



CASE STUDY

Meeting tight schedules and site constraints with strategic prefabrication

Banner Desert Medical Center
Women's Tower Expansion

📍 Mesa, Arizona





Informed Perspective

Cunningham embraces off-site construction as a transformative opportunity for developers, owners, designers, and builders. Off-site construction, including modular and prefabricated methods, offers substantial benefits related to cost efficiency, design quality, waste reduction, and overall project effectiveness.

On complex healthcare projects, where inflation, labor shortages, and supply chain issues pose significant challenges, off-site construction stands out as a solution. Prefabrication, when incorporated early in the design phase, is a proactive approach that can help manage complicated projects by providing cost certainty, accelerating schedules, and mitigating the impacts on operational campuses.

Cunningham’s commitment to advanced technologies like Building Information Modeling (BIM) and digital twin systems amplifies the advantages of off-site construction. These tools facilitate seamless collaboration from design through assembly, allowing us to identify and address potential issues early, thereby reducing costly on-site modifications. By integrating these technologies, we enhance the precision and control of our prefabricated elements, significantly reducing waste and improving overall project outcomes.

Ultimately, Cunningham views off-site construction as more than just an alternative delivery method; it is a cornerstone of our strategy to meet the evolving demands of the industry. As we continue to push the boundaries of design and construction, off-site construction enables us to deliver high-quality projects with agility, creativity, and sustainability.

“Prefabrication is not restricted to a building component that is repeated many times for cost efficiency; it is a design and construction process that allows elements of the building to be built off-site and transported for installation.”

Tracy Lauer, Cunningham Senior Associate

Cover: Prefabricated exterior skin on the completed facade

Left: Creating the prefabricated exterior skin

Project Overview

The vertical expansion of Banner Desert Medical Center's north wing adds five new floors, increasing the building's bed capacity and creating space for Banner Health's relocated and expanded women and infant services program. The updated facility strategically positions Banner Desert Medical Center as a local hospital of choice.

As the project's architect and interior designer, Cuningham worked closely with DPR Construction to strategically implement a variety of prefabricated building components. This alternative delivery approach allowed the team to address the complexities of the site more fluidly, while maintaining the day-to-day operations of the active facility — all on an expedited construction timeline.

Program Elements

- 14 labor and delivery rooms
- 3 C-section operating rooms
- 36 ante-partum/post-partum rooms
- 108 medical-surgical patient rooms
- A chilled beam system that reduces the amount of recirculated air, creating electric, water, and gas savings

Prefabrication Scope

- 158 prefabricated headwalls
- 150 prefabricated toilet pods
- 29,504 square feet of prefabricated exterior building skin

Right: Completed patient room featuring prefabricated Amico headwall and SurePods bathroom





56

days reduced on construction schedule
with prefabrication

30

working days with one crew needed
to install the entire exterior skin

\$1 million

in savings in escalation by utilizing
a separate GMP for steel purchases

0

scaffolding used in patient traffic areas

Left: Installation of prefabricated exterior

Goals and Challenges

Banner Health's primary goal for the Women's Tower Expansion was to quickly increase bed capacity on campus and accommodate the relocated and expanded women and infant services program. The existing department was over 20 years old and dated, and the emergency department was backed up due to a bed shortage. With a local competitor having just completed their own new women's center, **speed to market was critical so that Banner Health did not lose any market share.**

In addition to the client's aggressive timeline, the team also faced the challenges of vertically expanding an operational campus. Beyond the technical complexity of the scope, ongoing construction posed safety hazards and general nuisances for patients.

To meet Banner Health's aggressive desired schedule and maintain safety and accessibility for patients and visitors, DPR Construction realized that **prefabrication was the only way to create faster speed to market, establish predictable timelines, and minimize impacts on existing hospital operations.** They engaged Cunningham to create a design that could maximize their knowledge of the prefabrication and manufacturing processes, aggressively analyzing and implementing large and small prefabrication opportunities.

From the building's exterior skin to the use of modular bathroom pods, **prefabrication eliminated the logistical challenges of mobilizing a large labor force in an operating healthcare environment**, and significantly reduced risks associated with building on an active campus.



Prefabrication was the only way to create faster speed to market, establish predictable timelines, and minimize impacts on existing hospital operations.



Above, Left: Delivering prefabricated exterior skin

Design Approach

Utilizing prefabrication isn’t just a simple add-on to a completed design; it requires early integration into the design process itself and a team that is willing to go through the process together.

