

APPENDIX D



ANDREW FIREBRACE PARTNERSHIP

STRUCTURAL AND CIVIL ENGINEERING CONSULTANTS

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JH/SMB/00/1006/1.1

29th August 2001

Michael Scott Associates
Sheraton House
Castle Park
Cambridge
CB3 0AX

Dear Sirs

11 Netherhall Gardens, Hampstead

As instructed we have inspected the above property with respect to structural damage and the proposed refurbishment which might include the re-arrangement of internal partitions and the construction of extra accommodation in the roof space over the second floor, and can report as follows:-

INTRODUCTION

The property comprises a large detached house with accommodation on three floors, and is probably about 90 years old. The top floor is located within the lower part of the roof space. The external walls have been covered with a sand/cement render. Many alterations have been carried out over the years, most notably the construction of a two-storey extension on the north side and the sub-division of the building into self contained flats.

I am informed that some underpinning was carried out at the rear of the property, and a couple of brick buttresses were built against the rear wall of this underpinned part of the building at the same time.

The property is located on a level site on high ground and is reasonably level. The geological drift map indicates that the subsoil comprises London Clay, which is a firm highly plastic clay. This means that it can provide a firm foundation to build on, but can be subject to seasonal movement at normal house foundation depths in the vicinity of trees, large bushes and hedges.

There are some tunnels in the vicinity owned by Midland Railtrack.

There are some large horsechestnut trees on the plot in the front garden, about 8.5m from the front wall of the house. There are some large sycamore trees on an adjoining

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plot, the closest about 5m from the rear north west corner of the building. There is a large poplar tree about 20m from this corner of the building.

There are numerous cracks in the internal and external walls of the building. These have been recorded by Michael Scott Associates. We therefore do not propose to record again the location of all the individual cracks in this report. Our report is based on the cracks recorded by Michael Scott Associates and our own observations.

The pattern of cracking suggested a number of different causes:-

- 1] Distortion of external walls due to slight foundation movement.
- 2] Deterioration of render due to ageing and splashing with rainwater.
- 3] Distortion and cracking of internal partition walls due to sagging of supporting floors.

The foundation movement could have been caused by both leaking drains and nearby trees, so we had a CCTV survey of the drains carried out and we inspected the foundations and the subsoil by means of trial pits.

We had some of the soil samples tested. These investigations and tests provided us with enough information, so an investigation using a deep mechanically driven borehole was not required for this survey.

Walls

There are cracks in the external walls due to foundation movement. These cracks should be 'stitched' using stainless steel bed joint reinforcement after underpinning works have been completed. We enclose a copy of our sheet number SK01 giving construction details, a method statement and a specification for the materials.

There are cracks in internal partition walls due to floor movement. Many of these walls are too thin to 'stitch' using bed joint reinforcement and are too slender in relation to their height and require demolishing and rebuilding.

Some cracks in the external render are due to soaking with rainwater and frost damage. The render is quite hard, and its removal will damage the face of the brickwork.

Investigation of foundations and subsoil

The location of trial pits and hand augered holes is indicated on drawing number 00/1006/01. The results are shown on drawing number 00/1006/02. The soil test

results are shown on Table 1. These findings indicate that the north half of the building has been underpinned. Tree roots were found at depths in excess of the depths of the underpins on the front and rear elevations. Not surprisingly the soil test results showed that the clay has been desiccated by the tree roots at depths in excess of the depths of the underpins. The south half of the front elevation has not been damaged by the foundation movement, but could be in the future due to the presence of large horsechestnut trees in the front garden which may not yet have grown to maturity. The south half of the rear elevation has not been damaged by foundation movement and will not be damaged in the future unless trees or large bushes are planted close by.

We are therefore of the opinion that deeper underpinning is required to some of the external walls, as indicated on our drawing number 00/1006/03.

Drains Survey

The location of the drains is indicated on drawing number 00/1006/04. A CCTV survey was carried out by Rota-Rod. We enclose a copy of their findings. Tree roots have invaded the drains along the front, the north side and along the rear of the property. The drain along the rear of the property has been severely damaged by the roots. The drain along the front of the property is suspected to be cast iron and in a very poor condition. All the external drainage system, with the exception of the manhole at the front south east corner of the site and the manhole in front of the front door should be replaced.

