

# Tackling Missing Middle Housing Using Offsite Construction

World of Modular 2025

2025 **WORLD OF**  
**MODULAR**  
ANNUAL CONVENTION & TRADESHOW

# Meet Your Speakers



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# The Project



Tackling Missing Middle Housing Using Offsite Construction



# Project Program

## The Midland Apartments

- Located in Buena Vista
- Walkable to Main Street
- 60 Income Restricted Apartments
- Modular Construction



60 Units



30 Studio Units



24 One Bedroom Units



6 Two Bedroom Units



Energy Efficient



High Efficiency Heating and Cooling



High-Speed Internet Availability



Future 4,600 sf Early Childcare Center



# The Partners



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2025 WORLD OF MODULAR



# Team Modular Experience



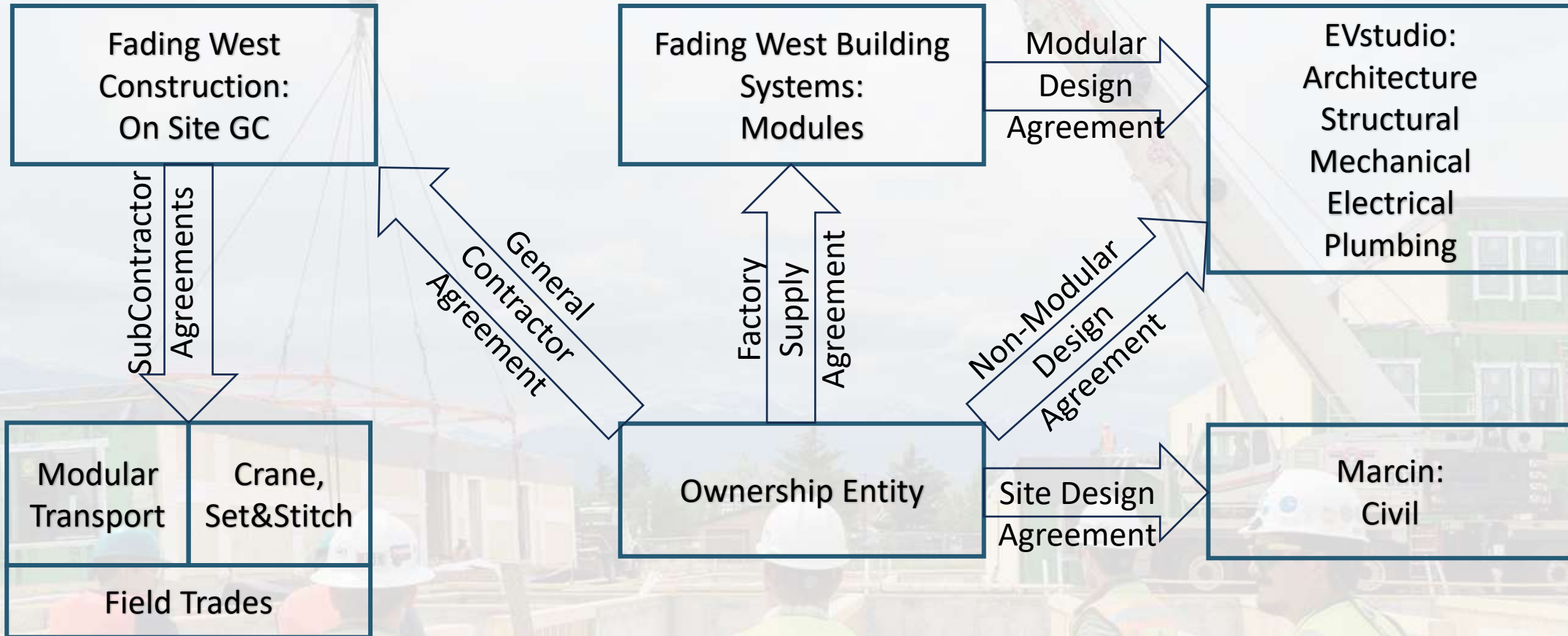
- Fading West Development
- Fading West Construction
- Fading West Building Systems
- NTA (Third Party Review)
  
- Setworks
- Transport: Westervelt and T&J
- Johnson Controls (FP)

- Architecture
- Structural Engineering
- Mechanical Engineering
- Electrical Engineering
- Plumbing Engineering

