NORTHERN CALIFORNIA PIPE USERS GROUP
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City of St. Helena “RUTHERFORD 12” WATER PIPELINE REHABILITATION”

PIPE BURSTING STEEL PIPE

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City of St. Helena, California,
"Rutherford 12-inch Diameter Water Pipeline Rehabilitation"

ABSTRACT: The Rutherford Pipeline Rehabilitation project was bid in the fall of 2009. Construction began in February 2010 and was largely completed by June 2010. The existing pipeline had suffered significant corrosion leaks and had been repaired at 17 locations. The trenchless pipe bursting process was used successfully to complete the project.

The right of way on the project was quite narrow, between and parallel to "Wine Train" railroad tracks and State Highway 29 in Rutherford, Calif., in the heart of the California Napa Valley wine country. Working in close proximity to the active railroad and the highway posed serious considerations.

The existing pipeline route was crossed, in one location, by a fast running slough. At the time of construction, spring run-off was at its height. This was a major concern, for the City to cross this slough with no disruption or environmental impact. Shallow depth of cover, over the pipe, in this location, was a major challenge and concern to the City and the construction team. Other obstructions included electric conduits very close to the 12-inch main.

The existing 12-inch welded steel water pipeline had a 3/16-inch wall thickness and included style 38 dresser couplings at each joint. The joints were 40 feet apart. The pipe splitting system had to split both the steel pipe and the Dresser couplings. The couplings added several inches to the diameter of the pipe. This is a critical factor when splitting non-fracturable pipes like steel and plastics. After poor results on the job site, the contractor contacted TT Technologies for technical support. Testing was conducted with a section of pipe taken from the alignment with a dresser coupling in the middle. The testing showed that the pipe and coupling could be split successfully.

In the field, the contractor constructed machine pits for the static bursting machine to pull from and launch pits for the new 12-inch fusible C-900 PVC pipe. The fusion welded string of PVC pipe was attached to the bursting head and cutter assembly. The pipe was launched, the bursting/splitting operation went as planned. The steel pipe split

neatly and all Dresser coupling were split and expanded in place. Bursting forces were well within the capability of the 150-ton Grundoburst static bursting machine. After the pipe bursting runs were completed and tested, the new pipeline was tied into a new pump station and subsequently returned to service.

1. INTRODUCTION

Faced with the prospect of more leakage on the Rutherford water transmission line, the City of St. Helena, CA, planned to replace 2,627 linear feet of 12-inch Steel water main. Seventeen major leaks had been detected and repaired by city crews over a number of years leading up to the project. The existing 12-inch Welded Steel Pipe is located under a drainage ditch over most of the alignment that further complicates all excavations and would make an open cut project extremely difficult and costly, and would encroach onto Highway 29. Caltrans was not at all interested in impeding traffic in this area. The city needed a less intrusive replacement method than open cut construction. The existing alignment is in a very narrow right of way between heavily traveled Hwy 29 to the east and the Wine Train Railroad to the west. See Figure 1.

Figure 1. Tight conditions. Note: A State highway on one side of the jobsite and a rail line on the other.

More leaks in the line were predicted, so pipe replacement was considered. Maintaining a reliable source of water to the city and surrounding area in the Napa Valley was critical. The engineer for the City was in need of a repair solution for this section of the city's water transmission pipeline. Up to this point, repairs had been made mostly with full circle repair clamps. This type of repair is costly and is usually done as an emergency, leaving the pipeline out of service for a period of time while repairs are completed.

In the fall of 2009, the city publicly bid a project to replace the aging pipeline using the static pipe bursting method. The successful bidder, Team Ghilotti of Petaluma, CA., was awarded the contract. Trenchless pipe bursting was chosen for the project because the section of main ran along the highway and was constricted on the other side by the Wine Train. Numerous utilities were also in the same alignment, many in very close proximity to the 12-inch main. Another element became apparent; the entire run of the 12-inch steel pipe was joined, at 40-foot intervals, with Style 38 Dresser Couplings. This would prove to be a major challenge to successful pipe bursting. A conventional open cut construction project would have forced the city to take a lane in the Caltrans controlled Highway; this was not an option. Another scheduling element required getting the project completed before the

Grape Harvesting Season or “Crush” as it is known locally. Harvesting grapes in this region is a major component in producing some of the finest wines in the world.

2. PROJECT BACKGROUND

After a wet winter that pushed the project two-and a- half months off schedule, Team Ghilotti, Inc. was under pressure to get the project started. After locating and removing all known couplings and repairs on the welded steel pipeline crews constructed machine pits. From these launching and receiving pits, spaced approximately 400 lineal feet from each other, crews attempted to install the 12-inch fusible C900 PVC pipeline. Fusible PVC pipe was attached to the bursting head and cutter assembly. A “floating” pulling head for the fusible PVC pipe is used to isolate the actions of the bursting head from the string of new pipe.

The pipe was launched, however, the bursting/splitting operation did not go as planned. The welded steel pipe was split successfully but progress was stopped in the first 40 lineal feet due to the Dresser couplings. The contractor was compelled to dig up each Dresser coupling to make ant forward progress. Over the next three days, with only 120 lineal feet of progress made, the project was in need of a new technical support team.

