Center of Attention

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An art museum consisting of five separate buildings comes together in a dramatic steel-topped atrium.

THE NASHER MUSEUM OF ART is located on park land between Duke University's East and West Campuses in Durham, N.C., suggesting the central role played by the arts in a university education.

In turn, an expansive courtyard plays the central role in bringing together the museum itself, which is made up of five separate, rectangular pavilions. Topped by a glass atrium featuring architecturally exposed structural steel fit for an art museum, this central court serves as the museum's main lobby as well as exhibition and function space, with a stepped platform along one side that can be used as a stage.

The museum creates a strong dialogue between indoors and outdoors, as abundant sunlight and glimpses between the pavilions to the surrounding gardens draw nature into the building. The complex, almost vertiginous, geometries of the glazed atrium roof are formed by a hierarchy of structural supports.

Five into One

The primary structure is comprised of five steel box beams that echo the five separate buildings. The beams are trapezoidal in section, and each extends outward on a perpendicular from one of the five pavilions to intersect with two of the other beams, interlocking to form a pentagon over the center of the atrium floor. The long-span, column-free exhibition space is thus achieved by supporting each of the five primary structural steel members in

three places—once by the load-bearing concrete walls of the pavilions, and twice by the other beams.

Forming the secondary structural system, five smaller steel beams extend from corners of the concrete pavilions to points on and above the primary structural pentagon; vertical steel arms joined to the box beams support the secondary members where they rise to form the apexes of the roofline. Onto this secondary structure are laid the purlins and aluminum mullions that support the roof glazing.

Because of the close fit between the roof structure and the skylights, the steel had to be constructed to a very high tolerance, which led the design team to use the AESS tolerances outlined in the AISC *Code of Standard Practice*. In order to achieve the necessary degree of precision in the geometric 3D work points, the design team provided a 3D model to the steel fabricator and skylight contractor, who then collaborated with each other during fabrication and installation. The Nasher Museum of Art was one of the first projects completed by Rafael Viñoly Architects to use 3D modeling in this fashion during the construction process.

In terms of erection, the five tapered box beams that comprise the primary structure were installed on-site with the aid of hydraulic jacks. Once all five beams were in place, the jacks were removed to test the deflection of the roof structure; subsequently, the jacks were replaced, the secondary structure and glass roof were installed, and then the jacks were removed a final time, and the structure

was allowed to support itself once more. In all, the roof deflected nearly three inches under its own weight, which the construction team took into account when installing the roof glass. This process resulted in a building that conformed to the design standards with remarkable accuracy.

Additionally, load-bearing concrete perimeter walls form the structural system of the individual pavilions, supporting steel frame roofs with a clerestory to introduce natural lighting into the galleries in a controlled manner that preserves the artwork displayed there.

Painted Pictures, Painted Steel

The atrium steel is coated with a light shade of intumescent paint, creating an exposed framework that is eye-catching and at the same time blends in with the rest of the atrium and its visual elements.

The exposed steel was blasted and then given a protective coating: a two-component, moisture-cured, organic zinc polyurethane prime coat with a zinc content of 87% minimum by weight in dry film, meeting requirements of SSPC PS 12.01; a two-component epoxy polyamide intermediate coat; and a two-component, high-build acrylic polyurethane enamel, semi-gloss sheen finish coat. Intumescent paint from Carboline was used for fire protection on the roof structure.

Behind the Scenes (and in the Beams)

In addition to unifying the separate pavilions around one interior space and providing a sense of transition between the galleries, this seemingly complex, yet deceptively simple, network of structural supports also conceals the building services. Electrical conduit runs and sprinkler lines are hidden from view on top of the box beams, and rain gutters are positioned in the seams between the roof purlins. The box beams also provide air distribution to the atrium via vertical slots along their sides; the beams are actually part of the HVAC system.

Spatially and Visually Engaging

With pavilions and high-quality gallery space deployed radially along the contour lines of the sloping site, and with a flexible atrium area that allows visitors to engage with nature and allays museum fatigue, the Nasher Museum of Art creates a memorable and logical architectural experience that foregrounds the arts and forms a focal point on campus. It serves as the center of cultural life for both the university and the Raleigh and Durham communities, with flexible space that can be adapted for a variety of uses.

The pavilion structure yields the additional advantage of addressing the likely issue of future expansion, as additional rooms can be easily accommodated in the pavilion plan without compromising the integrity of the overall design. MSC

David Rolland is Rafael Viñoly Architects' project director for the Nasher Museum project, and Carl Yost is the firm's architectural writer.

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