Floors

The trial pit investigation within the building revealed that the floor in the extension on the north side is of suspended reinforced concrete construction. The slab in the area we inspected was 150mm thick and reinforced with mild steel reinforcement bars at 200mm centres with about 50mm bottom cover.

The cracking in the ground floor partitions in this part of the building has been caused by excessive floor slab deflection due to insufficient floor slab depth and reinforcement. We recommend that the existing ground floor slab in the area shown shaded on drawing number 00/1006/05 be removed and replaced with a suspended precast concrete beam and pot floor. This work would necessarily entail the removal of the ground floor internal partitions in the affected area.

The cracking in the internal partitions on the first and second floors has been caused by excessive deflection of these floors. This excessive deflection has been caused by

the weight of the blockwork partitions built on the timber floors. We recommend that these walls be demolished and rebuilt. New steel beams will be required, inserted into the floors to support new thicker blockwork partitions. Some of the partitions on the second floor are not unstable and could be retained. If you decide to retain the present partition layout the timber joists directly under each of these cracked partitions could be strengthened by fixing a 178 x 102 rolled steel channel to its side face, as indicated on sheet number SK02. This would entail the removal of part of the ceiling below, and often complications arise due to the presence of plumbing and wiring within the floor. Therefore, although the cost of each steel channel is fairly nominal, the cost of the labour to install the beam and the cost of making good finishes and diverting wiring and plumbing could be significant.

Roof

The part of the roof structure which could be inspected was in a reasonably good condition, and we could see no areas requiring structural remedial work. However, the conversion of the upper roof space into the flats would entail a substantial amount of strengthening to the roof structure, and may require some strengthening of the second floor also.

General Remarks

The tunnels in the vicinity have not caused any structural problems.

It is not normally possible to obtain a Building Society or Bank Mortgage for a property unless subsidence cover can be obtained.

The fact that the property has been underpinned already, and needs some further underpinning to prevent further cracking will present problems as far as obtaining subsidence insurance is concerned. There are some specialist insurance companies which offer subsidence cover to buildings which have been underpinned. With this property we strongly recommend that such a company be approached before commencing any underpinning in order to establish the conditions under which subsidence cover would be offered. I would expect them to require the work be specified, inspected and approved by a Structural Engineer. There is normally a high policy excess for subsidence claims with these companies.

We have in this report assumed that the intention is to bring the building up to current standards in order to minimise any problems with valuation surveys, and to avoid devaluation due to substandard construction.

Conclusions

- 1] The external walls on the front north side and part of the rear elevations of the

property need to be underpinned down to a depth of about 4m, as shown on drawing number 00/1006/03

- 2] The ground floor slab in the area shaded on drawing number 00/1006/05 needs to be replaced.
- 3] The drains need to be replaced with the exception of the deep manhole at the front south east corner of the property.
- 4] The internal partition walls are too slender in relation to their height and require demolishing and rebuilding. They have cracked due to insufficient support from the timber floor structure. New steelwork will be required to support new partition walls.
- 5] The upper part of the roof is in a good condition but would need substantial strengthening in order to convert it into living accommodation.
- 6] The cracks in the external walls should be 'stitched' using stainless steel bed joint reinforcement.
- 7] The cracks in the internal partition walls which can be retained should be made good using expanded metal lathing.

We have not inspected 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.

This engineers report only deals with the above mentioned defects and our liability in respect of this report is limited to yourself as our client. There is no intention to confer any third party rights as described in the Contracts (Rights of Third Parties) Act 1999.

If you have any queries, please do not hesitate to contact me.

Yours faithfully

JOHN HOWLETT
For and on behalf of Andrew Firebrace Partnership

encls

AFP

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Project: 11 NETHERHALL GARDENS HAMPSTEAD	Job No. 00/1006	Drawing No. BH 2.1
Title: BOREHOLE 2	Prepared: CW	Date: AUG'01
	Checked: JEH	Date: AUG'01

