

Review of Missouri City Projects, Plans and Technical Needs

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Missouri City is one of the fastest growing cities located within the Houston metropolitan planning area with a current estimated population of approximately 75,000. The City encompasses approximately a 30 square mile area. The City's Extra Territorial Jurisdiction (ETJ) encompasses an additional 25 square mile area with a current estimated population of approximately 35,000. The continued growth within the City and its ETJ has necessitated the City and its partners to upgrade and expand its water and wastewater infrastructure. In this presentation, we will review City's key infrastructure projects that are planned or underway and its unique approach to address growth and regulatory requirements.

As part of a regional water supply initiative, the City of Missouri City in partnership with 30-plus other Municipal Utility Districts (MUD's) and private sector groups is currently expanding capacity of its existing surface water treatment plant (SWTP) to meet projected growth and the Fort Bend Subsidence District groundwater conversion mandates. These mandates currently require the City to use at least 30% of its water supply needs through surface water sources, and increasing that amount to 60% by 2025. The rules are aimed at reducing ground water usage, which is attributed to causing land subsidence and other negative impacts in this region.

The first phase of the City's SWTP was constructed and commissioned at a cost of approximately \$50 Million in 2012. The plant works by taking water from the Brazos River and pumping it into the two plant reservoirs via the Brisco Canal. It is then channeled into various treatment tanks, including a membrane filtration system, where sediment is removed and the water is disinfected. The treated water is stored in a large on-site tank to be dispersed by transfer pump stations to the MUD water plants around the City. Expanding the current plant from its 10 MGD (Phase I) capacity to 20 MGD (Phase II) was factored in the original design and accommodation for modular expansion was incorporated. Construction work for Phase II expansion began in April 2018 with an estimated completion in 2020.

The SWTP plant has been a success story for the city. The City has not only worked strategically with its partners in planning for future water needs of the community, but has done so in a fiscally responsible manner by producing high quality water at a low cost. The SWTP project has also been a recipient of the Environmental Project of the Year Award from the Texas Chapter of the American Public Works Association. In this

presentation, we will highlight the planning and foresight that went into in making this SWTP a “crown jewel” of the City’s infrastructure project.

The next project is a wastewater packaged plant project, which is a tale of “trash to treasure” that creates a win-win opportunity for all. The Mustang Bayou Service Area (MBSA) is located southeast of the City and includes Fort Bend County MUD No. 47, Fort Bend County MUD No. 48, additional Missouri City residential developments and commercial areas off Highway 6 and the Fort Bend Parkway Toll Road. The MBSA encompasses approximately 7.0 square miles and is projected to contribute to a significant portion of the City’s growth over the next 10 years. Current average daily flow is 0.65 MGD with flows expected to exceed the design capacity of 0.95 MGD in near future based on development commitments necessitating additional capacity in place within a year. Based on recent flow projections over the next 10 years, the anticipated flow is expected to reach 1.5 MGD and beyond by 2028. Then the City would likely regionalize wastewater treatment by diverting this plant to the nearby Palmer Plantation WWTP. As a result, the City was looking for the most economical solution to providing additional treatment capacity that also met a very tight schedule, knowing this facility would eventually be decommissioned.

Then along came a golden-brown opportunity. The City learned of relatively new 1 MGD package plant a neighboring municipality had just decommissioned due to a permanent plant expansion. The City evaluated this option and a new plan was hatched. The City negotiated and purchased the nearby City of Pearland’s packaged wastewater treatment plant. This brand-new package WWTP was originally needed to help the City of Pearland with supplemental short-term treatment capacity in order to facilitate an overdue expansion of their permanent WWTP. The City’s design consultant (ARDURA) is reconfiguring the Pearland package plant originally designed for 400 mg/l CBOD5 and reconfiguring to the lower 250 mg/L influent of the Mustang Bayou WWTP. This proposed reconfigured WWTP layout can also accommodate provisions for expansion to 2.0 MGD. The City is utilizing the construction manager at risk (CMAR) method to deliver this WWTP project based on a tight schedule.

The next project is the City of Missouri City Steep Bank Flat Bank Wastewater Treatment Plant (SBFB WWTP) located in southern part of the City abutting the City’s ETJ. The City is experiencing rapid growth in the ETJ mainly due to the master planned developments within the Sienna and Riverstone area. The City is working with its other partners (MUDs) to regionalize and expand current plant capacity from 3.0 MGD to 4.5 MGD.

Currently, SBFB WWTP utilizes two oxidation ditches with mechanical surface aerators with a rated 3.0 MGD capacity. To address insufficient mixing/aeration and equipment issues, the use of fine bubble diffusers, external blowers, and horizontal static mixers was assessed to increase oxygenation capacity and efficiency, as well as to improve mixing, aeration, and horizontal velocity along the bottom of the channel. As part of the planned expansion, the plant treatment process is planned to be converted from extended aeration (15 lb. of BOD5 per 1,000 cubic feet volume) to complete mix with nitrification (35 lb. of BOD5 per 1,000 cubic feet volume). With the process conversion, the combined capacity of the two existing oxidation ditches can be doubled from 3.0 MGD to 6.0 MGD at average daily design flow. Due to the hydraulic limitation of the existing clarifiers, the achievable overall treatment capacity is 4.5 MGD at average daily design flow, which is sufficient to serve the existing and proposed customers at buildout.

Some of the benefits of changing the treatment process as part of the regional plant expansion include: (a) minimizes the expansion footprint and construction cost, (b) allows basin cleaning and construction to proceed while the plant remains in operation at full capacity, (c) provides a higher capacity expansion which allows more operational flexibility and “cushion” for treating existing flows, (d) corrects aeration/mixing issues at the existing plant that may be resulting in reduced capacity, and (e) results in the same treatment process at all of the City’s facilities.

The design consultant (Costello, Inc.) also recommended a phased approach. In order to maintain full plant capacity during construction, a phased approach that utilizes retrievable fine bubble diffusers is planned to increase the basin capacity and allow each basin to be taken out of service during construction. This planned expansion is estimated to cost approximately \$8.0 Million and is scheduled for completion by 2021.