

All-Precast Parking Structure Creates Attractive Solution



New facility provides Washington, D.C., commuters with much needed parking while offering faster construction, lower initial cost and plant-cast quality

Most Washington, D.C., commuters have good words to say for the Metro rapid transit system. Service is frequent, the trains and stations are clean, and it is safe, even at night.

But when a commuter wanted to ride the train into the heart of the city from a suburban stop, the best advice has been: “Get there early.” The parking lots and garages usually filled to capacity quickly.

To alleviate that, system administrators are constructing a number of parking structures at suburban locations, using precast concrete components to speed construction and reduce initial costs. One such project is the new structure at Shady Grove, a terminus of Metro’s busy red line about a mile north of Rockville, Md. The facility, built almost entirely of precast concrete, gives Shady Grove’s 13,000 daily commuters an additional 2,050 spaces, bringing the total at the location to 5,467 spaces.

‘We believe precast saved up to 10 percent in initial cost and time of construction.’

“We wanted to fit the symmetry of the Metro system and not build just another garage,” says Kassa Seyoum, project manager for the Montgomery County Public Works & Transportation Department, the structure’s owner. “When we planned the garage, we



Fact Sheet

Project: Shady Grove Station Parking Structure

Type: Seven-level, all precast

Location: Montgomery County, Md., for the Washington, D.C. Metro system

Designer/engineer: Walker Parking Consultants, Wayne, Pa.

Architect: Mariani Architects, Washington, D.C.

Structural engineer: Cagley & Associates, Rockville, Md.

Contractor: San Jose Construction, Washington, D.C.

Precaster: Shockey Precast Group, Winchester, Va.

Owner: Montgomery County, Md.

Size: 2,050 parking spaces

Precast components: 791 double tees, 43 precast flat slabs, 27 closure/separator walls, 36 12-inch stair/shear walls, 123 8-inch stair/shear/walls, 50 stairs, 32 20- by 20-inch columns, 120 24- by 30-inch columns, 35 30- by 30-inch columns, 160 R-beams, 49 L-beams, 54 inverted T-beams, 87 8- by 57-inch fascia panels, 18 10- by 59-inch fascia panels, 52 10- by 74-inch fascia panels, 18 fascia L-beams, 108 fascia panels with pockets, 114 ramp walls and 32 prestressed flat slabs

Project cost: \$28.5 million

Precast concrete: \$13 million



The total-precast parking structure at Shady Grove station on Washington, D.C.'s Metro red line has visual appeal as well as functionality. The stair tower at left adjoins an elevator tower. Photos: ©EricTaylorPhoto.com



Design features enhance the exterior appearance of the stair tower, which, from the inside, is appealing in its openness. Photos: ©EricTaylorPhoto.com

looked at three important elements: time of construction, initial cost and long-term life-cycle costs. We believe precast saved up to 10 percent in initial cost and time of construction.”

The precast components, 1,949 in all, were produced by the Shockey Precast Group of Winchester, Va. “Has the facility been received favorably? Ask any commuter from Shady Grove,” enthuses Nick Kolar, project manager for Shockey. “They think it’s the best thing since sliced bread. It’s just a stone’s throw from the station platform. We’ve also received very favorable comments on the architecture and the appearance of the sand-blasted finish. It’s not your typical cookie-cutter box. It has character.”

Consistent Look Desired

The facility’s character was a key ingredient for the owners. The Metro system has been a big success, growing to five lines totaling 103 miles and carrying as many as 670,000 passengers daily in the 15 years since it opened. The system now includes a number of parking structures in the suburbs, where most of the trains run above ground. These structures were erected with more of an eye toward expediency than aesthetic integration, leading to designs that

featured all manner of shapes and forms.

Authorities wanted the Shady Grove structure to provide a basic template that could help relate new facilities to older ones and relate architecturally

Authorities wanted Shady Grove to provide a basic template for future projects.

to the above-ground, highly visible stations. The stations include attractive, gull-wing canopies over the platforms, and many of the newer ones also feature curved-glass canopies over the outdoor escalators.

In planning the new structure, Montgomery County officials brought together a consulting group that included Walker Parking Consultants of Wayne, Pa., the prime design engineer; Mariani Architects of Washington, D.C.; Cagley & Associates of Rockville,

Md., the structural engineer, and Metro authorities.

