

## *Unwelcomed Storm Water Infiltration Stopped*



THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS



### BRICK AND MORTAR CSO REPLACED WITH COST-EFFECTIVE AND LARGER POLYPROPYLENE PIPE LINE

As more and more cities face aging stormwater and sanitary sewer piping infrastructure and consent decree requirements to remove combined sewer and sanitary sewer overflows, the need for cost-effective solutions that are long lasting and with improved joint integrity pipelines has accelerated.

One recent example of a city moving ahead is Moberly Missouri. To prevent storm water from infiltrating into its sewer system they decided to replace the crumbling 80-year old brick and mortar tunnel that was serving as a combined storm water and sanitary pipeline. Partially financed with funds from the American Recovery and Reinvestment Act of 2009, and part of Governor Nixon's Transform Missouri Initiative, the project designed by Jacobs Engineering Group, Inc. (St. Louis, MO), supplied by Water and Sewer Supply (Columbia, MO), and installed by Emery Sapp & Sons, Inc. (Columbia, MO) cost some \$1.2 million. Serving nearly 14,000 residents, the city's new system will remain a combined sewer but, because of the type of pipe used, seeping groundwater will be prevented from entering the system, which lowers the City's treatment cost per gallon of effluent.

The Reed Street Combined Sewer Overflow (CSO) replacement project used more than 3,000 feet of new pipe to connect to the Taylor Street CSO by replacing the old leaking brick sewer with a larger diameter pipe and also eliminate a bottleneck under Morley Street.

## *Unwelcomed Storm Water Infiltration Stopped Cont.*



THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS



According to Mike McCarty, P.E., of Jacobs and who designed the system, "The combined sewer collects wastewater and stormwater runoff from the downtown area of Moberly. "In designing the new pipeline, we tried to match or exceed what the capacity of the brick arch was, which yielded the combination of pipe sizes -- 60-inch RCP and 54-inch PVC. After the project was awarded to Sapp, the city was approached and asked to consider polypropylene pipe. After consideration of constructability, cost and hydraulic issues, the decision was made to construct the project with triple wall polypropylene pipe manufactured by Advanced Drainage Systems. An additional benefit we got from the polypropylene pipe was that we were able to increase the capacity for the entire run."

This new sewer was installed in 2010 and headed by J. Keith Phipps, Director of Utilities for the City of Moberly. "We had a brick pipe system that was about 54 inches tall at the peak – it was egg shaped and narrow at the bottom with a trough - carrying combined sewage to a swirl concentrator. There were places in this tunnel that were basically falling apart. Some portions of it dated to the 1880's. This design not only eliminated the inflow infiltration sources but the larger pipe also provided more storage capacity in that trunk sewer so that it wouldn't cause as many backups during a storm." The combined sewer carries sanitary waste from homes and commercial areas plus the storm-water runoff collected from street inlets and curbs and gutters. It is the only trunk line to the treatment plant.

## *Unwelcomed Storm Water Infiltration Stopped Cont.*



THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS



Since the City of Moberly is a combined sewer community, additional storage and primary treatment exist at three points in the sewer collection system. Two lagoons at the sites of the two old plants were converted to storm water holding basins for peak flow storage during rain events. These lagoons provide storage of storm water for small rain events, and are permitted as overflows if the rain water exceeds the storage capacity.

"The project was originally designed with conventional 60-inch reinforced concrete pipe and 54-inch closed profile wall PVC pipe to get the approximate same capacity as the original two by three foot brick arch sewer. After awarding the project to Sapp, we looked at the SaniTite HP pipe. We reviewed some of the case studies and determined that it would probably be a good product for this application and location. Initially we looked to replace just the 54-inch PVC pipe because of some concern with the winter installation and the brittleness of PVC, but as we got further into the plan, it became obvious that the cost for the 60-inch RCP justified that we replace all the pipe material on the project with the ADS pipe. Among the other things that make it attractive is that you get the benefits of a large diameter pipe, and the ease of installation of a lighter weight pipe."

