

IN THE MATTER OF the *Public Inquiries Act, 2009*, S.O. 2009,
c. 33, Sched. 6

AND IN THE MATTER OF the Elliot Lake Commission of
Inquiry, established by Order in Council 1097/2012

**SUBMISSIONS OF
EXP GLOBAL INC. (TROW)**

(In response to Procedural Order No. 9 regarding
the 1988 *Report of the Advisory Committee on the
Deterioration, Repair and Maintenance of Parking Garages*)

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Introduction

1. Pursuant to the Commission's Procedural Order No. 9, Trow is delivering these submissions regarding the 1988 *Report of the Advisory Committee on the Deterioration, Repair and Maintenance of Parking Garages* (the "1988 Advisory Committee Report").

2. Trow's submissions make three points:

- (a) The 1988 Advisory Committee Report identified the state of the art with respect to the inspection and repair of existing parking structures in Ontario at that time.
- (b) Trow's work in 1991-96 met the state of the art as set out in the 1988 Advisory Committee Report.
- (c) The Trow experts on the Advisory Committee in 1988 provided policy input to the Commission in 2013.

A. The Report reflected the state of the art in the late 1980s

3. It is apparent from the 1988 Advisory Committee Report itself, and from the submissions by Ontario regarding the Report, that the Report identified the state of the art with respect to the inspection and repair of existing concrete parking structures in Ontario at that time.

4. As noted by Ontario in its submissions on the Report (p. 2), the Advisory Committee was comprised of "leading specialists" within the Province of Ontario, including experts from provincial, federal and municipal governments, industry and the engineering community.

5. The Report was widely disseminated and broadly publicized by Ontario at the time (Ontario submissions, pp. 1, 5-6). The Report synthesized the then-existing substantial body of research into the deterioration of concrete parking structures, the appropriate inspection methods for identifying deterioration, and the available remedies.

6. It was the issuance of the 1988 Advisory Committee Report that led Ontario to amend the Building Code in 1988 to incorporate the requirements of CSA Standard S413-87 (Durable Parking Structures) for new parking structures (Ontario submissions, pp. 1, 4-5).

B. Trow's work in 1991-96 met the state of the art

7. The work performed by Trow at the Algo Mall between 1991 and 1996 was consistent with, and reflected the application of, the state of the art regarding the inspection and repair of existing concrete parking structures, as set out in the 1988 Advisory Committee Report.

8. In the 1980s and 1990s, as Ontario's submissions describe, there was growing awareness of the problem of chloride-induced damage to concrete parking structures. As is reflected in the Report, the focus was upon corrosion of the reinforcing steel within the concrete itself (see, e.g., pp. 3-5 of the Report, regarding corrosion of steel "in concrete"). However, there was also an appreciation of the need to monitor for corrosion of other structural steel elements, such as beams, columns and connections (see, e.g., p. 11 of the Report).

9. The 1988 Advisory Committee Report addresses the need to inspect for, and repair, the deterioration caused by all such corrosion. Trow in turn, when it performed its work at the Algo Mall in the early 1990s, did inspect for, and call for the repair of, all such corrosion – as explained in detail in Trow's closing submissions relating to Part I of the Inquiry.

10. With respect to inspection and testing methods, the 1988 Advisory Committee Report endorsed all of the methods selected by Trow at the Algo Mall - including visual inspection for spalling and rust stains, chain dragging to test for debonding, core sampling, and inspection for pitting corrosion of the structural steel.¹

11. As noted in Trow's closing submissions, Trow's 1991 inspection of the roof slab at the Algo Mall included a visual survey of the top surfaces, a sounding survey using a chain drag, and the removal of 13 cores to determine the as-constructed details, the chloride ion content of the concrete and the condition of the top surface of the supporting beams. The inspection of the underside of the roof slab included a visual examination of the suspended ceiling panels, inspection of the steel beams, columns and connections and the underside of the concrete slab, and identification of other forms of deterioration and evidence of water leakage.² The 1994

¹ 1988 Advisory Committee Report, pp. 12-24

² Trow's Closing Submissions, paras. 19-34

inspection was similar and also included testing for pitting corrosion on the most visibly corroded steel beam.³

