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Rapid In-situ Load Testing

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RAPID IN-SITU LOAD TESTING

THE NEED

Load tests and structural monitoring are used to gain information regarding the health and performance of an existing structure. Both are more representative than analytical approaches to evaluate the structure, especially when little is known about the structure's geometry and composition. For structures using relatively new materials, such as fiber reinforced polymer, the use of load tests can answer the question of structures' capability. Yet to justify the time and expense associated with full-scale load testing is difficult since it needs a long period of time over a large portion of the structures.

THE TECHNOLOGY

Rapid in-situ load testing is intended to be much simpler and can be carried out in a fraction of the time and at a much lower cost. The testing procedure was originally developed at Center for Infrastructure Engineering Studies, University of Missouri-Rolla to offer a non-destructive yet conclusive demonstration of the performance of new construction techniques and technologies.

The key concept of this technique is the identification of the structural component and its response. The load test involves applying loads to the structural component through the use of hydraulic jacks. To gain critical responses in the structure without doing any permanent damage, the location and magnitude of loads are carefully designed. Deflections and strains induced are measured, and the structure's performance is evaluated based on the linearity of its response to loading.

This rapid in-situ load test system is easily shipped to a site; the equipment contains two gang boxes. The boxes include hydraulic jacks and a remotely controlled hydraulic pump for applying loads; several instruments for measuring deflections, strains, elongations, and slopes; and a digital data acquisition system that records data to a portable computer.

THE BENEFITS

This rapid load test system can be a powerful tool for the assessment of new construction technologies and for evaluation of structure when little is known about the

structure's geometry and composition. The system also provides the information of structure with less risk of damage to the entire structure.

The system's approach allows a much simpler evaluation of structures and can be carried out in a fraction of the time and at a much lower cost. The installation of the system may take 3 to 4 hours depending on the applications. The actual test takes less than one hour.

STATUS

Currently the rapid in-situ load test system has been implemented to evaluate seven different structures with bonded carbon fiber reinforcement. This system is being considered as way of testing fiber reinforced concrete, concrete structures reinforced with carbon fiber rods, and pultruded glass fiber reinforced plastic bridge sections.

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REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

Purdue University does not endorse this technology or represents that the information presented can be relied upon without further investigation.

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