Pipe Bursting Sanitary Sewer Force Mains

Generally speaking, pipe bursting should be one of the first options considered when evaluating alternatives for replacing sanitary sewer force mains. However, even those of us that have extensive experience with the process in regards to gravity sewer mains, must recognize that the application is similar but not exactly the same when it comes to the sewer force mains. Beware the subtle differences. Over the years, there have been more than a few inquiries regarding the feasibility of pipe bursting sanitary sewer force mains and how it differs from pipe bursting gravity sewer mains. As with most questions, the proper answer to weather pipe bursting a particular force main is feasible is "it depends". Let's go through some of the more important issues upon which the feasibility of pipe bursting force mains depends.

Pipe Bursting In General

First and foremost, we must remember that pipe bursting is a tried and tested method for replacing pipe lines the world over. It is still the only trenchless technique that can upsize an existing host pipe to one, two, and in some cases three sizes larger than existing. We must remember that all the general benefits and limitations of pipe bursting any pipe still apply to force main applications. Also, the pipe bursting process can accommodate most any type of pipe desired for a sanitary sewer force main installation. Some of the more common pipe materials installed by the pipe bursting process include HDPE, Fusible PVC, Restrained Joint PVC, and Ductile Iron.

Existing Host Pipe Material

Pipe bursting, as a process, works best on pipe materials that fracture such as Vitrified Clay Pipe, Concrete Pipe, Asbestos Cement Pipe, Cast Iron Pipe, and thinner classes of PVC Pipe. Other pipe material such as Ductile Iron Pipe, Steel Pipe, HDPE Pipe, and thicker classes of PVC Pipe must be split rather than burst and are much more problematic for the pipe bursting process. So, the first feasibility test is "can the host pipe material be pipe burst".

Alignment

The pipe bursting process is typically used when replacing pipe that is fairly straight between two points up to +/- 500 feet in length (sometimes longer). The process can, however, accommodate a slight bend and radius in the host pipe. The normal joint deflection that would have been acceptable when the host pipe was originally installed is generally not problematic. However, the pipe bursting process will not normally navigate bends (fittings) installed in the host pipe. Because many force mains have bends installed throughout the length of the line, the bends must be located prior to pipe bursting. Once these bends are located, they can be planned for and most times simply used as locations for insertion and exit pits. The real challenge is in identifying the location of these bends. Since there are few access points for Pre-CCTV inspection, accurate as-built information is often depended upon for locating bends. Consequently, the feasibility of pipe bursting a force main may come down to how accurate the as-built information is for the existing host pipe. So, the second feasibility test is "are there bends in the system and do we know where they are".

Temporary Bypass Pumping

A few years back, my company pipe burst 8,000 LF of 36" Hobas force main in Tallahassee, Florida with 36" HDPE (DIPS DR 9) pipe. We pulled 600' shots right down Capital Boulevard, one of the busiest DOT roads in Tallahassee. One aspect of the project that was critical but didn't get much fan

fare, at the time, was that the City had figured out a way to reroute the flows of the existing force main through its existing gravity system. Miraculously, we didn't have to provide any temporary bypass pumping to accomplish the pipe bursting of this large diameter force main. Imagine the challenges that would have arisen, if that 36" force main had to be temporarily bypassed above the ground. So, the third feasibility test is "do the existing flows need to be temporarily bypassed and can we find a suitable route to install this temporary bypass system".

Had the Tallahassee system required temporary bypass pumping, it's quite possible that the project would have failed this feasibility test. This test is just as valid for small diameter force mains. However, the smaller diameter lines are much easier to work with. It is much easier to maneuver and find space for the smaller bypass lines. Furthermore, there is a much greater chance that smaller diameter bypass lines can be temporarily buried across intersections, driveways, and parking lots. Generally speaking, the smaller the bypass system the better it is for this feasibility test.

Depth & Separation of the Host Pipe From Other Utilities

As with any pipe bursting application, the depth and separation of the host pipe from existing utilities is a critical aspect to feasibility. The pipe bursting process attempts to compact the host pipe and surrounding soil up, out, and away, creating a void large enough to allow the new pipe to be pulled through. This compaction and soil movement can, at times, be significant enough to push into nearby utilities and possibly cause damage. With gravity sewer mains, we often have the luxury of being deeper than the rest of the utilities and therefore avoiding these potential problems. However, sewer force mains are often buried at or near the same depths as many of the other underground utilities such as water, gas, electric, telephone, and cable. Consequently, the fourth feasibility test is "do we have proper depth and separation of the host pipe from the other utilities".

Conclusion

As discussed, pipe bursting should be one of the first options considered when evaluating alternatives for replacing sanitary sewer force mains. The principals that have made pipe bursting one of the most used techniques for replacing pipes for any purpose could and should be applied for the benefit of force mains, as well. With proper consideration of a few issues, the option can be properly assessed.