El Dorado Water Utilities Effluent Pump Stations Design

El Dorado Water Utilities (EDWU) operates two atypical WWTPs. The plants pair facultative lagoons with dissolved air flotation (DAF). This system was the first of its kind when it was installed in the late 70s and is still unique to the State of Arkansas. To address ever increasing NPDES permit requirements, particularly nutrient limits, EDWU decided to relocate their discharge point from a stream with a base flow of nearly zero to the Ouachita River. The Utility formed a coalition called the Joint Pipeline Group (JPG) with three local industries who were facing similar issues. The JPG submitted an NPDES permit application in 2004 and were awarded a 20 MGD discharge permit in 2010 after winning an argument heard by the Supreme Court of Arkansas. The joint force main was constructed under a single contract but each of the JPG's entities was responsible for the design and construction of its own pump station. HW was selected by EDWU for the design of the effluent pump station at each of its WWTPs in June 2012. It was critical that the Utility's pump stations be on-line by the end of 2013 to align with their new NPDES Permit requirements. HW understood the importance of schedule on this project and marshaled resources to complete the the design in less than four months.

The effluent pump station peak design capacities for EDWU's North and South WWTPs are 5 MGD and 7 MGD respectively. The pump station design required that EDWU be capable of discharging the WWTP peak design flow through the pipeline regardless of pumping activities of any of the other three (3) pipeline users. To assist with the pump selection under these complex and variable hydraulic conditions HW created a hydraulic model of the entire joint pipeline system. The pump stations would be required to overcome a static head of approximately 125 feet and a total dynamic head that ranged from 150 – 265 feet depending on the combined volume of flow in the pipeline. Variable speed 3-stage vertical turbine pumps were selected for the application.

HW 's pump station designs are based on the appropriate Hydraulic Institute (HI) standards. Basing our designs on HI Standards protects our clients in two significant ways; it maximizes the life of the pumps and it minimizes the Owner's liability should a pump fail prematurely. When pumps fail prematurely, the first thing that a pump manufacturer typically assesses is the wet well design. If the wet well is not designed in accordance with HI standards, it is not uncommon for the pump manufacturer to wash their hands of any liability associated with the failure. For this project HW selected an open bottom can wet well design that lowered the overall construction cost by more than 30%.

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HW HighLights

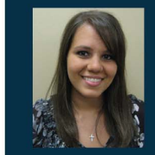
this issue:

Welcome to the Hawkins-Weir Team

Cary Beth Lipscomb, E.I., joined HW's Little Rock office in June 2013. Ms. Lipscomb graduated from the University of Arkansas in May 2013 with a B.S. in Civil Engineering.

Caleb Posey, E.I., joined HW's Van Buren office in June 2013 and transferred to our Little Rock office in April 2014. Mr. Posey graduated from the University of Arkansas in May 2013.

Chris Morris, E.I., graduated from the University of Arkansas with a B.S. in Civil Engineering in December 2013, and joined our Van Buren office in January 2014.



Christy Clark joined our Van Buren office in October 2013 as an Administrative/ Accounting Assistant. Ms. Clark graduated from the University of Arkansas-Fort Smith with a B.S. in Business Administration.

At Hawkins-Weir Engineers, Details Matter.

Why do details matter? The details that are either incorporated or not incorporated into a set of construction documents (plans, specifications, and contract documents) often determine the success of a project based on the following parameters – budget, schedule, operations, and maintenance.

Omission of details can result in increased bid prices. An unclear set of construction documents creates uncertainty and risk for Contractors during the bidding process and results in increased bid prices to compensate for this risk. Increased bid pricing due to an incomplete set of construction documents is difficult to define because it is never revealed to the Owner since construction contracts are typically awarded on the basis of low bid. This statement is especially true for lump sum construction contracts. An omission of details can similarly result in increased change orders during the construction phase of the project, which can also have a significant impact on the project schedule and delay its completion. An omission of details can impact the operation of a project through decreased functionality or efficiency. And finally, an omission of details can impact the maintenance of a project over its design life through an increase in repairs or maintenance activity.

