



LEED SILVER CRITERIA

WRIGHT PATTERSON AFB SENSORS LAB

Project Type: Research lab

Location: Wright Patterson Air Force Base, Dayton, Ohio

Owner: Louisville District US Army Corp. of Engineers
in conjunction with the United States Air Force

Joint-Venture Designers: Barge, Waggoner, Sumner & Cannon (BWSC), Nashville, Tenn.,
and Emersion Design, Cincinnati, Ohio

Design Team Architect: Edged & Tinney Architects, Dayton, Ohio

Structural Engineer: THP, Cincinnati, Ohio

Contractor: Butt Construction Co., Dayton, Ohio

Precaster: High Concrete Group Midwest Region, Springboro, Ohio



OVERVIEW

The versatility of architectural precast concrete panels are capitalized on to provide a range of expressions for drastically different buildings at this major Wright Patterson Air Force Base development. A total of 113,000 sq. ft of architectural precast concrete wall panels were used in the project, which includes a 56,000-square-foot, four-story office building and two connecting indoor/outdoor range buildings containing 19,000 and 23,000 sq. ft, where sensitive equipment is tested. In addition, there is a small (4-5 cars), unheated vehicle maintenance/storage garage on site that was built using conventional precast walls.

Mission of the Air Force Laboratory Sensors Research Directorate is to lead the discovery, development, and integration of affordable sensor and countermeasure technologies. Accordingly, the master plan for the \$50 million complex includes buildings designed to house an anechoic chamber (a room designed to stop reflections of sound and/or electromagnetic waves), Class 10-10,000 clean rooms (rooms with an extremely low level of environmental pollutants, dust and microbes), and S, CL & Bistatic Band Towers (facilities for radar cross section measurements).

Construction of the new buildings was phased to allow for renovation of existing clean rooms and consolidation of laboratory space, administration facilities, and SCIF suites (i.e. Sensitive Compartmented Information Facility providing physical, audible, visual, and electronic security) to occur while the existing building remained occupied.

The project's design-build team consisted of Butt Construction, Edged & Tinney Architects, and THP. The RFP joint-venture team hired by the Army Corp of Engineers to originate the design included Emersion Design and BWSC. KlingStubbins, Philadelphia, Pa., was the designer for the indoor/outdoor range buildings. Mechanical/electrical engineer was Heapy Engineering, Dayton, Ohio.

Precast concrete panels created a cohesive design for the complex development. The high-profile office building serves as the gateway to the campus. Precast concrete panels helped it achieve a dramatic appearance. High-tech sensors laboratories offer a monolithic appearance and are windowless, highly functional structures with a warehouse appearance. Precast concrete architectural panels helped tie the two styles together while achieving the functional goals of each.

20 PERCENT

Amount of recycled content in construction materials

75 PERCENT

Goal for the amount of construction waste to be diverted from the land fill

100 PERCENT

Amount of precast concrete components that were regionally sourced

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Project includes a four-story office and two indoor-outdoor range buildings.

Photo: Butt Construction Co.



Precast panels give dramatic appearance to the high-profile office structure.

Photo: Butt Construction Co.



Architectural precast provides monolithic look to high-tech lab buildings.

Photo: Butt Construction Co.

"Precast concrete allowed us to meet the needs of both ends of that spectrum in this one project," says James Cheng, design principal for project design at Emerson Design. "Precast concrete panels were [also] used to provide architectural compatibility with other structures in the complex. The existing buildings had a specific 1960s character that consisted of precast concrete panels, and the base officials wanted to extend that character and ensure the new appearance replicated the existing buildings." That appearance featured horizontal reveals and protrusions that new panels could replicate.

Achieving the specific look for the office building required a careful balance, Cheng adds. "The command headquarters needed to have an elevated design statement, but, as a publicly financed building, it couldn't look frivolous or extravagant. It had to convey an image of strength and stability while also projecting an image of sophistication and contemporary dynamics to represent the type of work done here. Precast concrete offered a lot of advantages in balancing those needs." The panels feature two face mixes and two finishes, with acid etching and exposed-aggregate designs to create contrast. The range buildings feature smooth textures on the interior, while the office complex was furred out, insulated, and finished with drywall to provide a traditional office appearance.

In all, 113,028 sq. ft of precast concrete components were utilized, including 3,548 sq. ft of spandrels, 23,929 sq. ft of regular wall panels, 64,435 sq. ft of insulated wall panels, 4,922 sq. ft of wall returns, column covers, and special shapes. The office building and lab renovation included 5-in.-thick precast concrete panels. The architect and precaster worked hard to match precast colors and textures already in place on the site. Included are smooth panels with light-medium sandblast finish; ribbed panels made with plastic form liner; and exposed aggregate panels in a C-shape. Panels were finished on the interior with steel framing, insulation, and drywall, and were double-caulked to ensure weather-tightness and minimize opportunity for air and moisture infiltration/exfiltration. The structure includes a 60-ft, enclosed pedestrian connector bridge in which precast panels were used as structural support.

PRECAST CONCRETE'S CONTRIBUTION TO SUSTAINABLE CONSTRUCTION PRACTICES

Precast concrete construction contributed to the project's sustainability in the areas of optimizing energy performance and in the use of regional and low-emitting materials. The project's master plan, renovation, and additions were designed to LEED Silver criteria.

Sustainable Sites:

Using precast concrete on the project reduced the amount of site preparation required, cut construction waste, and helped the contractor meet the tight construction schedule. Shop drawings and design drawings were done simultaneously in the design-build scenario. The panels on one of the range buildings were erected in a vertical fashion, covering the 70-ft height quickly. Less dependent on weather conditions than other types of structural systems, the panels could be erected quickly regardless of the weather.

Precast component erection started in November 2009 with substantial enclosure by mid-December and erection completed in January 2010.

"The panels could be installed quickly, and since there are no other construction materials on the exterior, they could be erected and the windows installed on the office portion quickly," says Chuck Cheadle, project manager for Butt Construction Co. "That meant we were done with the exterior and could move inside."

The project includes bike racks and space for low-emitting vehicles.

Open space was maximized and efforts were made to reduce light pollution and the heat island effect.

Water Efficiency:

Low-flow plumbing fixtures are installed throughout and reduced water usage by 38%. The project features water-efficient landscaping and no landscape irrigation was installed.

Energy & Atmosphere:

The headquarters building also required insulated sandwich wall panels, which included C-Grid carbon-fiber wythe connectors. The system provides a non-corrosive, non-thermally conductive connection and has a higher tensile strength than steel. Included are high-efficiency air handlers and a heat recovery system.

Materials & Resources:

The range buildings utilized CarbonCast High-Performance Insulated Wall Panels with 3 in. of extruded polystyrene (XPS) foam in the sandwich panel and an R-16 insulation rating. Interior surfaces were float-finished and steel-troweled where exposed.

All precast concrete components were locally sourced. Concrete for foundations, roadbed gravel, and asphalt were also from within the region. In total, more than 20% of all materials were regionally sourced.

Recycled content of construction materials topped 20%, including fly ash in the precast concrete. Goal of the project is to divert more than 75% of construction waste from the landfill.

Indoor Environmental Quality:

Low-emitting VOC materials were specified. The project also features extensive window area to admit daylight and automatic sensors for room lighting.

Innovation & Design Process:

Innovation credits were received for greatly exceeding both recycled content and use of regional material guidelines. 



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