

# Wet Well Wonder in a Deep Sewer Tunnel

This wet well is a critical piece of a system designed to intercept wet weather overflows, and it demands powerful, high-quality pumps to handle the load.

Designed to reduce environmental impacts resulting from Combined Sewer Overflows (CSOs) in Columbus, Ohio, the Olentangy-Scioto-Interceptor-Sewer Augmentation Relief Sewer (OARS) is the key component in meeting this goal. This sewer tunnel will intercept wet weather overflows that currently empty into the Scioto River and instead carry the flows to the city's Jackson Pike and Southerly wastewater treatment plants.

The overall length of the OARS tunnel is just less than four and a half miles, and it includes three relief structures that divert wet weather combined sewer flow to the OARS tunnel. The OARS tunnel is sized to provide adequate conveyance capacity through 2047 for all storms contained within the typical year as defined by the city. The OARS tunnel ends at the OARS Diversion Structure just north of the Jackson Pike wastewater treatment plant, which serves as the pump station wet well.

## Scope

Among the most interesting components of the OARS project is a 215-foot deep, 60-mgd capacity pumping system and a 185-foot deep screening system. The OARS pumping system consists of multiple pumps that can handle enough flow to dewater the tunnel within two days of a large flow event. The difficulty with the deep pumping system on this project is that the static head condition varies from as much as 210 feet when the tunnel is empty to as little as 15 feet when the tunnel and shafts are full.

The tunnel, being built about 170 feet below ground, will require special drop structures—or vertical shafts—to direct flow from existing shallow sewers to the new deep tunnel.

## Solution

The response to this pumping challenge was the installation of four Flygt Model CP3351.995, 800-hp, 4160-volt, 15-mgd adjustable speed pumps that handle the majority of the work at the deep tunnel level, and two Flygt Model CP3531.960, 450-hp, 4160-volt, 20-mgd adjustable speed pumps to handle the shaft dewatering. Two grit pumps, Flygt Model NP3301.095, 105-hp, 460-volt, and one Flygt Model NP3306.715, 100-hp, 460-volt were also installed.



Flygt model CP3351/995 FM 800 HP 4160V, 10417 gpm at 192' tdh



Flygt pumps in a 200' deep wet well

**Customer:** City of Columbus, Ohio  
**Challenge:** Wet well weather condition issues  
**Solution:** 4 - CP3351.995  
2 - CP3531.960  
2 - NP3301.095  
1 - NP3306.715

The best solution from an investment and operational perspective in cases such as these is often to install submersible pumps in a circular wet well design.

The Phase 1 contractor utilized slurry panels to provide a watertight support of the excavation system in the top 115 feet, soft ground portion of the shaft. The lower 100 feet of excavation was in rock. It was first pre-grouted, then drilling and blasting were used to excavate to the bottom of the shaft. A finishing wall of concrete that was two-feet thick in the rock section and three-feet thick in the soil section was installed to create a permanent watertight wet well shaft. The 50-foot tall baffle wall system was constructed within the shaft. Upper flow diversion channels were built around the top portion of the shaft. The structural top of the shaft was finished with a 113-foot by 83-foot concrete pad with a 42-inch parapet wall around the opening of the deep shaft.

The Phase 2 contractor then took over the shaft and installed all the piping and supports. Installing the piping support system was difficult in that it required everything to be lined up perfectly to allow for ten-foot tall pump installation and retrieval along straight guide rails over the 215-foot depth. A great deal of coordination was required on the shop drawings to ensure adequate space for everything to fit just right.

### Results

Wet testing of the pumping systems was completed in April 2017 and the system has been handling live flows since early July. Faced with a huge CSO problem, Columbus has now combined sound engineering with state-of-the-art equipment in the Olentangy-Scioto-Interceptor-Sewer Augmentation Relief Sewer to deliver the solution to CSO issues for decades to come.

**Flygt pioneered the installation of submersible pumps in large capacity circular wet wells and has gained significant experience in this area from model testing and proven installations.**



Flygt pump being installed on guide rails



Flygt deep lift mechanism

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