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New Off-Site Construction Standards:

Potential & implications of ICC/MBI 1200 and 1205 for advanced building construction

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About the ABC Collaborative

The Advanced Building Construction Collaborative (ABC-C) brings together a diverse network of incumbent and emergent buildings sector actors — across manufacturing, construction, real estate investment, development, and related areas. Our network includes some of the most innovative businesses working to accelerate the uptake, scaling, and mainstream adoption of high-performance industrialized construction solutions for building decarbonization. ABC-C is leveraging its collective knowledge to help modernize the US construction industry and create a sustainable built environment.



About ADL Ventures

ADL Ventures is a venture consulting firm that focuses on developing new products and services, and launching new businesses, on behalf of corporate and government clients in critical infrastructure sectors. We are a team of experienced entrepreneurs and technologists with strong backgrounds in the building construction, power, and transportation sectors. ADL has offices in Boston, Denver, San Francisco, and Washington, DC.



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New off-site construction standards:

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It is no secret that the US construction industry faces a confluence of challenges, including stagnant productivity, costly delays due to extended labor shortage and supply chain variability, and persistent hesitation towards innovation. Advanced building construction (ABC) approaches, such as high-performance prefabricated off-site construction, offer a promising solution to these challenges and help invigorate the construction industry while providing a spectrum of environmental and economic benefits. Off-site construction can provide superior energy efficiency, tighter building envelopes, carbon and waste reduction, significant cost efficiencies, buffering of supply chain delays, and attractive employment for a new generation of the construction workforce, among other benefits.

Benefits of Off-Site Construction Depend on Code Approval

Accelerated construction timelines and their associated cost savings are often highlighted by fabricators and suppliers as key benefits of prefabricated systems. Off-site construction processes allow multiple building components to be constructed simultaneously while protecting the components and workers from weather-related and other risks. As a result, off-site construction can yield 50% faster construction timelines with higher quality control — welcome improvements in an industry (dominated by conventional building practices) where some **75% of projects are late, over budget, or both.**ⁱ

Prefabricated buildings are an attractive option for developing new construction projects because of their potential advantages over conventional construction. However, the economic and time-saving benefits of off-site construction quickly diminish if states and cities do not have efficient mechanisms to determine the compliance of off-site construction with applicable building code requirements. If code officials are unfamiliar with the methodology and terminology for approving closed prefabricated panels or modules at the site, projects using off-site construction can be delayed, while the backlogs of permits, inspections, and compliance paperwork burden local officials. Projects may also be rejected outright. Ultimately, these challenges may deter builders from choosing an otherwise attractive pathway to new construction. The current code landscape and regulatory barriers reflect the construction industry's aversion to change. However, the transformation of building code paradigms can unlock more streamlined and efficient approaches to construction.

ⁱ These statistics and other quantified benefits of off-site construction can be found in the 2019 McKinsey and Company report [Modular Construction: From Projects to Products](#) by Nick Bertram et al.

Fragmented Landscape: Codes Can Hinder or Help Adoption of Off-Site Construction

In states without clear code compliance pathways for off-site construction inspections and approvals, off-site projects can face lengthy delays, limiting the realization of off-site construction's advantages. In states that do have off-site code compliance programs, outdated regulations and nuances bring in confusion, unnecessary delays, and added costs, thus preventing the widespread adoption of off-site construction practices and limiting manufacturers to jurisdictions with familiar local code officials. This is partly a result of the fragmented and complex building code landscape in the United States, where building code requirements often differ from jurisdiction to jurisdiction and state to state.

In the United States, states or localities that adopt and enforce codes are referred to as authorities having jurisdiction (AHJs). AHJs often rely on model building codes developed by the International Code Council (ICC) and known as the International Codes (I-Codes). The I-Codes include the International Residential Code (IRC) and International Building Code (IBC), in addition to energy, zoning, and fire codes. The IRC and IBC are published on three-year cycles, and states and localities retain the authority to choose the version of the code to adopt through legislative or regulatory action.

States and localities typically base their adopted codes on a version of the IBC and IRC with various amendments, differing degrees of enforcement, and exceptions or additions. They adopt and update their building and residential codes independently of one another — every six to nine years on average — adding another layer of fragmentation.

