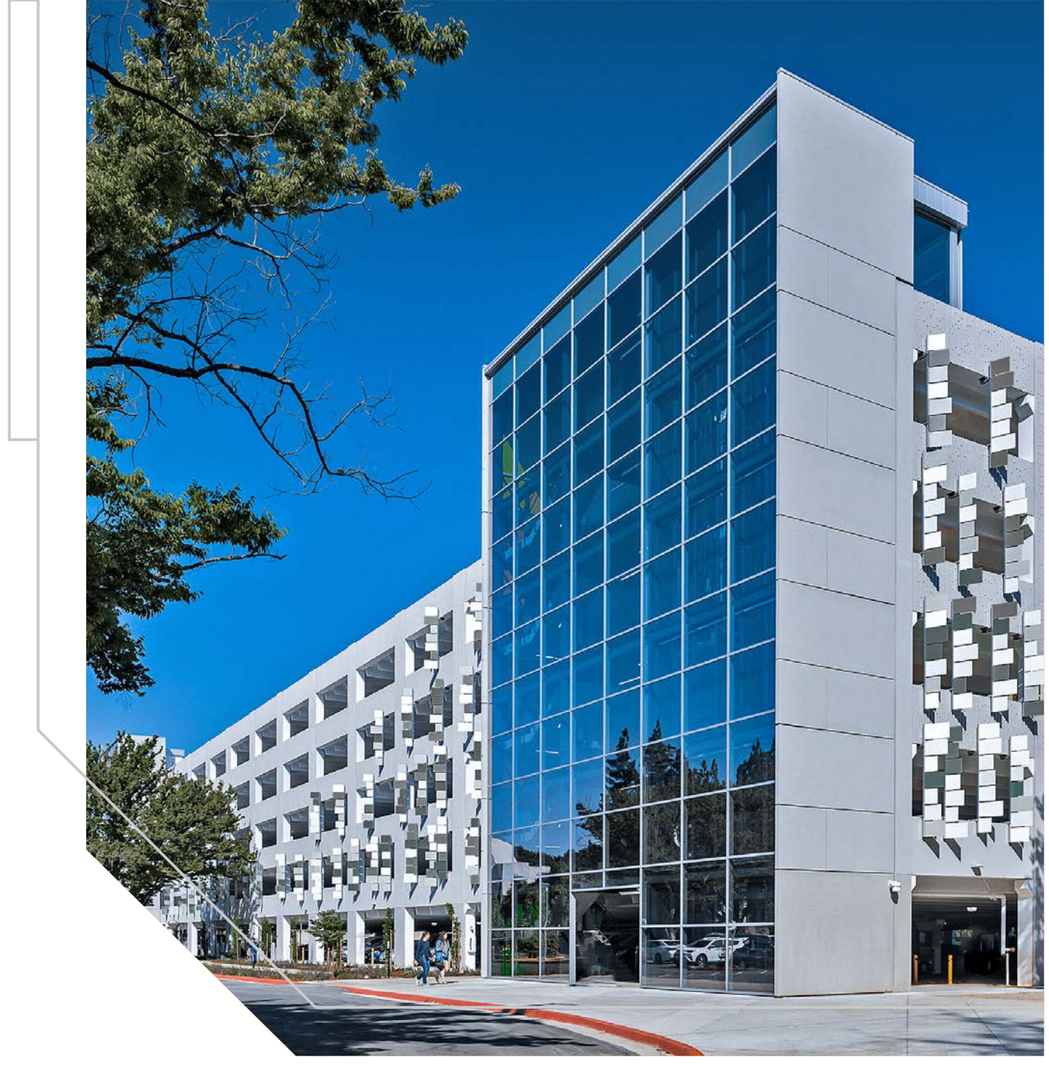


5 PREDICTIONS ABOUT THE FUTURE OF CONSTRUCTION AND WHAT YOU CAN DO TO PREPARE.

A guide for architects, developers, and general contractors.

CLARK PACIFIC

INTRODUCTION

If the construction industry was poised for change before, the COVID-19 pandemic has pushed that transformation into overdrive. The industry as a whole has always been reluctant to change, but we've reached a critical point where architects, developers, and contractors who fail to evolve risk getting left behind.

