
Category: 8 – Best Building Project – GC (Under \$10M)

Contractor: Swinerton Builders

Project Name: Colorado State Bank Recladding

Downtown Denver is experiencing a building surge with nearly \$2 billion in construction recently completed, under way or planned. This increase in leasing options means that many *older buildings*, such as the Colorado State Bank Building built in 1972, *must compete for tenants with new transit-orientated developments* 10 blocks away in the Denver Union Station neighborhood. Owners of these older buildings are also looking for *affordable ways to repurpose* their properties for future sale. Swinerton Builders accepted the challenge to help the 27-story CSB Building remain competitive in Denver’s active marketplace by *recladding 18 vertical precast columns with sleek metal panels*. These light-weight panels evoke a contemporary appearance and maintain the building’s structural and wind profile. While the architect’s drawings depicted final appearance expectations, the engineering of *how to safely hoist and install the panels remained unclear*. It was up to Swinerton to develop a hoisting technique to ensure the *3,000 panels, workers and equipment remained 100% tied off* during installation above one of Denver’s busiest intersections. Working through a fast-track schedule to avoid winter construction conditions, a crew of 30 installed panels from swing stages – up to 350 feet above the street - without incident to modernize this office building’s appearance.

Raising the Platform for Safety

During design with Gensler, Swinerton assembled a team to mitigate our biggest obstacle and risk – *safety*. This team included metal panel subcontractor Gen 3, safety equipment provider Spider, scaffolding supplier Safeway and structural engineering firm Mountain Design Group. To eliminate safety threats and protect the integrity of the underground parking structure due to load levels, Swinerton erected an expansive, engineered scaffold system consisting of I-beams and shoring equipment to create a platform which served multiple purposes:

- 12-foot-tall covered, clean and well-lit *walkway to separate the 23,000 pedestrians* that walked past the project daily at the intersection of 16th Street Mall and Broadway *from construction activities*

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- 20-foot-wide platform for worker access, material and equipment staging
 - High hat scaffolding area 16 feet tall to provide access for the deliveries to the 451,000-square-foot occupied building

Once the platform was in place around the building, Swinerton began to install the roof-top support systems for the u-shaped and straight stages which carried installation crews as they progressed up and down each of the 18 precast columns. Each column required a ***custom-fit, u-shaped stage*** and netting held in place with cables from 20-foot beams and counterweights installed on the building's roof. Cables for the smaller straight stages and workers' life safety ropes connected into structural elements tucked underneath the building's mushroom cap-shaped crown.

Installers working on the building's exterior to ***affix 100,000 square feet of metal panels*** were constantly exposed to the rapidly changing weather Denver endures. Anemometers monitored wind speed and Swinerton suspended work in winds reaching 25 mph or greater to maintain a safe work environment. Also, ***Swinerton placed stages on all four elevations*** so that if winds impacted one side, crews could move to a more protected side so work could continue and remain on schedule to avoid winter weather conditions which would have made this difficult operation far more precarious.

As installation progressed up the exterior, Swinerton prepared to re clad the crown which cantilevers over the top of the building. Upon close inspection of existing conditions, the team discovered ***deteriorating concrete in the crown*** due to a lack of drip edges cast into the precast. This scenario allowed water to wick into the concrete during freeze/thaw cycles.

Swinerton and the structural engineer mocked up several installation scenarios for this unforeseen condition with the ultimate solution of reinforcing the existing concrete by bolting steel and injecting epoxy into viable concrete so panels could hang safely. While this solution was being engineered, ***installers redirected their attention to areas that were safe*** so that mitigation of this unforeseen condition did not impact the overall schedule.

Safety Rules from Pre-Planning through Punchlist

Excellence in execution began during preconstruction with both Swinerton and the safety equipment provider conducting *competent person training for scaffolding, rigging, fall protection and anchoring systems to ensure safety compliance, and protection of employees, the building structure and pedestrians*. Over six months, five crews installed 3,000 metal panels on 18 precast columns from suspended stages, a system similar to window washing equipment. However, our u-shaped stages were engineered to sustain 1,000 pounds of live loads, including up to three installers, their tools, rigging and safety equipment, along with the panels weighing approximately 100 pounds.

