

LINDEN GROVE

High-Rise Modular

Developer	Blue Sea Development Company Gilbane Development Company
Service Provider	Jewish Association Serving the Aging [JASA]
Public Partners	NYC Housing Authority NYC Housing Preservation and Development NYC Housing Development Corporation NYSERDA
Architect	Chris Benedict, R.A.
Structural Engineer	Murray Engineering
Energy Consultant	Steven Winter Associates
Financial Partners	T.D. Bank Raymond James

Hope Gardens NYCHA

Linden Grove



Type	Affordable Senior Housing
Height	13-stories
Units	153 (30% formerly homeless set aside)
Area	100,000 gsf
Construction	Volumetric Modular
Certifications	Target: PHIUS+ 2021, LEED Platinum, Energy Star, NGBS, Fitwel
Completion Target	Spring 2024



Overall
CONSTRUCTION PERIOD

26 months

Underwriting

21 months

Target

16 months

Best Case

Bottom Line
POTENTIAL SAVINGS

\$450K per month

- Construction Interest
- Annual LC Fee
- General Conditions
- Site Safety Manager
- Crane Rental

x 10 months

= \$4.5M

= \$45/sf

Modular DESIGN

- Layout Efficiency
- UL vs Proprietary System
- Column vs. Bearing Wall
- Façade Type
- Module Dimensions
- Connection Details
- Waterproofing Strategy
- Mechanical penetrations
- Design Preparedness



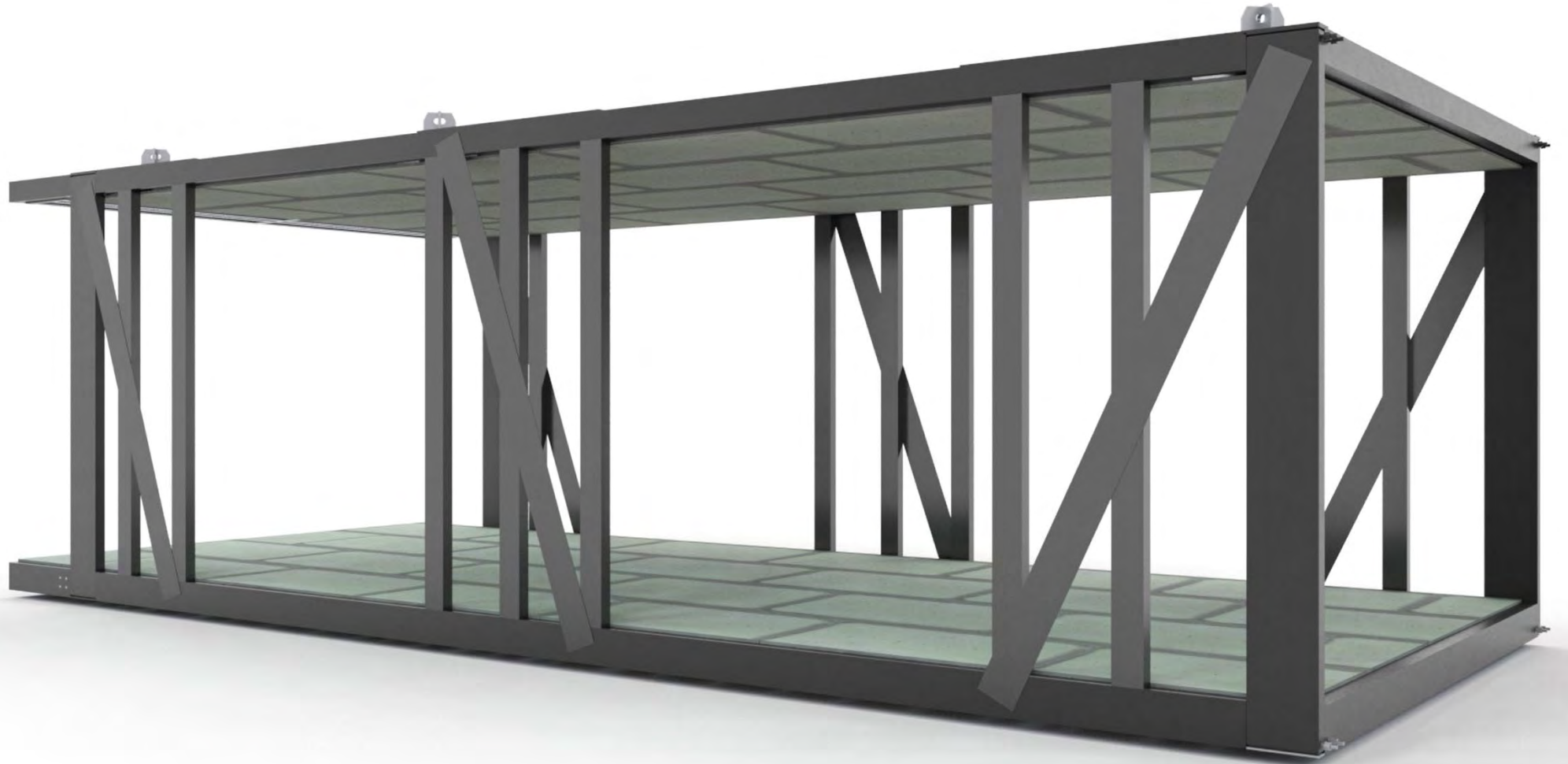
MODULE LEGEND		
X1	STUDIO + CORRIDOR	
X2	1BDRM [paired with X1]	