Even within a state or locality, the codes for different construction types may be based on model codes from different years. For example, Utah adopted and enforces its commercial building code based on the 2018 version of the IBC, while residences are held to codes based on a version of the 2014 IRC. In Tennessee, commercial buildings are held to the 2012 IBC, while residences must meet requirements based on the 2018 IRC. While most AHJs develop their respective building and residential codes by slightly modifying the I-Codes, several US states have not adopted an IBC or IRC statewide. This allows municipalities to govern residential and building code adoption, mandates, and enforcement.

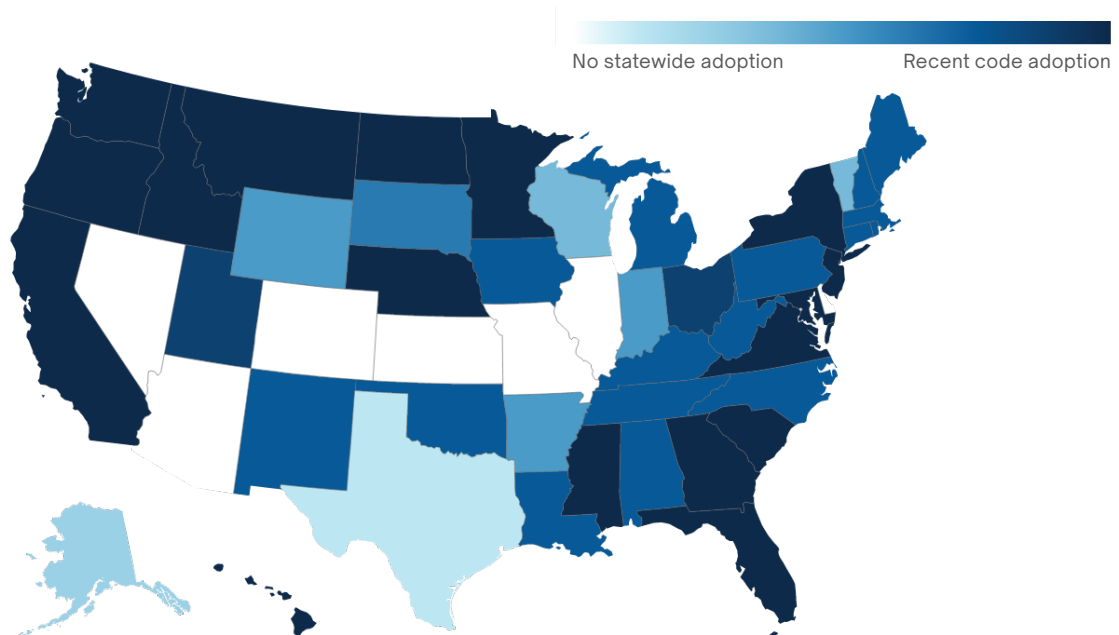
The outcome is a building code landscape that is highly fragmented, ranging from enforced statewide mandates or no building codes to specific exclusions and odd nuances. Colorado, which does not have a statewide code, leaves code adoption, compliance, and enforcement to its 59 permitting municipalities. Of these, 15 have no residential or building code requirements, and the remaining have adopted recent codes, resulting in jurisdictions with stringent building codes next to neighbors that have none. Although Iowa does not have a designated or adopted statewide building code, state government buildings must comply with the 2015 IBC. Maine took a different approach when it adopted the 2015 IBC and IRC statewide but allowed towns with fewer than

4,000 residents to choose to adopt and enforce codes independently. In New York State, the 2018 IBC and IRC are mandated and enforced at the state level, barring New York City, where different building codes apply. In short, the basis for and enforcement of building and residential codes and enforcement is fragmented on multiple scales.

One common thread across the fragmented code landscape is that building codes and industry standards are generally written from the perspective of site-built construction. Nevertheless, permanent prefabricated construction must comply with these local building codes.

Notably, off-site construction can refer to manufactured homes (historically called mobile homes) as well as permanent prefabricated modular or panelized construction. While manufactured and modular or panelized homes are prefabricated at off-site locations, they are regulated by different codes. Manufactured housing is regulated at the federal level by Manufactured Home Construction and Safety Standards administered by the US Department of Housing and Urban Development (HUD). The HUD code first came into effect in 1976, and HUD last updated its energy provisions for manufactured housing in 1994, although new standards are set to go in effect later this year. (Manufactured housing built before 1976, properly referred to as mobile homes, does not comply with the HUD code.)

