# Modular Architecture

## Getting great design by thinking inside the box.


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*Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.*

# About Lowney Architecture

Offices in
California + Hawaii

45+
Firmwide +
Project Awards


20 Years in
Business

50 Person
Collective
Team


Grocery
Hospitality
Industrial
Mixed-use
Multifamily
Restaurant
Retail

# Modular Expertise

First modular project completed

**2013**

**5,300+**

modular units and keys designed

**50**

completed or active modular projects

**1st**

modular project for The Moxy in the US

**20+**

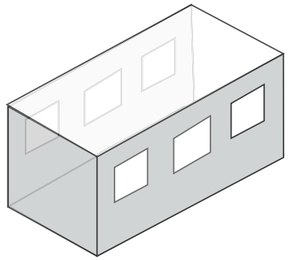
Modular topics presented across the country


# Learning Objectives

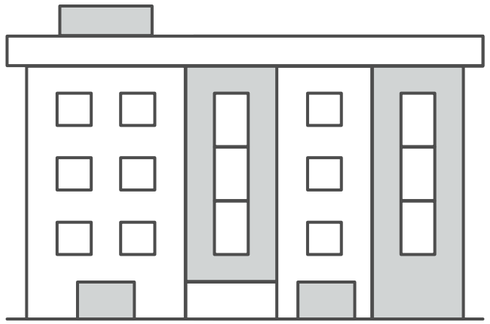
1. How to assess which projects are the best fit for modular.
2. Understand the unique design hurdles and opportunities when designing modular.
3. Identify modular specific details compared to traditional construction.
4. Key Lessons learned for the next project.

# “Thinking Inside the Box”

## Applying known principals, within constraints.

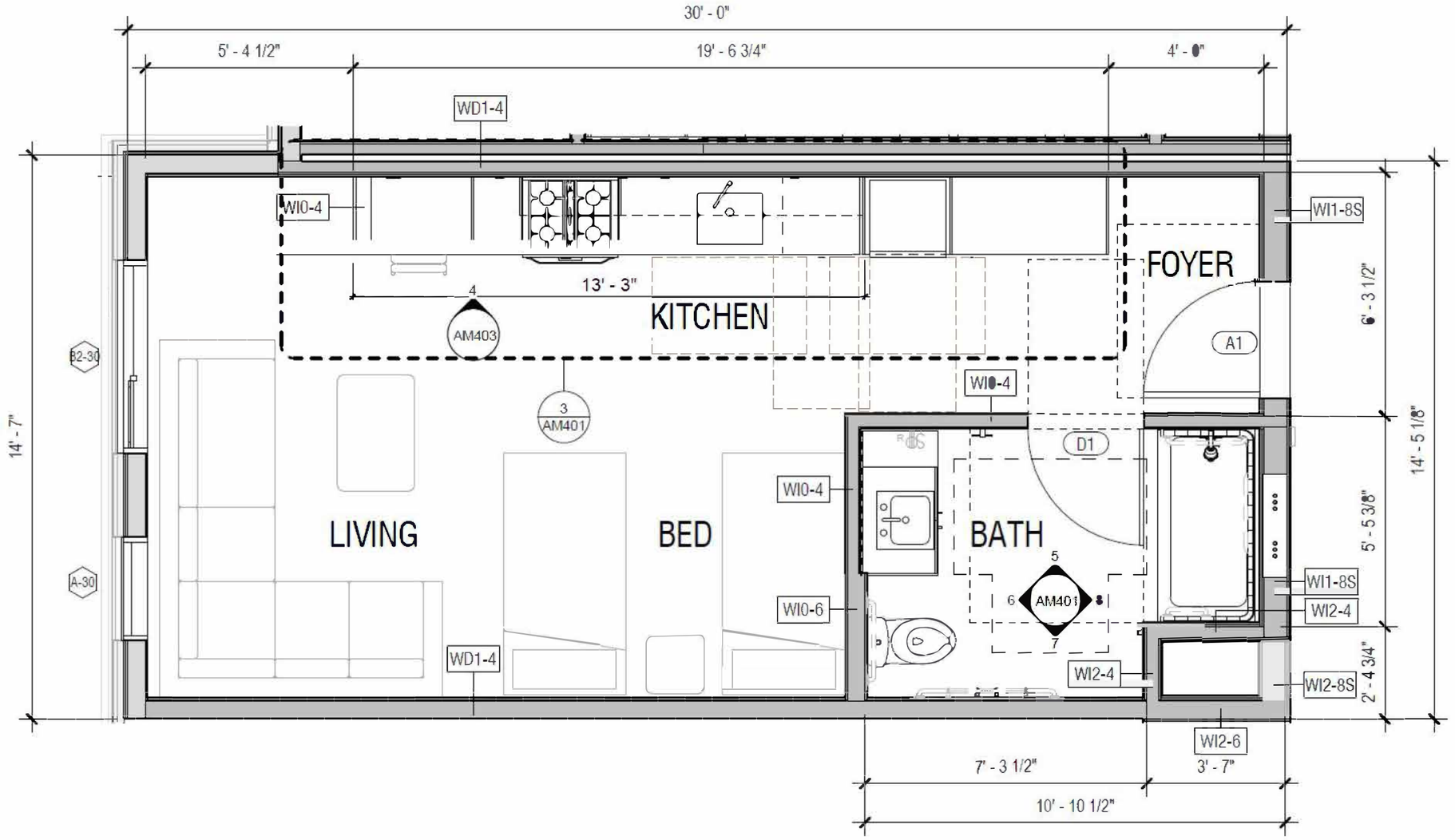


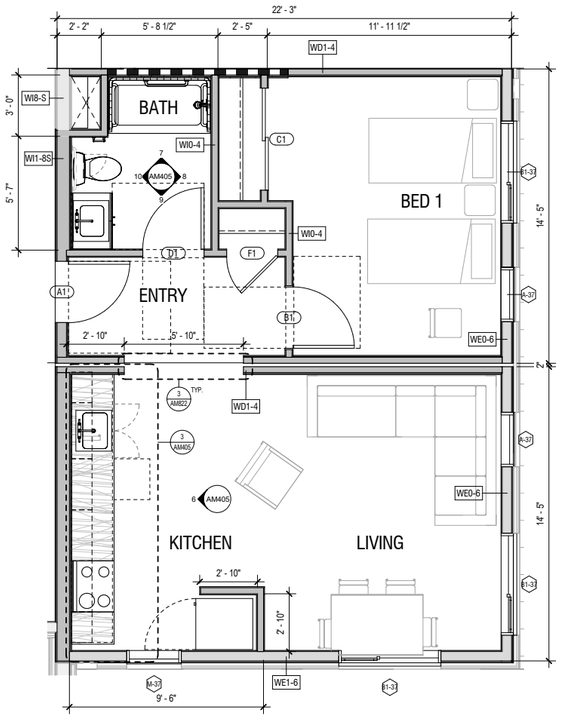
VOLUMETRIC MODULAR
(Wood)

