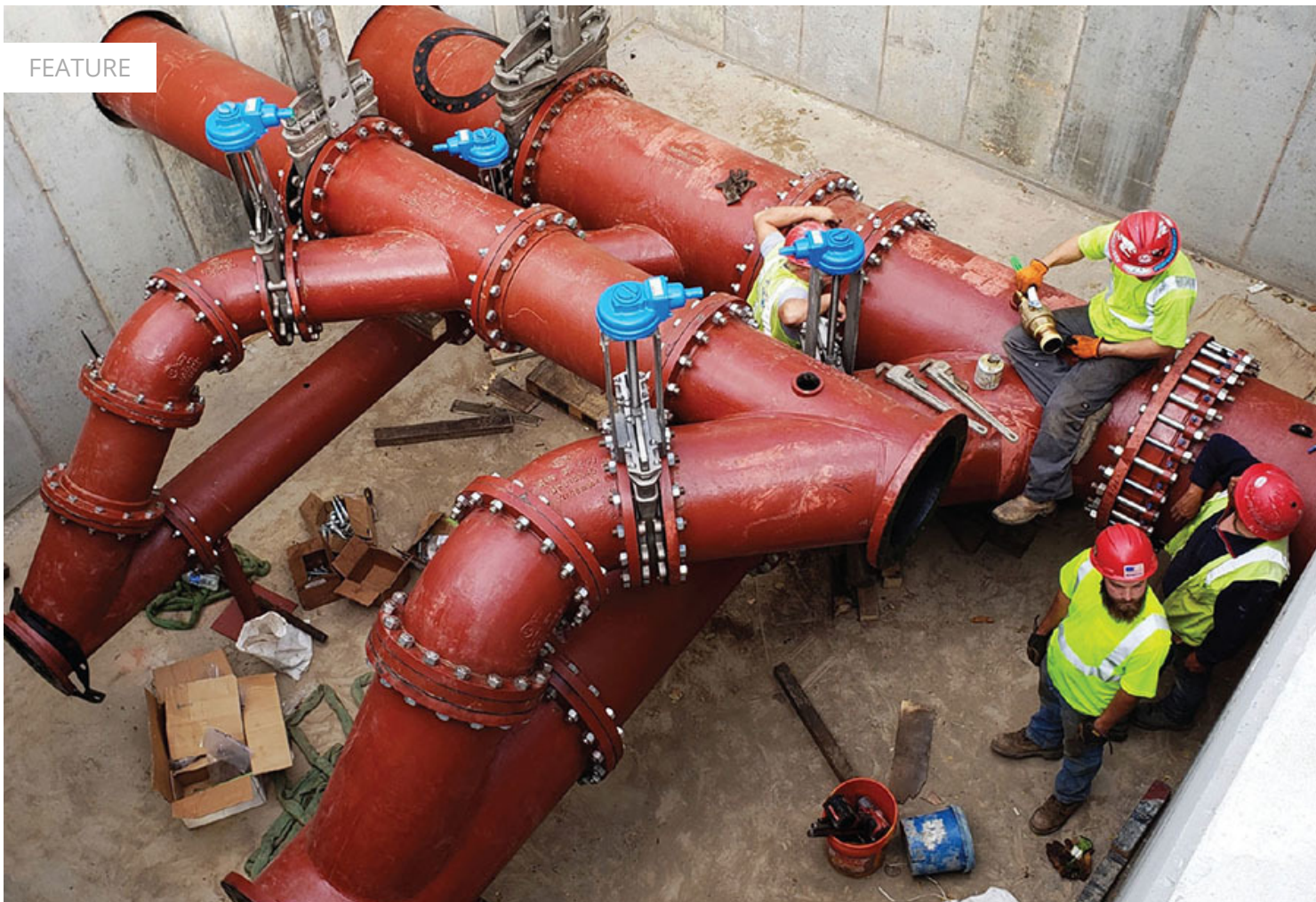


FEATURE



Fitting In

Engineer approaches time and space challenges with standard products

Amit Kumar and Roger Johnson

The City of Minnetonka, Minnesota, needed a secondary sewer force main for one of their man sanitary sewer lift stations. They also wanted a sewer junction box connection so that service could be diverted to this secondary main during needed maintenance on the original force main. This project included a time sensitive Main Lift Station Junction Box in a critical area. A forward-thinking, design and consulting firm was hired to design and work out the logistics of maintaining service and laying out piping within a structure in a limited space and as a time-critical project.