DEPTH METRES	DESCRIPTION	SOIL SAMPLE	TEST TYPE RESULT	REMARKS	DEPTH OF WATER
.1					
.2	AS TRIAL PIT 2				
.3					
2.4	STIFF MID BROWN				
.5	MOTTLED ORANGE GREY				
.6	VEINED SILTY CLAY				
.7	WITH PARTINGS OF ORANGE				
.8	SILT / FINE SAND &				
.9	CRYSTALS	3.0		2.9m SEVERAL ROOTS	
3.0	STIFF / VERY STIFF	●	V 140+	OF DEAD APPEARANCE	
.1	MID BROWN MOTTLED		140+	TO 2mmØ	
.2	ORANGE GREY VEINED SILTY				
.3	CLAY WITH PARTINGS OF				
.4	ORANGE SILT / FINE SAND				
.5	& CRYSTALS			3.5m OCCASIONAL ROOTS	
.6				OF LIVE APPEARANCE	
.7				TO 1mmØ	
.8					
.9		4.0			
4.0		●	V 140+	4.0m SEVERAL ROOTS	
.1			140+	OF DEAD APPEARANCE	
.2				TO 1mmØ	
.3					
.4					
.5					
.6					
.7					
.8					
.9		5.0			
5.0		●	V 140+		
.1			140+		
.2					
.3					
.4					
.5				B.H. DRY & OPEN	
.6				ON COMPLETION	
.7					
.8					
.9		6.0	V 140+		
6.0	BH ENDS AT 6.0m	●	140+		

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Project: 11 NETHERHALL GARDENS HAMPSTEAD	Job No. 00/1006	Drawing No. BH 3.1
Title: BOREHOLE 3	Prepared: CW	Date: AUG'01
	Checked: JEH	Date: AUG'01

DEPTH METRES	DESCRIPTION	SOIL SAMPLE	TEST TYPE RESULT	REMARKS	DEPTH OF WATER
.1	MADE GROUND, FIRM			0.1 NUMEROUS ROOTS	
.2	DARK BROWN BROWN CLAYEY TOPSOIL			OF LIVE APPEARANCE	
0.200	MADE GROUND, FIRM MID			TO 10mmø	
.4	BROWN MOTTLED ORANGE				
.5	GREY VEINED SILTY CLAY				
.6	WITH TOPSOIL AND BRICK				
.7	RUBBLE				
.8					
.9		1.0		0.9 NUMEROUS ROOTS	
.0		●	V 70	OF LIVE APPEARANCE	
.1			78	TO 3mmø	
.2					
.3					
.4					
1.5	STIFF MID BROWN MOTTLED				
.6	ORANGE GREY VEINED SILTY				
.7	CLAY WITH PARTINGS OF				
.8	ORANGE SILT / FINE SAND			1.8m SEVERAL ROOTS	
.9	AND CRYSTALS	2.0		OF LIVE APPEARANCE	
.0		●	V 108	TO 10mmø	
.1			108		
.2					
.3					
.4					
.5					
.6					
.7				2.7m SEVERAL ROOTS	
.8				OF LIVE APPEARANCE	
.9		3.0		TO 1mmø	
.0		●	V 122		
.1			128		
.2					
.3					
.4					
.5				3.5m SEVERAL ROOTS	
.6				OF LIVE APPEARANCE	
.7				TO 2mmø	
.8					
.9		4.0	122		
.0		●	V 130	4.0 OCCASIONAL	

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Project: 11 NETHERHALL GARDENS HAMPSTEAD	Job No. 00/1006	Drawing No. BH 3.2
Title: BOREHOLE 3	Prepared: CW	Date: AUG'01
	Checked: JEH	Date: AUG'01

DEPTH METRES	DESCRIPTION	SOIL SAMPLE	TEST TYPE RESULT	REMARKS	DEPTH OF WATER
.1				ROOTS OF	
.2				DEAD APPEARANCE	
.3				TO 1mmø	
.4					
.5					
.6					
.7					
.8					
.9		5.0			
5.0	STIFF / VERY STIFF MID	●	V 140+	TO 5.0m	
.1	BROWN SILTY CLAY WITH		140+		
.2	PARTINGS OF ORANGE &				
.3	BROWN SILT / FINE SAND				
.4	& CRYSTALS				
.5					
.6					
.7					
.8					
.9		6.0			
6.0	B.H. ENDS AT 6.0m	●	V 140+	B.H. DRAY AND OPEN ON	
.1			140+	COMPLETION	
.2					
.3					
.4					
.5					
.6					
.7					
.8					
.9					
.0					
.1					
.2					
.3					
.4					
.5					
.6					
.7					
.8					
.9					
.0					