In order for prefabrication to be successful:

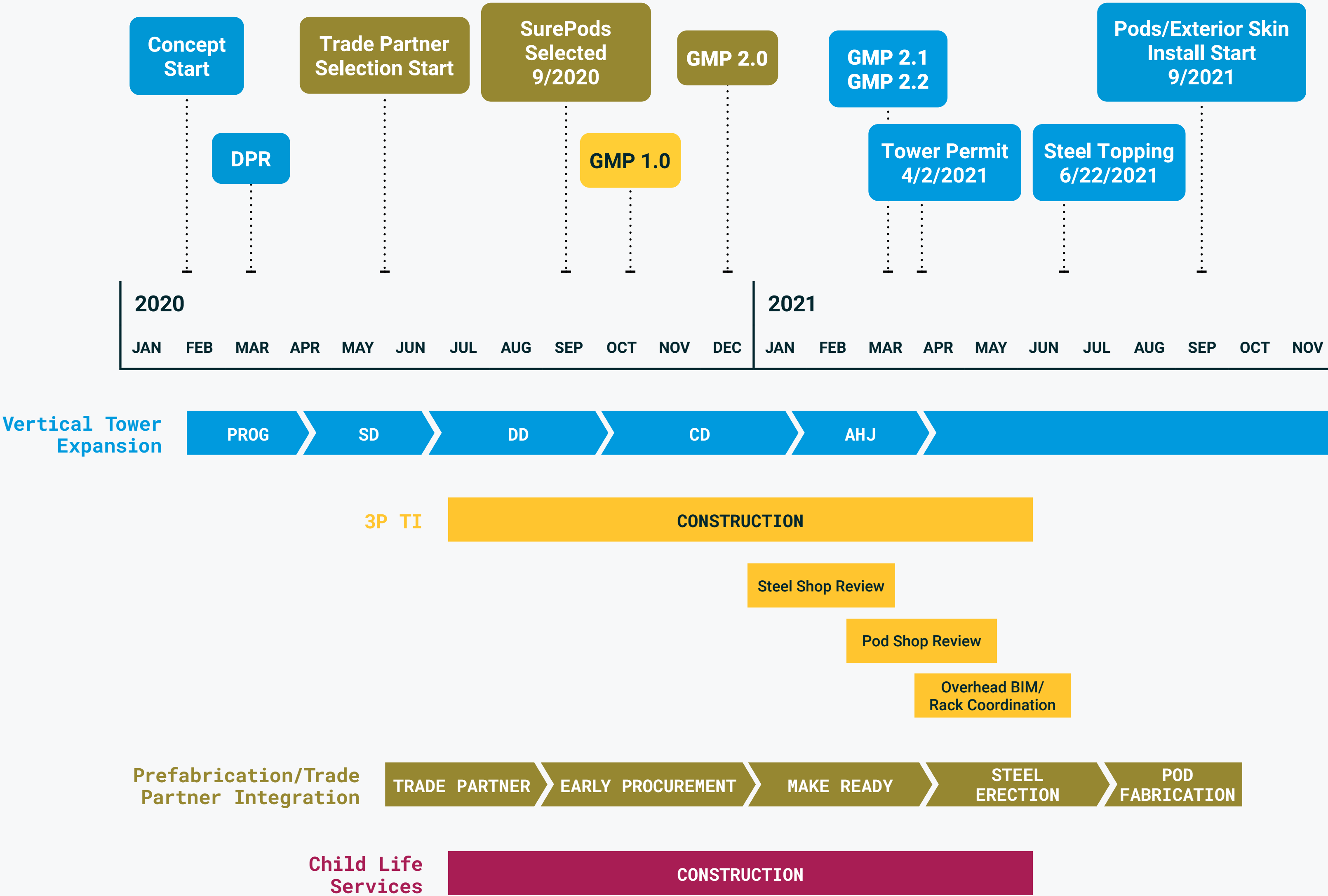
- The client must be open to the risks involved
- The architect must be willing to work within the alternative design process
- The contractor must analyze the costs and schedule impacts throughout the design process and execute the construction

With this understanding, the team of Cuningham, DPR Construction, and Banner Health brought onboard and closely collaborated with trade partners during the design development phase — much earlier than is typical. These partners included mechanical, electrical, exterior envelope, steel fabricator, and pod manufacturer.

“When challenges arose, the team was able to come together seamlessly to discuss the issues and constructability of the solutions.”

Tracy Lauer, Cuningham Senior Associate

Right: Snapshot of the accelerated project schedule, where design and construction activities overlapped



Bringing trade partners on this early and committing to the prefabrication process is not without risk; if budgets are not aligned and the project reverts to traditional construction methods, the team will lose both time and money. Therefore, it was critical that the entire team was aware of the associated risks and costs. Despite the increased upfront costs of involving these partners early, the benefits were clear: a quicker path to market and the ability to procure materials well ahead of traditional timelines would save time and money.

As the project’s architect, Cuningham adjusted the firm’s typical design process to allow overlapping of design and construction activities. Not only did this mean the team had to have documents ready ahead of time for early procurement, but they also had to be flexible in their design process. For example, the steel shop drawings were submitted in rolling packages in order to have the steel fabricated and ready to deliver by the time a permit was issued. This also required a rolling GMP that authorized over \$12 million of steel, mechanical units, and pod mock-ups four months ahead of the final GMP.



“Having trade partners on board really helped us reduce RFIs, figure out what’s missing, and determine how to build the building from the beginning. Getting the right eyes on the plans from the start was something that the collaborative environment brought that doesn’t always happen in preconstruction.”

