

SOLOMON CORDWELL BUENZ

Modular Construction

About

As modular design solutions become more readily available in the construction industry, designers and manufacturers are working together to develop a multitude of applications across all scales, ranging from full pre-fabricated units to more targeted module elements for facades. Solomon Cordwell Buenz (SCB) is helping clients determine if modular construction is a viable option for projects across the country.

Key to any project considering a form of modular construction is understanding if, and how, this delivery method can provide value to the project; be it reducing building costs, increasing quality control, saving time, reducing environmental impact, or any combination of the above. The most successful projects engage construction, manufacturing, and designers from the start to help find the right solution and work together through the careful planning and coordination required to deliver modular projects.



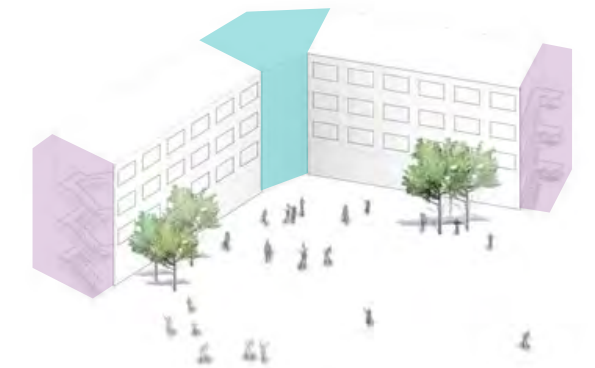
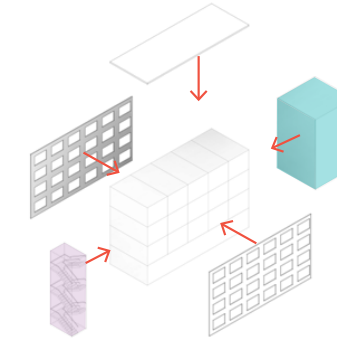
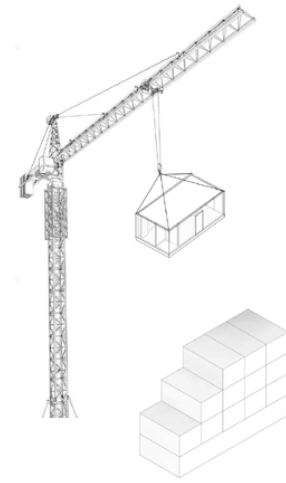
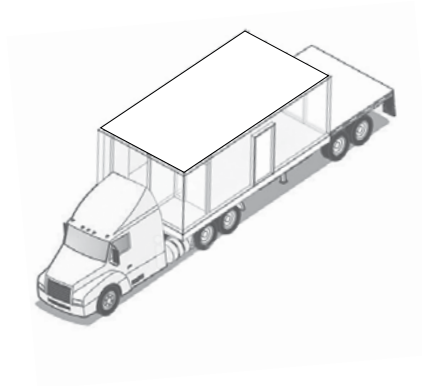
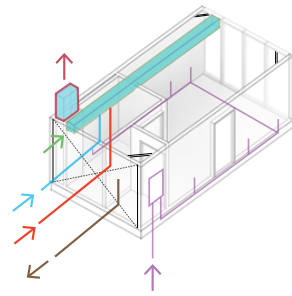
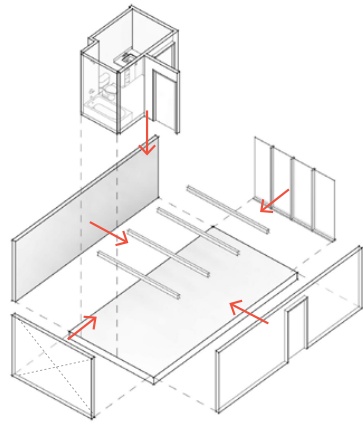
Budget



