

Off-Site Construction: Delivering Better Buildings

Webinar | March 26, 1-2 pm ET



SPEAKERS



Ryan M. Colker

Innovation Vice President, International Code Council



Sara-Ann Logan

Volumetric Building Companies



Jeff Brown

State Building Codes Office Director, Division of Building and Fire Regulation Virginia

Department of Housing and Community Development

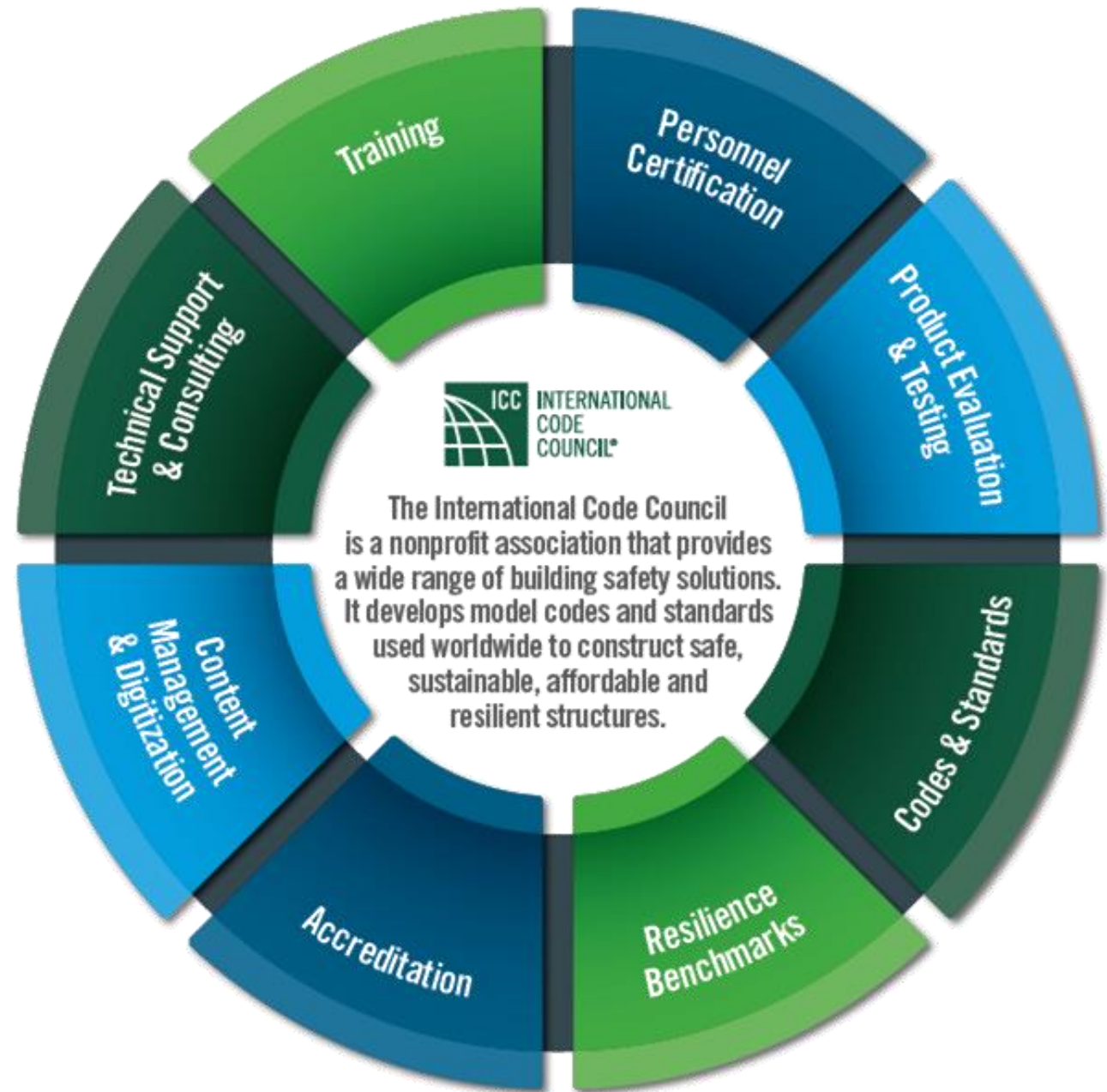


Mary Tingerthal

President, Tingerthal Group, LLC

ICC Family of Solutions

- Codes and Standards
- Personnel Training & Certification
- Product Evaluation
- Accreditation Services
- Codification & Administration Services
- Engineering Support
- Community Resilience Benchmarks[®]
- Third-Party Evaluation Services



Why Off-Site Construction?