Modular MANUFACTURING

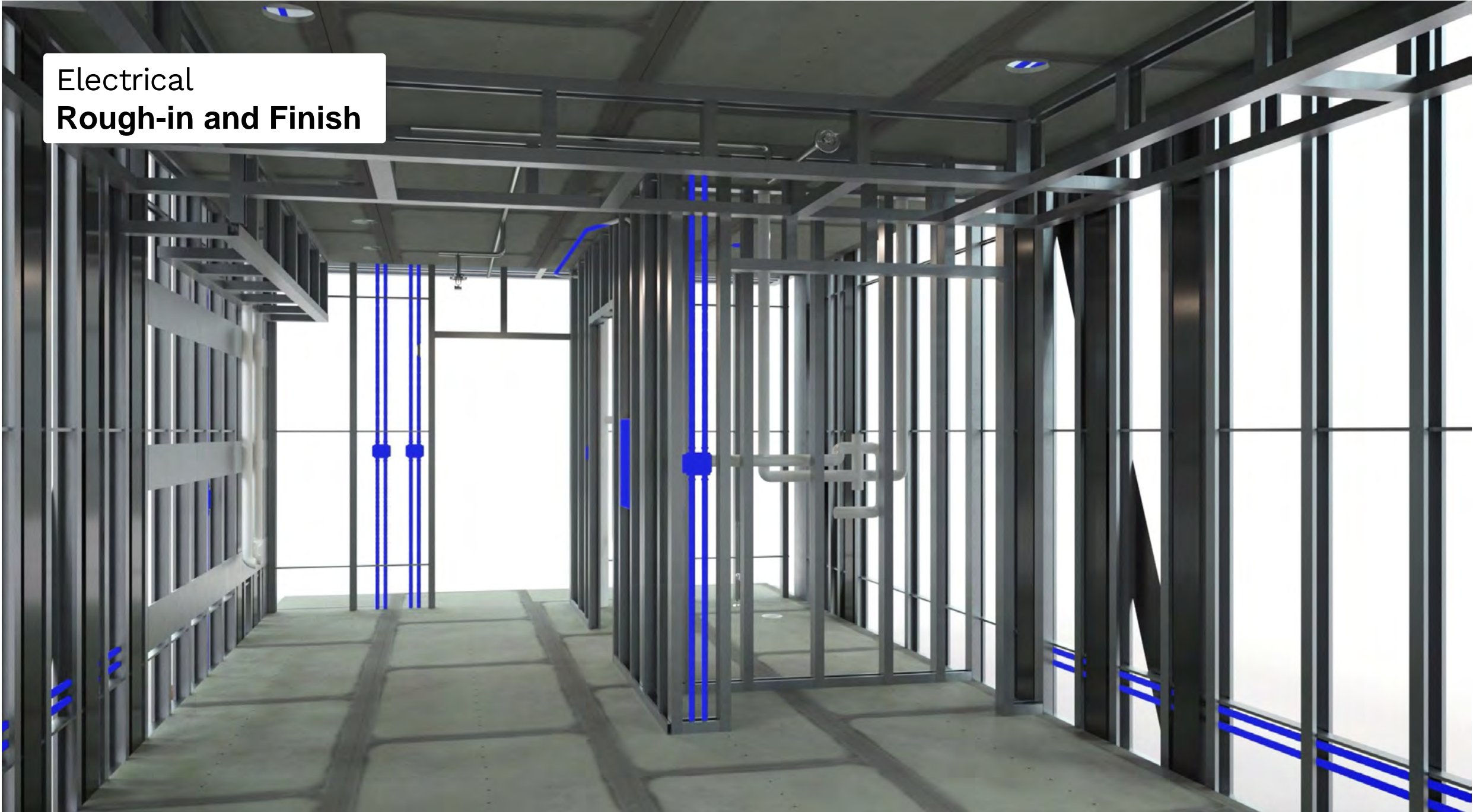
- Who will build it?
- Factory Location
- What type of Manufacturing system?
- Factory Pipeline
- Subcontractor Dependence
- Bonding Capacity