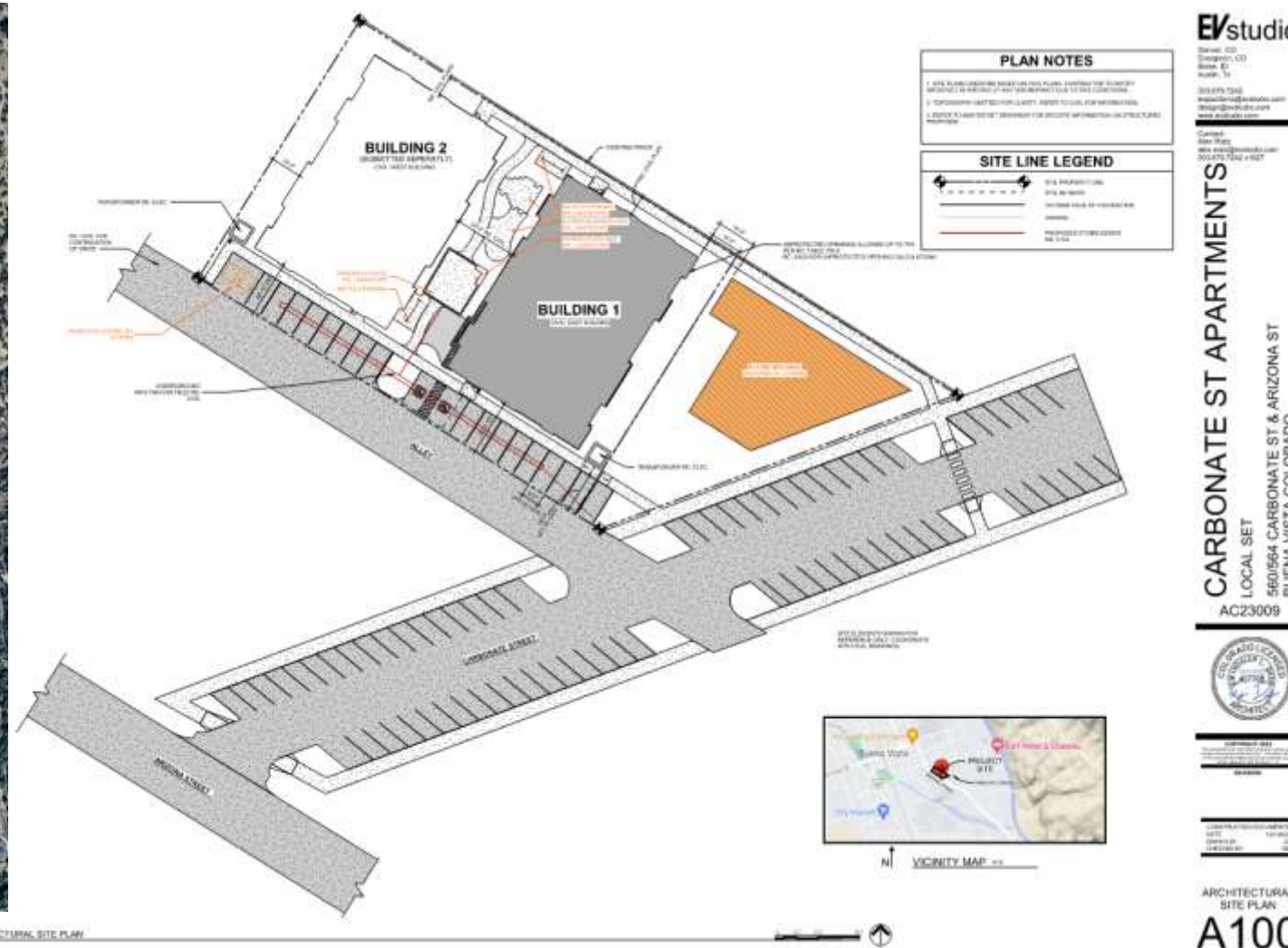
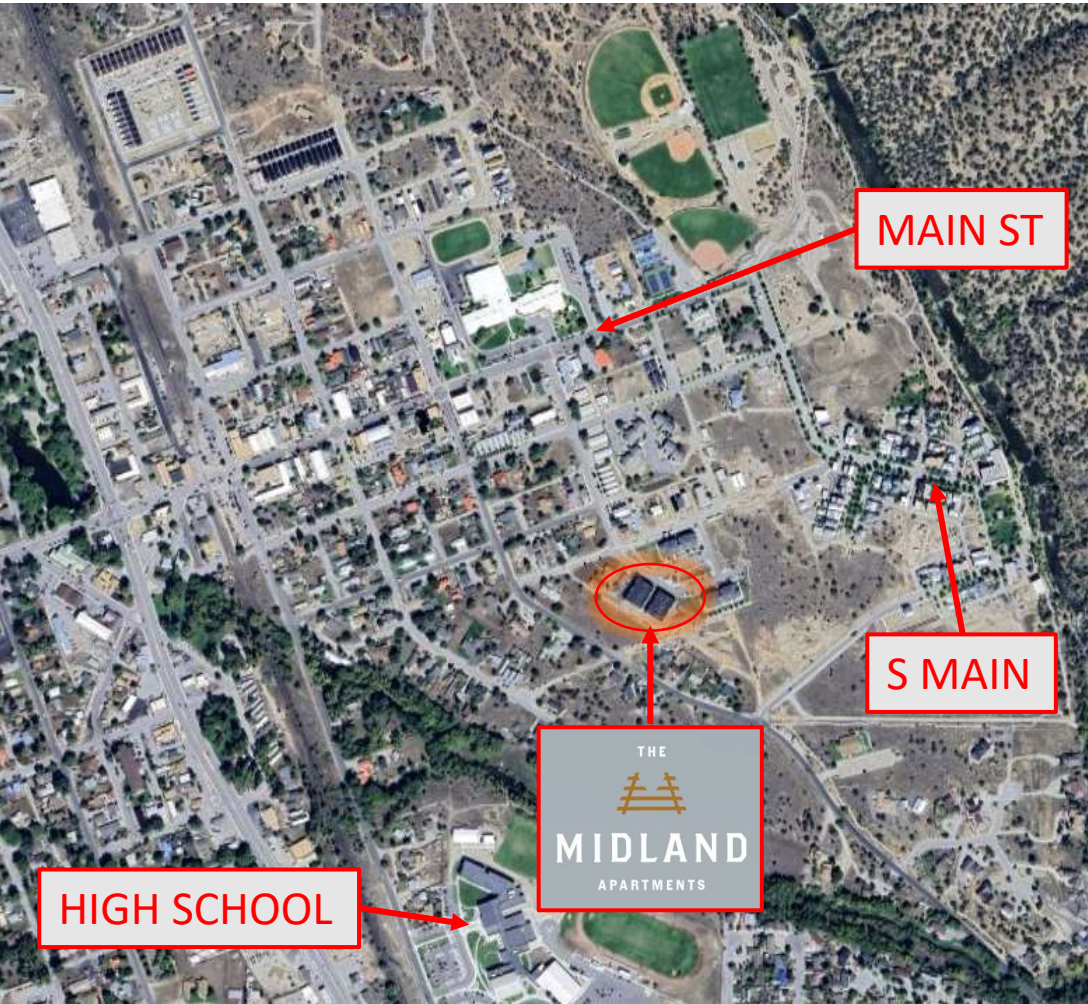