Schedule



Scale



Design Considerations

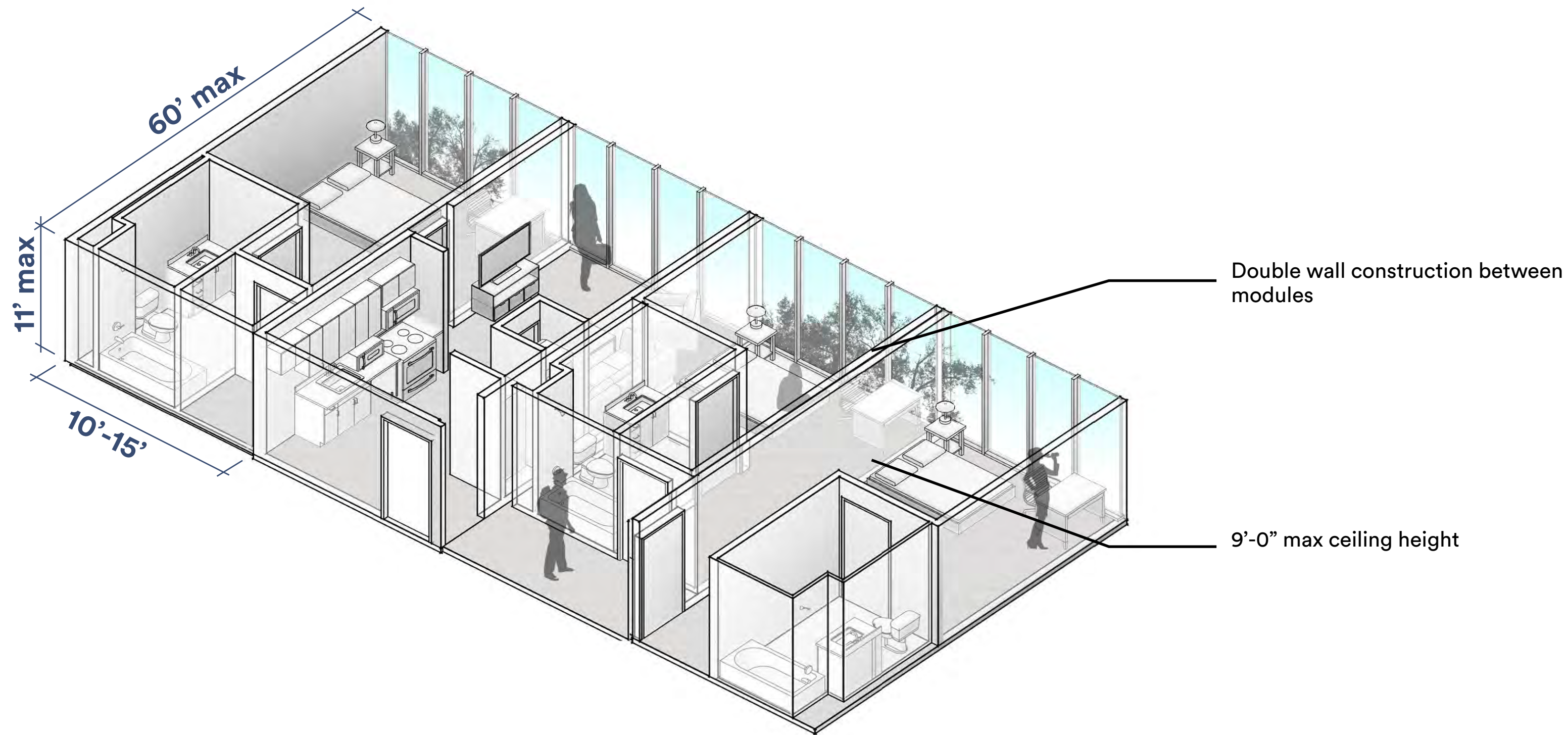
- Limited flexibility in layouts due to rigidity of modules
- Reduced building efficiency
- Requires stacked and repetitive spaces
- Parity between units
- Potential for increased sustainability
- Increased collaboration between disciplines

Construction Considerations

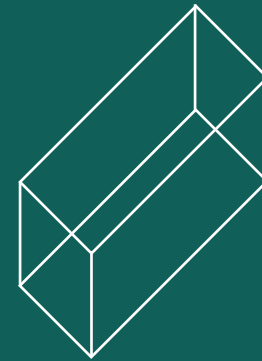
- Tighter construction tolerances
- Quality control/assurance through factory-controlled fabrication
- Prefabricated module size determined by transportation limitations
- Crane size and site logistics
- Building height limited to structural capacity of modules
- Potential for reduction in site waste

