

Concrete v steel (1) – HIE and the construction of the funicular at Cairn Gorm

Description



The Frachey Funicular at Champoluc, Italy.

Most funicular railways across the world are supported by steel rather than concrete structures. Following my series of posts in 2021 asking if the repairs to the funicular would work ([see here](#)), I decided to investigate further the reasons why the funicular was constructed out of concrete to understand the repair work better and the likely future costs.

I will set out what I have found over three separate posts:

- the first on how the decision was taken to use concrete;
- the second a detailed examination of the costs of steel compared to the costs of concrete;

- the third on the real reasons why HIE chose concrete over steel and the implications for the future



The concrete “I” beams during construction. Photo courtesy of the COWI report Dec 2018.

Why steel – what HIE told the Public Audit Committee

Prior to producing their report into the funicular controversy in 2010, members of the Scottish Parliament’s Public Audit Committee met with three representatives of Highlands and Islands Enterprise (HIE):

One final, further point that I should make is that Keith Bryers and I worked for HIE throughout the period in question. For part of the period, from 1999 to 2001, Douglas Yule was employed by Morrison Construction Ltd, which was one of the contractors on the project. Keith Bryers and I will therefore try to cover any questions that relate to that period.

Statement by Sandy Brady from the Audit report of 02/12/2009. Note the rather ambiguous understatement that Morrison Construction Ltd was one of the contractors NOT the main contractor!

Mr Keith Bryers, Head of Property and Infrastructure, and Mr Sandy Brady, acting Chief Executive Officer Director of Strategic Planning, went on to claim that the construction materials used to build the Cairngorm funicular had been changed from steel to concrete as part of a cost – cutting exercise

("It" refers to Morrison Construction):

Keith Bryers: As I recall, it offered the lowest bids.

George Foulkes: The lowest in each case?

Keith Bryers: I think that that is correct, yes.

George Foulkes: Where was the major cost overrun?

Keith Bryers: The major difficulty probably related to the replacement of the proposed steel beams on the rail track with concrete beams. Morrisons made that proposal with its tender. Construction of the tunnel was another challenging engineering issue, given the weather conditions, the altitude and the various environmental considerations.

George Foulkes: Morrisons proposed changes to both those aspects of the original tender specification.

Keith Bryers: That is correct.

George Foulkes: Having won the contracts out of 14 companies in one case and four companies in the other, Morrisons persuaded you to change the specification.

Sandy Brady: That was done as part of a cost-saving exercise.

George Foulkes: A cost-saving exercise?

Sandy Brady: We agreed to merge the two lots and to seek savings because Morrisons had won the two contracts. A package of changes was made, which included reducing the specification of

This and the following screenshots courtesy of the Public Audit Committee report of 02/12/2009.

Note:

- the third sentence from Keith Bryers, which states the change from steel to concrete caused a “major difficulty”
- how he confirmed George Foulkes’ understanding this proposal came from Morrisons, and
- the following sentence by Sandy Brady which stated it was part of a “cost-saving exercise

Cathie Craigie (Cumbernauld and Kilsyth)

(Lab): Continuing on the theme of the funicular’s construction, you state in your written submission to the committee that Morrisons and Doppelmayer won the competitive tenders, but you go on to say:

“Partly because of the shorter construction period than originally envisaged—spanning only two summers rather than three—construction costs rose”.

I am no expert in construction, but normally when construction is done in a shorter period of time the costs at least remain stable. There is only a rise if construction goes on and on. Can you explain the reason for that?

Sandy Brady: Yes, indeed. I will ask Keith Bryers to kick off, then I will come in.

Keith Bryers: Essentially, we were trying to do a three-summer job in two and a half summers, because we lost half of the first summer through the European regional development fund delays, following the judicial review. We also had an ERDF deadline, which meant that we had to complete the job by the end of December 2001. By the time the job started, the contractor had a huge amount of work to do in less time than we had originally envisaged. The construction took place in a very constrained environment, in terms of getting materials up the hill, because the type of access road that you would usually expect was not available. The construction company had the use of an access road, but it was very constrained. The company installed a cable crane, but that was subject to a number of delays and the tonnage that it could take up the hill was restricted—helicopters had to be used to move concrete up the hill. All those things caused the project costs to increase.

A very interesting and pertinent question from Cathie Craigie but unfortunately what no one asked was:

- (1) Was the original design specification, used to obtain tenders from companies, for steel rather than concrete ?
- (2) If so, when the specification was changed from steel to concrete were any other tenders sought?, and,
- (3) Were A. F. Crudens paid first to design in steel and then again to change the specifications to concrete? !

The Public Audit Committee Report suggests no-one actually saw any documentation to prove the cost saving. It has always been accepted as being a fact, something which prompted me to investigate.

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Note the concrete “I” beam is being lowered into place using the aerial cableway.

In the exchange Mr K. Bryers said helicopters had to be used to carry concrete up the mountain as the aerial cableway couldn’t carry the weight and yet this second photo clearly shows a concrete “I” beam suspended below the cableway. That is also confirmed by the following screenshots from the Health and Safety file compiled by Morrison Construction:-

The list includes the Companies
Cableways used during the Project
included, as they were the main

Two long distance cableways
the site with personnel transport

Machinery was also delivered using the cableway to wherever it was needed.

It doesn't exactly inspire confidence in what the Committee were told when the Head of Infrastructure for HIE, the people paying the bills on behalf of the taxpayer, appears not to have known what was going on!

Part 2 of concrete v steel, a detailed examination of the respect costs, will follow on Wednesday.

Category

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