# Contracting



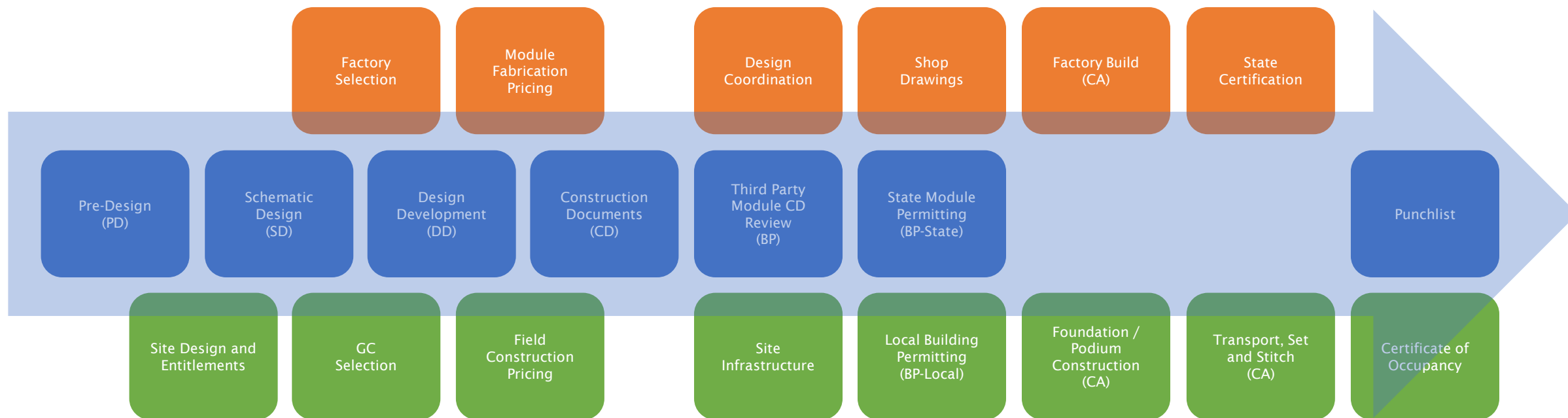
# The Site







# The Process



# Entitlements



- Six rounds of Submittals with Town
- 2-3 Month Delay in Schedule to Start Site Work
- Modules Manufactured in Advance of Site Prep
- Storage and Maintenance of Modules
- Quantifying Costs

# The Design



- Similar Phases like any other project  
PD, SD, DD, CD, CA
- Two Sets of Documents
- Scope Delineation
- Document Management Plan







# Assemblies

**WALL TAG LEGEND**

**PARTITION NOTES**

- SEE FLOOR PLAN FOR THIS PARTITION LOCATION.
- REFER TO THE LOCAL BUILDING CODE FOR ALL STRUCTURAL REQUIREMENTS AND RESTRICTIONS.
- SEE ALL PARTITION AND WINDOW SCHEDULES FOR ALL PARTITION AND WINDOW SCHEDULE REQUIREMENTS.
- SEE BALCONY AND PATIO SCHEDULES FOR ALL BALCONY AND PATIO SCHEDULE REQUIREMENTS AND RESTRICTIONS.
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**CARBONATE ST APARTMENTS**  
 MASTER SET  
 CARBONATE ST & ARIZONA ST  
 BUENA VISTA COLORADO  
 AC23009

