Denver Health 601 Broadway Hospital Support Services Building Project Overview

Denver Health 601 Broadway Support Services Building project and design-build team used an underutilized process that fit the Denver Health construction plan and schedule with top-down construction. Through top-down construction, this presented all parties an opportunity to lean their processes to improve efficiency, quality, and safety. When difficult circumstances with the utilities were discovered, the fully integrated design-build team worked through each scenario to resolve all issues and eliminate all disruptions to an active hospital.This $57.7M brownfield improvement project consolidates the administrative, business office and general operational support offices scattered around the existing Denver Health and Hospital Authority (DHHA) campus into a single location to improve efficiency.

The Administrative Office Building is located at 601 Broadway, on the southeast corner of the DHHA campus in Denver, Colorado. It is a 309,600 SF, 9-story mixed-use building. This includes 202,000 SF of office space on the top six stories, 258 parking stalls on the lower three floors, and 6,000 SF of retail space located at grade. This project comprises structural precast concrete twin tees, structural exterior panels with an architectural finish (50% thin set masonry, 50% acid-etched colored concrete), insulated metal panels, and a curtain wall system.

Solutions of Special Projects

In the early months of the project, the sanitary sewer installation started the excavation process to install the 18” sewer pipe and dig 20’ deep below grade along Acoma Street. During installation, the following conditions altered the utilities installation:

- Two additional valves were replaced, as were two new hydrants.
- Soil conditions were unsuitable for backfill so the soil was removed and replaced with imported structural fill.
- In anticipation for the installation along 6th Avenue, the design-builder and subcontractor, BT Construction, Inc. located an additional fiber line not shown on the design drawings running directly above the future sanitary sewer line.

•After further pot holing and coordination, this line was identified as a CenturyLink trunk fiber line, which carried main lines for 911 and the Federal Aviation Administration.

The sanitary sewer installation progressed into 6th Avenue after extensive coordination between the design-build team and the City and County of Denver Wastewater Management to identify and design an alternate route due to the CenturyLink trunk fiber. After multiple meetings with CenturyLink and BT Construction, the project team concluded that it was in the best interest of the project schedule and project financials to pursue an alternate design for the sanitary sewer, in lieu of relocating the CenturyLink fiber line. Through extensive coordination between the design-build team and the City and County of Denver Wastewater Management, an alternate solution was identified, entailing the construction of larger custom vaults with the use of narrower sheet piling in lieu of wider trench boxes, which ensured the CenturyLink fiber line was not severed during construction. Bill Mosher, Trammell Crow Company, stated, "Your [Hensel Phelps] work this year really made a positive impact in the overall success of the Denver Health facility, and we want you to know how much we appreciate your commitment…" to design and construct the sewer around the CenturyLink fiber. The fiber was added to the As-builts for any future construction involving the City and County of Denver and Denver Health.

Excellence in Project Execution and Management/Team Approach

At the time of award, the project was projected to be a 4-story office building with two stories of structured parking. Through collaborative efforts by the design-build team, the project quickly changed to include additional space for DHHA business partners, implementing an integrated design work plan (IDWP) that considered the value engineering options of cast-in-place concrete, steel structure, and precast concrete. The design-build team deemed precast concrete as the best option for this construction process to expedite the schedule and maintain quality and cost through thte new inovative idea of top-down construction. As the owner on the project, Bill Mosher with The Trammell Crow Company, said: "We consider Hensel Phelps an extension of our team and look forward to continuing and growing that partnership…"

Schedule benefits of top-down construction:

- Sequencing of the precast concrete in four phases
- Sequencing of the trades
- Ability to install the hoist to the top floor with no additional jumps
- Start with roof and utilities
- Drying in the building more quickly
- Permitted the trades to funnel from the top of the building down
    - Limited trade damage
    - Re-cleaning
    - Additional temporary protection
    - Early phased move in

Using the top-down construction model, Sturgeon Electric, the electrical subcontractor, implemented a lean process to prefabricate each room efficiently and manage material from room to room. They used virtual models and drawings to review what was required prior to ordering parts and organizing each room into individual boxes. This allowed them to identify all required materials so they could ensure they were ordered and onsite in time for construction. The process increased quality, improved safety and schedule, and added efficiency for the subcontractor and Hensel Phelps by reducing the number of deliveries on a tight site.

Value Engineering

The GMP for this project was established at $54,714,000 at the end of the Schematic Design phase, and was maintained through 100% Construction Documents. As part of this assignment, the Target Value of the precast package was established at $8,400,000. Working in a collaborative effort with Rocky Mountain Prestress Concrete and Davis Partnership to modify spans, wall panel, tee section, and strategically locating stairwell locations, a final value of $8,377,000 was reached, with negligible impact to the design.

Other construction value engineering savings included:

- Savings of $1,000,000 for adjusting the construction of the below grade parking to above grade parking by using existing lower garage walls on 6th Avenue for shoring and for engineering tiebacks into the existing parking structure walls to maintain the integrity of

6th Avenue and eliminate disruptions in lieu of traditional shoring. .

•Savings of $1,018,568 through deleting a portion of the basement parking while maintaining the same quantity of parking spaces above.

