HSS compliance 1 – best practice and structural movement

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2025

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Contents

- Introduction
- Assessing instability in walls
- Practical on-site diagnosis of instability
- Case study 1
- Case study 2
- Reporting
- Conclusions

2

Learning objectives

- Understand some of the structural ‘rules’ that relate to above-ground movement
- Consider and practice how some of those rules can be used in the real world;
- Review and understand an above ground structural assessment working ‘protocol’ that has been used in practice for some time.

3

3

Group discussion

What sort of movements and distortions do we typically find in a residential property in the UK and how do we assess them?

4

4

Group discussion

What sort of movements and distortions do we typically find in a residential property in the UK and how do we assess them?

FEEDBACK

5

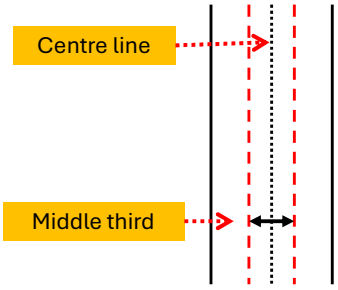
5

Assessing the extent of lateral instability in walls

6

The ‘middle’ third rule

To assess the wall properly, the extent of the bulge needs to be assessed. The ‘middle third’ rule is often used. Although it is sometimes not practical to use this method on pre-sale surveys, understanding this approach can help you make broad based assessments and with practice, this method can help give you and your client a good approach to assessment.



If the centre line of a bulging wall falls outside the middle third, then the stability of the wall may be under threat.

Another way of thinking about the rule is if the wall is vertically leaning or bulging by more than one sixth of it’s thickness, then stability may be threatened.

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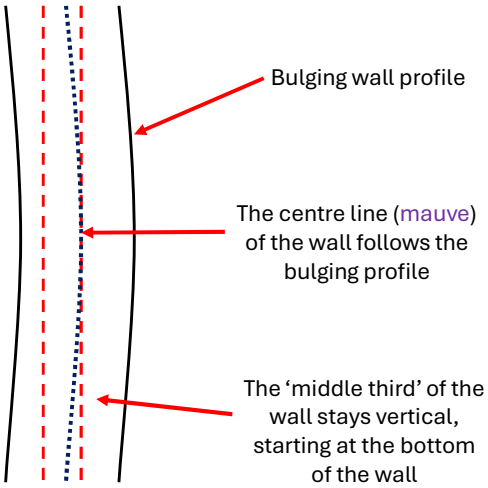
This diagram shows how the theoretical centre line of a bulging wall can fall outside the ‘middle third’ – Method ‘A’



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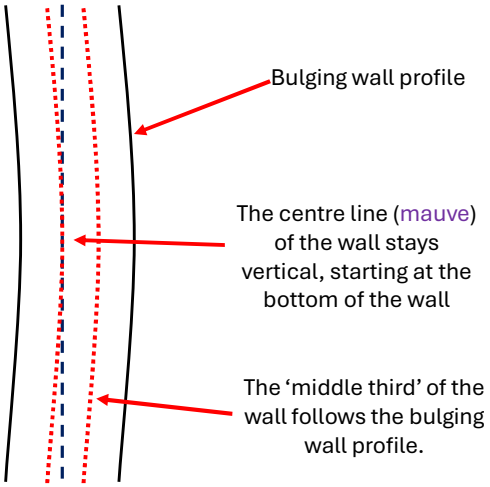
This diagram shows how the theoretical centre line of a bulging wall can fall outside the 'middle third' – Method 'B'



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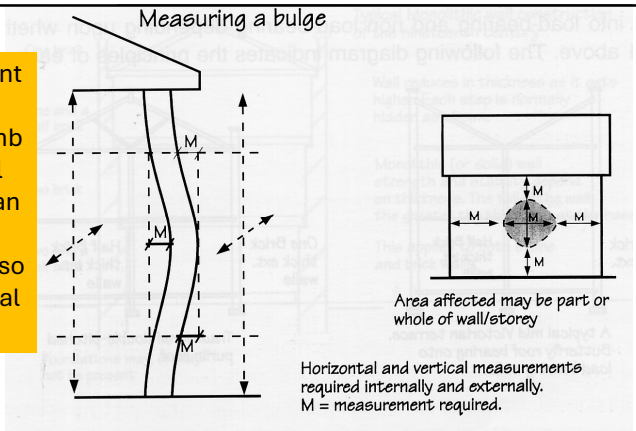
To properly assess the extent of the problem, precise measurements from a plumb line to the face of the wall must be taken. This data can be used to outline the 'contours' of the bulge and so help determine any remedial work



Example – for a 225mm thick wall, the width of the middle third will be 75mm:

If the wall is between 0 – 37.5mm out of vertical – it may not be a problem.

If wall is more than 37.5mm out of vertical – the wall may need restraining to stop it getting worse and possibly collapsing.

If wall is more than 75mm out of vertical, stability is likely to be threatened and significant works such as 'Helifixing', partial or complete rebuilding is likely to be required.

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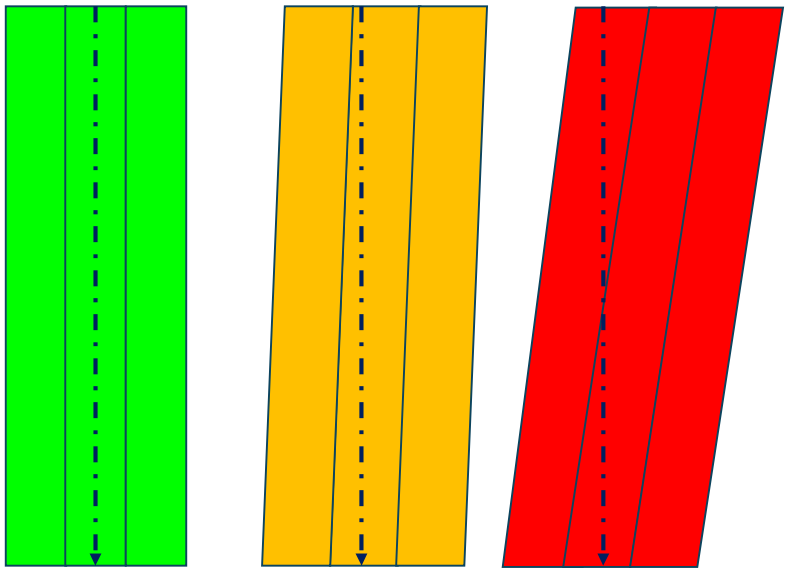
Middle third rule – also used for leaning walls



Compliant | Compliant…just | Compliant…NOT!

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An example of typical signs, symptoms and practical diagnosis

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Some problems are more obvious than others!
This wall has been a problem for some time. The top section has been rebuilt at some time in the past.
What feature of the property may have contributed to the distortion?
These ‘raking shores’ are meant to be holding the wall in place but appear to be poorly constructed.

