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Your Ref:

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CRP/jat/0038

REPORT ON STRUCTURAL DAMAGE

at

337, Wokingham Road
Earley
Reading
Berkshire

October 2000

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Report on Structural Damage at : -
337, Wokingham Road, Earley, Reading, Berkshire

1. Brief

1.01 Acting upon instructions received from Mr Ray Fox we visited site on the 19th September 2000 to complete a walkover visual inspection of the structural condition of the above property. This report relates specifically to the structural condition of the property and is not a report on the general condition of the property as a whole.

1.02 We would confirm that this practice has been appointed as Structural Engineering Consultants to advise on structural damage to numerous properties in the Reading area. Due to the extent of structural damage to the fabric of these properties, most claims have been pursued under the terms of Buildings Insurance Policies. Liability has been accepted for the reasonable cost of repairs and remedial works as completed to Specifications prepared by this Practice.

2. Introduction

2.01 The property 337, Wokingham Road, Earley, Reading comprised of a traditionally built, detached chalet style house. The property was originally a bungalow, which has been subject to a loft conversion and single story rear extension. It is thought that the original property was constructed in the early 1960s.

2.02 In September 1992 the property was subject to a survey and investigations by Mr. R.A. Hayes of Hayes Design Associates, (HDA), as surface water was found to be running down towards the property from the road at the front of the property during periods of inclement weather. This excessive surface water was due to a defective highway gully sited at the edge of the public footpath adjacent to the driveway at the front of the property. Investigations were completed and subsequently repairs were completed to the surface water drainage system. The report produced by HDA is attached to this report as **APPENDIX I**.

2.03 Sited adjacent to the rear, north boundary was a new development of housing. This housing development had been constructed on the site of an oil storage depot previously owned by Shell UK Limited. Prior to the development of housing, this site was decontaminated by Shell UK Limited in 1994. Subsequently, since completion of various boreholes in the rear garden to number 337, Wokingham Road, it has been found that

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the ground beneath the rear garden and property has become contaminated due to the ingress of contaminated material through the ground stratum. The nature and extent of contamination is subject to current litigation.

2.04 In recent months Mr. Fox has noted that significant fracturing has occurred in the rendering to the external walls and that internally the suspended timber floor construction in the dining area flexed excessively under imposed loading, possibly due to partial collapse of the sleeper walls supporting the floor construction.

2.05 Due to the extent of movement noted, Mr. Fox notified his Buildings Insurers, Royal & Sun Alliance Corporate Partnership (R&SA), and advised as to his concerns. Subsequently, R&SA appointed Cameron Durley Consulting Structural Engineer's, (CD), to investigate the possibility of site subsidence to the property. CD visited site on 13th June 2000 to complete a walkover survey. Subsequently, due to the extent of contamination of the ground adjacent to the property, CD declined to complete any further investigations due to the risk of health and safety to those completing the investigations. We attach to this report a copy of the letter from CD dated 27th June 2000, as **APPENDIX II**.

2.06 This report is written for Mr. R. Fox and specifically relates to the identification of the precise cause, nature and extent of structural damage to the property. This report endeavours to deal with the cause of movement based upon the information contained in the report produced by HDA and extracts from the report completed by Monitor Environmental Consultants (MEC), relating to ground conditions in the immediate area. Due to the ongoing litigation regarding contamination ground and concerns regarding health and safety, we have not completed our own site investigations but have relied upon the professional expertise of other parties.

2.07 All references to the property are made from the road known as Wokingham Road. At the time of our inspection, the property was fully furnished and floors covered with close fitted carpets with the exception of the kitchen floor. This report should be read in conjunction with the photographs attached.

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3. Description of the Site

3.01 The property was situated on a sloping site with the front garden sloping down from the road at the front of the property towards the front elevation. A typical longitudinal section through the property is shown on a drawing as produced by Dunster & Morton, Chartered Surveyors of Reading. This section, drawing number **JF/00/1**, is attached to this report as **APPENDIX III.**

3.02 Due to the slope in the natural topography of the ground, a raised patio had been constructed adjacent to the rear of the property. The patio and parts of the rear elevation to the property are shown in **photograph 1**.

