

The Lloyd D. George United States Courthouse

Las Vegas, Nevada

Architectural precast concrete panels, specially designed to resist a severe bomb blast, were used effectively to beautify and protect this eight-story federal courthouse building.

The new, nearly \$100 million Lloyd D. George United States Courthouse in Las Vegas, Nevada, is the first major federal project to be designed and constructed to satisfy the new Interagency Security Committee (ISC) Security Design Criteria, which include measures to mitigate the effects of a bomb blast. These design criteria were developed under the guidance of the General Services Administration (GSA), a branch of the U.S. Government responsible for managing construction of new buildings under federal jurisdiction.

When a bomb damages a building, some of its structural elements will be eliminated, thereby requiring a redistribution of forces. If the building is to remain standing, a portion of the energy must be absorbed and the resulting load redistributed. In order to protect the occupants to the highest degree possible, the aim of the new criteria is for a building to remain standing long enough to evacuate every person

and to protect occupants from injury or death resulting from flying debris.

Because of its inherent characteristics and versatility, architectural precast concrete can be designed to mitigate the effects of a bomb blast and thereby satisfy the GSA requirements. To comply, the following elements were built into the precast panel system:

- The panels were relatively large and more ductile than conventional panels. In this way, the panels can absorb a large portion of the energy from a bomb blast without destroying the connections that tie them to the main structure.

- The panels were attached to the floor diaphragms, rather than to the columns, in order to localize the damage. Thus, in the event of a bomb blast, the panels would fail individually, but the type of progressive collapse that caused the Oklahoma City building to fail would be avoided.

- The panels were uniquely designed

with integrally cast ribs, vertical mild steel reinforcement and a special connector.

- The panel system was to accommodate a 4 in. (102 mm) story drift.

The GSA stipulated a design-build project with the provision of a “bridging” document. In essence, this meant that blasting criteria would not totally dictate the design and that all accumulated knowledge gained from the bidding process would be considered. GSA’s intent was that aesthetics would play a major role in the design of the building, and that the final structure would not look like a “fortress.”

An important development in the design process of the courthouse building was the advice given by Eve Hinman, president of Hinman Consulting Engineers, who advocated the use of architectural precast concrete and subsequently became part of the design-construction team.

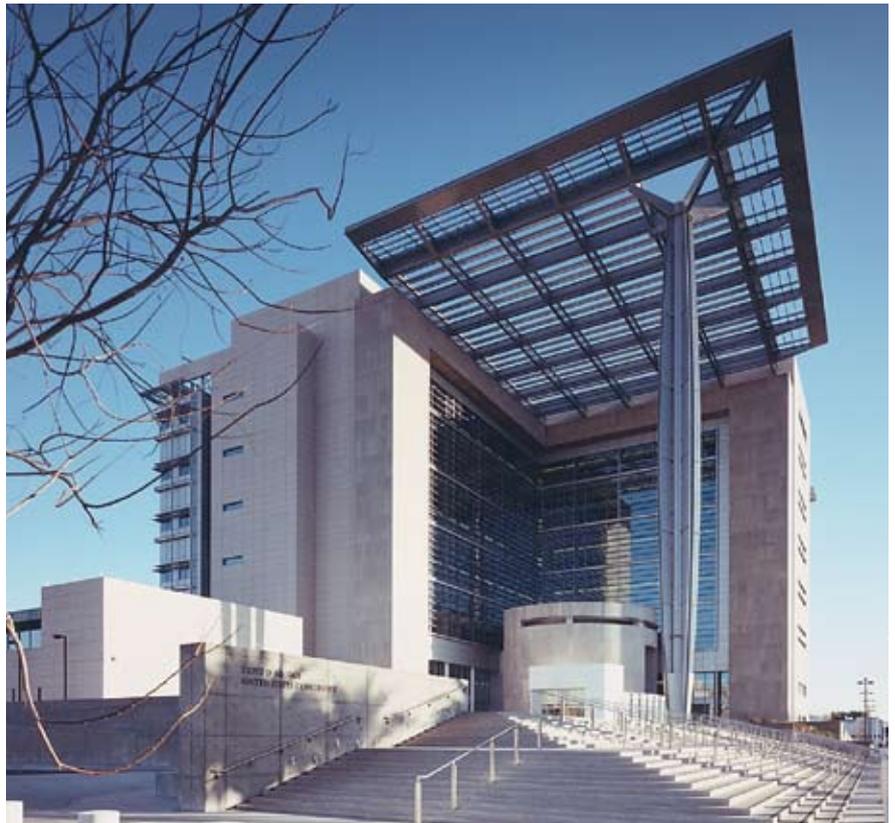
The design-build contract was awarded to J.A. Jones Construction in



October 1997. The other members of the team were Langdon Wilson Architects (executive architect), Dworsky Associates (design architect), Martin Peltyn Inc. (structural engineer), Clark Pacific (precaster), and of course, GSA (the owner). The responsibility for the final design was Langdon Wilson Architects.