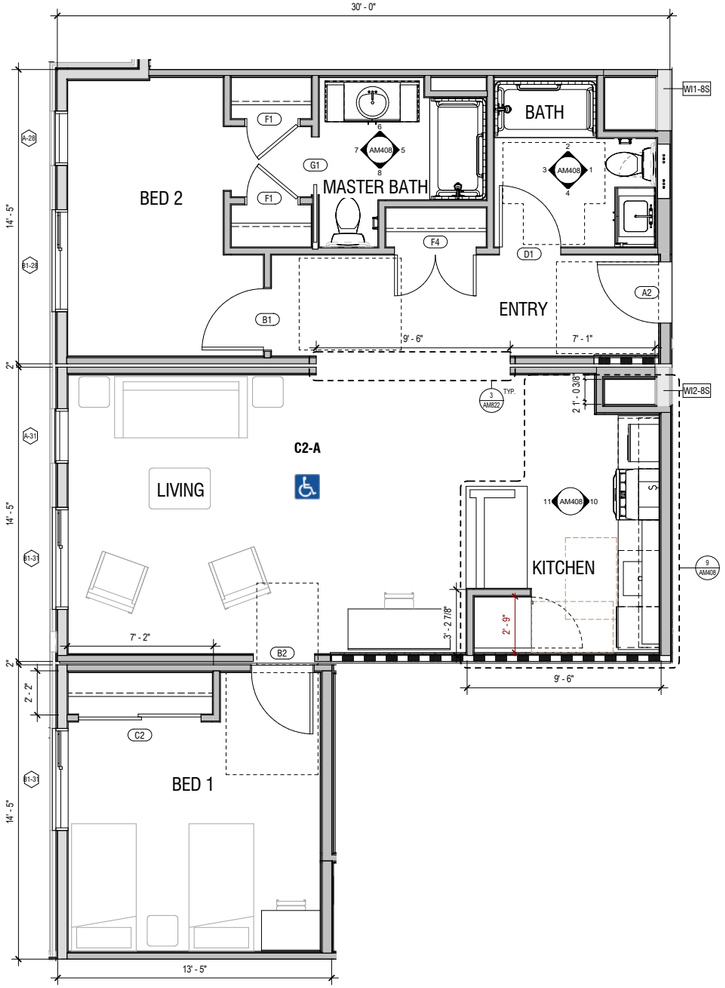


MULTI-STORY BUILDINGS
(10+ units, not ADUs)

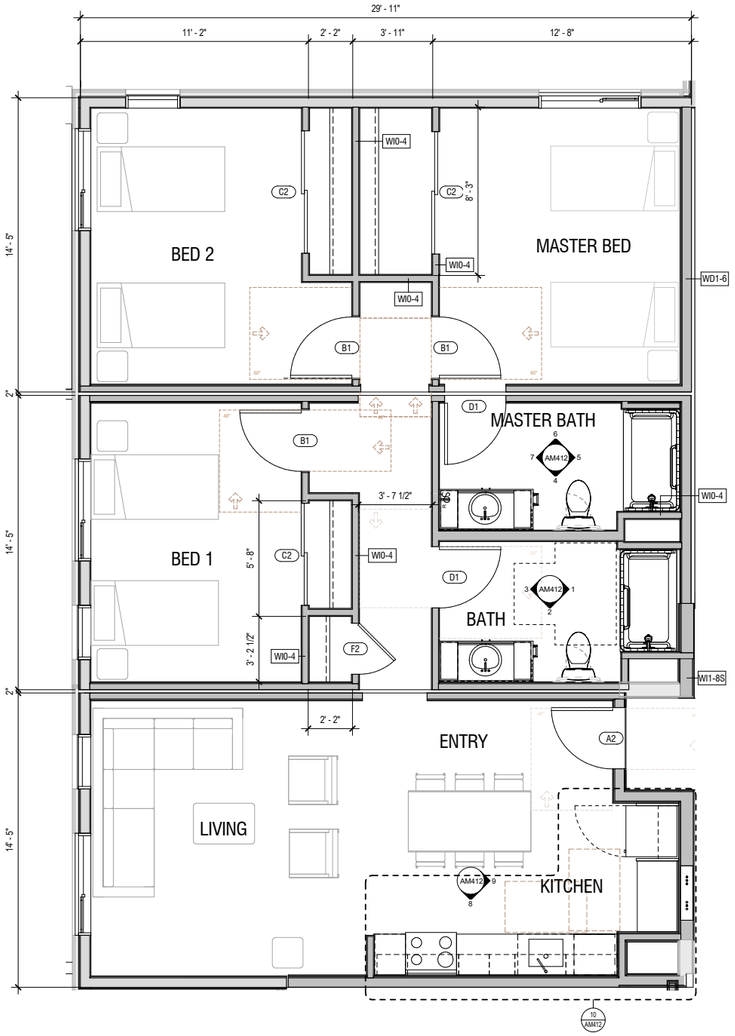
URBAN + SEMI- URBAN SITES
(not rural areas)


30' - 0"
5' - 4 1/2"
19' - 6 3/4"
4' - 0"
WD1-4
WI0-4
WI1-8S
FOYER
13' - 3"
KITCHEN
4
AM403
A1
6' - 3 1/2"
B2-30
3
AM401
WI0-4
D1
14' - 7"
14' - 5 1/8"
WI0-4
LIVING
BED
BATH
5
6
AM401
7
5' - 5 3/8"
A-30
WI0-6
WI1-8S
WI2-4
WD1-4
WI2-4
WI2-8S
2' - 4 3/4"
WI2-6
7' - 3 1/2"
3' - 7"
10' - 10 1/2"




NOTE: SEE SHEET AM406 FOR INTERIOR DIMENSINONS NOT SHOWN HERE




CANNON

# What Projects are Best for Modular?

## Applying known principles, within constraints.

### 1 PROJECT SITE

- Geography + Lot Type (corner lot, through lots)
- Topography
- Zoning Envelope
- Logistics (crane accessibility, trucking accessibility, staging proximity)

### 2 PROJECT PROGRAM

- Unit standardization
- Smaller units
- Floor plate repetition

### 3 PROJECT TEAM

- Experienced designers, contractors, subcontractors
- Ability to make up front, early decision making
- Factory capability and limitations
- Project funding


**AWARDS**
2022 US WoodWorks Wood Design Awards
2022 Modular Building Institute, Permanent Modular Hospitality Project
2021 AIA East Bay Nominee - Mixed Use + Commercial Project

