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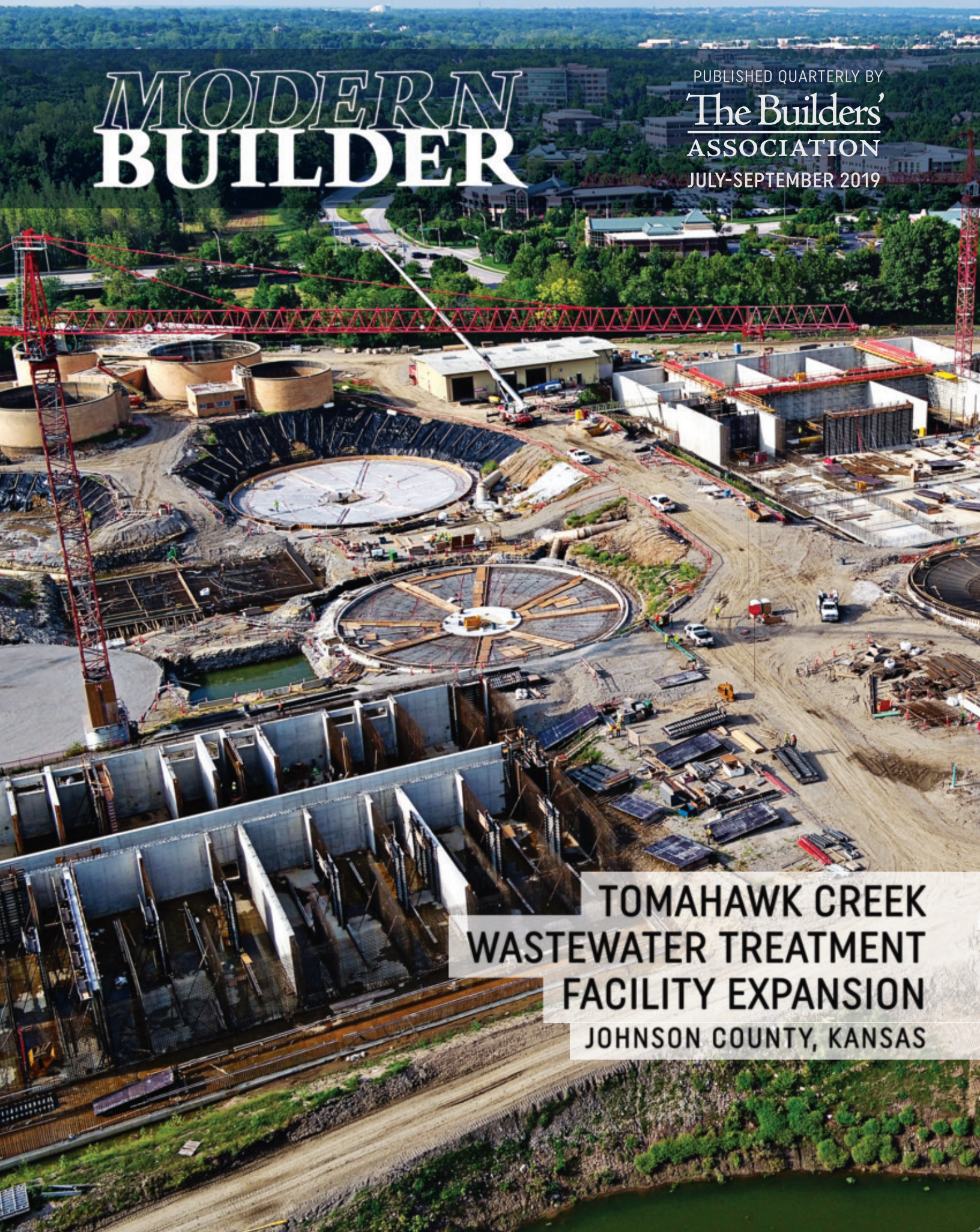

TOMAHAWK CREEK WASTEWATER TREATMENT FACILITY EXPANSION

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McCarthy Building Companies on Schedule to Complete Tomahawk Creek Wastewater Expansion by Spring 2022

Project Is Johnson County's Largest Ever Infrastructure Investment

– McCarthy

Primary Clarifier 1: May 2019

At primary clarifier 1, the worker at right is setting bulkhead for the outer ring slabs, which will be poured first, followed by the center rings and the pies, which will be poured in alternating fashion. Setting of the bulkhead allows the team to isolate the outer section before pouring concrete into it, while breaking the slab into sections allows the concrete to expand and contract. The two workers holding the curved radius rebar are getting ready to set it in place. In the immediate background at center is a drill rig for drilling piers.

