

## **Lochside Leisure Centre Forfar** **Structural Overview July 2008**

### **Brief**

Property Services requested a cost for undertaking a structural survey in an E-mail dated 3/6/2008 and following their concern regarding the current structural condition of the building and the fact that the last structural appraisal of the building was undertaken in 2001.

A meeting was held at Lochside Leisure Centre on 25/6/2008 (Allan/Thomson) to view a number of defects which, according to staff, had appeared to have worsened in the period since the last inspection. The main areas of concern were highlighted in an E-mail from Mr Thomson and dated 2/7/2008.

It was agreed that Mr Allan would forward costs for an updated Structural appraisal of the building and also proposals for monitoring the ongoing condition of the Lochside Leisure Centre to ensure the future structural integrity of the building.

### **Background**

The above building which, was constructed in 1977, was founded over 'made' ground which originally formed part of the Forfar Loch. The infill materials were essentially industrial refuse of significant depth and therefore the use of a fairly new foundation technique to strengthen the structural bearing capacity of the underlying soil strata was adopted. The technique known as vibro-compaction, was in its infancy when applied to this project and there was not a great deal of UK knowledge available at the time. Unfortunately, it is now known that the use of this foundation technique needs to be carefully considered for use with refuse infill which contains a significant organic content since ongoing foundation movement can be expected. To exacerbate the situation, hard construction materials were used (brick and concrete) in the construction of the building which imparts heavy and varying foundation line loads and has led to heavy differential foundation settlement. The building materials used are not ideally suited for dealing with acute differential foundation movement and heavy structural damage evidenced by the presence of cracking in floors and walls has resulted.

Lochside Leisure Centre has been the subject of a number of structural reports extending back to 1984 when differential foundation movement was noted through to the most recent structural report in 2001 undertaken by the Angus Road Dept where ongoing movement was noted however occurring at a slow rate.

In 2002 structural damage to a wall in the Sports Hall store, which had occurred over many years, required to be re-built on new piled foundations to ensure safety.

Given the extent of the differential foundation settlement over the building footprint it is likely that heavy damage to fireclay foul and surface water pipes has occurred and are leaking. This can promote further foundation movement and therefore the drainage to the building should be inspected for damage and repaired where necessary.

### **General Discussion**

It is of the utmost importance to review the structural performance of this building from its construction in 1977 since this is a key factor in identifying an appropriate strategy for managing the future structural integrity of the building. Differential foundation movement still continues resulting in increased distortion/damage of structural elements inducing stresses for which they are not designed. Various repairs have been undertaken over the years which have failed or are failing. The existing foundation system can also be sensitive to external factors such as high groundwater levels or drying out promoting local accelerated foundation movement.

The report prepared in 2001 by this Dept. recommended that the frequency of structural inspections should be increased to an annual basis and this should be implemented without delay. This is necessary since structural damage can be expected to continue therefore it is crucial that vulnerable areas are identified and monitored in a consistent and regular fashion as part of the overall future management of this facility.

### **Future Structural appraisals**

To allow future informed judgments to be made with regard to the safe performance of structural elements within the building a monitoring process needs to be formulated and embedded in a management asset plan. Given the nature of the foundation problems and the increasing degree of uncertainty with regard to overall structural integrity then an ad-hoc approach is not appropriate.

The monitoring process can be undertaken in a number of ways however a simple approach is probably the most appropriate. Differential movement needs to be monitored rather than overall foundation movement and the areas to be targeted would be based upon the detailed floor level surveys undertaken in 2001. In addition, a simple arrangement of glass telltales and stud rosettes over existing wall and floor cracks would give ample information in relation to the rate of cracking within the building and its structural significance.

A budget cost for the monitoring system would be of the order (a joiner) of £750 and £750 for a structural survey by this Dept. in the first year. Annual inspections thereafter would be of the order of £250.

### **Visual Inspection of Lochside Leisure Centre carried out 25/6/2008**

During Mr Allan's site visit on 25/6/2008 your assistant Mr Thomson indicated various cracks within the building in walls and floors and also a number of floor slopes. There was evidence that previous repairs to some cracks had failed and it can be concluded that ongoing differential foundation movement of the building is active in these areas. Mr Allan was also informed that a number of movement joints had opened up in the building façade and had been recently repaired to ensure the weather tightness of the building.

The movement joints in the walls of the main sports hall have failed sometime in the past (mastic is brittle) and movement is much greater at the top of the joints. This movement is symptomatic of classic 'hogging' which can occur under

**buildings founded on weak ground. The extent of the movement in the joints is out with the movement capabilities of most propriety sealants.**

**From the visual inspection undertaken on 25/6/2008 and although there is ongoing foundation movement resulting in the failure off previous repairs, I do not feel there is immediate concern from a structural point of view. It is imperative, however, that the structural defects within this building are carefully monitored on a structured basis to ensure that no defects propagate to a stage where they may become potentially dangerous and compromise the safety of the general public and staff within the building.**

### **Recommendations**

- 1) Install a structural monitoring system within the building at an installation cost of £750 and fees of £750. The system to be installed within the next 3 months**
- 2) Annual structural appraisals of the building based on the structural monitoring system at a fee cost of £250**
- 3) Property Services to instigate appropriate measures within the annual maintenance arrangements for Lochside Leisure Centre to ensure that the above recommendations are carried out**
- 4) Carry out inspections of existing drainage connections from the building perimeter and repair as necessary.**

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9/7/2008**