# Moxy Downtown Oakland

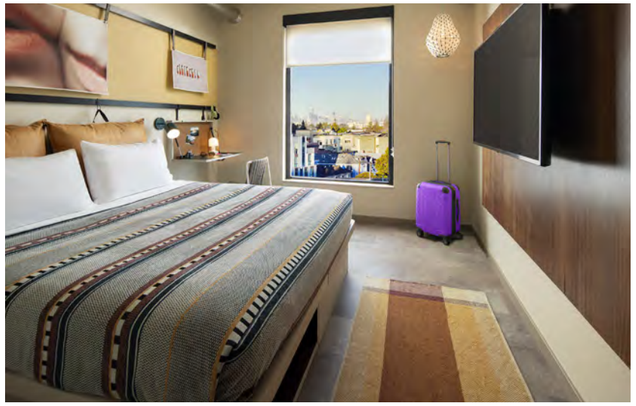
Oakland, CA | 173 keys

# Moxy Downtown Oakland

## Why was this a good contender for Modular?

### PROJECT SITE

- Corner lot
- Crane Accessibility
- Trucking Accessibility
- Staging Proximity



### PROJECT PROGRAM

- 150 King Rooms
- Brand standards allows for it to be more like a “product”
- First floor site built podium for amenity space

### PROJECT TEAM

- Marriott is a proponent for modular.
- Lowney has modular design experience.
- Front end decision making is easy due to brand standards.

# Ideal Sites

## Lot Configurations

### LOT A: THROUGH LOTS

Interior lots with two street frontages

Lot Width: Minimum = 78’ : Ideal = 88’

Lot Depth: Minimum = 185’ : Ideal = +200’

### LOT B: CORNER LOTS

Corner lots with two street frontages

Lot Width: Minimum = 185’ : Ideal = +200’

Lot Depth: Minimum = 78’ : Ideal = +175’

### LOT C: BLOCK LONG LOTS

Block long lots with three street frontages

Lot Width: Minimum = 200’ : Ideal = +250’

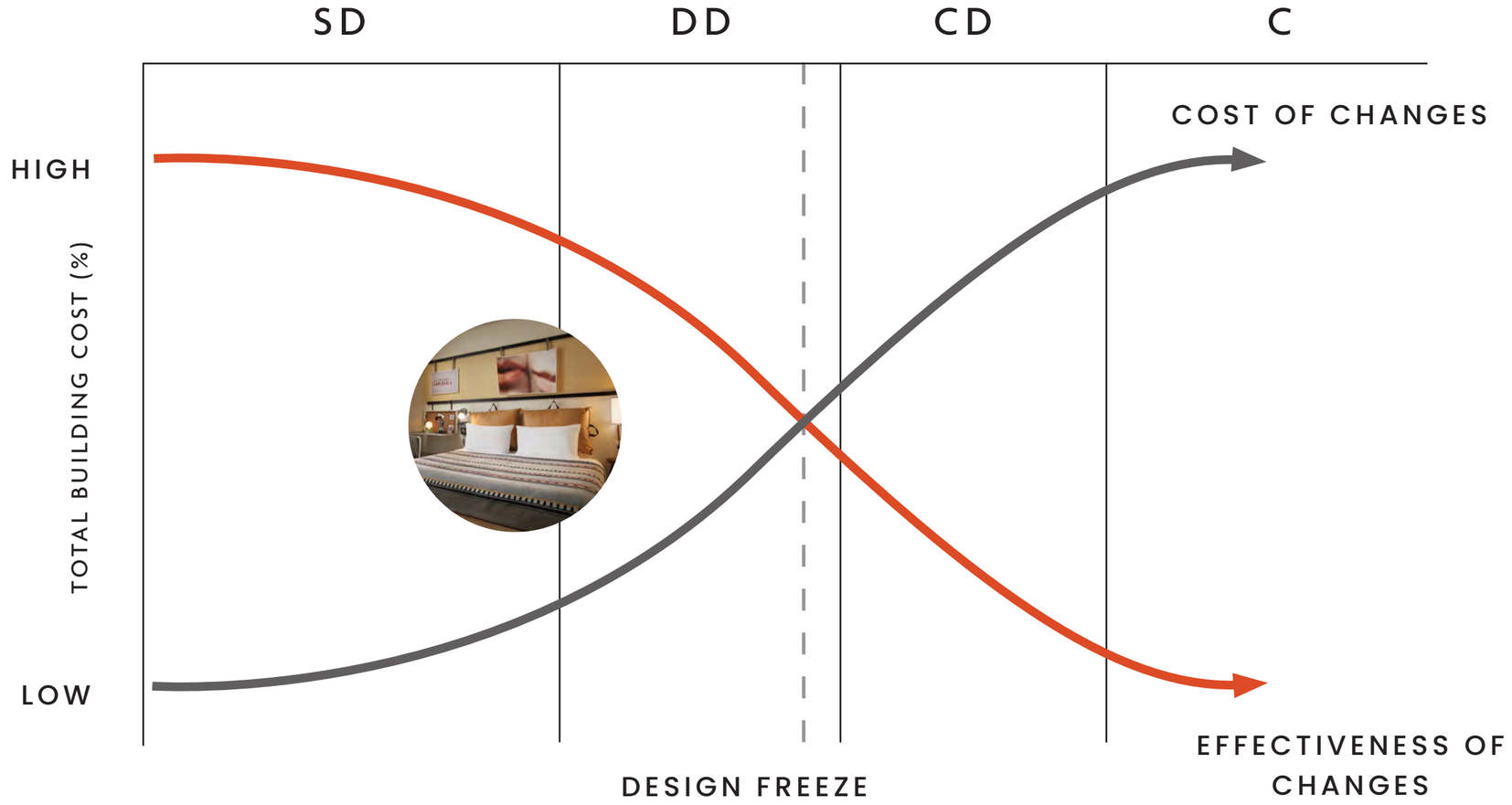
Lot Depth: Minimum = 78’ : Ideal = +181’

# Front Loaded Decision Making

## Design Changes Via Phase

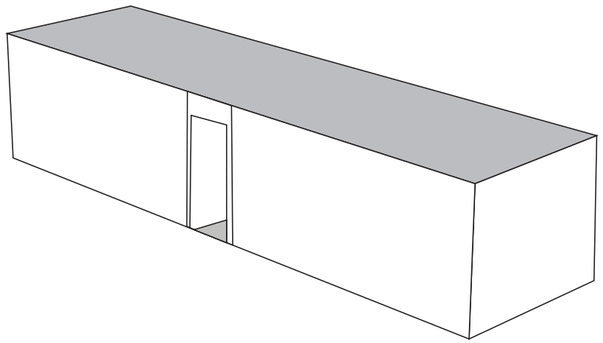
- A defined design ahead of construction is necessary so production can be secured. Because most hoteliers have established design guidelines and a product standard, this often works well.