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Some problems are more obvious than others!
This wall has been a problem for some time. The top section has been rebuilt at some time in the past.
The original lime and sand chimney flue ‘parging’ has failed, allowing salts, condensates and tar to cause deterioration in the masonry – any bond between the chimney breast and gable has failed

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This view shows the bulge more clearly. The building is so distorted that rebuilding will be the only option
Assessment can be done, with practice, by eye

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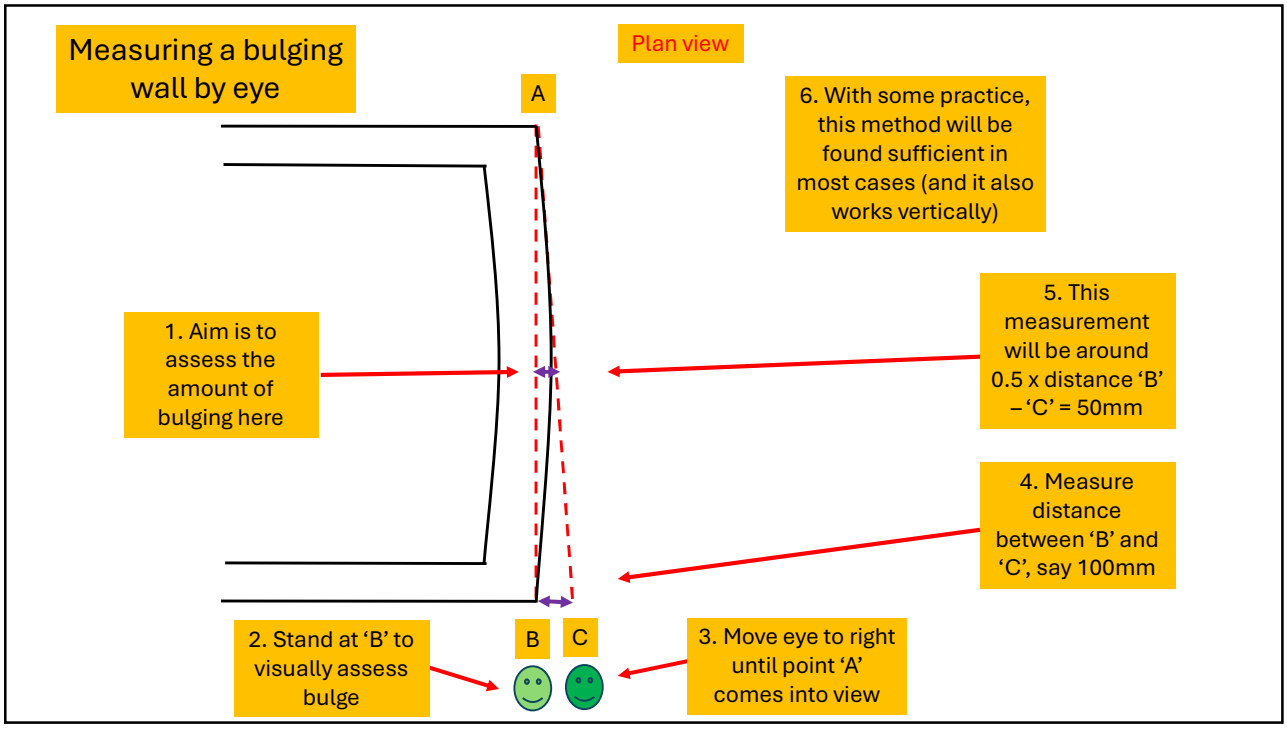
Measuring a bulging wall by eye
Plan view
A
6. With some practice, this method will be found sufficient in most cases (and it also works vertically)
1. Aim is to assess the amount of bulging here
5. This measurement will be around 0.5 x distance 'B' – 'C' = 50mm
4. Measure distance between 'B' and 'C', say 100mm
2. Stand at 'B' to visually assess bulge
B
C
3. Move eye to right until point 'A' comes into view

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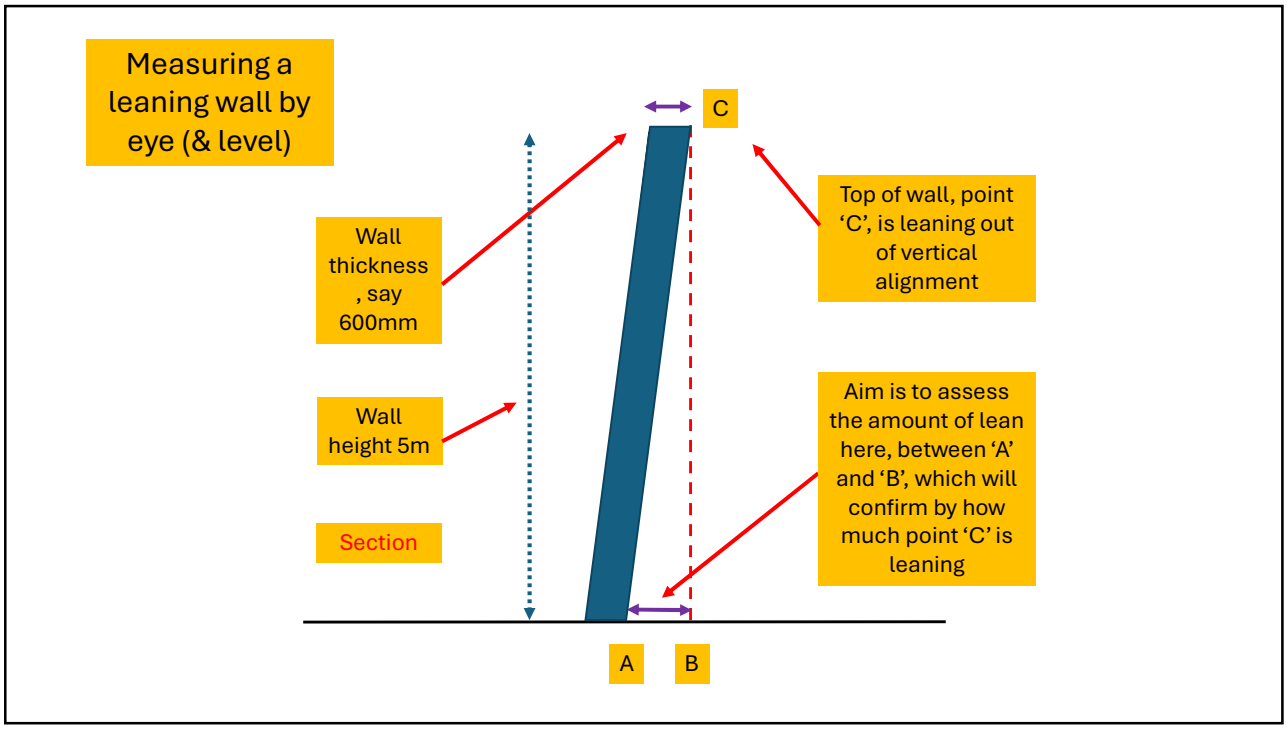
Measuring a leaning wall by eye (& level)
C
Top of wall, point 'C', is leaning out of vertical alignment
Wall thickness, say 600mm
Wall height 5m
Aim is to assess the amount of lean here, between 'A' and 'B', which will confirm by how much point 'C' is leaning
Section
A
B

