Seismic Performance of Perimeter Lateral-System Structures with Highly Flexible Diaphragms

Robert B. Fleischman, Kenneth T. Farrow, and Kristin Eastman

Building structures are typically designed under the assumption that the floor systems serve as a rigid diaphragm between the vertical elements of the lateral force-resisting system. However, perimeter lateral-system structures with long floor spans possess diaphragms that behave quite flexibly. Current design may provide insufficient strength to maintain elastic diaphragm response. An analytical study was performed to determine the effect of diaphragm flexibility and strength on the seismic performance of perimeter lateral-system structures with highly flexible diaphragms. Nonlinear transient analyses were performed using ground motion suites corresponding to multiple levels of hazard for high seismic zones. Design recommendations for flexible diaphragms are presented.


The 2002–2003 U.S. Markets Construction Overview

This publication covers some 9 percent of the nation’s gross domestic product in a single document. The report discusses some of the market issues confronting six targeted market sectors within the construction industry and provides anticipated management responses to many of those issues. Responses are organized under 11 areas of management practice. Another section offers FMI’s view of both the current economy and the near future, and discusses spending by types of construction projects. A number of pages are devoted to public utilities, including extensive discussions of energy, water, and wastewater markets. Geographical comments and data for nine regions of the country conclude the report.


The New Face of Parking

Rick Kinnell

The classic gray-banded design of traditional parking structures is being replaced by attractive buildings with eye-catching facades. From brick and marble exteriors, to functional features like clock towers, the face of parking is being dramatically altered. Today, designers are implementing exciting new approaches to using precast concrete in the design of parking structures. These changes are part of a larger revolution in parking design that is resulting in more dynamic structures. Parking designers are going to greater lengths to design attractive buildings that complement the architecture of local buildings and community landmarks.


Corrosion of Highway Bridges: Economic Impact and Control Methodologies

Mark Yunovich and Neil G. Thompson

Corrosion of metallic structures has a significant impact on the U.S. economy. From 1999 to 2001, CC Technologies Laboratories, Inc. conducted research under a cooperative agreement with the Federal Highway Administration (FHWA). The total direct cost of corrosion was determined to be $276 billion per year, which is 3.1 percent of the U.S. gross domestic product (GDP). The overall dollar impact of corrosion on highway bridges is considerable and is estimated to be $8.29 billion annually. The article summarizes the costs of corrosion of reinforced concrete highway bridges and discusses the available control and prevention methodologies.

Concrete International, V. 25, No. 1, January 2003, pp. 52-57.

Digital Layout Speeds Ballpark Construction

Lou Ly-Pham

In 2004, the city of San Diego, California, will have its own state-of-the-art ballpark to rival the best major sports facilities in the United States. To achieve the speed and accuracy the job demanded, Morley Construction Co., the structural concrete subcontractor, quickly realized that conventional building layout techniques could not be used because of the numerous and complex coordinates requiring calculation. However, using AutoCad® files and special surveying software, precise, computer-generated coordinate points were determined quickly and were easily downloaded into the layout data collectors. The resulting concrete work on the new stadium proved that improvements in computer technology will bring increasingly more enhancements to concrete stadium design and construction.


Rheological Model for Self-Consolidating Concrete

Van K. Bui, Yilmaz Akkaya, and Surendra P. Shah

This paper presents the development of a rheological model for self-consolidating concrete, based on the paste rheology criteria. The rheology criteria of the cement paste matrix are related to the average aggregate diameter and aggregate spacing, which are influenced by physical properties and content of aggregates. The properties of SCC were characterized by quantitative measures of segregation and flow. The proposed model was developed by testing more than 70 concrete mixtures. The results showed that the past rheology model is useful in designing SCC mixtures and reducing the extent of laboratory work, testing time, and materials used.