QUALITY



WORKFORCE



SUSTAINABILITY



SPEED TO
MARKET



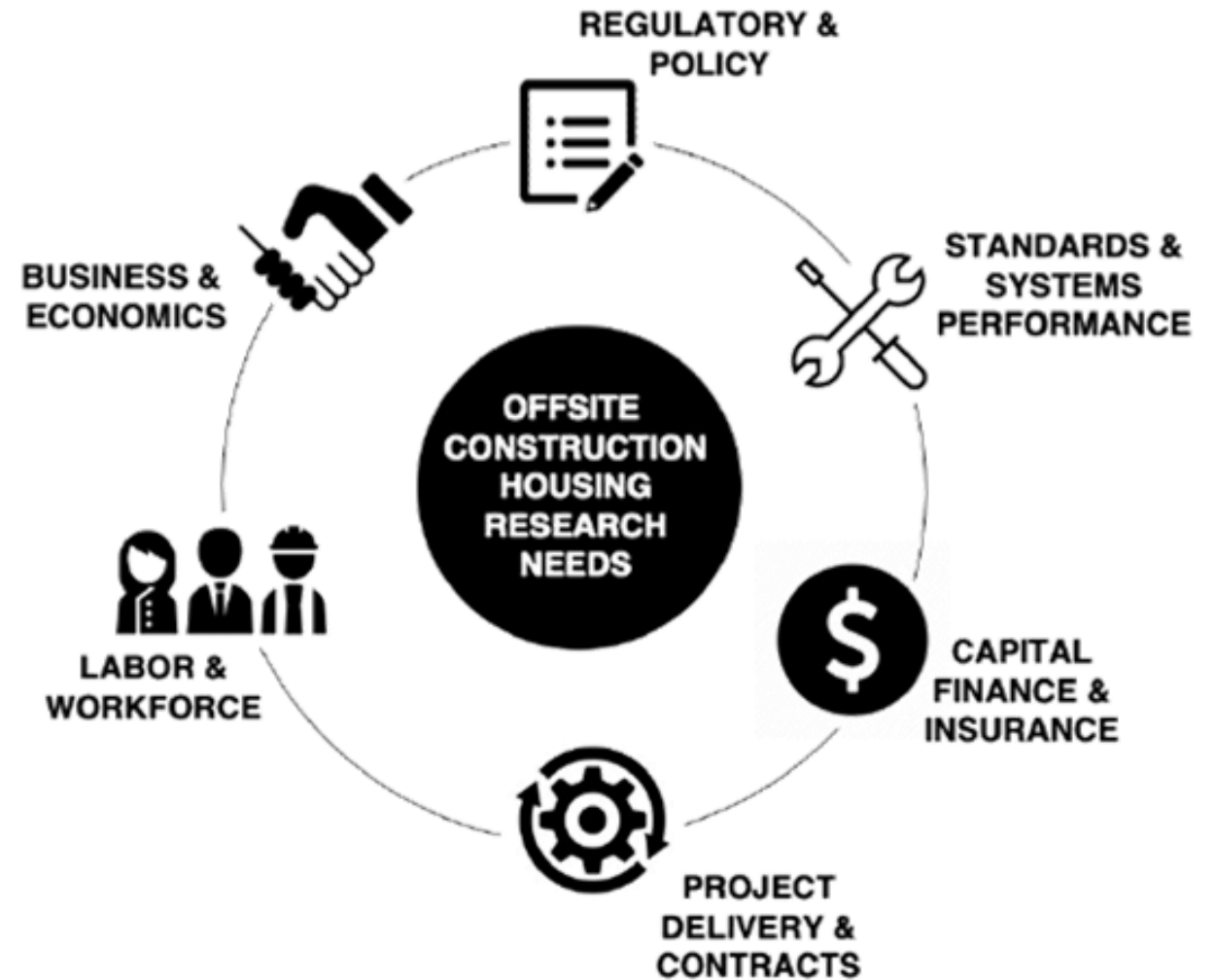
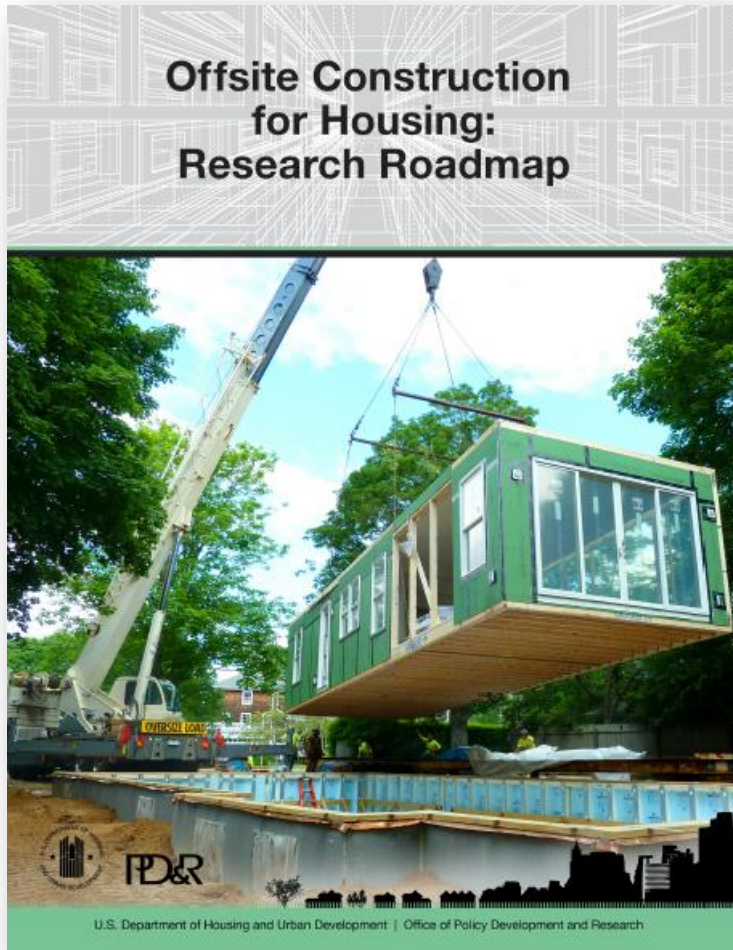
AFFORDABILITY



JOBSITE
SAFETY



HUD Off-Site Research Roadmap



What is Off-Site Construction?