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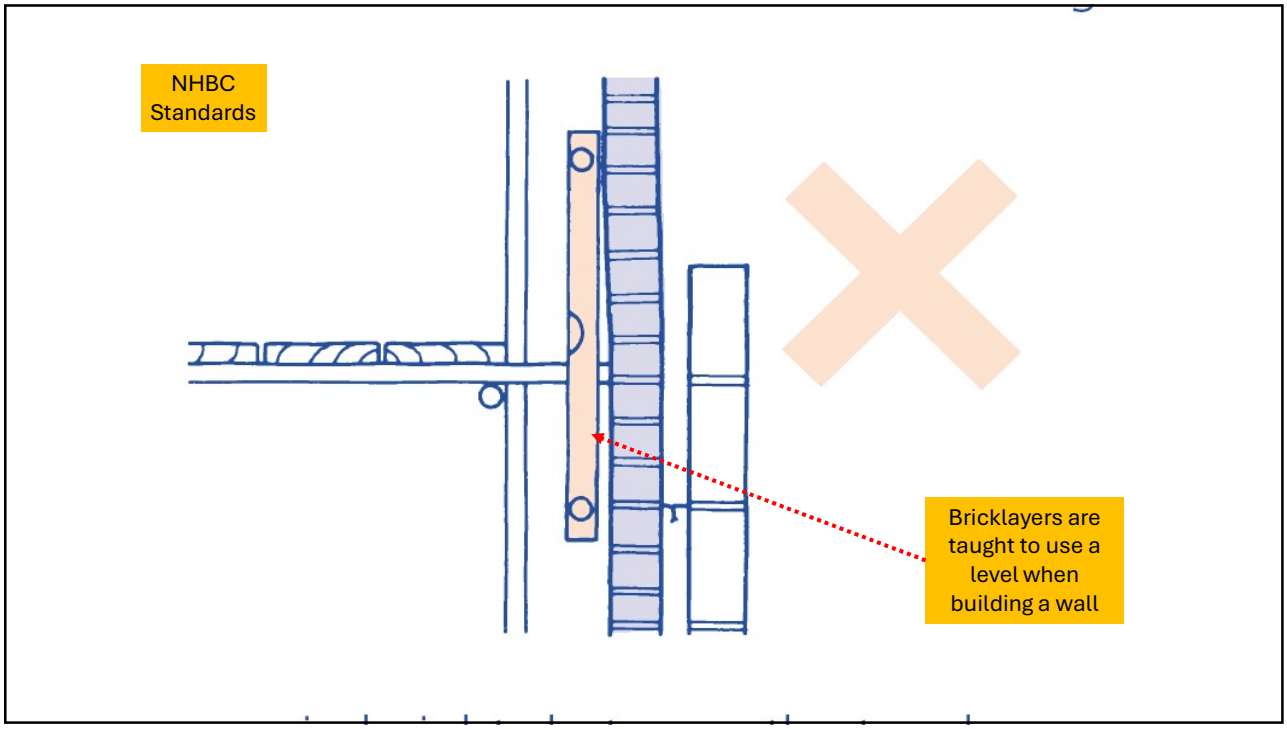
NHBC Standards
Bricklayers are taught to use a level when building a wall

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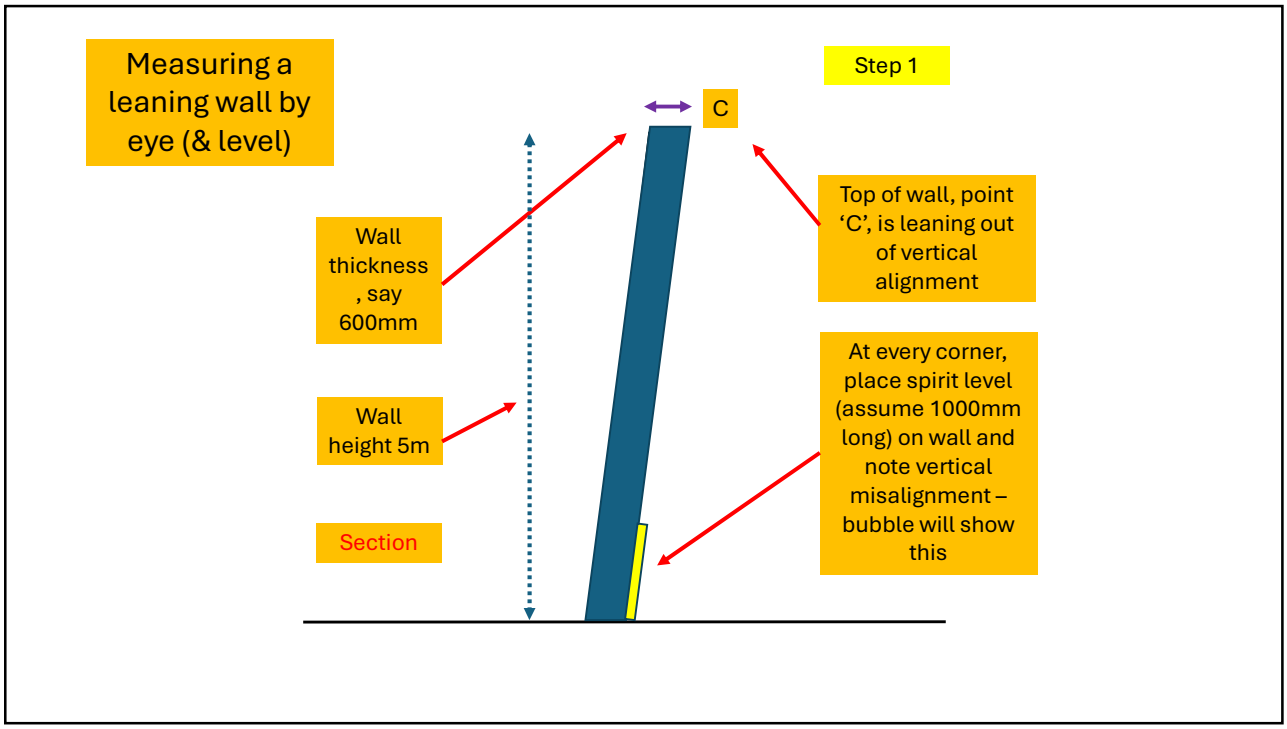
Measuring a leaning wall by eye (& level)
Step 1
C
Top of wall, point 'C', is leaning out of vertical alignment
Wall thickness, say 600mm
Wall height 5m
Section
At every corner, place spirit level (assume 1000mm long) on wall and note vertical misalignment – bubble will show this

