

# Con Cast Pipe Box Units Utilized to Detain Stormwater on Evans Avenue Site

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In 2014, Con Cast Pipe worked in collaboration with CDC Contracting, Menkes Development Ltd., GM Blueplan Engineering Consultants Limited, and R.V. Anderson Associates Limited to implement a precast stormwater detention tank for the Humber Mews Townhomes project located at 636 Evans Avenue, in Toronto (Etobicoke District). The project by Menkes Development Ltd. consists of 66 designer units spread across seven townhome blocks, with a single level underground parking structure residing below the western portion of the site. R.V. Anderson Associates Limited was retained by Menkes Development Ltd. to provide site development engineering services. The City of Toronto's stringent Wet Weather Flow Management Guidelines (stormwater management criteria) meant that a large volume of runoff was required to be detained on site in order to reduce the total peak rate runoff being discharged from the site during all storm events. This volume of storage was achieved by utilizing a mix of precast concrete products produced by Con Cast Pipe.

considerable area that would otherwise be utilized as valuable parking spaces. R.V. Anderson Associates Limited provided the volume and discharge parameters, determining that since the tank would reside below the P1 level and the site's storm service connection, a pumping system designed by the project's mechanical engineer to discharge stormwater from the tank was needed. It also meant that the storage system had to be structurally designed to withstand potential loads from the structure above.

Ultimately, a concrete box culvert unit system was selected by Menkes Developments Ltd. in collaboration with CDC Contracting, Con Cast Pipe and R.V. Anderson Associates Limited. The system was selected since it could achieve the required storage while reducing construction costs and time, offering proven durability and life span and achieving the structural requirements. GM Blueplan Engineering Consultants Limited was retained by Con Cast Pipe to provide the structural design. The system was composed of a combination of horizontal box units and a vertical precast concrete structure with plugs and caps to contain the storm water on site. The horizontal portion of the system was composed of seven 4.8m span x 3.8m rise box units, with a

4.8m x 3.8m precast cap and plug at each end of the box system. The vertical portion was composed of two 4.8m length x 4.8m width box units, with a 4.8m x 4.8m precast base slab and transition slab. On top of the transition slab, a standard 1,200mm manhole taper top was provided to allow for maintenance access from the P1 level above. The heaviest section of the 4.8m span x 3.8m box unit weighed 41,587 kg, and the horizontal box units together measured 12.1m in length. The heaviest section of the 4.8m x 4.8m vertical chamber was 38,755 kg with a height of 6.8m. Structural water-tightness was achieved through the installation of butyl rubber jointing material to fill the annular space within the joints, and application of a secondary safeguard made up of the wrapping of the external portion of the joint with Mel-Rol joint sealer and filter fabric to help mitigate the exfiltration of ground water and sedimentary fines.

CDC Contracting installed the units using a 500 tonne crane and an eight-person crew. The installation was time-sensitive and the working footprint was limited due to the size and proposed layout of the site. The system was delivered to the site designed for the in-situ conditions and did not require additional site preparation, excavation or concrete

formwork as would have been required if a cast-in-place system were used. As a result, the entire installation, from the initial groundbreaking to excavating the area for the placement of the units to the complete backfilling of the system, took two days. This ease of installation also aided in the reduction of any product performance issues resulting from improper installation. Additionally, standard maintenance hole components and specialty designed access openings and frame and covers were used to provide maintenance access requirements.

Considering the relative ease of installation, installation time, maintenance, and structural strength, it is clear why the design team for the project selected the precast concrete storage system for the site's stormwater detention facility.



Custom Made Precast Concrete Stormwater Detention System

A precast system was chosen due to its cost-effectiveness and reduced construction time required to install the system compared to a cast-in-place system. Other pre-manufactured solutions were also considered, however, a precast system was selected as the preferred option. The precast system could be customized to fit site-specific conditions, layout or structural requirements. While a detention tank would normally be placed on the P1 level of the underground parking structure, the team decided that the storage system could be placed below the P1 level to address the relatively large volume of stormwater that needed to be detained in the tank. The shallow municipal storm sewers in Evans Avenue as well as a flat site grade would result in a tank on the P1 level having a reduced internal height. This led to the tank footprint taking up