Project Background

The Tomahawk Creek Wastewater Treatment Facility (WWTF) treated 7 million gallons per day (MGD) of wastewater until its temporary closure in 2018 for the current expansion. This was the largest amount it could treat and still comply with its discharge limit for ammonia, but it amounted to only 40 percent of the wastewater collected from parts of Leawood, Prairie Village, Overland Park and Olathe within Johnson County, Kansas.

To handle the additional flow, a result of the area's high growth rate, the remaining 60 percent was outsourced across State Line to Kansas City, Missouri, at a higher cost of treatment.

In 2010, Johnson County Wastewater, which owns and operates the facility, hired consultants to study three options: 1) Expand the facility to 19 MGD; 2) Upgrade the facility to 10 MGD and send 9 MGD to KCMO; or 3) Send all flow to KCMO.

Expanding the facility was determined to provide the most cost-effective, long-term solution for ratepayers. The upgrades are designed to improve water quality using the

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Cover Photo: September 2019

View looking south. College Boulevard (east-west) intersects with Tomahawk Creek Parkway in the upper portion of the photo. United Methodist Church of the Resurrection is visible on the horizon.

In the lower-left foreground is the filter and disinfection complex (FDC). On the upper section of the south portion of the structure, where the smaller bays are located, is where the disc filters will be located. There will be eight separate bays, each with 24 ten-foot diameter discs that will be able to treat dry weather and wet weather flows. Following filration, the water will be disinfected with chlorine, de-chlorinated, and then discharged to the overflow channel and to the creek. A portion of the overflow channel that runs from west to east across the site is visible at lower-right. An outfall structure will allow water to flow into the channel.

At left center (just south of the FDC) are four final clarifiers – large circular settlement basins where solids will settle out from liquids. Clean water will filter over the top of the weirs. The rectangular structure between the clarifiers is the final sludge pump station that circulates the solids back to the head of the Biological Nutrient Removal (BNR) basin, the massive concrete structure at upper right. The smaller circular structures at upper left are the four digesters where the solids are digested and broken down. (Cover photo courtesy of McCarthy)

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Tomahawk Creek WWTF

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latest, proven technologies, and to maintain the high quality of life enjoyed by Johnson County residents.

"The existing facility could treat only 7 MGD, but during wet weather the combined flows could exceed 125 MGD, in which case only a very small amount could be treated on the Kansas side," said BJ Peterson, Project Director, McCarthy Building Companies, Inc. "Johnson County could either pay KCMO to upgrade their facilities to handle the additional flow, or they could send all of the flow to KCMO for a limited amount of time, demo the existing treatment plant, and build a new plant that would result in a savings of $16 million per year."

By diverting all of the flow to KCMO during construction, the project team was also able to reduce the projected duration of construction by 18-24 months up front, added BJ. McCarthy built two new pipes and structures to divert the wet weather flow: the junction structure (the head of the facility) and the flow control structure. The wastewater will flow by gravity through the 72-inch interceptor that feeds into the 87th Street Pump Station just west of Blue River in KCMO. (Kansas City can handle up to 80 MGD from the Tomahawk Creek site.) When the project is complete, the gate that sends flow to KCMO will be permanently shut, and Tomahawk Creek WWTF will be the largest of Johnson County's six major treatment facilities.

Johnson County elected to use the Construction Manager at Risk (CMAR) collaborative delivery method for the project, which is located at 10701 Lee Boulevard, south of I-435 and east of Mission Road in Leawood. They solicited a Request for Qualifications in 2016.

McCarthy, which has completed major water/wastewater projects around the country, was interviewed in February 2017 by representatives from Johnson County, Johnson County Wastewater, and the design team of Black & Veatch and HDR. McCarthy was chosen as CMAR for the preconstruction portion of the project in March 2017. The design team began its collaboration with McCarthy after completing a 30% set of drawings.

The facility is located on a 57-acre site. The footprint of the new facility will be approximately 30% greater than the existing footprint, with expansion taking place primarily on the west, on property owned by Johnson County Wastewater.

The old trickling filters technology required a larger space to treat less water. The new technology does not require as much space, but the new facility will nonetheless be larger in order to treat 19 MGD. "The new facility will use much smaller footprints of treatment volume, so it will virtually triple the treatment capacity," said BJ.