The years ahead will present construction stakeholders with a wave of new challenges alongside familiar issues like rising costs, sustainability, and a shortage of skilled labor. At the same time, these compounding challenges offer an opportunity to push the construction industry forward and improve the quality of the built environment.

This guide covers the trends we expect to have the biggest impact on construction, and how forward-thinking players can seize the moment to access new opportunities and deliver more value to clients, consumers, and the community as a whole.

URBANIZATION, REMOTE WORK, AND INFECTION CONTROL CREATE NEW PROBLEMS FOR THE CONSTRUCTION INDUSTRY TO SOLVE.

PREDICTION
#1

Major societal changes, some spurred by the pandemic, are creating new problems for the construction industry to address.

URBANIZATION

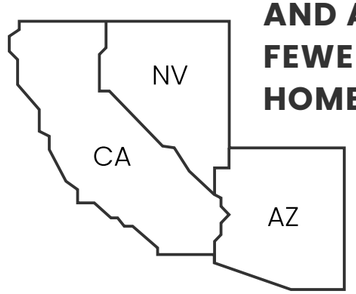
The first issue is a long-term global trend that's only growing more acute. Over the past few decades, more people have been moving into cities, creating a shortage of affordable housing. In the US, there is a shortage of seven million homes available to low-income renters (those whose household incomes are at or below the poverty guideline or 30% of their area median income). California, Arizona, and Nevada face some of the most serious shortages, with 30 or fewer homes available for every 100 low-income renters.[1]

As a result, urban planners and developers are looking for ways to reimagine residential space.

New single-family homes are getting smaller, and will continue to do so, and the number of multi-family and high-density dwellings will continue to rise[2].

New homes will also be designed and built with flexibility and adaptability in mind. For example, while the kitchen and bathroom may be fixed rooms, the rest of the space will be more variable, with fewer interior walls, allowing the occupant to adapt the space as needed without incurring high costs or making structural changes.

FOR EVERY 100 LOW-INCOME RENTERS IN CALIFORNIA, NEVADA, AND ARIZONA, THERE ARE FEWER THAN 30 AFFORDABLE HOMES AVAILABLE.



URBANIZATION, REMOTE WORK, AND INFECTION CONTROL CREATE NEW PROBLEMS FOR THE CONSTRUCTION INDUSTRY TO SOLVE.

PREDICTION
#1

REMOTE WORK

Another societal trend impacting construction is the rise in remote work. With the pandemic accelerating the adoption of work-from-home arrangements, the workplace is evolving rapidly. Office buildings aren't becoming obsolete, but they do need to adapt. While remote work has proven to be popular and effective at many companies, 56% of executives say they will need more workspace in the next three years.

And even though it remains to be seen how working from home will affect office space over the long term, hybrid remote/in-office work appears to be emerging as the way forward.[3] Like the housing market, flexibility is critical to ensuring spaces are adaptable to the evolving nature of office work.

URBANIZATION, REMOTE WORK, AND INFECTION CONTROL CREATE NEW PROBLEMS FOR THE CONSTRUCTION INDUSTRY TO SOLVE.

PREDICTION
#1

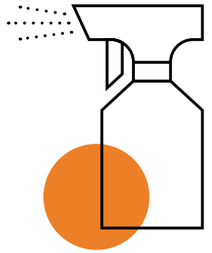
INFECTION CONTROL

After the COVID-19 crisis, there's no going back to "normal." Building occupants are more aware of cleanliness and infection control than ever. And businesses want to brace for any future illnesses (even the regular flu season).

Practices common in healthcare facilities will make their way to other commercial and residential buildings, and buildings will be constructed with occupant health in mind. Ninety-two percent of real estate professionals believe that some of the changes implemented during COVID-19 will become permanent.[4]

Expect more designs to include features like restrooms without doors and fewer surfaces where bacteria can accumulate. HVAC will no longer be another item on the maintenance to-do list; it will become a major part of improving building health.

Alternative systems (underfloor systems, radiant heating and cooling, etc.) are already becoming more prominent because they rely less on recirculated air. The current inventory of Class A- and Class B office spaces won't be able to accommodate these demands, opening up the possibility for a new office product to emerge.