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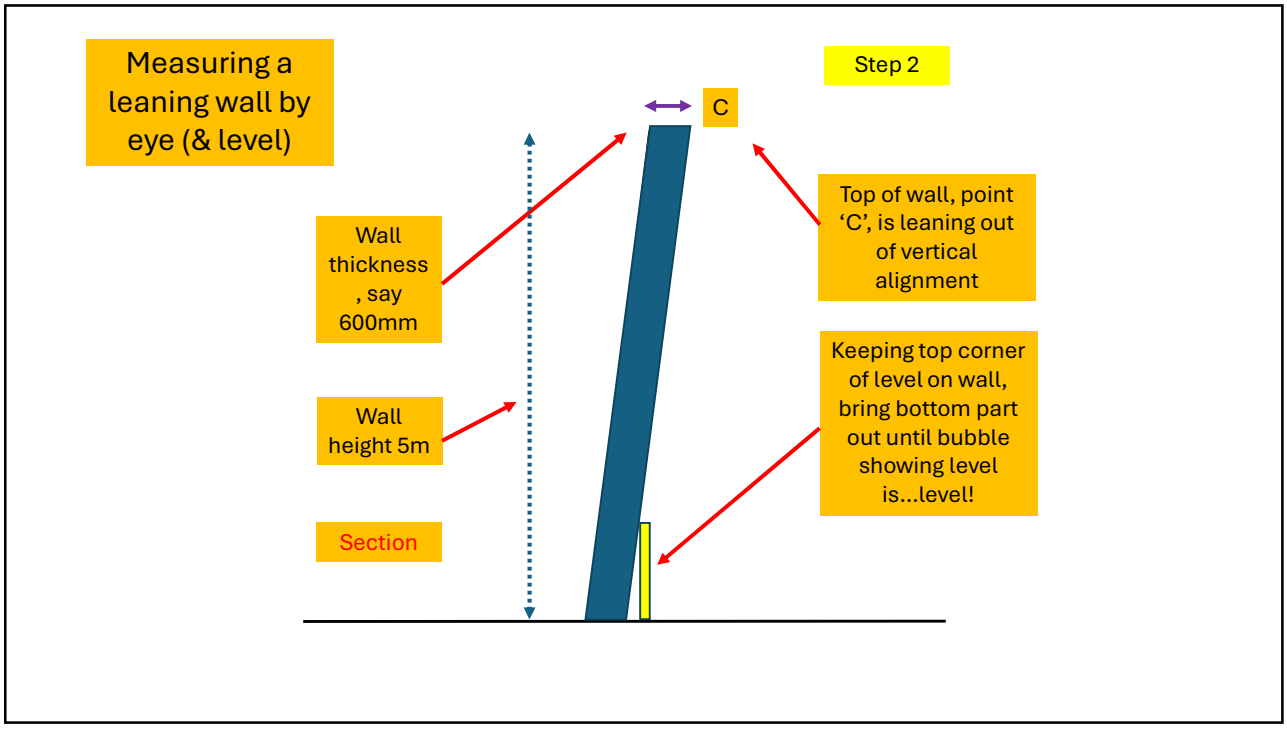
Measuring a leaning wall by eye (& level)
Step 2
C
Top of wall, point 'C', is leaning out of vertical alignment
Wall thickness, say 600mm
Wall height 5m
Section
Keeping top corner of level on wall, bring bottom part out until bubble showing level is...level!

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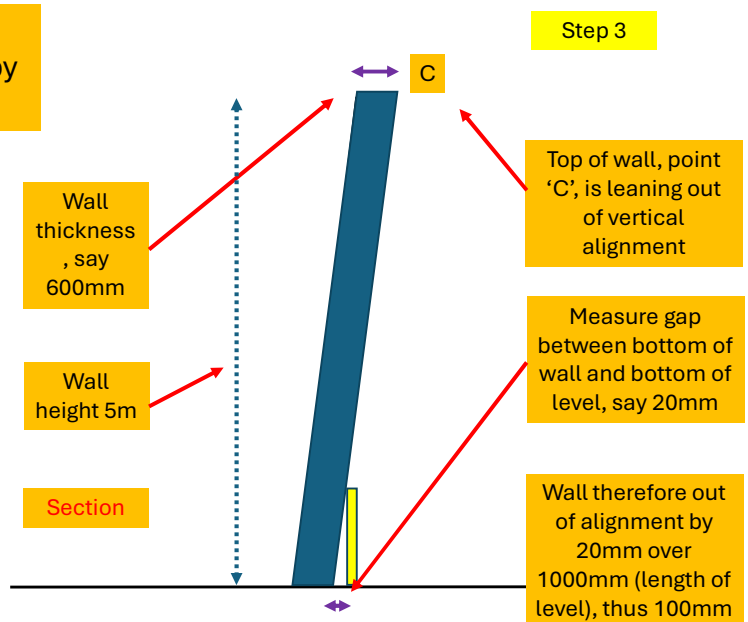
Measuring a leaning wall by eye (& level)



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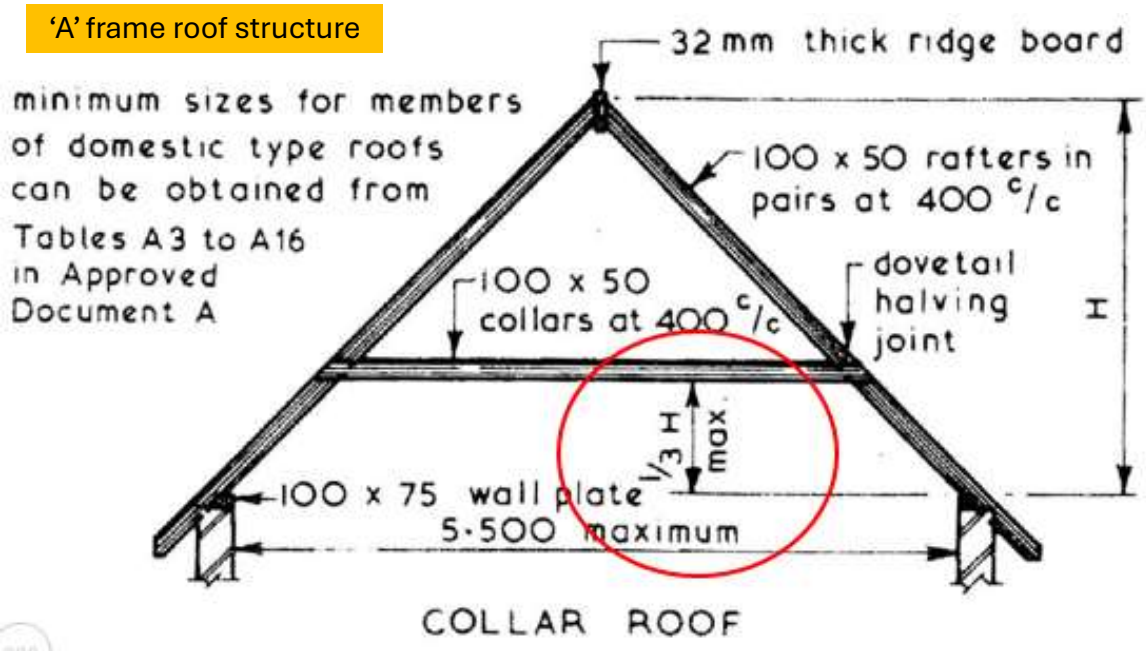
'A' frame roof structure



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3.6.4 Recording all reasonably available information

HSS 2

The RICS member or RICS-regulated firm **must** keep a record of the inspection of the property and local area (traditionally known as 'site notes') for as long as is legally required. The RICS member or RICS-regulated firm **must** ensure that the information is in a format to allow for subsequent reflection before and during preparation of the report for the client. See sections 3.1 and 3.7.

The amount of recorded information will depend on the Level of Service but **must** include all information relevant to the instruction. Examples include:

- any material information and other relevant information obtained from the vendor, occupier, agent, neighbours or others
- the form of construction and materials, condition, defects, deficiencies, personal hazards, risks to the property, legal issues, any other matter(s) where relevant to the Level of Service and circumstances of inspection (including any limitations)
- the nature, position and results of checks (e.g. moisture meter or spirit level readings) made to the fabric, structure and other parts as necessary (e.g. building services) and what was found – see Fryer v Bunney (1982) 2 EGLR 130
- appropriate dimensions (e.g. thickness of walls or timber sizes) and diagrams (e.g. a sketch of an elevation with damage and crack patterns), sketch plans (e.g. a plan of the site, or annotated floor plans) – also see section 5.3
- any images captured during the inspection –photographs and videos are helpful for reflection during preparation of the report but are supplementary to the process and **must not** be used as an alternative or a substitute for the physical inspection that the signatory of the report **must** carry out.

Level 2 Services on additional risk properties and all Level 3 Services will include more detailed assessments of the property when compared with a typical Level 2 Service for a conventional property – the amount of recorded information will therefore be greater.

