

LOWER CARBON CONCRETE CASE STUDY: ESSEX ROUNDABOUT



PROJECT DETAILS

Project Name: Essex Roundabout

Location: Essex, ON

Year: 2024

Project Owner: County of Essex

Contractors: Green Infrastructure Partners

Project Scope: Concrete Roundabout

Type of cement used: GUL

SCMs: 25% slag

Exposure Class: C-2

Concrete Design Strength: 32 MPa at 28 days

Amount Used: 7,000 m³

In 2024 the County of Essex installed a concrete roundabout using GUL cement at the intersection County Road 42 and County Road 43.

The County of Essex's first concrete roundabout was built in 2014 to address rutting and shoving issues caused by heavy truck traffic at their asphalt roundabouts. This concrete roundabout was constructed at the intersection of County Road 22 and County Road 2 in the Municipality of Lakeshore. Over the past 11 years, this roundabout has proven to be much more durable than the previous asphalt roundabouts, with no maintenance required. Following the success of this pavement, the County of Essex has begun using concrete roundabouts to resolve the rutting and shoving issues previously seen with asphalt roundabouts.

Using the Concrete Ontario Member Industry-Wide Environmental Product Declaration (EPD) for Ready-Mixed Concrete document the total CO₂ savings for the project can be calculated based on the industry average EPDs. Table 4 below shows the CO₂ savings achieved on the CR42 roundabout project for both the actual mix design at 25% slag. The actual mix used for the CR42 roundabout concrete pavement provided reduction in CO₂ of over 475 thousand tonnes, a 21% reduction in CO₂ compared to the baseline mix for a 32 MPa concrete.



Photos: County of Essex Project Photo Library

Extra details obtained from the county of Essex:

Pavement Structure for concrete apron and concrete lanes:

- 220 mm thick concrete pavement with 32 mm epoxy coated dowels 450 mm long and 15M epoxy coated tie bars 750 mm long
- 100 mm of open graded drainage layer (OGDL)
- 225 mm Granular A Base
- 480 Granular B Type II Subbase
- Stamped concrete apron

Source: Case Study on the Use and Performance of Concrete Roundabouts in the County of Essex, Paper for the 2025 Annual Conference of the Transportation Association of Canada