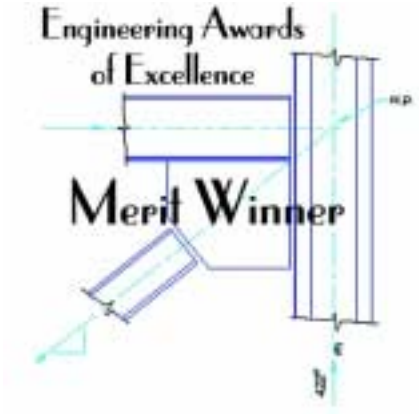

Hawaii Convention Center

Honolulu, Hawaii

The $200 million, 1.1-million-sq.-ft. Hawaii Convention Center in Honolulu encompasses all the elements of a tropical paradise. The imagery of palm trees, sails, sunlight, warm breezes, waterfalls, and exotic flora can all be found within the design of the convention center.

Completed in October 1997, the facility was on budget and 1 month ahead of schedule. The center is expected to attract 400,000 additional visitors to Hawaii each year, generating $3.5 billion in new annual tourist expenditures and $178 million in new tax revenues.

A one-of-a-kind convention facility in a one-of-a-kind place, the Hawaii Convention Center captures the friendly and exciting spirit of "Aloha."

An international competition with world-class participants was the method used to solicit designs for the facility. The four

Jurors' Comments

"An outstanding design, especially given the site and loading constraints. This structure is a work of art—from the design complexity to the detailing and fabrication."

"A very innovative design with ground level convention space. The development of a supertruss helped create a very efficient structural system."

"The development of special software was critical in the design of these unique connections."

competing teams faced a very challenging building program:

- The owner's program did not fit on the site without stacking the functions on many levels.
- The water table was just 4' below grade.
- The potential existed for flooding hydrostatic pressure.
- The soil was deep, soft lagoonal deposits.
- The design, permitting, and construction time totaled only 750 days.
- The construction site was a very tight urban block located directly on the busiest intersection in Hawaii.
- The contractor had to guarantee the price based on only the competition submittal drawings, which had to be completely developed in just a little over two months.

The winning design was the only one submitted that was able to have setbacks and terraces, due, in large part, to the struc-

tural system developed. It was also the only competition entry that achieved a ground-floor exhibition hall and provided ideal structural modules for each usage area.

A three-dimensional "super-truss" structural system reduced building height by 50' and allowed the terracing and setbacks. A double-pitched Hawaiian roof, architecturally exposed steel "tree" columns, fabric rooftop "sails," tapa-patterned concourse roof framing, and an underground utility corridor are other unique structural elements incorporated into the successful design.

Innovative Techniques

The structural system was key to the design's choice for this project. It allowed the development of a terraced structure capped with a native double-pitched roof, instead of the tall, imposing, boxy solutions proposed by other teams.

Another key was the use of "super-trusses." In normal building design, rooms requiring wider column spacing are typically stacked above rooms with tighter column spacing. For a convention center, that typically means locating the exhibition hall above meeting rooms and parking—essentially the design proposed by the other competing teams. This may be best for the structure, but an on-grade exhibition hall works best for facility operations and was accomplished through the development of a "super-truss" system. The Hawaii system consists of two-story-deep trusses at 90' on center with perpendicular single-story-deep trusses suspended below at 55' on center. This solution:

- Captures otherwise-unusable interstitial truss space for parking and meeting rooms;
- Reduces building height by 50';
- Allows the exhibition hall to be located on the ground-floor;
- Provides ideal structural modules for each usage area, with 90' x 118' column-free spans in

the exhibition hall, 55' column-free parking bays, and 90' x 330' of column-free space for meeting areas.

A major architectural feature are 14 exposed steel tree columns rising up to 108' in the lobby area and echoing the mature palm trees planted alongside and soaring to a lobby "sky" of sails and light. The columns appear visually free-standing, yet support the tallest tension glass wall system in the Western Hemisphere. Columns were designed to allow pre-fabrication in large, easily erectable pieces. To preserve the architectural expression of the trees, they were filled with reinforced concrete. This step met fire code requirements without unsightly fireproofing and costly cladding. A king post truss system atop each tree serves triple duty - supporting the skylight roof, offering stability against the wind, and providing stiffness for the glass system. The lobby is light, dramatic, and open to the elements; in fact, the skylights and sails were oriented to minimize the amount of wind-driven rain brought in with the trade winds. The complex geometry of the roof sails was developed using soap film models.

Futre Vertical Expansion

The structure design not only provides optimum facility configuration, it also allows for easy and economical vertical expansion, stacking future areas on the existing top level. Expansion is accomplished by simply adding new two-story space-capturing trusses onto the existing two-story trusses. These super-economical add-on trusses will provide 100,000 additional square feet of interstitial meeting rooms with 100,000 additional square feet of exhibit space above.

Because the project was bid under a design/build contract, the contractor had to commit to costs with only competition drawings, leaving the design team to face the challenge of meeting owner requirements while working within predetermined financial commitments on this $200 million project.

Finally, the schedule allowed only 750 working days for design, permitting, and construction of a $200 million, 1.1-million-square-foot facility.

Despite the tight schedule, the facility was turned over one month ahead of schedule and on-budget.

Project Team

Owner:
State of Hawaii

Structural Engineer:
Skilling Ward Magnusson Barkshire Inc., Seattle, Washington

Architect:
LMN Architects (Seattle), in association with Wimberly Allison Tong & Goo (Honolulu)

General Contractor:
Nordic/PCL, A Joint Venture, Bellevue, Washington

Steel Fabricator:
Canron Construction Corp. (Vancouver, BC and Portland) and Herrick Corporation (Pleasanton, CA)