The team was able to obtain soil information by performing 52 borings across the entire site. However, there were a few difficult to reach areas where borings were minimal or not possible. The project team did not, early on, have boring information on the lagoon (on the east), which was discharged when there were wet weather flows, and the wooded areas on the west, north (the location of the overflow channel) and northeast. "Various unknowns were discovered and addressed once we started construction," said BJ.

The original site was developed for wastewater treatment in 1955. Since then, the facility has been expanded and upgraded numerous times. Most of the existing structures were built in the 1950s and 60s. All but two of those structures have been demolished during the current project due to age and obsolescence.

The two structures being reused are the Influent Pump Station (on the north, just south of Lee Boulevard) and the Digester Complex (on the south, north of College Boulevard). At the Digester Complex, the solids are heated to a certain temperature for an amount of time to reduce the solids volume, stabilize the solids, destroy pathogens, and produce methane gas. The methane produced is used to heat the digesters with the remaining flared off. The digested solids are pumped through centrifuges that will separate the liquid from the solids, which can then be trucked off to farms for land application.

There are four anaerobic digesters. Three will have radial fixed-beam covers. The cover on the smallest digester (on the northwest) will have a flexible membrane. This membrane helps with short-term storage of gas that will allow for future improvements related to beneficial reuse.

National Water Group

Tomahawk Creek WWTF is McCarthy's first wastewater treatment project in Johnson County. "Our National Water Group is based in Phoenix and manages large water and wastewater treatment infrastructure projects in partnership with our local resources – in this case, Kansas City and St. Louis – to form the project team and execute the work," commented BJ. "They assist with project cost reporting, quality control, safety and other areas."

Soon after being selected as CMAR, McCarthy assembled a team of 12 staff onsite to begin developing the most efficient sequence for the work. By early August 2019, with construction approximately 35 percent complete, there were 45 staff and another 250 workers onsite. McCarthy expects to reach a peak of close to 300 workers by the end of 2019, said BJ.

"McCarthy is split into five regions," he continued. "The Tomahawk Creek project is an internal joint venture between our Southwest Region and our Central Region. The two regions provide upper-level collaboration on our management and staffing needs."

Safety

McCarthy is a member of the Build Safe Partnership Program (BSPP), a formal cooperative partnership between OSHA, The Builders' Association, and Builders' member companies who meet its strict eligibility

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Subcontractor Members of The Builders' Association Who Worked on the Tomahawk Creek WWTF Expansion

Aegis Fire Protection, LLC
All Temp, Inc.
Ambassador Steel
AmeriFence Corporation
AT Abatement Services, Inc.
Blackmore & Glunt, Inc.
Building Erection Services Company
Central Industrial Sheet Metal Works, Inc.
Coreslab Structures (Missouri) Inc.
Dahmer Contracting Group
Faith Technologies, Inc.
Flynn Midwest, LP
Hayes Drilling, Inc.
K.C. Coring & Cutting Construction
Kansas City Structural Steel, Inc.
Kelly Construction Group, Inc.
Mark One Electric Company, Inc.
Midland Thermal, Inc.
Musselman & Hall Contractors, L.L.C.
MVP LLC
PCI (Performance Contracting Inc.)
Pretech Corporation
Rand Construction Company
Regents Flooring (a Division of DB Flooring)
Robinson Fence
S&W Waterproofing, Inc.
SGH, Inc.
Sorella Group, Inc.
Whitley Construction Company, LLC

McCarthy Building Companies' Key Supervisory Personnel for the Tomahawk Creek WWTF Expansion

BJ Peterson, Project Director
Walt Eldridge, Project Director
Mike Wigness, General Superintendent
RJ Muha, Project Superintendent
Juan Maya, Project Superintendent
Matt Fischer, Project Manager
Tim Sommer, Project Superintendent
Jared Hamel, Project Manager
Mark Jackan, Project Manager
Dave Moran, Project Manager
Scott Moellering, Project Manager
Kerry Klausner, Project Manager
Randy Lachance, Project Superintendent

The above are part of a team of 45 total McCarthy staff members currently working on the Tomahawk Creek WWTF Expansion.

One Team

CMAR: McCarthy Building Companies, Inc.
Design Firm: Black & Veatch/HDR Engineers
Owner: Johnson County Wastewater

Tomahawk Creek WWTF

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requirements. In March 2019, the McCarthy team earned first place at The Builders' Association Safety Excellence Awards in the General Contractor Division, Over 1 Million Work Hours. McCarthy has experienced zero lost-time incidents since the start of the project on August 12, 2018.