Project Management Considerations

- Requires early commitment to GC / Manufacturer
- Minimal changes recommended during CD's and construction
- Construction schedule can be compressed by up to 50%
- Shipping costs dependent on size of modules
- Reduced on-site trade engagement
- Limited number of manufactures and suppliers
- Extensive site coordination between construction and design teams
- AHJ oversight needs to be reviewed



Volumetric Modular Construction



Factory constructed full unit or compartment

- Full finished, stacked volumetric modular units
- Greatest potential for time savings in construction schedule and reduction of construction waste
- Highest level of factory-controlled construction and quality control
- Single point of contact for entirety of units
- Exterior enclosure not included with volumetric units
- Traditionally includes a site built core and foundation
- Module size typically controlled by shipping requirements (11'H - 10-15'W - 60'L)
- Limited to 8-10 stories in height without additional structural support



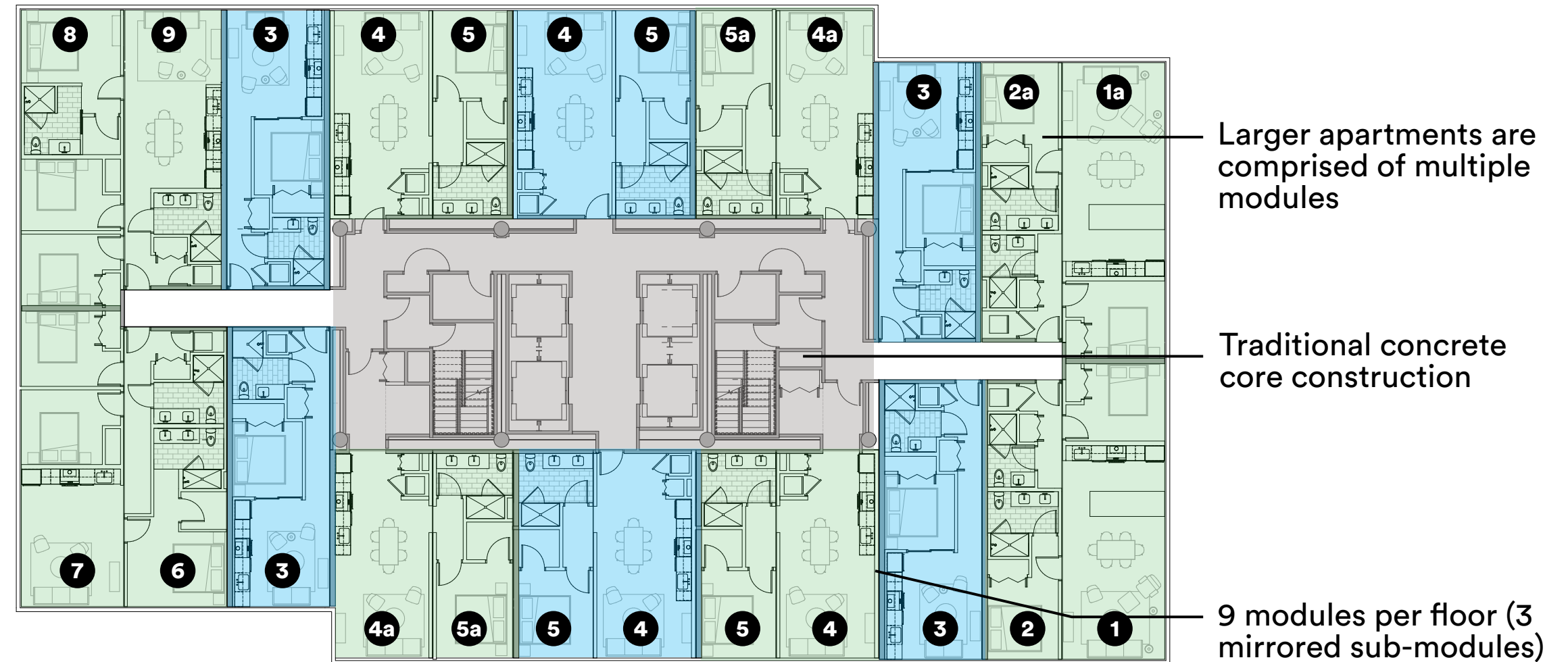
469 Stevenson

469 Stevenson was designed to utilize fully volumetric modular construction for its 467 apartment units, along with a traditional concrete core and foundation. Studio units were designed to be installed as a single module, with two- and three-bedroom units comprised of two modules. The shared wall between the modular elements is fully finished, with any door frames or openings finished on-site. In total, nine modules with three mirrored sub-modules, are used to create the 14 units on each typical residential floor.

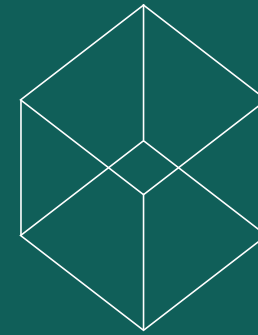
Location
San Francisco, CA

Size
543,000 SF
27 stories

This project has subsequently transitioned back to standard construction methods.