With the Dresser couplings at each joint the pipe splitting system had to split both the steel pipe and the Dresser couplings. See Figure 2.

Figure 2. Style 38 Dresser Coupling.

The couplings added several inches to the diameter of the pipe. Team Ghilotti contacted trenchless equipment manufacturer TT Technologies, Inc., Aurora, IL. to brainstorm on a different method to reliably split the pipe and couplings, which the other bursting system failed to do. TT Technologies was asked to determine if the pipe and couplings could, in fact, be split reliably. Between Team Ghilotti and TT Technologies it was decided to excavate, remove, and ship back to the factory a 10-foot long section of welded steel pipe (WSP) containing a Dresser coupling in the middle for above ground testing. The above ground testing ensured all parties could witness the results and how the tests were carried out. Within two hours of the decision to ship a piece of pipe it was on a plane to Aurora, IL. The following images demonstrate the way the pipe and couplings were split. A Grundoburst 1250 G static bursting machine was utilized for the testing and subsequently for the City of St. Helena project on site in Rutherford. TT Technologies was able to confirm that the burst test was successful. Copied with videos, Team Ghilotti approached the City of St. Helena with new bursting procedure thus resulting in an agreed upon contract change order. See Figures 3 to 5.

Figure 3. Above ground test, launching the cutter head.

Figure 4. Above ground test, splitting the Dresser Coupling.

Figure 5. Above ground test, coupling successfully split.

2. BURSTING OPERATIONS

The remaining project footage project was divided into four bursting runs, one reach was approximately 600 linear feet, the others in the range of 400-500 linear feet. A Grundoburst 1250G static pipe bursting system was shipped to the project while Team Ghilotti positioned pits for 400-500 lineal feet of pulls. See Figure 6.

Figure 6. Static bursting unit.

The first run was approximately 600 lineal feet to accomplish splitting the WSP with couplings that ran beneath a fast running slough where the existing pipe was buried approximately 60 feet in width from the top of one bank to the next. This 600-foot pull was the toughest portion of the project as 4" and 6" tees, capped off from previous connections also existed under the slough in the alignment. Team Ghilotti crews constructed 2-way machine pits that were used to pull from each direction. The existing 12-inch steel pipe was approximately 7 to 8 feet deep. Spring runoff was at maximum this was certainly one of the toughest parts of the project. It was imperative to be able to make it through this area. A dig-up was simply not possible. With a high water table, Team Ghilotti crews had to dewater the site continuously throughout the project and the machine and launching pits were extensively shored.

Once the excavation was prepared, Team Ghilotti, Inc crews began by threading the exiting pipe with the Quicklock bursting rods. Once the rods were through the pipe and at the insertion pit, the cutterhead, expander, pulling head and Fusible C900 PVC pipe were attached. See Figures 7 to 8.

Figure 7. Connecting the bursting head and pipe string.

Figure 8. Bursting run launch.

The first run was completed without incident taking approximately 2.5 hours of actual bursting time to complete. The second was performed two days later. The bursting unit, still set in the machine pit, was turned 180 degrees in order to burst the 320-ft section of pipe. The next pipe section was rodded and the cutterhead, expander and new FPVC were attached. At the second 2-way machine pit, the Grundoburst machine was “shoe-horned” into a vertically tight pit with multiple electric conduits visible in the upper portion of the excavation. Ultimately all runs were successfully burst and replaced in a couple of hours for each run.

The static bursting machine operated without interruption. The pulling forces were within the working range of the 150-US-ton capacity machine. The cutter and expander reliably split, cut and expanded the 12-inch steel pipe and the steel Dresser couplings for each bursting run.

5. Project Wrap Up and Lessons Learned

As the project concluded, the contractor had become quite skilled at operating the specialized bursting equipment. The pipe bursting runs were virtually flawless. New 12-inch FPVC pipe was safely and successfully installed. Representatives from the City of St. Helena were very pleased with the projects progress and successful completion. Once the new Fusible PVC pipe was installed it was connected to the existing piping, a connection to a temporary pump station was made, and a handful of other connections were made for water services and fire service. The line was pressure tested successfully and the city was extremely pleased to have the project completed. With thirty-five years of experience in the underground business, Team Ghilotti was impressed by this project. Looking back, digging up repair clamps may not have been necessary.

The “Lessons Learned” representative for the city stated that in future projects, they would more closely specify the pipe bursting system to be utilized. Because of this project, splitting 12-inch welded steel pipe coupled with Dresser type couplings has been well documented. This will help future project designers to have the proper equipment for similar projects. Because of the failures early in the project it is quite apparent that there is a need for advance testing or proven systems to be used. Substantial expense, lost time and high stress levels can be avoided. What started out as a major pipeline replacement project with great difficulty splitting 12-inch steel pipe developed into a successful conclusion. Efforts made by the contractor, the city and the pipe bursting technology provider to test and verify the pipe bursting process resulted in a good model of cooperation that led to successful completion of the project. Going forward the city is interested in doing more of this works, however, funding is not available for those projects at this time.