**WALL ASSEMBLIES**  
**A050**

- Assemblies are the building blocks for unit plans
- Horizontal and Vertical Dimensional Control
- Opposite of typical outside-in design approach
- Factory SOPs and SKUs



# “Kit of Parts”

- Incorporate Production Efficiencies – Integrate into plans to optimize the build.
- Think like a Factory:
  - Velocity
  - Simplicity and repeatability
  - Materials palette within SKU supply chain



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**ACCESSIBILITY ELEVATIONS**  
**A902**



# Unit Plans



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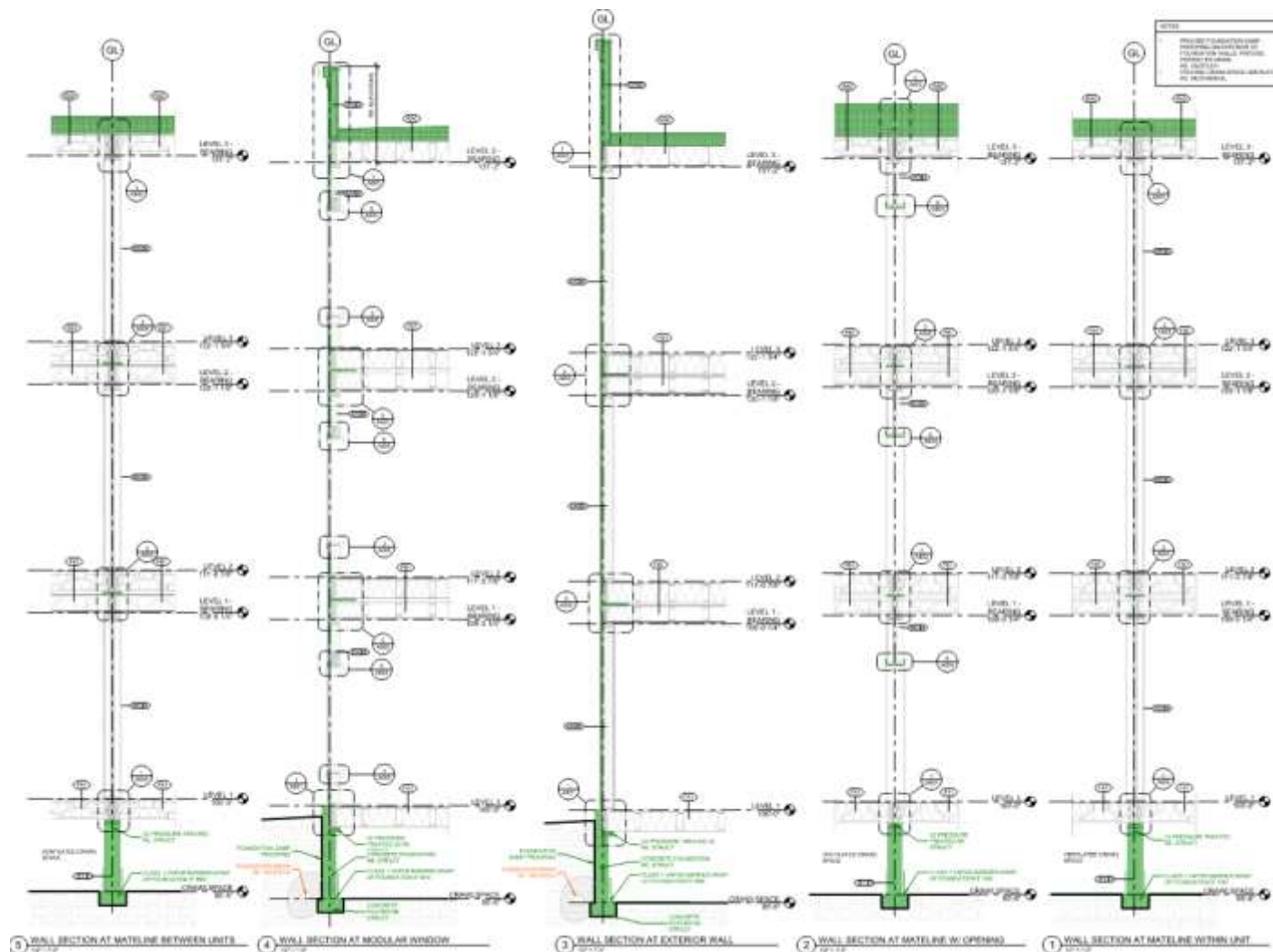
# Building Plans



- Unit Plans combine to form Building Plans
- Cross Corridor Mate Lines
- Optimize number of unique modules
- Did we mention repeatability?

