REFERENCE CARDS

KEYWORDS: aesthetics; architectural precast concrete; buildings; connections; design (structural); façade; multistory buildings; precast concrete; seismic design; wall panels.

ABSTRACT: Architectural precast concrete panels played a prominent role in beautifying the exterior façade of the new French Embassy in Mexico City, Mexico. A total of 2100 precast concrete components with a large variety of dimensions in flat, curved, and angled shapes were used. This article discusses the overall concept and solution, design features, production, and erection of the building with particular emphasis on the architectural precast components.

REFERENCE: Kohn, Bernard, Terrazas, Eduardo, and Fastag, Mario, "Architectural Precast Panels Glamorize French Embassy Façade in Mexico City," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 14-20.

KEYWORDS: aesthetics; arch buildings; architectural precast concrete; balusters; bridges; construction; design (structural); erection; panels; precast concrete; replacement bridges.

ABSTRACT: Precast concrete played a prominent role in constructing the new Somerset County Bridge — a distinguished precast, reinforced concrete arch structure, which replaced a deteriorated bridge in Somerville, New Jersey. The new crossing comprises two precast, reinforced concrete curved members to form a 60 ft (18.3 m) clear span with a 9 ft 6 in. (2.90 m) rise and a 50 ft (15.2 m) width.

REFERENCE: Chiou, Wen-Jinn, and Slaw, Robert A., "Somerset County Bridge: A Precast Replacement Solution," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 22-30.

KEYWORDS: aesthetics; architectural precast concrete; buildings; connections; design (structural); façade; laboratory; medallions; precast concrete; production; staircase; wall panels.

ABSTRACT: The new Molecular Biology Research Building on the downtown Chicago campus of the University of Illinois took advantage of precast concrete's plasticity and aesthetic values to create a distinctive image inside and out. On the exterior, this was achieved by differentiating the individual functions in the building with different façade treatments. Other key elements included the addition of decorative precast medallions above the entry tower on each of two sides and a precast double helix interior staircase.

REFERENCE: Anderson, Floyd D., Nijhawan, Jagdish, and Kelley, Tom, "Precast Concrete Delineates Biology Lab Inside and Out," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 32-41.

KEYWORDS: beam-to-column connections; buildings; connections; design (structural); frames; hollow-core slabs; multistory buildings; precast concrete; prestressed concrete; research; semi-rigid frames; stability.

ABSTRACT: Full-scale experimental tests were carried out to determine the influence of connection behavior on stability, both in the in-plane (bending) and out-of-plane (torsion) modes of sway. This paper shows how small quantities of reinforced cast-in-place infill concrete provide composite action between the precast elements to enhance strength, stiffness and ductility, leading to a semi-rigid frame where column effective lengths are reduced and second order (deflection induced) bending moments may be distributed via the connectors to the beams, leading to significant economies.

REFERENCE: Elliott, Kim S., Davies, Gwynne, Gorgun, Halil, and Adlparvar, Mohammed Reza, "The Stability of Precast Concrete Skeletal Structures," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 42-60.

KEYWORDS: analysis; bridges; girders; instrument; precast concrete; prestress losses; prestressed strand; strands; strength.

ABSTRACT: A prototype instrument has been developed to estimate stress levels in exposed prestressed strands in existing members. The stress level is determined by application of a lateral force to an exposed strand and measuring the resulting displacement. The instrument was calibrated for 0.5 in. (12.7 mm) diameter seven-wire strand with exposed lengths of 1.5 to 3.75 ft (0.46 to 1.14 m). It was tested to determine its accuracy, precision, and usefulness in the field. Strand forces were consistently estimated to within 10 percent of the actual load. The device was also utilized in the placement of strand splices and was found to be more reliable in checking induced strand tensions than the standard torque wrench method.

REFERENCE: Civjan, Scott A., Jirsa, James O., Carrasquillo, Ramon L., and Fowler, David W., "Instrument to Evaluate Remaining Prestress in Damaged Prestressed Concrete Bridge Girders," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 62-71.

KEYWORDS: box beams; bridge decks; bridges; cracking; durability; field survey; performance; precast concrete; prestressed concrete; shear keys.

ABSTRACT: Bridge decks supported by adjacent precast, prestressed concrete beams have become increasingly popular in recent years due to their ease of construction, shallow superstructure, and aesthetic appeal. In New York State prior to 1992, such structures were built by placing a number of precast beams alongside one another and connecting them through 12 in. (0.305 m) deep grouted keyways called shear keys to transfer shear forces across the structure. Prompted by the frequent appearance of longitudinal deck cracking over these partial-depth shear keys soon after construction, full-depth shear keys with more transverse tendons were adopted in 1992. A follow-up study evaluated the performance of this new full-depth shear key/transverse tie system. Results indicate that this method has reduced the frequency of shear key related deck cracking.

REFERENCE: Lall, Jyotirmay, Alampalli, Sreenivas, and DiCocco, Eugene F., "Performance of Full-Depth Shear Keys in Adjacent Prestressed Box Beam Bridges," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 72-79.

KEYWORDS: bridge decks; bridges; composite construction; cyclic loads; design (structural); form panels; precast concrete; prestressed concrete; research; strength; testing.

ABSTRACT: An experimental investigation was conducted to evaluate the behavior and strength of bridges constructed with full-span prestressed concrete form panels. This paper addresses the behavior under repeated service loadings and ultimate strength of this type of bridge. Two full-scale specimens were fabricated and subjected to 5 million cycles of service loading before being loaded to failure. It was concluded that these composite bridges will perform adequately under repeated service loadings when composite action between the precast panels and a cast-in-place topping is achieved by applying a raked finish to the precast panels. The full design moment capacities were developed in each specimen after the 5 million cycles of service load had been applied. These ultimate capacities were found to be independent of the moments induced by the restraint of time-dependent deformations.

REFERENCE: Peterman, Robert J., and Ramirez, Julio A., "Behavior and Strength of Bridges with Full-Span Prestressed Concrete Form Panels," PCI JOURNAL, V. 43, No. 2, March-April 1998, pp. 80-91.
