Innovating Student Housing: The Case for Modular Construction

TRANSFORMING CONSTRUCTION 2024:
AN INTERACTIVE WEBINAR SERIES

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Introduction

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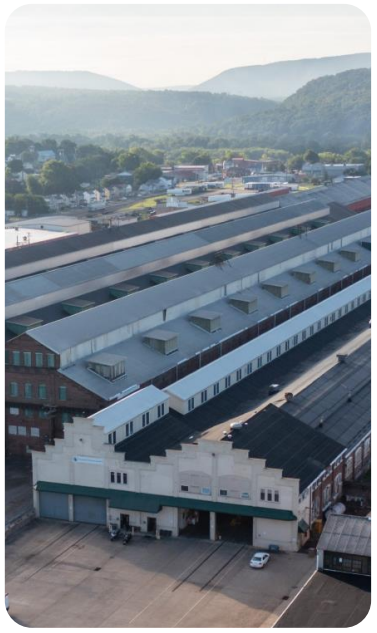
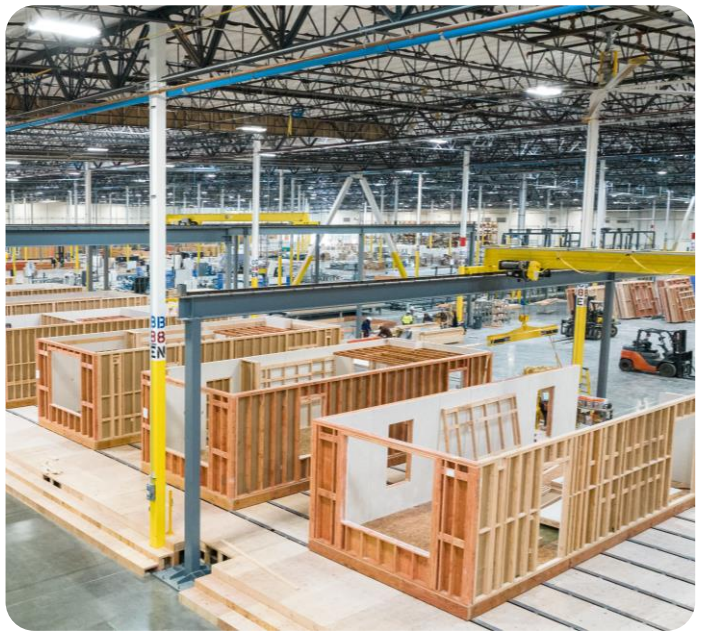
VBC INTRODUCTION

Company Growth





Vaughan adopts Kevin, VBC's Chief Paw Officer

2009

Vaughan Buckley Construction (VBC) starts as a Philadelphia General Contractor. Most of VBC's projects already use modular construction but are limited to townhomes and small projects.

2017

To help secure manufacturing space for his growing business and increase adoption of commercial modular construction, Vaughan (VBC's CEO) starts a joint venture factory in Pennsylvania.

2019

VBC purchases its first manufacturing facility in Hamlet, NC. This factory services projects as far west as Colorado and as far east as Philadelphia.

VBC expands to offer integrated design and engineering services.

2021

VBC purchases a state-of-the-art 600,000 SF facility in Tracy, CA and begins to build one of the most technologically advanced automated volumetric modular manufacturing lines in the world.

2022

VBC expands to Europe and adds volumetric modular construction and furniture production to its service offering.

VBC acquires a manufacturing facility in Berwick, PA to more easily serve the Northeast and Mid Atlantic. VBC bids farewell to its first factory and it becomes a single-family home manufacturer.

2023

VBC bolsters design and engineering capabilities and opens its European Center of Excellence in Monaghan County, Ireland.

2024

2025

VBC serves markets globally through five manufacturing facilities, designing projects in wood and steel.

Benefits of Modular Construction

Modular provides a suite of benefits that traditional construction can't touch.

The proliferation of the digital era has changed the way we design and build cars, airplanes, and ships -- but the building industry has largely remained unchanged. We think it's time to change that.

Faster. Full stop.

The most obvious advantage to modular construction is the ability to parallel process. There aren't any weather delays, but at VBC we've added additional innovation to make our production line faster.

Increased Certainty

Certainty isn't an adjective typically associated with the construction industry, but that doesn't have to be the case. VBC has de-risked our supply chain by partnering directly with commodity manufacturers.

Better Buildings

High end performance comes as standard with modular construction. The integration of advanced technologies may reduce total energy use by 50 percent when compared to comparable site-built construction.

More Sustainable

Since few materials are wasted, stolen, or damaged when stored in a factory this reduces waste and make things greener, but that's only the tip of the iceberg.

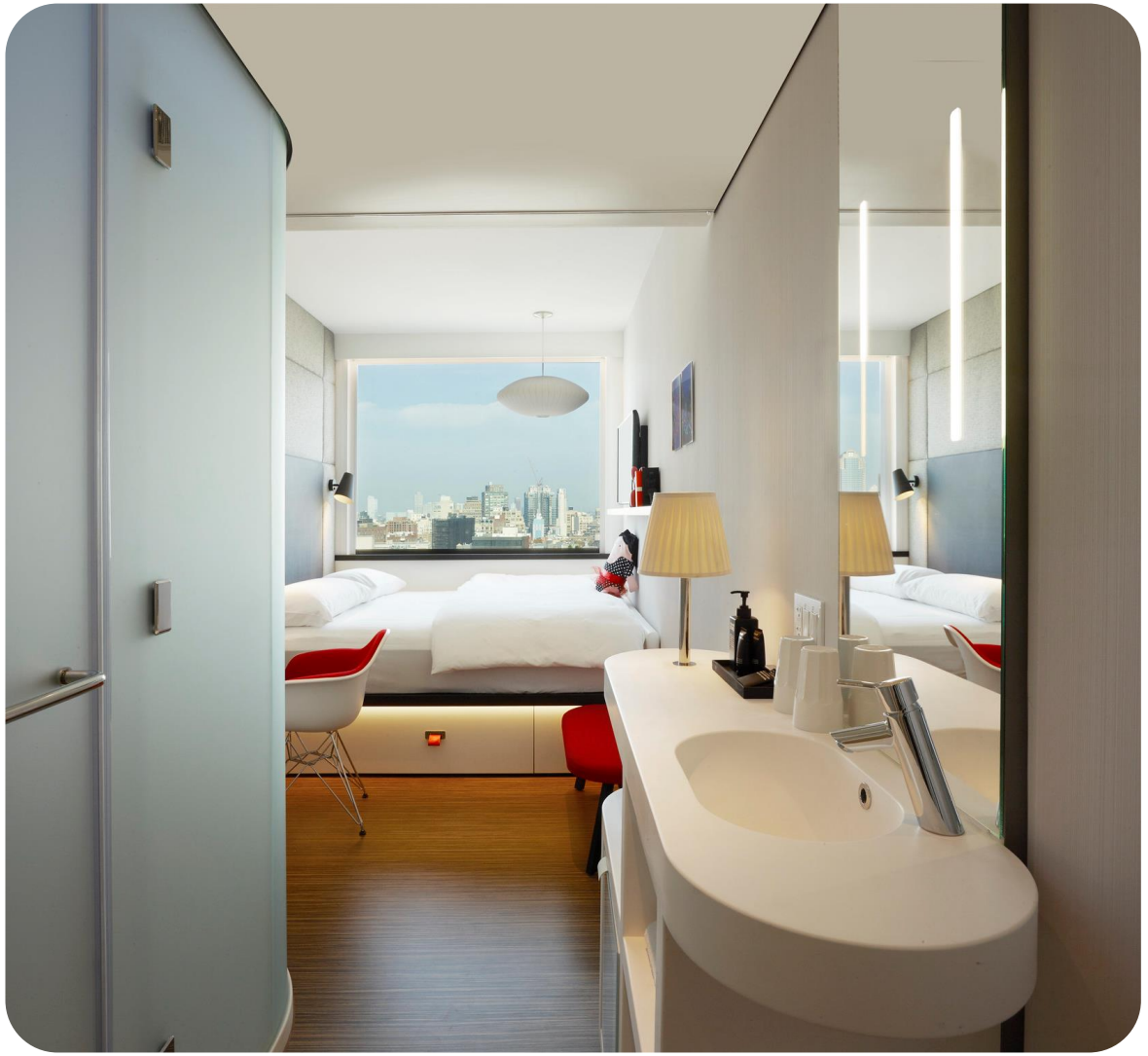
Improved Efficiencies

Enhanced reliance on machinery naturally increases efficiency. Machines can be set and programmed to perform the same act repeatedly and deliver with a consistency and accuracy that humans can't match.

Flexible Designs

VBC offers a productized approach to housing development with a standard catalog of units. This not only expedites design time but allows VBC to continually innovate and improve our product offerings.

Volumetric Modular



Logistics


500 miles
300 miles
Berwick, Pennsylvania
Well positioned to serve East Coast Metro areas.


X24
175241
WEST
676

VBC Experience

Unparalleled modular experience

With more than $3.6B of real estate built and 6,000+ modules delivered, VBC stands above the rest.

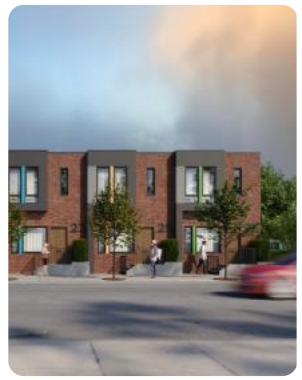
Watch VBC's Wall Street Journal Feature

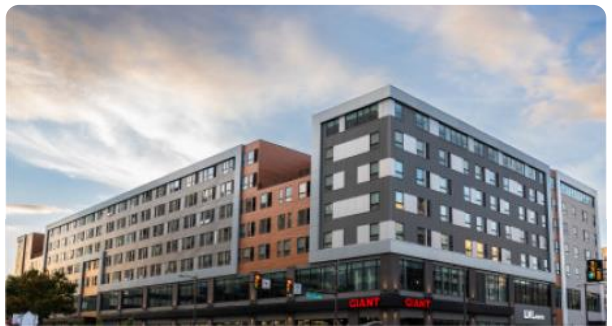
VBC has a decade-long history in modular construction. Our experience spans across diverse geographical locations, showcasing our adaptability and expertise in delivering modular solutions that meet the highest standards of quality and efficiency.










44th Street - Oakland, CA

5 Modular Stories
143 Modules
57 Modular Units
150 Beds

1598 University - Berkeley, CA

5 Modular Stories
207 Modules
158 Modular Units
245 Total Beds

Student Depot - Kraków, Poland

Furniture Fit Out
734 Units

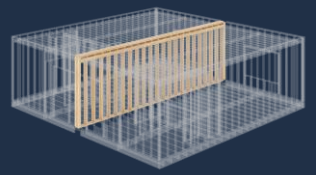
VMX WOOD - BERWICK

Offerings by Factory

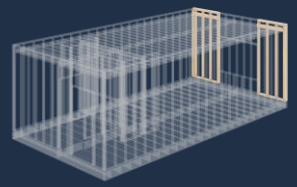
	Fire Resistive	Non-Combustible	Ordinary	Wood Framed
Construction Type	Type I	Type II	Type III	Type V
Resistance (hours)	3-4	1-2	0-2	-
Maximum Stories	UL(A), 12(B)	5 (9*)	5 (6**)	4(A), 3(B)
Primary Offering	Poland	Poland	**Berwick**, Tracy	Berwick, Tracy
Offering With Demand	Berwick, Tracy	Berwick, Tracy		

**The height limitation for buildings of Type IIA construction in Groups R-1 and R-2 shall be increased to nine stories and 100 feet (30 480 mm) where the building is separated by not less than 50 feet (15 240 mm) from any other building on the lot and from lot lines.*
***where allowed*

Definitions



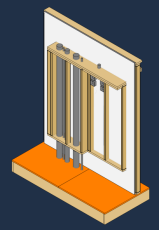
Mate Wall or Long Wall
Long walls of the module where neighboring modules meet

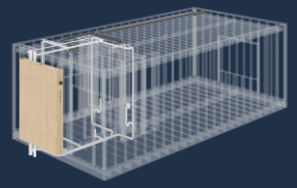


End Wall or Short Wall
Short walls of the module that typically face the exterior

Full Module
A full module consists of two volumes built together with a central corridor on the line with one shared floor assembly.

Half Module
A half module consists of one volume with or without a corridor or portion thereof.





Interface
The point of connection between two things.

Interface (Corridor) Bumpout
A 2x10 bump out where the vertical connections are made, often at the corridor.

Definitions

Tower

A tower is one vertical stack of modules within a multi-story building.

VMX

VMX is the brand offered by Volumetric Building Companies that encompasses a range of modular systems and components designed to streamline construction processes, enhance sustainability, and deliver high-quality results.

Intentionally omitted

DfMA

An acronym which stands for ‘Design for Manufacturing and Assembly,’ which means products are designed to work with the manufacturing and assembly methods in place.