Construction Innovations/State-of-the-Art Advancement

While working during the design phase, the team looked at the radial corner for potential cost savings and redesigned the structure from steel to radius precast concrete. The benefits of this decision included:

•Saved time

•Allowed for a more adjustable budget

•Used existing erectors

•Minimized welding required

•No additional coordination required with crane

•Less manpower

•Ability to fabricate offsite eliminated additional material layout on a tight site

Virtual Mockups

A picture is worth a thousand words. The use of SketchUp, Revit, and our other visualization tools, including Virtual Reality, allow us to virtually mock-up areas or components of the work. The ability to create, test, and prove virtual prototypes allows us to get it right the first time, and then communicate the work to the craft persons in the field. From the DHHA project, any issues with the MEP was mitigated by reviewing the virtual mockup prior to installation to ensure quality and functionality. Hensel Phelps looks for constructability, coordination, completeness, aesthetics, and the ability of the crafts to deliver the quality workmanship required. The virtual mock-ups allow us both to sequence the work properly, especially when working with top-down construction, and also to understand what is required to install the work with a high degree of quality and minimal conflicts for all aspects of the building.

Environmental/Safety

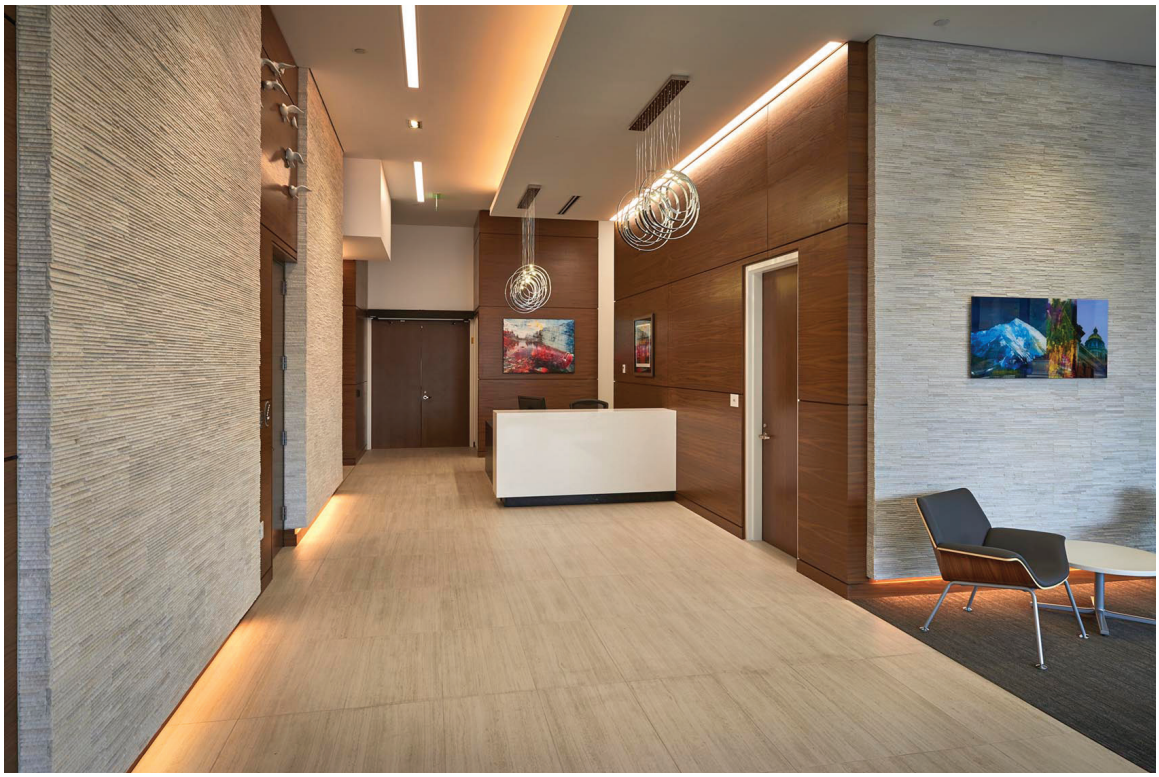
Nothing is more important than sending everyone home each day without bodily injury. The

emphasis Hensel Phelps places on safety has resulted in one of the industry's best safety performance records. This record is even more significant considering that Hensel Phelps self-performs more than 4,000,000 work-hours of labor each year. The current Hensel Phelps safety "Experience Modification Rate" or EMR of 0.49 is significantly below the industry benchmark standard of 1.0, which provides the owner with significant savings through reduced worker's compensation insurance rates for every work-hour of labor performed on a project. Hensel Phelps has been able to sustain an exceptional safety record year after year because of the importance that it places on safety. This specific project accrued 296,475 total manhours with only one lost-time accident.

The design and construction of the 601 Broadway Support Services Building used an integration of LEED energy-efficiency strategies, renewable energy systems, building site design, and environmentally friendly building materials. The project is currently pending final LEED certification.

Excellence in Client Service and/or Contribution to Community

This project is located near schools and an active neighborhood so the redevelopment of a brownfield site removed an unusable area and replaced it with a fully functional medical office building with retail/amenities on the main floor fostering the growth of the local community. Through the construction process, Hensel Phelps hired local, small businesses for various aspects of the project. As stated from James Jensen: "It's this type of team effort and willingness to assist small businesses that helps set Hensel Phelps far apart from other primes."

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