Reiman Gardens Conservatory Complex

Ames, IA

All photographs courtesy Assassi Productions.

Reiman Gardens Conservatory Complex is a signature architectural statement for the main entrance of Iowa State University. The mission was to create an exciting addition to an existing botanical garden. The new complex offers entomology and horticulture education to the staff, students, and the general public, while providing an entertaining experience. The University anticipates that that the new complex will draw visitors from across the state and the entire region.

A linear circulation spine ties the complex together like a main street: the restaurant, gift shop, Emerging Pupae display, and Learning Center. At the beginning and end of this street are two highlights—the Exotic Butterfly Flight House and the Conservatory. These are steel and glass greenhouses for plant displays which rotate on a three-month cycle.

In structure, the Flight House communicates its function with a delicate steel-and-glass form that emulates flight. The butterfly-shaped structure rests on two tapered piers, one concrete and one plate steel. Plate-steel thickness was limited to ½" to allow cutting by a local fabricator's plasma cutter. The butterfly is composed of one large triangular truss and smaller steel pipe trusses. Support for curtainwall, sprinkler piping, and exterior gutters are integrated into the exposed galvanized steel structure, creating a unified whole.

There is no diagonal bracing in the walls, but lateral forces at the roof are resisted by a steel-HSS-grid diaphragm and perimeter tension ring. The diaphragm is created by shop-fabricating small X-shaped sections of 1.5" by 1.5" round HSS with slots at each end. These slots drop onto smaller X-shaped connection plates built into the top chord of the trusses. The perimeter tension ring is also a 1.5" by 1.5" HSS, completing the 1.5"-thick diaphragm. Lateral forces (including torsion) are directed through the roof to the piers. Out-of-plane forces due to the folded-plate shape are resis-

Juror Comment

"Elegant, light steel structure emphasizing glass panels."

Owner
Iowa State University, Ames, IA

Architect
Architects Smith Metzger, Des Moines

Structural Engineer
Charles Saul Engineering, Des Moines

General Contractor
Story Construction, Ames, IA

Engineering Software
RISA 3-D

Detailing Software
AutoCAD

ted by the strong axis of the small trusses. Top-chord compression forces in the large truss cantilever through the truss depth and connect into the top of the piers. Connections of the small trusses to columns are designed to "disappear" by slotting the pipe columns into the truss webs.

The Conservatory structure is composed of small E-W pipe trusses and larger N-S pipe trusses. The structure steps down the existing grade by using the V-shaped small trusses, which are top-chord bearing at one end and bottom-chord bearing at the other. These rest on larger trusses with arched bottom chords, spanning from pier to pier. The arch creates a thinner section of truss at mid-span which seems counter-intuitive. However, this does give a lighter feel as the trusses "spring" from support to support. Stabilization of the smaller bottom-chord bearing trusses is hidden above the major trusses in the perpendicular directions, and aligns with the glass-roof supports. Galvanized steel sprinkler pipes, automated windows, automated shading, and steel cross-bracing are integrated into the roof structure. Shorter concrete piers and tall, tapered plate-steel columns resist lateral forces, eliminating the need for vertical cross bracing.

Considerable field welding and touch-up with a cold galvanizing compound performed well in the humid greenhouse environment. Small construction-related scratches in the surface of some members have exhibited minor rusting, but not at the connections. ★