



March 2015

Do you want to build a bridge?

The US 6 Bridges Design Build Project is bringing a number of much-needed improvements to the Denver area. From a refurbished Barnum Park system to remodeled access from I-25 to US 6, there are plenty of changes afoot.

At its heart, however, this project is about the bridges. Crews are replacing six outdated bridges and introducing six new bridges from scratch, for a total of 12 complete structures from start to finish – all in about a year and a half.

So – how do you design and build bridges in such a short period of time? From design to construction, a large team must come together to take a project like US 6 from plan to reality.

Design

Before construction can begin, each bridge must be designed individually. The design team, a role taken on by the Felsburg, Holt and Ullevig (FHU) design team for this project, must consider a number of factors, including topography, water currents, wind patterns, soil conditions, traffic volumes and budget.

They must also design the bridges to be structurally sound. On the US 6 Project, the FHU team takes into account dead (bridge weight), live (weight of traffic), and environmental (wind, possible collisions, etc.) loads contributing to the forces that may act on the bridge.



Left: Girder placement on the Federal bridge over US 6 – March 2015.

Right: Crews pour the bridge deck on the Federal Boulevard bridge over the new westbound US 6 collector-distributor road.

Construction

Because each bridge is uniquely designed for its location and use, the construction process also varies. The key steps to building a typical beam bridge are outlined below.

See Figure 1 on page 3 for an image showing the different parts of a bridge.

Step 1

Substructure: Everything that supports the superstructure.

1. Construction begins with the foundation. Crews will drive support structures (either concrete caissons or steel pilings) up to **90 feet into the earth** for bridges such as the Federal bridge over US 6.
2. Crews then install concrete columns, which also serve to support the bridge.
3. They build bridge abutments and other walls to keep dirt at bay.
4. They top off the columns with pier caps, to which the girders and bridge deck will attach.

Step 2

Superstructure: Everything that rests on top of the piers and columns.

1. Prior to setting girders (beams which support the deck) on top of the pier caps and abutments, the FHU team puts together a detailed plan.
2. With the help of partial or full road closures, crews attach the girders to the new pier caps. **Each girder can weigh more than 100,000 pounds.**
3. To complete the superstructure, crews set panels to form the base layer of the bridge deck.

Step 3

Bridge deck: The new road that will facilitate traffic.

1. Crews tie reinforcing steel for the deck itself to prepare for the concrete pour.
2. Precise measurements and other tests help ensure the deck is poured to the correct thickness, elevation and profile. The entire team meets to be sure everything is ready to go.
3. With the help of a concrete pump, crews pour the deck, which usually consists of **several hundred cubic yards of concrete.**
4. The fresh concrete deck is covered with a curing compound and, depending on weather, insulated blankets to make sure everything goes smoothly in the curing process, which takes several days.
5. When the concrete is strong enough, work continues on the deck with installation of concrete barrier and other finishing touches to prepare it for heavy traffic.