Getting Started

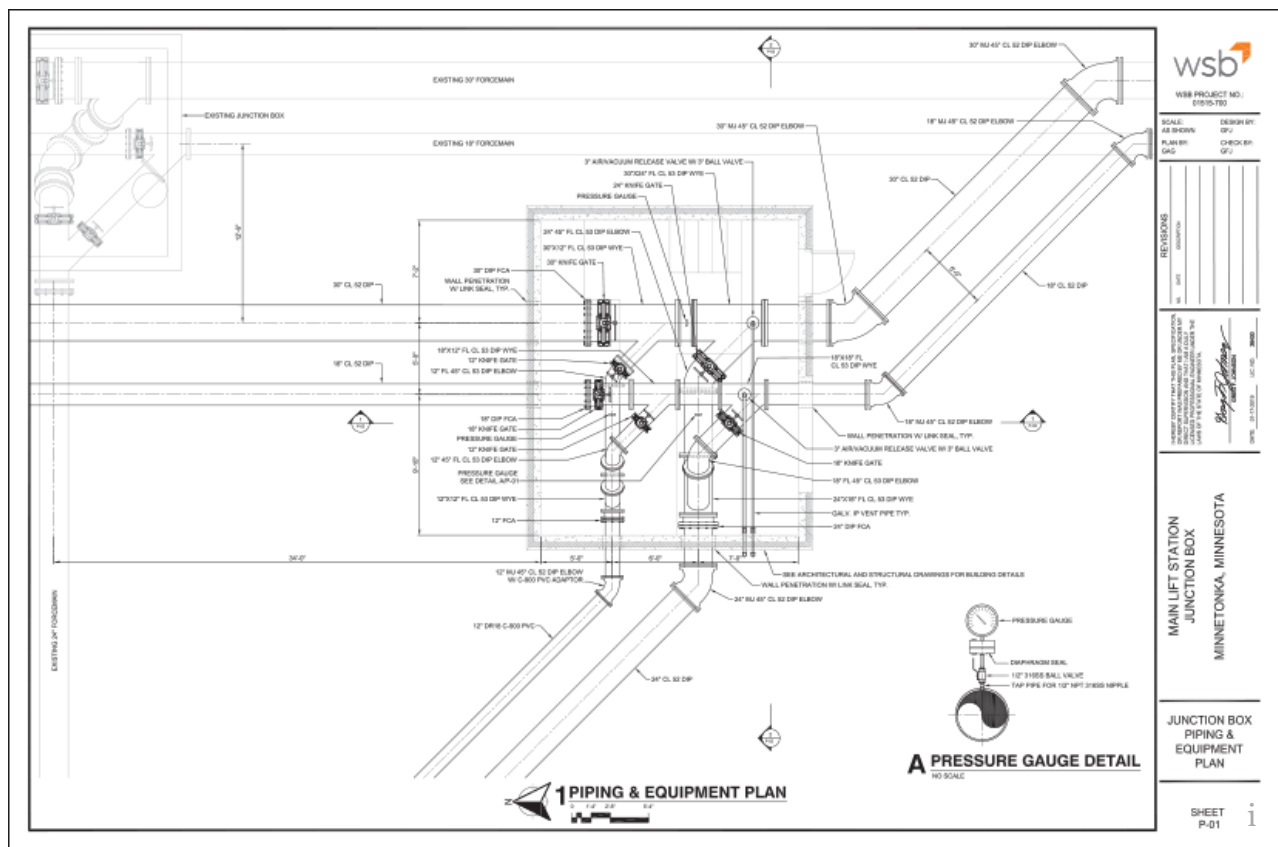
Greg Johnson, P.E., with WSB (Minneapolis), was assigned as the Project Manager in 2018 with the ambitious goal of putting all the requirements together and getting this project going. He explained in an interview that he had to accommodate many factors in laying out the pipe design, which included fittings, knife gates, and air valves that had to be accessed by a catwalk for future maintenance. This all had to be fit in a structure with a limited space on the job site. There was a public park on one side, a hill with telephone poles, and a parking lot on another side. The other issue was that they had to maintain a gravity feed line through the property that had to be rerouted and remain active throughout the project. This limited the space they had to work with inside and outside the structure.