Exhibit 1 US state building code adoption by IRC and IBC base year, simplified.



Note: Specific municipalities may have local nuances. Darker shades indicate statewide adoption of recent versions of the IRC and IBC. Mid-tone colors indicate the adoption of older versions of the IRC and/or IBC. Lighter colors indicate the adoption of outdated IRC and/or IBC, or the absence of statewide adoption of either. White states indicate lack of statewide adoption of the IRC and IBC.

Map: ADL Ventures. Source: [International Codes-Adoption by State \(August 2021\), ICC.](#)

In contrast, permanent prefabricated construction is held to the same local residential and building codes as conventionally constructed buildings. While manufactured housing is an important option for homeownership for nearly 22 million Americans, the remainder of this brief focuses on navigating codes for permanent prefabricated construction.

The IBC and IRC do not mention the term “modular,” but, again, all permanent prefabricated construction projects must adhere to local building and residential codes, introducing layers of complexity and barriers for the off-site construction industry. Unlike the federal HUD code that guides manufactured housing code compliance nationwide, there is no national code for modular construction at this time.

By definition, prefabricated buildings comprise volumetric modules or panelized systems constructed off-site and transported to and installed or assembled at their final destination. This introduces challenges for on-site inspections when the wall assemblies are already closed before they reach the site (closed construction). For example, a local official may need to inspect the insulation within a wall, but the wall system is closed at the manufacturing facility and the local inspection official lacks a mechanism to inspect and approve what they cannot see once the system arrives at the job site. This often leads to delays in inspection approval or, perhaps, failure of code inspection altogether. Additionally, this fragmentation increases barriers to market entry for innovative ABC solutions such as energy-efficient podded HVAC units, highly insulative technologies, or dynamic windows to satisfy code compliance standards across a multitude of jurisdictions. Navigating fragmented building codes and compliance thus deters ABC technologies’ widespread adoption and is a barrier to their development as it represents a potentially insurmountable cost for seed-level technology that offers superior energy efficiency, performance, or durability.

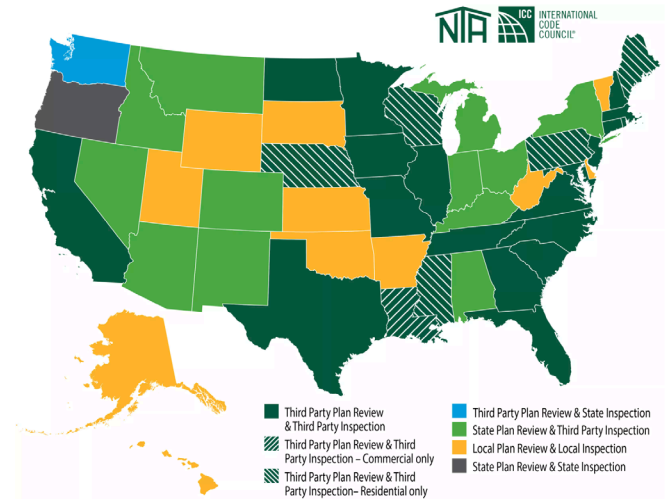
“Silence in the code is not an exemption from the code.”

-Modular Building Institute (MBI)

Just as the adoption of building codes varies from state to state, the regulation of off-site construction also differs, introducing an additional level of complex fragmentation for off-site builders, inspection officials, and end-users. While 39 US states have state-level regulatory offices that oversee off-site construction, the rules for each of these programs vary significantly. Some cover only commercial or residential projects, others include only modular or panelized systems. Additionally, while some allow the use of third parties for

plan review and inspection, others carry these out in-house. There is an additional level of inconsistency related to the department responsible for overseeing these programs in each state. In Illinois, the Department of Public Health holds the statewide regulatory authority over off-site construction. However, in Maryland, the Department of Labor regulates off-site construction. In the 11 states that do not have state-level off-site compliance programs, the entire regulation is the responsibility of local officials who often lack the expertise, resources, terminology, or framework to inspect and approve off-site projects.

Exhibit 2 Plan review inspection jurisdictions by state.



Source: [International Code Council and ICC NTA](#).