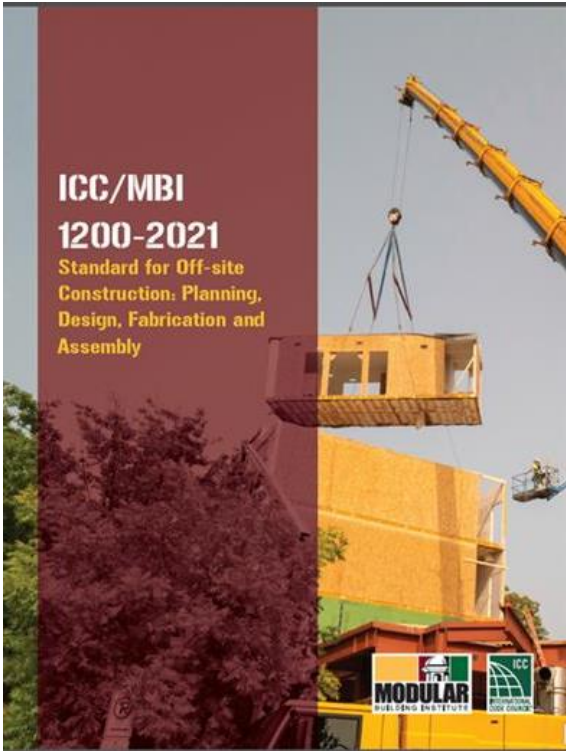
OFF-SITE CONSTRUCTION. A modular building, modular component or panelized system which is designed and constructed in compliance with this standard and is wholly or in substantial part fabricated or assembled in manufacturing plants for installation - or assembly and installation - on a separate building site and has been manufactured in such a manner that all parts or processes cannot be inspected at the installation site without disassembly, damage to, or destruction thereof.

- ICC/MBI Standard 1200/1205



Off-Site Construction Standards

**ICC/MBI
1200-2021**
Standard for Off-site
Construction: Planning,
Design, Fabrication and
Assembly

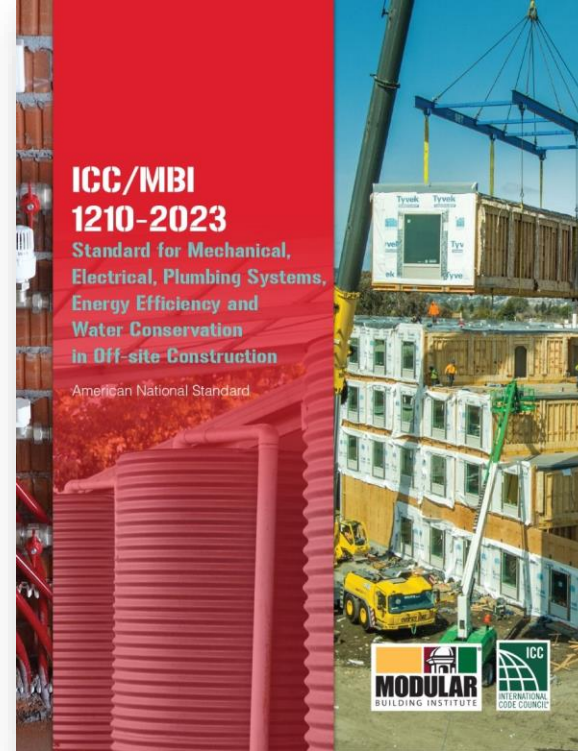


**ICC/MBI
1205-2021**
Standard for Off-site
Construction: Inspection
and Regulatory Compliance



**ICC/MBI
1210-2023**
Standard for Mechanical,
Electrical, Plumbing Systems,
Energy Efficiency and
Water Conservation
in Off-site Construction

American National Standard



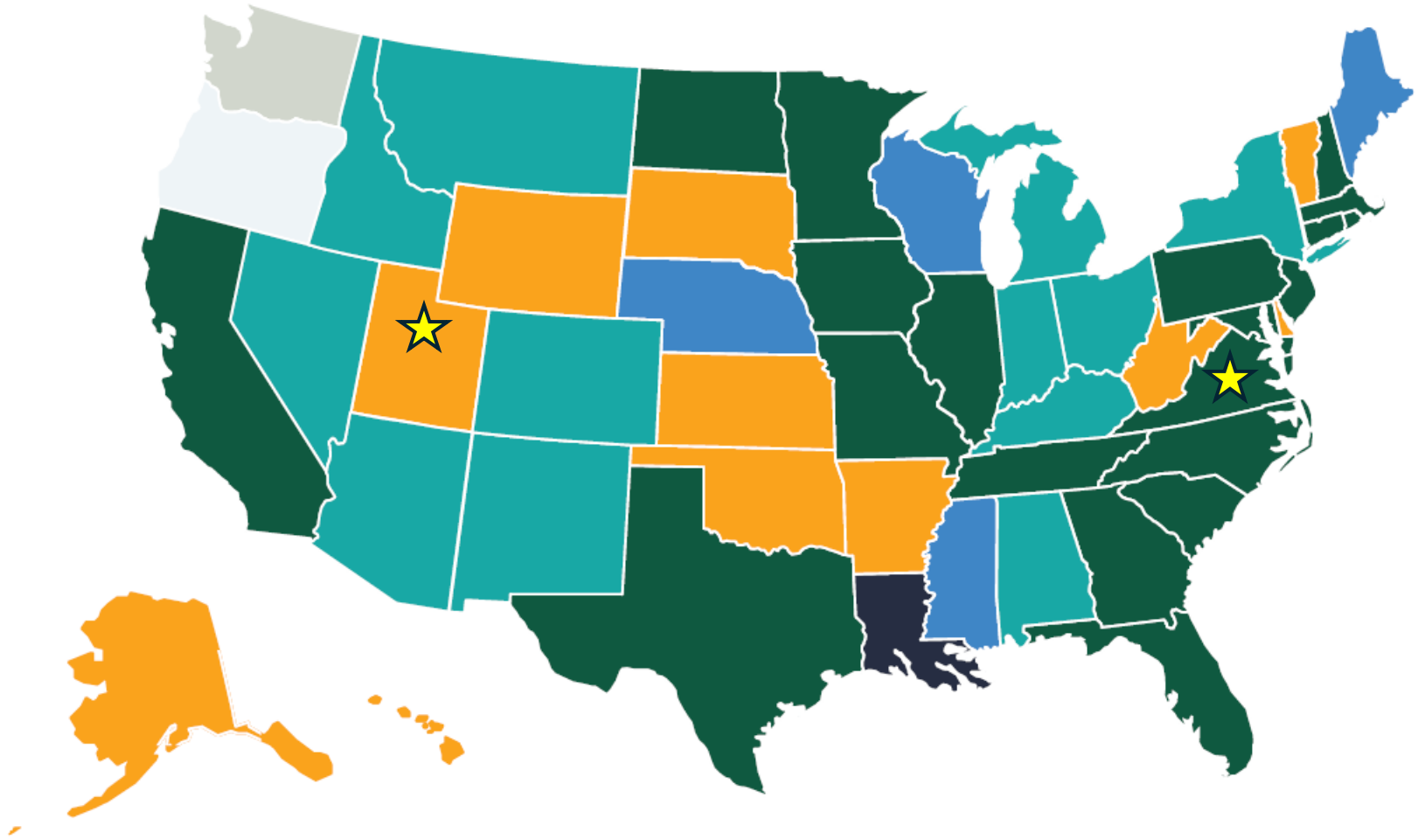
ICC G6-2023
Guideline on Advanced Panelization for Buildings



