# Safe & Sound Bridge Construction

The new bridges being constructed under the Safe & Sound Bridge Improvement Program include a variety of designs, but the vast majority use precast elements. This strategy of MoDOT's design-build contractor, KTU Constructors, simplified the design process and created economies of scale that enabled MoDOT to maximize the number of bridges to be constructed to deliver a systemwide improvement. It also speeds the construction process, thereby minimizing inconvenience to users caused by bridge closures. Closure durations average 40 days, or half what a normal bridge replacement would require.

**Bridge Types:**

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| Adjacent Core Slab | 196 | NU Girder | 6 |
| Adjacent Box Beam | 117 | Flat Slab | 17 |
| Adjacent CS/BB | 45 | Box Culvert | 15 |
| Spread Core Slab | 80 | Pipe Culvert | 1 |
| Spread Box Beam | 42 | Super Cor | 1 |
| Spread CS/BB | 23 | Prestressed Slab | 3 |
| Steel Girder | 8 | **TOTAL** | **554** |

These pictures illustrate the most commons steps in the construction process.

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| **Prestressed Girder Fabrication**<br><br>The girders are fabricated prior to road closure and a variety of facilities. This picture shows the prestressing strands, reinforcement and the voids prior to casting. |  |
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**Traffic Control**

MoDOT staff establishes the detour route, closes the road and installs all appropriate signage.



**Demolition**

After demolition is complete, steel is sent to a metal recycler and clean concrete rubble is reused for embankment protection.

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| Using a cutting torch, a worker removes rebar from the old concrete.<br><br>The design-build portion of the Safe & Sound program (554 new bridges) will recycle 9,000 tons of steel and 160,000 tons of concrete. |  |
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| **Access**<br><br>After a week of work at this site, the old bridge had been removed and a temporary access road constructed. |  |
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| **Pile Driving**<br><br>Driving pile through silt and soil to provide a solid base for the bridge's foundation.<br><br>In the foreground of the picture at right is what's left of timber piles from the old bridge. |  |
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| Piling being driven here is called H-pile, because the steel is shaped like the letter H.<br><br>Some site conditions call for the use of pipe pile, which is driven to bedrock and then filled with concrete. |  |
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| **Formwork for Bents, Abutments**<br><br>Once piles are in place, abutments and bents can be formed up for concrete. |  |
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| **Abutments**<br><br>One abutment has been poured and the other form is being prepared to accept concrete. |  |
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| **Reinforcing Steel**<br><br>Steel rebar gives concrete its strength. |  |
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**Pouring Concrete**

Placing concrete in a formed bent cap.

**Abutments and Bents In Place, Ready to set beams**

Some designs use beams set side-by-side. Others spread the beams with precast concrete panels set inbetween.

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| **Rock Blanket**<br><br>Rock blanket is placed before beams to protect slopes beneath bridge. Slope beneath bridge would not be accessible once beams are in place. |  |
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| **Setting Precast Beams**<br><br>Because of the beam's weight and length, and the site conditions the contractor is using two cranes to set the beams in place. |  |
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| Some bridges require the use of a beam-launching system to set beams. |  |
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| **All Beams in Place**<br><br>The exterior beams have exposed steel to reinforce the concrete barrier wall when it is added to the structure. |  |
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| **Concrete Deck**<br><br>Bridges that carry high volumes of traffic (more than 1,000 vehicles/day) receive a concrete deck. Steel is green because it is epoxy-coated to protect against corrosion. |  |
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| **Barrier Wall**<br><br>After the deck is in place, workers ‘slip-form’ the concrete barrier wall. |  |
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| **Waterproof Membrane**<br><br>On decks that will have an asphalt driving surface, a waterproof membrane is placed over the concrete beams prior to asphalt application. |  |
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| **Asphalt Deck**<br><br>Bridges that carry lower traffic volumes receive an asphalt deck. |  |
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| **Roadway**<br><br>Asphalt or concrete is used to tie the new bridge back into the existing roadway with a smooth transition. |  |
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| **Site Cleanup**<br><br>After the bridge construction is completed, guardrail is installed and the site is backfilled, regraded, seeded and mulched. |  |
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| **Finishing Touches**<br><br>After the contractor has completed his work at the site, MoDOT paints the roadway stripes. |  |