

THE LAKELANDS, LOWER GALE, AMBLESIDE

BACKGROUND TO LEISURE COMPLEX REPAIRS/ REFURBISHMENT

Origins

Anna Williams Associates were instructed in March 2019 to investigate longstanding issues with damp in Phase 2 apartments; primarily in Loughrigg D & Fairfield C, and leaks above the north external door off the pool and in the plant room, where past repairs had been unsuccessful.

The parapet walls were originally designed as troughs for planting, but had long been felt to be a source of leaks and damp, so the west facing parapets outside Apartments A-D were rebuilt in 2004 in steel reinforced solid blockwork with steel railings. However, our investigation found water ingress between the new parapet and the wall above the glazed roof. This has now been remedied, but by then it had severely damaged key structural steelwork.

The planters at the south end above the plant room were not rebuilt. These were a poor design from the outset, built with inappropriate materials and had no means of drainage or air flow. While the soil was removed, they were poorly capped so that rainwater continued to run into the trough, where it simply accumulated and saturated the blockwork, damaging the render and causing varying degrees of damp. In particular, at the south west corner this ran off the edge of the concrete balcony deck into the plant room onto the bearing of the beam and column and electrical equipment.

Consequential Damage

Whilst we understand that the causes of the leaks had been investigated by local contractors over the years, they had not previously been properly considered and the more serious implications were not highlighted due to lack of the right expertise. As a result, hidden damage to the steel beam above the glazed roof in the pool went unchecked for many years.

The beam in the leisure centre is of continuous solid steel over 16 metres long, supported in two spans onto three internal steel columns. It supports the wall and glazing at first floor level and the glazed roof at ground floor level. To assess the damage caused, it was exposed where the water ingress was most severe at the north end of the pool, and examined in more detail in the plant room. The beam is very badly corroded at these points to the extent that its structural integrity is seriously compromised.

In addition, there were multiple points of water ingress through the poorly built wall above the beam, along with condensation forming on the beam due to the inadequate insulation and very high levels of humidity caused by inadequate ventilation. These add to the corrosion and drip onto the floor below.

We therefore removed areas of internal plasterboard and external masonry, which revealed that the entire beam is corroded to varying degrees, which is severe in many areas, particularly on the external face where it is in almost constant contact with wet masonry. The base of the supporting columns are also badly corroded due to the effects of chlorinated water, resulting in loss of strength.

A structural engineer was engaged to assess the beam, who deemed it unsafe to continue to allow owners to use the leisure centre until further investigative work was carried out. At the same time, the Structural Engineer confirmed there was no additional risk to owners occupying the apartments in phase 2.

A structural propping system was therefore designed and installed in December 2019 pending complete replacement, and the pool was closed due to health and safety issues. The beam above the north entrance, supporting the wall and window above, has also been found to be badly corroded and requires substantial repair. These repairs have now been specified by the structural engineer.

Further Investigations

Service Installations

There is severe humidity and condensation in Apartment D due to the lack of a vapour barrier in the dividing walls with the pool and steam/sauna room, coupled with very poor environmental control in the pool and complex as a whole. This triggered an in depth inspection of all plant installations, where it quickly became apparent that the pool plant and ventilation systems have reached the end of their design life. Piecemeal plant replacements have proved inadequate to address this, and has added to the damage caused to the whole leisure complex from the initial poor design of the building, resulting in rusting services, rotted skirtings, saturated carpets, corrosion to the supports to the spa pool, condensation run off on walls and windows, and failed glazing.

The initial design of the leisure centre, including the sauna and steam room venting into the corridor, extract fans and shower rooms venting into sealed voids, inadequate heating and ventilation to ancillary areas and defective windows, has resulted in uncontrolled air leakage. Water ingress and humidity in the plant room have also seriously compromised electrical equipment.

Given these findings, the age of the installation and the severity of damage to the building fabric, a comprehensive review and overhaul is long overdue. Using an independent consultant to undertake this, rather than going direct to suppliers and contractors, ensures cost management and optimum specification. Plant suppliers often hide their design costs in their quotations, so theirs is not a “free” service.