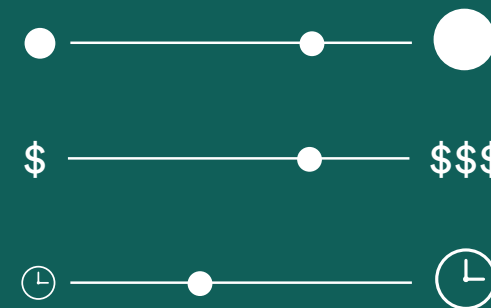


Partial Volumetric Modular Construction



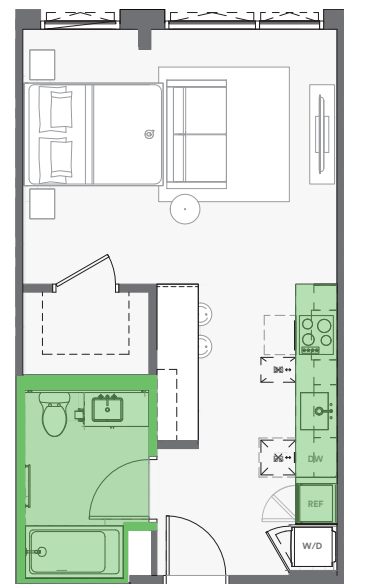
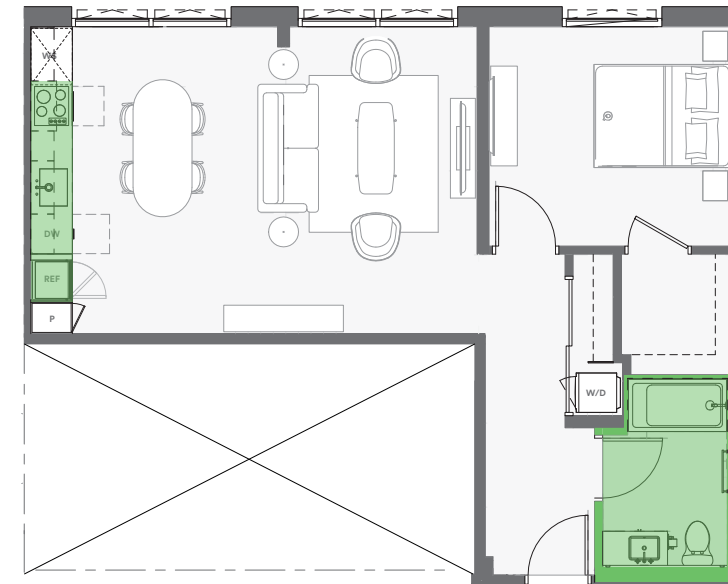
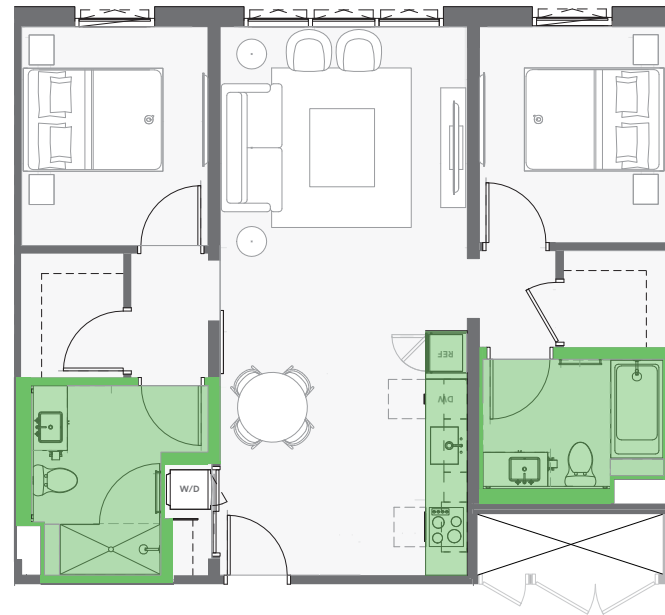
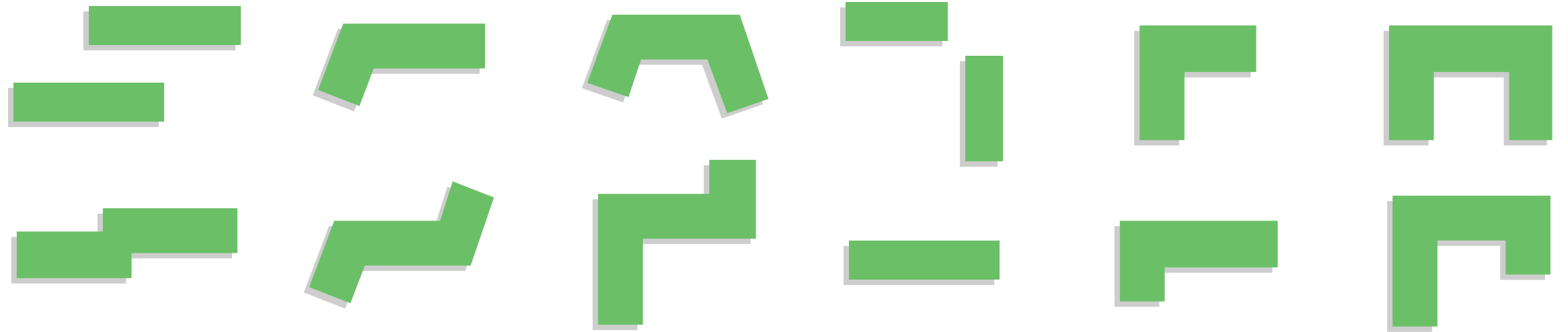
Factory constructed bathrooms or kitchens

- Higher degree of flexibility in floorplans and unit design
- Unit design is not restricted by building module
- Allows for design flexibly within the non-prefabricated spaces, while capitalizing on benefits of modular construction for repetitive spaces
- Similar modules must be identical
- Parity between modular elements



Multifamily Prototypical Unit Design

As part of the firm's ongoing research and development initiatives, SCB has studied and created a series of prototypical residential units that can be utilized across a variety of project scales and construction types; from smaller neighborhood infill projects, to taller, higher-density urban scales. The units are designed to utilize modular kitchens and bathrooms to leverage the consistency and quality control afforded by factory-built components and the construction schedule savings resulting from prefabrication. The rigid, prefabricated bathrooms and kitchens allow a project to capitalize on repetitive program elements while permitting flexibility in the remaining massing and layouts to shift in response to various anticipated site and building constraints.



Panelized Modular Construction



Manufactured panelized structural walls to be assembled on-site

- Typically assembled on a traditional concrete podium
- Floor-to-floor height limitations
- Allows for layout flexibly within the same floor
- Requires majority of walls to stack
- Requires site coordination between trades
- Building height typically limited to 10 stories
- Early design coordination preferred, but not required



Case Study

Coyote Village

Coyote Village is a 407-bed living/learning community for first year students composed of two angular buildings that frame and activate a shared courtyard. The residential floors are organized into 11, 36-bed pods, with each pod composed of 17 double occupancy rooms, two single occupancy rooms, a resident advisor room, dedicated study room, shared living room, and two gender-inclusive community bathrooms.