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Walls external

Level of Service	Parts usually inspected and minimum level of inspection
General	Type and nature of walls, materials and construction form (e.g. solid, cavity, structural frame, brick, stone, render, mortar, cladding, concrete, timber, MMC, insulation, DPC), parapets including copings and damp-proofing, lintels, openings, sub-floor ventilation and ground levels.
Level 1	Visual inspection.
Level 2	As Level 1, including checking for distortion, e.g. using optical instrument such as a spirit level, using ladders where appropriate and tapping finishes such as render, taking care not to damage the property.
Level 3	As Level 2, using an optical instrument at corners and regular intervals on longer elevations. Use a probe to check condition of representative sample of materials.

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Walls and partitions internal

Level of Service	Parts usually inspected and minimum level of inspection
General	Type and nature of materials (e.g. brick, block, stone, timber, plaster) and construction form (e.g. solid, studwork), party and gable walls (including in roof spaces and voids), internal surfaces of external walls, internal walls and finishes (e.g. plaster, dry-linings). Note previous alterations and potential impact on remaining structures.
Level 1	Visual inspection, especially parts likely to be at greater risk of moisture, e.g. cold bridges.
Level 2	As Level 1, including checking moisture levels and for evidence of salt contamination or damage (e.g. tapping plaster finishes) or similar in identified locations to all wall surfaces and attached timbers, e.g. skirtings, as required, especially parts likely to be at greater risk, e.g. beneath parapets, in basements or similar; and of appropriate dimensions.
Level 3	As Level 2, including checking at more regular intervals, e.g. 1m centres for moisture.

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Following the trail

A4 Following the trail

The RICS member or RICS-regulated firm must follow the 'trail of suspicion' for all Levels of inspection, as required by common law principles (see *Roberts v J Hampson* & Co [1989] and *Hart v Large* [2021]).

Examples of following the trail include carrying out a more thorough inspection than is outlined within this Appendix for each element, such as making more regular checks for distortion with a spirit level or checking more often where moisture problems are suspected based on visual or other evidence or the moisture readings found. The justification for following the trail and the extent of that trail will in most instances be informed by the RICS member's and/or the RICS-regulated firm's 'required professional knowledge'.

Case law backs up use of a spirit level

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Scott v Sheppard 2016

Helps demonstrate the importance of careful checking

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Scott v Sheppard 2016

- This case relates to advice given by a Structural Engineer, following a referral for further investigation in a HBR (level 2 report) by a Chartered Surveyor.
- It relates to a property in Hastings that was ultimately demolished and rebuilt, because of the extent of structural movement, mostly tilt (or '*rigid body rotation*') it had suffered.
- Purchased 2011
- Rebuilt 2013 – 14

April 2009 Original

August 2016 Rebuilt

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Scott v Sheppard 2016 cont'd

- Whilst as with all cases there were many issues that were argued and considered, the fact that the Structural Engineer made no reference to the tilt was ultimately damning. The claimants' expert had measured the tilt in several areas and specifically referenced his findings to the advice given in BRE Digest 475. The Judge commented as follows:
- *"Mr Cockayne's approach to BRE Guidance on tilting walls in buildings was, in my judgment, verging on the cavalier at times. BRE Digest 475 "Tilt of low-rise buildings" carefully explains the considerations of tilt in existing buildings. Table 2 "indicative values for tilting of low-rise housing" sets out different classifications, and the most extreme is "Ultimate limit" at 1/50 (or more severe). This states:*
- *"If tilt reaches this level, the building may be regarded as in a dangerous condition, and remedial action either to re-level or to demolish the building will be required urgently."*

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Scott v Sheppard 2016 (cont'd) – a costly claim

- Judge's quote:
- *"…applying the terms of the BRE Digest, that building has reached (if not well exceeded) it's 'ultimate limit'. Table 2 in the Digest makes it clear that for this amount of tilt, the building may be regarded as in a dangerous condition….*
- *…Mr Sheppard's approach to this subject is therefore, in my judgment, outside the range permissible of a Structural Engineer exercising reasonable care and skill. The fact that the building in question has not yet fallen down is no answer."*
- ……property bought for £247,000 – Judge awarded damages totalling £203,092.18 + interest.

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Scott v Sheppard 2016 – how the tilt was measured

- In Scott v Sheppard the defence tried to discredit the measurements quoted by the claimant's engineer, because they were taken with a spirit level rather than a plumb bob. This was successfully defended by reference to BRE 343 & 344 which references spirit levels as suitable equipment.
- The Judge commented:
- "*The fact that there are other methods available does not mean that a spirit level does not give accurate, or broadly accurate, measurements. I find that in this case it was appropriate to measure the building in the way that Mr Taylor did.*"
- (Mr Taylor was the expert for the claimants)

Moral of the sory – use one of these

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Continuing CPD obligations are applicable to all RICS members and RICS-regulated firms. There is an expectation that practical learning and knowledge relevant to the Level of Service and property type will be supplemented by study of a wide range of technical literature and knowledge of related issues, for example:

2.3 Qualifications, competence and experience

- this professional standard
- BRE Digests, e.g. 245, 251 and 475
- Investigation of moisture and its effects on traditional buildings – principles and competencies – joint position statement, 1st edition
- sustainability issues, thermal performance of materials, cold-bridging, EPCs, etc.
- basic construction, building services and building pathology knowledge; paying special attention to issues most clients deem important such as structural movement, roof coverings and structures, and excessive moisture levels
- heritage issues
- legal issues
- information about relevant local and/or regional issues, e.g. environmental matters such as soil types, flooding, radon, knowledge of local stone types for older and historic properties
- any other relevant knowledge required for the particular instruction and/or client requirement.

The required knowledge, understanding and competence will be broader and deeper for certain property types, especially additional risk properties – see Appendix F. It is very likely RICS members will require practical experience (supplemented by extensive reading, additional mentoring and CPD training, etc.) to acquire a level of knowledge sufficient to ensure satisfactory understanding and competence relating to these property types.

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Bulging and leaning walls

Case studies 1 & 2

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The property is a former village school, built 1840, Grade II 'listed' and in a Conservation Area

Case study 1

Outside walls are of solid, coursed and uncoursed, 'carrstone' (local sandstone) with brick quoins and string courses. There is a chalk 'skin' inside the sandstone. Overall thickness varies between 350 – 600mm including the inside plaster

