Precast Stormwater Solution Maximizes Usable Space On Large Distribution Warehouse Project.

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A 1 million square foot Amazon warehouse distribution centre located in Ajax, Ontario, just west of Toronto, was recently completed. As with many urban areas in Canada, locating a suitable development site that will accommodate a large distribution centre while meeting the stormwater management criteria is a challenge.

Overhead view of installed precast stormwater structure

In addition to the building's footprint, a significant amount of area was required to accommodate the logistical vehicles that will be transporting the products. It was essential that the site layout including the stormwater management pond and design optimize the site coverage.

The site storm management requirements would have required a large stormwater pond in order to satisfy the stormwater target flows. Based on the limited footprint available for a traditional stormwater management pond, A.M. Candaras Associates Inc. designed a portion of the pond to be extended below the trailer parking area. The DECAST O-Series arches were selected.

A belowground precast structure with a volume of 11,730 cubic metres was required in addition to the open stormwater management pond to satisfy the stormwater management criteria for the site. DECAST in conjunction with A.M. Candaras Associates worked together to provide the complete solution to Roxboro Excavation Inc., the General Servicing contractor responsible for the heavy civil works. The proposed belowground structures would utilize 144 "O-SERIES" arches, designed and manufactured by DECAST. Each of these arches would have a span of 13.716 m and a weight of 33.29 MT. In order to meet the tight timelines, DECAST was able to manufacture two arches per day. The design consisted of the arches installed on a cast-in-place slab (49 m x 128 m) and placed in three rows. One end of the arches would be capped while the other end would be open to the pond which would also provide access to maintain and clean out the structure as required.

The DECAST slab design contained a keyway where the legs of the arches would rest on shims. Once installed, the keyway was filled with non-shrink grout. The use of the shims allows for both ensuring the levelness of the arches and for the grout to flow under the leg and lock in the structure. DECAST also included joint detailing to ensure the structure would be watertight. This included a butyl mastic placed in the

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joint and covered with Mel-rol. Roxboro Excavation was able to install 12 to 14 arches per day and the complete installation was completed in 15 working days.

A.M. Candaras Associates Inc. provided the engineering layout design for the belowground stormwater storage with the project Geotechnical engineer providing geotechnical analysis and subdrain design. The DECAST engineering and technical team provided the design and detailing of the cast-in-place slab. The overall design allows for traffic loading and provides the option for the area above the structure to be utilized.

In addition to gaining useable land above the DECAST structures, the excavation volumes for a traditional pond would be less and thereby potentially reduce off-site disposal costs.

From preliminary design to providing the required logistical support, A.M. Candaras Associates Inc. worked closely with DECAST who provided the technical contributions. In addition, DECAST's manufacturing expertise helped ensure project success.