Executive Summary: Morning and evening commutes were a nightmare for motorists traveling at the I-44 and Missouri State Highway 141 interchange located in Valley Park, MO. High traffic volumes in the area caused major traffic backups and frequent crashes. Precast prestressed concrete girders manufactured and delivered by County Materials Corporation offered a solution as integral components in constructing a flyover ramp that allows Hwy 141 southbound traffic to easily merge with I-44 eastbound traffic.

About: In early 2015, the Missouri Department of Transportation (MoDOT) began addressing congestion at the I-44 and Hwy 141 interchange with local community leaders. MoDOT explained their plan to request Statements of Qualification from contractors to compete for a design build contract that would result in an upgraded interchange system. On January 6, 2016, the Missouri Highways and Transportation Commission selected Pace Construction Company and its partners AECOM Technical Services, Inc., Kuesel Excavating Company, Inc. and Lochmueller Group to fulfill the contract. MoDOT selected PACE Construction because they determined their design had the best value while also having innovative solutions that would minimize length of construction and traffic impacts. Pace Construction turned to County Materials to manufacture and deliver 43 precast prestressed concrete girders and 24,471 sq. ft. of precast deck panels for a flyover ramp.

Challenges: During the community involvement planning meetings, MoDOT officials set several goals for the design build project, including delivering the project on time and within the program budget, a system that maximized mobility and improved traffic efficiency, prevented flooding, and would be long-lasting. Pace Construction and their partner, AECOM, took these goals into account when designing the new interchange. Their design resulted in an interchange made up of a large flyover ramp and several free-flow on and off ramps designed for moving traffic more efficiently and managing storm water runoff. The most daunting aspect of the project was the flyover ramp, which was designed to tightly curve and raise above both Hwy 141 and I-44. Pace Construction and AECOM determined precast prestressed concrete girders were the best material to meet the goals set by MoDOT, because concrete girders have a long service life and require less maintenance than other materials. In addition, concrete girders would allow for many custom inserts, which were necessary for speeding up the construction timeline and managing storm water on the fly over ramp.

The final design was a complex system of girders, each with a different design to meet the demands of the flyover ramp. County Materials’ Technical Administrator Chris Everette knew right away that making each piece of the project would be a challenge. “Typically, a bridge will have girders with the same design and depths. This bridge required sloped girders with multiple depths and lengths. In addition, the contractor required a number of different
inserts including lifting loops, drains, and exposed rebar,” Everett recounted. “We ended up having to create separate shop drawings just for the forms we created before even casting each unit.”

The many inserts cast into the girders made them easier to handle for construction crews and helped meet goals set by MoDOT. By having lifting loops, girders were ready to install immediately upon arriving onsite, helping minimize the impact construction had on traffic. Drains cast into the bridge components were important for removing water from the road. Additional inserts allowed scaffolding to secure directly to the bridge—another way that concrete girders were an integral part in meeting the project’s tight deadline.

County Materials supplied 21 Type 6 girders, 2 Type 6 Modified girders, 12 NU 70 girders, and 8 NU 78 girders totaling 5,560 ln. ft. In addition, County Materials supplied 24,471 sq. ft. of precast deck panels. The smaller Type 6 Girders range in size from 84’ to 100’, while the larger NU Girders reach lengths of 157’. The larger NU girders were necessary for the wide spans that crossed above Hwy 141 and I-44. By only using the larger girders when necessary, project budge was able to stay under the budget set by MoDOT.

The girders for the bridge are already in place, with final deliveries for deck panels expected to take place from January 16-17, 2018. Additional work on other intersections and ramps will continue through early 2018, with an anticipated completion date in June 2018.