Gen 3 fabricated and finished the materials at their local facility and delivered a week's worth of panels which were stored on the elevated platform. From there, workers in straight stages connected a tie-off rope to each panel and hoisted it to three installers housed in the u-shaped stages. Then, *installers used muscle and hand tools to hang each panel* on heavy gauge mechanically fastened vertical girts. Every panel remained tied off until complete installation to ensure safety. Approximately 160 panels cover each column.

For ultimate project execution and workforce management, up to *four precast columns were reclud concurrently* as u-shaped stages framed the columns and straight stages operated between columns to supply materials to the adjacent u-shaped stages. Work progressed from bottom to top with workers and materials hoisted from the platform. The panels kept their protective coating until punchlist inspections which Gensler conducted from the stages as soon as a column completed.

Fabricating Solutions with Safety and Schedule in Mind

Swinerton explored several techniques to ensure the safest, most efficient method to hoist and install the panels. Our team quickly discovered that *typical rope applications* did not meet Swinerton's high *safety standards* and were *manually intensive and slow*, which threatened the schedule.

Analysis by Swinerton's superintendent and Gen 3 resulted in a solution to fabricate a ***mechanical pulley system for hoisting the metal panels from the platform***. The pulleys tied into the building structure in the crown with their own safety ropes which eliminated the risk of a panel falling. The pulley system held the weight of the panel so that ***craftsmen could focus on proper installation*** without the physical exhaustion of wrestling each panel into place. This system reduced the schedule by 10% over traditional hoisting methods.

While modeling technology greatly assisted the team during preconstruction to configure the scaffold, staging and logistics plan, all materials had to be field measured to match existing conditions. Glare from the building's glass rendered laser scanning ineffective by distorting the data. Field measuring performed off the u-shaped stages took several weeks due to the inconsistent size of each column.

Installing 3,000 panels without advanced technology required a ***tremendous eye for detail and understanding of craftsmanship*** on the installers' part. They carefully aligned panels with window mullions and column-to-column alignment to meet the design intent and to match existing ground-level panels from a previous renovation.

Zero Tolerance for Any Incident

Swinerton completed this project with zero lost time and zero incidents by dedicating time and attention to safety protocol in providing a safe work environment that also protected the public. Safety remained an integral part of the project, and our plan included:

- Every worker in the stages wore a life safety harness that tied off to the building's structure in the crown
- Lanyards provided 100% connection between electrical and battery-operated tools and stages
- Hand tools were tied to the employees' tool belts
- Hard hats, radios and phones were tied to the life safety harness
- All metal panels were tied to the stages until permanent installation with lanyards engineered for fall protection

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- Personal rope grabs moved along vertical lifelines to provide continuous fall protection and locked immediately if a worker were to fall.

No workers, equipment nor materials fell during this project.

Swinerton's superintendent team and riggers from Spider inspected all tie-offs, lanyards and knots daily, and at various times, to ensure all working conditions and equipment remained safe. Local and regional Swinerton safety professionals made random, unannounced inspections as an added layer of safety.

Pedestrian safety below the platform required special attention. In addition to six-foot-tall fencing adjacent to the building which cordoned pedestrians from workers, Swinerton added flashing lights and signage to warn people of hazards, and posted a security guard at an alley entrance to guide pedestrians as they passed this congested area.

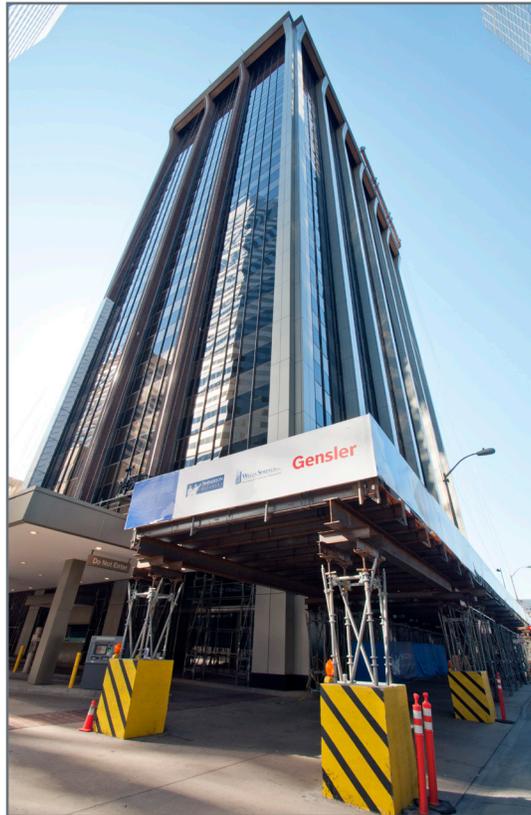
Mindful of the Client, Tenants and Community

Contemporary metal panels updated this tower without costly deconstruction of existing precast columns and maintained structural integrity and wind profile. This modernization delivered an appealing building to tenants and affordably repositioned the property for future sale.