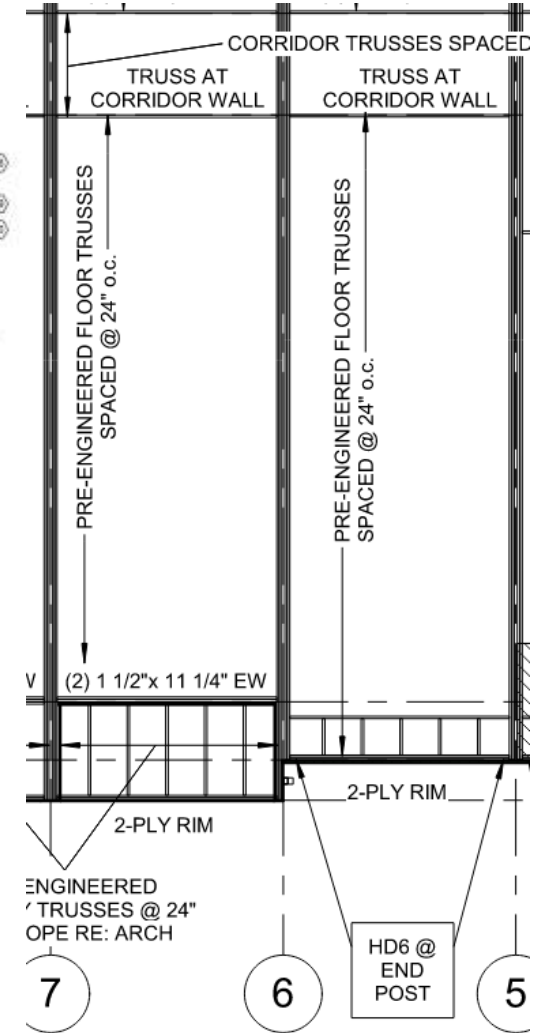
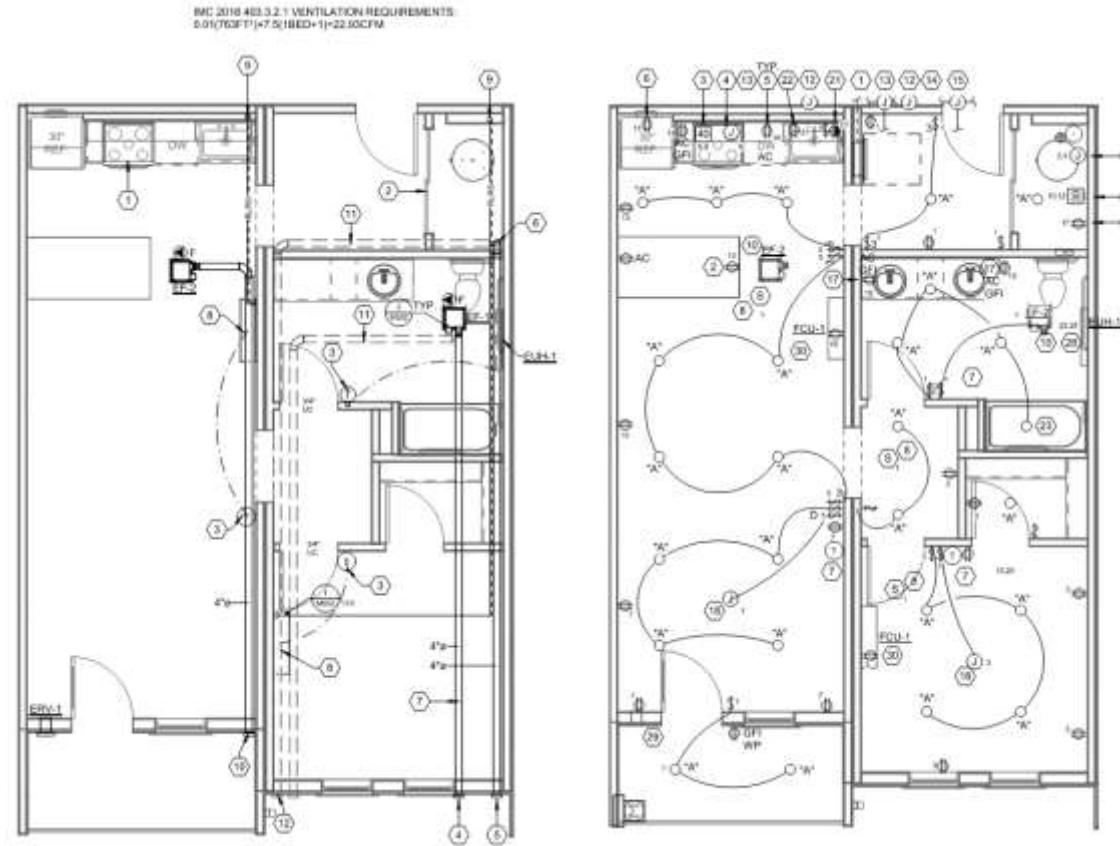
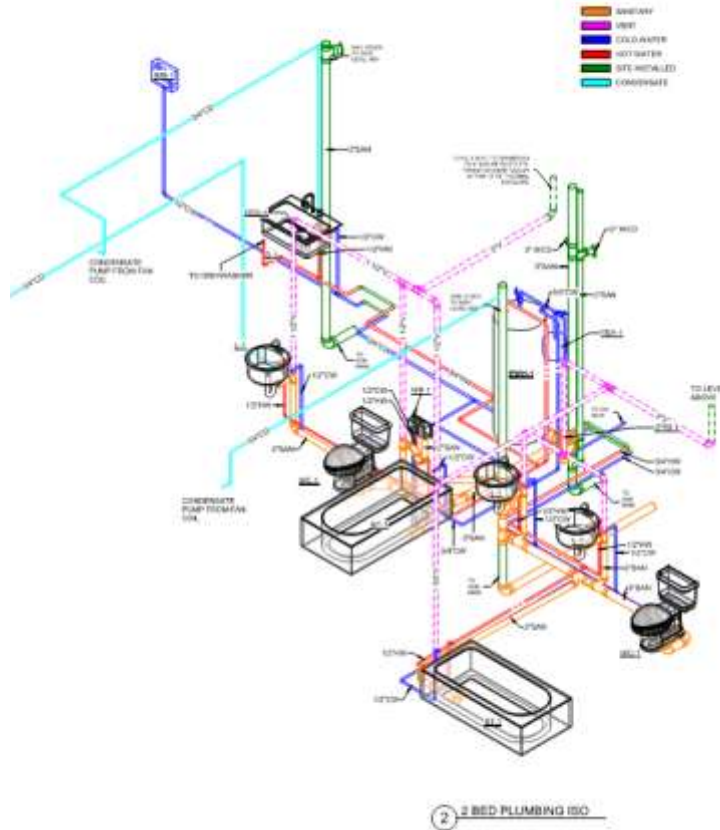


