

Design/Build of Special Gate & Valve Control Systems for Chicago Deep Tunnel Project

Controlling gates and valves that operate dams on America's waterways is one of the most important capabilities that distinguish Sorensen Systems from other system designer/builders. For the past 50 years, the company has developed a reputation for designing, fabricating, installing and servicing water, waste-water, and water to wire electrical control systems that control the flow of water for large scale municipal and industrial systems.

Recently, Sorensen Systems has developed a hydraulic and automation motion control system to operate a massive water control gate system at the 300 foot deep Thornton Quarry Reservoir near Chicago, Illinois. This enormous project, which is variously known as the Deep Tunnel Project and the Chicago Deep Tunnel, is a large civil engineering project that was built to reduce flooding in the metropolitan Chicago area and to reduce the harmful effects of flushing raw sewage into Lake Michigan by diverting storm water and sewage into a series of deep, large diameter tunnels and vast holding reservoirs.

Gates Regulate Water Flow

According to Mike Gardella, VP of Engineering and Manufacturing for Sorensen Systems, the gates for this project regulate the flow of water through large underground tunnels constructed to slowly feed the stored water to the Calumet treatment facility before being released into the



Major Engineering Project

The Chicago Deep Tunnel project has been in the planning and development phase for decades, but actually first came to life last Thanksgiving when for the first time it handled a 400 million gallon overflow of rain water successfully avoiding flood damage to the Chicago suburbs.

Cal Sag Channel. The four stainless steel roller gates, each 18 feet wide and 28 feet high, manufactured by Steel-Fab, Inc., of Fitchburg, MA, are powered by sophisticated Sorensen Systems Hydraulic Power units. The Programmable Logic Controller (PLC) ladder logic that monitors the gates, controls motion and performs coordinated multi-gate control and sequencing was developed by Casco Systems of Cumberland, Maine, as a subcontractor to Sorensen Systems. Each of the four gates weighs approximately 100 tons and can withstand 300 feet of water pressure and isolate the tunnels from the reservoir when necessary.

The Thornton Reservoir project, which was first proposed 40 years ago, came to life beginning on Thanksgiving 2015, when it began to fill for the first time. It had to divert 400 million gallons of raw sewage and rainwater that resulted from a steady rain event, thus christening the project successfully. According to a spokesman for the project, Kevin Fitzpatrick, civil engineer, the rainwater and sewage was slowly draining towards the reclamation plant where it was being cleaned. The Chicago area Metropolitan Water Reclamation District reported that the Thornton Reservoir filled to a depth of 17 feet,

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Design/Build

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which was about 400 million gallons. The reservoir's capacity is eight billion gallons.

System Serves 500,000 People

According to information released by the MWRD, over 500,000 people benefit directly from the protection to over 180,000 homes in the 14 communities to the south of Chicago. A spokesperson for the MWRD said, "We are happy to put our latest engineering marvel to work. The Thornton Composite Reservoir is the world's largest reservoir and has drawn intrigue from across the world."

"It's satisfying to know that Sorensen Systems has played an important role in helping a community cope with water resources and its proper management such as this successful divergence of potentially harmful flood waters," said Mike Gardella. According to published reports, flood damage in the general Chicago area has occurred over the past century with an alarming regularity. Major flooding took place in 1938, 1952, 1954, 1957, 1961, and 1973. It was about this time that the concept of a Deep Tunnel was proposed and put into motion.

The project ultimately consisted of 109 miles of tunnels ranging from nine to 33 feet in diameter, up to 350 feet underground. The roller gates installed by Steel-Fab and the hydraulic and motion control system developed by Sorensen Systems are the active part of the management system. The quarry



Gate Control System

The control panels designed and built by Sorensen System are responsible for controlling the movement of four massive stainless steel roller gates, each 18 feet wide and 28 feet high, which required a robust system of piping, motors, and valves assembled on skids.



Electronic Control System

Sorensen Systems designed and built a hydraulic and automation control system to operate the water control gate system at the Chicago Deep Tunnel flood control project. Chuck Keyes, Project Engineer, looks over specifications during the fabrication process of the control panels at Sorensen System's manufacturing locations in Northborough MA.

itself has been dug out to a dimension that is one half-mile in length from east to west and one quarter-mile wide from north to south; it's 300 feet deep. It will be one of the largest reservoirs

of its kind in the world according to the Metropolitan Water Reclamation District.

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