

PROBLEM SOLVERS


Protecting Portland from Floods

New trash rakes meet deadline despite the pandemic

Problem: Automated trash rakes frequently failed and required extensive maintenance.

Solution: Installing a new rake system that handles larger items and has a faster self-cleaning ability.



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Automated trash rakes with frequent equipment failures to be replaced by a much more efficient new system — all very carefully scheduled for a fast-track completion ahead of the November to June flood season — and then ... along comes a pandemic.


The Multnomah County Drainage District No. 1 (MCDD) in Portland, Oregon, helps protect lives and property from flooding. MCDD, in conjunction with three other districts, operates and maintains flood management systems for nearly 5,260 ha (13,000 ac) of land along the Columbia Slough and the lower Columbia River. These systems include 43 km (27 mi) of levee, 12 pump stations, and 72 km (45 mi) of sloughs, streams, and culverts to maintain the river corridor levee system and remove stormwater. This system protects tens of thousands of jobs and residences, hundreds of acres of parks and natural areas, places of cultural and historical significance, and public infrastructure such as Portland International Airport.

Risky Rakes

Robust pumps and trash rakes are essential to keep the system flowing. However, in recent years, during heavy rainstorms and debris accumulation, frequent equipment failures were causing the existing, automated trash rakes at MCDD's Pump Station No. 1 to shut down.

Brian Eberhardt, MCDD Project Manager said, "With the old rakes at the end of their service life, we had the opportunity to invest in better, looking at how we could improve the performance of the pump station and have a system that would also allow the debris gates to handle larger items such as trees. We also wanted to have trash rakes designed with quicker self-cleaning that would in turn be easier to maintain."

Randy Lyons, MCDD Operations Manager, added, "We were having to undertake far too much supplemental removal of debris, which for 6 to 8 days of the year meant us having to have a two-man team go out on a barge to collect larger debris with an excavator, which apart from taking up valuable time, also raised health and safety

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looking for a new system with mechanical design firm, Murraysmith, and their Senior


Engineer Austin Rambin. A much bigger mechanism with a larger rake head was required to increase efficiency over the previous units, which had a 1-m (3.5-ft) rake head. Also, a trash rake that could lift 907 kg (2,000 lb) or more was needed, versus an existing lifting capacity of 567 kg (1,250 lb).

"We spoke to operators in our region and went to see them," Rambin said. "These included one at a hydroelectric dam and another at a power generating site. The fact that the Lakeside Muhr trash rake was scalable for our required widths was a big advantage, rather than some manufacturers, who could only provide fixed sizes."

Cleaning Time Reduced to Less Than Five Minutes

Rambin continued, "MCDD has a very good, experienced team, who certainly know how to maintain and troubleshoot, but when we were considering the design of the system around the rakes, we knew we wanted to improve on the cycle time for cleaning, which for two traversing rakes on a chain system, was taking half an hour. With five Lakeside Muhr stationary Model T-260 Hydronic T Trash Raking Mechanisms, this cleaning time would be reduced to less than 5 minutes."



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MCDD Asset Maintenance Specialist Josh McNamee added, "The Lakeside rakes allowed us to achieve our aims by providing the increased redundancy we'd gain from having one rake per bay. Also, with fewer moving parts to maintain and less movement, less wear and tear would reduce operation and maintenance time as well as costs — and lessen the use of our log boom."

Unlucky Timing


With the support of MCDD Operations team, Brian Eberhardt said, "We confidently placed our fast-track order in November 2019 for delivery by the end of June 2020 — and then of course in the spring of 2020, right in the middle of the manufacturing process of our new equipment, COVID-19 hit."

With some staff unable to work and a whole new world of needed precautions and safety protocols to be adhered to, the project faced a potential slow down while the impending season of potential flooding kept coming.

"We needed more manpower to do the same job," Eberhardt added. "And with the weather not always being predictable, the pressure was high to somehow still achieve the fast-track delivery and installation dates."

Quick Thinking and Clear Communication

Speaking for Lakeside, Dan Widdel commented, "We were determined to deliver everything as originally scheduled for the June 30, 2020, deadline. It is a tribute to all parties pulling together that made it happen. MCDD and Murraysmith are top quality professionals, who kept positive throughout. The huge degree of cooperation and coordination allowed us to work quickly on verifying field dimensions so that long-lead items could be ordered straight away. Quick-thinking and clear lines of communication also enabled us to manufacture the trash rakes to fit the equipment within the existing pump station's structure, match everything up to clean the existing bar racks, and to discharge debris into the existing conveyor system."

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System Specifications


The Hydronic T trash rakes are constructed in galvanized steel and include hydraulic power units (one for each trash rake). Having five individual trash rakes allows four units to remain in operation if/when one trash rake must be taken off-line for any reason such as routine maintenance. Usually, the trash rake systems are furnished with completed control panels, but on this occasion, MCDD wanted Lakeside to work with its systems integrator, Industrial Systems Inc. (Vancouver, Washington) to ensure that the supervisory control and data acquisition (SCADA) system would operate and control the new equipment.

The trash rack cleaners are designed to initiate an automatic cleaning cycle based upon a liquid level sensor or via time clock operation. The hydraulically driven trash raking mechanisms start in a parked position, with the telescoping boom and rake head fully retracted. Upon activation, the telescoping boom moves outward (away from the bar rack) and lowers the rake head downward to the bottom of the bay floor. With the telescoping boom fully extended, the rake head then moves inward into the bar rack for engagement. Once engaged, the telescoping boom raises the rake head to remove captured debris from the bar rack. When the telescoping boom approaches the fully retracted position, debris is removed from the rake head via a wiper blade and discharged into an existing trough, which is then transported to a debris pit, before being removed by an excavator.

Protecting Downstream Properties at All Costs

Liz Edgar, MCDD Engineer and Construction Lead, said, "The installation certainly achieved our goals of reducing maintenance and cleaning times. Protecting downstream properties from flooding has to happen at all costs, so the upgrade has given us a more robust system, with everything moving in the right direction. It's been a difficult time, but we all pulled together. The MCDD crew was awesome to work with and certainly rose to the challenges."


Cony Pierce, MCDD Operations Specialist, added, "Overall, the new trash rake is easy

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Randy Lyons, Operations Manager, continued, "Just to add to all the complications of COVID-19, we had staff vacations and smoke from wildfires to try and negotiate!"

Eberhardt concluded, "The creativity and persistence shown by the Operations team did not waver during some very challenging troubleshooting. Hard work, quality of construction, and ingenuity were major factors in the success of this project. Completing in time for the major flood season — despite everything — is a major achievement for our team.

"Once the rakes were operational, our team worked with Lakeside's and Muhr's engineers to dial in controls, to help the system work as efficiently as possible through January 2021. We have now completed our first flood season with the newly installed rakes, and are very pleased with the speed, lifting ability, and level of control made possible with the Lakeside Hydronic T system."

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