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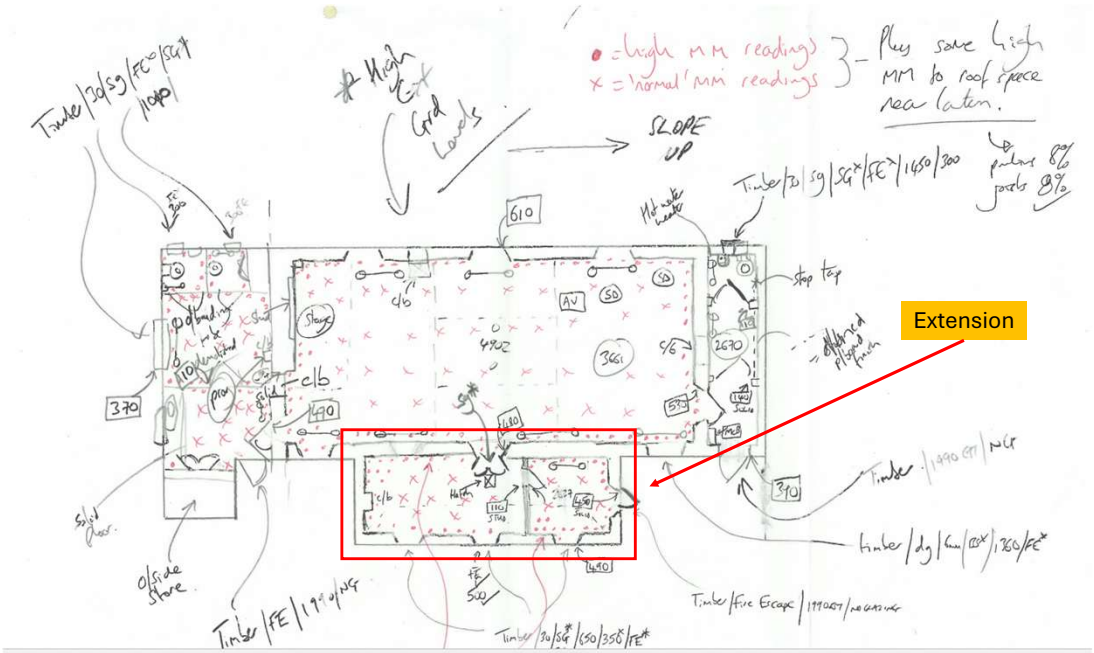

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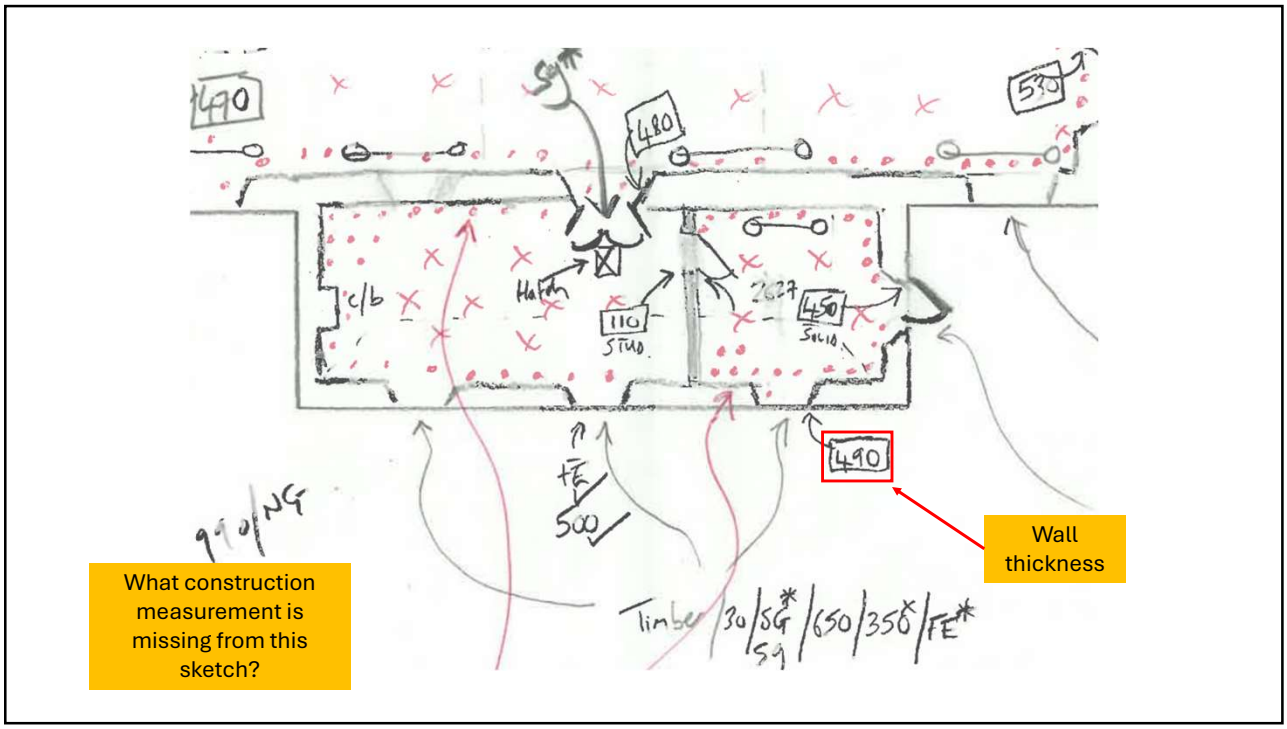
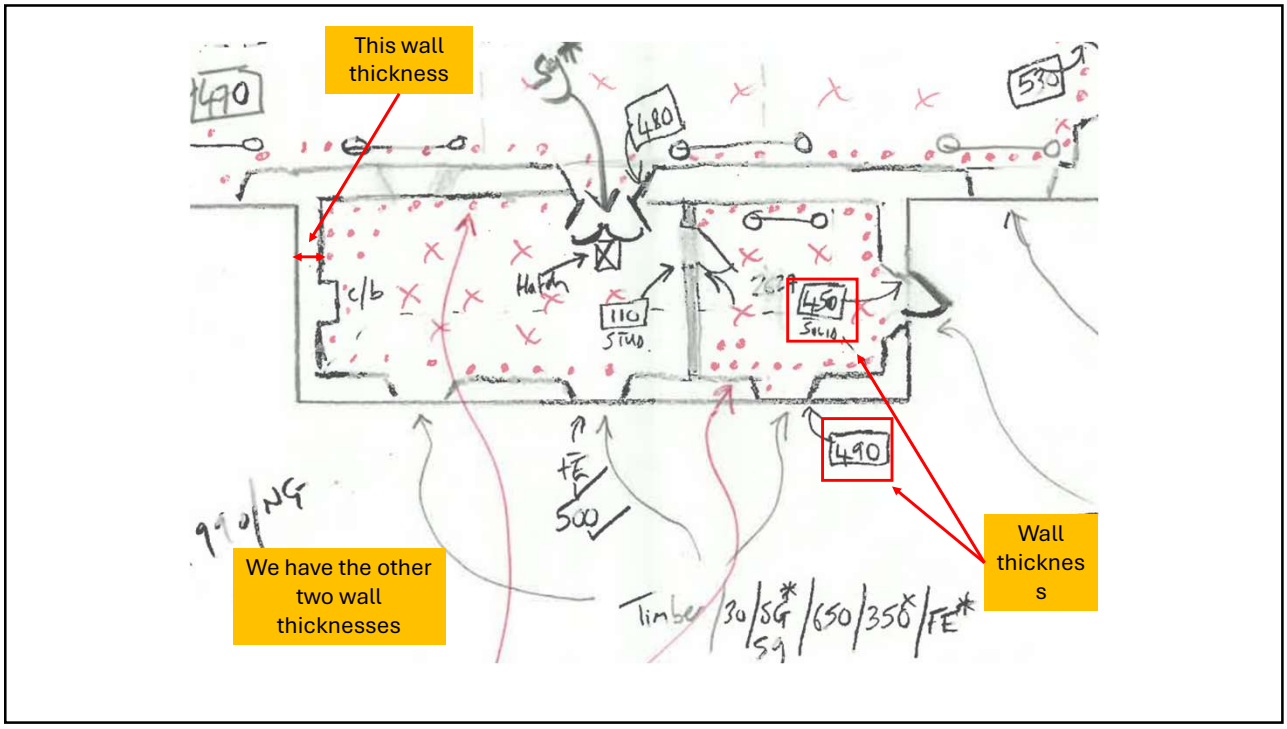
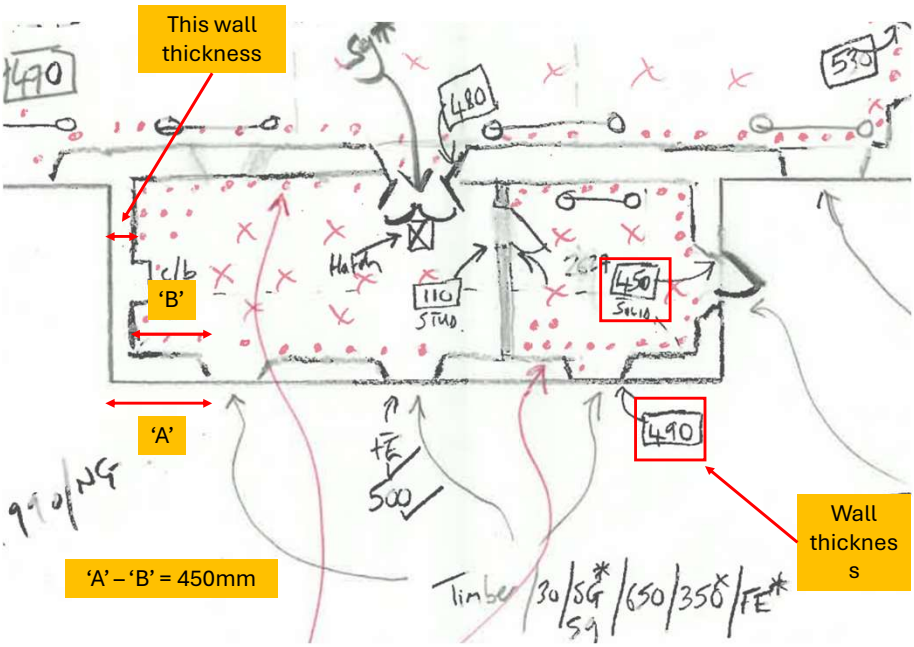