Lack of consistency in regulating off-site construction undermines the inherent efficiencies of these approaches. If a manufacturer expands across state lines or localities, it may need to alter its compliance processes to accommodate jurisdictional differences, counteracting the benefits of having a highly replicable process. While states without off-site regulatory compliance frameworks stand to benefit from implementing a mechanism to inspect and approve off-site projects, the entire industry would gain from consistent and uniform processes across state lines.

The Solution: Introducing ICC/MBI Standards 1200 and 1205

Given the complexity of code adoption processes, varying degrees of code implementation and enforcement, and silence from the IBC and IRC on off-site construction, off-site manufacturers, contractors, and officials plainly need clearer compliance pathways. To fulfill this need, the ICC and Modular Building Institute (MBI) created the 2021 ICC/MBI Off-Site Construction Standards 1200 and 1205. Standard 1200 governs the planning, design, fabrication, and assembly, while Standard 1205 covers the inspection and regulatory compliance of off-site construction. The first edition of ICC/MBI Standards 1200 and 1205 was developed by the ICC/MBI Off-Site and Modular Construction Standard Consensus Committee (IS-OSMC) in compliance with the American National Standards Institute (ANSI)-approved ICC Consensus Procedures. The IS-OSMC comprises 15 representatives from nine stakeholder categories (manufacturer, builder, standards promulgator/testing laboratory, user, utility, consumer, public segment, government regulator, and insurance) to ensure adequate consensus and fulfillment of ANSI requirements. While the effort to advocate for the inclusion of Standards 1200 and 1205 into the 2024 IBC was unsuccessful, they are readily available for immediate adoption and use by jurisdictions.

“Most folks would say codes are not the most exciting topic, but I see them as the intersection of a variety of things—it’s the pathway to unlocking off-site construction, affordable housing, resiliency, sustainability, and bringing those pieces together.”



**-Ryan Colker, Director of Innovation,
International Code Council (2020)**

The adoption of these standards serves as a tool to support the promise of off-site construction on two key scales: individual jurisdictions and across jurisdictions with widespread adoption. In individual jurisdictions that adopt

the standards, off-site construction has greater potential to ease the ongoing affordable housing crisis faced by many regions through efficient and fast construction of high-quality buildings at lower cost. On a large scale, widespread adoption of the standards effectively reduces the burden of navigating the current patchwork of regional regulations and promotes industry standardization, allowing manufacturers to operate more efficiently and expand their markets.

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

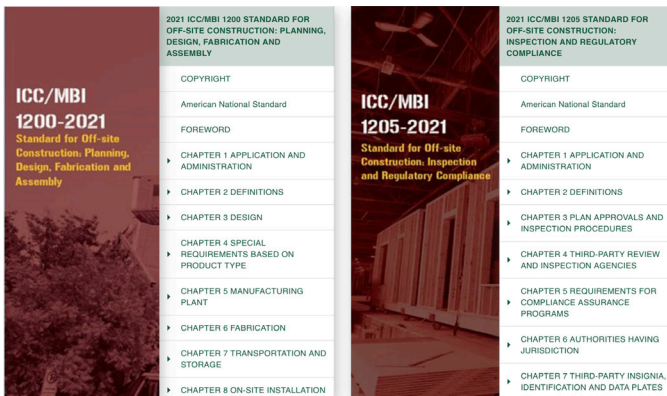
ICC/MBI Standard 1200 provides guidance and insight for the planning and preparation requirements of off-site construction projects. Standard 1200 outlines the appropriate roles for architects, modular manufacturers, construction managers, and general contractors; planning requirements for the location of the manufacturing plant relative to the final construction site; and material procurement and lead times. In addition, Standard 1200 includes the requirements for maintaining a controlled manufacturing environment and material protection, effective supply chain integration, structural versus nonstructural modular, fabrication process, and on-site assembly. The Standard is available for adoption by AHJs and sets forth a framework to allow modules to comply with local building codes while providing a clear structure of the required roles, responsibilities, and necessary documentation at each step. The requirements of Standard 1200 establish off-site construction code compliance consistent with the scope of the I-Codes to protect public health, safety, and welfare, without unnecessarily increasing construction costs, and support the use of new materials, products, and methods.