<https://www.iccsafe.org/offsite>



Plan Review & Inspection Jurisdiction Map



★ Adopted ICC/MBI
1200 & 1205

- Third Party Plan Review & Third Party Inspection
- Third Party Plan Review & Third Party Inspection - Commercial only
- Third Party Plan Review & Third Party Inspection- Residential only
- Third Party Plan Review & State Inspection
- State Plan Review & Third Part Inspection
- Local Plan Review & Local Inspection
- State Plan Review & State Inspection

Additional Off-Site Resources



Primer on Off-Site Construction, Codes, Standards and Compliance

August 2022
www.iccsafe.org



FAQs on Off-Site Construction

Why is there a growing interest in off-site construction?
The use of off-site construction is expected to increase significantly as the building industry and society struggles to address key challenges including the availability of affordable housing, a lack of skilled workers, material use and sustainability, job site safety and industry productivity.

What is off-site construction? Pre-Fab? Modular?
Off-site construction (also called pre-fab or modular construction) is defined by the [National Institute of Building Sciences Off-Site Construction Council](#) as, "the planning, design, fabrication and assembly of building elements at a location other than their final installed location to support the rapid and efficient construction of a permanent structure. Such building elements may be prefabricated at a different location and transported to the site or prefabricated on the construction site and then transported to their final location." Often, the broad concept of off-site construction is broken into additional characteristics including open versus closed construction, permanent versus relocatable and manufactured housing versus modular housing versus tiny homes.

What is the difference between open construction and closed construction?
Closed construction means that the final product cannot be inspected at the installation site without disassembly, damage or destruction. Open construction still allows for inspection of the product at the installation site. The fact that a closed construction product cannot be readily inspected at installation has caused the regulatory process to move into the factory. Examples of open construction include mechanical racking and certain panels (without embedded MEP for instance). Examples of closed construction include volumetric modules, pods, and some panelized systems.

www.iccsafe.org Page 1

Facilitating Affordability, Sustainability Goals through Standards for Off-site Construction

With national housing costs rising 52 percent from 2017 to 2022, modular construction offers an affordable solution, capable of curbing construction timelines and reducing costs.¹ Off-site construction can deliver projects 20 to 50 percent faster than traditional methods, which can provide cost savings of up to 20 percent.²

Off-site construction includes a variety of processes including production of volumetric modules (fully enclosed rooms with six sides), wall panels with integrated insulation and building system components, bathroom or kitchen pods, pre-fabricated accessory dwelling units (ADUs), tiny homes, and shipping containers, that are fabricated in a factory. Doing so enables economies of scale, increases job site safety, can ensure greater and more consistent construction quality, and enhanced sustainability through reduced waste and product spoilage. Off-site construction processes vary from traditional construction such that traditional on-site inspection methods are not adequate to determine compliance with building codes.

Currently, a patchwork of compliance processes exist for off-site construction—hindering some of the efficiency gains that off-site construction can provide.

The Current Gap in Consistency of the Off-site Construction Process
Currently, 39 states, plus Washington, D.C., regulate off-site construction at the state level. State programs are responsible for plan review and inspection of off-site construction components. However, these programs vary significantly from state to state—some states allow third-party agencies (like ICC-NTA) to conduct both plan review and in-factory inspections whereas others only allow state employees to perform these functions. There is also inconsistency in the types of projects and components covered in each state—some only cover

1. S&P Case-Shiller U.S. National Home Price Index (2017 to 2022): <https://www.spglobal.com/commodities/en/resources/news/2022/08/01/spglobal-case-shiller-us-national-home-price-index-2017-to-2022>
2. McKinsey & Company, Modular construction: From projects to products (June 2019); Galletta, et al., Building Affordability by Building Affordability: Expanding the Benefits, Barriers, and Breakthroughs Needed to Scale Off-Site Manufacturing Construction, Texas Center for Innovative Housing at UT Dallas (Mar. 2017)

Facilitating Affordability, Sustainability Goals through Standards for Off-site Construction 1

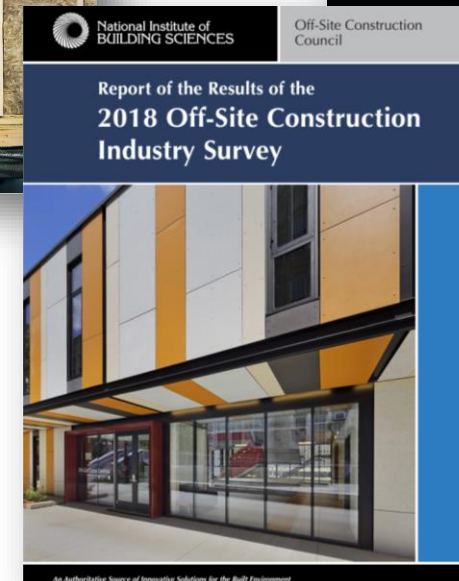
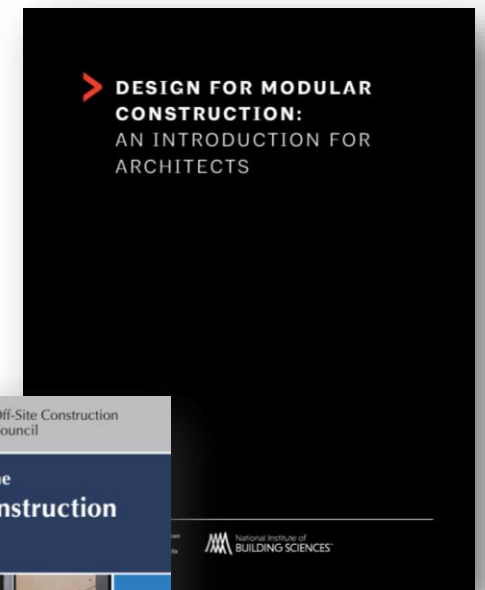
iccsafe.org/offsite