490
480
530
c/b
Hafen
110
STUD
2627
450
Solid
490
FE
500
Timber
What construction measurement is missing from this sketch?
Wall thickness

37


This wall thickness
490
480
530
c/b
Hafen
110
STUD
2627
450
Solid
490
FE
500
Timber
We have the other two wall thicknesses
Wall thicknes s

38


This wall thickness
'B'
'A'
'A' – 'B' = 450mm
Wall thickness

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Pattress plates visible on left-and right-hand elevations
Right-hand (eastern) elevation

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Left-hand (western) elevation obscured by oil storage tank
Front (southern) elevation

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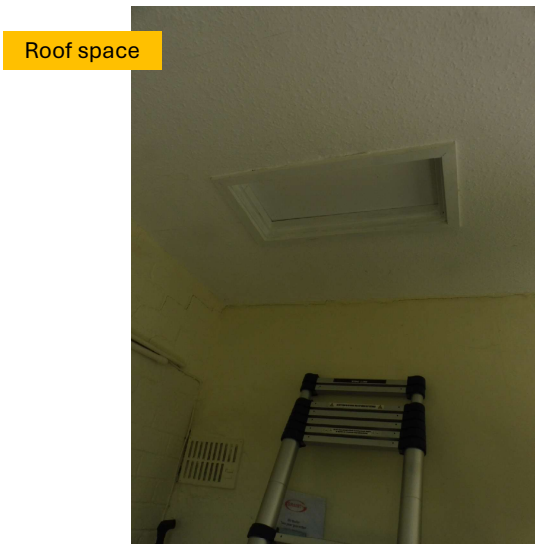
Roof space
Hipped roof, with two timber trusses


Left-hand truss

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Tie bar attached to pattress plates, otherwise unattached to front wall
Inside view of front left room

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Front wall
Inside view of front right room
Stud partition

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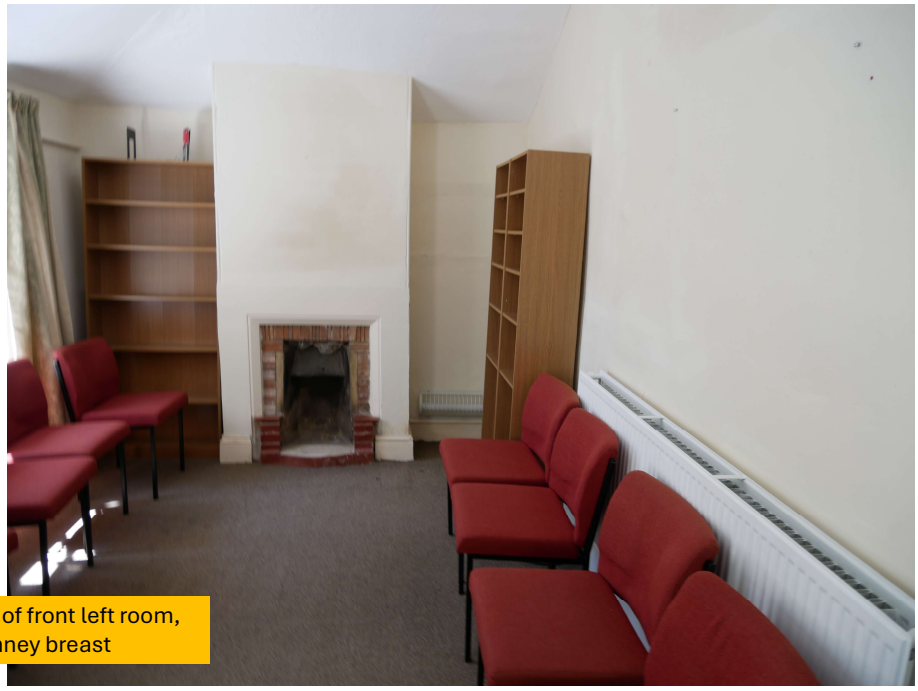

Inside view of front left room, chimney breast

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Defects noted

Case study 1

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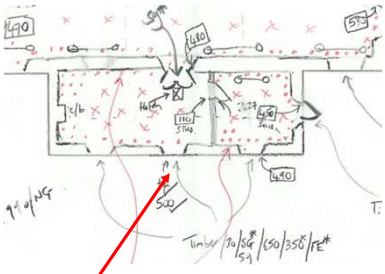
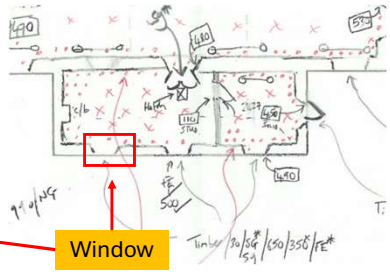
Case study 1



Front wall has bulged at eaves level

This can be seen by looking along the line of the gutter and the top string course of the wall