# Sections



- Think like a Factory...  
AND a GC
- Means and Methods
- Physical Constraints
- Field Work in Green
  - Every Discipline
- Fire Rated Continuity

# A/E Coordination



Rigorous Technical Review Process





# Permitting

## CARBONATE STREET APARTMENTS

LOCAL SET  
560/564 Carbonate St & Arizona St, Buena Vista Colorado

**CONTRACTOR/FACTORY**  
FADING WEST DEVELOPMENT

**OWNER**  
CARBONATE STREET APARTMENTS & LLC

**DESIGN TEAM**  
EVstudio

**CODE SUMMARY**

**SHEET INDEX**

**EVstudio**  
LOCAL SET  
CARBONATE ST APARTMENTS  
560/564 CARBONATE ST & ARIZONA ST  
BUENA VISTA, COLORADO  
AC23009

**COVER SHEET - LOCAL SET**  
G000

## CARBONATE ST DEVELOPMENT

MASTER SET  
CARBONATE ST AND ARIZONA ST, BUENA VISTA COLORADO

**CONTRACTOR/FACTORY**  
FADING WEST DEVELOPMENT

**OWNER**  
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**COVER SHEET - MASTER SET**  
G000.S

Two Distinct Sets of Plans to Coordinate and Manage



# Manufacturing Overview

## **LEAN MANUFACTURING**

***State of the Art factory set up in a U-shape design with sub-assemblies and kitted parts in the center***

- 110,000 Sq. Ft
- 30 Acre Lot
- 102 Direct Labor Employees
- 20 Factory Support Employees
- 20 In-Line Assembly Stations
- 25,000-40,000+ Sq. Ft. Monthly
- 25-40+ Houses Produced Monthly





# LEAN Manufacturing

## UTILIZING LEAN MANUFACTURING

HOW WE BUILD HIGH-QUALITY, ARCHITECTURALLY INTERESTING ATTAINABLE BUILDINGS

### PROCESS

Maximizes customer value by eliminating waste through the entire value stream.

### TOOLSET TO ELIMINATE WASTE

Waste – any actions that do not create value for the customer.







# Manufacturing – Metrics for Success

## METRICS TO MEASURE FACTORY PERFORMANCE DAILY

### DAILY MANAGEMENT ENSURES:

#### SAFETY

- *Daily safety inspections*
- *Safety occurrences*

#### QUALITY

- *In-line quality inspections*
- *First pass yield*

#### DESIGN

- *Engineering shops accuracy*

#### INVENTORY

- *Inventory levels*
- *Stockouts*

#### VELOCITY

- *Factory turns per day*



# Built in Quality



## BUILT TO LAST

- 20% LONGER LIFE THAN STICK BUILT
- 75% REDUCTION IN MATERIAL WASTE
- MEETS ENERGY STAR PERFORMANCE
- EXCEEDS NEW IECC REQUIREMENT
- < .8 IN BLOWER DOOR TEST