An independent consulting mechanical and electrical engineer has therefore carried out a comprehensive review of all electrical, heating and ventilation systems in the leisure complex, including briefing specialist pool plant suppliers. These installations were found to be inefficient and not compliant with current Health and Safety regulations and therefore require comprehensive renewal.

Building Fabric

Other building defects were investigated, including surface cracking to balconies, render defects on parapets and stairways, damp to apartments, and the leisure complex windows. Some repairs were carried out under instruction by Anna Williams Associates to cure localised damp, but the widespread defects found included:

- Corrosion to the suspended ceiling frame throughout the leisure complex due to humidity
- Lack of a vapour barrier to the partition between the pool and apartment D, causing severe condensation in the apartment
- Poor detailing around rainwater outlets on balconies contributing to damp
- Cracks to the balcony surfaces due to failed asphalt, causing the later cement screed to fail
- Widespread failure of render to balconies and stairways, posing serious health and safety risks
- Fixing for handrails penetrating the tanking to the balconies
- Poor construction of the hollow trough parapets resulting in render failure and severe water penetration
- Incorrectly detailed balcony soffits that collect and hold rainwater

- Incorrect damp proofing and insulation and cracked render to the wall above the steel beam over the pool windows causing water ingress onto the beam and floor below
- Inadequate vertical damp proof courses around French windows and door openings (now repaired)
- Rising damp due to poor detailing where the balcony deck is continuous with the structural floors
- Defective slate window cills to the pool area
- Condensation run off from the glazed roof over the plant room and solar gain affecting efficiency of plant.

Leisure Complex Windows

At nearly 40 years old the colour coated steel windows are reaching the end of their design life, and show serious defects including misted glazing units, failed gaskets, widespread open joints to the steel frame components, and advanced surface weathering. Many of the windows are, or soon will be, leaking. This includes the glazed roof above the plant room, which is also in poor condition, although the glazing has already been removed and temporarily replaced to install the propping to the beam.

It is not practicable to take out and reinstate these windows during works to the beam; even with the best of care, the steel fixings will have corroded resulting in damage to the windows during removal. The labour cost would be significant, and suitable site storage would need to be provided. Even if reinstatement was possible, they would only give good service for a few years and would soon require replacing, resulting in another pool closure and re-erecting costly scaffolding.

Structural Proposal

It is clear that the main beam is no longer fit for purpose, but all remedial options are problematic:

- Localised repair: the structural engineer has stated that it is not practicable to repair the beam. It is corroded along most of its length, and repair would require site welding plates onto what little sound material remains beyond the corroded areas. This would affect most of its length, requiring full access to all faces of the beam, including taking down the previously glazed roof structure below and the wall and windows above. Phasing the repair would require even more complex propping systems, incurring design and installation costs. This would still only result in a repaired beam and would still require complete renewal of the wall and glazing.
- Rebuilding the wall above the beam would involve significant upgrading to damp proofing and insulation to avoid repeated water ingress, condensation and corrosion and removal of windows above. Propping it in situ during steel repairs or renewal would end up largely dismantling it.
- Replacing the beam presents significant logistical and safety issues, as a crane would be required to lift it into position and manoeuvring it between buildings is highly problematic, even in sections. This is not considered practicable or economic. Similar challenges exist in removing the beam, but this can be cut into shorter more manageable sections.

Given that the windows will also require replacing whatever happens to the beam, it is more efficient to design the beam out altogether and replace it with a continuous two storey glazed elevation. The proposed scheme greatly enhances the experience for users of the complex, optimising the spectacular views from the pool. This requires careful detailing to ensure this integrates with the building fabric and to ensure a weathertight and structurally sound solution.

Additional Building Work

Much of the work centred on replacement of the beam is interconnected, so that there are significant efficiencies in optimising use of the scaffolding to carry out works to parapets, balconies and render.