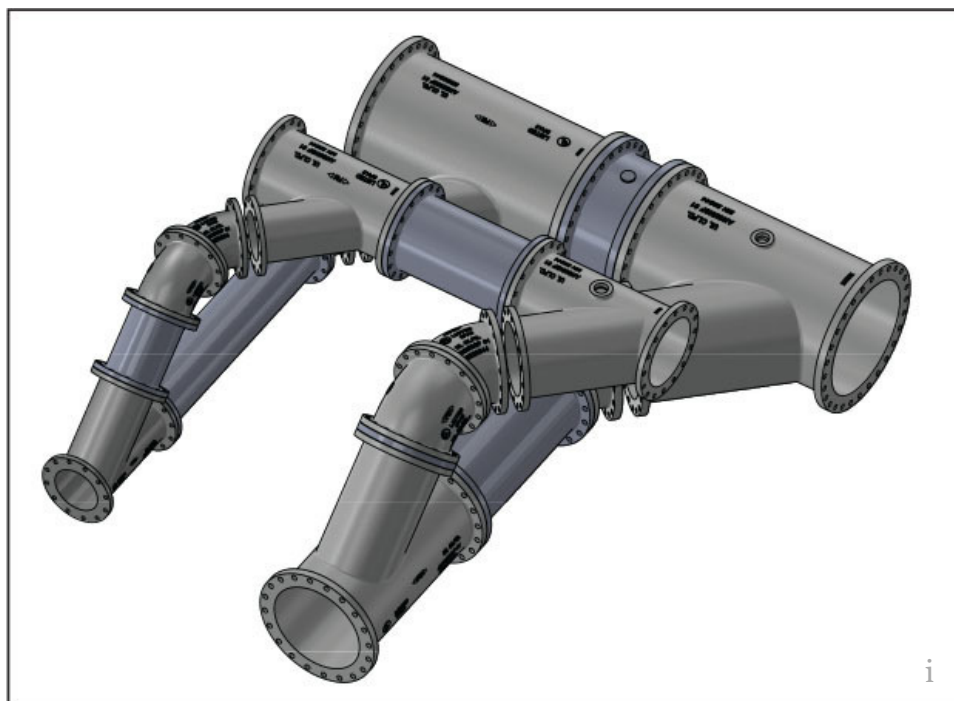
Greg also explained, as he went over the drawings (Figure 1, p. 48), that he had to add notes on the drawings to show how critical the timing of each progression was with this project. Greg and his staff completed the drawings and specifications in short order to get this project out to bid with the municipality's and others' required approvals.

The project was awarded, and construction began in 2019. The contractor knew time was a factor and selected a distributor he could trust for his piping needs. Local Sales Manager Rick Kemele and District Manager Wade Baumberger with Core & Main (St. Louis) were the guys to make it all happen for the contractor. Wade took charge, sourcing the pipe spools, knife gates, air valves, and the fittings. The fittings and spools posed a problem the way they were generically laid out, as they were not standard dimensions and needed to be configured so that everything would align to fit in the limited space of the junction box structure. Because of the short delivery need, special fittings were out of the question.

Nimble Solution

On June 12, 2019, Wade and Rick contacted Mark Troyanowski and the SIP Vice President of Business Development Bharat Agarwal at SIP Industries (Houston) to get the ball rolling with all the stops out. SIP Industries is a manufacture of American Water Works Association (AWWA; Denver) fittings, joint restraints, and municipal castings since 1960. SIP was known for its nimble approach to finding unique solutions to secure nonstandard fittings. Because of the project's limited time frame, the standard process of design, making patterns and core boxes, would take upwards of 180 days. The "Lost Foam" fitting manufacturing process SIP uses could cut this time frame in half, but still this was not in the time span of this project. The aggressive schedule needed an engineering solution.