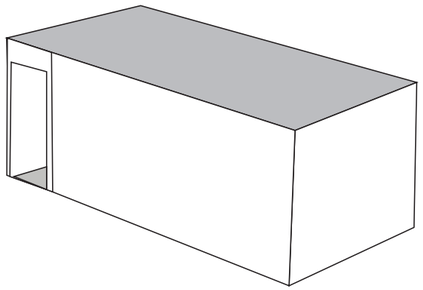
- Since hotels are large, well-known brands, off-site modular construction helps with rolling out a brand standard.

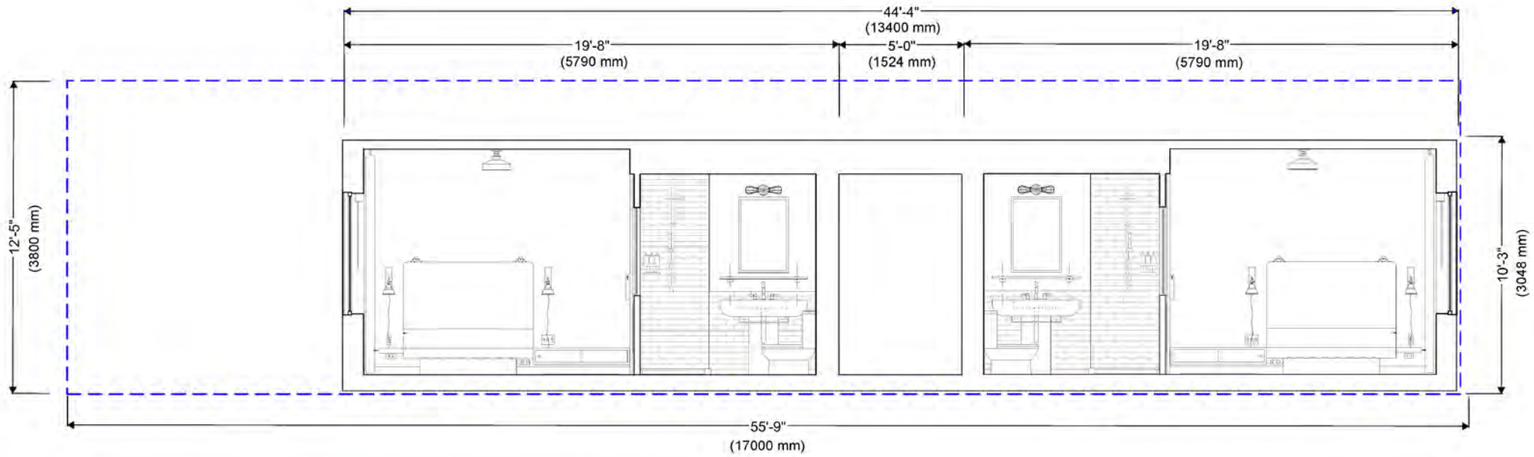


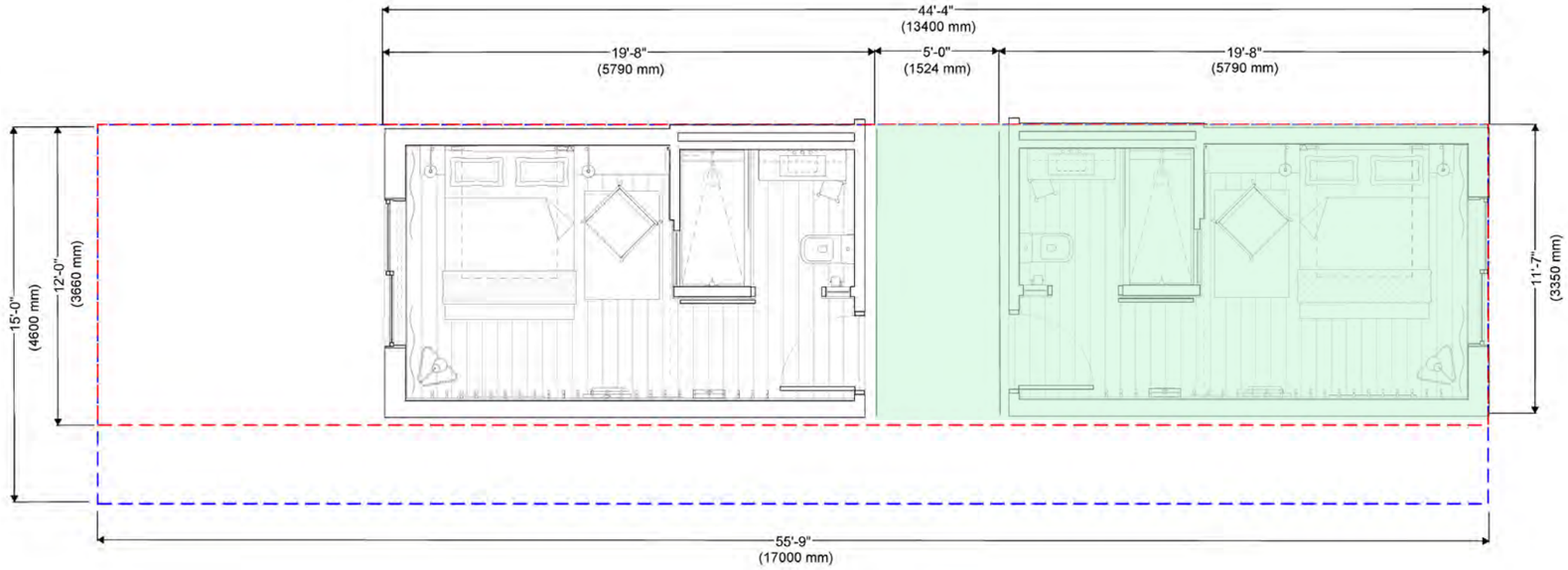
# Hotel Module

## Pair of Rooms





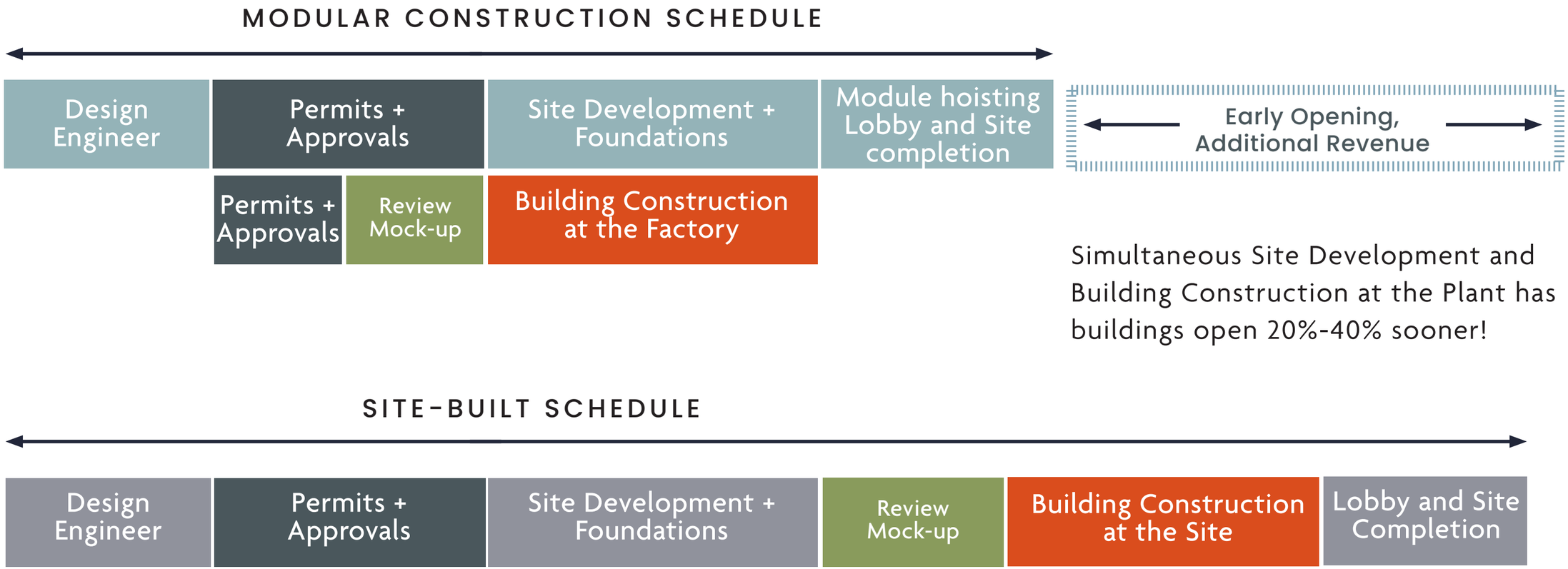


# Project Process

## Modular vs Site-Built

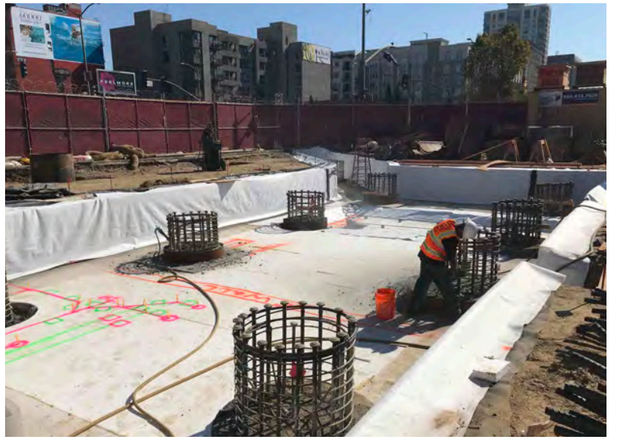
Parallel process (2 separate projects coming together as one) vs serial process.




Simultaneous Site Development and Building Construction at the Plant has buildings open 20%-40% sooner!

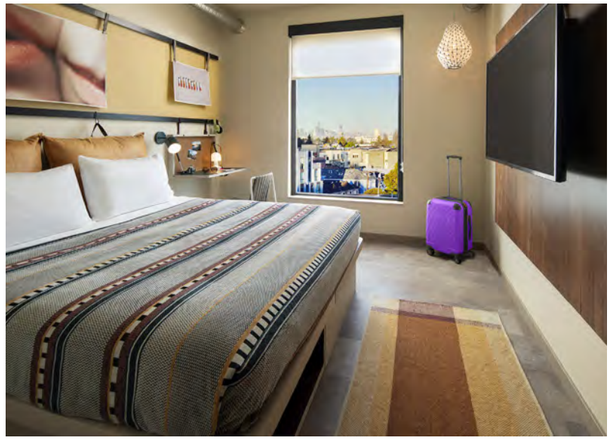
# At the Site...

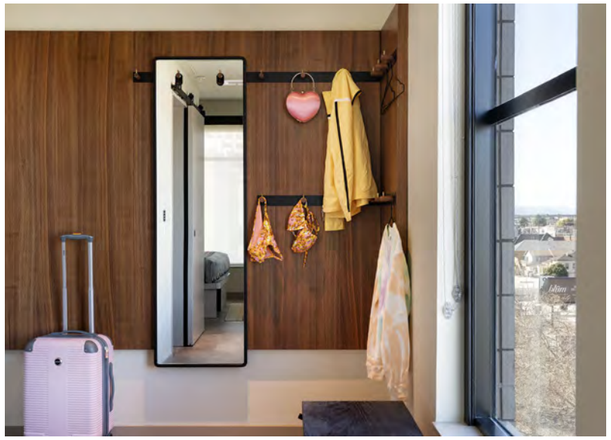
## Foundations, Site Prep



# ...while At the Factory.

## Hotel Keys






## Design Objective

Bring a well known Marriott brand to market quick in a developing neighborhood within the City of Oakland. Maximize unit count yielding 160+ keys.

## Technical Challenges

- Box size vs. factory standard
- Procurement
- Staging
- Parapets
- Coordination between design team and factory

## Outcomes + Solutions

- Factory willing to do smaller boxes
- Some materials installed in field
- Staging locations at Port of Oakland
- Parapets made in factory, shipped as flat packs to site
- Some site work in ADA units

## Lessons Learned

- Use Revit/Navisworks to integrate all points of view
- Procurement needs to be way ahead of the curve
- The shorter the distance from site to staging, the less the costs

# What are the Design Challenges + Opportunities?

## Applying known principals, within constraints.

### 1 A LARGE FLAT BOX

Modular buildings are typically flat for economy and ease of detailing.

### 2 ZONING + PLANNING

The form-based Zoning code required a well-articulated exterior of superior design quality.

### 3 MAXIMIZING DENSITY

For the project to pencil, the developer needed to create a dense building on the site and to deliver it as quickly as possible.