THE INDUSTRY WILL SEE GREATER CONSOLIDATION, WITH FEWER PLAYERS SEEKING TO TAKE GREATER CONTROL OF THE SUPPLY CHAIN.

PREDICTION
#2

The construction supply chain is notoriously fragmented. Any project may involve dozens or hundreds of vendors, many of whom are subcontractors.

It's an inherently disjointed arrangement, where stakeholders only interact to hand off tasks. That fragmentation creates waste, cost overruns, and missed deadlines, in addition to stifling innovation. In the United States, $31.3 billion is wasted every year due to rework, with $17 billion of that due to poor communication. The main drivers of poor communication are unresponsiveness and inability to collaborate, symptoms of a badly broken system.[5]

In response, the innovators of the future will be integrating the supply chain. For example, KPMG says that top 20% innovators in AEC will be focused on unlocking an asset's value throughout its lifecycle, with one approach being to fully integrate planning, design, construction, commissioning and operation of assets by integrating vertical supply chains and organizations.[6]

IN THE UNITED STATES, $31.3 BILLION IS WASTED EVERY YEAR DUE TO REWORK.

Instead of each stakeholder focusing only on their deliverables, integrators will emerge. These integrators will take ownership of multiple items in the supply chain to reduce friction and improve project delivery. As innovators see the benefits of integrated supply chains – such as improved communication and better cost control – traditional business models will become obsolete.

CONSTRUCTION TECHNOLOGY WILL CONTINUE TO EVOLVE, AND NEW TECH COMPANIES WILL SHAKE UP THE INDUSTRY AS A WHOLE.

PREDICTION
#3

Construction technology is changing in two fundamental ways.
For starters, it's becoming less fragmented. While most construction tech has traditionally focused on point solutions, platforms (systems that integrate with other systems, or that aggregate data from various sources in a single place) are becoming increasingly popular.

Twenty percent of construction technology companies offer solution suites that address more than five use cases, an increase from 13% in 2017.[7] These platform solutions are breaking down data silos and improving collaboration between stakeholders.

The other construction technology change is coming from Silicon Valley. Tech companies, backed by venture capital firms, are getting into the construction business. From 2014 to 2019, venture capital firms invested $25 billion into engineering and construction (E&C) technology. In the previous five years, that investment was only $8 billion.[8] New technologies range from expected (such as internet of things (IoT) technology and 3D modeling) to surprising (such as blockchain).[9]

When Silicon Valley sets its sights on something, it has a tendency to revolutionize everything that it touches. Now that investors see the opportunity presented by construction tech, expect accelerated disruption using both old and new technologies.

CONSTRUCTION TECHNOLOGY WILL CONTINUE TO EVOLVE, AND NEW TECH COMPANIES WILL SHAKE UP THE INDUSTRY AS A WHOLE.

PREDICTION
#3

The Amazon Effect Comes to Construction.

Industry analysts are closely watching Amazon, which has signaled that it may make a future foray into the construction space. The prospect sparked a conversation about how Amazon's strengths are well-suited to solve construction industry challenges.10

Amazon's biggest advantage is its ability to bring systems, processes, and people together into complex ecosystems that deliver a seamless customer experience. It's vastly different from the construction supply chain, which is a fragmented network of specialized vendors who typically are bonded by relationships, not necessarily the goal to provide better project outcomes. Whether Amazon leads the charge or not, its practices have the potential to completely transform the construction supply chain.

LABOR SHORTAGES WILL PERSIST, BUT TECHNOLOGY AND BETTER COLLABORATION WILL START TO CLOSE THE GAPS.

PREDICTION
#4

For years, the construction industry has faced a skilled labor shortage, which was only exacerbated by the pandemic. Poor productivity is a major part of the problem. Construction professionals report they spend 35% of their time on tasks like hunting down project information, resolving conflicts, and dealing with mistakes that require rework.[11] Considering that productivity in the construction sector lags far behind other industries, it's high time to reduce these productivity-killing tasks.

The pandemic revealed that there is opportunity to improve productivity and reduce the number of employees needed for projects.

In 2020, 40% of firms adopted new hardware or software to alleviate labor shortages.[12] It's likely that, once adopted, software will prove to be a permanent solution to at least some labor shortage issues. Implementing collaborative tools (such as platform technologies) and processes will also improve productivity, along with greater integration of the supply chain.