# Field Work During Fabrication

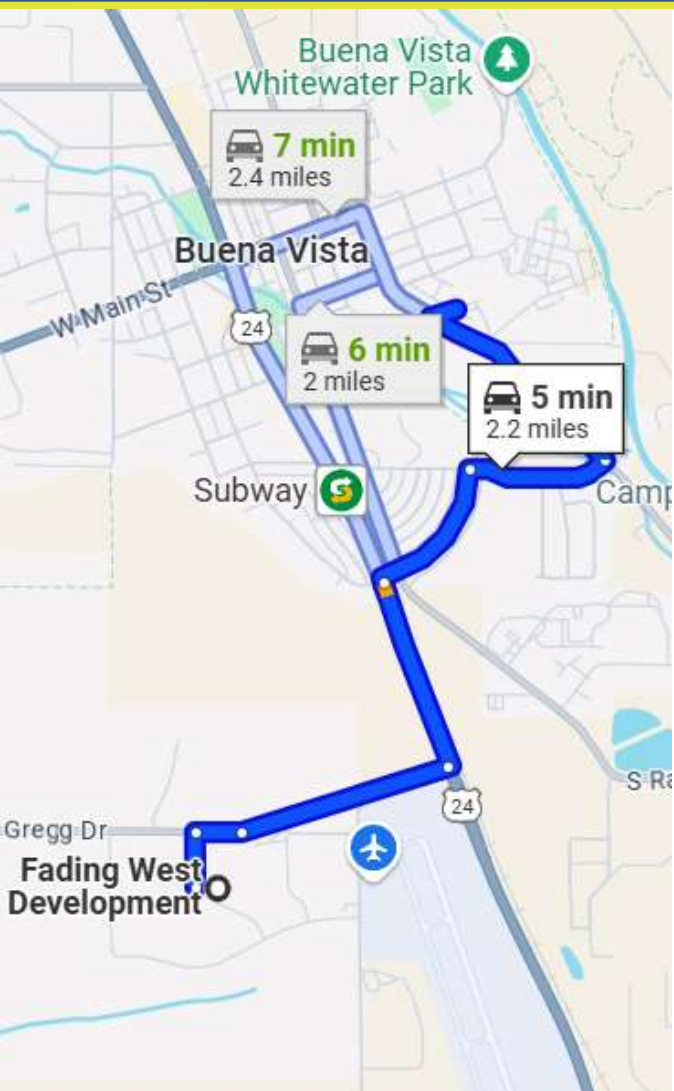


- Ideally Concurrent with Manufacturing
  - Site preparation
  - Site grading
  - Foundations
  - Crawlspace walls
  - Foundation waterproofing
  - Underground utilities
- Delays in Entitlements set back site work Schedule





# Transport



- Logistics and Costs
  - Transport Cost / Mile
  - Shuttling Cost / Day
  - Staging Important
- Route
  - Not Always Shortest
  - Dry Run
  - Permits
  - Module Load Size



# Field Work – “Set and Stitch”



- During Set
  - Coordinate Shuttling
  - Coordinate Crane
  - Align and Set Modules
  - Blind Side Structural Connections
  - Maintain Waterproofing
  - Inspections and QA process



# Field Work – “Set and Stitch”



- After Set
  - Structural Connections
  - Parapets
  - Roofing
  - Mechanical Crossovers
  - Plumbing Vertical Connections
  - Electrical Crossovers
  - Electrical Distribution
  - Closing up and finishing Mate Lines
  - Fire Protection
  - Low Voltage
  - Exterior Siding
  - Railings, Awnings
  - Corridors and Stair Finishes
  - Inspections





# SET VIDEO





# Project Schedule

- Start of Factory Production: 11/26/2023
- Completion of Factory Production: 2/14/2024
- Start of Site Work: 4/22/2024
- First Building Set: 6/17/2024 (4-5 Days)
- Second Building Set: 7/9/2024 (3-4 Days)
- Target TCO: 4/15/2025
- Landscape and Paving to follow (Based on Weather)
- Total Schedule could be shortened if no Entitlements Delays

# Unit Summary and AMI Stats



## Unit Mix Assumptions

<u>Model / Unit Type</u>	<u>Size</u>	<u>Count</u>	<u>Housing Cost</u>	<u>AMI</u>	
<b>Multifamily Units</b>					
Studio		418	30	\$1,289	79%
One Bedroom		757	24	\$1,949	112%
Two Bedroom		1,092	6	\$2,544	120%
Circulation		10,860	-	-	0%
[Placeholder]		-	-	-	0%
<b>Weighted Average / Total:</b>		<b>621</b>	<b>60</b>	<b>\$1,679</b>	<b>96.3%</b>



