



B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 www.bmross.net

File No. 09178

VIA EMAIL ONLY

April 8, 2025

Mark Ortiz, Director of Engineering and Public Works
Municipality of Strathroy-Caradoc
52 Frank Street
Strathroy, ON N7G 2R4

**RE: Queen Street Phase II Road Reconstruction
Contract No. 2024148 - CN Track Storm Sewer Crossing**

As requested, BMROSS investigated the possible options of utilizing Birnam's (Ward & Burke), proposed dual purpose 1350mm carrier/casing pipe as a casing pipe with a smaller diameter carrier pipe, to satisfy CN Rails requirement for sewer's (carrier) to be installed within a casing pipe.

BMROSS consulted with Armtec and ADS to find a suitable, readily available, carrier pipe, with an outside diameter that would fit inside the Ward & Burke 1350mm carrier/casing pipe proposed. It was determined that ADS's triple walled, 1050mm dia. Sanitite HP carrier pipe would meet the criteria.

Upon determining a carrier pipe size, BMROSS re-examined the storm sewer model on Queen Street with the proposed 1350mm dia storm being replaced by the 1050mm dia. Sanitite pipe.

The design assumptions used for this model were as follows:

- 5 Year storm event, although the Strathroy-Caradoc Servicing Standards, October 2021 specifies a 2 Year Storm event (3.2.4 - 2-year Rainfall-Intensity Duration)
- The Fieldcrest Development was included in the design – Catchment Area 140 from attached Storm Catchment Area Plan.
- **No** flow splitting at English. All Queen Street flows go to Arthur Street outlet
- Submerged outlet. Backwater ends at the tracks

With a 1050mm dia pipe being used in the model for the CN crossing, (MH 12A – 12C) and using the afore mentioned design assumptions, there were no impacts to the function of the system from the outlet to the tracks. On the south side of the tracks, the model indicated that the storm sewer would be running with a greater depth of flow, but the surcharged amount does not exceed the obvert of the pipe sections. Table 1 below summarizes the flow depths of the storm sewers upstream of the proposed amendment to the storm sewer sizing.

Table 1 – Five Year Storm Event

Storm Sewer Section	Pipe Diameter (mm)	Flow Depth (mm)
12A-12C	1050	590
12C-12	1050	870
12-10A	1050	760
10A-14	1050	710
14-19	1050	750
19-20	900	630
20-22	900	630
22-25	900	620
25-30	900	610
30-33	825	580
33-37	675	510
37-40	675	450
40-432	675	450
432-431	675	430
431-48	525	410
48-52	375	280
52-56	300	0

As noted by the depth of flow in the storm sewers upstream of the proposed reduction in storm sewer diameter from a 1350mm dia to a 1050mm at the CN crossing, minimal negative impacts were found. The storm sewer model for the flows along Queen Street, between the tracks and Carroll Street, did not indicate any surcharging any higher than the diameter of the sewer itself. This lack of surcharging above the obvert of the storm sewers, can be partially attributed to the design contingency that was allowed for in the original design. The design contingency consisted of purposely setting the storm sewer crossing at the tracks at a grade steeper than what the minimum grade required for the calculated volumes would be. This steeper grade at the tracks allowed for some flexibility in the crossing grades should the storm sewer be built slightly off of the target design grades. The storm sewer grade used at the tracks was 0.7%, while the balance of the project had a storm sewer grade of 0.25%. Given the distance from the outlet to the CN crossing of approximately 830m, the concrete pipe has a nominal diameter of 1350mm (54”), a typical mass of 4429 kg, and the gravel used for bedding, could have a stone size of 19mm, laying pipe exactly at the design grade is challenging.

Queen/Arthur Street Storm – 100year Storm Event

As requested, the Queen Street storm sewer was modeled using a 100 year storm event. As anticipated, the hydraulic grade line for the 100 year storm event is higher than the ground elevation. This is to be expected as the size of the storm sewer was determined using a 5 year storm frequency.

English Street/Caradoc Street Storm

In addition to the Queen Street storm sewer model, the English Street to Caradoc Street to the Sydenham River model was re-evaluated. Please note, when the Caradoc Street outlet was being designed, the Arthur Street storm sewer outlet was not being considered. As such, the English Street to Caradoc Street to the Sydenham River storm sewer catchment area included Queen Street, the

Fieldcrest development and 40ha on the south side of Carroll Street. Of note, the English Street and Caradoc Street storm was modelled using a 2 year storm event.

Upon re-evaluation of the English Street and Caradoc Street storm system, the Queen Street, Fieldcrest Development and 40ha from the south side of Carroll Street were excluded from the model. This re-revised model resulted in a 2 year rainfall-intensity duration of 3623 L/sec, down from 5343L/sec. Please note, that even considering these reduced flows, the existing 975mm dia storm on English Street would still be surcharged. The capacity of the 975mm dia storm at the calculated grade of 0.233% only has a capacity of 1082L/sec.

Budget

Two options were considered for budgeting purposes. Birnam's submission of CCN #3 Revision #3, dated March 14, 2025 (enclosed) was the basis for the budget, with tendered deletions as noted in the CCN #3. The two options consisted of the following scope:

Option No. 1 consists of Birnam's CCN 03.

- 1350mm dia microtunnel pipe as the storm sewer carrier pipe
- 600mm dia microtunnel pipe as the sanitary carrier pipe.

Option No. 2 consists of Birnam's CCN 03,

- 1350mm dia microtunnel pipe as a casing pipe
- 1050mm dia storm sewer carrier pipe
- 600mm dia microtunnel pipe as a casing pipe
- 375mm dia sanitary sewer carrier pipe

The following summaries the costs for the two options:

	Option No. 1 Part 3 without Casings for Storm and Sanitary	Option No. 2 Part 3 with Casings for Storm and Sanitary
Part 3 Less Items Removed from Tender as per CCN 03	\$1,214,026.66	\$1,214,026.66
CCN 03	\$2,262,427.26	\$2,350,226.86
Revised Part 3 Total (excl taxes)	\$3,476,453.92	\$3,564,253.52
Additional Costs		
Revised Part 3 Totals	\$3,476,453.92	\$3,564,253.52
Less Original Part 3 Total	-\$2,462,975.35	-\$2,462,975.35
Total Additional Construction Costs (excl taxes)	\$1,013,478.57	\$1,101,278.17

Timing

From a timing perspective, Option 2 that consists of casings and carrier pipes, would probably result in the least amount of delays as CN would need between 4 and 6 weeks to do a review Option 1.

Also, Birnam's CCN 03 may be subject to change as their change order indicated that the work was to be completed during the spring of 2025.

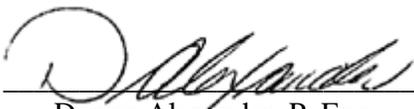
Recommendations

Since the 1050mm dia storm sewer resulted in minimal negative impacts even under a 5 year storm event, the 1050mm dia will fit inside the proposed 1350mm dia casing, the cost impact is close to the Municipality's revised budget, and the risk of CN delays is reduced, BMROSS has no concerns with implementing Option 2.

Should you have any questions or concerns, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per  _____
Darren Alexander, P. Eng.

DLA:hv
Encl.