When designers of a new office tower in Shelton, Connecticut started work, they were also faced with a critical shortage of land for parking. The solution was an integrated precast office tower/parking garage. A total precast framing system is credited with saving land, time and money on the project.

The eight-story structure is set on a sloping site and includes 6 levels of office space and 3 levels of parking. The overall footprint of the structure is 392' x 182' comprising 200,000 SF of office space and 170,000 SF of parking for 659 cars. It is the last structure of a nine-building office complex known as the “Enterprise Corporate Center” with 1.2 million square feet of office space. RD Scinto Inc. from Shelton, is the owner-developer.

Unique features of project

The exterior spandrel beams have a complex series of reveals, exposed aggregate finish and light sandblast finish which can be seen in the photo above. Lateral bracing elements are located within the building so as not to interfere with functionality of the office space. Spliced columns were required due to weight and shipping constraints to the jobsite.

Early strength zero energy, SCC precast concrete

Increases in the cost of energy are changing the way early strength development is obtained with precast concrete production. A recent survey by NPCA, the National Precast Concrete Association, noted increases as high as 50% for gas, 30% for oil, 14% for electricity and 60% for propane.

New high-range water-reducing (HRWA) admixtures based on polycarboxylate (PC) chemistry and viscosity-modifying (VMA) admixtures offer early strengths without accelerated curing and other unique advantages for precast concrete production. An article in the April issue of Concrete International, examines strength development and modulus of elasticity gain with “zero energy” concrete versus conventional concrete.

New admixture system

The admixture system developed for “zero energy” concrete consists of a combination of PC based HRWA admixtures (PC-NS and PC-HES) and a viscosity modifying admixture (VMA) to achieve higher early-age strengths than traditional HRWA admixtures.

The compressive strengths of six mixes with varying amounts and types of cement, fly ash, additives and percentages of aggregates are compared at 6, 12, and 18 hours for both accelerated and conventional curing at 70° F.

The results indicate that SCC containing PC-HES and VMA admixtures: 1) Achieve higher strengths than SCC with previous admixtures; 2) Achieve release strengths earlier than conventional concrete; 3) Achieve comparative strengths with Type 1 cement versus Type 3 cement; 4) Achieve adequate modulus of elasticity values at early ages of curing. The authors are from the Concrete Research and Development Department of Master Builders, Inc. in Cleveland, OH.

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Washdowns and regular checkups recommended for healthy garages

Precast parking garages require minimum but specific periodic maintenance and care. Most experts on garage preventive maintenance recommend semiannual washdowns of all floor surfaces with a fire hose or minimum 1.25" hose. Washdowns should start from the roof and work down. Periodic condition audits or checkups are recommended at a minimum of once every three years.

Spring flushing is recommended to remove salt carried in from roadway melt during the winter. Cracks whether they be micro or larger are especially vulnerable to penetration of salt saturated runoff. The subsequent corrosion of reinforcing is usually the major problem with maintenance. Allowing accumulations of sand and other debris saturated with salt is like rubbing salt in a wound.

**Condition audits after flushing**

Condition audits are best made after a spring flushing. An engineer experienced in parking structure design and restoration is recommended to perform the audit. Corrosion from deicing salts is a complex phenomenon. Some remedial actions such as overlaying a slab with an asphalt wearing course can actually accelerate the deterioration of a slab. An engineer with capability in restoration will see problems that will not be apparent to the inexperienced or untrained person.

Here are a few recommendations from the PCI publication on “Maintenance of Precast/Prestressed Concrete Parking Structures. PCI notes that an effective PM schedule will extend the useful life of a parking structure and minimize costly repairs.

**Preventive maintenance items**

- Floor surfaces that show excessive wear and cracking should be repaired as necessary. Potholes should be patched and worn spots levelled with appropriate patch material such as latex modified concrete. Cracks should be routed and sealed with a high quality sealant.
- Reinforcing or connection plates that are exposed and rusted, should be cleaned of rust down to bright metal by sand blasting or power brushing and then coated with epoxy paint prior to patching concrete.
- Expansion and control joints that show deterioration, wear or damage from snow plows should be repaired as required.
- Floor drains and downspouts should be inspected, cleaned and repaired as necessary.

Open load bearing shear walls provide garage passive security

Security and safety of patrons are major considerations when designing parking structures. Load bearing shear walls with large openings add to passive security features of a structure.