SPRINGFIELD SITE INVESTIGATION LIMITED

www.springfieldsi.co.uk

LABORATORY TEST RESULTS

Date : 8th May 2001
Location : 11, Netherhall Gardens, NW.3

Ref. No. : 7219
Table No. : 1

Borehole No.	Depth	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Estimated Minimum Equilibrium Moisture Content	Apparent Moisture Content Surplus or Deficit (-)	Linear Shrinkage of Complete Sample
	m	%	%	%	%	%	%	%
2	Sect B	32.5	79	29.2	50	32.0	0.5	19
	Sect A	31.8	80	30.4	50	32.9	-1.1	19
	3.0	30.2	76	28.6	47	30.6	-0.4	19
	4.0	29.8	78	28.2	50	30.2	-0.4	19
	5.0	29.8	77	28.3	49	29.9	-0.1	19
	6.0	28.6	75	27.8	47	28.9	-0.3	19
3	1.0	28.6	66	25.7	40	27.4	1.2	17
	2.0	30.9	79	30.0	49	32.5	-1.6	19
	3.0	29.2	76	28.4	48	30.5	-1.3	19
	4.0	28.3	73	27.2	46	28.7	-0.4	18
	5.0	30.2	78	28.9	49	30.6	-0.4	19
	6.0	27.7	73	26.7	46	27.7	-0.0	18

ROTA-ROD

"EXPERIENCE WHEN NEEDED"

INDUSTRIAL AND DOMESTIC DRAIN & PIPE CLEANING •

Andrew Firebrace Partnership
Stable Barn
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6 MILL GARDENS,
ELMSWELL,
BURY ST EDMUNDS,
SUFFOLK. IP30 9DQ
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FAX: 01359 241250

28th April 2001.

Dear Sirs,

RE; 11 Netherhall Gardens, Hampstead, London.

A camera survey on the drainage system was carried out as follows.

Manhole 1 inv 1480mm upstream to manhole 2	150mm clay, possible cast iron
000.7Mconnection at 3 o clock	
002.5Mconnection at 3 o clock	
002.7Mconnection at 3 o clock	
012.1Mroots	
012.6Mmanhole 2	
Manhole 1 inv 1480mm downstream to manhole 1A	150mm clay, possible cast iron
002.7Mconnection at 9 o clock	
011.5Mend	
Manhole 1 inv 1480mm upstream to lateral 1	100mm clay pipe
unable to negotiate bend	
Manhole 2 inv 1160mm upstream to manhole 3	100mm clay pipe
002.0Mwater level 40%	
004.6Mroots, abandoned	
Manhole 2 inv 1160mm upstream to lateral 1	100mm clay pipe
001.4Mend	
Manhole 3 inv 1000mm upstream to lateral 1	100mm clay pipe
000.7Mend	



• BLOCKED DRAINS CLEARED FAST • HIGH PRESSURE WATER JETTING • CHEMICAL DESCALING
• CCTV CAMERA SURVEYS • IN-SITU REPAIRS • DRAIN TESTS TO B S 8301



Manhole 3 inv 1000mm upstream to lateral 2
unable to negotiate bend 100mm clay pipe

Manhole 3 inv 1000mm upstream to lateral 3
001.2Mbase of SVP 100mm clay pipe

Manhole 3 inv 1000mm upstream to lateral 4
005.7Mmanhole 4 100mm clay pipe

Manhole 4 inv 900mm upstream to lateral 1
unable to negotiate bend 100mm clay pipe

Manhole 4 inv 900mm upstream to lateral 2
001.2mend 100mm clay pipe

Manhole 4 inv 900mm upstream to lateral 3
000.7Munable to negotiate bend 100mm clay pipe

Manhole 4 inv 900mm upstream to head of run
001.0Mburied manhole 100mm clay pipe
006.0Mmanhole

FMH 1A inv 3340mm, no steps into manhole, unable to survey laterals

Manhole 5 inv 2300mm downstream to manhole 1A
009.0Mbackdrop into manhole 1A 100mm clay pipe

Manhole 5 inv 2300mm upstream to lateral 1
000.2Msilt & scale 100mm clay pipe

Manhole 5 inv 2300mm upstream to lateral 2
002.1Mconnection at 9 o clock 100mm clay pipe
003.1Mbase of stack

Manhole 5 inv 2300mm upstream to lateral 3
000.6Munable to negotiate bend 100mm clay pipe

Manhole 5 inv 2300mm upstream to W C
004.1Mbend to W C and circumferential crack 100mm clay pipe

Summary

The 150mm pipework we suspect is cast iron and is heavily scaled, if this was pressure jetted we feel that may destroy the pipe there is also substantial root damage from manhole 6 down to the buried manhole as we could not get the camera into the pipe.