Additional Off-Site Resources



Workgroups:

- Standards & Regulatory Support
- Case Studies & Best Practices
- Data & Surveys



<https://www.nibs.org/oscc>

Volumetric Offsite Construction For Multifamily Housing

Mary Tingerthal

Former CEO, Minnesota Housing Finance Agency

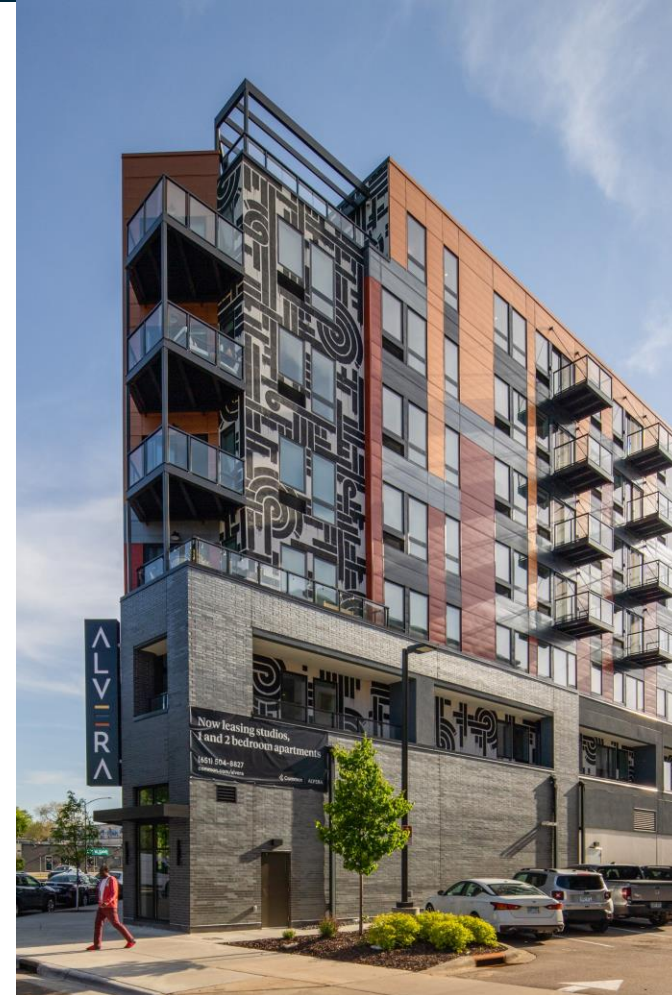
Consultant to RISE Modular

Founder, Construction Revolution



Why Offsite Construction Makes Sense

- **Time Savings**
- **Cost Savings**
- **Site Considerations**
 - Tight urban sites
 - Access to construction workforce
 - Proximity to manufacturers
- **Quality and Sustainability**



Challenges for Volumetric Manufacturers

- **Negative Industry Track Record**
- **Capital Requirements**
 - Fixed Investment
 - Workforce Investment/Retention
 - Performance Bonds
- **Long “Proof of Concept” Cycle**
- **Durable Project Pipeline**
 - Vertical Integration
 - Developer Partnerships



Winning over the gatekeepers (developers)

- **They don't immediately see the upside**
- **Relationships w/Contractors**
 - Bids reflect major fear factor
 - Revenue generation from captives
- **Perceived Risks from Lenders**
 - Insurance, bonding requirements
- **Competitive Process for Affordable**
 - Complicated scoring systems
 - No reward for innovation
- **Sharing Success Stories**



Story #1 Alvera - Saint Paul, MN

The Case for Modular

- Tight urban site 0.6 acres, 193 units
- Construction cost and time schedule

The Results

- 2023 MBI Best of Show Awardee
- 13-month completion (vs.18-24 mo)

Lessons Learned

- Staging site
- Inspections coordination



Story #2 – Minneapolis PHA Scattered Site

The Case for Modular

- Needed standard design, multiple sites, large units
- Needed fast rolling completion