Photograph 2 shows part of the rear garden to the property with a surface water drain to the habitable accommodation extending beneath the paved path towards the manhole sited at the north east corner of the garden.

3.03 The longitudinal cross-section clearly shows that the ground at the rear of the property forms a natural low point for collection of ground water, both from the south of the property and from the new housing development adjacent to the northern most boundary of the property.

3.04 The ground investigations as completed by HAD confirmed that the foundations to the property are founded in clay with some flints. The depth from finished ground level to the underside of mass concrete foundations was found to be 375 mm.

3.05 The scaled site plan of the oil storage depot, prior to the housing development, in relation to 337, Wokingham Road is attached to this report as **APPENDIX IV**. The surface water drainage system from the storage depot and adjacent properties is sited in the north east corner of the garden. A 1:350 scale plan of the property is shown as **APPENDIX V**. The manhole is clearly shown. This plan was produced as part of the investigation works regarding contaminated ground and was completed by MEC, who subsequently undertook a CCTV survey of the drain. It was determined that the 225 mm diameter surface water drain was defective. A copy of the letter regarding the defective drainage from MEC is attached to this report as **APPENDIX VI**.

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3.06 In December 1990 Resource & Environmental Consultants Limited (REC) completed a site investigations regarding contamination of the ground stratum on the site of the property. **APPENDIX VII** shows the location of the boreholes undertaken by REC in relation to the property. Whilst these boreholes clearly established levels of contaminants, they also established extensive contamination in the lounge. These contaminants had been taken through the ground by natural ground water percolating through the stratum from the area of the original oil storage depot. In our opinion, this confirms there is a significant change in the natural ground water conditions beneath the habitable accommodation and rear garden to the property.

4. Nature of Damage - External

4.01 A visual inspection was undertaken as to the structural condition of the property externally. With regard to the right-hand external elevation, shown in **photograph 3**, we have the following comments and observations to make:-

1) vertical fractures were noted in the rendering as shown in **photograph 4**. **Photograph 5** shows a vertical fracture adjacent to the bottom, right-hand corner of the kitchen window. This fracture extended from sill level down through the render and continued down to ground level. A further fracture extended up from the vent to the central heating boiler and terminated halfway up the external wall.

2) **Photograph 6** shows a series of fractures within the rendering with the most significant vertical fracture being behind the vertical rainwater pipe. **Photograph 7** shows a close-up of this fracture, which extended the full height of the property.

Elsewhere within this elevation, there was no visual evidence of any further significant fracturing within the rendering to the external wall.

4.02 On the rear elevation to the property, as shown in **photograph 1**, an area of rendering had become detached from the surface of the wall between the rear external floor and rear French windows. Elsewhere on this elevation, there was no visual evidence of any significant structural defects.

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5. Nature of Damage - Internal

5.01 Internally, the property was in good decorative condition throughout the ground floor. At the time of our inspection the property was fully furnished and floors covered with close fitted carpets. Due to the extent of fixtures and fittings, our visual inspection was limited. However, the following defects were noted:-

1) **Photograph 8** shows fracturing to internal walls, approximately 3 mm wide.

2) **Photographs 9 and 10** show typical fracturing within the internal plaster walls to the bathroom.

5.02 In the dining room, sited towards the centre of the property, the suspended timber floor deflected excessively under normal foot traffic. The floor construction comprised brick sleeper walls with floor joists over. Whilst it is normal for suspended timber floors to deflect slightly under normal foot traffic, we are of the opinion that the movement within the floor construction to the dining room was excessive.

