive maintenance approach requires chemical detection of potential deterioration problems before they even start.



True Active Preventive Maintenance of Concrete Bridges in Corrosive Environment

* Reference is made to two year interval (biennial inspection interval)
** Longer Inspection Intervals must involve NDT of corrosion activities.