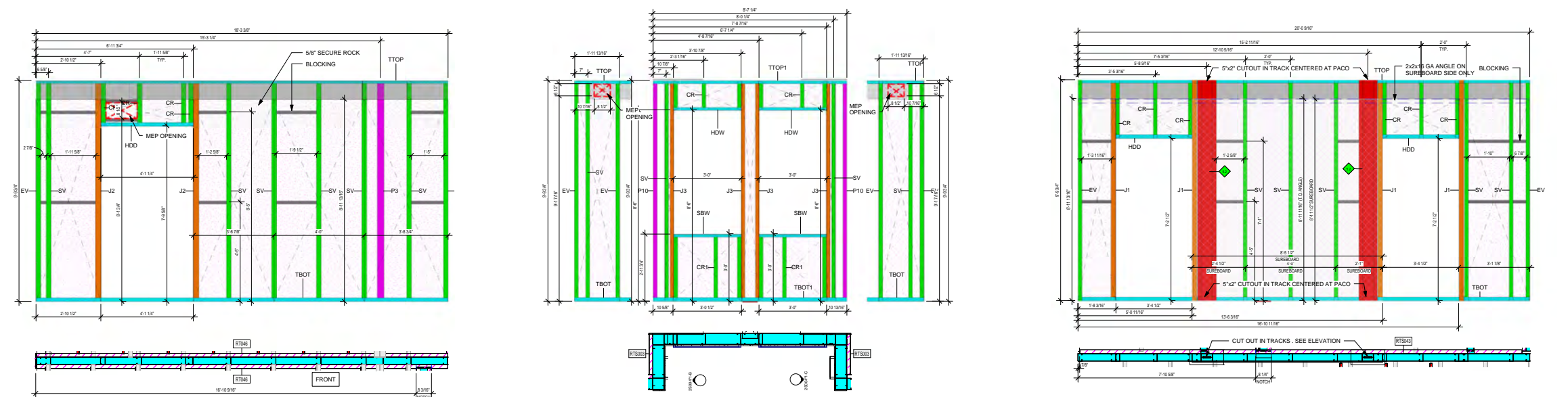
Coyote Village was designed and constructed utilizing cold form metal framing panelized modular construction. Every wall was factory built and fully coordinated with all MEP systems and wall openings, negating the need for on-site coring and drilling. Additionally, all exterior openings came to the site fully framed.



Location
California State University, San Bernadino

Size
114,000 SF
4 stories

Sustainability
LEED Gold



Modular Elements



Factory constructed facade and circulation items

- Cost effective enclosure
- Quality enclosure with economy of scale
- Higher repetition results in more savings
- Decreases construction time for building enclosure
- More consistent exterior envelope
- Available in panelized walls and unitized glazing
- Crane location and site logistics



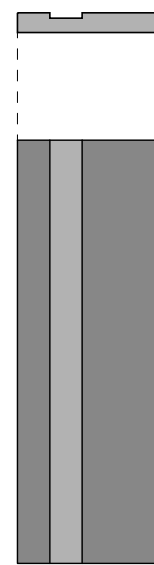
Academic and Residential Complex

The facade of the Academic and Residential Complex (ARC) at the University of Illinois at Chicago was designed using a series of two-story precast panels and unitized window wall system. The design for the distinct pre-cast façade was the result of a highly collaborative and integrated effort between the design and construction teams. Together, they developed three adaptable pre-cast forms that could be manipulated to produce the various panel types that make up the building's contextual façade. Combined, the two modular systems allowed for more streamlined construction, sequencing, and installation, resulting in both cost and time savings. The entire enclosure was assembled on site in under two months.