“From the beginning, it was pretty much a given that the structure would be built of precast,” says Reginald Cude of Mariani, who was the design architect on the project. “Precast provided the ability to shape the building into attractive forms.”

“Planning for this structure took longer than the usual time for a project of this nature,” says Michael Hacke, project manager for Walker, the prime engineer. “We had to consider the county’s planning requirements, then go through the plans with Metro. It was an extensive process.”

‘Precast provided the ability to shape the building into attractive forms.’

The design of the Metro stations, both above ground and below, has established a visual image that is widely known for its architectural integrity. The gull-wing canopies and station platforms are harmonious in design and the system itself is considered not only attractive but clean and safe as well.

The architects believed that precast concrete was the ideal material to relate new parking structures with the architecture of the stations. As such, they were able to transform the large, rectangular garage into an attractive building with curved forms. The seven-level garage has four stair towers that resemble the towers of a castle. It is highly visible in the neighborhood of low-rise housing and industrial buildings and is the first thing Metro passengers see upon arrival at the station.

The building’s four rounded stair towers used curved precast panels to achieve the desired look and enhance the overall appearance. The tower at the southwest corner stands next to a lobby and another tower that contains four elevators. In addition to the stair towers, major exterior columns also are rounded on their outer face, as are the vertical edges of the shear walls on the east and west facades. Spandrel panels have 18- and 12-inch diameter bullnose projections at their bottoms and tops,



*The elevator tower is enclosed in glass, one of the few non-precast components in the garage.
Photos: ©EricTaylorPhoto.com*

respectively, progressing to 6-inch diameter metal railings above. Topping off these architectural achievements are reveals, recesses, surface texture and patterns that provide an appealing appearance.

The total-precast design includes components that are typically produced in precast concrete, such as shear walls,

inverted tee beams, spandrel beams and double tees. But precast also is used for elements that often are constructed in steel, glass and masonry. These include the stairs, elevator tower and elevator machine room. The stair towers, including stair runs, landings, railings, parapets, columns and shear walls, make distinctive features as precast concrete

elements. The elevator tower also is precast, although necessarily enclosed with glass.

Precast Resists Weather

Precast concrete's ability to resist harsh weather was a key factor in its favor, says Theodore F. Mariani, president of Mariani Architects. The precast components feature air-entrained concrete, he explains. The process uses an additive in the mix to create microscopic air cells, almost like a foam, that eliminate the potential for moisture to infiltrate the material.

Hacke says another advantage precast offered was the fact that "we could erect it more quickly than constructing a



*The total-precast design includes shear walls, inverted tee beams, spandrel beams and double tees. Here, columns for one of the stair and elevator columns are erected.
Photo: ©FineArtPhotography.com*

'There is no doubt that precast allowed greater speed of construction.'

cast-in-place, post-tensioned concrete deck." He estimates precast saved about 5 percent from the initial cost of a cast-in-place, post-tensioned concrete alternative because of the shorter erection time.

Shockey Precast had cast all of the components before construction began, according to Kolar, the project manager. "We worked out our designs based on the architectural scheme," Kolar says. "Then we put two crews of seven to nine workers each and two cranes on site to erect the precast."

Despite those early delays, the precast

went well. "It stayed pretty much on schedule," according to Seyoum, the Montgomery County project manager. "We also had some problems in getting the garage finished, electrical and mechanical problems and some other weather-related issues."

The general contractor, San Jose Construction of Washington, D.C., agreed that precast helped maintain the construction schedule. "There is no doubt that precast allowed greater speed of construction," says Joshua Hall, a project manager with San Jose Construction. "Working with a good precast contractor makes the job a lot easier than cast-in-place concrete."

Since the Shady Grove structure was completed, at a total cost of about

\$28.5 million, Montgomery County has built another similar garage for 1,500 cars at Grosvenor, also on the red line and four stops south of Shady Grove. And it might add another in one of the current Shady Grove parking lots.

"We're going to expand the Grosvenor garage by 500 cars," says Seyoum. "It's also being used for patrons of the concert hall, just next door. We have commuters in the daytime and concertgoers at night. It's a busy place." ■

— Donald P. Merwin



*Major exterior columns were rounded on the exterior face to maintain the rounded theme used throughout the project.
Photo: ©FineArtPhotography.com*



Click For More...

To learn more about **total-precast concrete parking structures**, visit the Designer's Knowledge Bank by clicking on the DKB icon at **www.pci.org** or at your local precaster's Web site.