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Typical Ciste tower base

Job name: Condition report - Ciste chairlift bases
Job number: 16011
Client: Cairngorm Mountain Ltd
Engineer: Mr Angus Armstrong
Date: October 2016

Revision	Date	Comments
A	18/10/16	Issue

1. Introduction:

- 1.1 At the request of Cairngorm Mountain Ltd, the Client, the writer carried out a visual inspection of the concrete support structures to both the redundant Ciste chairlifts at the Cairngorm Mountain resort. The writers brief was as follows: *"To carry out a non-disruptive visual inspection of the concrete foundations to the stations and tower bases covering those areas that are fully exposed and to report findings along with any recommendations".*
- 1.2 This report may not be relied upon by a third party for any purpose without the written consent of this practice. Furthermore, this report has been prepared and issued specifically for the benefit of the addressee and no responsibility will be extended to any third party for the whole or any part of its contents.
- 1.3 The structural inspection was carried out by means of visual inspection and measurements, generally from ground level. No disruptive investigations, geotechnical investigations or materials testing were carried out, nor were any calculations carried out.
- 1.4 The purpose of this report was to comment on the integrity of the concrete components of those parts inspected, within the limitations of the brief and inspection techniques.
- 1.5 This report specifically does not address any part above the various concrete bases.
- 1.6 The inspections were carried out in mid-October. All days were dry and bright.
- 1.7 There are two redundant chairlifts leading up onto the mountain from the Ciste car park. The lower chair lift leads from beside the old ticket office at 550m into the bowl of Corrie Ciste and to the base of the steeper section at 700m. From here the upper chair lift rises to 970m and the upper bowl.
- 1.8 All tower bases are numbered from the bottom up.
- 1.9 Refer to appendix A for all referenced photos.

2. Executive summary:

2.1 Ciste chair lifts – lower and upper:

- 2.1.1 At worst, the lower lift bases are in very poor condition and the upper lift bases are in extremely poor condition.
- 2.1.2 The scale of comprehensive repairs would require the removal of most of the towers and casting new bases.
- 2.1.3 Stability calculations have not been carried out, but the extent of decay in some cases leads to concerns about the structural stability of the system. It is recommended that in the short term the cable and any associated chairs be taken down with a view to the removal of the towers in the medium term.

3. Observations:

3.1 Lower chair lift:

Reference	Observations
Bottom station	Some undermining of the foundations was seen on the down slope site. The concrete was seen to be in a poor but serviceable condition.
1	Fair condition, but spalling corners.
2	Acceptable.
3	Mostly buried, but exposed corners of concrete are disintegrating around the bolts.
4	Base is partially undermined on the slope and is spalling badly. Ref photo 1.
5	Concrete is seriously disintegrating, particularly around the bolts. Ref photo 2 & 3.
6	Areas of spalling have been repaired, but have subsequently failed again. The base is partially undermined and base plate grout has failed.
7	Grout to base plates failed.
8	Buried.
9	Areas of spalling have been repaired, but have subsequently failing again.
10	Top is spalling. Grout to base plates failing.
11	Partially undermined. Grout to base plates failing.
12	Partially undermined. Base decaying under bolts. Ref photo 4 & 5.
13	Acceptable.
Top station	Main base crumbling. Added cap slab cracked and unstable. Ref photos 6 & 7.

3.2 Upper chair lift:

Reference	Observations
Bottom station	Partially buried. General condition reasonable to poor.
1	Acceptable.
2	Some spalling. Grout to base plates failing.
3	Buried.
4	Major disintegration of surfaces. Grout to base plates failing. Ref photo 8.
5	Partially buried. Lower corner around bolt fractures and unstable.
6	Buried.
7	Base cracked through the middle. Two bolt sets no longer effectively supported. Unstable. Ref photo 9.
8	Acceptable.
9	In poor condition. Possible old repair to two sides but in poor condition.
10	Base major fractures, generally disintegrating. Bolts loose. Unstable. Ref photo 10.
11	Buried.
12	Partially buried, but generally acceptable.
Top station	Areas of spalling concrete. Large corner chunk loose. Generally stable.

4. Recommendations:

- 4.1 For this section both lifts will be amalgamated. Refer to "traffic lights" color coding of observations.
- 4.2 **Red.** 32% of bases were seen to be seriously compromised and beyond repair. These were evenly split across each lift. The stability of these bases cannot be assured and steps should be taken to reduce the risk of a collapse. It is recommended that the remaining chairs and the cable be removed from these lifts there by reducing the wind loading. Given this system has survived thus far, the removal of the ropes will improve the factor of safety in the short term. Plans for the removal of the towers should be put in place in the medium term (next summer).
- 4.3 **Orange.** 32% of bases were seen to be in a state of significant deterioration. Whilst these bases should be stable, given the ropes are to be removed, some remain in a questionable state due to undermining and deteriorating concrete and grout around the bolts. These towers should also be removed.
- 4.4 **Green.** 20% of bases were considered acceptable. No action is required.
- 4.5 16% of bases were buried and could not be commented on. If these towers are to be retained, further investigations are recommended into the condition of these bases,

Appendix A: **Photos**



Photo 1:
Lower lift base 4. Note particularly undermining of lower edge and no cover.



Photo 2:
Lower lift base 5. Note disintegration of concrete around all bolts.



Photo 3:
Detail on one corner of photo 2.



Photo 4:
Lower lift base 12. Note undermining of base.



Photo 5:
Lower lift base 12. Note disintegration of concrete surface around all bolts.



Photo 6:
Lower lift top station. Major fissure through concrete.



Photo 7:
Lower lift top station. General disintegration.



Photo 8:
Upper lift base 4. General disintegration of base and bolt grout.



Photo 9:
Upper lift base 7. Major disintegration of base.



Photo 10:
Upper lift base 10. Major disintegration of base.