The shear walls shown above are a nominal 8’ wide and 12” thick placed on a 12’ module for 12’ wide pretopped double tee deck members. The net openings in and between the walls are 4’ wide leaving vertical legs each 12” x 24” in section. A second level of walls will be stacked on top using NMB splice sleeves. The monolithic corbels cast on the side of the walls vary in elevation to provide bearing for the sloped ramps of double tee members.

The photo was taken during erection of a new garage at the Dartmouth Hitchcock Medical Center in Hanover, NH this winter. Despite bitter cold, the 600 precast members were erected on time and according to schedule, which would not have been feasible with conventional construction. The structure is 240’ x 120’ providing parking for 556 cars.

The architects were Shepley, Bulfinch, Richardson and Abott from Boston. The parking consultant and engineer was Walker Parking Consultants, also from Boston. The specialty precast engineer was Ross Bryan and Associates from Nashville, TN. The construction manager was McCarthy Building Co from St Louis, MO. The William E. Dailey Co cast the precast members at their plant in Shaftsbury, VT. The erector was American Steel Erectors from Greenfield, NH.

Visit: www.pcany.org

For information on precast concrete products and precast concrete producers with links to their websites.
Reveals & other finishing details from Designer's Notebook Series

Reveals and other finishing details are forms of sculpturing that add visual interest to the exposed faces of flat spandrel beams or wall panels. The light and shadow achieved by sculpturing can produce a major visual effect for the member. The PCI Designer's Notebook Series, on architectural precast concrete, covers techniques and details affecting geometry and forming. The series have previously appeared as articles in the PCI AS-CENT magazine. Here are excerpts from the publication on "Reveals."

Reveals can be grooves or steps to create the desired effect. Other names for reveals are demarcation feature, rustication or false joint. Reveals can run vertically, horizontally or diagonally. Reveals typically measure 1/2 to 3/4 of an inch deep and 3/4 to 4 inches wide with 45 to 60-degree beveled surfaces allowing for ease of stripping. A reveal can be used to separate multiple finishes, mixes or textures. When exposed aggregate is used, a reveal or demarcation feature is required to keep the retarder from spreading to adjacent areas.

Reveals divert attention from color and texture variations

Reveals or demarcation features will divert attention from texture and color variations. The scale of large panels may also be reduced by using reveals. It's important to remember that a reveal reduces the structural thickness of the panel. When a deeper reveal is required than is typical, its location and effect on the panel's structural performance must be considered.

Oldcastle plant receives OSHA Merit VPP Award

The Oldcastle precast plant in Manchester, NY has received the Occupation Safety and Health Administration (OSHA) Merit Volunteer Protection Program (VPP) Award. The program was established by OSHA to recognize companies whose commitment to safety runs throughout the culture of the company.

The Manchester plant precasts and installs hollowcore plank and structural systems throughout Western New York, and is part of the Building Systems Division of Oldcastle. OSHA reviews the company's safety records, programs, and history as well as conducts detailed safety interviews at all levels of the organization. The proactive safety culture of Oldcastle was a primary determinant in qualifying for the award.
Precast and productivity:

There were widely differing views at a recent meeting of the Civil Engineering Research Foundation, (CERF) in Washington, DC, focused on construction productivity. An article in the May 12th issue of ENR, noted an agreement that some productivity may be declining, but there seems to be no accepted or reliable way to measure it. Measuring productivity is more than dividing total cost or time by man hours.

One presenter noted the industry is building more complex facilities with shorter design and construction times. Another reported on studies of 200 tasks and how they had on all types of construction including, parking garages, office buildings, housing, had on all types of construction including, parking garages, office buildings, housing, and even water and sewer systems. Wherein we come to precast and the special advantages it has for systems building.

Precast elements keep getting bigger and better with more sophisticated casting methods, materials and designs. Added to that is the evolution in equipment for handling, storage, trucking and installation at the jobsite. Precast elements are a natural for all types of system construction.

A good case in point is our feature story this month with massive pretopped double tee deck members, structural spandrel beams with architectural finishes, shear and load monolithic landings.

No matter how you analyze it, precast concrete systems improve productivity and reduce man hours over traditional design. We include hours in the plant plus hours of installation versus hours at traditional tasks. In addition, precast systems compensate for skilled work force shortages in many market areas of the country. We're glad CERF is talking about productivity, and precast has the answer.

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