# Mayfair Station

El Cerrito, CA | 223 units


CANNON
HALTON
SKECHERS OUTLET
SKECHERS

# Mayfair Station

## How Did We Address Design Concerns

### NON-STACKING FACADE

Utilizes angles non-repeating exterior wall

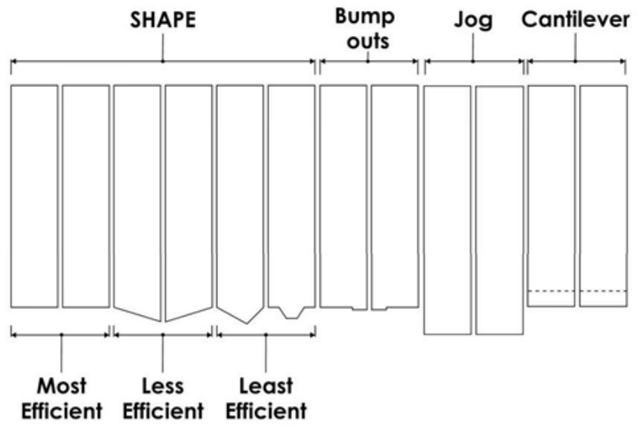
### TWO STORY PODIUM

Two story open portal for amenity space required careful intermingling of site built and modular construction.

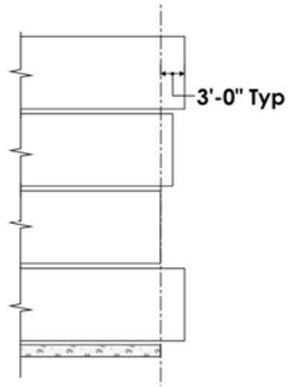
### SINGLE-LOADED CORRIDOR

An “in-between” site in terms of ideal dimensions, but single-loaded corridor fit nicely in particular site consideration - minimizing the acoustic impact of adjoining BART line

# Façade Articulation



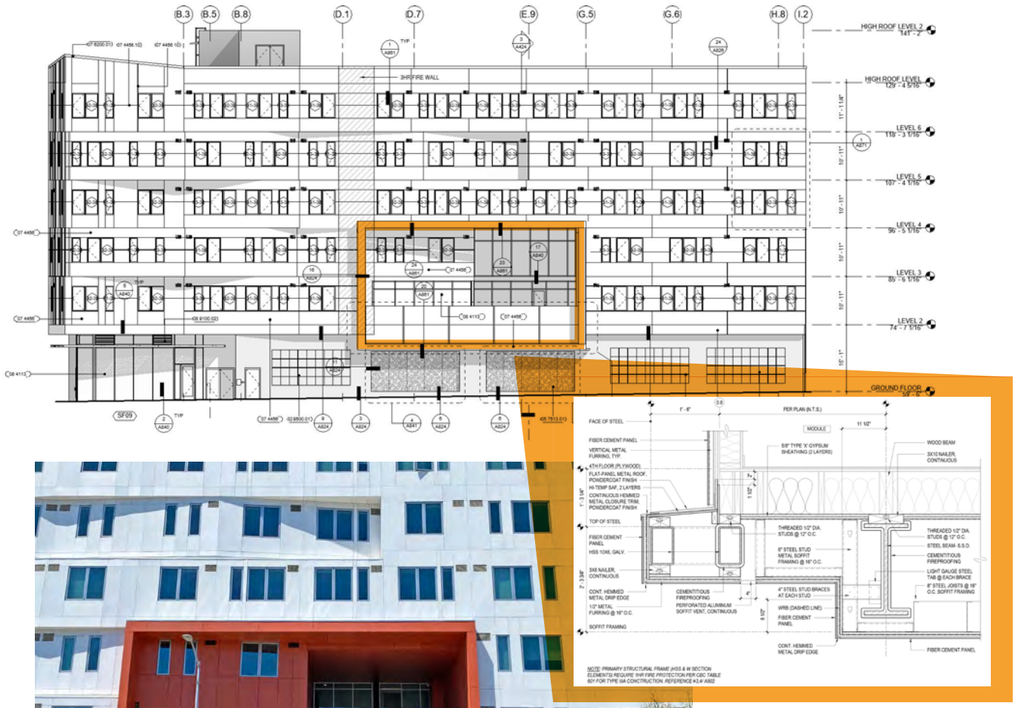

PLAN

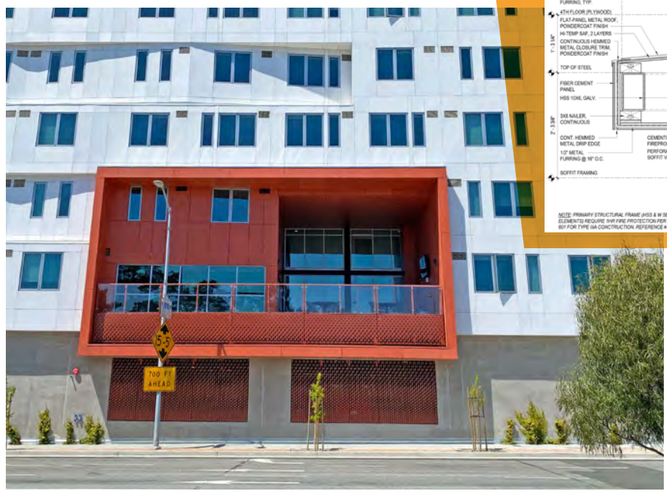



SECTION


MAYFAIR
LEASING OFFICE

# Two-Story Open Portal



# Single-Loaded Corridor

## Design Objective

Maximize density. Avoid a large flat looking building. Utilize design elements which open the project to the public and tie the building to it’s surroundings.

## Technical Challenges

- Facade articulation disrupted the typical shear path, so alternate load paths had to be found inside the building. Additional detailing for tops and bottoms of projecting walls.
- The two-story portal required special structural analysis and additional cost to carry the load of the modules above. Acoustic intensity of adjoining BART line.

## Lessons Learned

- Early work with structural engineer is key to success.
- It is possible to do unconventional modular facades with the following caveats: close coordination with the factory (and early buy in to concept); structural considerations; and additional expense.

# Modular Details vs. Traditional Construction

## Applying known principals, within constraints.

### 1 TALLER BUILDINGS

Each volumetric box comes with both a ceiling and a floor, adding an average of 10” to the floor to floor height.

### 2 WIDTH + LENGTH OF UNITS / BOXES

Shipment constraints limit box widths to 14’-6” x 72’-0” before a highway escort is required ($$)

### 3 UTILITIES TO CORRIDOR

Since plumbing and electrical are installed in the factory, connections should be brought to the corridors so the units/ rooms can remain pristine during on-site construction.