The Results

- Finalist for Ivory Innovation Award
- First move-ins 5 mo. after mod set

Lessons Learned

- Need coordination before bidding
- Careful attention to site selection



Opportunities for Volumetric Modular in Multifamily Residential



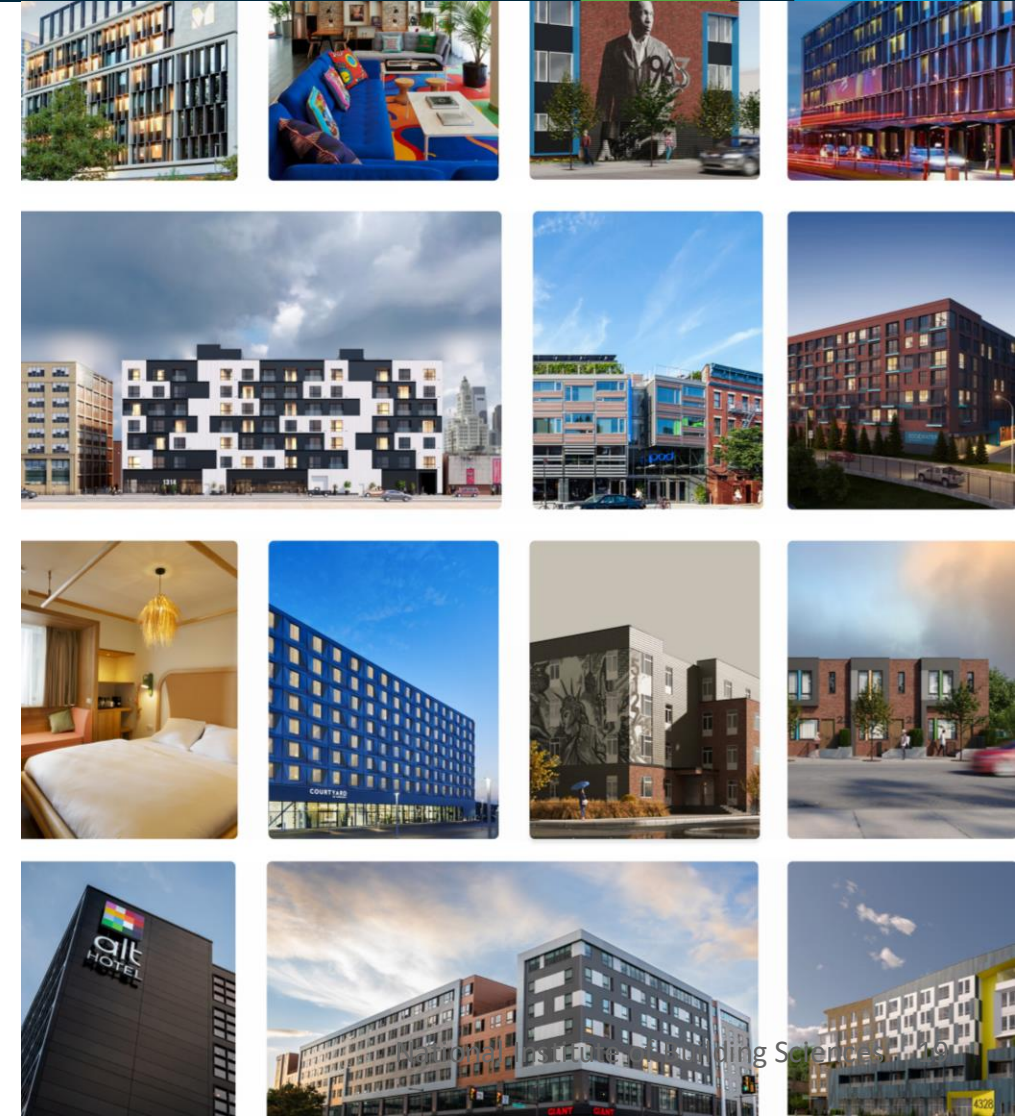
- **Increase Extent and Frequency of Information Exchange**
- **Incentives and Set-Aside Programs**
 - Developers
 - Manufacturers
- **Structure Programs with Long Enough Runway**
 - Plan to support replicability with integrated teams
 - Capture lessons learned as part of the plan
- **Learn from Other Countries**
 - International Exchanges
 - Japan, Sweden, Ireland, Scotland, UK

Utilization of Products, Components, and Platform Design for Offsite Construction

Sara.Ann Logan AIA, RIBA, NOMA, IIDA

VP of Design – Volumetric Building Companies

Principal and Stamping Architect



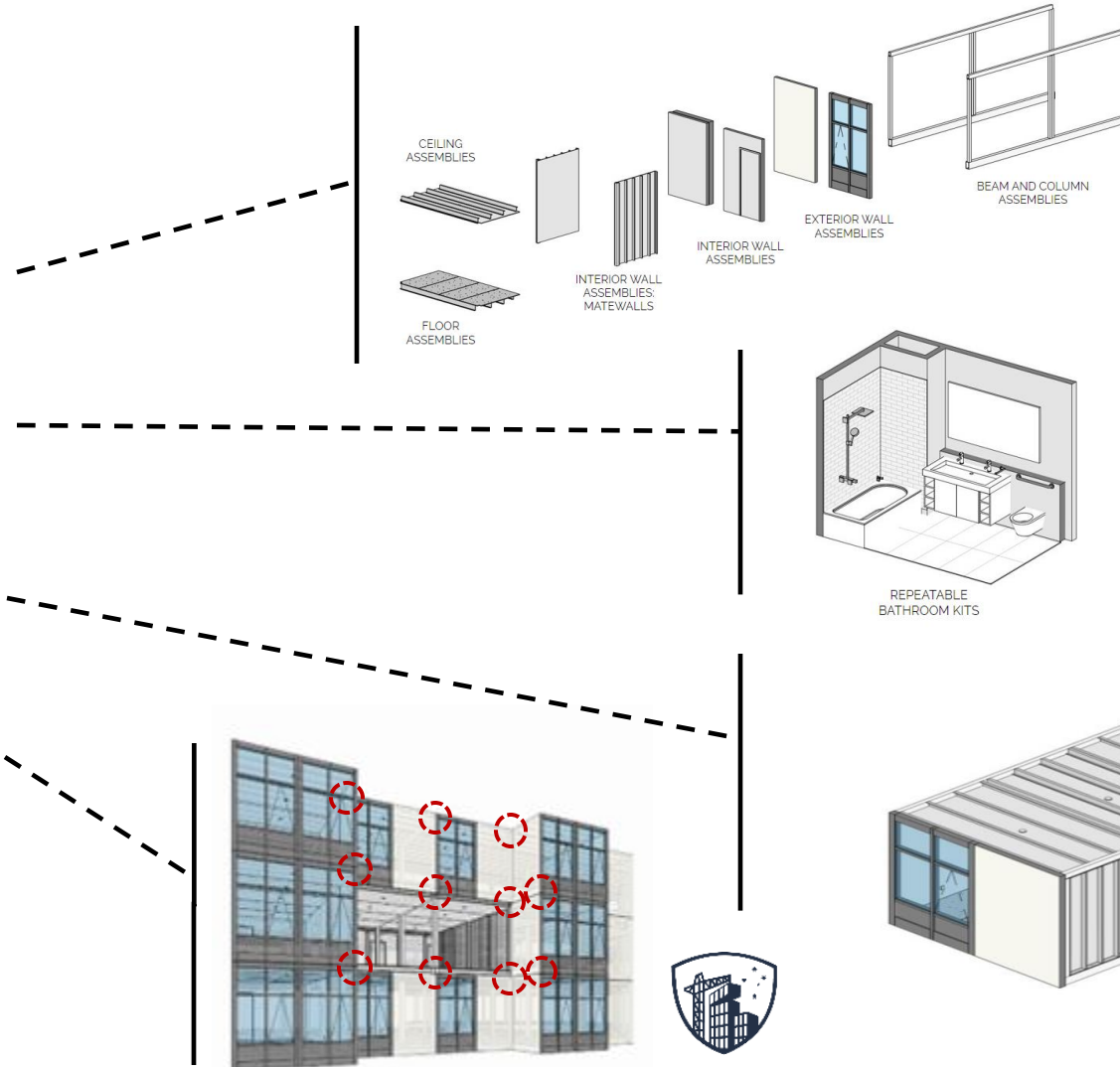
What Options are there In Off-site?