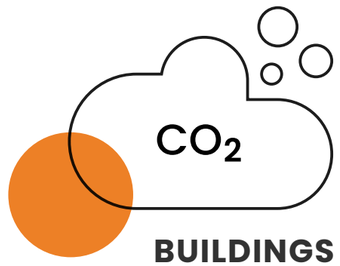
SUSTAINABILITY PRESSURES WILL INCREASE – FROM REGULATORS AND THE PUBLIC, AND CALIFORNIA WILL BE AT THE FOREFRONT OF CHANGE.

PREDICTION
#5

As the climate crisis becomes more dire, more companies are disclosing data on their carbon footprint in response to shareholder requests.[13]

Greater visibility leads to enhanced public pressure. For instance, Apple and Amazon were pressured to announce ambitious goals to reduce their carbon footprint after disclosures revealed that they were major contributors to carbon emissions.

Buildings and building construction are responsible for 40% of direct and indirect CO2 emissions.[14] Those emissions from buildings and construction may hinder the ability to reach targets set by the Paris Agreement. Expect even greater public and regulatory pressure to reduce that impact, such as California's Title 24, the state's standards for energy consumption in buildings.



BUILDINGS AND BUILDING CONSTRUCTION ARE RESPONSIBLE FOR 40% OF DIRECT AND INDIRECT CO2 EMISSIONS.

And since California is typically at the forefront of environmental regulation, the Bay Area, with its acute housing shortage and high volume of tech disruptors, will be central to initiating change. The most competitive developers, architects, and contractors will be prepared to meet public pressure and deliver solutions that address both regulatory and private-sector demand for reducing construction's carbon footprint.

HOW TO PREPARE FOR THE FUTURE OF CONSTRUCTION

The challenges facing the construction industry may be complex and multi-layered, but there are some solutions that solve multiple problems at once. Here's what you can do to prepare for disruption and ride the wave of change.

EMBRACE COLLABORATION AND PARTNERSHIP.

The construction ecosystem is long overdue for an overhaul of how disparate teams work together. The challenges that plague construction, both old and new, can't be addressed when stakeholders are forced to focus on their individual profits, timelines, and deliverables. Historically, there has been little incentive to change. But the future trends covered in this guide may finally provide the impetus the industry needs.

So, what exactly does collaboration in construction look like? It varies. It can be as simple as implementing technology that streamlines internal processes. And it can be as complex as restructuring your organization and go-to-market strategy to be more competitive as the construction supply chain becomes more consolidated.

Both avenues are necessary to keep up with the future of construction, and they both provide tangible benefits. For example, investing in connected construction technologies pays off throughout the construction lifecycle by reducing:

- **ENGINEERING HOURS BY 10/30%**
- **BUILDING COSTS BY 5/10%**
- **OPERATING COSTS BY 10/20%**
- **DECOMMISSIONING HOURS BY 5/10%**[15]

Using technology as a foundation, construction firms can not only break down silos, they can also integrate the construction supply chain.

McKinsey predicts that construction value and profit pools will shift dramatically, and by 2035, total profit pools may double, unlocking $265 billion in potential new profit for stakeholders who take the lead in embracing change.[16] But design professionals and general contractors risk getting left behind.

General contractors must offer more than execution alone, and design will face increased commodification and automation. To stay ahead of the curve, stakeholders must focus on building partnerships and alliances that are centered on delivering better outcomes and value to owners, not just project-based transactions.

BY 2035, CONSTRUCTION PROFIT POOLS MAY DOUBLE, UNLOCKING UP TO $265 BILLION IN NEW PROFITS.

IMPLEMENT DIGITAL TWIN TECHNOLOGY.

Adopting Building Information Modeling (BIM) is one way to improve collaboration, but the current approaches to BIM in the United States are lacking. Too often, the model is static, and doesn't serve much use after the completion of construction.

Greater data access and sophistication, from artificial intelligence to the internet of things, allows for better monitoring and control of buildings post-construction. But most BIM approaches simply weren't built with these capabilities in mind. The result is a fragmented data set, with 4D and 5D data being decoupled from the model after construction.