At Hawkins-Weir, addressing the details begins with a collaborative design team process. We like to engage the Owner at various levels of their organization – management, engineering (if they have an internal engineering department), operations, and maintenance. The reason is simple. Each level of an Owner's organization is focused on different design parameters that collectively will determine a project's success. We begin the design process by listening to the Owner. We listen to the Owner's description of the problem that precipitated the need for the project. We listen to what the Owner considers as their critical success factors for the project. We listen to any Owner's preferences regarding the selection of equipment that they may have standardized on throughout their system. We then collaborate with the Owner and the entire design team to clearly identify the project scope. Once the project scope is defined, our engineers and support staff bring their expertise to bear and begin the development of the construction documents. This collaborative process continues throughout the design phase at typical milestones of 30%, 60%, 90%, and 100% completion of the construction documents. We also remain engaged during the bidding, construction, and post-construction phases of the project. Yes, post-construction phase also. We believe it is important to support the Owner during the warranty period and throughout the design life of the project. This latter belief is consistent with our simple business philosophy – we want to earn an Owner's repeat business through exceptional engineering service and the success of the projects that we collaborate on. All we ask from an Owner is for the opportunity.

At Hawkins-Weir, details matter. We believe that addressing the details within a set of construction documents translates to savings to the Owner, not only through a decrease in change orders but also on bid day. We also believe that by addressing the details, the project will have a better probability of being completed on time, operating as intended, and with a decreased maintenance burden. If details matter to you, please contact Hawkins-Weir and let's discuss how we can assist with your next project.

HW Project Spotlight

City of Greenwood Lift Station No. 1 Improvements



HW assisted the City of Greenwood (AR) in the replacement of ductile iron pipe in Greenwood's main sewage lift station wet well, located adjacent to the County Courthouse and Town Square. The ductile iron pipe was failing due to corrosion caused by sulfuric acid, produced by microorganisms (Thiobacillus bacteria) that digest hydrogen sulfide gas and secrete the corrosive liquid.

The ductile iron pipe was failing due to corrosion caused by sulfuric acid.

Upon inspection of the sewage lift station, it was found that the corrosion was not limited to the wet well piping. Severe concrete corrosion was also taking place and threatening the structural integrity of the lift station.

Corrosion was not the lift station's only ailment. In order to manage increased flow rates during wet weather events, two suction lift pumps were added to the existing lift station's two submersible pumps. Together these pumps managed increased flow rates caused by inflow and infiltration and controlled sanitary sewer overflows (SSOs) in the collection system during wet weather events. However, hydraulic characteristics of the wet well frequently caused the suction lift pumps to lose prime, making their operation unreliable and problematic. Without the benefit of SCADA at the lift station, the suction lift pumps periodically failed to operate until Utility personnel discovered the problem on-site. Due to the high cost of concrete repairs and bypass pumping along with other issues, the decision was made to construct a new sewage lift station.

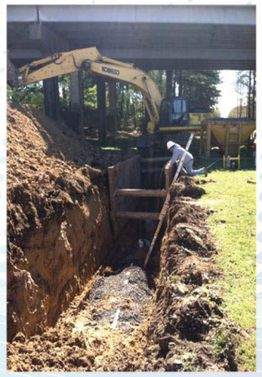
The new sewage lift station includes two wet wells, each containing one wet weather and one dry weather pump. It also includes two new submersible wet weather pumps, two existing submersible dry weather pumps, and the existing standby generator and transfer switch were relocated to the new lift station once the new wet wether pumps were operational. Variable frequency drives were also added for enhanced operational flexibility and a SCADA system was installed for operational control and alarms.

An odor control unit was installed lowering pressure and drawing the hydrogen sulfide and other offensive gasses from the lift station and through an air scrubber where they are absorbed into the carbon media. Additionally, a concrete admixture was used to inhibit microbial growth and protect the concrete structure from corrosion.

Jacksonville Wastewater Utility Highway 67 Sewer Relocation

This project involved the relocation of multiple sanitary sewer mains along U.S. Highway 67/167 in Jacksonville, Arkansas in preparation for proposed roadway improvements by the Arkansas State Highway & Transportation Department (AHTD). As part of this project, Hawkins-Weir Engineers assisted the Jacksonville Wastewater Utility in obtaining project cost reimbursement from AHTD for design, construction, construction management, easements, and regulatory review fees. The project consisted of the construction of approximately 870 LF of 18" PVC gravity sewer line, 300 LF of 15" PVC gravity sewer line, 600 LF of 12" PVC gravity sewer line, 520 LF of 8" PVC gravity sewer line, 70 LF of 6" PVC gravity sewer line, sewer service lines, road bores, railroad bores, manholes and appurtenances. The project also included the abandonment and removal of approximately 3,215 LF of existing gravity sewer line and manholes. Hawkins-Weir was faced with an aggressive schedule to have this project designed and constructed so that AHTD's project was not delayed. Each segment of this project was successfully completed on time within the Utility's budget. Hawkins-Weir Engineers' Cary Beth Lipscomb, E.I. was the Inspector for the project.