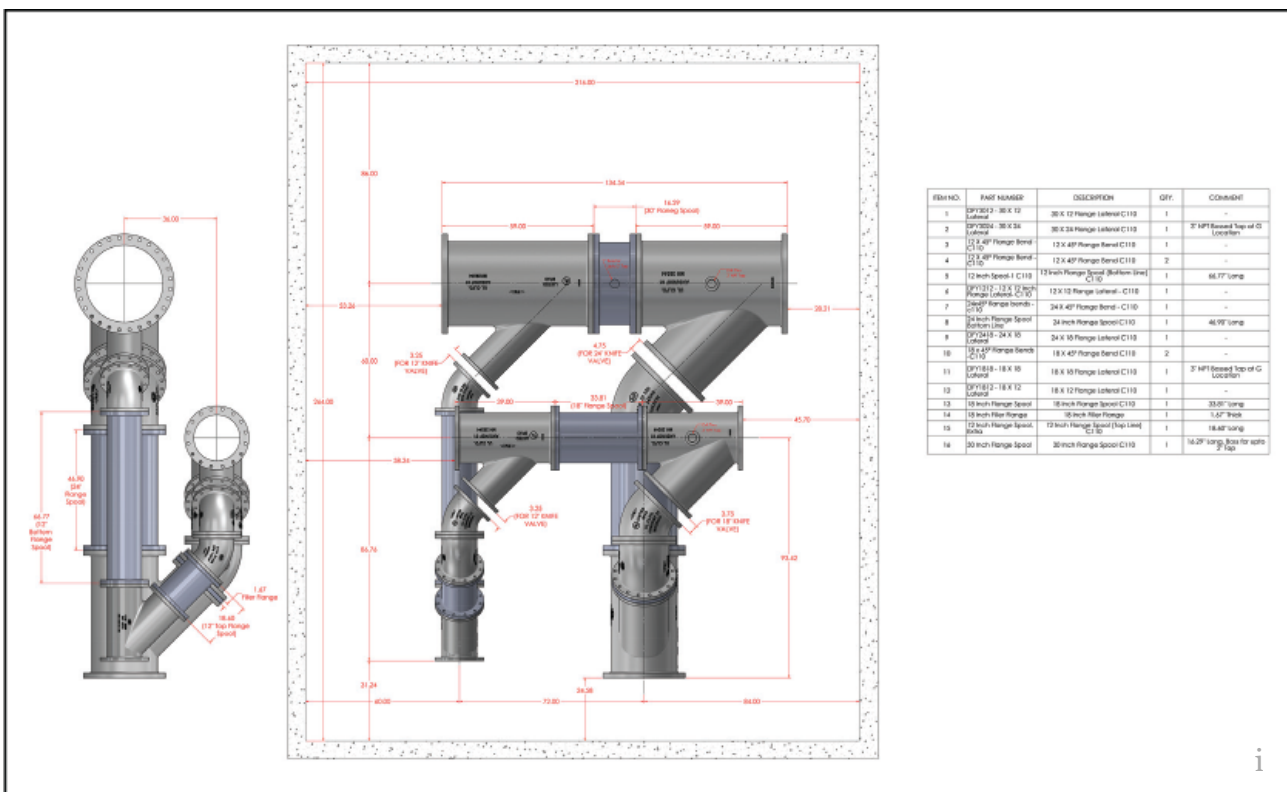


As the Director of Engineering at SIP Industries, I received a copy of the drawings and set out to figure out a way to make this design work. We received copies of the knife gates and air valves to be used. Using a 3D computer aided design system, I spent precious time trying to make everything fit with all the components and the only thing I could control were the SIP-supplied fittings. Making specialty fittings would be the simplest solution, but it would take too much time. Changing the laterals to using just standard tees would make it simpler, too, but the engineer used the laterals in his design for a more efficient system performance.

The original design showed standard laterals and bend fittings rotating to align piping. This is a common design misunderstanding, that fittings can just be rotated to make different configurations and still line up. As they say, "it looked good on paper," but the reality of lining up everything with standard fittings would not work the way it was drawn. The challenge was to use multiple standard fittings.

My innovation ensured the fittings would mate. Precise fabricated spool lengths and common filler flanges helped to keep material costs low. Bosses also had to be added to the fittings to allow threaded taps to accommodate the required air relief valves and gauges, while still being accessible by the catwalk. On June 17, only 5 days after the first inquiry, I unveiled a design (Figure 2, p. 49). Everything lined up and fit in the limited space.

Meanwhile, the contractor was getting anxious to get the fittings in hand, as the time clock ticked on the project's limited time. WSB Engineer Greg Johnson reviewed my 3D-model drawing and agreed it would complement his original design and not sacrifice performance. With that, the fittings were ordered. It took 12 weeks to get all the material on to the jobsite while making the contractor very happy about saving precious time.



Peak Problem Solving

Many manufacturers hesitate to take up the challenge of spending time to make a better project. It is much easier just to work with what is on hand.

Challenges like this are one of the reasons why I became an engineer — to solve problems using my experience and create innovative methods. That’s what makes an engineer a useful part of the process and not just a commodity.

This project is a great example of how the manufacturer, distributor, contractor, and the design engineer working together, solving problems, is a great tool that will help everyone on a fast-track project. Having industry experienced people in the decision-making process was the key. The engineer Greg used his experience and created a vision then put it to paper.

The end user received standard material, which meant lower costs, faster delivery, and a standard product that can be easily changed or modified if needed. The engineer got a modification to his design that worked with his original vision, performance and again saved time, costs, and hassles of specially designed fittings. The contractor, who was under pressure for making his schedule, got quality products that were approved by the engineer with a drawing showing the layout of standard products. SIP and Core & Main not only got a sale but the satisfaction of showing how to create a fast-track solution and show their engineering value to the whole process. This is one of those "win-win" stories that makes everyone feel good for a job well done by a communal effort.

***Amit Kumar** heads the engineering department at SIP Industries (Houston). **Roger Johnson** is the Director of Technical Services at SIP Industries.*
