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December 2008

STRUCTURAL APPRAISAL

OF

GARDEN WALL

AT

KEEPERS COTTAGE, PARK HALL, AISLABY

WHITBY

FOR

MR DALGLISH

Prepared by

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Consulting Civil & Structural Engineers
Established 1988

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1.0 BRIEF:-

This report has been prepared on the instruction of Mr Dalglish.

Our client, Mr Dalglish, is concerned at the condition of the garden wall immediately joining the Keepers Cottage at Park Hall, Aislaby and has requested a structural engineers appraisal.

This report is a structural appraisal of the current status of the structure and is NOT a full specification for carrying out any remedial works.

We have not inspected the woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are, therefore, unable to report that any such part of the property is free from defect.

Dimensions noted in this report are rough visual estimates for identification purposes only. No actual measurements have been taken at the site.

2.0 INTRODUCTION:-

The structure is a free standing masonry wall which forms the northern boundary of the garden to Keepers Cottage. The wall joins onto Keepers Cottage at the north-west corner of the cottage. See sketch 2.106-sk1 in appendix of this report.

The age of the structure is not known, but we anticipate that it is well in excess of 200 years.

2.1 Date of Visit:-

The property was visited for the purpose of this report on the 21st August 2008.

2.2 Weather:-

The weather was mild and wet. There have been some significant periods of wet and windy weather recently.

2.3 Topography:-

The site is in a rural village. Land slopes gently down towards the south. Adjacent gardens are of generous size and well kept.

There are a number of large mature trees (over 20 metres high) along the western boundary of the parent property, Park Hall. Immediately adjacent to the garden wall that is the subject of this report are 2 large mature trees.

The site is reasonably exposed to inclement weather from the North Sea.

2.5 Geology:-

The British Geological Survey one inch series sheet 44 indicates that the subsoil should comprise Boulder Clay overlying Sandstone beds of the Lower Oolite series.

At this stage no subsoil investigations have been carried out.

3.0 GENERAL:-

The wall is a 450mm thick free standing masonry structure. Foundation details are not known, but this type of wall is usually set on slightly wider stones at a modest depth.

3.1 Western Side (adjacent keeper's cottage):-

The wall curves in a small arc to meet the gable of keeper's cottage with a simple butt joint.

The junction is opening up at the top and past movement indicates that the wall is leaning towards the South.

There is a large tree immediately adjacent to this location and it is visually apparent that roots are physically displacing and causing rotation of the foundations.

Immediately North West of the tree, (towards the entrance gate), there is evidence of at least 2 nr., predominantly vertical, cracks which have resulted from the rotation movement of the section of wall adjacent to keeper's cottage.

The remaining length of wall, (approximately 5 lin.m.), leans over to the North noticeably. There is a second large, mature tree adjacent to this Northern end. The roots from the second tree are physically displacing the foundations of the wall and causing the general rotation/lean.

3.2 Eastern Side (viewed from garden of Keepers Cottage):-

Over the short length of wall adjacent to the NW corner of the cottage (approximately 7 lin.m.) there are at least 7nr., predominantly vertical cracks. All the cracks relate to damage done to the wall leaning over to the North. This movement is caused by mechanical action between the roots of the two large, mature trees and the foundations of the wall.

See photo in appendix this report:

Adjacent to the cottage there is a vertical crack. This was difficult to assess due to various garden items/timbers being stacked in this area.

Approximately one metre from the cottage a vertical crack runs the full height of the wall. Several individual masonry units are fractured.

Approximately 3 metres from the cottage is another full height vertical crack. Several individual masonry units are fractured. Crack widths are typically greater than 15mm.

Approximately 4 metres from the cottage a thin (less than 1mm) vertical crack runs effectively the full height of the wall.

To the North of this latter crack is another predominantly vertical crack. The crack runs effectively the full height of the wall and generally follows mortar bedding and joints. The crack is noticeably wider at the top than at the base.

Adjacent to the Northern corner there is a diagonal crack at high level. At this location the general leaning to the North of the wall is being restrained by the corner masonry.

3.3 Wall adjacent Main Road.

A brief inspection was made of the remaining length of wall (approx 18 lin. metres) running to the north alongside Main Road, Aislaby. This length of wall did not appear to shown any significant signs of serious distress nor significant recent movement.

4.0 CONCLUSIONS:-

Damage assessment has where possible been made in accordance with Building Research Establishment digest No.251 (BRE 251), "Assessment of damage to low-rise buildings". The digest has six categories '0' (negligible) to '5' (very severe).

It is not unusual for trees to cause damage to structures, usually as a result of roots affecting the moisture content of shrinkable foundation soils. In this case, due to the extreme close proximity of 2 particular and substantial trees and the surface extent of their root systems, the soil conditions are almost irrelevant. Damage is being caused by mechanical action between the surface root systems and the foundations of the wall (i.e. roots are physically pushing shallow foundation stones).

The approximately 7 metre length of garden wall adjacent to the Keeper's Cottage is being physically pushed over by the roots of 2nr., mature trees. As a result there are at least 7nr. significant vertical cracks in the wall (on one side alone!).

In it's current state the continuity of strength to the masonry units has already been lost. Several individual units have been completely fractured. The wall needs carefully dismantling and re-building in order to restore its integrity. However, in this case, the presence of large roots at shallow depth is causing direct damage by mechanical/physical action and, therefore, even with rebuilding this damage will continue.

New foundations or underpinning are unlikely to significantly reduce the tendency for continued damage. Common solutions that include reinforced concrete foundations with heave protection measures for foundations near trees would have very little benefit in this case. The trees are too close for such measures to be effective.

It is very unlikely that future stability of the wall will be achieved without removal of the two main trees and their roots.

The soil conditions are having very little influence on the wall, it is physical contact with root system that is causing the problem.

In accordance with BRE 251 we would classify the visible evidence of damage on this elevation as category 4 (severe) for which the digest remarks "*...Extensive repair work involving breaking-out and replacing sections of walls,... ...*".

6.0 RECOMMENDATIONS:-

Approximately 7 metre length of wall adjacent Keepers Cottage to be carefully dismantled, individual stones numbered and recorded to ensure rebuilding as existing. (length of wall to be dismantled identified by 'A' – 'A' and cross-hatched on attached sketch.

Two trees indicated with 'X' on attached sketch to be felled and root systems adjacent to wall to be removed.

New concrete strip footing at 900mm depth with 50mm polystyrene heave protection placed both sides.

Carefully rebuild wall, replacing individual units that have already fractured.

Signed for
Richard Agar Associates Limited

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APPENDIX

- Photographs
- Sketch