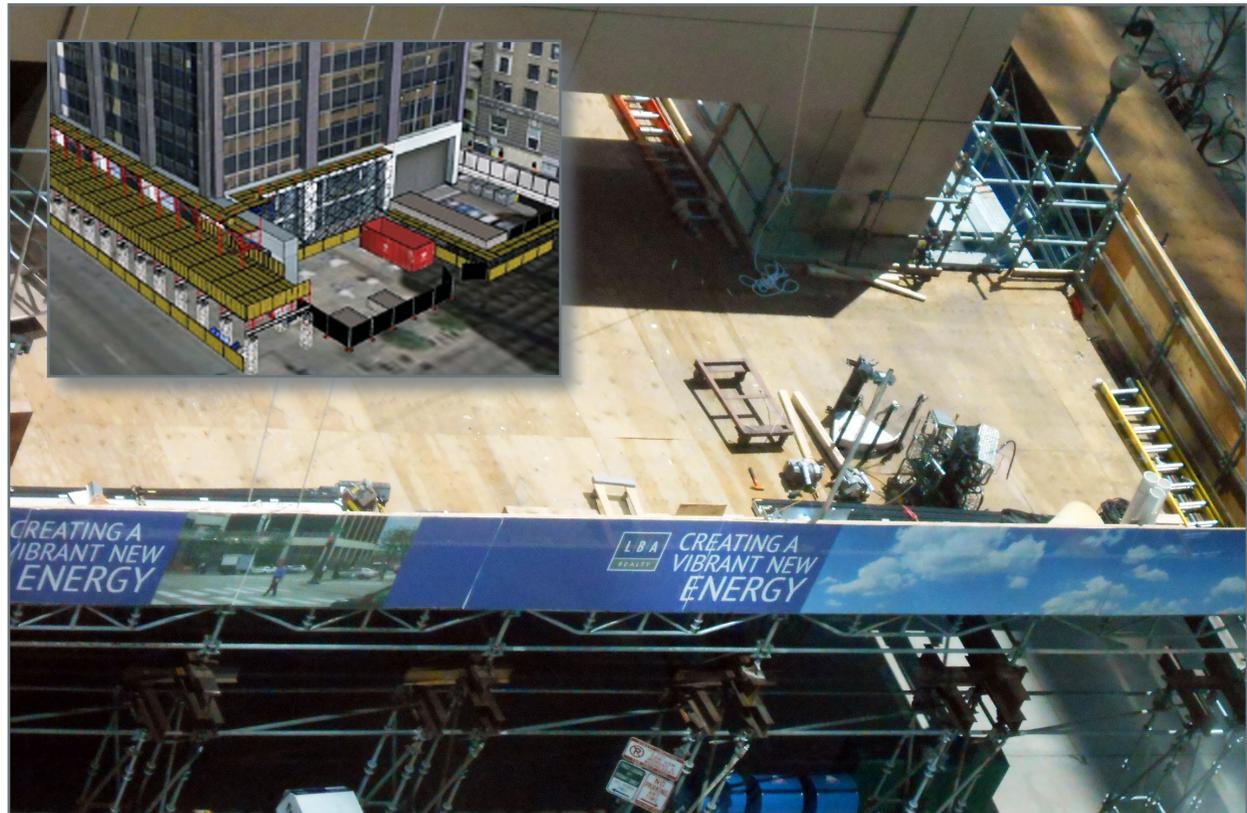
During construction Swinerton scheduled vertical girt installation at night so that ***noisy hammer drilling would not disrupt the office building tenants***. Rubber rollers between the stages and building spun as the stages moved along the columns, providing sound mitigation and protecting the building from stage movement damage.

“The time Swinerton spent with Gensler upfront during design to anticipate possible situations proved invaluable. Swinerton took Gensler’s design and developed innovative approaches to safety and logistics for our high-profile renovation.”