Intentionally omitted

AOR | EOR

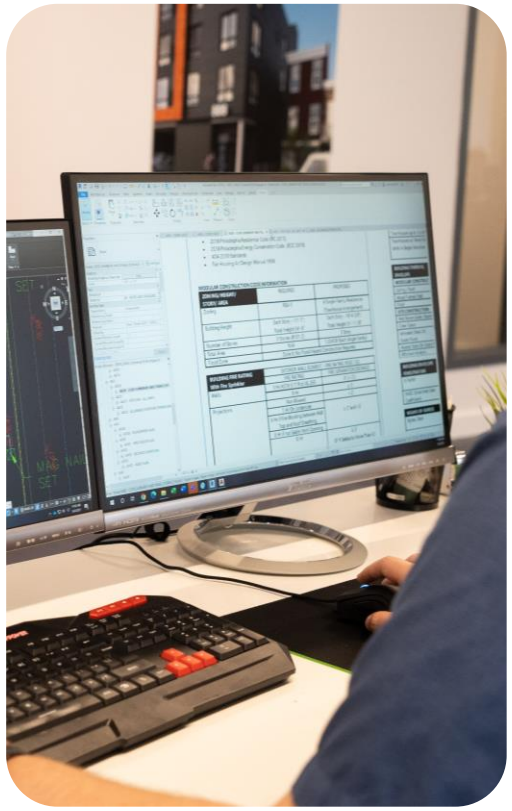
Architect of Record | Engineer of Record
The responsible architect | engineer for the scope of work completed on site.

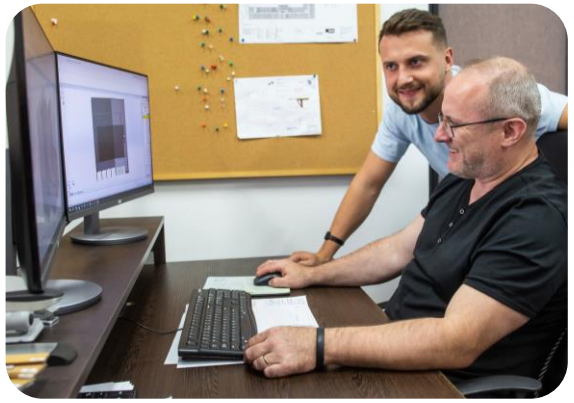
MAOR | MEOR

Modular Architect of Record | Modular Engineer of Record
The responsible architect | engineer for the scope of work completed in the manufacturing facility.

Common Paths of Engagement

…A Client wants to switch to modular from site-built for various reasons…





…In this case, there are typically already approved AOR drawings to be converted to modular

…A Client knows they want modular construction from the start…

…In this case, the MAOR designs alongside the AOR

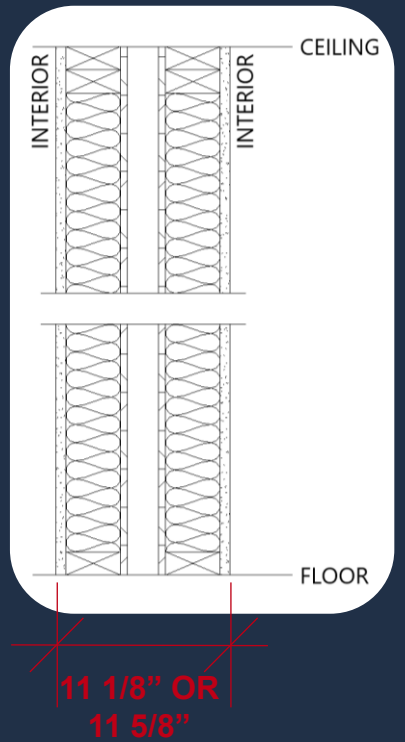
Non-Negotiables

01 **Module Maximum Length**
68’-0” stud-to-stud

02 **Module Minimum & Maximum Width**
11’-0” (minimum) & 15’-9” (maximum) stud-to-stud

03 **Module Maximum Height**
To be verified by state. Most states are 14’-6” maximum height for shipping – New England states are 13’-6” maximum height for shipping.

04 **Mate Wall Assembly**
11 1/8” (4 stories or less) | 11 5/8” (5-6 stories)



Non-Negotiables

05

Structure

The VMX Wood system is line-loaded with predominant shear forces on the mate walls. Secondary shear is provided by perforated shear walls located at the corridor (preferred) or at the exterior walls. The structure utilizes a semi-balloon frame for typical floors, while the roof structure is platform framed.

06

Mate Wall Openings

Maximum of 10’-0”

07

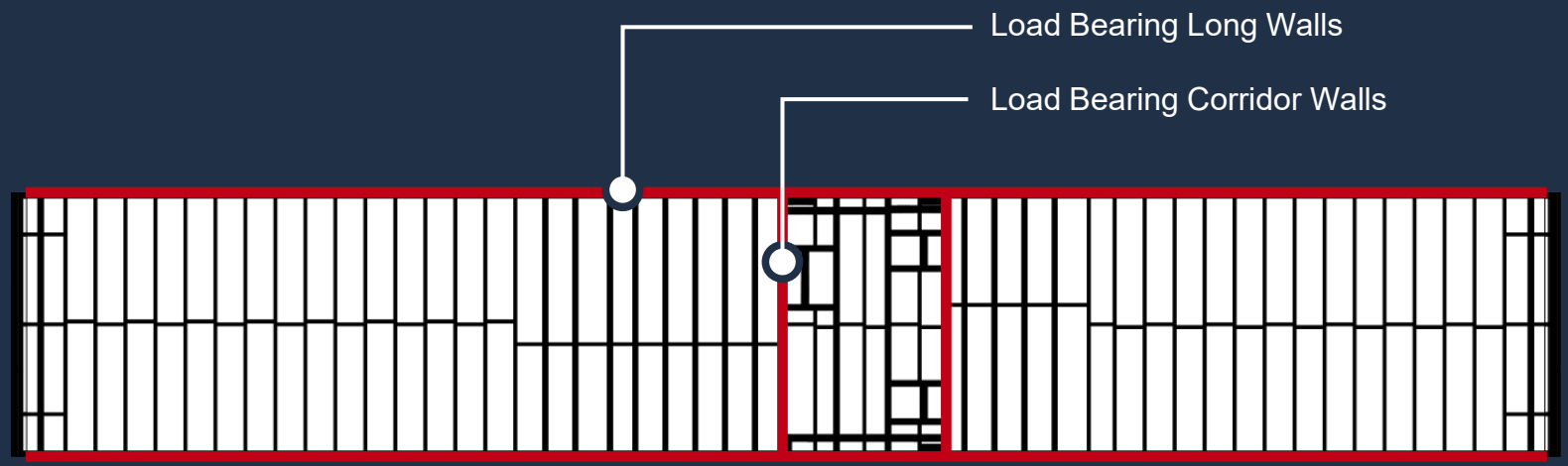
Windows

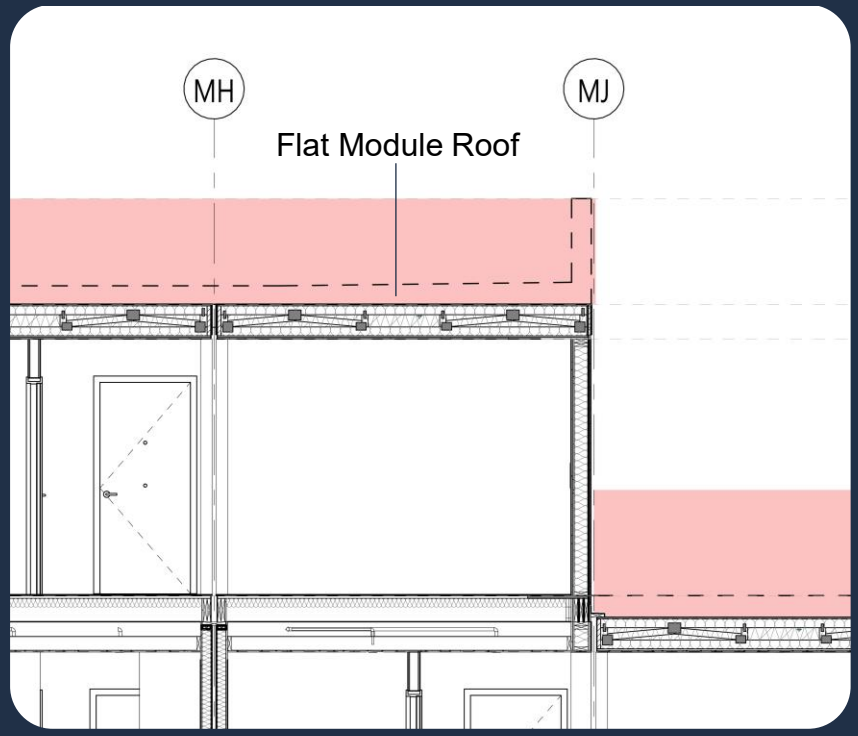
Minimum of 2’-0” from grid lines

08

Flat Roof Module

VBC roof modules are flat, platform framed with 5/8” OSB





DfMA

PRODUCT

Provide standardization where it provides **high value to the manufacturer**

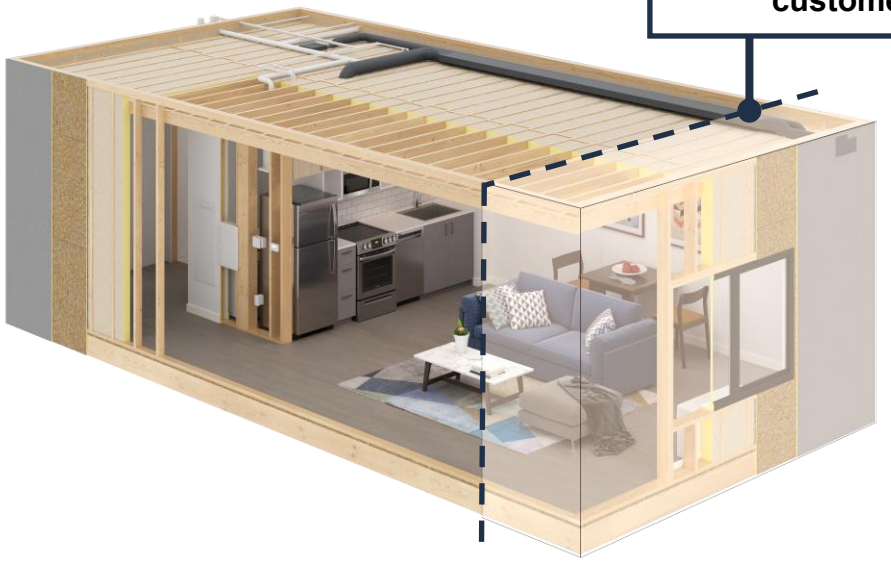
1. Interface Locations
2. Subassemblies
3. Plumbing Layouts
4. Materials

[DESIGN DECISIONS]

- cooling
- heating
- internal layout
- material selection

PROJECT

Provide variation where it provides **high value to the customer**

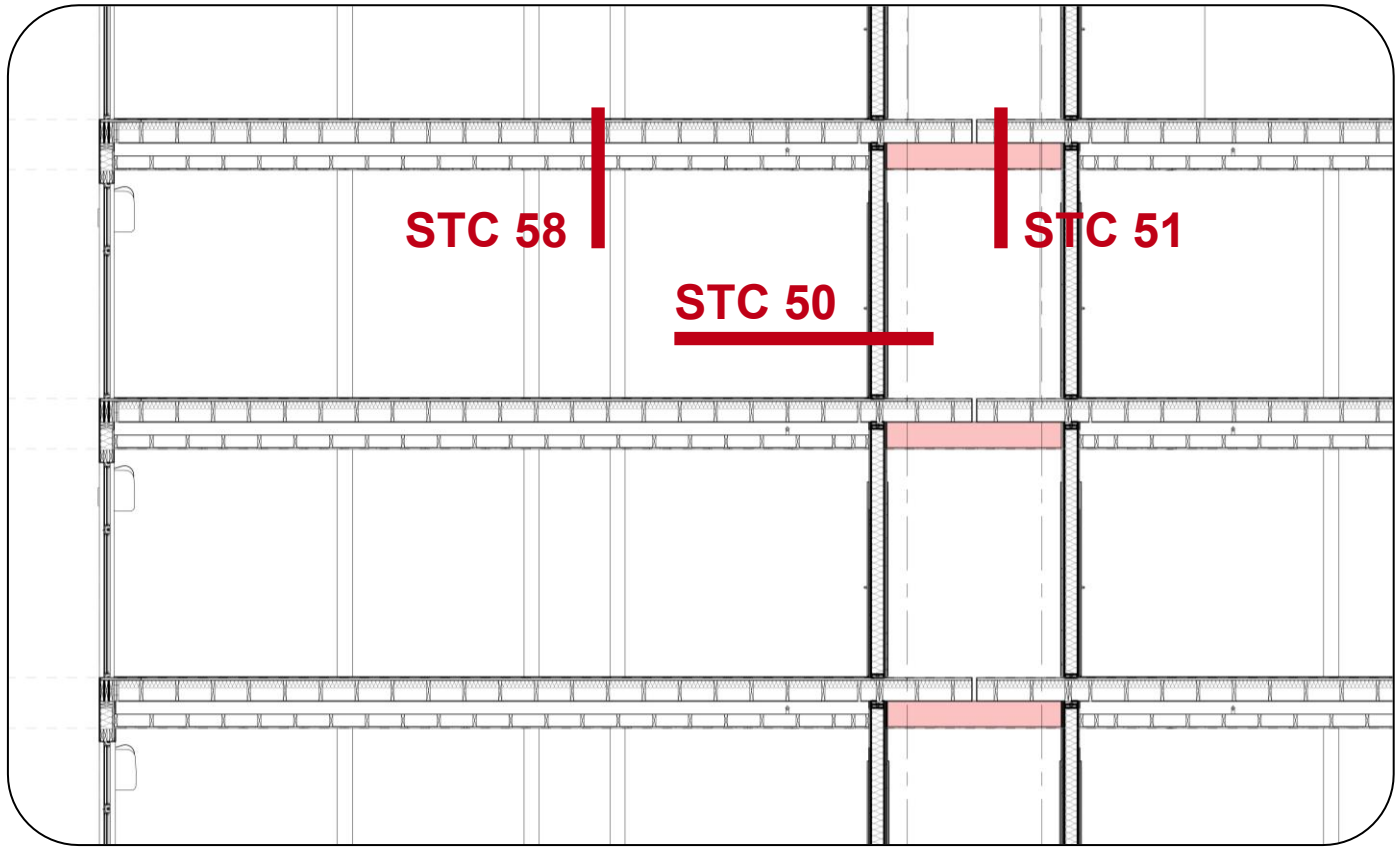


1. Building Articulation - Exterior
2. Options for Accessibility Compliance
3. Unit Size to Fit Project Sites
4. Finish Options