Project involved the relocation of multiple sanitary sewer mains along U.S. Highway 67/167



Legislative Update

High Court Ruling May Ease Restrictions on Peak Wastewater Flow Management

Sewer collection and treatment systems are as different and unique as the towns and cities that they serve. But there is one thing that nearly every sewage collection system has in common, they all leak. The primary concern with leaking collection systems is that they fill up with stormwater during rainfall events. This surcharging can overwhelm wastewater treatment plants (WWTPs) and cause sewage to overflow from low points in the collection system. Regulatory agencies often require that utilities expand infrastructure to prevent sanitary sewer overflows (SSOs). These agencies have also historically limited the way a utility could process peak flows at their WWTPs, particularly blending. A recent U.S. 8th Circuit Court ruling addressed blending at WWTPs and appears to pave the way for its use in the future.

Regulatory agencies have commonly required that all WWTPs include some form of biological treatment. Further, they have required that the plant's biological components be utilized under all flow conditions. Biological treatment processes are sensitive to variations in flow. If peak flows are not properly managed through a plant, they can overwhelm the biological process and render it inoperable. Blending has been used by some WWTPs to protect their biological processes by routing a portion of the peak influent flow through primary treatment and then around biological treatment. The diverted flow is later recombined with the main effluent stream prior to disinfection and discharge. The combined final discharge was required to meet all of the facilities NPDES permit limits. In recent history, the practice of blending has only been permitted by EPA & ADEQ on a rare case-by-case basis. They have contended that all wastewater must receive biological treatment and that the practice of blending can result in a violation of the bypass rule (40 CFR §122.41(m)(1)).

A group of cities in Iowa filed suit against the U.S. Environmental Protection Agency (EPA) to protest that agency's internal wet weather policy in 2010. They contended that the policy was more stringent than required by the Clean Water Act. They also asserted that proper legal procedures were not followed in the development of the Agency's wet weather policy. At the heart of the issue was the EPA's perceived prohibition on blending. The group contended that the EPA limited municipalities' options in dealing with peak wet weather flow and often required that more costly and generally less desirable options be implemented.

The Court's historic ruling has the potential to fundamentally change the way that peak flows are treated across the United States.

The suit was filed with the United States Court of Appeals for the 8th Circuit in 2012. The Court issued its decision in 2013 ruling in favor of the plaintiff. The Court's ruling sought to vacate the EPA's apparent ban on blending. The ruling also asserted that the EPA's attempts to regulate blending or other treatment practices within a WWTP were beyond that Agency's authority.

The Court's historic ruling has, on its surface, the potential to fundamentally change the way that peak flows are treated across the United States. It can be interpreted to read that the EPA's responsibility is to set appropriate discharge limits, not to dictate how a permitee complies with the limits. A more moderate interpretation, however, might suggest that EPA revert back to its 2003 draft Peak Flow Policy (68 Fed. Reg. 63,042 (Nov. 7, 2003). This draft policy reflects the Agency's historical approach to peak flow processing, which did not seek to regulate the type of treatment process (biological or physical) used to achieve compliance with secondary treatment limits. It also recognized blending as an acceptable method for processing peak wet weather flows. This policy can be summarized to read that so long as a facility is operating as it was designed (not turning off treatment units simply because it can still meet permit limits), meeting applicable end-of-pipe permit limits, and providing the diverted flow with the equivalent of primary treatment, it is legal for a WWTP to use blending.

This potential shift in policy could result in substantial savings for wastewater utilities. Peak flow processes, such as high rate clarifiers, can be constructed for a fraction of the cost of expanding a WWTP. Those processes are ideally suited for long periods of dormancy and have the ability to start up very quickly in response to peak flows. The EPA has not yet outlined a new approach to dealing with blending at WWTPs, but they are taking positive steps in that direction. Hawkins-Weir Engineers is working with several of our clients to take advantage of this new opportunity. In fact, we have worked with one of our clients to submit the first application in EPA's Region 6 for the use of blending at a WWTP. Please don't hesitate to contact us if you would like to discuss how this apparent regulatory shift could benefit your utility.