"We discovered that having a large diameter sewer pipe that was lightweight, had a long laying length and easy assembly, increased our production rates and subsequently our bottom line. The SaniTite HP bells install easily and are extremely tough yet not brittle," said Jason E. Rode of Emery Sapp & Sons, Inc. Rode and his crew of four cut and covered 3,300 linear feet of the SaniTite HP pipe in just a month and half. "On some days we did about 200 feet of pipe in a 15-foot deep trench," he stated.

## *Unwelcomed Storm Water Infiltration Stopped Cont.*



THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS



ADS SaniTite HP pipe provided the stiffness, strength and joint performance specified for this sewer system. While ADS has been known since the late 1960s for its corrugated high-density polyethylene (HDPE) pipe, the company's newest product is manufactured using an advanced grade of polypropylene resin and was specifically engineered to serve the gravity flow, sanitary sewer market and storm sewer applications that require enhanced pipe strength and durability as well as premium joint performance.

SaniTite HP meets the requirements of ASTM F2736 (12" to 30") and ASTM F2764 (30" to 60"). The 30-inch to 60-inch diameter pipes have a triple-wall construction that provides a smooth interior and exterior wall design, supported by a corrugated structural core for improved stiffness and greater beam strength to minimize deflection and further enhance long-term performance. It is also watertight, exceeding the requirements of ASTM D3212 with dual-gaskets, and banded reinforced bell and spigots. Regionally, it is approved by the Metropolitan St. Louis Sewer District for sanitary and storm sewer applications, as well as for all drainage applications by a variety of agencies, including MoDOT, Columbia and Springfield.

Furthermore, ASTM F2764 standard includes the material, design, construction and joint performance. Included in this standard is a 1000-hour, 10.8 psi, joint pressure test on three samples of each diameter. No other gravity flow sewer pipe has been required to pass this extremely stringent test protocol to verify long-term joint performance. The polypropylene resin used to make the pipe resists even the combination of hydrogen sulfide attack, abrasion and corrosion while being much easier to handle on the jobsite.

## *Unwelcomed Storm Water Infiltration Stopped Cont.*



THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS



The resiliency of the pipe was put to the test by both nature and man. "We had depths of up to 20 feet in some areas," Rode stated, "but sometimes cover was very little especially in the low lying, swampy area around the creek which also had very poor soil conditions."

"As far as durability, when we used it for a temporary ditch crossing we had hardly any cover....just put dirt around it. We drove all of our machines over it and it would flex and go back to its original shape. That includes one of our biggest machines...a Komatsu 400 excavator that weighs 100,000 pounds."

"It's the second or third time we've used the ADS pipe. But it's the first application of such a large volume - the size and length of the pipe put into the ground. We've done small projects with it and other ADS pipe...a hundred feet or less, but this is the first job we've done with thousands of feet of pipe. There was no learning curve going from our small jobs to this one, because the pipe is very similar to the other product that ADS has...the regular, black HDPE pipe."

We went with the ADS pipe. Before it would have been more than likely that we would have used concrete or something like it," said Phipps. "We were provided a piece of the larger diameter SaniTite HP to play with and beat up on it. My guys took a backhoe and worked it over pretty good, slamming it over and over again with the bucket. There were only surface scratches to it. Our 'test' didn't

## *Unwelcomed Storm Water Infiltration Stopped Cont.*



THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS



"make it oblong or interfere with the interior. I think we ended up using that section for a storm culvert somewhere else."

Due to the rural area, there were fewer than 30 lateral hook-ups from the 60-inch trunk line, which the Sapp crew accomplished using INSERTA TEE® fittings from ADS.

"We will be using ADS pipe in the future," stated Phipps. "It makes economical sense. Also, I'm not crazy about concrete being in sewers anyway in case there are hydrogen sulfide odors, gas or any thing like that. Plus you have a better seal with the SaniTite HP pipes due to its double gasket and bell and spigot that are molded in as part of the pipe."



**MOBERLY, MO - Located in the middle of Missouri about equal distance from Kansas City and St. Louis, the City of Moberly replaced an aging sewer line with 60-inch diameter pipe from ADS.**