[DESIGN DECISIONS]

- location
- massing
- positioning of openings
- material selection
- solar design
- landscape
- orientation
- shading
- thermal mass
- insulation
- internal layout
- ventilation

What You Get – Great Acoustics



Results from independent third-party field test

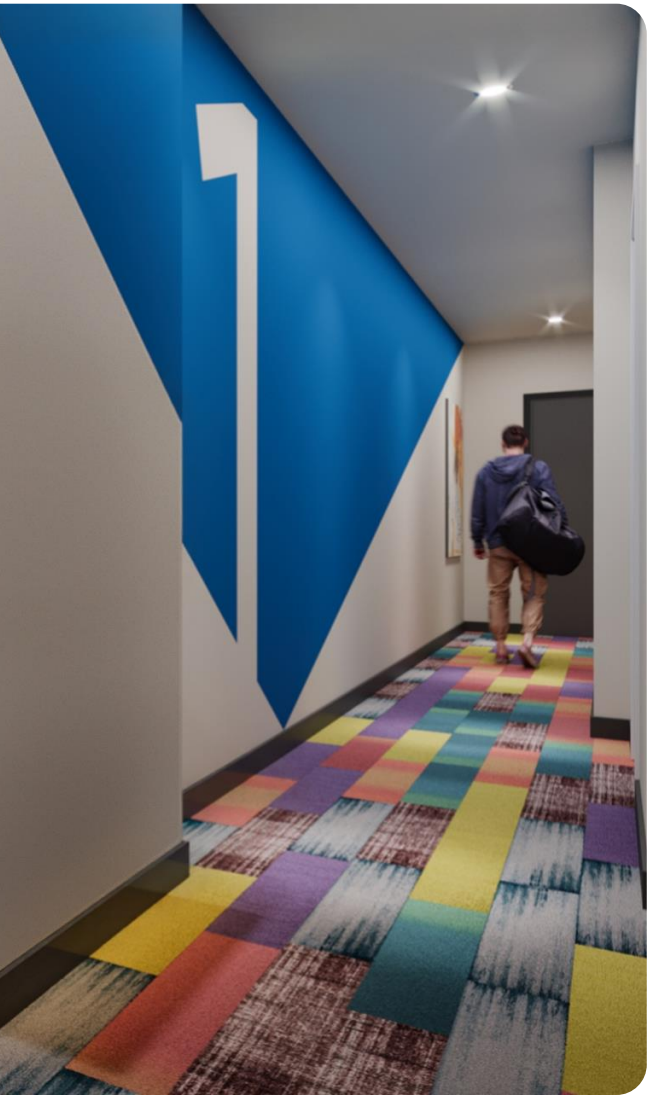
What You Get – Quality Product

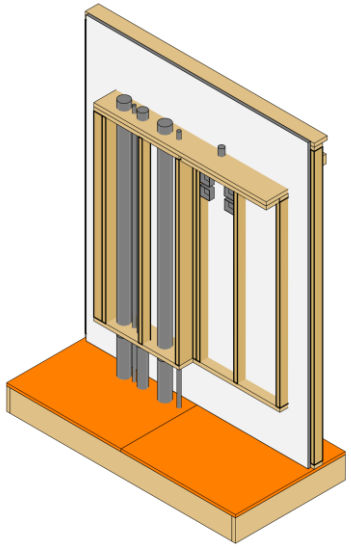
VMX is our line of mid - luxury finishes at affordable prices.

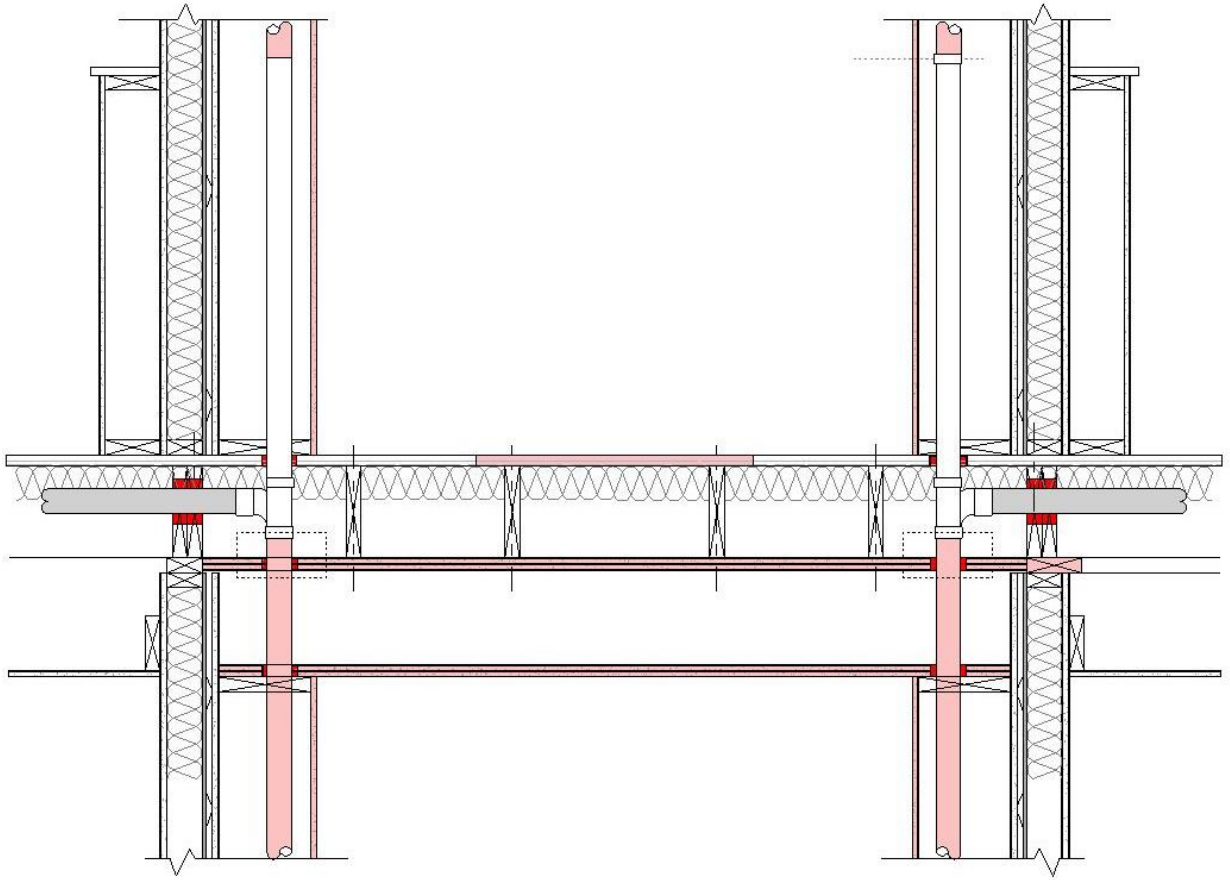
Don’t waste money on brand tax and distributor fees. Go direct to the manufacturer.

- Better supply chain certainty
- Wholesale discounts
- Trendy finishes
- Durable quality product

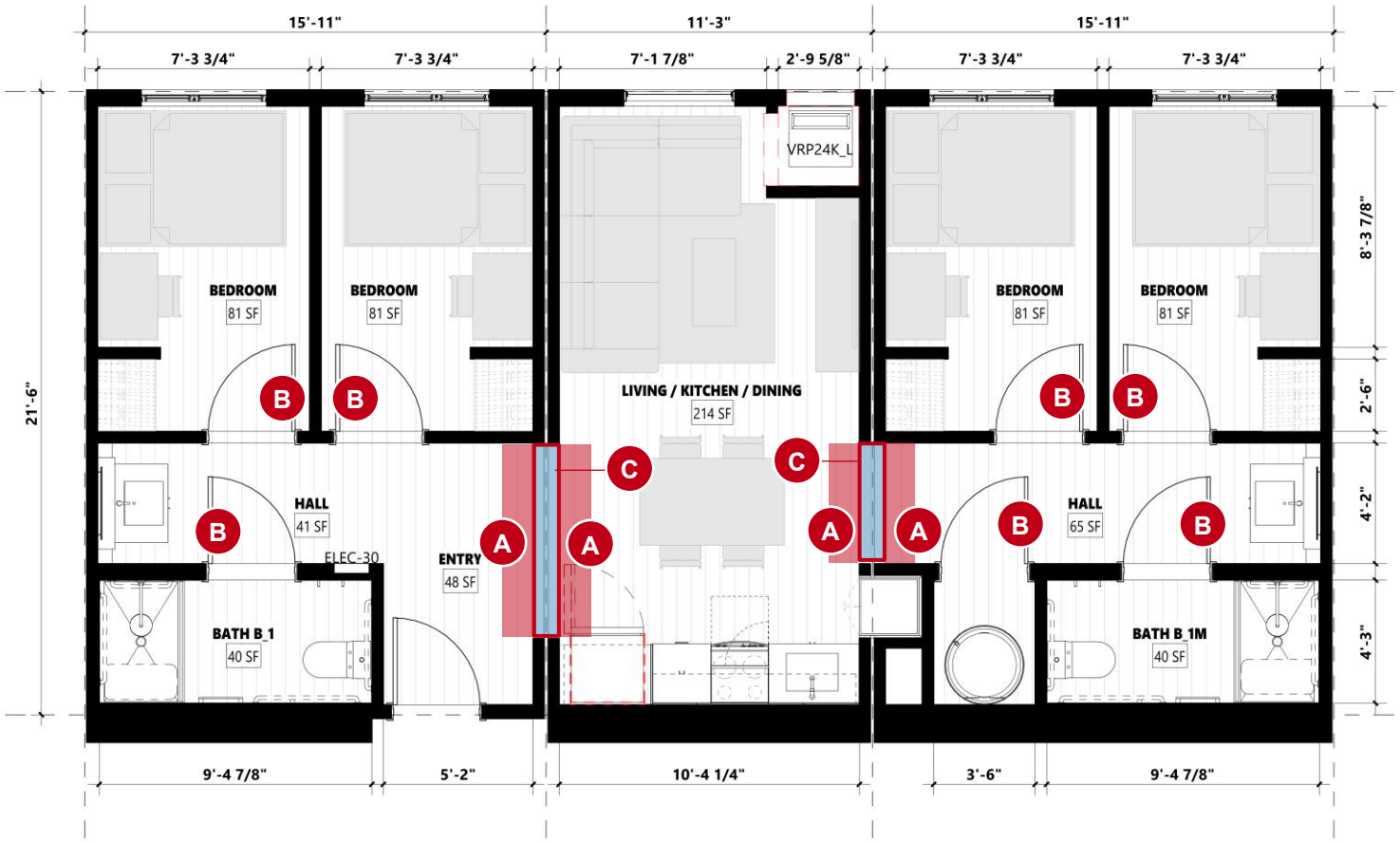
What You Get – Easy Vertical Connections







What You Get – Easy Finishing



ON-SITE SCOPE OF WORK

A GC subcontractor to complete installation for “tacked only” base molding and areas where finish flooring is shipped loose.

B GC subcontractor to complete final adjustment of door for proper clearance, alignment and operation, as necessary.