Scope of Work

The project scope consists of the following:

1) Demolition and decommissioning of the existing facilities
2) Establishing temporary provisions for flow diversion
3) Sitework including grading and drainage, underground piping, site roads, and construction of a site bridge
4) Modifications to Lee Boulevard to accommodate site access
5) Influent junction and flow control structures
6) Influent and peak flow pump stations
7) Headworks building
8) Primary clarifiers
9) Biological Nutrient Removal (BNR) basins
10) Final clarifiers as well as associated pump stations and splitter structures
11) Tertiary pump station
12) Filtration complex
13) Chemical disinfection and de-chlorination
14) Effluent reaeration structure
15) Gravity thickener
16) Solids processing building which includes thickening and dewatering
17) Solids digestion and gas storage
18) Waste gas flare
19) Administration and maintenance building

The completed project will incorporate nearly 50,000 cubic yards of structural concrete, along with nine miles of underground utilities and 790 drilled shafts.

GMP

McCarthy developed the Guaranteed Maximum Price (GMP) of $267,892,045 in February 2018. On March 29, 2018, Johnson County wrote an addendum to McCarthy's contract to include the construction phase.

"The project has high liquidated damages," commented BJ. Johnson County projects that, with rate increases, they will be spending $2 million a month by the end of the project for KCMO to treat their wastewater, so McCarthy is at risk for that amount every month the project is delayed. "Every day counts," he added.

"This year's wet weather impacted our ability to excavate the large volume of existing structures in a timely manner," he continued. "Every time it would rain three inches we would have to navigate several feet of water because of the creek and the lithology, which consists of clay on top of rock on top of limestone. We discovered that in the holes we dug, the groundwater would rise and fall depending on the weather, because the creek runs around the entire site."

Project Milestones

The formal groundbreaking was held on April 12, 2018. As of early August 2019, McCarthy was ahead of schedule and on budget, said BJ. McCarthy split the project into five milestones:

1) Liquids Train: October 25, 2021. The first milestone is to complete the liquids train so that water can once again be treated at the Tomahawk Creek facility.
2) Solids Train: November 29, 2021. About five weeks after the liquids train is completed, a sufficient amount of solids will have been built up so they can be treated through the digesters and then taken to the landfill.
3) Substantial Completion: March 1, 2022.
4) Final Completion, Phase 1: June 1, 2022.
5) Final Completion, Phase 2: March 1, 2023.

Odor Control

McCarthy is installing new technologies that will provide a more complete odor control

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– McCarthy

Before

View looking northeast. The existing facility consisted of a mechanical treatment plant and a lagoon. The facility could treat up to 7 million gallons a day (MGD). Flow in excess of this capacity was conveyed to Kansas City, Missouri, for treatment.

– McCarthy

After

View looking northeast. The new facility will be able to treat 19 MGD with a wet weather capacity of 176 MGD. The footprint of the new facility is 30 percent larger than the footprint of the existing facility, with more than 30 new structures under construction, including the BNR or Biological Nutrient Removal basin (the dark rectangular portion on the southwest, just north of Indian Creek and Mission Road). The three primary clarifiers are north of the BNR. The Digester Complex includes the circular structures with white roofs on the south. KCP&L began constructing the Indian Creek Substation, which is at upper right (on the northeast) in September 2019.

The site bridge at upper-left will span the top of the overflow channel that separates the north side of the site from the south side of the site when there is a wet weather event.

At the east-west line dividing the site south of the primary clarifiers and north of the BNR, the rock falls off 10 feet in elevation. The structures on the north, including the primary clarifiers and the final disinfection chlorination facility are all on drilled piers. The structures to the south are on bedrock.

Tomahawk Creek WWTF

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system. They include three activated carbon air scrubber systems spaced around the site to remove odors. The five-stage biological nutrient removal process will produce less odors than the trickling filters that existed prior to decommissioning.

Self-Performance

McCarthy is self-performing the concrete, yard pipe, process pipe, miscellaneous metals (for items such as stairways and handrails), the setting of heavy equipment including clarifiers, pumps, mixers, centrifuges and treatment plant equipment, and portions of the earthwork.

"Self-performing the work allows us to better control the schedule, quality of the work, and safety of the workers," said BJ.

Wet Weather Flows

The main wastewater treatment includes clarification, biological nutrient removal, additional clarification, filtration, chlorination and de-chlorination. The wet weather system uses the same filtration process as the main flow. When the storm water reaches a certain level, the wet weather and peak flow pump stations will kick in, allowing it to flow directly to the disc filter system for filtration, where it mixes with the main flow for chlorine contact, de-chlorination, and discharge to the creek.