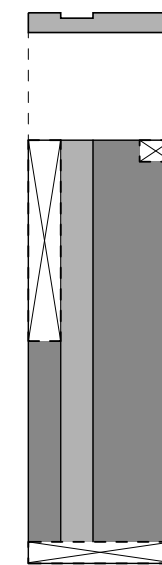
Location
University of Illinois at Chicago

Size
201,000 SF
10 stories

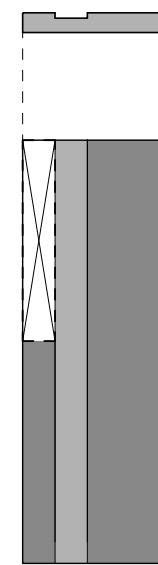
Sustainability
LEED Gold



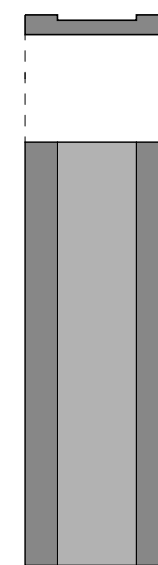
PANEL A



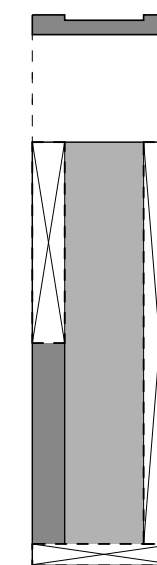
PANEL A - 1



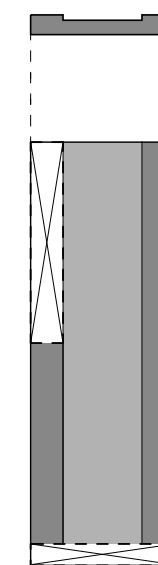
PANEL A - 2



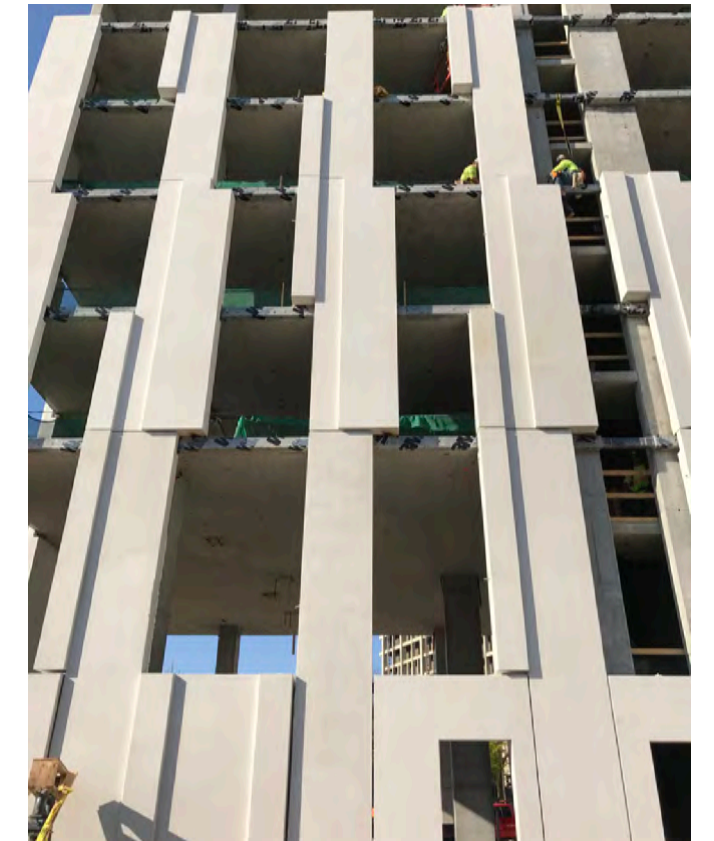
PANEL B



PANEL B - 1



PANEL B - 2



Solomon Cordwell Buenz

Solomon Cordwell Buenz (SCB) is an architecture, interior design, and planning firm with a thoughtful design vision and a dynamic national imprint. Since 1931, SCB has made a lasting visual impact on skylines, campuses, and neighborhoods nationwide. From offices in Chicago, San Francisco, Boston, and Seattle, we offer our expertise to clients across the country, helping them achieve their goals, serve their constituents, and create unique built environments. Our approach is to ask questions, listen, and develop the best design solution for each individual project. We are future-oriented, continually challenging ourselves to design to a higher standard, innovate at every level, and give our clients more as we achieve design excellence.

Architecture
Interior Design
Planning

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