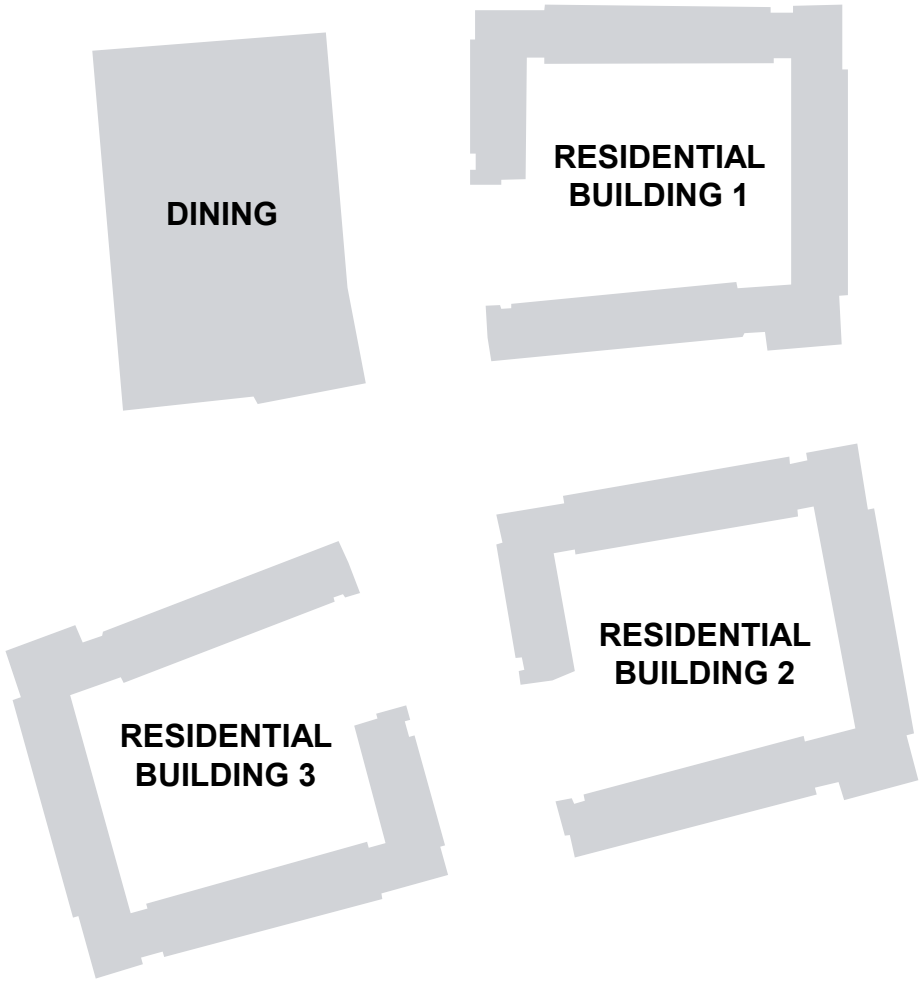
C GC subcontractor to complete drywall, spackle, paint; include all cutting, patching, shimming, necessary to provide a flat level surface for drywall installation from one modular unit to the next.

GC subcontractor to include cutting, patching, and shimming as necessary to provide a smooth flat level surface for finished flooring installation.

Typical finish flooring locations that cannot be factory installed will be shipped loose for onsite installation by GC subcontractor.

CASE STUDY #1

Original Design



Project Data

Location
Within 500 miles of Berwick

Scale
404,623 Modular SF
789 Modules
1,709 Beds

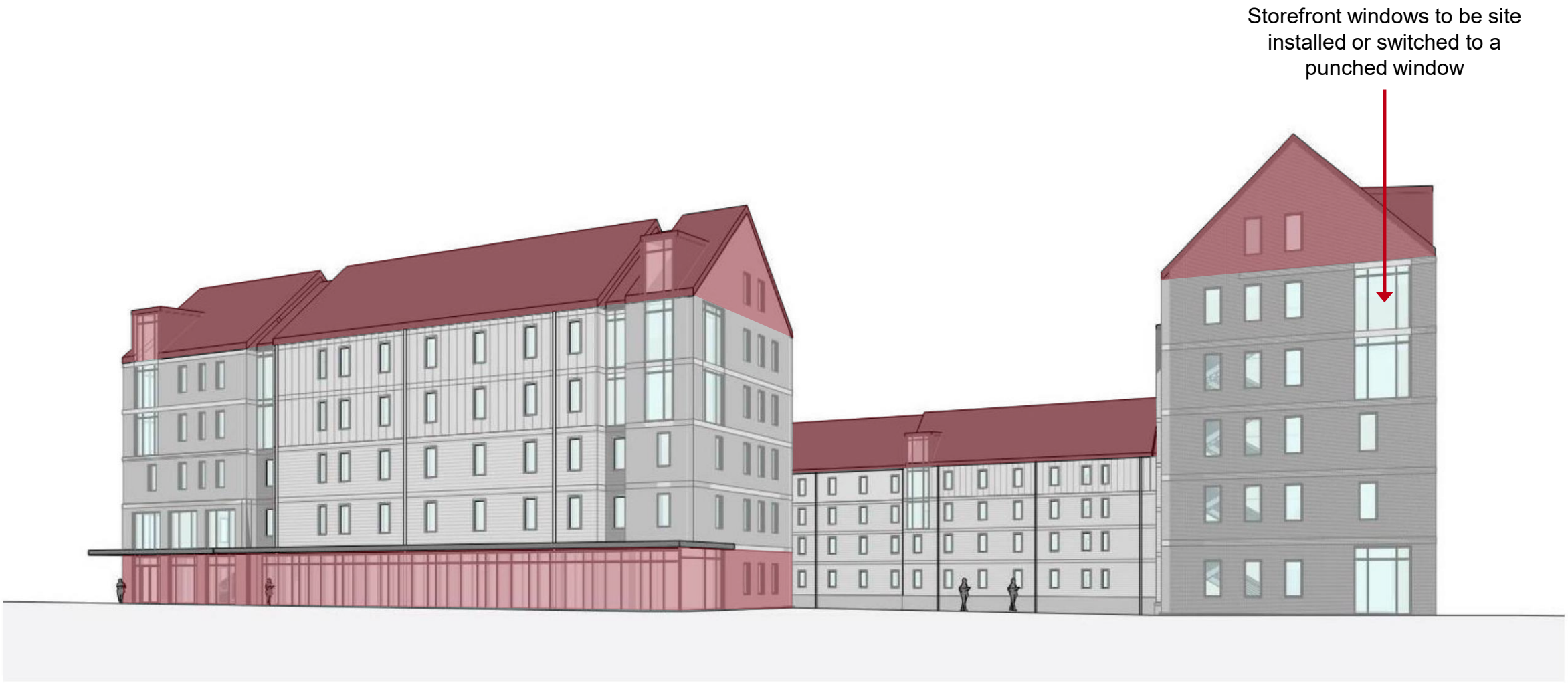
Site
No existing infrastructure

Reasons for Modular Pursuit
Limited labor force
Quality

Starting Point
Site built construction

AOR Documentation
Design Development

Original Design



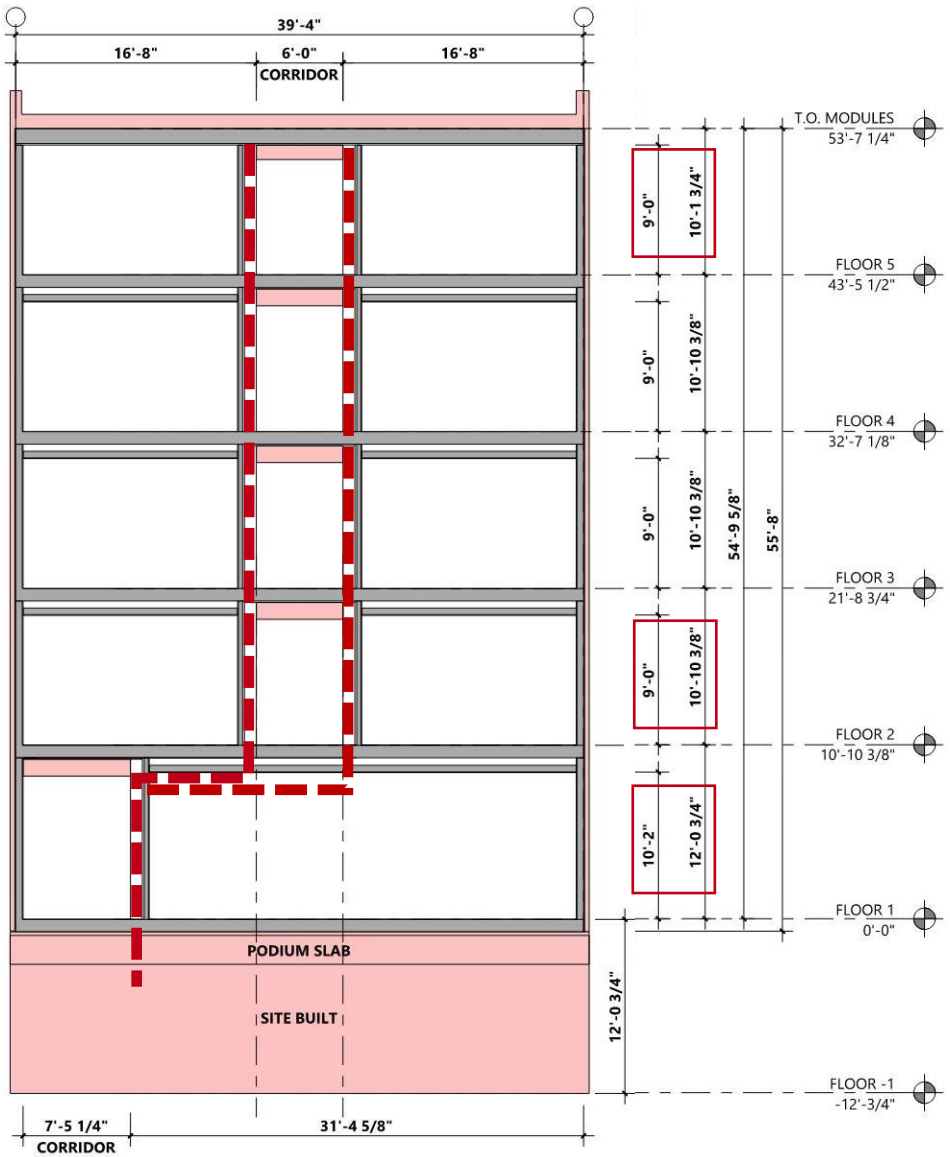
Site Scope

Original Design

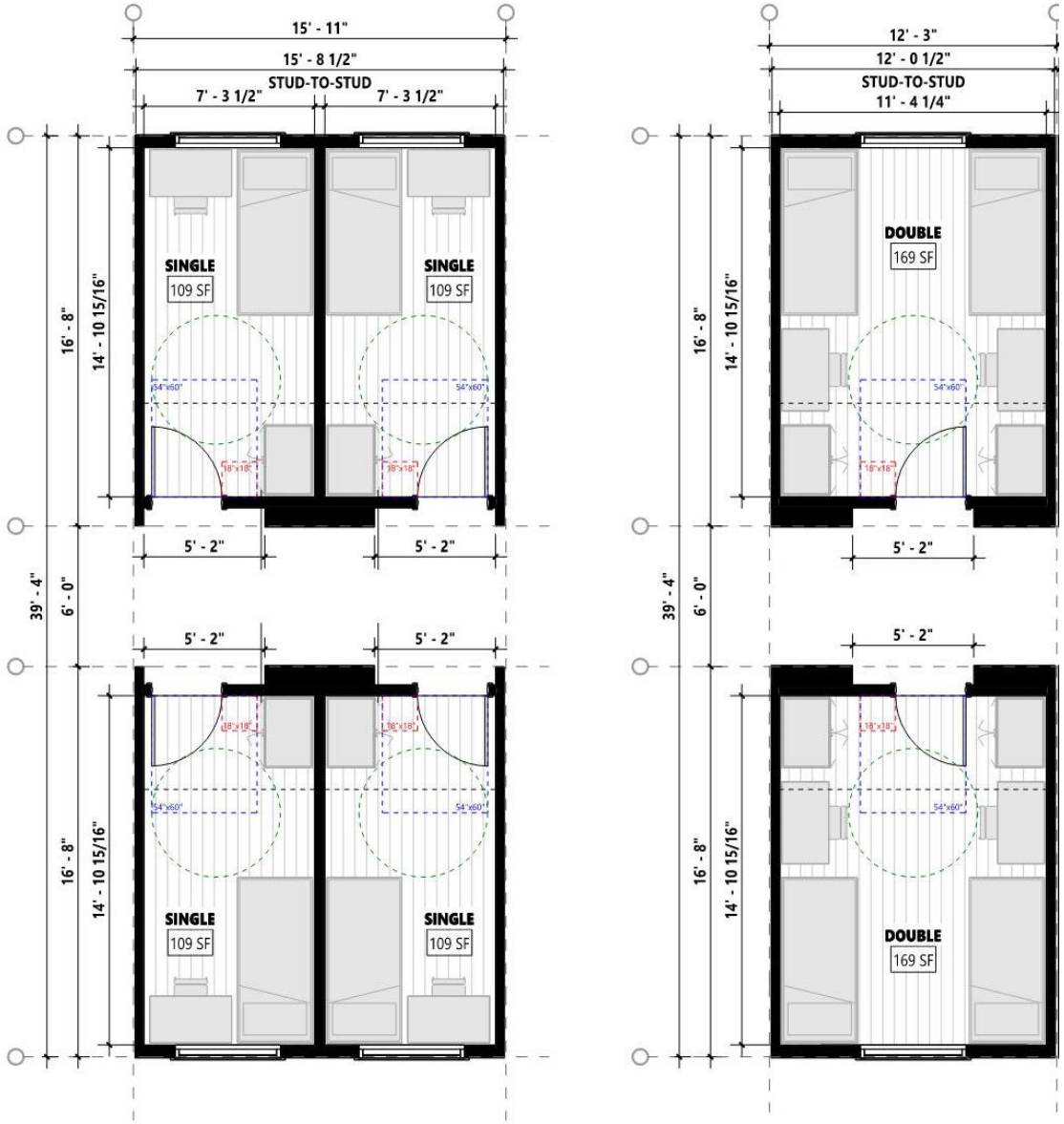
MODULAR MODIFICATIONS

- **A** Move to Level 1
  Due to Vertical Connections & Module Height
- **B** Reorganization
  Based on Module Layout
- **C** Reorganization
  Based on Unit/Module Layout