"Approval of wet weather treatment technology that can treat higher flows was a key component of this project," said BJ.

Meeting the Challenge

The McCarthy team has met a number of challenges thus far, including estimating a project the size and magnitude of the Tomahawk Creek WWTF. Unknown market factors such as tariffs, which have mostly affected steel, have provided a measure of uncertainty.

Due to Leawood's height restrictions, McCarthy had to dig deep into the bedrock. "Typically, when you're designing a wastewater treatment plant, you want to pump to the highest point and then use gravity as your friend to get it through the system," explained BJ.

"Also, this project is in the middle of a floodplain. Two-thirds of the old plant was prone to flooding during significant rains. To build the new facility, we had to build the overflow channel on the north, which created the flood mitigation measures needed to be able to raise the site."

BIM

McCarthy outsources BIM modeling to their offices in Phoenix and St. Louis. They also have staff onsite who are proficient in clash detection and BIM coordination. Their subcontractors are required to populate a single BIM model.

"Black and Veatch and HDR modeled the entire site in 3D during design in great detail. As a part of that, we were able to track changes in design and trending throughout the entire preconstruction process. When you look at the model, you can see all the process lines that are buried underground and all the utilities. You can zoom in for greater detail and see handrails, piping connections, mixers, and other equipment.

"This helps you determine where your cranes are going to go, where your site roads are going to be, and the layback of your excavations. BIM plays a huge part in understanding sequencing as well. If you look at the splitterbox [the final clarifier splitter structure] in 3D, you can see how the pipes interweave and determine how to put together the right schedule sequence to build it.

"Seeing in 3D is a huge help as it relates to schedule and site logistics development. Through the 3D modeling process you can see the design detail come to fruition and understand the added detail related to design development and trending. We put cost models together at a 30% level when the design was at 30% completion," added BJ.

– McCarthy

May 2019

Work proceeds on the slab-on-grade portion of the BNR basin. The 61-meter concrete pump truck at left is transferring liquid concrete via boom pump to the workers at right, who are placing, vibrating and finishing it. Concrete trucks (shown backing up to the pump truck) will unload the concrete into a hopper so it can be pumped to the desired location. Visible in the distance at left is a 65-ton RT (rough terrain) crane. (The RT crane appears within the arc of the boom pump.) At left, Carpenters install bulkhead in order to isolate the concrete slabs. In the foreground, at center, Ironworkers lay rebar (reinforcing steel). In the background (at right), beyond the wall forms for the BNR basin, is a tower crane. The project team completed pouring the slab-on-grade for the BNR structure on August 5, 2019.

Drone Technology

McCarthy takes drone photos of the site every few days. "We print them out and use them in our progress meetings with the Owner and in our subcontractor coordination meetings. We can address site logistics, develop workflows, identify potential safety issues, and determine where additional resources are needed. Drones allow us to do all of this in real time, which is so impactful.

"With drone photos we can talk through how we're going to start hanging wall curtains on the primary clarifier, where we're going to set wall forms, and how construction traffic is going to flow in and out of different areas," said BJ. "We'll also use it for data collection on site levels. We have a lot of cut fills out here, so once we've moved dirt from one place to the other, we can use the drone to map how much dirt has been moved, what the new elevation is, and whether it is at the design elevation – or if more cut fill needs to be placed in a different area.

"Drone technology has been advancing throughout the project. We are finding more and more ways to use drones to create 3D models and map the site. The other technology we use is a cloud-based collaboration platform that can scan the surface of whatever you need to scan – whether it's an excavation, slab-on-grade, earth or subgrade – and then put it into a 3D model so you can quickly figure out if the grade is plus or minus whatever the design elevation needs to be. That's been one of the coolest technologies we have employed on this project."

The location of Tomahawk and Indian Creek during and after construction will remain unchanged. "The main change for the surrounding community is the outfall. The old outfall of the overflow channel was on the far east side and was just an unattractive outfall pipe that people who were on the walking path could see. The new outfall will be a cascading waterfall," said BJ. It will be located north of the filter disinfection complex and west of the Indian Creek Substation.

Tower Cranes

McCarthy has three tower cranes onsite, each 140 feet tall. They also have three RT (rough terrain) cranes onsite: two 65-ton RT cranes and one 90-ton RT crane. Each RT crane has four rubber tires so it can be moved in and out of areas quickly. "You can mob [mobilize] the RT cranes anywhere on site to help support the tower cranes or access places the tower cranes can't reach," noted BJ.

