2014 AGC Ace Awards
Category: 11 – Best Building Project – GC ($70M)
Contractor: Kiewit
Project Name: Denver Union Station Transit Improvements
Entry #: 2901

The Denver Union Station Transit Improvements project transformed 42 acres of blighted former rail yards into the centerpiece of a vibrant, bustling downtown Denver, anchoring and facilitating new connections between the metropolitan region's transit systems. All within seventeen city blocks, riders can now hop between bus, light rail, or commuter rail by way of a new iconic, eight-track commuter rail train hall, new light rail station, and an airy, airport-like 22-bay underground bus concourse. Surrounding street re-alignments and new public plazas, each designed with a distinct personality and purpose, set the stage for a truly mixed use transformation of the area.

The Kiewit Design-Build team - comprised of Kiewit as the lead design-builder with AECOM as the design and engineering powerhouse and Skidmore, Owings & Merrill LLP (SOM) as the architectural visionary - helped form the plan for the massive P3 project as members of the Master Developer team.

The project boasts a few important "firsts." At $374.8 million, it is the largest current multimodal project in the United States. Second, the former brownfield site is the largest multimodal project ever to earn Leadership in Energy and Environmental Design (LEED) Gold certification from the US Green Building Council.

Solution of Special Challenges/Problems

With its enormous scale and expectations, design presented considerable challenges shaped by historic considerations, view corridor restrictions, post-9/11 security requirements, public opinion, and goals of the Denver Union Station Public Authority, a collective of five public-private agencies. While AECOM and SOM developed the brilliant architectural solution that is the commuter rail train hall, Kiewit tackled challenges related to construction in a highly

congested, active urban environment. For example, Kiewit excavated of over 360,000 cu. yd. of contaminated soil and dewatered 270 million gallons of groundwater. These were just two of the many daunting tasks that required exhaustive coordination with public utilities and city officials as well as half a dozen private developers building concurrently around the site.

Excellence in project management/team approach

Project management centered on communication, trust building, and accountability in the form of public feedback, constructability charrettes, and discipline task forces. By groundbreaking, DUSPA, its Owner's Representative, Trammell Crow Company, and the Kiewit Design-Build team achieved overwhelming consensus for the vision, budget, and schedule.

A key to success in delivery of the project was the Design-Build approach, were communication, collaboration, integration, and trust on all levels was critical. Some strategies included:

- Two Certified Design-Build Professionals on-site to coordinate design with construction.
- Discipline Task Forces comprised of design and construction representatives.
- A phased approach where design packages were released in alignment with construction.
- Schedule review meetings that focused on a rolling three week look-ahead of major milestones, resulting in substantial completion 87 days ahead of schedule.
- Weekly OAC meetings to ensure open lines of communication and engagement of key decision makers.
- Public Feedback meetings to engage the surrounding community and solicit feedback.
- Co-location of AECOM , SOM, and Kiewit staff to enable rapid resolution of design questions.
- Cost charrettes to deliver real-time analysis of construction costs as the design progressed.
- Distribution of drawings for a review and comment period by the whole team at each design milestone.

Construction innovations/State-of-the-art advancement

During design of the pre-cast, post-tension underground bus concourse, Kiewit worked closely with AECOM to design the lid of the massive underground structure. Through numerous design

and cost charrettes, the team evaluated a multitude of options and concluded that integration of a Unistrut® metal box channel system into the box girders was the superior solution.

Since structural compromise of the pre-cast "lid" was simply not an option, the box channels, into which supports for the complex ceiling-mounted Mechanical, Electrical, and Plumbing (MEP) systems would be placed, significantly reduced the possibility of structural failure during construction. The approach allowed MEP subcontractors to mount systems without the need to drill into the concrete and potentially damage tendons.

Additionally, although not required by the Owner, the Kiewit Design-Build team understood the value that Building Information Modeling (BIM) would bring to the design and construction of the underground bus concourse. The structural model developed allowed the team to design the entire structure for a “just right” fit for buses to flow in and out from ground level with ease. For the Owner, use of BIM eliminated unnecessary conditioned space above the buses, saving on both material and operational costs. The MEP model also drove down costs and sped up accelerate schedule through the ability to visually communicate to the subcontractors the location of complex systems in relation to one another other in a neat and orderly layout.

The investment in BIM paid off. Through a collaborative approach focused on constructability, the Kiewit Design-Build team achieved Substantial Completion 87 days early and received a sizeable early completion bonus.

Environmental/Safety

Several challenges were environmental in scope, resulting from Union Station’s long and storied history as a train and bus station. For example, the underground bus concourse sits just below the water table, requiring excavation of over 360,000 cubic yards of soil - enough to fill a 20,000-capacity sports arena over nine times. Over 270 million gallons of water was removed simultaneously - enough to fill an Olympic-size swimming pool over 400 times. Already a challenge, this effort was further complicated by the contamination of the soil and water due to the site’s former life as a rail yard.

The Kiewit Design-Build team not only successfully addressed these environmental issues, but presented the Owner with an opportunity to pursue LEED Certification with negligible cost or time.

Kiewit's safety program for the Denver Union Station Transit Improvements project was built on the principle that "Nobody Gets Hurt." Key elements included mandatory safety orientations, the Speak Up, Listen Up (SULU) program, Job Hazard Analysis (JHAs), and "Near Miss" reporting.

The Speak Up, Listen Up (SULU) program is unique to Kiewit and gives all project personnel both the authority and the responsibility to plan safe work, and to correct unsafe actions through a system that encourages, tracks, and rewards safety corrections and discussions. A highly successful program, Kiewit recorded approximately 2,000 engagements, most commonly for minor concerns. On a project that spanned four years and required over 3.3 million man hours to complete, Kiewit did not receive a single OSHA citation.

