The Expansion of Off-Site Construction and the Quest for Resilience

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Institute for Catastrophic Loss Webinar Series

March 13, 2023
The Family of Building & Community Solutions

- Codes and Standards
- Personnel Training and Certification
- Product Evaluation
- Accreditation Services
- Codification & Administration Services
- Engineering Support
- Community Resilience Benchmarks™
- Third-Party Evaluation Services
Alliance for National & Community Resilience (ANCR)

- Communities...  
  - survive and thrive based on their ability to serve key functions  
  - must look holistically across these functions  
  - need tools to understand where they are and where additional investment or focus will move them forward

- ANCR is developing a coordinated set of benchmarks across these functions  
  - Buildings, Housing & Water Benchmarks now available
Fixing the Construction Industry’s Skilled Labor Shortage

Construction Materials Costs Increases

Where Are All the Builders?

Construction costs are climbing and production is lagging, in part because there aren’t enough workers to go around.

Andrew Souergel, Senior Reporter | June 28, 2018, 3:03 a.m.

Construction Worker Shortage Continues To Grow

In Autodesk-AGC study, four of five contractors report tough time finding qualified workers.

September 4, 2018

The U.S. construction industry’s labor shortage continues to worsen, in 2018, according to the recently released Autodesk-Associated General Contractors (AGC) construction worker shortage survey.
Why Off-Site Construction?

- Quality
- Workforce
- Sustainability
- Speed to Market
- Affordability
- Jobsite Safety

**Modular Construction Schedule**

- Design Engineering
- Permits & Approvals
- Site Development & Foundations
- Install & Site Restoration

**Time Savings!**

Simultaneous site development and building construction at the plant reduces schedule by 30% to 50%

**Site Built Construction Schedule**

- Design Engineering
- Permits & Approvals
- Site Development & Foundations
- Building Construction
- Site Restoration
President Biden Announces New Actions to Ease the Burden of Housing Costs

MAY 16, 2022 - STATEMENTS AND RELEASES

New Biden-Harris Administration Housing Supply Action Plan To Help Close the Housing Supply Gap In Five Years

- Promoting modular, panelized, and manufactured housing – and construction R&D. Innovations in homebuilding, including manufactured, modular, panelized, precut, and additive construction, hold promise for increasing housing productivity and thus housing supply. HUD will highlight these and other technologies that can benefit affordable housing construction during the Innovative Housing Showcase on the National Mall in June 2022. HUD is also working to assess hurdles to modular and panelized housing posed by inconsistent state and local inspection requirements and standards, which limit economies of scale and potential cost savings. The Department of Energy also recently awarded $32 million in funding to support 30 next-generation building retrofit projects that will dramatically improve affordable housing technologies. These technologies include prefabricated, super-insulated wall retrofit panel blocks and 3D-printed modular overclad panels.

https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/16/president-biden-announces-new-actions-to-ease-the-burden-of-housing-costs/
HUD Off-Site Research Roadmap

Offsite Construction for Housing: Research Roadmap

Source: MOD X
Delivered by CMHC, this $1 billion initiative will cover the construction of modular housing, as well as the acquisition of land, and the conversion of existing buildings to affordable housing. The RHI is the newest initiative of the National Housing Strategy (NHS). It is expected to enable the rapid creation of up to 3,000 new affordable housing units across the country and will help stimulate the economy.
Open vs. Closed Construction

OPEN CONSTRUCTION. A modular building, modular component or panelized system manufactured in such a manner that all portions can be readily inspected at the building site without disassembly, damage or destruction thereof.

CLOSED CONSTRUCTION. A modular building, modular component, or assembly manufactured in such a manner that all portions cannot be readily inspected at the installation site without disassembly, damage or destruction thereof.
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
Multiple Off-Site Approaches
# The Fabrication Process

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>General material assembly</td>
</tr>
<tr>
<td>1</td>
<td>Floor framing and decking, int./ext. wall framing, “box” mounted to chassis</td>
</tr>
<tr>
<td>2</td>
<td>Roof framing/mounting, ceiling attached to “box” interior partition installation, rough plumbing</td>
</tr>
<tr>
<td>3</td>
<td>Sheetrock (walls), rough electrical (walls)</td>
</tr>
<tr>
<td>4</td>
<td>Sheetrock (ceiling), batt/spray foam insulation, rough electrical</td>
</tr>
<tr>
<td>5</td>
<td>Exterior plywood sheathing, rough opening cleanup, general interior cleanup</td>
</tr>
<tr>
<td>6</td>
<td>Exterior plastic sheathing, interior finish work (paint, trim)</td>
</tr>
<tr>
<td>7</td>
<td>Finish plumbing, finish electrical, install flooring</td>
</tr>
<tr>
<td>8</td>
<td>Install windows, install siding, weatherproof</td>
</tr>
</tbody>
</table>
Off-Site as A Disaster Recovery Solution

https://recovery.texas.gov/files/resources/planning/alternative-housing-study-findings-report.pdf
Built-In Resilience
Modular construction emits 45% less carbon than traditional methods, report finds
And Off-Site is Cool!
New Off-Site Construction Standards

Developed by the ICC/MBI Off-Site and Modular Construction Standard Consensus Committee (IS-OSMC)

ICC/MBI Standard
1210 (upcoming)
Mechanical, Electrical, Plumbing Systems, Energy Efficiency and Water Conservation

https://www.icc safe.org/offsite
ICC/MBI Off-Site Construction Standards

ICC/MBI 1200: Planning, Design, Fabrication and Assembly
“...provide minimum requirements to safeguard the public health, safety, general welfare and address societal and industry challenges in multiple facets of the off-site construction process including: planning, designing, fabricating, transporting and assembling...”

ICC/MBI 1205: Inspection and Regulatory Compliance
“...provide minimum requirements to safeguard the public health, safety, general welfare and address societal and industry challenges for the inspection and regulatory compliance of off-site and modular construction.”
Additional Off-Site Resources

iccsafe.org/offsite