The resulting structure is an airy, light-looking, eight-story, 410,000 sq ft (38000 m²), building clad in architectural precast concrete. It features a soaring 170 ft (52 m) high steel and glass canopy and a glass curtain wall for entry into the building. The structure has a steel moment-resisting frame. For additional resistance at the building corners, the steel frame has box columns instead of wide flange columns. Each story is 22 ft (6.7 m) tall, which necessitated a relatively large [4 in. (102 mm)] story drift to be incorporated into the cladding system.

The selection of architectural precast concrete as the cladding material





proved to be an excellent choice from a functional, aesthetic, construction and economic viewpoint, and especially in meeting the GSA bomb blast guidelines. Note that a metal panel system with interior framing would have been more costly and would reduce the amount of usable space inside the building.

The precision and uniformity achievable with precast concrete made it an ideal choice for the solid masses, which frame the open-glazed areas of

the building. Precisely aligned reveals and panel joints, along with substantial corner returns on the panels, allow an expression that looks monolithic as opposed to cladding that is hung from a structure.

The quality control available in a plant made possible a very rich material in terms of color, expression of aggregate and texture. Deeply recessed punched windows within the panels add to the monolithic character of the building.

Another advantage of the precast panels was in their application as substrate for areas of the façade where limestone was used to frame the open, transparent lobby areas expressed on the two major elevations. Precast panels provided the ideal manner to panelize this stone veneer. Layout and review of the veined stone was facilitated by the accessible, controlled environment of the precast plant. Erection of the stone clad panels was speedy and smoothly accomplished



when compared with the alternative of hand-setting stone on site framed walls.

A total of 450 precast panels were used comprising wall panels, limestone-veneer panels, column covers, flat and curved sill panels, and flat and curved roof spandrels. For a breakdown of the number and dimensions of these panels, see Table 1.

Measured using GSA stipulated metric (SI) guidelines, a typical panel size is 6730 mm high x 3480 mm wide x 152 mm thick (approx. 252 sq ft). A limestone-like finish was used on the upper floors with panels featuring Indiana limestone veneer inset into the pieces around the lobby entry. The 6 in. (152 mm) thick panels were reinforced with square pilasters (ribs) cast integrally into the panels to provide additional blast resistance.

The precast panels were fabricated by Clark Pacific at their plant in Fontana, California, and shipped by truck-trailer to the project site. Clark Pacific was responsible for the transportation and erection of the panels. In addition, they were responsible for the overall design of the product, reinforcing arrangement and connection to the main structure. Note that only mild steel reinforcement was used in the panel without any prestressing. In all, some 1200 pages of design calculations and more than 230 shop drawings were produced.

Fabrication of the panels was done between August 1998 and February 1999 while the foundations and steel superstructure were being constructed. Erection of the panels occurred during the latter part of 1999. Clark Pacific was able to erect an average of 15 panels per day. The precast portion of work was completed in July 2000.

The total project cost was \$96.8 million, and the total precast package was \$4.2 million.

The facility has now been in service for the last couple of years and has been performing with a high degree of excellence. Indeed, the building has quickly become a major landmark in Las Vegas and is much admired for its architecture and elegance. In retrospect, the design-build concept worked very well, and all participants in the project were pleased with the

Table 1. Number and dimensions of architectural precast concrete components.

<ul style="list-style-type: none"> • 243 Wall Panels: 265 in. tall x 137 in. wide x 6 in. thick (6730 x 3480 x 152 mm) • 45 Limestone Veneer Panels: 294 in. tall x 159 in. wide x 7 in. thick (7470 x 4050 x 182 mm) • 30 Column Covers (C-shaped): 336 in. tall x 49 in. wide x 6 in. thick (8530 x 1250 x 152 mm) • 20 Spandrels (Curved): Radius: 6263 x 276 x 106 in. (159075 x 6998 x 2680 mm) 	<ul style="list-style-type: none"> • 14 Sill Panels (Flat): 276 in. tall x 70 in. wide x 6 in. thick (7000 x 1780 x 152 mm) • 19 Sill Panels (Curved): 276 in. tall x 71 in. wide x 6 in. thick (6998 x 1800 x 152 mm) • 17 Roof Panels (Flat): 276 in. tall x 88 in. wide x 6 in. thick (7000 x 2230 x 152 mm) • 12 Roof Panels (Curved): 276 in. tall x 88 in. wide x 6 in. thick (7018 x 2230 x 152 mm)
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end result.

The Lloyd D. George United States Courthouse project won an award for "Best Justice Facility" in the 2002 PCI Professional Awards Program. The jury comments were as follows:

"This is an excellent contemporary interpretation of a justice federal courthouse building, showing a nice blending of contemporary materials. The relationship between the precast components and the glass areas creates a welcome and inspiring building. These materials have given the courthouse true landmark status."

CREDITS

Owner: General Services Administration, San Francisco, California
 Executive Architect: Langdon Wilson Architects, Los Angeles, California
 Design Architect: Dworsky Associates (now Cannon Dworsky Inc.), Los Angeles, California
 Structural Engineer: Martin Peltyn Inc., Las Vegas, Nevada
 Precast Concrete Manufacturer: Clark Pacific, Fontana, California
 Special Consultant: Hinman Consulting Engineers, San Francisco, California

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