 **Assemblies**

 **Kits | Pods**

 **Volumes | Modules**

 **Interfaces | Platform**



veev **blueprint**

Oldcastle **VMX**

KIT SWITCH

SurePods

VMX

F_OS

Autovol
VOLUMETRIC MODULAR



RISE
modular

Examples of Kits and Pods

- Bathroom Kits | Pods
- Kitchen Kits | Pods
- Fixtures and Finishes



Helps simplify tedious, highly specific, and highly skilled portions of a project and simplify them for inclusion into either off-site or traditional processes



Examples of Modules

- **Steel (light-gauge, red-iron with light gauge infill)**

specialty residential, mid to high-rise

- **Wood (framed)**

residential to mid-rise

- **CLT**

mid to high-rise (in certain markets)

- ◆ Helps improve speed of construction and lower overall project development time



Examples of Platform Design Concept

- **Heavy up-front product and DfMA focus**

dedicated product development and manufacturing optimization to be deployed in projects but developed outside of the project structure

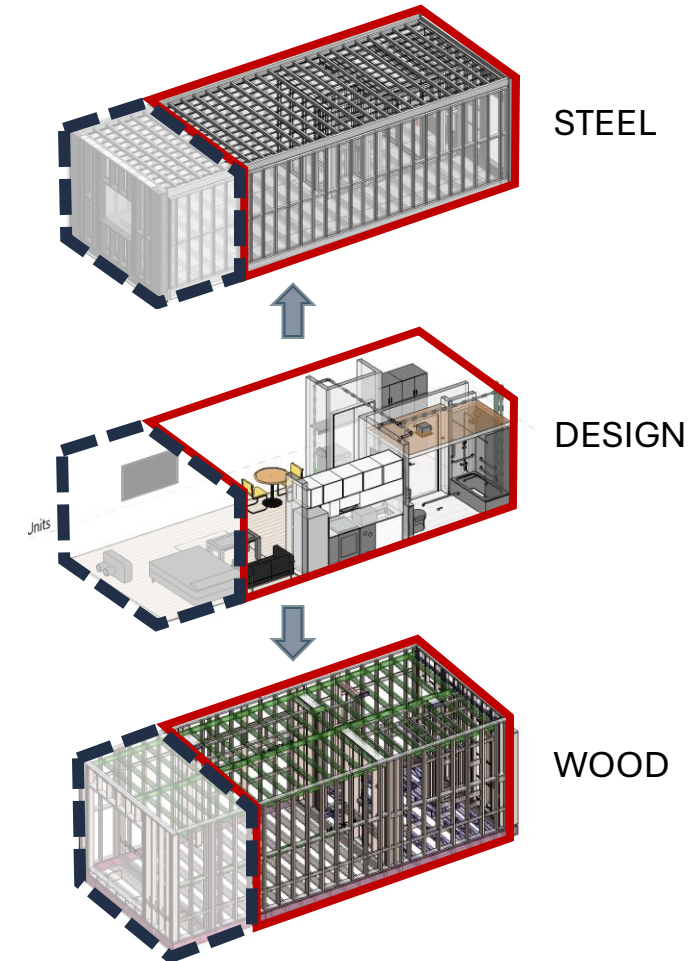
- **Focus on use in multiple markets, multiple systems, multiple asset classes, or multiple projects**

establish the company or client's scope or reach to increase demand and open up opportunities for efficiency
(VBC operations in multiple markets, systems, asset classes, and repeat portfolios)

- **Focus on defining the need for flexibility**

what areas of flexibility are needed for success in your market?
(size, design, aesthetics?)