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

ICC/MBI Standard 1205 addresses the societal and industry challenges in the inspection and regulatory compliance of off-site residential and commercial building components. Standard 1205 also provides a framework for permitting, inspections during assembly at the manufacturing site, final inspections on-site, and third-party plan review and inspections. The roles and responsibilities of builders, state modular programs, and AHJs are outlined as well. Standard 1205 provides guidance for streamlining inspections and approvals through insignias, identification and data plates, implementation of quality control processes, and factory inspections, which are then followed up with on-site inspections at the final site. These procedures reduce the barriers for final on-site inspection processes and allow for

faster construction timelines to realize the cost and time savings offered by off-site construction. In addition, they provide code officials and third-party inspectors a pathway to approve off-site construction projects.

Exhibit 3 ICC/MBI Standards 1200 and 1205 for off-site construction and table of contents, respectively.



Source: [ICC/MBI Standard 1200](#); [ICC/MBI Standard 1205](#).

To achieve the promise of off-site construction and a more efficient, sustainable, affordable, and innovative construction industry, effective code compliance mechanisms need to be identified and implemented. Collectively, Standards 1200 and 1205 set out a framework for the efficient and consistent approval of off-site construction projects, benefiting regulatory officials and inspectors, off-site manufacturers, and the localities where they are adopted. When Washington State adopted the third-party framework for off-site construction inspections from Standard 1205, its regulatory approval backlog was reduced from 20 weeks to three weeks, lowering the burden on local officials.

Clear mechanisms for consistent permitting, in-factory and on-site inspections, and approvals also benefit manufacturers by reducing delays and added costs. In Illinois, a developer of an apartment building cited an additional \$10,000 cost per unit when navigating the state’s off-site code regulations, which required additional inspections for high wind load conditions — a vestigial compliance requirement from when the state was focused on regulating mobile homes. It may also result from lack of clear terminology: modular buildings are secured to permanent foundations, akin to conventionally built housing, whereas manufactured housing is secured to a steel chassis. The unnecessary regulatory burden and barriers to approving off-site projects can be alleviated by the adoption of Standards 1200 and 1205. This will also reduce costs for manufacturers, allowing units to be constructed at lower costs and with greater replicability across markets. In tandem, this can allow faster construction of affordable housing. Adopting the clear and consistent framework set forth by Standards 1200 and 1205 allows

off-site construction a foothold to gain greater traction as a solution to some of the complex challenges faced by the construction industry and society at large.

States and jurisdictions can adopt ICC/MBI Standards 1200 and 1205 into their statewide or local code to help enable the benefits of off-site construction. The 11 states without off-site programs are especially well-positioned to capitalize on off-site construction. Off-site manufacturers in states with well-developed off-site programs, such as California, will also benefit from the consistency; they can readily expand to other areas with consistent off-site regulatory processes without investing supplemental time and resources to educate AHJs. However, due to the code development and adoption processes in the United States, the standards currently serve only as an available resource — they neither hold the weight of the code as law nor can they be enforced until they are adopted by local authorities. The current status of the standards allows states and jurisdictions to adopt the standards at their own discretion with amendments and control (The benefits and drawbacks of a national off-site code for modular and panelized construction will be analyzed in a forthcoming, complementary brief).

IRC and IBC Development and Adoption

As noted previously, the IBC and IRC are developed independently by the ICC on a three-year cycle. The ICC code development process includes three inclusive and transparent stages. In the first stage, the ICC issues a public call for code change proposals. The code proposals are then made available for public review through the ICC’s cloud-based program to allow for broad involvement and transparency.

The second stage involves direct feedback through committee action hearings where code development committees hear public input on the merits of including proposed changes in the next edition of the code. The code development committees presiding over the committee action hearings are open for anyone to apply to serve. The ICC appoints members to the committee based on application recommendations from the Codes and Standards Council. The committee represents various interest categories, such as government regulatory agencies, users, building owners, designers, insurance companies, private inspection agencies, academics, producers, builders, contractors, manufacturers, and distributors, to capture a diverse array of stakeholder input. The committee then votes to either approve, approve with modifications, or disapprove code change proposals. The code development committees’ actions are open to public comment, whereby any participant may challenge a committee’s actions. The code change proposals are then considered at public comment hearings and voted on by eligible voters defined as representatives of government agencies with no financial stake in the outcome and committed to protecting public health and safety.