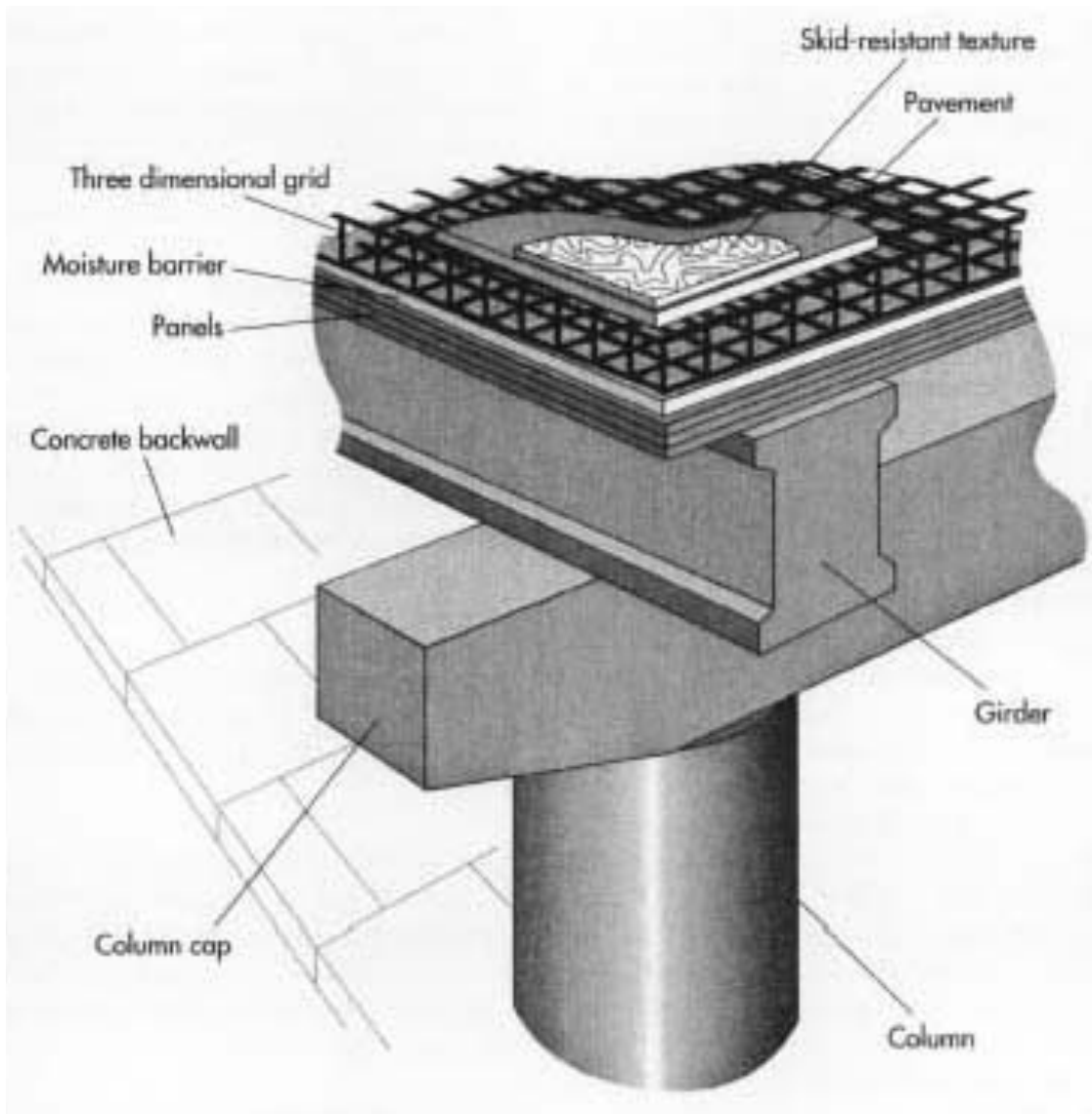


Figure 1: Breakdown of the different parts of a bridge.

With this project, we have seen firsthand how quickly one of these bridges can come together when crews managed to demolish and completely rebuild the Knox Court bridge over US 6 in just 85 days.

With each of the other bridges on the project, closing them completely for that length of time was simply not an option, resulting in the need to build each in a series of phases. This method takes longer but maintains critical access for drivers.

Construction update

February accomplishments

- Opened the brand new Federal Boulevard on-ramp to eastbound US 6 and closed the old eastbound US 6 on-ramp from 5th Avenue.
 - ***Significance: The old ramp was a hotspot for accidents and traffic backups. It was active for more than 50 years and its closing marks a the beginning of a major safety improvement.***
- Shifting both directions of US 6 traffic to the north onto new concrete pavement between Federal Boulevard and Knox Court.
 - ***Significance: This is another step in eventually moving all US 6 traffic to the north, which will allow space to the south for crews to finish the final aspects of this project.***

March updates

- Setting girders on the Federal bridge over US 6, new westbound US 6 collector-distributor (CD) road, Bryant Street and the S. Platte River.
- Pouring bridge deck for Federal bridge over US 6, new westbound US 6 CD road and the S. Platte River.
- Beginning work on new retaining walls between Bryant and Federal, as well as near the S. Platte River.
- Relocating a storm sewer line across Federal.
- Replacing a century-old, 44-inch sanitary sewer line crossing US 6.
- Continued reconstruction and improvements to a 1-mile stretch of the S. Platte River trail.
- Construction of a new restroom building in Barnum Park East.
- Completion of new fence around Barnum East baseball field, as well as grading for the new multi-purpose field.
- Installation of a new 54-inch water line across US 6 into Barnum Park South.
- Concrete paving on westbound US 6 between Federal and Knox Court.

The bridges of the US 6 Project

Now that you know a bit more about bridges, here are some quick facts about each of the pivotal bridges that make up the US 6 Bridges Design Build Project.

Knox Court over US 6

- **Year built:** 1956
- **Reason for replacement:** Functionally obsolete
- **Upcoming work on bridge:** None
- **Anticipated completion date:** Bridge re-opened in May 2014, 85 days after demolition



Before



After

Federal Boulevard over US 6

- **Year built:** 1958
- **Reason for replacement:** Functionally obsolete
- **Upcoming work on bridge:** Phase 1 (east half) is complete. Phase 2: Concrete deck pour coming Thursday, March 19. After that, crews will complete additional segments of this bridge, as well as the Federal bridge over the new westbound US 6 collector-distributor road.
- **Anticipated completion date:** Summer 2015



Before project



March 2015

US 6 over Bryant Street

- **Year built:** 1958 (widened 1967)
- **Reason for replacement:** Structurally deficient
- **Upcoming work on bridge:** Phase 1 (north half) is complete. Phase 2: Crews will set girders on this bridge the weekend of March 21-22. A deck pour will follow in late March and the bridge should be ready for a traffic shift a few weeks after that point.
- **Anticipated completion date:** Spring 2015



Before project



March 2015

US 6 over the South Platte River

- **Year built:** 1956 (widened 1967)
- **Reason for replacement:** Structurally deficient
- **Upcoming work on bridge:** Phase 1 (north half) is complete. Phase 2: Girder placement is set for the weekend of March 14-15. A deck pour will follow in mid-late March and the bridge should be ready for a traffic shift later in the spring.
- **Anticipated completion date:** Late spring 2015