- ◆ Key to success is based on transitioning from project thinking to portfolio or platform thinking in order to drive efficiencies in design and manufacturing



Virginia's Off-Site Construction Program



VIRGINIA DEPARTMENT OF HOUSING
AND COMMUNITY DEVELOPMENT
Partners for Better Communities

Division of Building and Fire Regulations

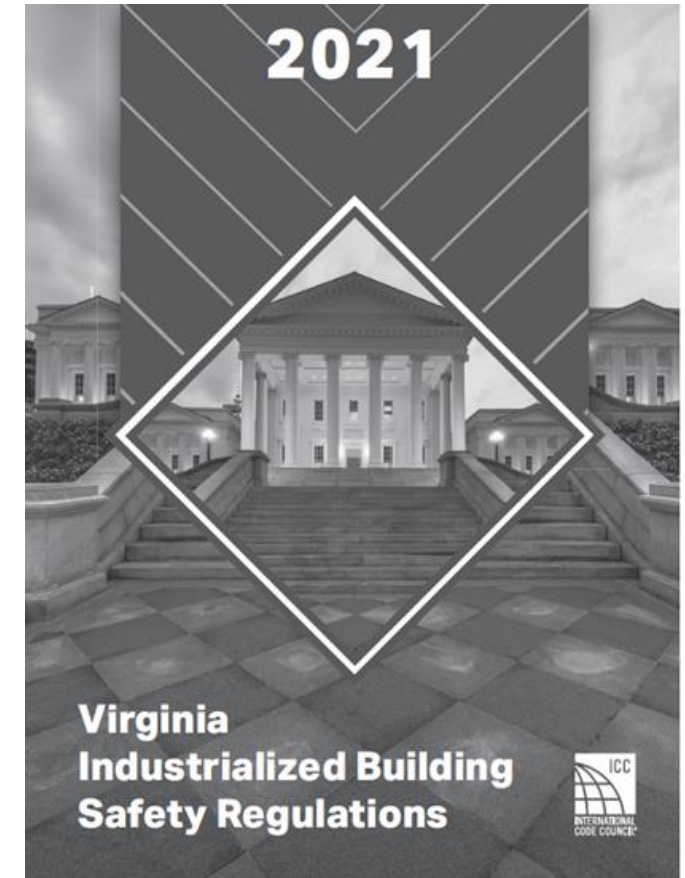
State Building Codes Office

Off-Site Construction
osc@dhcd.virginia.gov

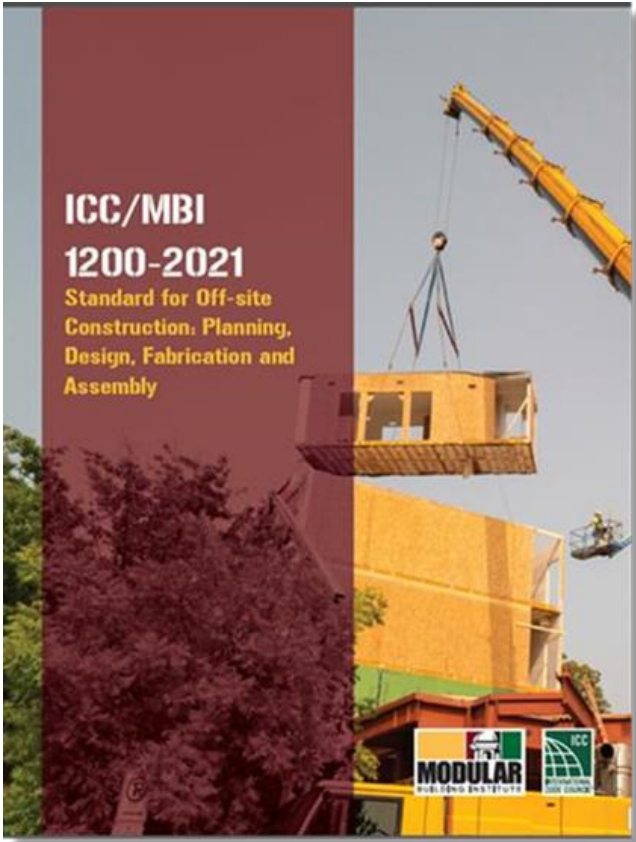
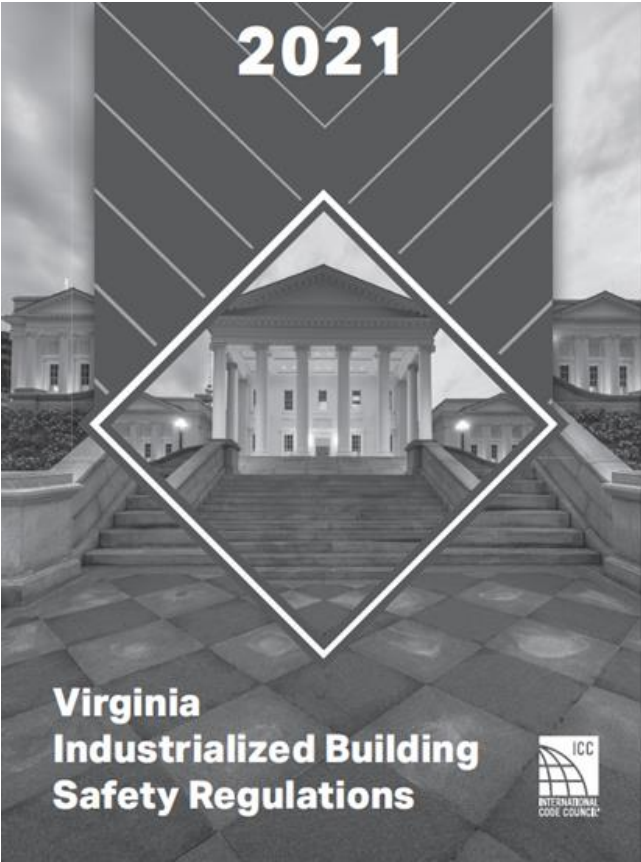
Virginia's Off-Site Construction Program

Virginia Industrialized Building Safety Regulations (IBSR)

- **Closed Construction**
Volumetric Modular, Panelized Systems, Components
- **Compliance Assurance Agencies (CAAs)**
Approved Third-Party Review and Inspection Agencies
- **State Building Codes Office**
Off-Site Construction AHJ
- **Local Building Departments**
On-Site Construction AHJ



Virginia's Off-Site Construction Program



Discussion Questions

- What recommendations would you give someone interested in pursuing their first off-site construction project?
- What are the biggest gaps you see in achieving widespread use of off-site construction and how do you see those gaps being filled?



THANK YOU