The final stage follows eligible voters' final consensus. The ICC Board validates and confirms the code changes, and a new edition of the IRC and IBC is finalized and published. The most recent editions are the 2021 I-Codes, including the IRC and IBC.

The ICC develops building codes through a governmental consensus process to safeguard public safety. Although updated versions of the IRC and IBC are published on three-year cycles, states and AHJs update their local codes independently and at their own discretion. The result is often outdated I-Codes across many states and a delayed trickle-down of building code provisions into state adoption and enforcement. The following section outlines the building code adoption process by states.

Code Adoption

The process whereby AHJs adopt codes occurs on varying timelines determined by the state legislature, government agency, building code board, or building code commission. How codes are adopted and the relationship between state- and local-level action also varies. Codes can be adopted at the statewide level for application across the state, with local governments enforcing the code. In Maryland, the code adopted statewide can be exceeded by local regulations, whereas in Virginia, local authorities do not hold the power to amend the statewide code. Some states chose to identify a code as required only if a locality elected to adopt it, as Mississippi does. States may also leave the adoption and enforcement of codes entirely up to local jurisdictions, as highlighted by Colorado's structure.

Once a new building code is selected, it is adopted through legislative or regulatory agency action. Legislative building code adoption occurs through a legislative body (state legislature, or city or county council) where the code is introduced and modified by applicable committees. At this stage, input and collaboration from external stakeholders and nontechnical groups is collated on the new code, and modifications are implemented. Regulatory action adoption involves executive branch agencies, building code boards, or building code commissions tasked with reviewing and adopting building codes. A typical regulatory action adoption process relies on an advisory board of appointed industry stakeholders — from design and construction professionals to code enforcement officials — to review the code and make recommendations. The advisory board's recommendations are then publicly reviewed.

While most states base their building codes on a version of the IRC or IBC, they are often renamed with state-specific names to reflect the modifications. In Maine, the state's building codes are based on the 2015 IRC and IBC and are referred to as Maine Uniform Building and Energy Codes (MEUBEC) to reflect the state-specific amendments. Utah and South Dakota, along with a few other states, use the legislative process. Most states, including California, Connecticut, and Florida, use regulatory agency actions to adopt new building codes.

Alternative Pathways to Code Adoption

While the ICC's code development process updates the IRC and IBC every three years to reflect current best practices, the slow uptake of updated codes by states hinders the widespread adoption of ABC and other innovative technologies and practices. When considering the code adoption process from the perspective of off-site construction, progress is constrained by a myriad of factors: limited compliance approaches at the state level, lack of process and infrastructure in localities without statewide programs, and general unfamiliarity with the existing compliance mechanisms for modular construction and innovative technologies. As mentioned earlier, the IRC and IBC do not mention the word "modular," leaving ambiguity around — and hampering the deployment of — off-site construction and its many potential benefits.

However, ICC/MBI Standards 1200 and 1205 for Off-Site Construction are available for adoption by states and AHJs independently of the IRC and IBC adoption cycles. The voluntary adoption of these standards would allow localities to efficiently deploy ABC practices at scale and unlock the benefits of off-site construction to reinvigorate the construction workforce, reduce waste, better address the affordable housing crisis, and enhance sustainability. Salt Lake City has implemented these standards.

2021 ICC/MBI Standards 1200 and 1205 in Action

In a unanimous vote by the city council, Salt Lake City became the first jurisdiction to adopt ICC/MBI Standards 1200 and 1205 for Off-Site Construction in March 2021.

Salt Lake City was the preferred location for the adoption of off-site construction standards due to three factors: absence of a statewide off-site program, existing regulatory barriers for code officials in the city's jurisdiction, and increasing shortage of affordable housing.

Utah does not have a statewide regulatory program to inspect and approve off-site construction. The state-level gap in the building codes led a local building official in Salt Lake City to find the emergent off-site standards and present them to the city council for adoption. The standards are designed to complement local building and residential codes, which allowed the city to readily adopt them into code.

Prior to the adoption of Standards 1200 and 1205, Salt Lake City mandated city building officials to inspect all construction projects within the jurisdiction. However, building officials were not allowed to leave the jurisdiction to conduct the required inspections. By limiting inspections and approvals to city building officials within the city jurisdiction, this regulatory structure effectively prohibited off-site construction. Standard 1205 provides an effective mechanism for third-party inspections that allow authorized

delegates to complete in-factory code compliance inspections for the city. While reducing the burden on local building inspectors, Salt Lake City also opened the door for manufacturers to complete off-site projects in a city that was once off-limits.