Balconies and parapets: this was initially proposed for a second phase to try to manage costs, but recent collapse of render at high level has brought this to the fore as a health and safety issue. The render in this area has been replaced and made safe but due to the poor construction of the parapets as a whole rebuilding these has to be brought forward. This has implications for the balcony surfaces (the new parapets will be narrower), thus bringing forward the balcony resurfacing work.

Suspended ceilings: these incorporate a poorly installed “vapour barrier” which compromises the design of the ventilation system. The panels and frame are in poor condition, so this also requires replacing at this stage. These will also get damaged during window renewal. To replace them now avoids a second shut down and draining of the pool at a later date.

Changing rooms: these are also badly affected by the humidity, and the fittings and finishes are very dated. Upgrading at this stage is strongly recommended.

New glazed partition: this is required on the landing between the changing rooms and pool to control humidity in the complex as a whole, and to manage condensation damage in these ancillary areas.

Plant room roof: to be replaced with insulated colour coated steel cladding to improve the working environment and optimise conditions for efficient operation of plant.

Steam Room and Sauna: The poor standard of installation is directly contributing to humidity problems in the complex as a whole, and they are currently not functional. It makes sense to strip these out whilst the major work is being done, and a use for the area can be determined at a later date.

Spa Pool: Investigation has found corroded supports, split pool casing and defective plant. This requires complete replacement.

Humidity Control: In addition to improved air handling plant, a vapour barrier will be provided within the pool area to address condensation in Apartment D.

For financial reasons, some additional works that can be carried out as a separate phase will be deferred. This includes renewal of the balcony soffits, renewal (and possible relocation) of the sauna, refurbishment of the store and steam room/sauna area, and some elements of refurbishment of internal finishes.

Even during the tender process unforeseen events required further works being added in, and the scope of works has also been further extended for operational reasons. This has created additional work for the design team in preparing specifications and drawings and for the contractor to obtain prices, within a very short timescale. The tender process has also been affected by the pandemic, with many subcontractors now so busy as the restrictions lift that they are unable to submit their prices in a timely manner, if they are willing to price new work at all.

Project Design Team

Previous reliance on local tradesmen and specialist suppliers over many years has not served the complex well, and has contributed to the current situation. Any element of design from these suppliers is recouped as hidden costs, since many employ their own designers or subcontract the design to other professionals; the potential “saving in professional fees” from this approach is misleading. They have a vested interest in selling their products and services, rather than delivering value for money and integrated and appropriate solutions, that fully incorporate the needs and characteristics of this building.

Specialist advice has therefore been sought at each stage in this process to provide an integrated design that gives a long term solution and to ensure the right skills are brought to this project. In chronological order of appointment, the team comprises:

Chartered Building Surveyor/Project manager

Anna Williams Associates, Kendal, based in Cumbria for over 30 years, specialising in defect diagnosis, managing damp and specifying remedial works. Also project manager, co-ordinating the design team.

Consulting Structural Engineers

R G Parkins & Partners Ltd, Kendal, advising on structural damage and specifying repairs

Building Services Design Engineers

Arrow Energy, Morecambe, reporting on existing service installations, preparing recommendations and specifying replacement systems.

Project Architect

Damson Design, Kirkby Lonsdale, providing an integrated design for the new glazing system and the project as a whole, also contract administrator, and Principal Designer and CDM co-ordinator under Construction (Design & Management) Regulations