5.03 To establish the precise cause of movement to the suspended timber floor construction and to establish whether the external walls had been adversely affected by fluctuations in the water table, we have referred to boreholes and investigations as completed by HDA and the ground investigations as completed by MEC. Under normal circumstances, we would have completed our own investigations but, due to contaminants within the ground stratum, we are reluctant to complete any further examinations.

6. Investigations

6.01 At the time of the inspection completed by HDA on 22nd September 1992, it was discovered that the highway gully at the edge of the public footpath at the front of the property was blocked. As a direct result, surface water collected from the road was discharged down the right-hand side of the property. HDA recommended that both the foul and surface water drainage systems be tested to ensure that they were not defective. As a direct result of these investigations the public surface water drain was

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found to be blocked, adjacent to the northern boundary to the property. In conclusion, he found that:-

"the foul sewer system was satisfactory and working properly. Defects were noted both in the highway gully and also in your storm-water drainage system at the rear of the house. The ground water level was located at 1090 mm in the gravelly material, below the depth of foundations, at the front of the house and some 300 mm below ground in the clay in the back garden. The presence of the clay in the back garden could be within the area where the clay geological strata outcrops, as indicated in the geological survey."

HDA concluded that the surface water drainage system should be repaired and diverted, via the neighbour's pipe in the garden, to the surface water manhole at the north end of the property. HAD stated that "the situation with the building needs to be closely monitored". This tends to indicate that HAD was sceptical as to whether repairs to the surface water drainage system would stabilise the property.

6.02 The trial hole completed by HAD confirmed that foundations had been constructed in ground comprising a mixture of sand gravel and clay. Although the depth of foundations was very shallow when compared with requirements of the current building regulations HAD concluded that *"there is no evidence of subsidence movement which could be attributed to clay shrinkage exacerbated by the effects of roots from the nearby oak tree"*. We have no reason to disagree with HDA's conclusion but the presence of ground water was noted at a depth of 1090 mm below ground level. HAD suggested that the presence of ground water within the clay stratum helped alleviate the risk of clay shrinkage.

6.03 It is now probable that the significant rise in the natural ground water table caused by the new housing development exacerbated by significant rainfall in recent months, has triggered further movement caused by washing away of silts within the ground stratum beneath the external walls.

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7. Conclusions and Recommendations

7.01 From the information gleaned from our visual inspection, trial holes completed by HDA and our knowledge of ground conditions in the immediate area, it is our professional opinion that structural movement to the external walls below floor level and oversight concrete beneath the suspended floor construction has occurred, due to significant fluctuations in ground water and saturation of the ground stratum. Significant variations in moisture content would result in silts within the stratum being washed away. These volumetric changes would result in structural movement now visible.

7.02 Volumetric changes in the ground stratum beneath the oversight concrete supporting the suspended timber floor construction have caused the significant deflection of the floor construction in the dining room.

7.03 It is probable that, since construction of the new housing development in 1996 adjacent to the northern most boundary, the ground water level has changed significantly. This is being exacerbated by the fact that the ground in the rear garden is at a low point compared with all other adjacent properties.

7.04 Whilst it may be argued that the structural damage to the property should be monitored, it is our professional opinion that such monitoring would probably only delay inevitable repairs, given the recent excessive movement of the suspended timber floor in the dining-room and fractures noted in the external walls.

7.05 If the structural damage visible at the property was assessed in accordance with the Building Research Establishment Digest, number 251, *"assessment of damage to low rise buildings"* it will be classified as Category three damage, requiring structural repairs.

8. Repairs

8.01 Based upon our experience of similar damage to properties we would anticipate the cost of remedial works to be in the region of £25,000 exclusive of VAT and professional fees. We would advise that this figure is a budget figure, with accurate costs only be known once a Specification of Remedial Works has been prepared and competitive tenders sought from local Contractors.

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8.02 Given the nature and extent of major works, it may well be necessary for the present occupiers of the premises to be placed in alternative accommodation due to the risk to health and safety whilst remedial works are being undertaken.

C.R. Paxton I.Eng., A.M.I.Struct.E.

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