

CON/SPAN bridge saves time & minimizes environmental impact



by Enrico Stradiotto, P.Eng., Con Cast Pipe

A major crossing of Stouffville Creek known as the Hoover Park Drive Bridge was completed quickly with minimal environmental impact using precast concrete products. This bridge crossing highlights the application of a twin cell CON/SPAN system with hydraulic capacity to accommodate a regional storm, and a future pedestrian link between historic downtown Stouffville and new residential development south of town.

The consulting engineers and contractor favoured the precast CON/SPAN system after evaluating alternate products along with construction costs, timing, and potential environmental impacts of construction. Precast concrete products offer tremendous time and money savings during on-site construction. In addition, the open bottom geometry of the CON/SPAN system presents minimal impact to existing waterways.

Since there would be minimal disturbance of the Stouffville Creek ecosystem, the installation was not restricted by the Lakes and Rivers Improvement Act. The regulations of the Act provide for construction activities outside the fish spawning and rearing periods between April 1 and June 30. Subsequently, the approvals process for the crossing was able to proceed much more quickly, enabling construction as soon as weather and scheduling permitted.

The unique design of the Hoover Park Drive Bridge includes precast footings as well as the arches. The precast structures provide the support for a four-lane major collector road, along with a 250 mm diameter sanitary sewer, 300 mm diameter watermain, temporary 150 mm diameter forcemain and partial 300 mm diameter storm sewer – all inclusive in the road bed.

Soils in the vicinity of the creek provided a poor footing for the weight of the structures. Con Drain elected to excavate the areas of the footings to impervious soils and then backfill with a 3/4 metre-deep bed of concrete dry-mix instead of clearstone. A clearstone foundation could present an opportunity for fines to migrate (in the presence of groundwater), from the surrounding support material. This action would jeopardize the stability of the founding support material. The use of concrete dry mix would solidify in the presence of water without material loss, and it could be used as the leveling course for installing the precast footings.

Once the concrete base foundations were ready, trucks delivered the precast footing units to the site where they were offloaded and placed directly into position. As soon as the footings were in place and backfilled, trucks arrived on site with one CON/SPAN unit per trailer. The units were offloaded by a 640-ton crane and placed directly onto the precast footings. A 640-ton crane was used for its capacity to reach the outer limits of each cell, and alleviate the need for multiple breakdowns and set-ups of the crane. Selection of proper lifting equipment goes a long way in determining the efficiency and success of product installation on site.

Installation went according to schedule. On July 29, all footing units were shipped to the site and set in place. Over the following three days the CON/SPAN arch units were shipped and completed as well.

Overall, 23 precast footing units were delivered along with 17 (10975 mm span x 3050 mm rise) and 17 (8535 mm span x 3355 mm rise) CON/SPAN units. The 10975 mm span units were used to enclose the existing waterway and the 8535 mm span units were used to create the overflow cell. The units had offset obverts to maximize the 2.5 metre clear space in the regional storm overflow cell. This provided the required headroom for pedestrians in the event a trail system is built by the Town of Whitchurch-Stouffville through the valley lands and adjacent to the creek. The culvert cells included skewed end treatments to match the road alignment.

The choice of products and materials for designing structures for road crossings over watercourses and environmentally sensitive areas continues to expand. Engineers have proven precast concrete options for structural support for roads and pipelines, as well as headwalls and wing walls for stabilizing steep embankments. With CON/SPAN systems, small bridge and large culvert construction has become a viable option for speedy construction and protection of environmentally sensitive areas.

Watermain and sewer contractors, Con Drain Company (1983) Limited, of Concord Ontario installed the bridge system. URS Canada Inc. (Consulting Engineers) designed the bridge system and servicing for the new development. Awarded in December 2002, the \$2,500,000 contract was completed in December 2003.