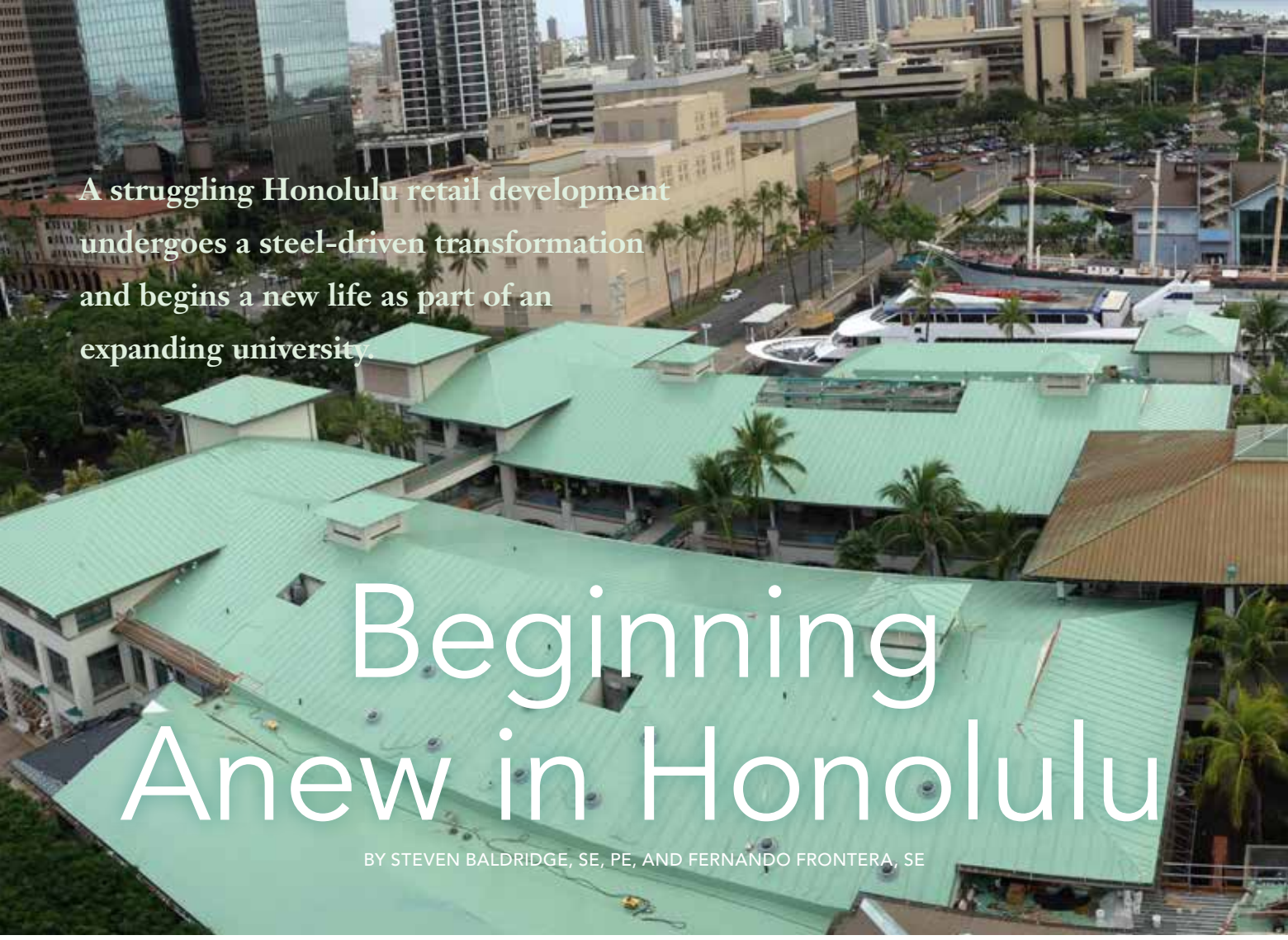

A struggling Honolulu retail development undergoes a steel-driven transformation and begins a new life as part of an expanding university.

Beginning Anew in Honolulu

BY STEVEN BALDRIDGE, SE, PE, AND FERNANDO FRONTERA, SE

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ALOHA TOWER MARKETPLACE, despite a prime location in downtown Honolulu, had fallen on hard times.