# Jefferson Elementary School District Workforce Housing

Daly City, CA | 56 units

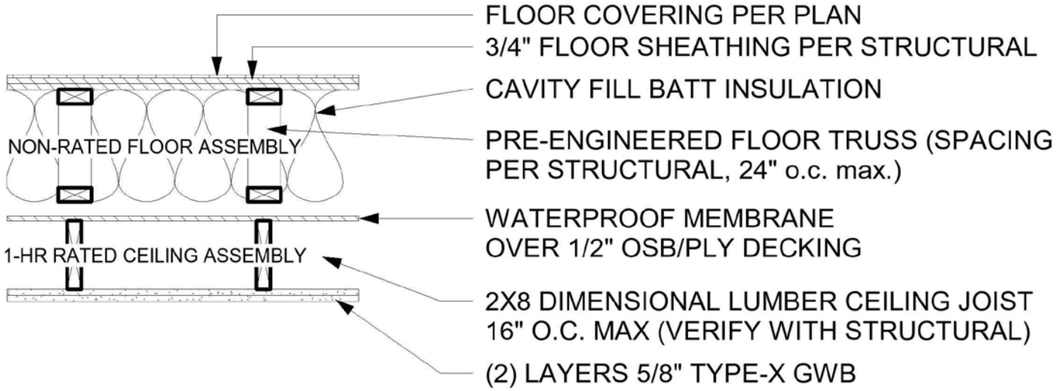
**AWARDS**

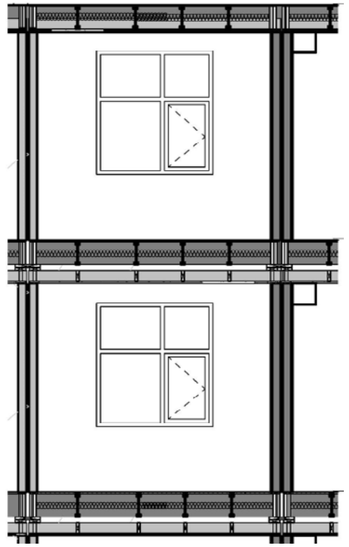
2021 Peninsula Clean Energy All-Electric Leader Award – Innovative Commercial

