

BASE Line

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B A S E

ALL MIXED UP

STRUCTURAL CHALLENGES OF MIXED-USE PROJECTS

Project economic viability often requires a diversification of different uses. It is not uncommon these days to see office, hotel, residential, and retail components mixed into large projects. These uses also require sufficient parking and access to urban transit infrastructure to work successfully.

The challenge of melding different uses is that each has an optimal and unique structural grid and MEP layout. Once different uses are stacked vertically, the transitions between structural grids/systems must be efficiently addressed. From a structural standpoint transitions may be accommodated by creative solutions such as sloped columns, stepped shear walls, transfer girders, long span truss systems, etc., with each solution having distinct design challenges and cost impacts.

KEAUHOU PLACE, HONOLULU, HI

Located in the booming Kaka'ako district of Honolulu, this nearly four acre, large city block is split between two developers: Gerding Edlen (GE) on the east third and Stanford Carr Development (SCD) on the west two-thirds. SCD's project, which BASE was structural engineer of record, includes a 400-ft., 388-unit residential tower and 35 townhomes. GE's project includes mid-rise rental apartments and commercial space. The entire development will provide access to the future HART rail station.

The different uses in SCD's project requires three unique structural systems. The tower structure utilizes post-tensioned flat plate construction to meet stringent height restrictions. The parking structure employs an efficient garage beam forming system with 60-ft. spans, optimizing the number of parking stalls and providing better access. The townhomes surround and visually screen the parking structure and use low-rise cold-formed steel construction to provide an economical structural system.



WAVE METRO MART, NOIDA, INDIA

The Wave Metro Mart, Parcel 3L, includes a total of 4 million square feet of space including:

- 45-story, 575-ft. tall office tower
- 33-story, 450-ft. tall residential tower
- Three floors of retail space
- Four floors of parking above retail
- Four floors of basement parking

In addition to the retail and parking levels, the podium also contains vertical circulation from the basement transit parking to a multi-level pedestrian bridge that connects directly to the adjacent metro station.



THE RITZ-CARLTON RESIDENCES WAIKIKI BEACH HONOLULU, HI

The largest new resort development in Waikiki in recent times, this project includes approximately 900,000 SF in two complementary 37-story towers, each 350 ft. tall. The towers are joined by an expansive 500-ft. long landscaped podium at the 8th floor.

The joint development project and unique site was encumbered by numerous easements, extensive access to loading zones for adjacent retail space and an underground electric utility power station.

A 120-ft. long concrete transfer truss and “W” column (shown below right and left, respectively) were required to provide vehicle maneuvering access.



WAVE ONE, NOIDA, INDIA

The 600-ft. tall Wave One project has 2.6 million square feet of space. 23 floors of office sit atop a 17-story podium that has seven levels of parking over large cinema spaces, a food court floor, and three levels of retail. Three basement levels include additional parking and retail space.

One of the biggest challenges on this project was accommodating large cinema spaces at the 4th and 5th levels. Due to site constraints, the cinemas are located directly under one side of the tower's supporting columns. Two sets of 300-ft. long transfer girders (shown below) are required to maintain column-free cinema space.

