



Project

- Eliminate two pump stations within the city
- Convert all flow to gravity
- Increasing the capacity for recent and future development
- Costs \$38,000,000

Duration

- February 2010 – July 2012

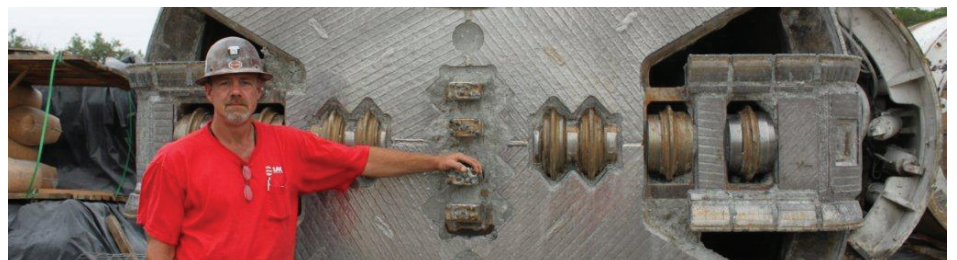
Tasks

- Project definition in TMS to create axis
- Define the longitudinal axis along the flow line
- Define profiles and bore diameter for the TBM
- Layout centerline station using TMS ProScan plus
- Scanning using TMS ProScan plus
- Incorporate the TBMs guidance system PPS with Amberg TMS

By Darrell Bartley: Interaction of Amberg TMS Solution with TBM Guidance System from PPS

Efficient Surveying and Excavating

The job was to eliminate two pump stations within the city and convert all flow to gravity as well as increasing the capacity for recent and future development. The biggest challenge was to reduce the tunnel bore size towards the upper end of the project as well as reducing the slope in order for us to stay below the Eagle



Ford Shale and increase the cover while excavating under Bouldin Creek. This, of course lowered the structures on the upper end.

The initial job definition was a single axis running along the flowline/centerline of the proposed tunnel alignment since this was a TBM job. The profiles were all circular defining the bore and pipe dimensions.



«In my 26 years as an underground surveyor I am very fortunate to have had the help from both Amberg Technologies and PPS. They both have been key to my projects

successes. I am very excited they are considering bundle servicing since I have used the two in conjunction with great ease and compatibility and will continue to do so for all my future projects.»

Darrell Bartley
Tunnel Surveyor
SAK Construction
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Challenges

- To reduce the tunnel bore size towards the upper end of the project
- Reducing the slope in order for us to stay below the Eagle Ford Shale
- Increase the cover while excavating under Bouldin Creek

Products Used

- Applications of Amberg TMS Solution:
TMS Office
TMS ProScan plus
TMS ProFit
- TBM Guidance System from PPS (Poltinger Precision Systems)

Contact

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The use of Amberg Technologies was not a factor in the awarding of the job. It was our decision to use Amberg to increase productivity and safety.

Since this was a TBM project, the only Amberg module used was the TMS ProScan plus. This was used for immediate information while surveying in the hole as well as set up of shaft configurations and structures. The calculation mode on the TMS Office was very useful in calculating laser offsets for the curved portions of the upper end of the tunnel. We used PPS Guidance while boring the 120" diameter tunnel but when we reduced the bore to 84" we had to revert back to laser and precise laser bending prisms for our guidance since the laser window and allowable space was reduced.

I was very satisfied with the assistance of Amberg Technologies applications on this job as well as all previous jobs I have had the pleasure to have had it. I will continue to use Amberg on every job I am associated with for the rest of my tunneling career.

For this particular job, the most appreciated aspect was the "string" mode of measurement in the TMS ProScan plus module. Not only for my use for instant information but it was most helpful for trainees better understanding. It took away any manual calculations from my inexperienced help.

My Conclusions

Although this was a relatively simple project compared to previous projects I have incorporated Amberg Technologies into, the further use of Amberg TMS is solidified in my mind as a tool I would not like to be without for any future tunneling projects.

I have used and trained personnel on TMS Office, TMS ProScan plus, TMS SetOut plus, and TMS ProFit. All of which I have pushed to the limits and I have never seen any incorrect information or calculations produced by the software or applications.

Amberg was used throughout the entire project from start to finish. (February 2010 - July 2012). Amberg Technologies eliminated any challenges or concerns associated with surveying on this project.

There was at the peak of this project 60+ employees and their safety was never at risk.