The remainder of the pipe is not very good for modern day use and we suggest that it is all replaced with new pipework.

Yours sincerely



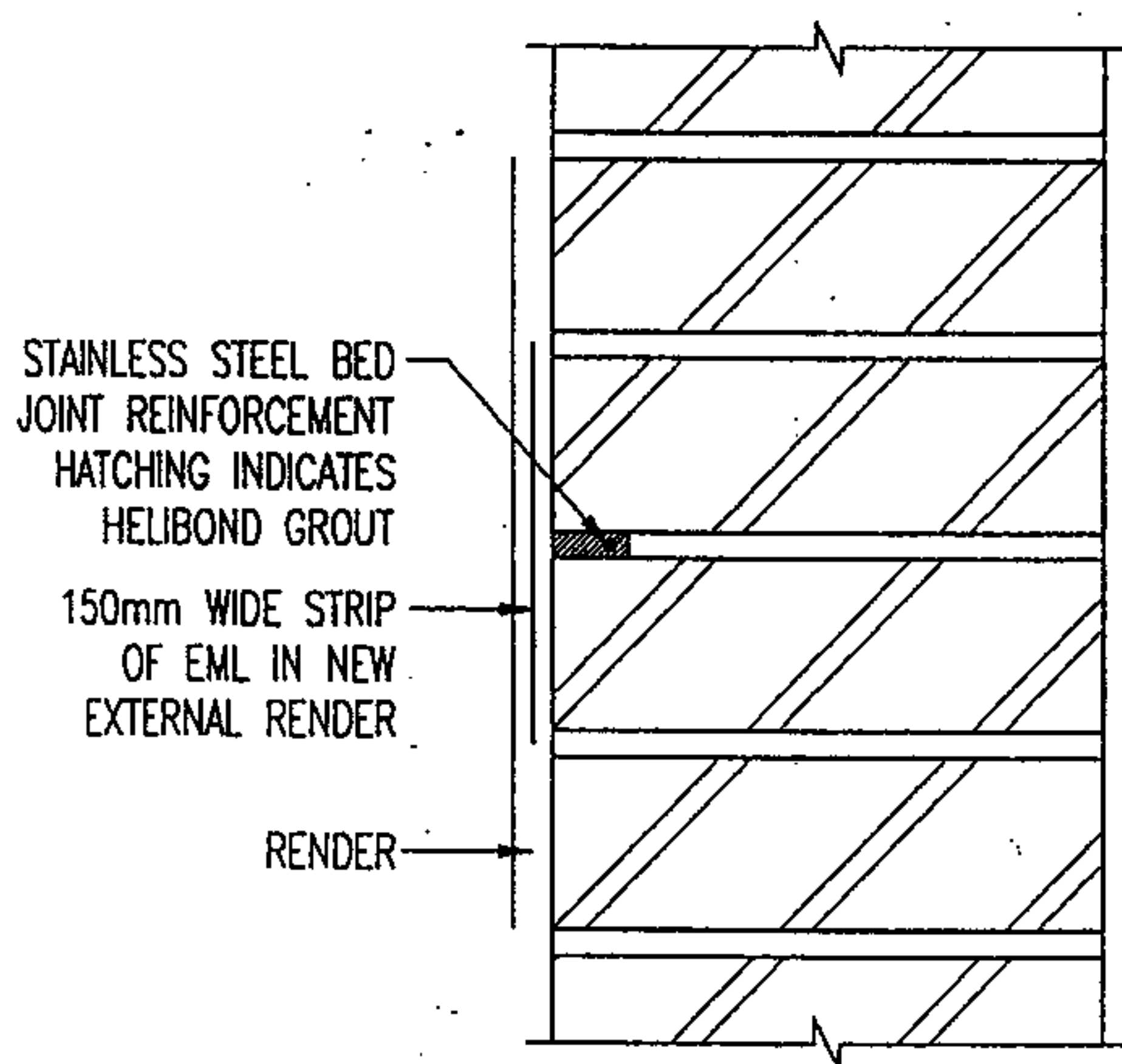
R J Barter -

AFP

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Project: 11 NETHERHALL GARDENS HAMPSTEAD	Job No. 00/1006	Drawing No. SK01
Title: CRACK REPAIRS DETAILS, METHOD STATEMENT AND SPECIFICATION	Prepared: CW	Date: JULY'01
	Checked: JEH	Date: JULY'01



SECTION THROUGH EXTERNAL WALL

(SCALE 1:5)

METHOD

1. Cut grooves in the bed joints of the blockwork to a depth of about 35mm.
2. Blow dust and debris out of the grooves.
3. Soak the grooves with water.
4. Inject beads of HELIBOND grout into the grooves to a depth of 15mm.
5. Insert stainless steel bed joint reinforcement. If reinforcement is too short use minimum 300mm laps.
6. Inject more HELIBOND grout.
7. Make good plaster using 150mm wide strip of EML.