The approximately 170,000-sq.-ft, two-story complex was built in 1994 to commercialize Piers 8 through 11 of the downtown section of Honolulu Harbor and its historic landmark Aloha Tower. Constructed on a still-active harbor pier as a waterfront shopping, dining and entertainment destination, the Marketplace had begun to struggle. It was foreclosed on by a lender, multiple owners declared bankruptcy and the number of tenants decreased significantly over the years.

In 2011, a public-private partnership with the State of Hawai'i as landowner and Hawai'i Pacific University (HPU) as owner of the Marketplace's retail buildings allowed HPU to begin a $50 million revitalization plan to convert the facility into a blend of student apartments, campus activity spaces, classrooms, community gathering and public retail and restaurant spaces.

Maximum Exposure

Aloha Tower Marketplace initially consisted of four structural steel-framed buildings interconnected by bridges. The buildings' second floors and mezzanines are made of composite metal deck slabs with wide-flange steel beams, and the sloped roofs are composed of metal decking and wide-flange beams, with all framing supported by structural steel columns. The original construction made use of exposed steel framing to complement the architectural design.

While the overall project was too large to be constructed without fireproofing the steel members, the original concept developed an approach of building separation, with firefighting access on four sides of each building and adequate fire sprinklers throughout that allowed the buildings to be classified as Type II-B. This approach was followed for the renovation, allowing the structural steel and metal decks to be fully exposed and inte-

Swinerton

above: A cool view of the complex's new cool roof.

right: A steel-supported exterior breezeway.


David Franzen

grated into the design, often accented by colorful painting schemes. And despite close proximity to harsh harbor conditions and the potential for corrosion, the steel and metal decking remained in great condition after 25 years in use, thanks to originally being coated with a high-quality marine epoxy.

Exposure was also the rule with new steel in the form of wide-flange steel beams ranging in size from W8×10 to W12×14, HSS10×3×¼ beams and HSS3.5×3.5×¼ columns that were introduced to help support new loft framing and create new interior stairs. In addition, the existing escalators were removed and a new grand stair was built in its place to lead people up to the second-floor gathering areas along the harbor. The stairs consists of exposed steel with C15×33.9 channel stringers and HSS3×3×$^{5}/_{16}$ columns that were integrated into the overall building aesthetic. New steel architectural security gates and canopies constructed with HSS6×6×$^{3}/_{8}$ beams and HSS5×5×$^{5}/_{8}$ columns were all expressed as part of the revitalized design.

The project also required a large new column-free space. A column transfer system using HSS sections was developed allowing the existing interior columns to be easily removed from the space. New 28-ft-long HSS12×4 sections were erected and welded to the sides of the existing interior columns that were removed, as well as to the existing perimeter steel columns that provide support for the transfer beams. Once the HSS sections were installed, the existing interior columns were cut right below the transfer beams. This simple transfer system, which did not require any temporary shoring, was possible in

part due to the lightweight nature of the steel roof and the steel framing's ability to accept new field-welded connections.

Sustainable Design

Repurposing is the ultimate approach to sustainable design—the full recycling of a building for a new use. Ultimately, the adaptability of the existing structural steel frame helped the failing retail complex achieve this goal. Because structural steel was used in the original construction, the second floors of the various buildings offered the flexibility to construct the new lofts for student housing, doubling the number of beds that could be achieved in these spaces. The structural steel provided ample reserve capacity to support the new loft framing, enhanced flexibility for the installation of the new MEP systems, adaptability without requiring major retrofit work and aesthetic expression that complemented the architectural design for the new lofts.

Additional sustainable features included the incorporation of natural ventilation and daylighting into the project. The flexibility of the existing structure allowed the architect to reconfigure original existing narrow interior retail service corridors into wider, two-story, open breezeways to access the new student housing units, allowing the apartments to have operable windows on both sides of the units providing ample cross ventilation. The existing steel deck roof system was also easily modified to accommodate multiple new large solar tubes to bring light into the building. In addition, the existing deteriorating tile roof system was also replaced with a cool metal roof system that allows for greater use of natural ventilation and reduced cooling loads in conditioned spaces.

Prior Knowledge

Renovations are always challenging due to the constraints and unknowns inherent in an existing building. Part of this project's success can be attributed to the adaptability of the project team to conquer unforeseen issues that come up during construction, an approach that included both physically and electronically coordinated information, questions and expedited responses. MEP subcontractors were

Detailed model of an apartment layout.

Group 70 International

David Franzen

New steel canopy and security gate.