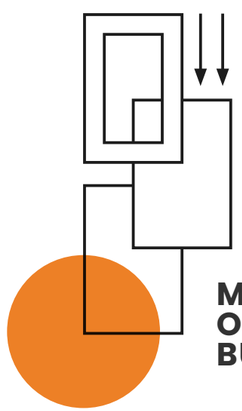
We live in an increasingly interconnected world and BIM models need to evolve to accommodate digital twin capabilities. Digital twins allow for true BIM, by serving as a virtual copy of the building and housing the data needed to perform complex visualizations and analyses. They are also able to incorporate real-time data to provide insight into the building's current state, its subsystems, its surrounding environment, and even its occupants.

Digital twins offer value at every stage of the construction lifecycle. Architects can gain deeper insight into how buildings are used and make more informed decisions about future designs. Contractors can use the twin to monitor onsite progress, better allocate resources and equipment, and track the causes of errors. And digital twins allow owners to use data to make better operational decisions, improve cost control, and manage occupancy levels.

EXPLORE OFFSITE CONSTRUCTION.

Offsite construction refers to the practice of constructing building elements in a setting outside of the building's final location. Also referred to as prefabrication or modular construction, offsite construction isn't a new concept.

But it's gaining popularity due to its ability to address many of the challenges the construction industry is facing.



MOST COMMON PREFABRICATED PROJECTS
OFFICES | COMMERCIAL WAREHOUSES | PUBLIC BUILDINGS | HEALTHCARE FACILITIES

By shifting many construction activities away from the job site and into factory settings, developers and contractors can control costs, improve project scheduling and reliability, and reduce risk. With prefabrication, multiple processes (such as foundation work and manufacturing) can take place simultaneously, significantly reducing building time. It can cut schedules by 20-50%.[17] And since fewer workers are needed for onsite assembly, it can reduce overall project labor costs by up to 25%.[18]

Design firms and contractors who use prefabrication or modular construction report overwhelmingly positive results.

PERCENTAGE OF USERS REPORTING MEDIUM, HIGH, OR VERY HIGH LEVELS OF POSITIVE RESULTS[19]

IMPROVED PRODUCTIVITY
PREFABRICATION 89%
MODULAR CONSTRUCTION 93%

IMPROVED QUALITY
PREFABRICATION 90%
MODULAR CONSTRUCTION 90%

INCREASED SCHEDULE CERTAINTY
PREFABRICATION 87%
MODULAR CONSTRUCTION 90%

IMPROVED COST PREDICTABILITY
PREFABRICATION 81%
MODULAR CONSTRUCTION 88%

Digital tools and improved logistics networks are improving the quality of prefabricated structures, making them well-suited to tackle the construction challenges of the future. Also, as the construction industry moves towards productization to take advantage of economies of scale and better integrate the supply chain, offsite construction aligns well with that shift. Western states in particular can benefit from prefabrication, as it can deliver the most value to areas experiencing serious housing and labor shortages.

One of the biggest hurdles to implementing prefabrication is that it must be considered from the start. This can place a considerable burden on designers in particular. But when you consider that design will become increasingly commodified and automated, it's a burden that will pay off by enabling firms to deliver greater value to developers and owners.

