REFERENCE CARDS

KEYWORDS: buildings; construction; cost; design-build project; erection; fast construction; modular construction; precast concrete; precast modules; schools.

ABSTRACT: Many school districts, as well as other building owners, face a common problem. They need a building designed and constructed very quickly and available for immediate occupancy. The Boston Massachusetts School District commissioned the Josiah Quincy Upper School as a design-build project to facilitate creative solutions and rapid project delivery. The project team delivered the $1.35 million building in 108 days from contract signing to completion by using modular precast concrete elements . By combining a tightly integrated design team, along with a well-considered scheme, the project was delivered and satisfied the budget and time constraints. This article describes the design features and erection of the school and especially the role that precast modular construction played in building the project.

REFERENCE: Smith, Michael A., Schreffler, David, and Messenger, Harold, "Precast Concrete Modules Speed School Construction," PCI JOURNAL, V. 45, No. 4, July-August 2000, pp. 36-42.

KEYWORDS: admixtures; batching; bridges; concrete mixes; construction; design (structural); durability; fly ash; high performance concrete; high strength concrete; permeability; piles; precast concrete; prestressed concrete; quality control; research; silica fume.

ABSTRACT: The Charenton Canal Bridge in Charenton, Louisiana, is the state's first bridge built with High Performance Concrete (HPC) components. The 365 ft (111 m) long new bridge replaces a 55-year-old existing reinforced concrete structure. The structure has five spans each consisting of five Type III AASHTO girders made of precast, prestressed HPC. The bridge's piles also were cast with HPC. Casting these components with HPC required considerable advance testing and several adjustments to the required match-cast cylinder tests to ensure a consistent 10,000 psi (69 MPa) compressive strength was achieved. This article discusses the research work that led to the adoption of HPC, then describes the design features of the bridge together with the pile testing, batching procedures, and importance of quality control in producing HPC components.

REFERENCE: Aymond, Thomas W., and Theobald, Don, "High Performance Concrete Extends Life of Charenton Canal Bridge," PCI JOURNAL, V. 45, No. 4, July-August 2000, pp. 52-62.

KEYWORDS: aesthetics; architectural precast concrete; brick-faced panels; buildings; economics; precast concrete; rehabilitation; sandwich wall panels; theatre; wall panels.

ABSTRACT: Brick-faced precast concrete panels proved to be the most efficient and cost-effective method to rehabilitate the 80-year-old Allen Theatre in Cleveland, Ohio. The rehabilitation program included renovating the existing stagehouse public areas to their former glory while adding new performance areas to accommodate large-scale, high tech, Broadway-style productions. A total of 218 architectural precast panels, comprising 30,400 sq ft (2830 m^2) of surface area, were used on this project. The 12 in. (305 mm) thick panels are composed of 6 in. (152 mm) structural concrete, 2 in. (51 mm) rigid insulation, and 4 in. (102 mm) of architectural concrete embedded with face brick. This article presents the conceptual aspects of the renovation program, design features of the architectural precast panels, erection highlights and economic considerations of the project.

REFERENCE: Huffman, Tim and Ciulis, John, "Brick-Faced Precast Concrete Panels Help Rehabilitate Allen Theatre," PCI JOURNAL, V. 45, No. 4, July-August 2000, pp. 64-71.

KEYWORDS: AASHTO girders; analysis; bridges; design (structural); girder spacing; high performance concrete, high strength concrete; large diameter strand; Nebraska girders; precast concrete; prestressed concrete.

ABSTRACT: The maximum lengths for simple-span pretensioned composite girders were investigated analytically using concrete strengths varying from 6 to 15 ksi (41 to 103 MPa), and prestressing strands of 0.5 in. modified and 0.6 in. (12.7, 12.7 and 15.2 mm) diameter. Both AASHTO and NU (developed by the University of Nebraska) sections were investigated. Girder spacings were varied from 5 to 11 ft (1.5 to 3.4 m). Use of the 0.6 in. (15.2 mm) diameter strand was more efficient and provided maximum spans up to 40 percent greater than 0.5 in. (12.7 mm) diameter strand. The strength of the deck did not significantly affect the maximum span, and the strength of the girders at release affected maximum span length more at lower design than at strengths greater than 12 ksi (83 MPa). Overall, the use of 0.6 in. (15.2 mm) strand with concrete strengths up to 13 ksi (90 MPa) may be used to provide more efficient prestressed concrete bridge girders.

REFERENCE: Kahn, Lawrence F., and Saber, Aziz, "Analysis and Structural Benefits of High Performance Concrete for Pretensioned Bridge Girders," PCI JOURNAL, V. 45, No. 4, July-August 2000, pp. 100-107.

KEYWORDS: aesthetics; anchorage; architecture; architectural precast concrete; buildings; design considerations; durability; façade; handling; joints; precast concrete; production; repair; state-of-the-art report; stone veneer-faced panels; stone properties; strength.

ABSTRACT: Stone veneer faced precast concrete panels have been used successfully to clad buildings in North America for the past 40 years. Their popularity is due to the aesthetics, strength, durability, substantial benefits and low maintenance cost of such panels. However, their successful implementation requires careful planning, proper stone selection, and skillful workmanship in producing the panels. This article provides information on stone properties, design considerations, anchorage of stone facing, panel watertightness, veneer jointing, handling, storage and shipping of panels and repair of panels, if needed. A wide variety of building applications of stone veneer-faced precast panels are given. Throughout the article, it is emphasized that for optimum results, close coordination is needed between the architect, precaster and stone supplier.

REFERENCE: Freedman, Sidney, "Stone Veneer-Faced Precast Concrete Panels," PCI JOURNAL, V. 45, No. 4, July-August 2000, pp. 72-99.

KEYWORDS: bent segments; box girders; bridges; construction; interchanges; precast concrete; prestressed concrete; segmental construction; segments; transportation structures.

ABSTRACT: Part 1 of this series of articles on Boston's Central Artery/Tunnel Project presented an overview of the scope of the work. This Part 2 article describes the innovative use of precast concrete segments, as well as other construction techniques, on two major interchanges.

REFERENCE: Towel, Paul J., Mainville, Peter A., Chandra, Vijay, and Homsi, Elie, "Central Artery/Tunnel Project: Innovative Use of Precast Segmental Technology," PCI JOURNAL, V. 45, No. 4, July-August 2000, pp. 44-50.
