

## Hydro-Brake<sup>®</sup> Drop cuts corrosion, complexity and cost for Saudi WWTP project

### Project profile

#### Objective

To convey foul water from a major city to a main wastewater treatment plant safely and efficiently, incorporating a 49 ft (15 m) drop to below ground.

#### Solution

Three Hydro-Brake<sup>®</sup> Drop systems enabled engineers to transfer water effectively, controlling peak flows of 523 cu ft per s and using a smaller, safer and less costly design than had originally been developed.

### Product profile

- Self-activating conveyance and flow control system
- Prevents damaging corrosion, erosion, noise and vibration effects
- Oxygen entrainment reduces H<sub>2</sub>S
- Robust, durable
- Low footprint

### Situation

As part of its ongoing work to raise the level of services in southern Riyadh and implement sustainable management of environmental resources and utilities, Saudi Arabia's National Water Company (NWC) is constructing an underground tunnel to transport sewage to the wastewater treatment plant (WWTP) at Al Haer, the country's largest environmental sewage treatment plant.

The project is the last of a series of projects to connect the WWTPs south of Riyadh; Saudi Arabia's infrastructure sector continues to expand, and the Al Haer project is a typical example of the kind of large, complex development in which the kingdom is investing.

The construction contract was awarded to Saudi Tumpane in December 2014, and drilling started in November 2015.

### Problem

The tunnel is 7.5 miles (12 km) long and traverses an area of difficult topography, and in order to transport the foul water out of Riyadh the system had to incorporate a drop of 49 ft (15 m).

When water falls from this kind of height it has a lot of kinetic energy, creating noise, vibration and a powerful "water hammer" effect that over time can damage sewer networks.



*The construction site outside Riyadh*

Additionally, as the water is foul it contains chemicals such as hydrogen sulfide, which can corrode concrete and other conventional building materials, as well as presenting safety issues and generating unpleasant odors.

Designers ILF Consulting Engineers developed an initial design that incorporated a cascade arrangement of conventional open shafts, with an additional bypass shaft, but they wanted to see whether this could be improved.

## Solution

ILF Consulting Engineers worked with Hydro International's Technical Manager Daniel Jarman and Wastewater Project Manager Keith Hutchings to develop an alternative design, facilitated by Regional Manager Ezzat Natsheh.

Taking the project requirements into consideration—not least the need to manage a peak flow of 523 cu ft per s (14.81 m<sup>3</sup>/s)—the team came up with an alternative design solution that incorporated three Hydro-Brake<sup>®</sup> Drop systems.

## Outcome

The alternative design proved to be a significant improvement in every way.

The Hydro-Brake<sup>®</sup> Drop systems enabled ILF Consulting Engineers to drastically reduce the size of the inlet structure, removing some parts of the original design completely. It also eliminated entirely the need for the additional bypass shaft.

The Hydro-Brake<sup>®</sup> Drop systems prevented any foul water from coming into contact with the main shaft walls, removing the need for expensive, heavy-duty liners to protect against corrosion and chemical degradation.

All of the above reduced the complexity of the project, cut the space requirements and drastically lowered overall construction time and cost.

The design also vastly improved safety and ease of access for inspection and maintenance personnel—a critical feature that is often overlooked or given lower priority on large projects such as this.

Finally, the Hydro-Brake<sup>®</sup> Drop delivered improved hydraulic performance overall, providing a more reliable, robust and durable solution with better noise control, vibration reduction and erosion control—the system's vortex technology eliminates “water hammer” effects entirely.



*The Hydro-Brake<sup>®</sup> Drop's air switch controls flow, while energy dissipation elements protect surrounding infrastructure*

## Hydro-Brake<sup>®</sup> Drop versus conventional drop designs:

Less noise, vibration, corrosion and erosion

Less H<sub>2</sub>S: reduced odor

Simpler, less costly construction

Easier, safer access

## Learn more

To learn more about how Hydro-Brake<sup>®</sup> Drop can help you to convey water more effectively, visit [hydro-int.com](https://hydro-int.com), search **Hydro-Brake Drop** online or contact us:

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