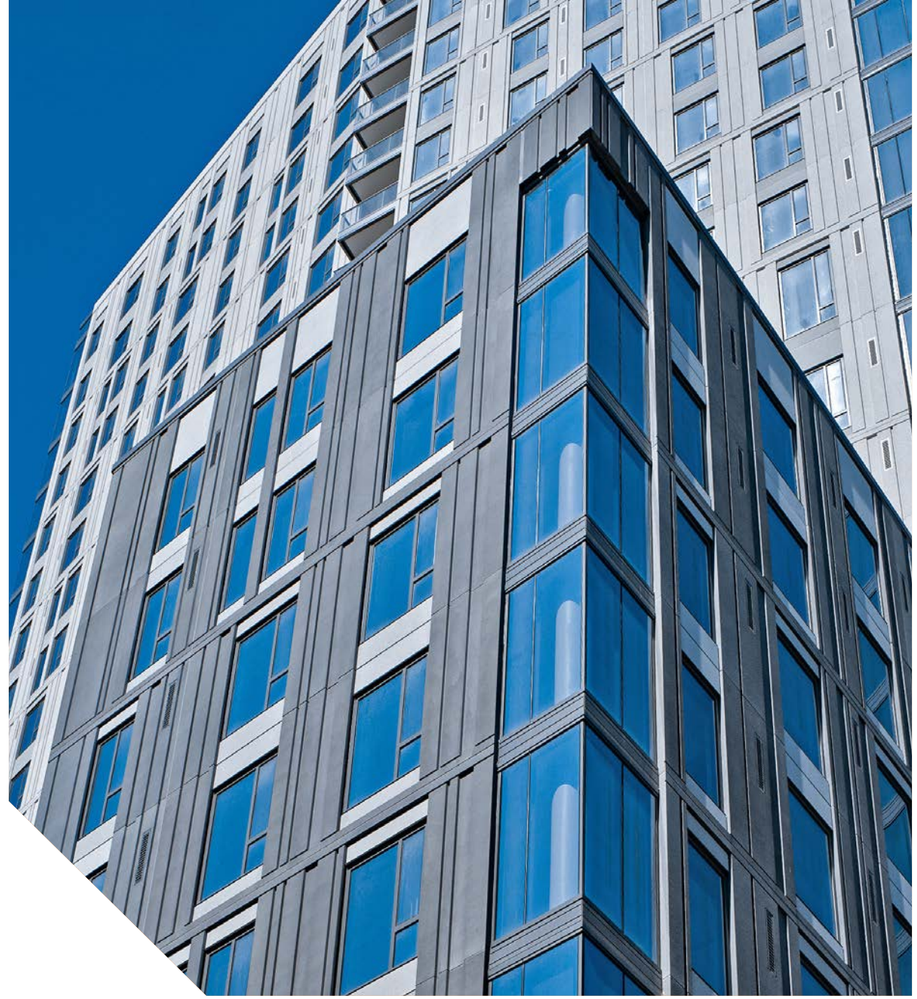
CONCLUSION

While the future of construction is fraught with challenges, there are also great opportunities for stakeholders to evolve their businesses and capture new revenue. Growing pains are inevitable, but they're a small price to pay as we strive towards a more integrated, value-driven industry. Homeowners, building occupants, and communities want (and deserve) buildings that can adapt to their evolving needs. The stakeholders who step up to provide that value today stand the most to gain as the industry shifts tomorrow.

ABOUT CLARK PACIFIC

For decades, Clark Pacific has been a leading manufacturer of prefabricated building systems. We are transforming design and construction by delivering high quality, cost effective buildings with less risk. Clark Pacific paves the way for prefabrication as a smarter, safer and more efficient way to bring great designs to life.

Clark Pacific collaborates with construction owners and design-build teams to develop and deliver prefabricated building systems for commercial and institutional projects of any size and complexity.



To learn how our experts can help you navigate the future of construction, contact us.

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Sources
1. https://reports.nlihc.org/gap
2. https://www.nahb.org/News-and-Economics/Industry-News/Press-Releases/2020/01/NAHB-Identifies-Top-Features-and-Design-Trends-for-2020
3. https://www.pwc.com/us/en/library/covid-19/us-remote-work-survey.html
4. https://www.pwc.com/us/en/asset-management/real-estate/assets/pwc-emerging-trends-in-real-estate-2021.pdf
5. http://pg.plangrid.com/rs/572-JSV-775/images/Construction_Disconnected.pdf
6. https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/04/global-construction-survey-2019.pdf
7. https://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/rise-of-the-platform-era-the-next-chapter-in-construction-technology
8. https://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/rise-of-the-platform-era-the-next-chapter-in-construction-technology
9. https://www.ey.com/en_us/real-estate-hospitality-construction/corporate-advisory-services/how-technology-advances-are-disrupting-the-construction-industry
10. https://searchaws.techtarget.com/feature/Is-construction-Amazons-next-target-for-disruption
11. https://www.constructiondive.com/news/industry-could-be-overspending-177b-per-year-study-finds/529450/
12. https://www.agc.org/news/2020/09/02/coronavirus-has-caused-significant-construction-project-delays-and-cancellations-y-0
13. https://www.npr.org/2020/02/27/806011419/better-late-than-never-big-companies-scramble-to-make-lofty-climate-promises
14. https://www.iea.org/topics/buildings

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