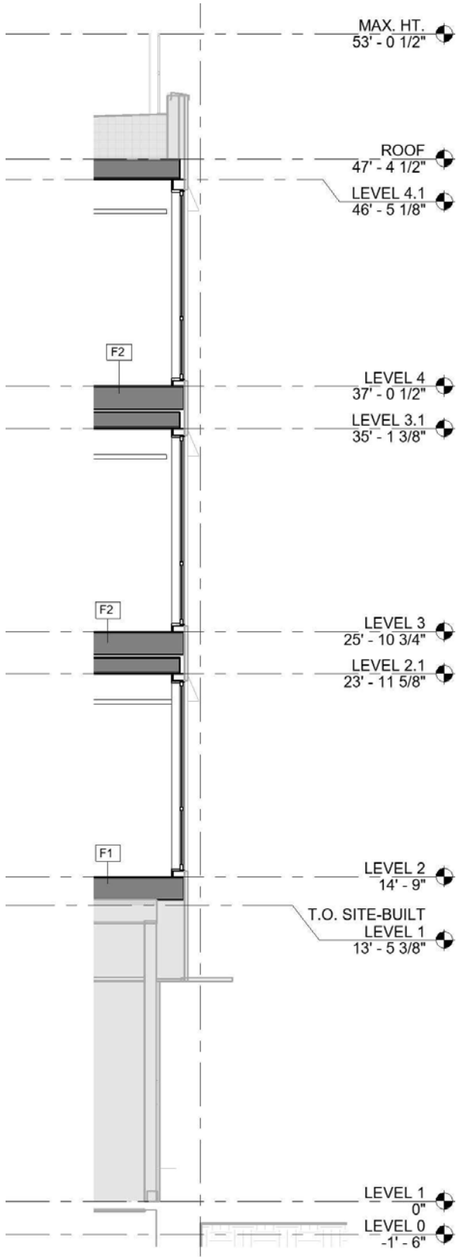
# Taller Buildings
## Zoning

### Modular buildings 1’ taller per floor

| F2 | TYP. FLOOR-CEILING ASSEMBLY | FIRE RATING | 1-HR | STC RATING | 55 |
|---|---|---|---|---|---|



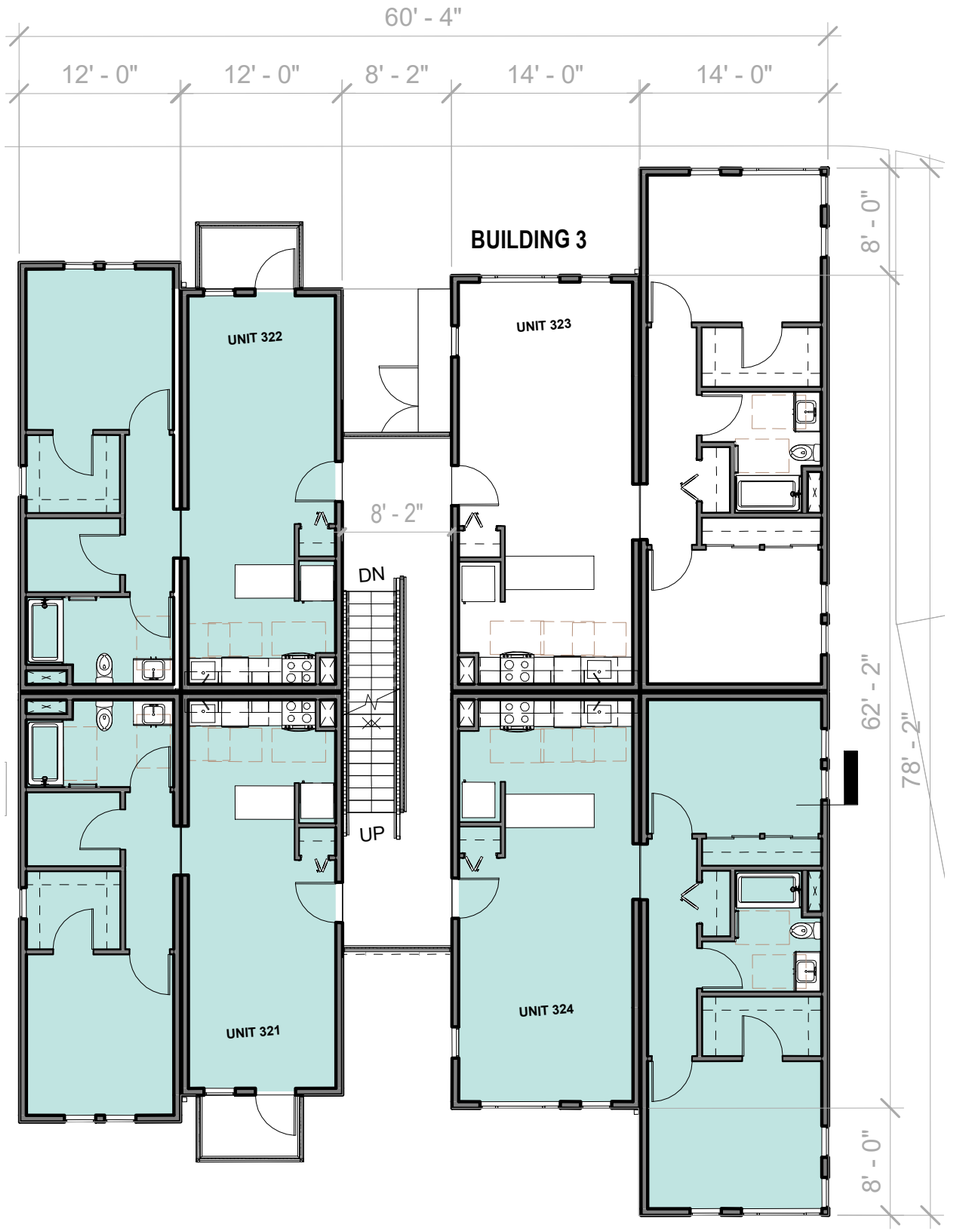






LEGEND
1 BEDROOM
2 BEDROOM
3 BEDROOM
CIRCULATION
COMMUNITY
OPEN SPACE
OPEN SPACE#2
PLAZA

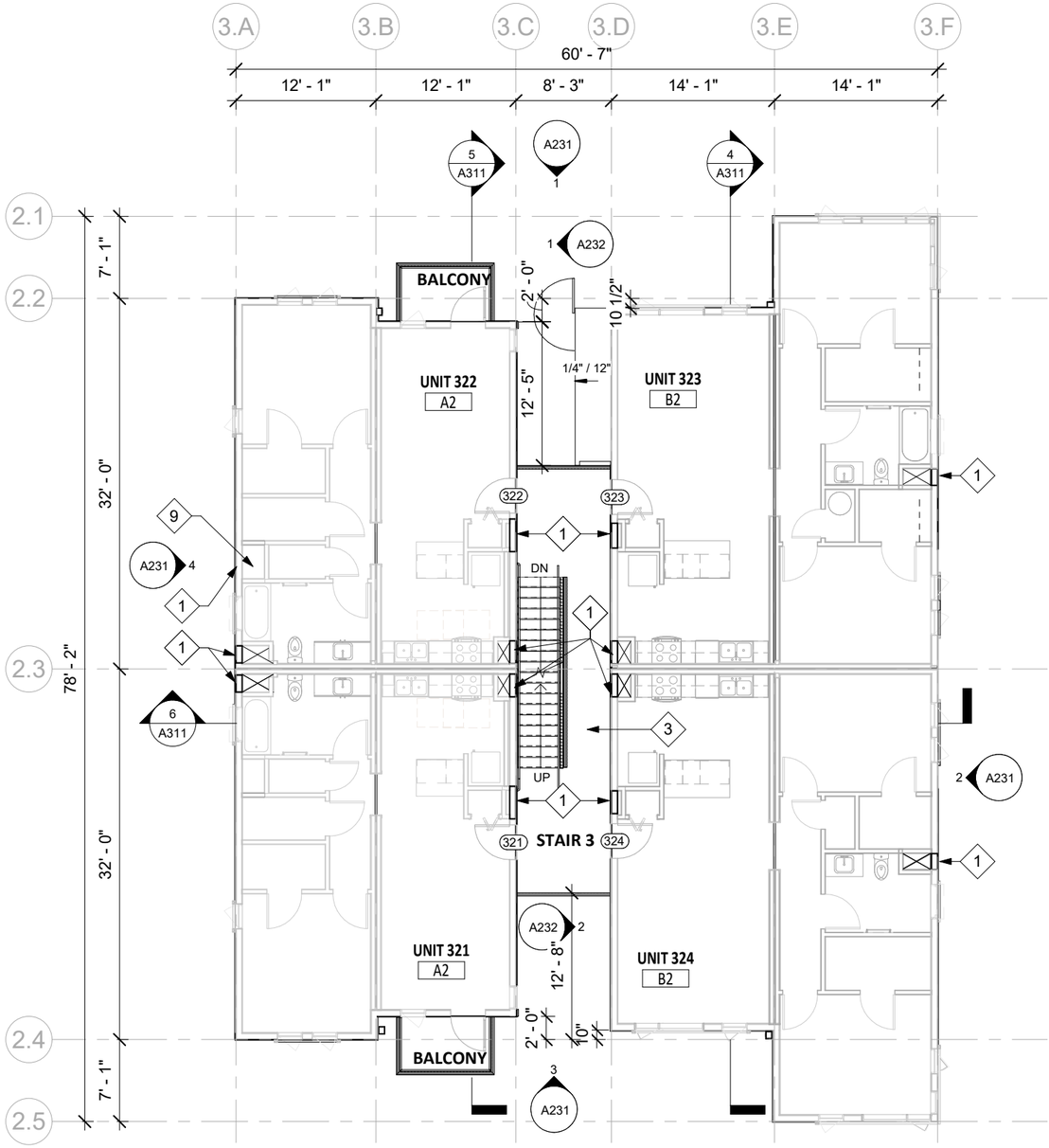
# Box + Unit Sizes

- In many jurisdictions, there are limits on the size of load that can be shipped on highways/freeways without a special escort.
- The heavier the box, the larger the crane.
- For single-loaded conditions, it is more cost effective to build both boxes together, then ‘sawbox’ them in the field.
- An experienced contractor or set crew can significantly reduce the time it takes to stack the building.
- For larger units, several boxes can be joined together.



# Utilities to Corridor

- Connections outside the unit minimize damage to the interiors during construction.
- Utility connections come up through the podium or slab and run vertically, either in a chase or in a wall.




DRYline
DRYline
DRYline


Tyvek


Tyvek

## Design Objective

Create a safe community housing development for Jefferson Elementary School District's workforce. Optimize housing / unit type to meet demographic and bring to market as quickly as possible. Incorporate a design that fits well within Daly City and the surrounding single-family neighborhood.

## Technical Challenges

- Design-build process, as proscribed by State law, versus the typical design-bid-build process.
- Back-to-back units require extra planning to daylight utilities.

## Lessons Learned

- Don't leave all the design to the material choices because when materials get VE'd, articulation can help save the day.
- A General Contractor with modular experience is the highest priority in the contractor selection process.










# Lessons Learned

## It doesn’t have to look modular.

Know your boxes--what they can do and what they can’t do

## Speed to dry-in

In locations where the building season is short, modular can make a big difference

## Rational plans are the order of the day

Orderly, well-stacked plans make all the difference

## Identical units are your friend

Exact duplicates make the assembly line process work for you

## Get your factory involved early

Within a set of rules, every factory does things slightly differently

# Thank you!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*This concludes The American Institute of Architects Continuing Education Systems Course*