# Sources and Uses of Funds



## Sources and Uses of Funds

Sources of Funds		Loan to Cost	Last \$ Loan to Value**
LP Equity	\$1,955,000	10.8%	
GP Equity	\$1,730,000	9.5%	
Senior Construction Loan - CPB	\$6,200,000	34.2%	40.8%
Subordinate Debt - TAHLF	\$2,850,000	15.7%	59.5%
Subordinate Debt - MIAP	\$2,000,000	11.0%	72.7%
Project Subsidies and Grants	\$3,400,000	18.7%	
<b>Total Sources of Funds:</b>	<b>\$18,135,000</b>	<b>100.0%</b>	

Uses of Funds		Per Unit	% of Total
Land	\$0	\$0	0.0%
Site Construction Costs - Residential	\$7,225,427	\$120,424	39.8%
Site Construction Costs - Childcare	\$1,196,557	\$19,943	6.6%
Factory Manufacturing Costs	\$7,542,017	\$125,700	41.6%
Soft Costs	\$1,018,843	\$16,981	5.6%
Development Fee	\$566,443	\$9,441	3.1%
Construction Cost of Financing	\$585,714	\$9,762	3.2%
<b>Total Uses of Funds</b>	<b>\$18,135,000</b>	<b>\$302,250</b>	<b>100.0%</b>

# Returns



## Targeted Returns (10-year hold)

	<u>Unlevered</u>	<u>Levered Gross</u>
IRR	9.1%	15.9%
Equity Multiple	2.0x	3.51x



# Comparison to Stick Frame



- 0-10% Lower Estimated Hard Cost of Construction
- Accelerated Schedule Yields:
  - Lower Interest Carry Cost
  - Lower General Conditions Cost
  - Lower Insurance Cost
  - Higher Return due to Faster Monthly Income
- Similar Costs:
  - Land Costs
  - Site Development Costs
  - Soft Costs
  - Development Fees
  - Finance Costs
- Total estimated 10-20% lower cost than stick frame approach



# Scalability by Repeatability



**Larkspur – Breckenridge CO**



**Sawtooth Phase II – Gunnison CO**

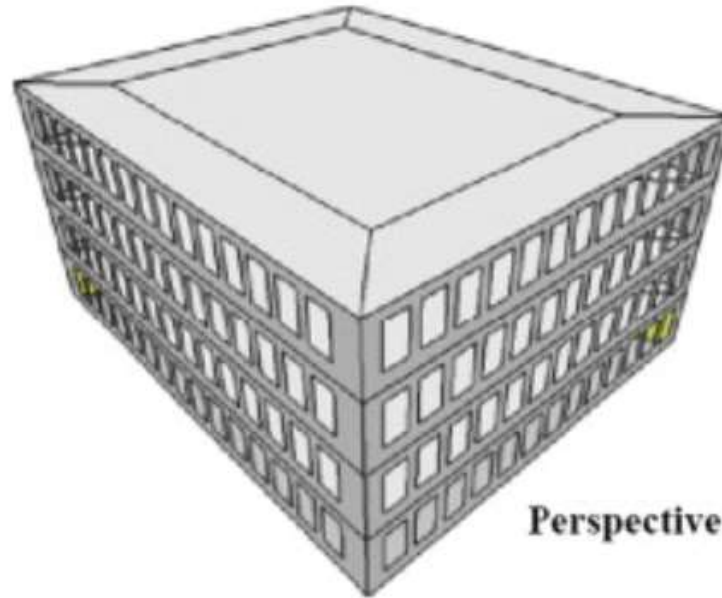


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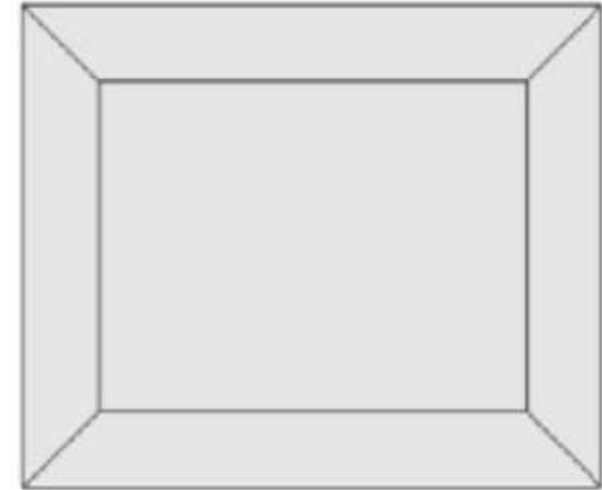


# The Stigma of Modular

It doesn't  
have to be  
this way!



**Perspective**



**Plane**

A simple rectangular building.





# Opportunities for Innovation

## Further Refinements in Manufacturing

- Advances in High Performance HVAC
- Improvements in Crossover Connections
- Scaling Procurement
- Vertical Integration of Materials
- Continuous Improvement (Kaizen)



## Reversible Design and Construction



- Construction Risk Mitigation
- Development Risk Mitigation
- Real Sustainability
- Lower Project Cost
- Cost Segregation Tax Benefits
- Secondary Markets



# Thank You!



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