MATERIALS

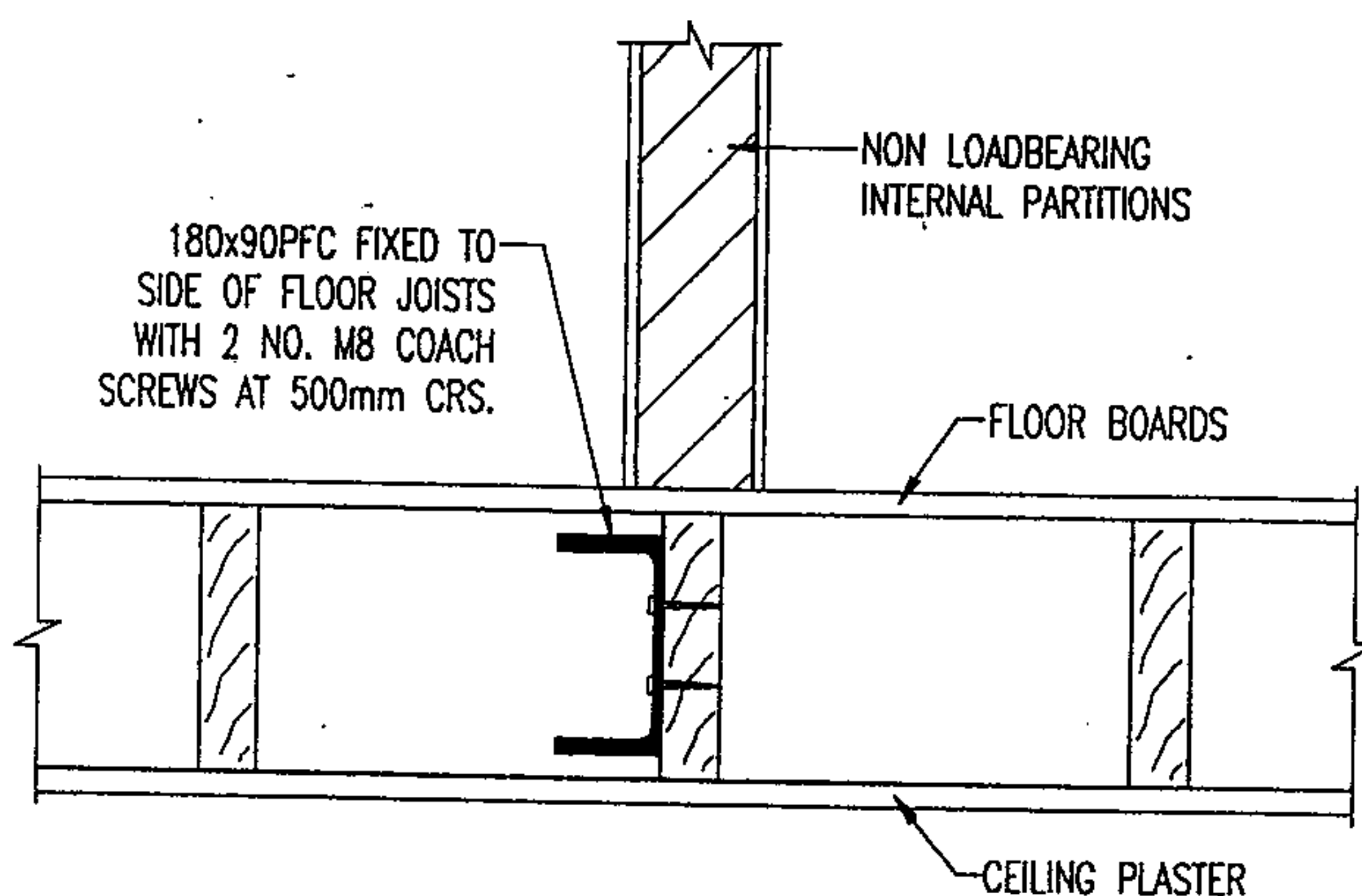
Reinforcement: 6mm ϕ stainless steel HELIBAR
Mortar: HELIBOND MM2 non shrink grout.