"Some people were surprised when they saw we were using tower cranes for a wastewater treatment plant. They would drive down I-435 and say, 'I see all those tower cranes. Why aren't you going up vertically?' We use the tower cranes because of the weather. With crawler cranes and RT cranes, you have to maintain the

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roads and the crane pads. With a tower crane, even if it rains four inches you can continue work the next day because it is fixed in that area, and no upkeep of the crane path is required." The tower cranes are strategically placed to cover as many structures as possible.

The cranes also provide a way for the project team to display their patriotism. "We love to fly the U.S. flag from the cranes. Kyle Christiansen [Assistant Superintendent, McCarthy] created the solar lighting that illuminates the flags at night," commented BJ.

Floodplain

The entire site is being raised up to or above the 500-year floodplain – from one foot in some areas to 12 feet in others, an average of six feet above previous site ground elevations.

A portion of Lee Boulevard, from Mission Road up to the site entrance, will be raised above the 500-year elevation to provide access to the facility during high water conditions. Mission Road will remain unchanged. As a result of the higher elevation, the facility's brick buildings will be more visible than they were. The blond brick on the exterior of the influent pump station and the digester buildings is being refurbished.

Other Current Projects

McCarthy's other current projects in Johnson County include the 33,000 square foot Medical Examiner Facility on the Johnson County Government campus at 119th and Ridgeview. The facility has a construction budget of $16.5 million and is scheduled to be completed by the end of 2019. They are also providing design-build services for the $30 million, 66,000 square foot Merriam Community Center, which is scheduled to be completed in 2020. It is located just east of Merriam Municipal Plaza and IKEA. ▲

CLC KC Chapter Delegation Attends Leadership Development Conference in Philadelphia

A delegation of nine CLC Kansas City Chapter Steering Committee members and spouses traveled to Philadelphia, Pennsylvania, for the annual CLC Leadership Development Conference from Wednesday, September 11 to Friday, September 13. They stayed at the DoubleTree by Hilton Hotel Philadelphia Center City, a few blocks from Independence Hall and the Liberty Bell.

Among the most popular class sessions on Thursday, September 12, according to Caleb McCandless, was "CLC Best Practices," a roundtable discussion with interactive breakout sessions where chapters could share their most successful activities and strategies.

CLC Best Practices was followed by another popular session, a working lunch on "Motivational Leadership" led by Robert Johnston, President, Dale Carnegie Training of Delaware. During this session, attendees learned how leaders can drive employee retention and satisfaction.

Following the sessions, the CLC KC contingent toured Independence Hall and visited the nearby Liberty Bell, which is inscribed with the words "Proclaim Liberty Throughout All the Land Unto All the Inhabitants thereof" (from the King James version of the Bible).

Later that afternoon, at the Chapter-Hosted Reception at Lucky Strike Entertainment, they bowled with Dirk Elsperman, 2019 President of the AGC of America and COO/Executive Vice President, Tarlton Corporation. ▲

At left: ***David Bledsoe*** *had his photo taken next to the bronze statue of Rocky Balboa, the underdog boxer played by Sylvester Stallone in the 1976 movie "Rocky." In one of the movie's exhilarating moments, Rocky, in training, runs up the steps to the Philadelphia Museum of Art (visible at left, in background) to the theme "Gonna Fly Now."*

September 12, 2019: Independence Hall

In front (kneeling): ***David Bledsoe****, 2019 CLC Secretary and Sales Engineer, Blackmore & Glunt, Inc. In back (left to right):* ***Kerri McCandless****;* ***Caleb McCandless****, CLC Representative and Professional Development Manager, The Builders' Association/Kansas City Chapter, AGC;* ***Matt Cline****, 2019 CLC Immediate Past Chair and Senior Estimator, E&K of Kansas City, Inc.;* ***Kendal Cline****;* ***Isha-Mori Kassen****, 2019 CLC Vice Chair and Project Manager, U.S. Engineering Company;* ***Adam Hammeke****, 2019 CLC Social Chair and Associate Project Manager, PCI (Performance Contracting Inc.);* ***Chad Lane****, P.E., 2019 CLC Community Service Chair and Project Manager, JE Dunn Construction Company; and* ***Steven Crosley****, 2019 CLC Membership Chair and Project Manager, McCownGordon Construction. Independence Hall is where the Constitutional Convention was held and the Declaration of Independence was signed.*