LEVEL 2



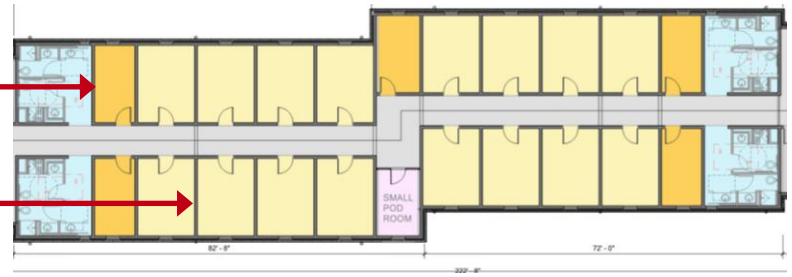
VBC Design Modifications



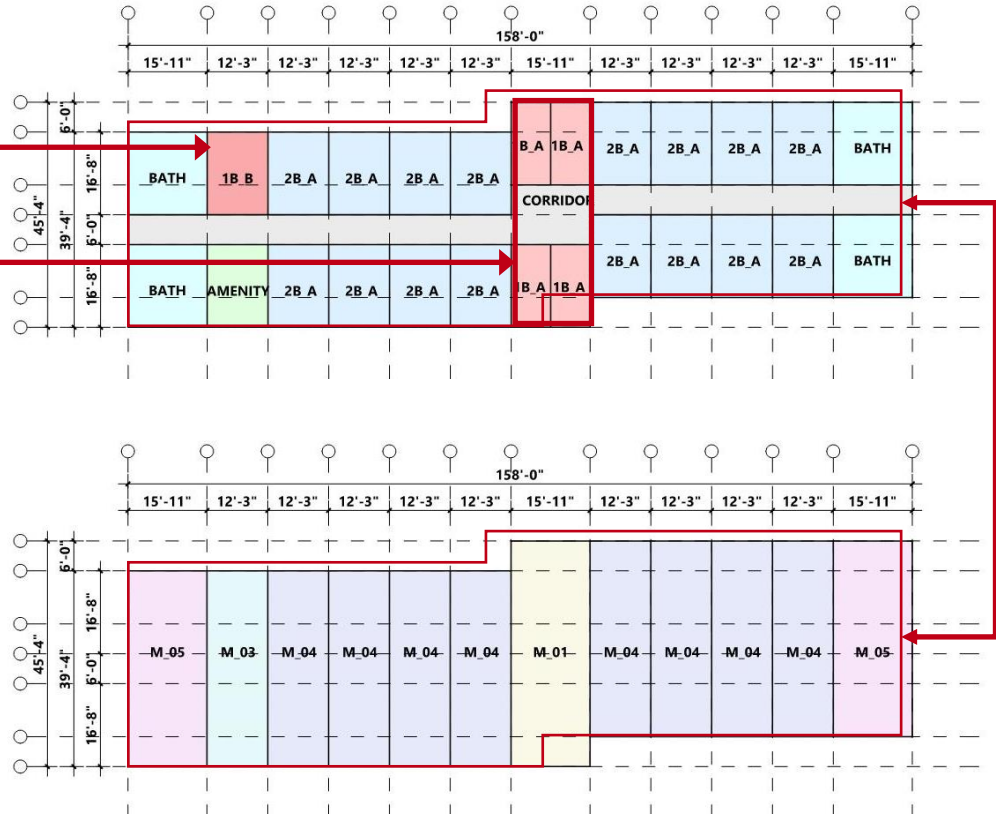
VBC Design Modifications

Combine 4 single rooms into 1 module

Adjust walls for mate wall thickness



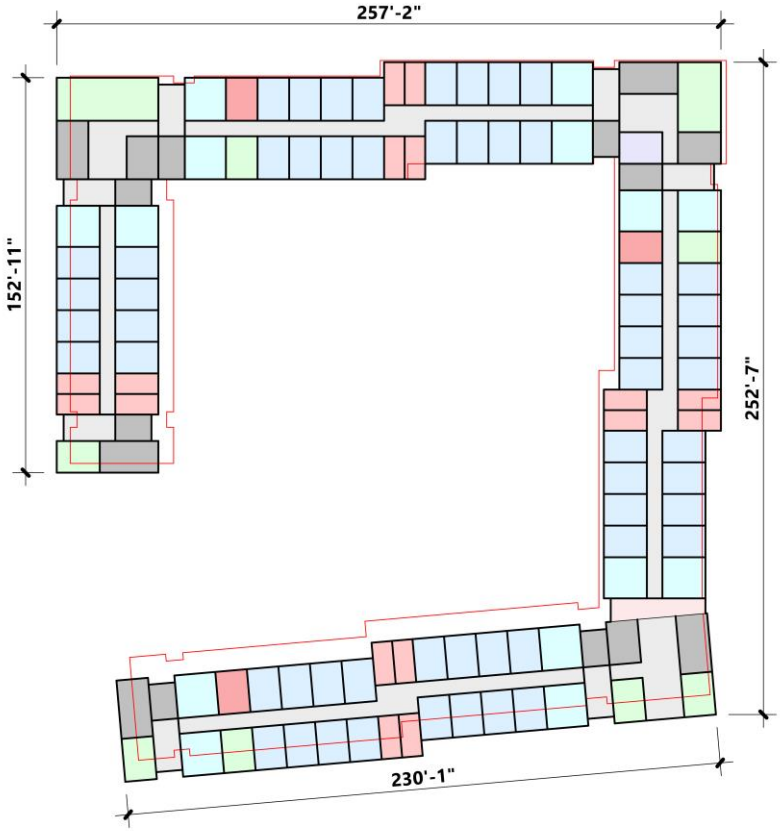
1 single becomes larger (can flex to a double) + 4 single room module moves to center due to the width of the modules in tower on level 1



Original building footprint

VBC Design Modifications

	Original (GSF)	Modified (GSF)
R1 Level 2 – Modular	0	30,617
R1 Level 2 – Site Built	30,120	274
R1 Level 2 – Total	30,120	30,891
R1 Building – Modular	0	139,828
R1 Building – Site Built	144,797	7,000
R1 Building – Total	144,797	146,828
All Buildings – Modular	0	404,623
All Buildings – Site Built	428,612	23,532
All Buildings – Total	428,612	428,155



VBC Design Modifications

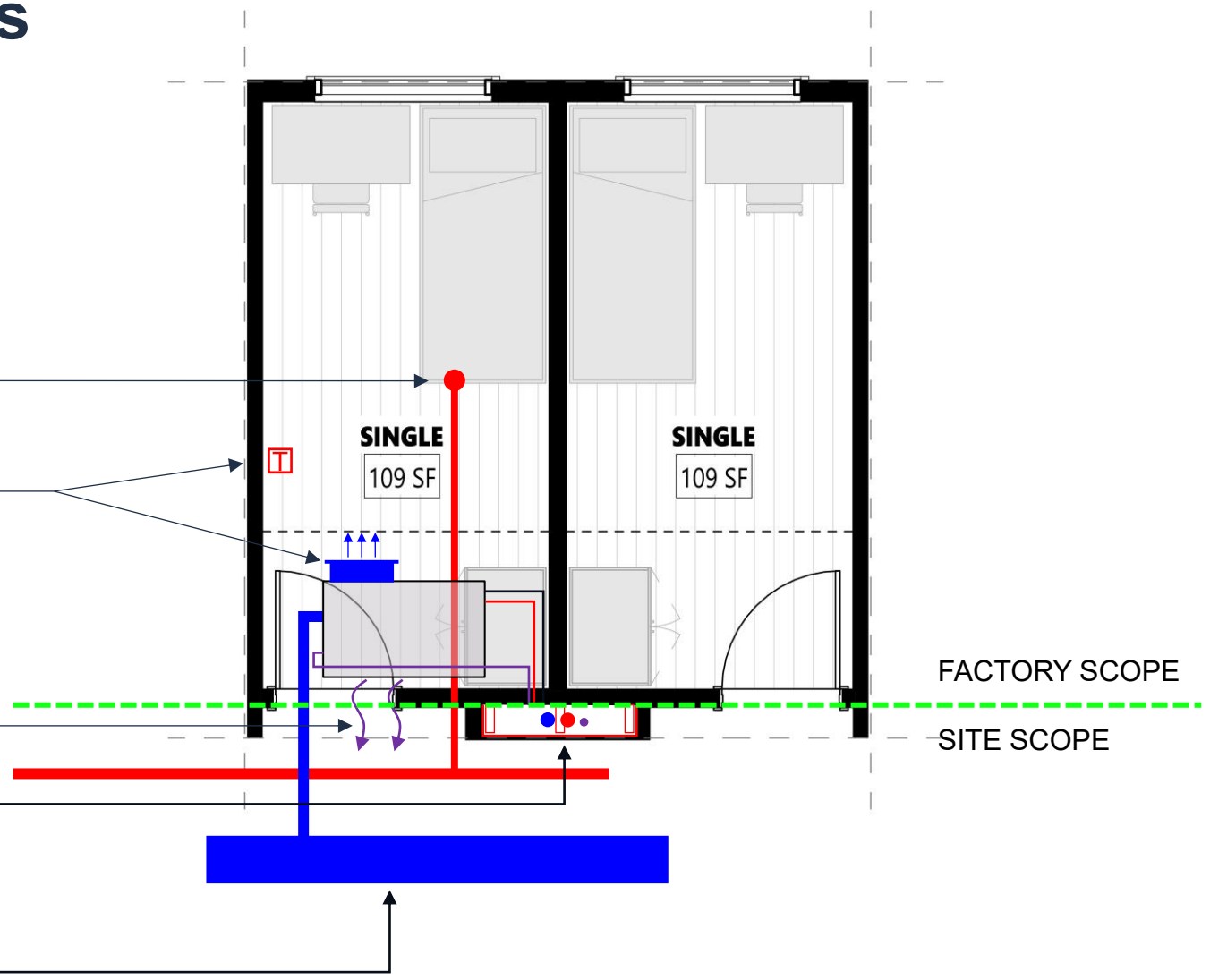
CONCEALED SPRINKLER HEAD

CLIMATEMASTER TRANQUILITY LOW-PROFILE (TRL) SERIES, MODEL TRL006 (1/2 TON), UNIT SIZE 22.5”W x 53”D x 9”H, WALL MOUNTED THERMOSTAT

<u>RELIEF AIR STRATEGY</u>
PROVIDE .75” UNDERCUT AT DOOR

VERTICAL RISERS (3) SERVING TWO UNITS AT CORRIDOR BUMPOUT, PIPES WILL BE PULLED THROUGH THE FIRE RATED ASSEMBLY AND CAPPED. ON-SITE REMOVE CAP AND MAKE CONNECTION

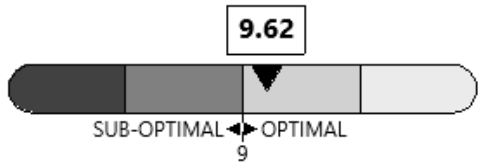
<u>OA STRATEGY</u>
DUCT AIR FROM CENTRAL AHU IN CORRIDOR, INSTALL FIRE DAMPER AT FIRE RATED WALL AND CONNECT TO VERTICAL STACK.
**NOTE SUPPLY AIR TO RESIDENTIAL ONLY*



