

Aquatera's Wastewater Treatment Plant

Grande Prairie, AB, Canada (2019)

PRODUCTS USED:

Krytol Internal Membrane™ (KIM®) **Hard-Cem®**

OWNER/DEVELOPER:

Aquatera

ENGINEER:

Stantec

GENERAL CONTRACTOR:

Graham Construction & Engineering Inc.

READY-MIX SUPPLIER:

Lafarge

DISTRIBUTOR:

Cascade Aqua-Tech Ltd. (Edmonton)

BACKGROUND

By 2013, Aquatera had noted that the past five years had seen the Grande Prairie population in Alberta increase by more than 18,000 more people, and it was likely to continue growing. Unfortunately, at that time, Aquatera's wastewater treatment plant for that region was already running at full capacity. It just didn't have room to handle the extra wastewater that would come from the additional population growth.

To remedy this issue, Aquatera decided to upgrade their plant. Costing over \$58 million, this upgrade would involve several additions to the plant's structure. One of the major additions would include the construction of two new biological nutrient removal reactors. These would allow the wastewater treatment plant to meet both current and future regulatory requirements. Then, to help the plant house upgraded sludge dewatering equipment, Aquatera planned to construct two new circular secondary clarifier filters and a new centrifuge building.

All of which would increase the efficiency of the plant enormously. For one, the upgrades would significantly increase the plant's hydraulic capacity, enabling it to go from treating 22,000,000 L of wastewater a day to 34,000,000 L a day. They would also help increase the life span of the plant and reduce how much power it consumes and the number of greenhouse gas emissions it would produce. In turn, Grande Prairie would be free to increase its population without having to overload their wastewater system.

Of course, to get to this point, the plant needed Graham Construction & Engineering Inc. and their team to build the upgrades under challenging timelines and through harsh wintery conditions.

SOLUTION

In recognition of the time constraints for this project, the team chose to protect the structures that had waterproofing and durability requirements with Kryton's KIM and Hard-Cem admixtures.



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With KIM for integral waterproofing and Hard-Cem for integral durability, the construction team no longer had to deal with external waterproofing membranes, dry shake hardeners, or other similar surface applications. That included the time, labor, and money that came with them. Instead, the team could apply the admixtures directly to their desired concrete mix with no extra effort required. As a result, multiple areas got the reliable waterproofing and durability they needed with no application concerns.

The areas that solely used KIM included the slabs and retaining walls for the gallery and tunnel raft, the exposed structural concrete that was covering them, and the raft slab and compartment walls for the bioreactors and circular secondary clarifier filters. For the first two areas, KIM would help protect them from any potential chemical attacks. For the last area, KIM would offer the same form of protection while also keeping any treated wastewater from entering the concrete.

The team also added Hard-Cem to the centrifuge building's slab-on-grade. This was to help give it the wear resistance needed to withstand being exposed to chlorides and severe amounts of sulfate during the wastewater treatment process.

Then, lastly, to give the concrete composite for the plant's steel deck extra protection, the team added both KIM and Hard-Cem together to the mix. That would provide a reliable form of protection against any moisture ingress, chemical attack, and abrasive and erosive wear.

All of which made it easier for them to get the waterproofing and durability they needed under significant wintery conditions. For instance, they had to contend with at least two snowy winters, and one winter in particular came with snowfall that went over 10 ft. This would have made it harder to effectively use surface-applied hardeners and waterproofing solutions. After all, they needed to make sure that the ground the concrete would go on remained unfrozen while also preparing the surface applications to survive the weather. Otherwise, the cold from the ground would interfere with the concrete's curing process, making the concrete set more slowly and slowing down any application processes. The concrete slabs could even end up with crusting, where the top of the concrete sets and the bottom of it remains soft. Moreover, even if they did manage to get the concrete curing on frozen ground, the ground would eventually thaw and settle, causing the concrete on top to crack, which neither a waterproofing membrane nor a dry shake hardener could fully protect.

To mitigate the chances of any of that happening, the construction team used a heating and hoarding process alongside Kryton's admixtures. That meant closing in the worksite area with heavy-duty industrial tarps and using heaters to warm the area enough to keep the ground unfrozen while also letting the treated concrete cure undisturbed. With this workaround, the team was able to successfully complete the upgrades for Aquatera's wastewater treatment plant on time, noting that the plant's new concrete structures were able to pass every hydrostatic test the team conducted.



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