Brittany Burbes, DPR Construction Project Executive

Above: Steel beams pre-outfitted with holes for bolted connections and installed on-site
Left: Toilet pod mockup

Prefabrication in Detail

Exterior Skin: MKB Construction & Kapture Prefab

Prefabricating the tower’s exterior skin increased speed to market and project safety. Collaborating closely with MKB Construction and Kapture Prefab, weekly meetings early in the design phase helped define parameters such as panel sizes, types, joints, thickness, and window locations. This process aligned the exterior design with the client’s corporate guidelines. Throughout construction, design details were continually refined through mock-ups and factory inspections, resulting in the installation of 136 panels covering 29,504 square feet of exterior skin in 30 days. The finished skin installation averaged 2,775 square feet per day by one crew instead of over several months on scaffolding with six to eight trade partners, as is typical in a conventional setting.

Below: Exterior skin installation



Toilet Pods: SurePods

Implementing modular bathrooms required close collaboration to discuss every component of the pod, from pod geometry and chase size to interior finishes and tile patterns for consistency. All 150 toilet pods were installed over a five-month duration, reducing the overall timeline by 56 days. Because the toilet pods could not be installed if trade partners were leaving debris, the project construction site had the additional benefit of being one of the cleanest Cunningham has ever worked on.

Above: Bathroom pod after installation in patient room

Headwalls: Amico

To reduce field labor and construction waste, as well as eliminate field errors in mirrored headwalls, the team used Amico’s standard line of prefabricated headwalls, with DPR Construction self-performing the installation. Because every patient bed in the hospital required framing, medical gas, and electrical rough-in at the head of each bed, prefabricating the headwalls created better consistency and superior quality control with fewer trade partners. Over 158 prefabricated headwalls are currently installed on the project, many of them installed back-to-back and prelabeled for easy installation.

Below: Final installed headwalls



Structural Steel: SidePlate & Amfab Inc.

Because the project was located on an existing structure that housed critical clinical operations, using traditional steel construction presented welding-related fire risks. To mitigate this risk, the team incorporated SidePlate’s proprietary all-bolted connection system, where steel beams are pre-outfitted with holes for bolted connections. Once delivered to the site, steelworkers install bolts at the predrilled locations, allowing the structure to be erected faster than traditional construction methods and virtually eliminating any fire danger.

Coordination and design criteria were developed and refined in tandem with the structural engineer and Amfab. Amfab’s design documents were incorporated in the construction documents and were permitted with the overall building. A rolling GMP was utilized to procure the steel three months prior to permits being issued. Shop drawings were being reviewed while the plans were in for permit. Once the permit was approved, steel was already fabricated and ready to ship to the site.

Above: SidePlate’s proprietary all-bolted connection system

Results and Impact

The Women's Tower Expansion benefited significantly from prefabrication in several ways. First, the number of prefabricated building components meant that fewer trade partners were needed on-site. This reduction in manpower also contributed to a safer construction site, as fewer people mean fewer accidents, and construction was executed faster and with less equipment compared to traditional methods.

Prefabrication also reduced campus impact by eliminating the need for scaffolding, leading to less noise and disruption. In addition, the project timeline was more efficient, as prefabrication requires upfront coordination between trade partners and designers, reducing the potential for design rework later on.

While utilizing prefabrication does not guarantee cost savings, the upfront coordination necessitated by the methodology allowed the design team to save over \$1 million dollars in escalation by purchasing steel earlier at a less expensive rate. Cost was also reduced as a result of substantial time savings; the steel structure topped out three months after receiving the construction permit. This upfront owner buy-in and decision-making was instrumental in leveraging pricing and design consistency on the project.

Cunningham's use of prefabrication also netted quality control benefits. More consistent construction quality resulting from inspections prior to leaving the factory led to a cleaner construction site and less construction waste.

Prefabrication eliminated the logistical challenges of mobilizing a large labor force in an operating healthcare environment.

Right: Patient room



Project Recognition

Awards

- Structural Engineers Association of Arizona Excellence Merit Award 2023 – Winner
- Healthcare Facilities Distinction Team Award – Winner
- Real Estate and Development (RED) AZ 2023 Award – Finalist

Credits

- Partner Firms: DPR Construction, Affiliated Engineers, Inc., PK Associates, and Dibble Engineering
- Professional photography © copyright 2024 by Samuel Forrest

Below: The completed tower, which was completed without shutting down the existing building

Articles

- [Virtual Big Room Delivers at Banner Desert Medical Center](#)
- [Award-Winning Team Chemistry Elevates Complex Banner Desert Medical Center Expansion](#)
- [Serving a Growing Population with Prefabrication](#)

How can prefabrication work for you?

Learn more about how prefabrication can reduce timelines and budgets on *your* upcoming project.



Contact:
Tracy Lauer
Cunningham Senior Associate
tlauer@cunningham.com



Cunningham

cunningham.com