Before project



March 2015

US 6 over I-25

- **Year built:** 1958, (widened 1966)
- **Reason for replacement:** Functionally obsolete
- **Upcoming work on bridge:** None
- **Anticipated completion date:** This bridge is essentially complete, though segments are currently being used as construction equipment staging areas and access



Before project



March 2015

US 6 over the Burlington Northern Santa Fe Railroad tracks

- **Year built:** 1956, widened 1966
- **Reason for replacement:** Structurally deficient
- **Upcoming work on bridge:** None.
- **Anticipated completion date:** This bridge is essentially complete, though segments are currently being used as construction equipment staging areas and access



Before



March 2015

The elephant in the room: What's with all the potholes?

Winter is never kind to roads. Lately, we've seen countless news stories talking about the horrors of potholes in Denver and on highways throughout Colorado.

In construction zones, it's the responsibility of the contractor – Kraemer North America on the US 6 Project – to fill potholes and repair the roadway following these storms. When it's not in a construction zone, the responsibility falls to CDOT for state highways and the local agencies for city streets, each with an annual budget for this type of work.

So what is a pothole? Or, perhaps more importantly, what causes a pothole?

By definition, a pothole is a depression or hollow in a road surface, most commonly caused by erosion due to water. In Colorado, they tend to get much worse in the winter and early spring when large snowstorms and wide temperature fluctuations tend to be the norm.

The process goes something like this:

1. Snow falls and accumulates
2. Snow melts and seeps into the pavement
3. Snowmelt freezes again, expanding in the crevices of the pavement
4. It melts again, creating voids and weakened pavement
5. This process repeats by day and night as temperatures change drastically
6. Eventually, a segment of the roadway collapses under force of traffic or gravity, leaving a fresh pothole



The project team does everything within their power to find and fill potholes as quickly as possible following these storms. Some hurdles do exist however, such as availability of asphalt filler and continued poor weather not conducive to making these repairs.

While the project team pledges to do whatever they can to maintain the safety of the traveling public, we do also encourage the driving public to exercise extra caution when driving through the project corridor – or anywhere else – during this time of turmoil for Colorado roads.

Meet the project team

Kevin Sutton, Kraemer North America

What is your role on the US 6 Bridges Design Build Project?

Superintendent.

How long have you been with Kraemer?

Eight years.

What is the most rewarding part of what you do?

The result. I enjoy how excited my kids get when they know that I was a part of the project. I would also have to add the people that I get to work with.

What is the most challenging part of rebuilding bridges that have been in place for decades?

Access. Bridges are put in place for a reason and that means access is usually difficult. Whether it is a river or a road beneath, they both pose their own challenges.

What would you want to tell the traveling public about the process of building a bridge?

A bridge doesn't go up overnight. The more patience and understanding they have the easier our job. We always take the approach that impacts the traveling public the least however sometimes it is unavoidable.

What bridge has presented the biggest challenges on the project?

The Platte. With the access being what it is and the saturated soil conditions.

Where did you attend school?

Longmont High School.

If you could have dinner with someone, dead or alive, who would it be and why?

My best friend John would be my first choice. However for the purpose of choosing someone everyone reading this could relate with I would choose Elvis Presley. From some of the things I have read about him he seemed to be so out of touch with reality it would be entertaining conversation at the very least.

Where is your favorite place you've traveled?

Del Ray Beach, Florida.

What are your hobbies?

Motocross and building classic trucks.

What was your first concert?

Hank Williams Jr.

What was your first car?

1983 Jeep CJ7. I still own and drive it today.

Do you prefer dogs or cats and why?

I prefer dogs. They tend to have more personality.



Note from the Project Director

We're into the final six months or so of this project and the time has certainly passed quickly. Before we selected Kraemer North America as the primary contractor, we anticipated this project would take nearly an entire year longer than Kraemer is delivering it – quite impressive.

We're almost there and we have some major shifts coming up in the next few months that will really begin to bring that final vision into focus.

We continue to ask for the public's patience as we head into the sprint for the finish. It's going to be an exciting spring and summer.

Sincerely,

*Kevin Sullivan
Project Director, US 6 Bridges Design Build Project
Colorado Department of Transportation*

Explore commuting options

If you find it too stressful to drive through the US 6 corridor while it is under construction, you might want to explore alternative modes of transportation. This could include using the Regional Transportation District's West Rail Line or bus services. [Click here](#) for information on RTD's light rail service. For information on bus fares and schedules, [click here](#).

Exploring carpool or vanpool services is another option you might want to pursue. [Click here](#) to access an online trip planner where you can input your starting location and destination address into a database to check out existing carpool or vanpool services in your area.

If biking or walking are more your speed for short trips, [click here](#) for tips on getting to your destination by foot or bicycle.

Want more information?

Website: www.coloradodot.info/projects/US6Bridges

Hotline: 720-881-5540

Email: us6bridgesinfo@cig-pr.com

Click [here](#) to sign up to receive *The US 6th Sense* every month.