Much of the existing space was converted to new student apartments for HPU.

Group 70 International

above: BIM view of an interior breezeway.

below: New transfer girders.

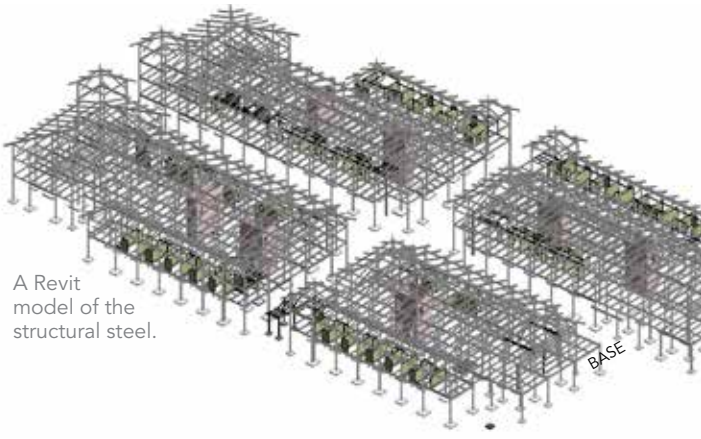
above: Completed breezeway.

above: Steel student apartment stairs being installed...

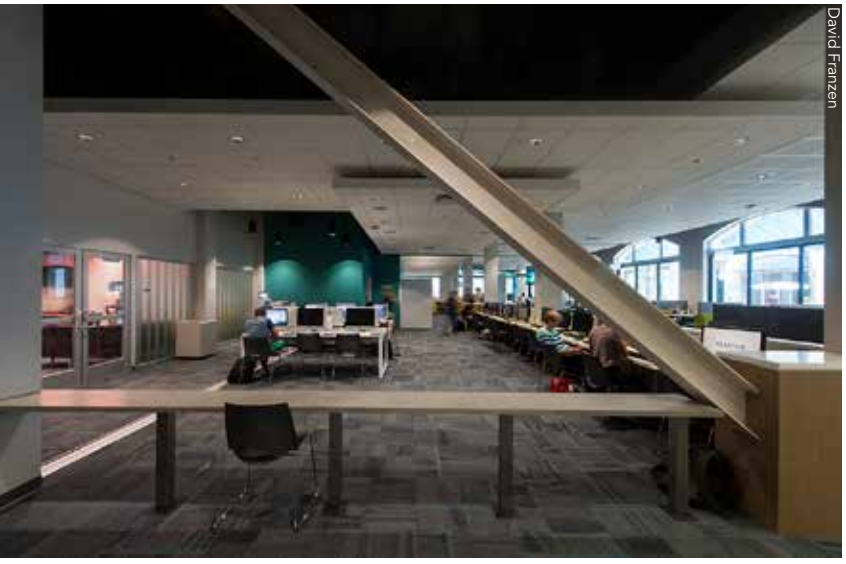
below: ...and in place following project completion.

A completed apartment.

Steel roof framing and supports.



A Revit model of the structural steel.



Exposed steel bracing in the learning commons area.

New steel-supported roof.


BASE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The interior courtyard.


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A view of the Honolulu skyline.

brought in during the pre-construction phase to provide information to HPU and architect G70.

As part of this process, the design team created a 3D model from the original construction drawings to serve as a starting point for renovation documents. This model was shared with general contractor Swinerton Builders, who used laser scanning technology to help verify existing conditions and also leveraged the early integration of the MEP subcontractors to create a merged 3D model using BIM 360 Glue to detect clashes between MEP and existing structural elements. As-built drawings typically show the general concept of what was built but don't always give the team the fine details needed to pre-plan work. But prior MEP planning and coordination helped the subcontractors install work in the right place the first time in order to meet the aggressive construction schedule.

And speaking of which, the project was completed in on time, on budget and with 100% of its contingency remaining—with much of the credit going to the fact that the original framing system and new structural elements were steel. In addition to its transformation into housing for HPU's students, Aloha Tower Marketplace has become a new gathering place featuring event areas, meeting spaces and a variety of restaurants for both students and the community. ■

Owner
Hawai'i Pacific University, Honolulu

General Contractor
Swinerton Builders, Honolulu

Architect
G70, Honolulu

Structural Engineer
BASE, Honolulu

Steel Fabricator and Detailer
ST Fabrication, Inc., Orting, Wash.