VBC Design Modifications

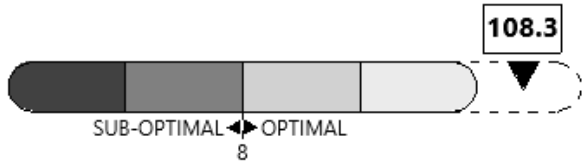
Total Number of Modules	Unique Number of Modules	Modular Efficiency
789	82	9.62

Total Number of Units	Unique Number of Units	Unit Efficiency
975	9	108.3



MODULE EFFICIENCY RATIO

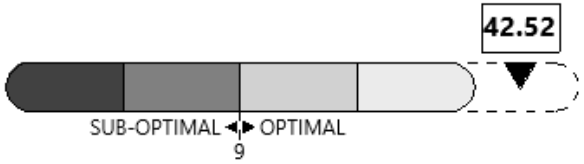
TOTAL NO. OF MODULES / NO. OF UNIQUE MODULE TYPES
ASSUMES DIFFERENT TYPICAL FLOOR AND ROOF MODULE CONSTRUCTION



UNIT EFFICIENCY RATIO

TOTAL NO. OF UNITS / NO. OF UNIQUE UNIT TYPES
EXCLUDES WALL TYPE UNIT VARIATIONS

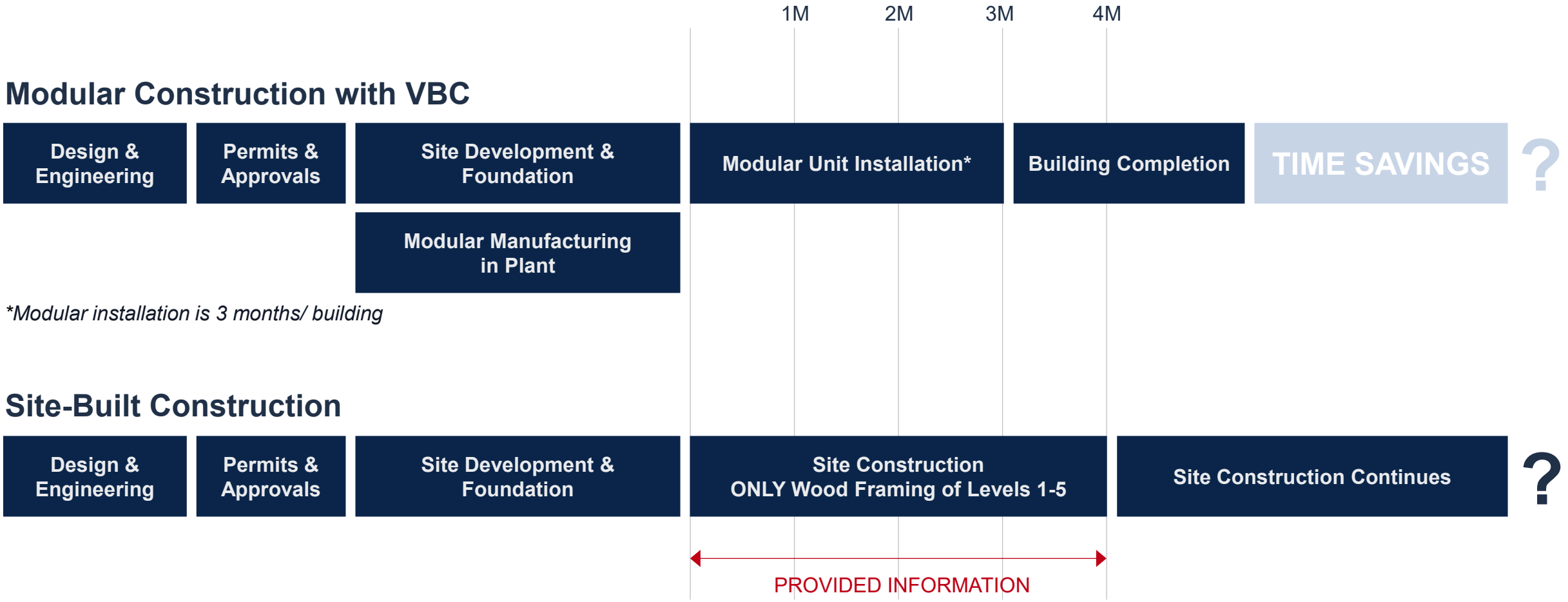
WOW!



PRODUCT OPTIMIZATION SCORE

(2/3 x MODULE EFFICIENCY RATIO) + (1/3 x UNIT EFFICIENCY RATIO)

