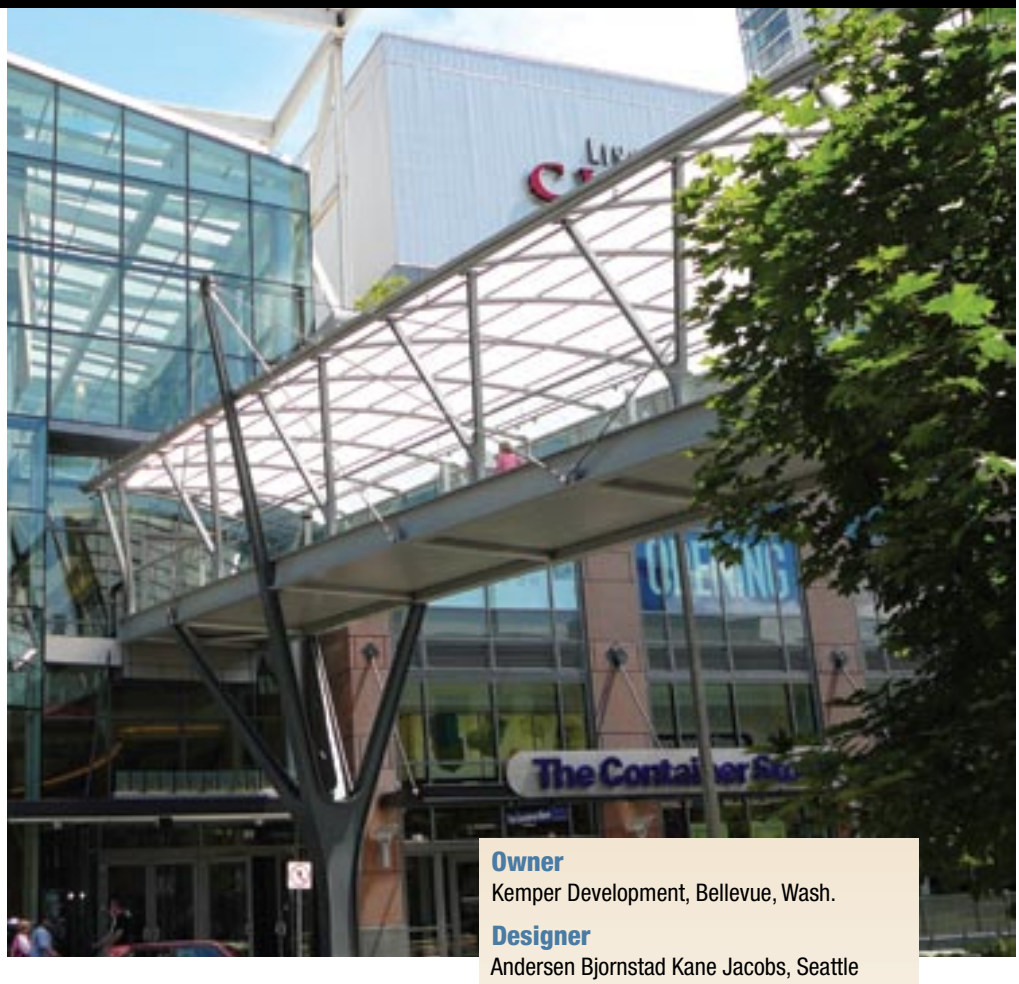
MERIT AWARDS

SPECIAL PURPOSE

Lincoln Square Sky Bridge

Bellevue, Wash.



The lightweight and open, steel-framed and cable-stayed Lincoln Square Bellevue Way Skybridge in Bellevue, Wash. provides access between Lincoln Square, a new mixed-use facility, and the existing 35-acre shopping center at Bellevue Square. The 11-ft-wide bridge has a trapezoidal shape to provide protection from strong southerly winds and is skewed across the 107-ft span.

The technical challenge for the skybridge structural design was to achieve a thin bridge deck profile that was comfortable for pedestrians. This was accomplished with the following engineering innovations:

➜ To utilize structural steel throughout, the architect selected wide-flange shapes for the built-up "tree trunk" columns as well as the bridge girders and built-up Y-columns. These members are fabricated from steel plates and are tapered and curved to emulate a natural tree shape.

➜ Supporting foundations for the skybridge structure are provided by four deep-founded, 18-in.-diameter augercast piles connected to a concrete pile cap located directly below each trunk column. The pile cap and piles also react to lateral seismic forces by pile bending.

➜ The cantilevered trunk columns taper linearly from the 26-in. by 16-in. base to 6 in. by 6 in. at the mast tops using 1½-in. flange plates and double 1¼-in.-thick web plates. Connection to the concrete pile cap is provided by eight 3-in.-diameter A 588 GR 50 anchor rods.

➜ Since the bridge was designed with the Lincoln Square retail level, all longitudinal seismic forces are delivered through the floor diaphragm and steel chords directly to a single floor coupling connection at the east bridge-building interface. The engineering design employed a pin connection, using a single high-strength 2-in.-diameter bolt, to transmit the 52-kip longitudinal seismic bridge force directly to an existing building drag strut.

➜ Using upturned W21×122 floor girders and a 6-in. deep by 16-gauge steel deck with a 3-in. concrete topping slab furnished the necessary bridge mass and stiffness to control foot traffic vibration and movement with help from 16 stainless steel mast cables attached to the bottom of the W21 girders.

➜ Bridge cables consist of twelve 28-mm forestays and four 36-mm backstays, and are ASTM A316 stainless steel cables with custom Ronstan adjustable turnbuckles.

➜ STAAD Pro 3-D dimensional structural modeling was utilized for the entire bridge and support columns above the pile caps.

➜ The cable stays were designed without a pretensioning requirement and were tightened to support partial bridge dead loads plus full live loads, to suit human comfort and for the bridge dynamic response tuning.

➜ Resistance to transverse seismic and wind forces is provided by the Y-column and bridge diagonal roof pipe framing to deliver transverse forces to the horizontal bridge deck diaphragm, with final distribution to the single tree trunk cantilevered columns located near each end of the bridge. MSC

Owner
Kemper Development, Bellevue, Wash.

Designer
Andersen Bjornstad Kane Jacobs, Seattle

Fabricator
Jesse Engineering Company, Tacoma, Wash. (AISC Member)

Detailer
Pacific Northwest Detailing Ltd., Burnaby, B.C., Canada (AISC Member)

General Contractor
Skanska USA Building, Inc., Seattle