Modular
ASSEMBLY

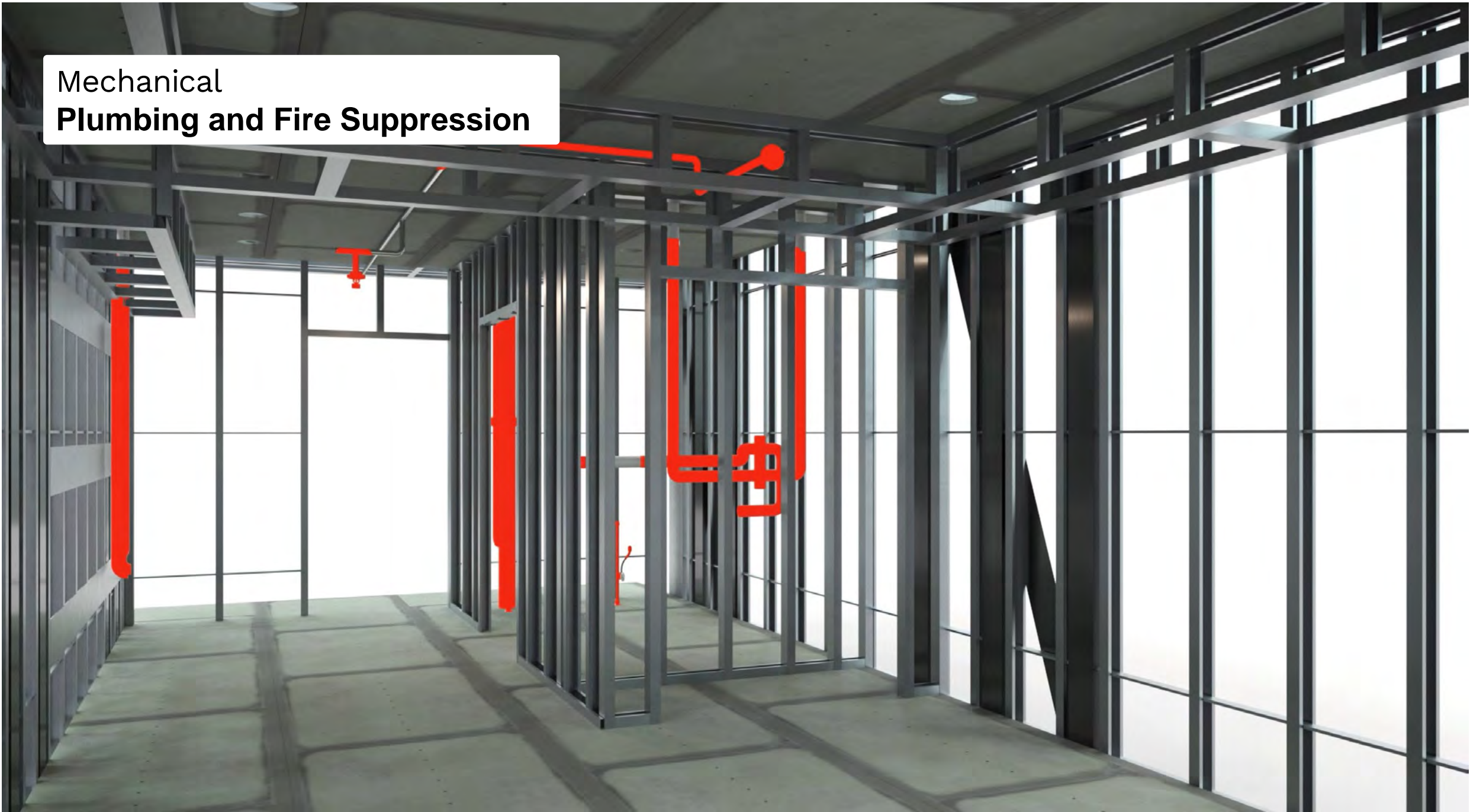




Electrical
Rough-in and Finish



Mechanical
Plumbing and Fire Suppression



HVAC