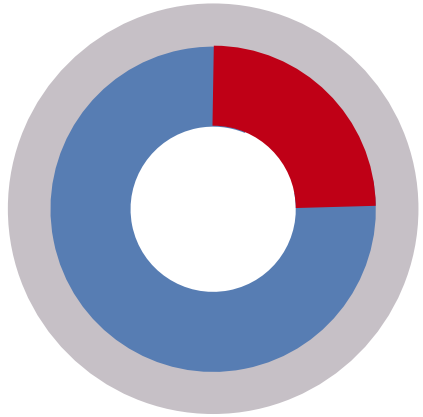
Faster Time to Market

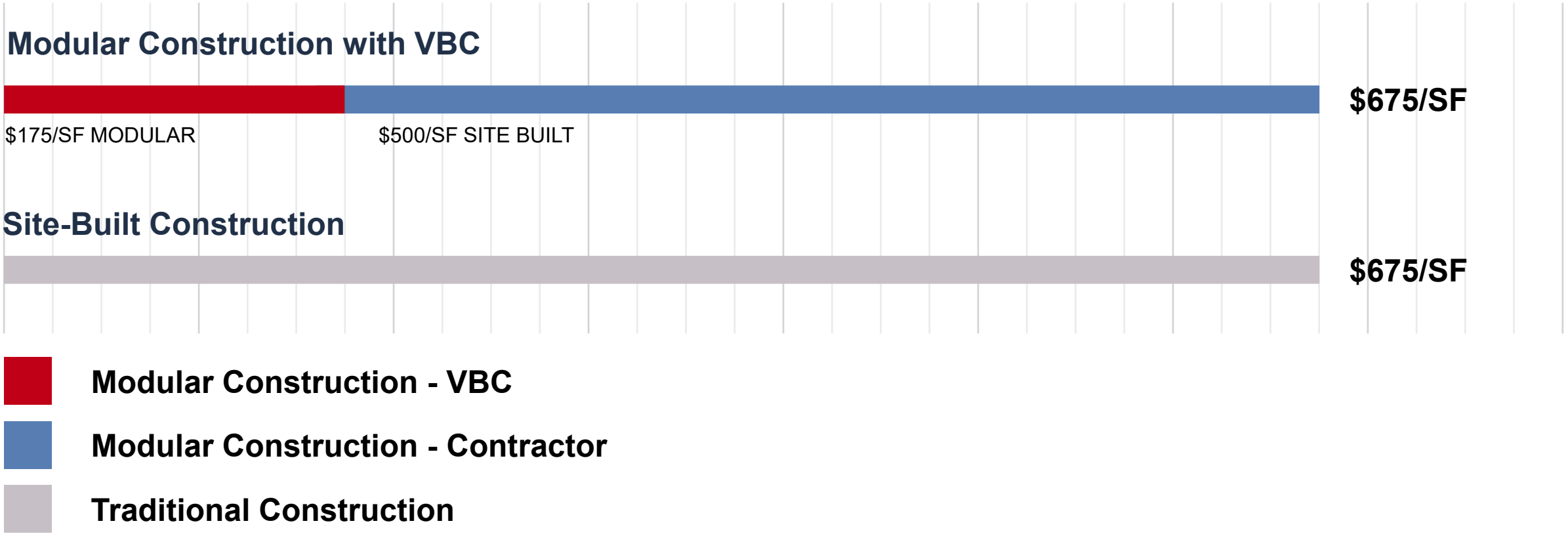


Comparative Cost Per Square Foot

0%

CONSTRUCTION COST SAVINGS





CASE STUDY #2

Original Design

Project Data

Location
Within 300 miles of Berwick

Scale
247,382 Modular SF
411 Modules
820 Beds

Site
Existing infrastructure

Reasons for Modular Pursuit
Budget
Schedule

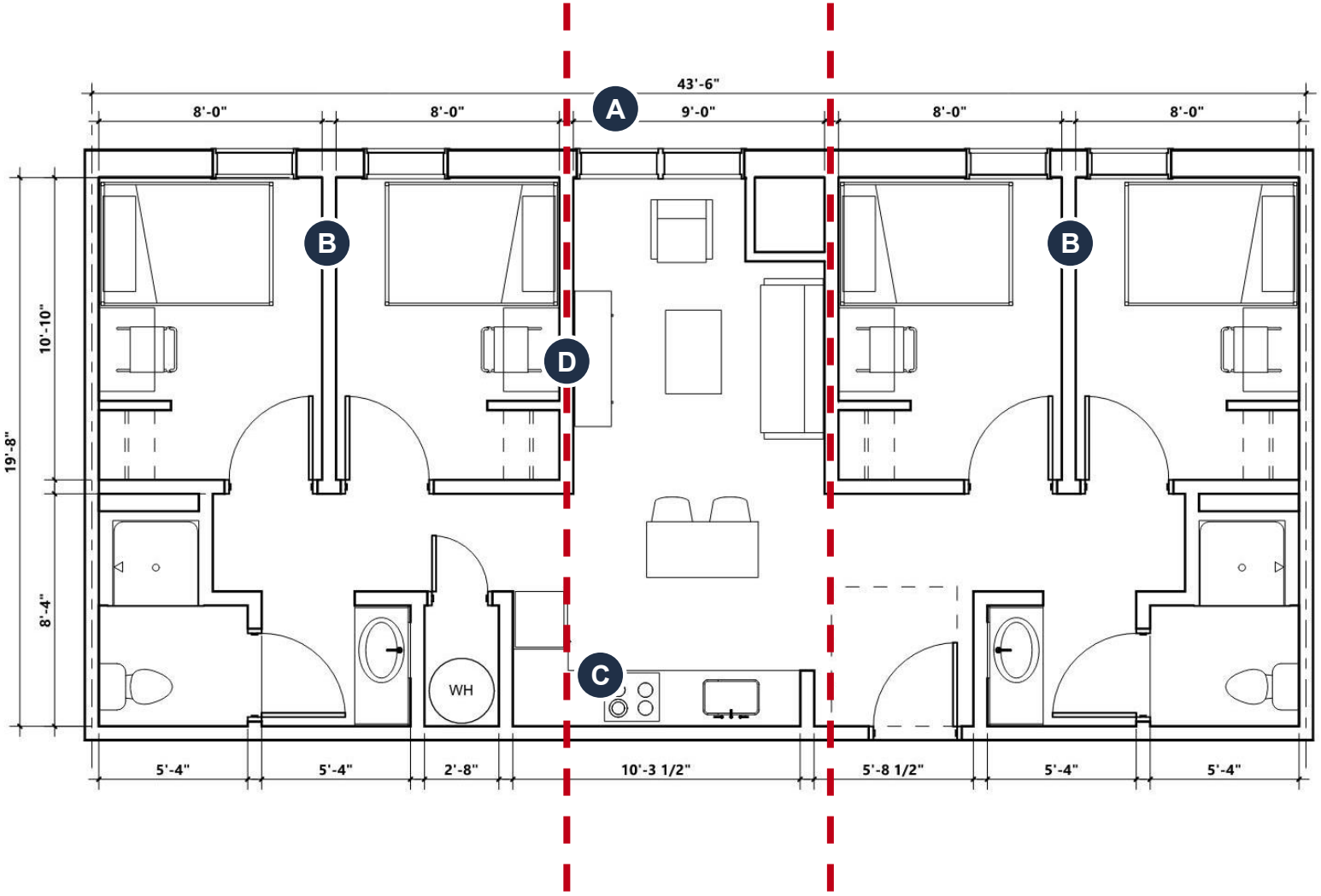
Starting Point
Modular construction

AOR Documentation
Concept Design

Original Design

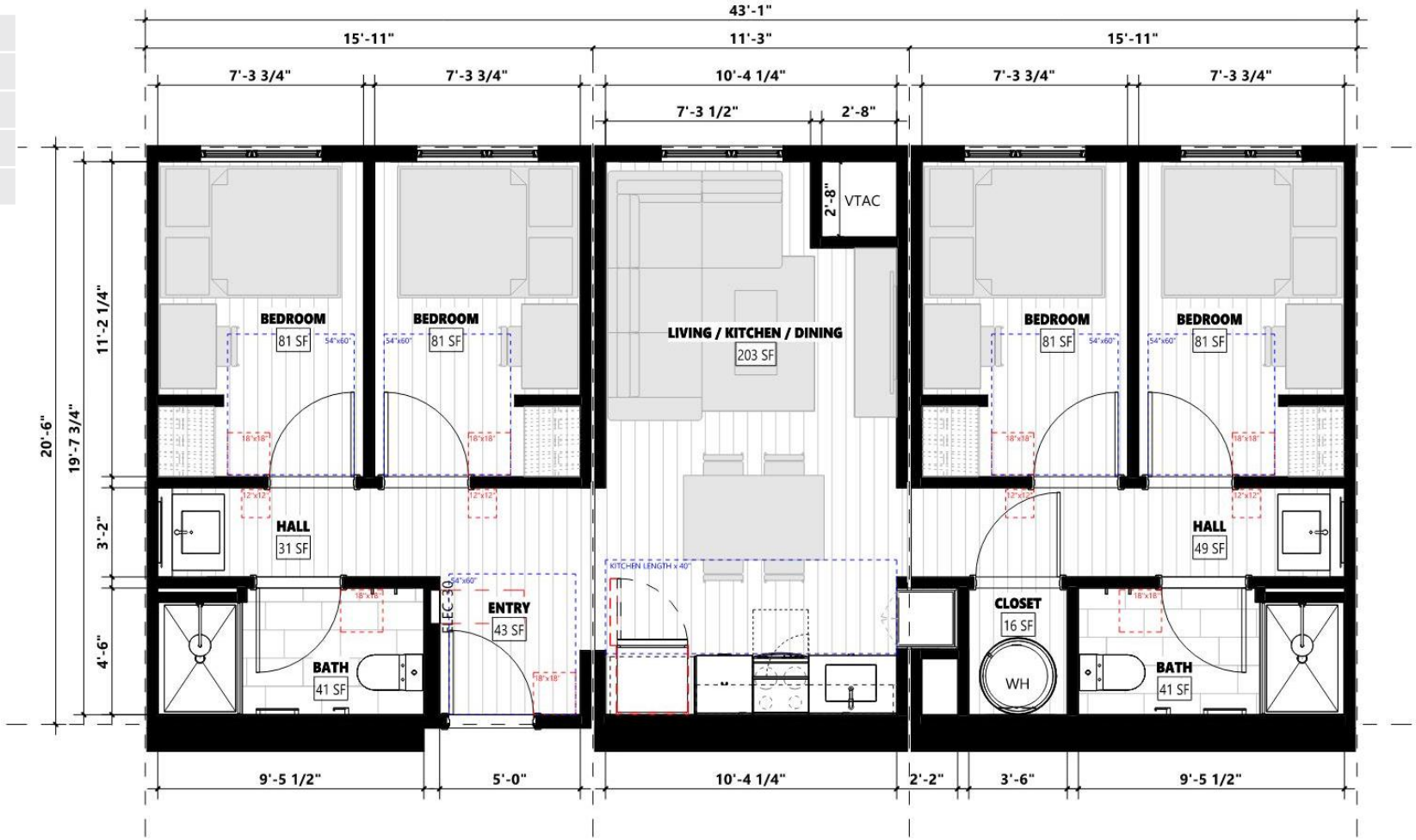
MODULAR MODIFICATIONS

- **A** Minimum/Maximum Module Width (11’-0” / 15’-9” stud-to-stud)
- **B** Combine two bedrooms into one module with a maximum 15’-9” stud-to-stud.
- **C** Reorganize spaces with mate wall alignment.
- **D** Adjust mate wall dimension to 11 5/8”



VBC Design Modifications

	Original	Modified
4 Bedroom – Length	43’-6”	43’-1”
4 Bedroom – Width	19’-8”	20’-6”
4 Bedroom Area (Net SF)	845	829



Typical Unit

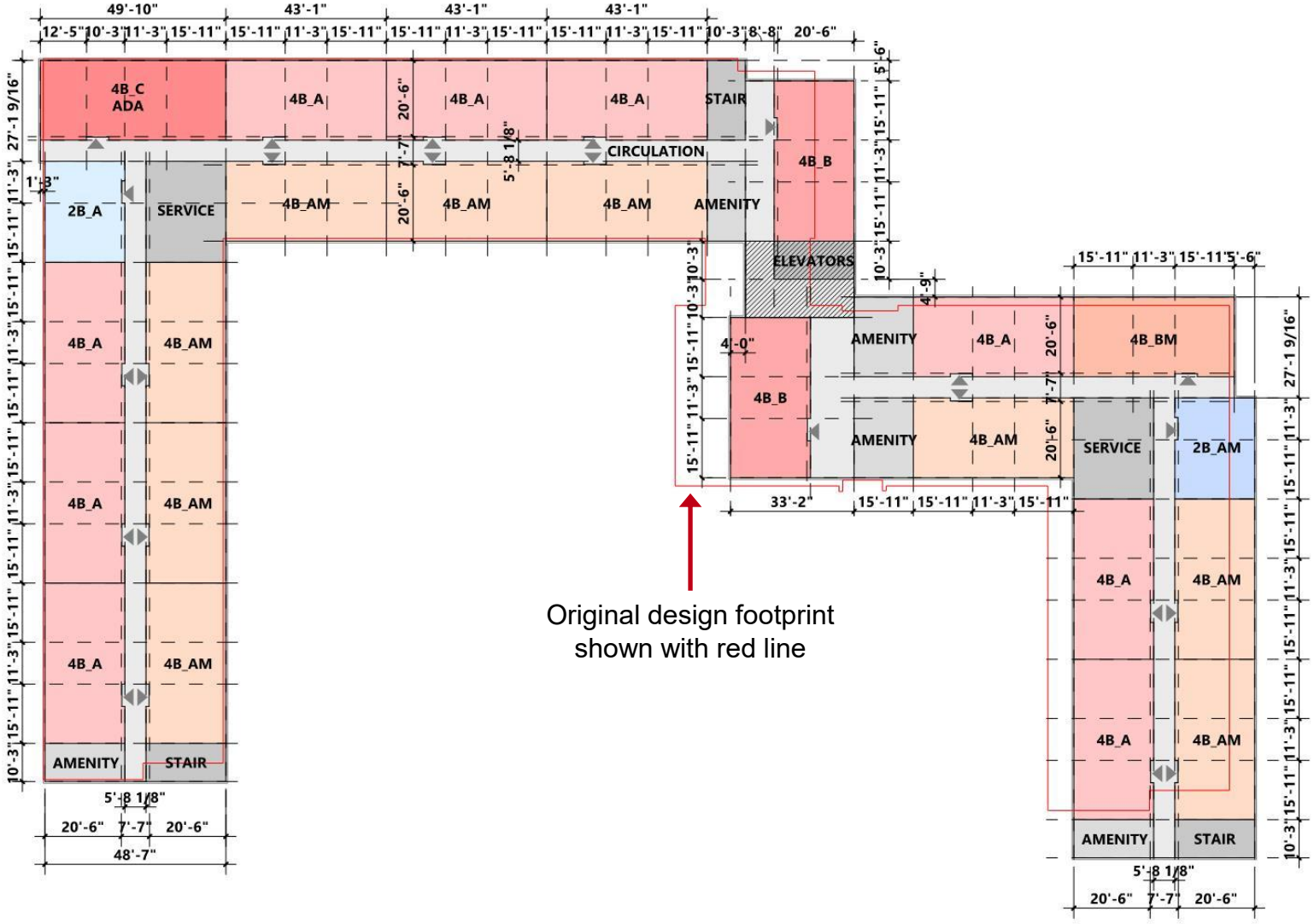
Original Design

MODULAR MODIFICATIONS

- **A** Site Built
  Elevator Core
- **B** Alignment Across Corridor
- **C** Minimum/Maximum Module Width
  (11’-0” / 15’-9” stud-to-stud)
- **D** Mate wall assembly is 11 5/8”

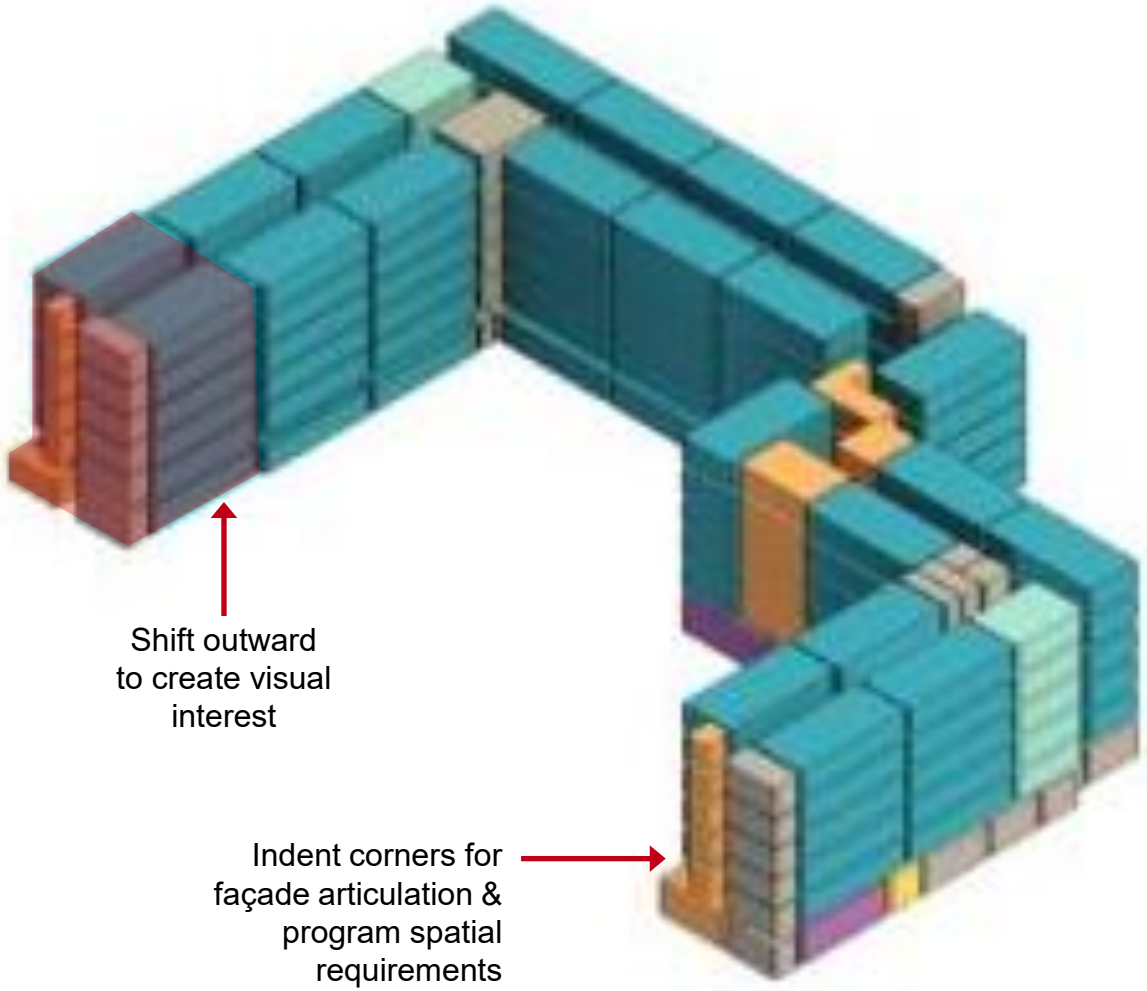
VBC Design Modifications

	Original (GSF)	Modified (GSF)
B/Level 2 – Modular	-	28,951
B/Level 2 – Site Built	-	1,245
B/Level 1 – Total	28,703	30,197