12. With respect to repair, the 1988 Advisory Committee Report endorsed Trow's recommended repair option for the Algo Mall – namely, localized repair and the installation of a waterproof membrane on the top surface of the slab.⁴ The Report described this approach as the most common repair and mitigation method – one that is, in principle, considered to be beneficial. The Report noted that the measures available to lessen corrosion in an existing parking garage are limited.⁵

13. The 1988 Advisory Committee Report also recommended that engineers set out, in their reports, the various repair options available before making a recommendation. The Report states:

When setting out the repair alternatives, care must be taken not to give undue weight to one alternative because of personal preferences. All alternatives must be examined in equal detail; failure to do so will lead to a situation where comparisons are not based upon equivalent premises and the economic outcome could be unreliable.⁶

14. In both its 1991 and 1995 reports, Trow recommended that a waterproofing membrane be installed.⁷ In both reports, Trow made its repair recommendation after setting out two options, one of which was not recommended.

15. The Report also recommended regular inspection of existing parking structures by a qualified engineer⁸ – something that Trow urged in its reports,⁹ and specifically proposed to do in its 1996 proposal in which Trow recommended that it be retained to inspect, among other things, the structural steel connections at the Algo Mall.

³ Trow's Closing Submissions, paras. 43-46, 51

⁴ Trow's Closing Submissions, paras. 35-39

⁵ 1988 Advisory Committee Report, pp. 6-8

⁶ 1988 Advisory Committee Report, p. 30

⁷ Trow's Closing Submissions, paras. 37, 62-63

⁸ 1988 Advisory Committee Report, pp. i, 9-25

⁹ Trow's Closing Submissions, paras. 54-55, 64, 69, 71-73

C. Trow experts from 1988 provided policy input to the Commission

16. Two of the leading experts in 1988 who authored the 1988 Advisory Committee Report were senior engineers at Trow: John Ryell and John Bickley. Mr. Bickley was Chair of the “Repair Methods” section of the Advisory Committee, and Mr. Ryell was a member of the section dealing with deterioration and inspection techniques.

17. John Bickley had, by 1988, already been the lead author of two other major reports on the deterioration of parking structures for the Canadian Mortgage and Housing Corporation – as referenced in and attached to Ontario’s submissions (Report, pp. 2-3 and Appendices A and B).

18. The Commission will recall that Mr. Ryell and Mr. Bickley were consulted by Trow during the Inquiry in order to arrive at the policy submissions set out in Trow’s closing submissions in Part I of the Inquiry.

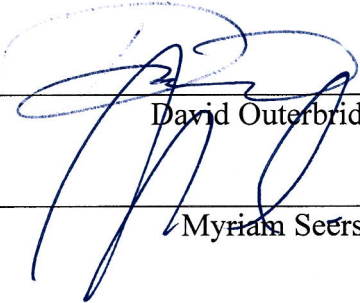
19. As noted in Trow’s closing submissions, John Ryell is a civil engineer with over 60 years’ experience, who has specialized in concrete restoration and rehabilitation for most of his career. Before joining Trow in 1986, Mr. Ryell worked for the Ontario Ministry of Transportation, with a focus on the use of concrete in highways and bridges. He has worked in CSA standards committees since 1960 and has been a member of almost every committee and task force dealing with cement, aggregate, concrete and allied material. Mr. Ryell’s resume (appended to Trow’s closing submissions) refers to his involvement on the 1988 Advisory Committee.

20. John Bickley is a civil engineer with over 60 years’ experience, who has specialized in concrete technology since 1955. He worked at Trow for 21 years, from 1967 to 1988. He has chaired or served as a member of many standards bodies including, in 1987, chairing the CSA Technical Committee on Durable Parking Structures which produced the CSA standard for parking structures (CSA S413-87 (Parking Structures)). This is the CSA standard that, as a result of the 1988 Advisory Committee Report, the Ontario government made mandatory under the Building Code for new parking structures.

21. The Commission will find that much of the policy input that Mr. Ryell and Mr. Bickley provided to the Commission echoes the themes and the positions taken in the 1988 Advisory

Committee Report – including, in particular, the emphasis on the importance of periodic inspections of parking garage structures by qualified engineers, and the utility of incorporating standards relating to such inspections into the Building Code.

ALL OF WHICH IS RESPECTFULLY SUBMITTED this 13th day of June, 2014



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