

CHAPTER 16

The Structural Condition of the Built Fabric

16.1 **On behalf of HS, Mr Addison stated** that the castle structure is uniquely preserved and one of the most impressively stable ruins he had encountered. It has remarkably sound structural characteristics. Almost totally neglected and roofless for nearly 300 years, its overall state of preservation is without equal. With wallhead repairs and expert repair and consolidation it could easily survive roofless for another 300 years. He agreed with Mr Webster that it is stable, and withstands gravity and wind loads with little or no movement being experienced to date as proven by their monitoring systems and structural analysis. The surveys and tests undertaken serve to prove the robustness of the ruin overall notwithstanding the discoveries that there has been a loss of mortar and voids inside some of the walls which need to be consolidated. He stated that it is rare to find masonry walls of this age which are totally free from voids even in protected walls, so not all of the voids encountered may be due to actual erosion or washout. However, consolidation would be a prudent intervention. Protecting the wallheads and joints would therefore be of significant benefit in this regard. Consolidation by grouting is difficult especially in robustly constructed walls of the kind seen at Tioram. Joints are tight, voids randomly located and grouting under pressure may be the only way to fill the 'defects' to the standards being sought by the applicant. This process could cause structural damage. Given the importance of the ruin and the unpredictability of grouting, it would be essential that any such work be first attempted on a trial basis under strict supervision.

16.2 The applicant's engineers do not appear to have used the sixteen test holes they sunk into the walls (the Borescope Survey) for also recording the actual moisture profiles and correlating them with the position of voids and assumed migrations of mortars. Although they have noted that the mortars were generally in a damp condition, only two of the holes actually revealed 'very wet' conditions suggesting perhaps that some of the voids are not of recent origin. In such conditions of exposure damp walls are inevitable. Walls of castles are thick with individual stones sensibly placed. The condition of the mortar does not always influence stability the witness having frequently found walls standing against all the elements without much mortar in the joints but he agreed that the presence of some mortar in such ruins is a comfort.

16.3 Moisture profiles would also assist long-term monitoring of the condition of 'dampness'. Rain is claimed to have caused voids and on-going deterioration yet its 'pathway' is incomplete. Moisture could affect the condition and performance of any new floors, finishes, thermal characteristics and the internal environment, it being very difficult to 'dry-out' walls built in impervious stone and to keep them 'dry' in such conditions. It was suggested that further analysis and research would be needed for both technical and strategic reasons.

16.4 Mr Addison agreed that the walls of the ruined castle appear to be in reasonable condition; there is no visible evidence of defects which would impair their overall stability; there are localised areas of deterioration and cracking in the masonry; and in time the stability of the walls will be affected if these are not attended to. He stated that the amount of extra time which would be bought by a sensibly directed consolidation would be in excess of that sought for a roofed structure (200 years). His opinion was that the ruin

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would not require to be roofed or to be digested within a dwelling to preserve it or to retain its significance as a place. Mr Webster was not insisting that a roof be provided as the only option and he agreed with this. He did not agree that, at this location, with high exposure to rainfall and winds, having a roof would reduce maintenance of the outer walls by a significant degree. The remarkable condition of the masonry suggested to him that it could safely be left very much as it is but that some consolidation would be prudent. Consolidation would be far less damaging to the monument than restoration. It was Mr Addison's opinion that there is no case on purely structural grounds (i.e. stability overall) for restoration of the castle; more of the ruin would be retained by sensible and practical repair and consolidation measures.

16.5 He agreed that the technical aspects of many 'British Standards' do not apply to this unique type of work. 'Hands-on' practical experience and learning from direct experience of such work and from experienced stonemasons is the only way.