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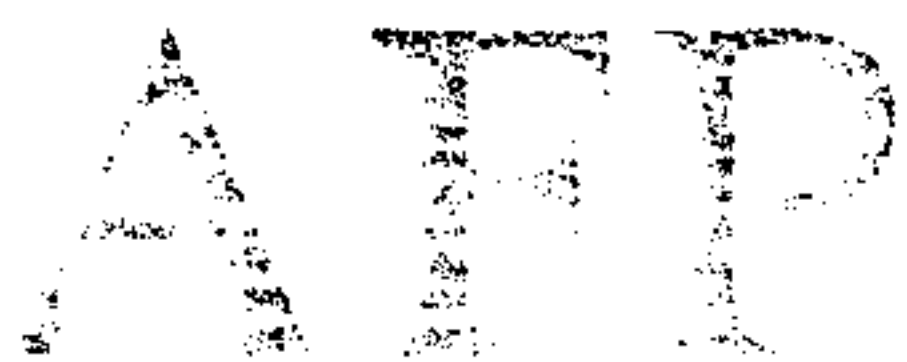
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Project:	11 NETHERHALL GARDENS HAMPSTEAD	Job No. 00/1006	Drawing No. SK02
Title:	STRENGTHENING UPPER FLOORS BELOW PARTITIONS	Prepared: CW	Date: AUG'01
		Checked: JEH	Date: AUG'01



SECTION THROUGH
PARTITION AND FLOOR
(SCALE 1:10)



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Michael Scott Associates
Sheraton House
Castle Park
Histon
Cambridge
CB3 0AX

Our Ref: 00/1006/JEH/BES

2nd January 2004

Dear Sirs

11 Netherhall Gardens, Hampstead

Andrew Firebrace Partnership inspected the above property in 2000, carried out a site investigation, and produced a report on structural damage in August 2001. That report included recommendations for the structural remedial works which would be required to make the property both structurally sound. At the time the building was unmortgageable because insurance cover for subsidence damage could not be obtained. The building had a history of structural movement due to subsidence. Part of the building had been partially underpinned, and even those parts which had been underpinned were still being damaged by foundation movement. Our investigation revealed that the subsidence damage had been caused by seasonal movement of the clay subsoil due to the presence of many large trees on this site and an adjoining site. In addition to the subsidence problem, there were also structural problems with the floors, namely excessive deflection of timber floors due to the later addition of internal partition walls, and excessive deflection of a suspended concrete ground floor due to insufficient floor slab depth and reinforcement.

In our report we produced the outline of a scheme for underpinning those parts of the building that had at that time been damaged by subsidence. I returned to inspect the property again on the 30th October 2003 because cracking had been noticed in areas of the building which had previously not been damaged. This cracking had occurred in Flat 1. I gained access into the rear garden and inspected the outside face of the rear wall where the new cracking had been reported. These cracks had opened above and below the ground and first floor window openings of Flat 1, and other existing cracks to flats 4 and 10 above had increased in width. The maximum width of the new cracks was about 8mm.

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At the time of my visit, at the end of a prolonged dry summer, the surface of the garden to Flat 1 was cracked due to drying shrinkage of the subsoil, suggesting that the new foundation movement to Flat 1 had also been caused by subsidence of the site caused by drying shrinkage of the subsoil.

In our report of August 2001 we thought it might be possible to stabilise the building by underpinning only about three quarters of the perimeter walls of the building, but this recent cracking indicates that the entire perimeter of the building will need to be underpinned. In order to make the property mortgageable it will be necessary to obtain full subsidence cover. There are few insurance companies prepared to offer subsidence cover for properties with a history of subsidence damage. These companies would also require underpinning for the internal loadbearing walls for this type of property, and would certainly charge high insurance premiums, and stipulate a high policy excess for subsidence claims. We also enclose a copy of our revised drawing No. 00/1006/03A.

I trust this answers your query regarding the recent damage. If you have any other queries please do not hesitate to contact me.

Yours faithfully



John Howlett

For and on behalf of the Andrew Firebrace Partnership

Enc.