While building officials saw value in filling a gap created at the state level and an opportunity to enhance the current code with an approval mechanism for off-site, the city council members considered the standards an enabler of the efficient creation of additional high-quality, affordable housing for constituents. Like many densely populated areas in the United States, Salt Lake City faces an affordable housing crisis exacerbated by the increasing cost of homeownership and rent. The adoption of the standards provided delineated roles for manufacturers, inspection officials, and building permitting agencies, and responsibilities and requirements for in-factory and on-site inspections. In the nine months after adopting Standards 1200 and 1205, Salt Lake City was able to increase housing in a quick and flexible manner. While the Standards are primarily used to inspect and approve the construction of prefabricated additional dwelling units (ADUs), the city recorded a substantial increase in housing: in less than a year, 30 ADUs were completed, 17 are in the inspection processes, 11 plans are under review, and 34 permits are pending. Salt Lake City also actively engages with off-site manufacturers to plan an affordable housing development of 50 units for low-income individuals and families.

The combination of these three factors made Standards 1200 and 1205 a natural fit for adoption for Salt Lake City, but any locality facing similar challenges could benefit from the mechanisms and frameworks in the standards. Salt Lake City is an example of using Standards 1200 and 1205 as a tool to ease regulatory barriers for off-site construction, complement local building and safety codes, allow for factory and third-party inspections to reduce the burden on local AHJs, create opportunities for off-site manufacturers, and alleviate the affordable housing crisis. The city's forward-thinking perspective and benefits realized in under a year provide a compelling case for other states and jurisdictions to replicate.

How ABC Collaborative can Advance Off-Site Construction through Code Adoption

The ABC Collaborative report [Market Opportunities and Challenges for Decarbonizing US Buildings](#) presented stakeholder analysis identifying widespread confusion and frustration with applicable standards, building codes, permitting, and approval processes across multiple stakeholder types when discussing industrialized construction (IC), which includes prefabricated construction methods. Due to the regionality of building codes and standards and an inconsistent interpretation of applicable rules, code officials are often unfamiliar with new technologies or processes being implemented, leading to onerous scrutiny, construction delays, and sometimes unjust rejections.

Supply stakeholders articulated that amending building codes and standards to consider ABC processes will increase efficiency and reduce timelines in the approval and permitting processes. The ABC Collaborative facilitates a Working Group on Codes, Permitting, Testing, and Accreditation to assist in the widespread adoption of advanced building technologies by improving code uniformity, education, interpretation, and enforcement. The working group brings together subject matter experts and industry stakeholders for regular discussions on easing the barriers to off-site construction through mechanisms related to codes and standards. The Working Group is open to interested parties with relevant expertise — individuals interested in joining this ongoing work can [contact the ABC Collaborative via our website](#).

Conclusion

The high level of building code fragmentation in the United States is evident in the varying levels of code adoption and enforcement, local nuances, and regulatory bodies responsible for off-site compliance programs at the state and local levels. The result is a building code landscape that is unnecessarily challenging and restrictive for the next generation of ABC practices. The lack of code consistency among different states and other jurisdictions hinders growth in the off-site construction industry and impedes economies of scale for off-site construction and innovative technologies. It also effectively restricts the areas where ABC materials and technologies can be efficiently deployed, which further deters innovation in the industry. On the surface, building codes might appear to be an unlikely lever to solve the complex challenges in the construction industry. A deeper look reveals building codes are one of the most effective tools to reduce institutional and market barriers for ABC. Standards 1200 and 1205 are tools available for states and localities to embrace off-site construction and deploy it to their advantage. In states and localities without off-site programs, the standards offer a clear and readymade pathway for the inspection and approval of off-site projects. In states with existing modular programs, the standards offer greater consistency across the code compliance landscape for builders. Effective mechanisms for off-site code compliance can promote widespread adoption of ABC.

In a forthcoming brief, we will analyze the benefits and drawbacks of a national off-site construction code, the role of zoning regulations and fragmentation, alternative compliance pathways, and the role of code compliance in the productization of components.



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