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Preventing SSO's - A Pre-Cast Solution



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Summary: Pre-cast concrete pipe is being used at a pumping station to prevent sanitary sewage overflows by providing temporary storage of wet weather flows.

A sewage pumping station located in Sackville, Nova Scotia, was unable to handle wet weather flows, creating a potential for Sanitary Sewer Overflows (SSO's) to nearby First Lake. This resulted in extra effort for the Owner to provide alternate disposal of surplus flows. In consultation with the Owner, it was decided to use large diameter pre-cast concrete pipe to construct SSO storage tanks to reduce the frequency of potential SSO's. Although this type of construction has been used elsewhere, this is thought to be the first time it has been used in Nova Scotia.

The Chandler Drive Pumping Station was built in 1969. The station was upgraded to its present configuration in the 1990's with new duplex submersible pumps and concrete wet well. A small service building was also constructed to house a backup power generator, fuel tank, and controls. The pumping station has an overflow pipe that leads to a nearby swale, which in turn runs into First Lake. This station typically has the potential to overflow during rain events of 45mm or greater (depending on the rainfall intensity). First Lake is used for recreational purposes during the summer months, and there is an obligation to protect the public, and the environment, by reducing the potential for overflows into the lake.

SNC-Lavalin carried out a pre-design study that included the installation of flow meters in the tributary sewers and a rain gauge to determine the volume of incoming flows during rainfall events. Flows were measured during storm events of between 1 in 1 and 1 in 5 year frequencies, and it was determined that a storage volume of 360,000 litres should reduce the overflow frequency to roughly once in every five years. It was determined that providing SSO storage at the pumping station would be more cost effective than the other options available.

The Chandler Drive pumping station is situated within a park area, and municipal Parks Staff desired to plan for a potential future requirement for parking to facilitate public access. Space

is limited, and it would be convenient to provide parking space over top of the SSO storage tank. Operations Staff will also have to access the site by driving their trucks over top of the tank. The use of pre-cast concrete pipe to construct storage tanks, versus a traditional cast-in-place concrete design, was more practical to achieve these goals.

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Although box culverts provide more space-efficient volume per metre length of tank, these culvert sections are up to four times more expensive than circular pipe sections, and in addition require special benching in the invert to help prevent the build-up of solids and debris. The use of circular pipe will mitigate both of these issues. In addition, circular pipe uses O-ring gaskets to seal each joint, and a peel-and-stick waterproofing membrane was also used on the exterior of each joint to prevent infiltration. Furthermore, a flexible cementitious coating was applied to the interior of the tanks to reduce residue build-up and to protect the interior of the tanks over the long term. The fabrication of all the concrete pipe components took place in a controlled factory environment, including the application of the interior coating, and this helped to maintain high quality in the product.

Three 27m long side-by-side tanks were designed for the site, and were connected to the wet well with large diameter pipe. The tanks were installed between the elevations of the normal operating range of the pumps and the SSO pipe such that sewage automatically backs up into the tanks when pumping capacity is exceeded. A new alarmed monitoring system will warn Operations Staff of an impending overflow once the volume of the tanks has been exceeded, to allow timely action to prevent an SSO to First Lake. When flows subside, the SSO storage tanks drain back to the wet well by gravity

with no pumping required. Baffles were installed within the wet well to prevent the escape of floating solids.

To reduce the requirement for personnel entry into the storage tanks (which requires Confined Space Entry procedures and equipment), a wash down system was installed to allow the periodic cleaning of the tanks to reduce odour. Washdown piping and spray nozzles were installed in each tank, and connected to a supply hydrant on the surface. Operations Staff will use a portable pump to pressurize the system with water from tanker trucks.

The use of pre-cast concrete pipe as SSO storage tanks provided an effective solution to the potential of SSOs from the Chandler Drive pumping station, and with the cooperation of the client, consultant, contractor, and supplier, the project was completed in a timely and efficient manner. The new SSO storage facility was constructed during the Summer and Fall of 2007, and was commissioned successfully in November of that year. ●

Owner: Halifax Regional Water Commission
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Contractor: Brycon Construction Limited
Pipe Supplier: Shaw Pipe

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