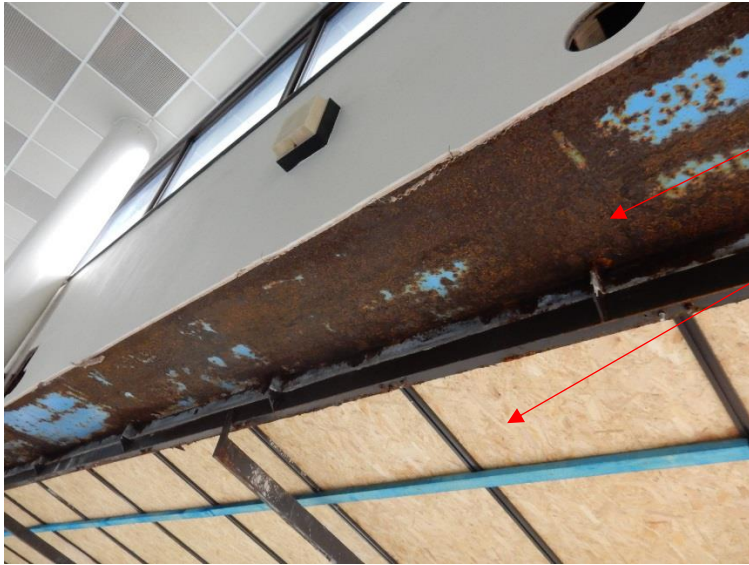
Chartered Quantity Surveyors

Saunders Quantity Surveyors, Windermere: providing cost estimates for strategy planning, managing tender processes, cost management during contract period and health and safety advisers under CDM regulations.

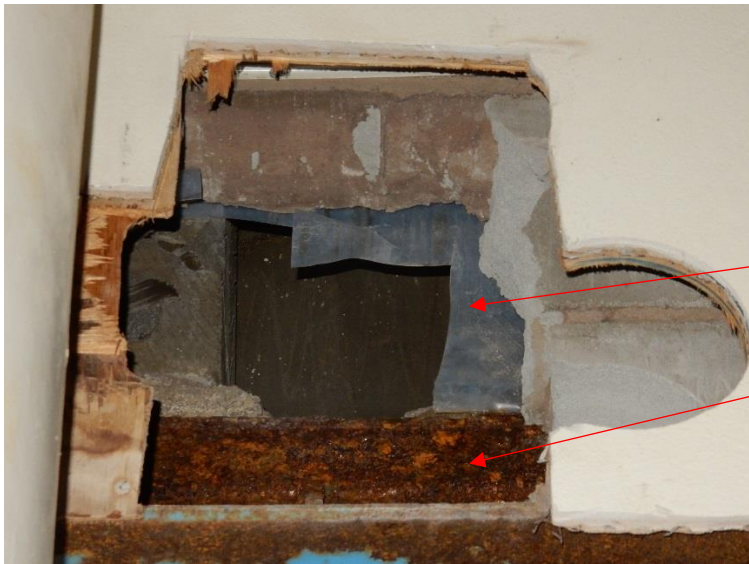
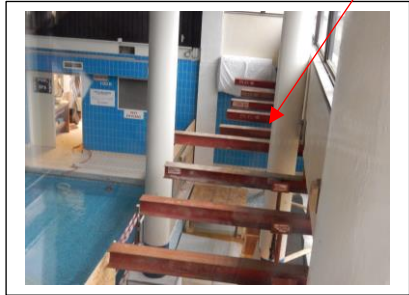
The team is acutely aware that the individual owners of the Club will be funding the project and the financial constraints that this may cause This has driven our design decisions at every stage. The range and complexity of the defects present particular challenges, requiring a fully integrated approach across all disciplines. We are seeking to bring a building that was poorly constructed, with widespread and serious defects, and where many elements have reached the end of their design life, back into a form that is both fit for purpose and a pleasure to use for many years to come.

AMW/TBM/AWA775

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Underside of beam before propping, showing extensive and severe corrosion over most of its length due to water ingress and condensation. Glazing to roof removed in preparation for installation of props



Plasterboard lining removed to exposed beam and wall construction.
Damp proofing very poorly detailed and no insulation resulting in condensation and water ingress.
Beam very badly corroded



Corrosion to foot of columns requiring repair



Corrosion to steel beam above plant room caused by water ingress from voids in parapet wall above



Standing water in parapet walls – formerly planters



Parapet above bearing of beam in plant room – part filled with gravel, end of trough roughly infilled with blockwork, resulting in water running off end of deck at bottom of trough into plant room.