VRF and ERV





Air Tightness
BLOWER DOOR TEST RESULTS

0.3 cfm50/sf

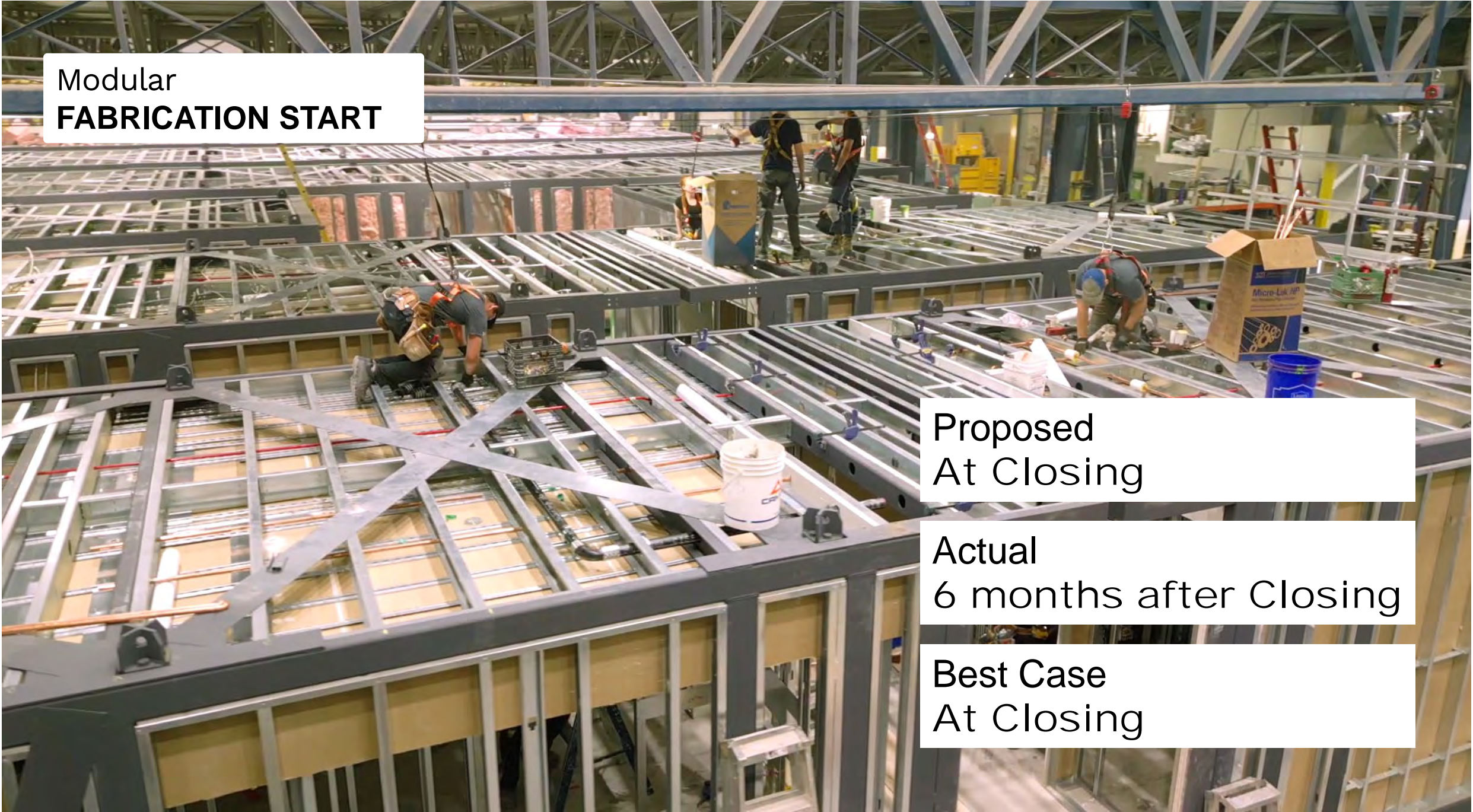
Requirement
Passive House
LEED
Energy Star