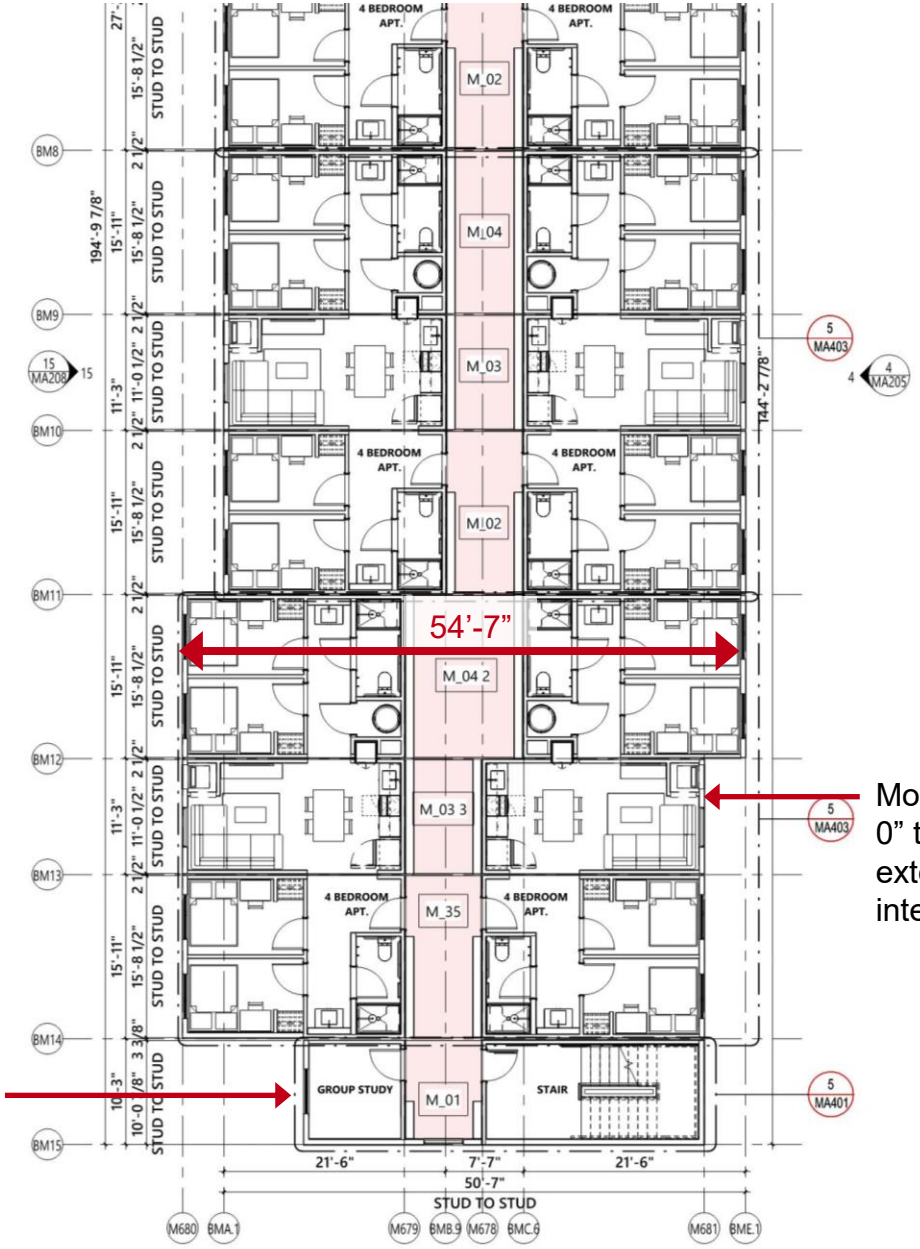
VBC Design Modifications

Continued Collaborative Design



Shift outward to create visual interest

Indent corners for façade articulation & program spatial requirements



Indented corner

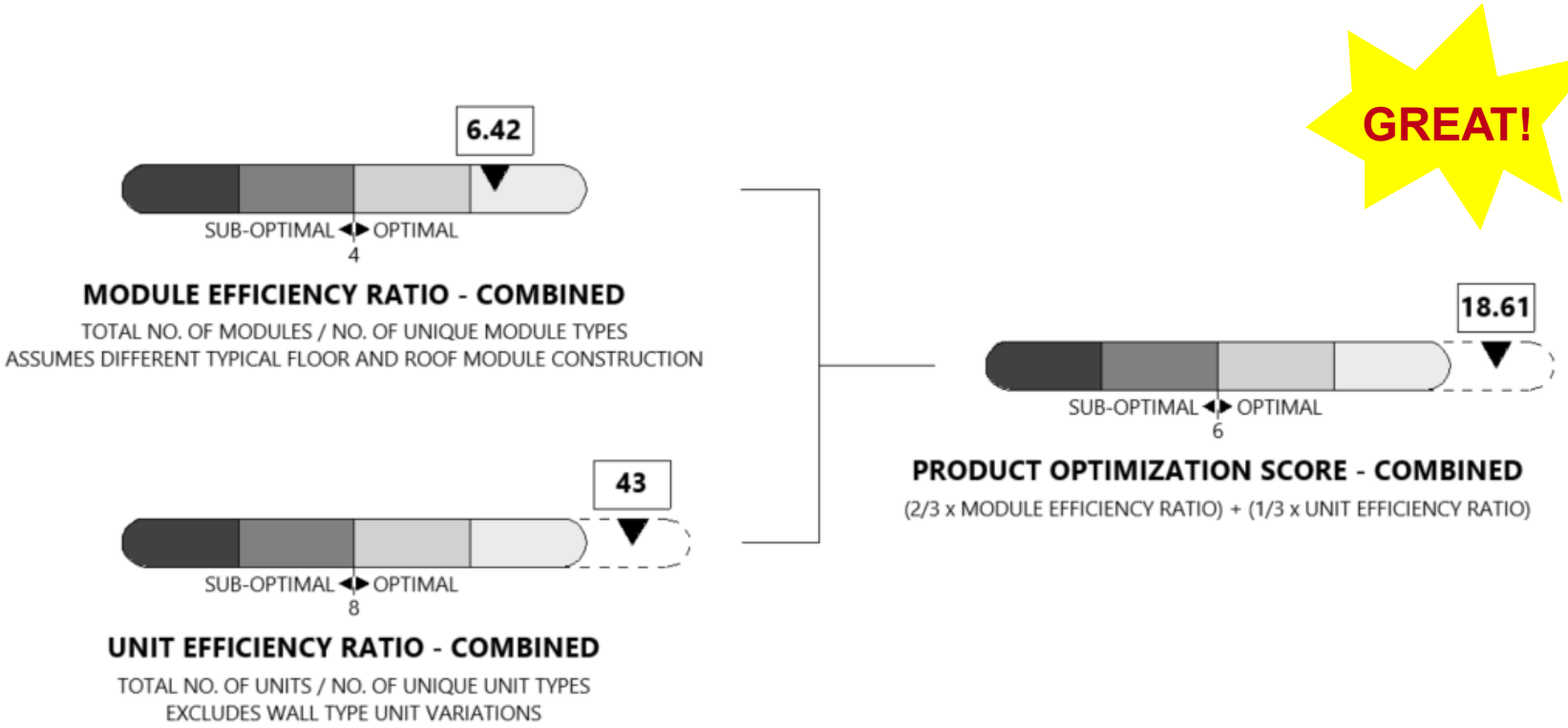
Module shift 4'-0" to create exterior visual interest.

Continued Collaborative Design

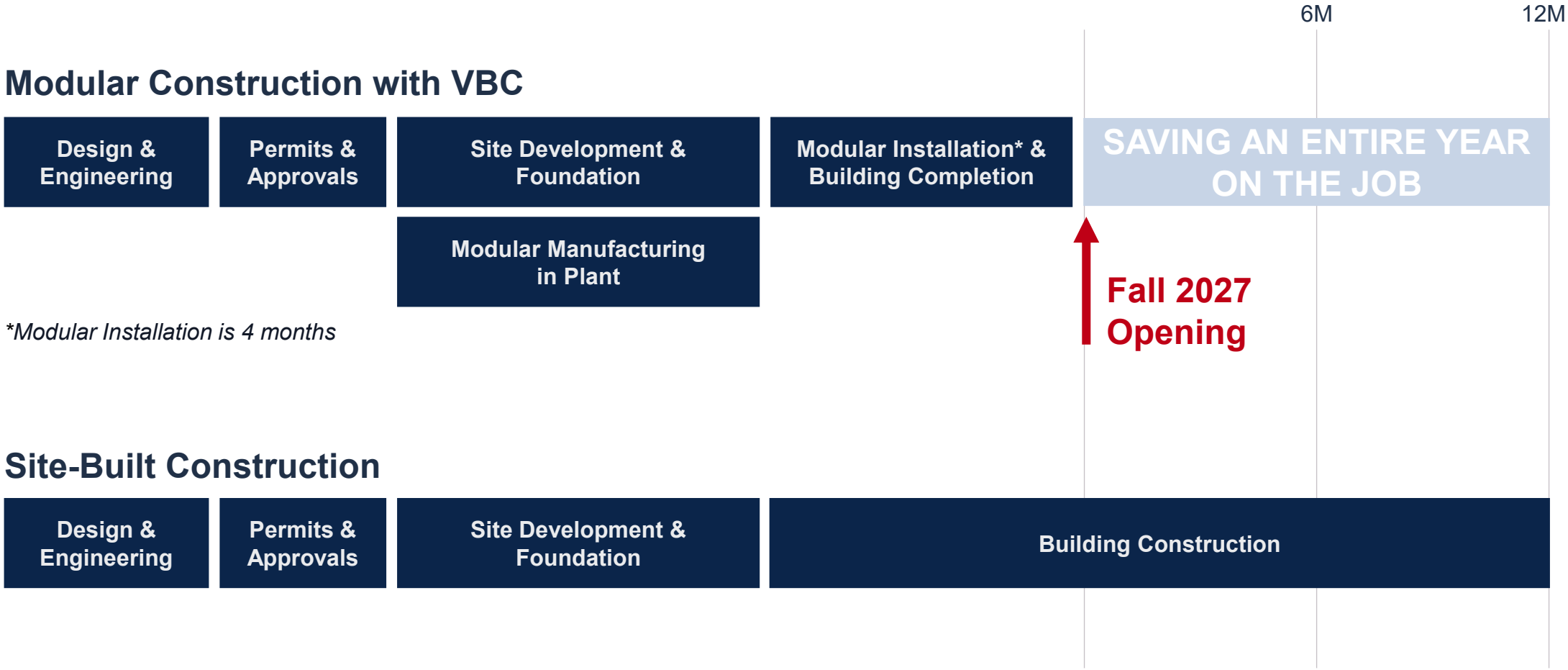
VBC Design Modifications

Total Number of Modules	Unique Number of Modules	Modular Efficiency
411	64	6.42

Total Number of Units	Unique Number of Units	Unit Efficiency
215	5	43



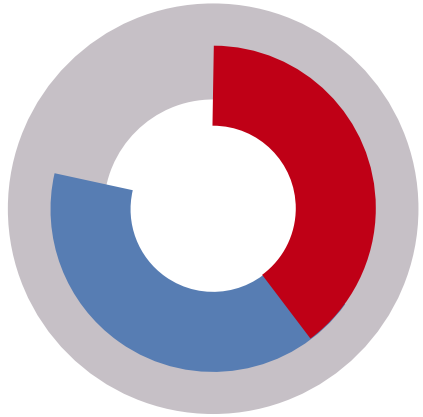
Faster Time to Market

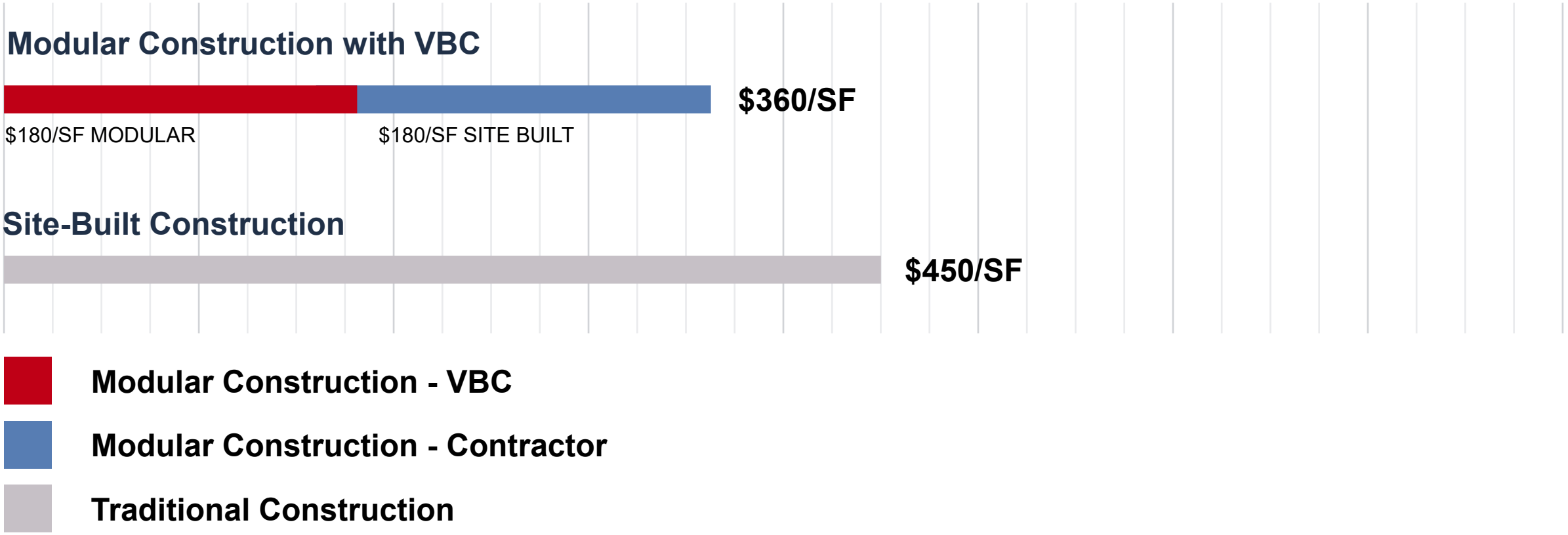


Comparative Cost Per Square Foot

20%

CONSTRUCTION COST SAVINGS





Visit Berwick

VBC is offering Berwick factory visits to attendees driving to/from the The Society for College and University Planning Mid-Atlantic Conference + other interested parties on May 19 & 21, 2025.

Please scan to join!

We look forward to connecting.

WWW.VBC.CO

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