~ David Wells, Owner's Representative



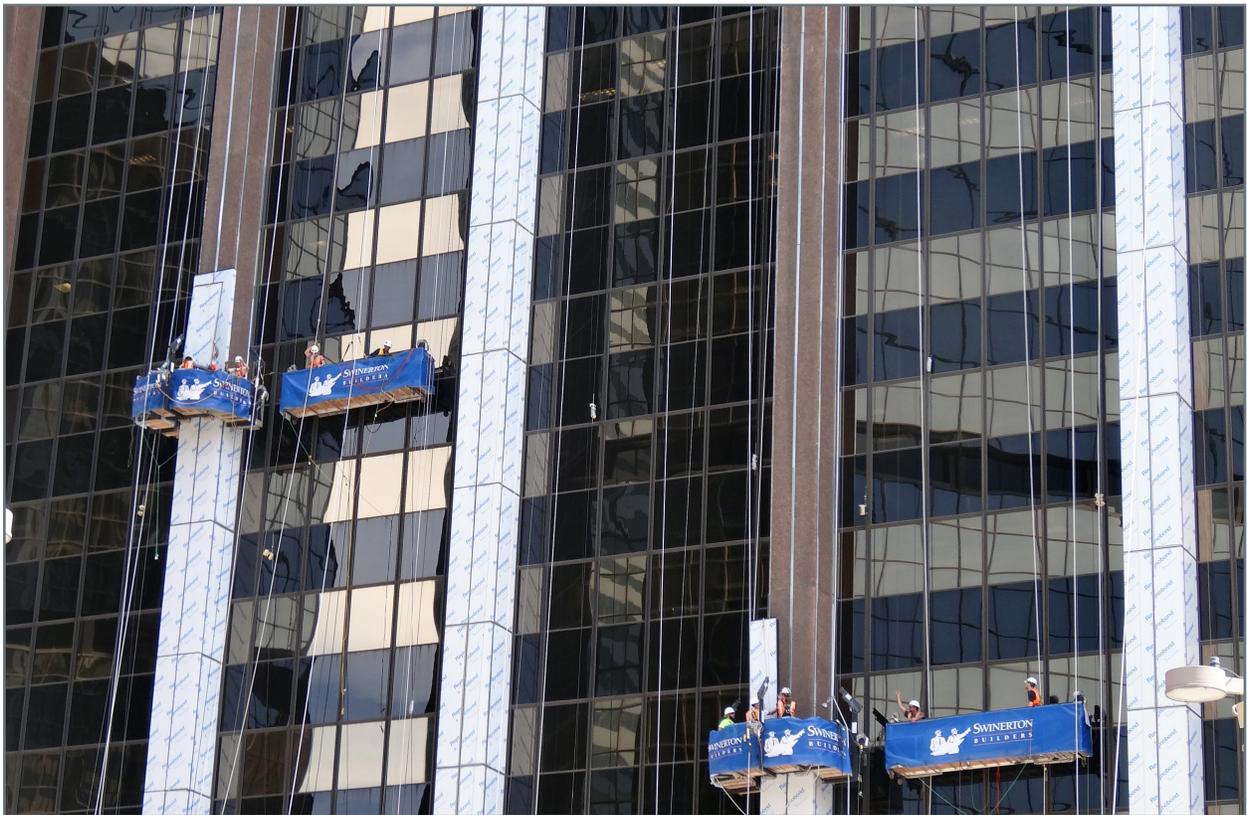
Swinerton erected an expansive, engineered scaffold system consisting of I-beams and shoring equipment to create a 20-foot-wide platform for worker access, material and equipment staging that 23,000 pedestrians walked under safely everyday for six months.



BIM modeling technology greatly assisted the team during preconstruction to configure the scaffold, staging and logistics plan. “The time Swinerton spent with Gensler upfront during design to anticipate possible situations proved invaluable.” David Wells, Owner’s Representative



Swinerton installed the roof-top support systems for the stages which carried crews as they moved along the columns. Each stage was secured with cables from 20-foot beams and counterweights installed on the building's roof. Life safety ropes connected into structural building elements,



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Top: Crews peel the protective coating from the panel while working safely in the u-shaped stage. The finished columns looking up to the crown of the building reveal the complexity of the installation at the top of the building.