Excellence in client service or community contribution

The Denver Union Station Transit Improvements project achieved two significant milestones for the state of Colorado and Denver metropolitan region.

First, the redevelopment of 42 acres in lower downtown Denver re-established a formal gateway to the heart of the capital city, where none existed for many decades. The economic and social impact of this new focal point cannot be understated. By 2030, Denver Union Station is projected to serve 500 trains and 200,000 trips per day, more than 20 times the number of daily trips taken prior to construction. With staggering population growth projections, the completion of Denver Union Station and more than 120 miles of interconnected rail as part of RTD's FasTracks program prove that the city will be able to meet this anticipated exponential demand well into the future.

Today, residents and visitors alike now have more and better transit options to get in and around Denver without the need for a car. Visitors can roam lower downtown Denver and surrounding boroughs with relative ease. Many everyday commuters can get to and from work without the

frazzled drive on congested city highways. Additionally, new public plazas surrounding the station serve as a vital place of respite and reflection amid the constant hum of the city.
The second significant milestone has national ramifications. The project once again proved the viability of multimodal transit-focused urban design. With easy access, downtown Denver is once again the place to be. Businesses are vying for space to take advantage of amenities afforded by a vibrant, mixed use environment. Triggered by this revitalization, there is now more than $1.5 billion in new commercial, retail, and residential development underway downtown, representing four million square feet. As such, Denver Union Station is likely to become a case study for the future of urban planning.

RTD General Manager and CEO Phil Washington said about our team, "The Kiewit Design-Build team has set a new standard for how design and construction teams can work together to create a 'masterpiece of a transit hub.' In every measure, the Denver Union Station Transit Improvements project exemplifies how a skilled design-build team can achieve top performance despite complex funding, site, and design challenges. Working hand-in-hand with the Denver Union Station Project Authority, an entity comprised of five major public and private agencies, including RTD, the Kiewit Design-Build team successfully delivered an iconic project for the City of Denver that also serves as a model for the future of public transit."

Sensitive to its place in history, but forward-thinking in its technical sophistication and city-building spirit, the transit improvements at historic Denver Union Station have set a new national standard for 21st century transit facilities.

3. Visual Presentation

Up to 10 photos of your project (embedded in the PDF or Word.doc). Maximum 10 MB file.

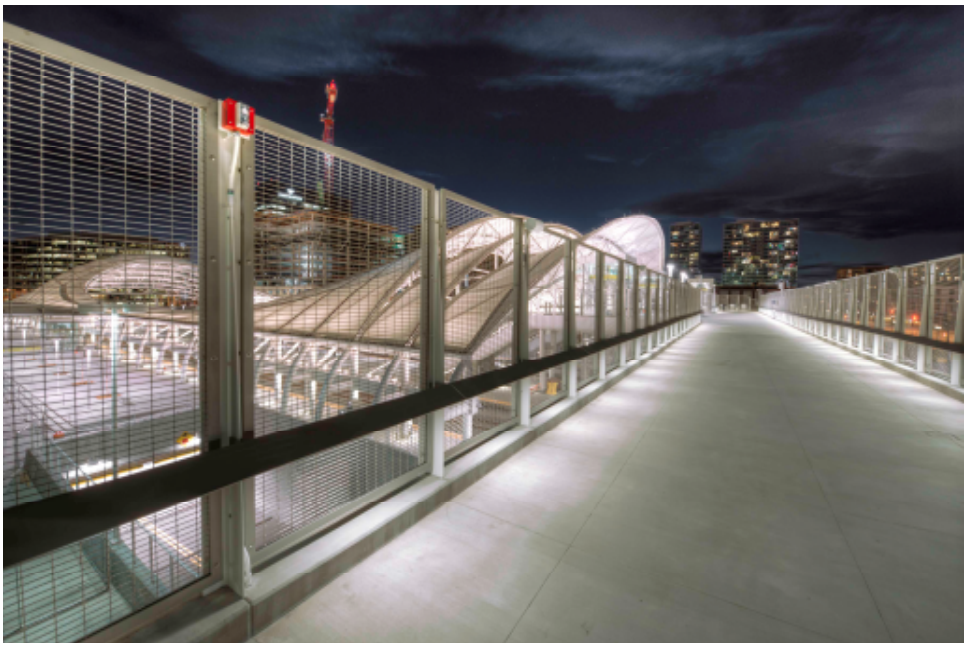
View looking southwest of the transit improvements (foreground) and lower downtown Denver
(Credit: Kiewit)

The Commuter Rail Train Hall canopy set against the backdrop of Union Station and lower downtown Denver.
(Credit: Kiewit)

Looking south through the "sky hole" of the Commuter Rail Train Hall canopy.
(Credit: Kiewit)

Denver Union Station Transit Improvements Site Plan
(Credit: Skidmore, Owings & Merrill LLP)

New light rail station just west of Union Station.
(Credit: Kiewit)


Looking west on the pedestrian bridge at the north end of the commuter rail train hall
(Credit: Kiewit)

Pedestrian corridor of the underground bus concourse
(Credit: Kiewit)


Bench in the pedestrian corridor of the underground bus concourse
(Credit: Kiewit)

One of 22 bus bays serving regional and local bus service in the underground bus concourse
(Credit: Kiewit)

The Kiewit Design-Build team poses for a team photo on the foundation of the east half of the underground bus concourse
(Credit: Kiewit)

Note: All images will also be uploaded to <u>www.wetransfer.com</u> separate from the 1500 word narrative.