0.15 cfm50/sf

Actual

2X

Modular
FABRICATION START



Proposed
At Closing

Actual
6 months after Closing

Best Case
At Closing



Modular
FABRICATION

Completion Rate
4 modules per day

Proposed
5 months

Actual
7 months

Best Case
5 months

Layout
TYPICAL



One Bedroom



Studio

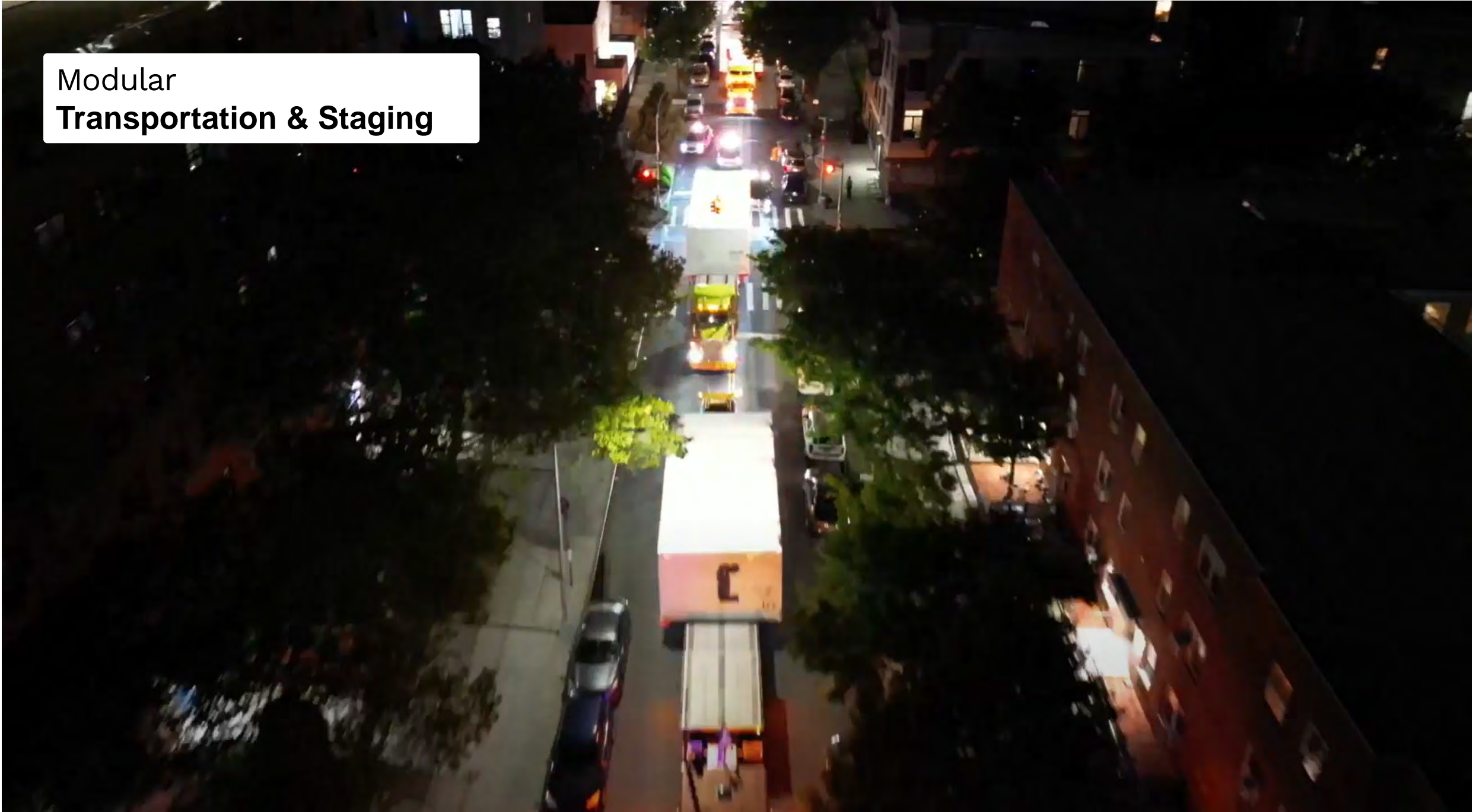






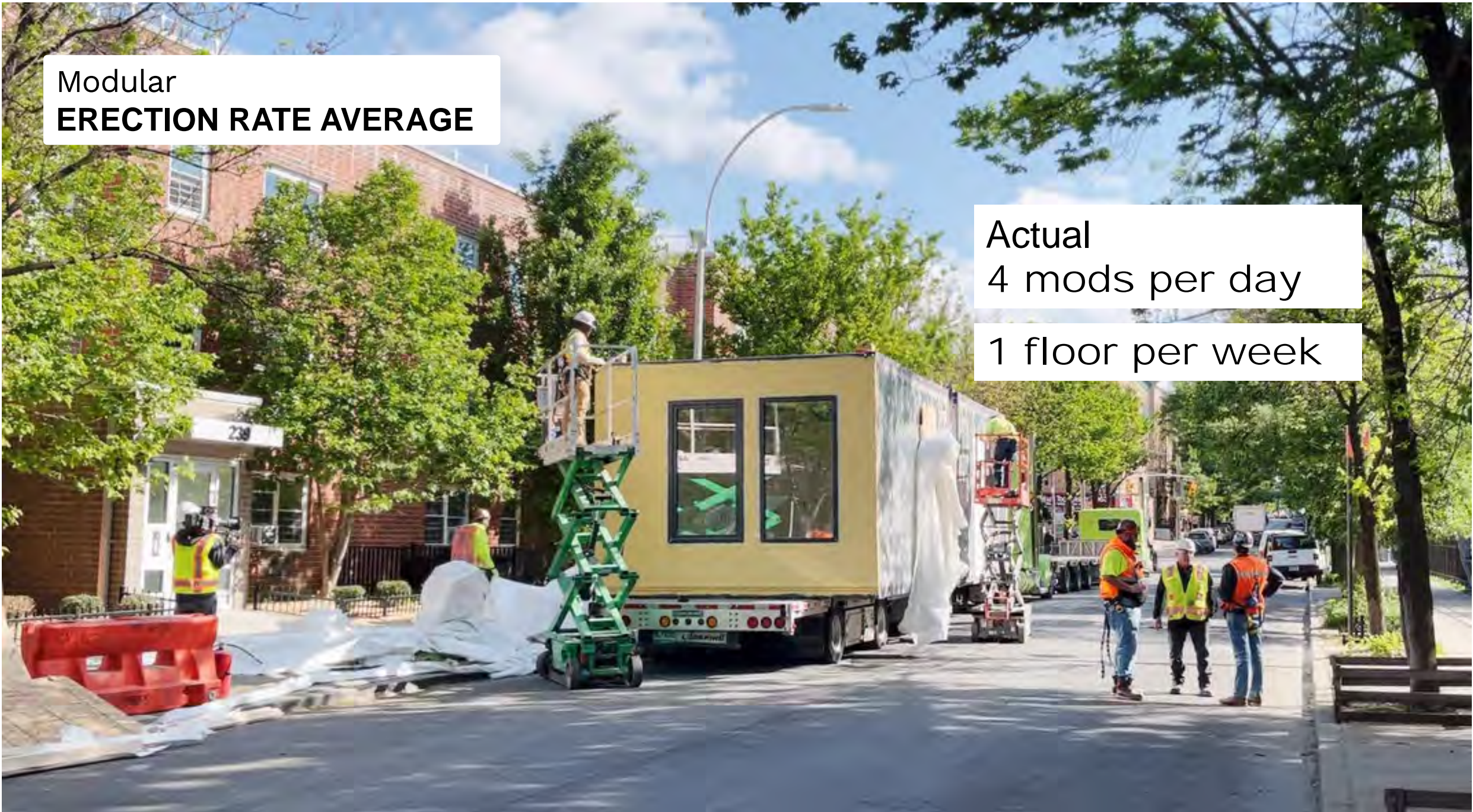


Modular
Transportation & Staging



Modular
ERECTION RATE AVERAGE

Actual
4 mods per day
1 floor per week



Modular
ERECTION RATE PEAK

Actual
8 mods per day

1.8 floors per week





Modular
ERECTION PERIOD

Proposed
3 months

Actual
3 months

Best Case
12 days

Street Traffic
COMMUNITY DISRUPTION



	PRECAST	MODULAR
Component Pieces	2,000+	300+
Truck Loads	1,000+	150+
Crane Picks	1,000+	350+

Lessons LEARNED

1. **Minimize price uncertainty and financial risk:** 100% CDs and Specifications needed minimum of two months prior to closing to allow for bid leveling and final pricing (reducing potential change orders)
2. **Fabrication Mobilization:** Begin fabrication as soon as possible to ensure a sufficient stockpile for continuous erection of modules. Module stockpile size must be matched to fabrication and erection speed.
3. **Erection Speed:** Base Fabrication timeline off need for at least 8-10 modules per day
4. **Erection Speed:** Plan for some extended workdays/Saturdays to minimize possible weather-related delays
5. **Design for Erection Speed:** Minimize welded connections between modules
6. **Erection Speed:** Lost opportunity for 12 erection days [Mondays] during 3 months erection due to NYC transportation limitations that prohibit crossing bridges with oversized loads on Sunday night. Look at additional staging area in Brooklyn to add Mondays as an erection day, but also would add expense due to double handling of the module trailer.
7. **Schedule:** Include storm and sanitary rough-in riser piping to modules to further reduce field work, material deliveries, etc.
8. **Design:** Include fire rated waterproof membrane on modules from factory, change to bolted connections where possible, design corridors as separate modules with HVAC, electric, sprinkler and plumbing lines incorporated, design with precast or steel frame building cores



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