47



Window

Wall is bulging at eaves level and therefore leaning outwards

The lean has caused the window sash to lean outwards, when open

Total amount of bulge is around 125mm at eaves level

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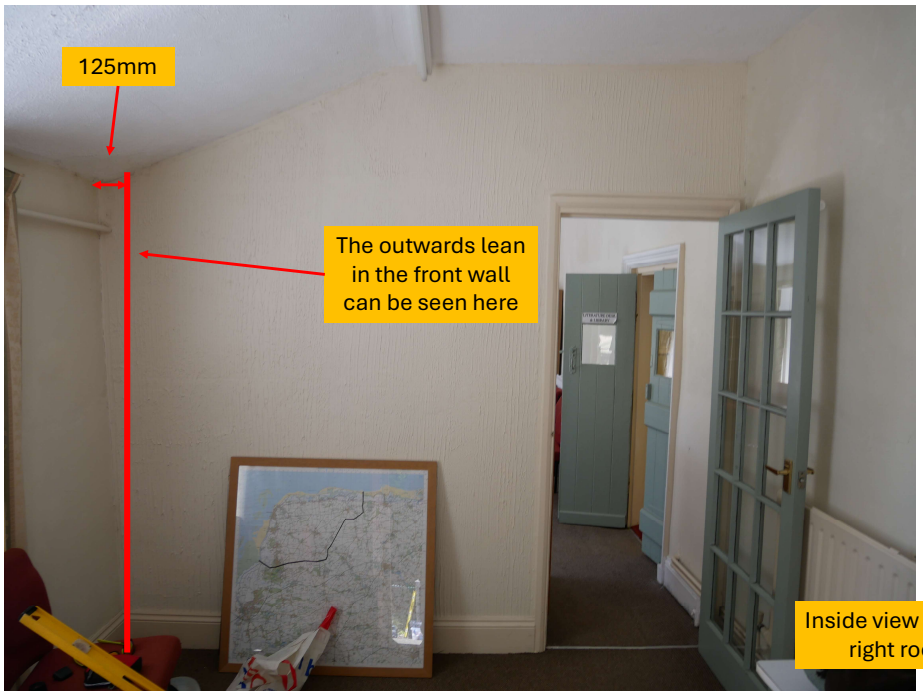
125mm
The outwards lean in the front wall can be seen here
Inside view of front right room

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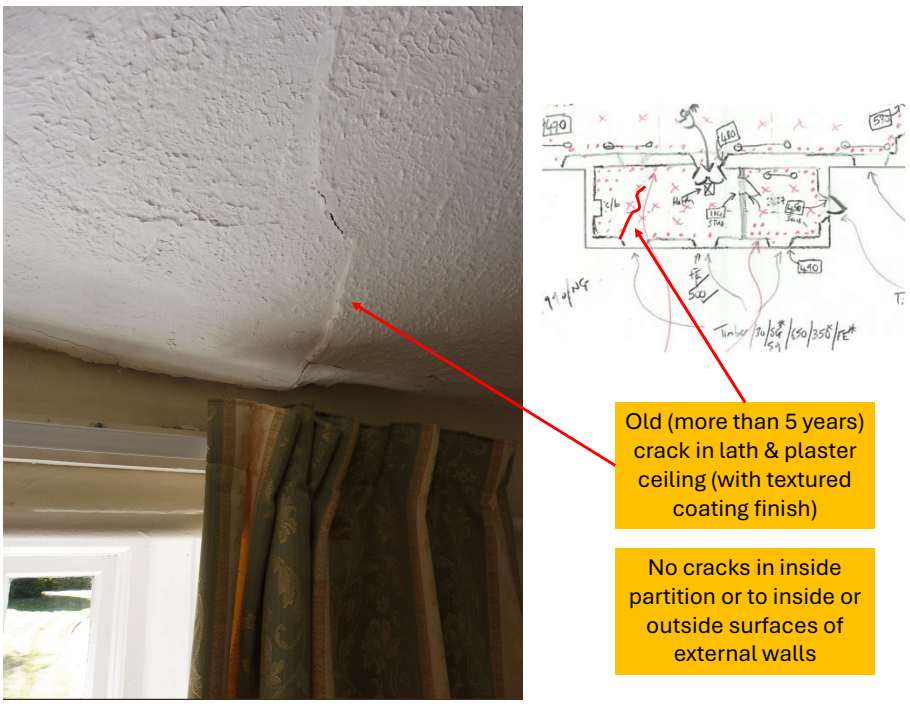
Old (more than 5 years) crack in lath & plaster ceiling (with textured coating finish)
No cracks in inside partition or to inside or outside surfaces of external walls

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Case study 1

Consider the matter carefully (assume no below ground movement) and then, using the 'above ground movement *protocol*', answer the following questions for each defect:

1. What is the cause of the movement?
2. Is the defect likely to get worse?
3. What is the Condition Rating?

Then consider some paragraphs that would go into the report

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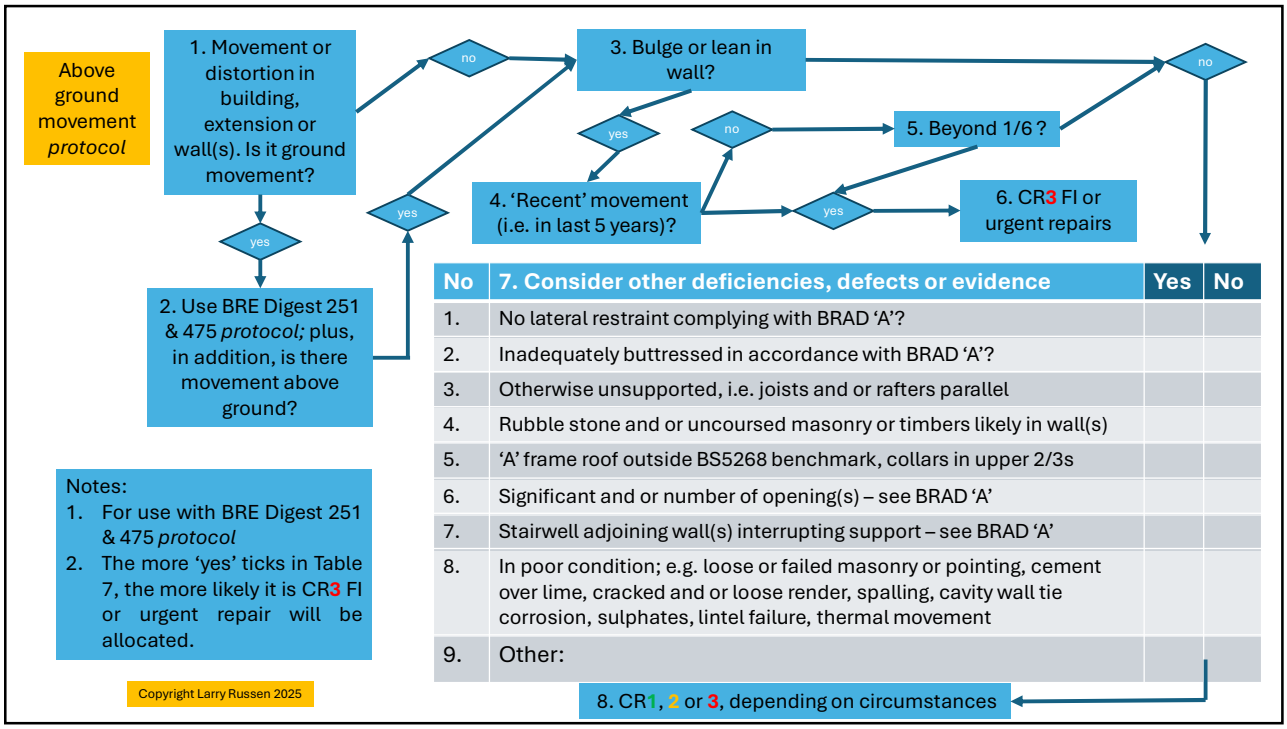

No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsupported, i.e. joists and or rafters parallel		
4.	Rubble stone and or uncoursed masonry or timbers likely in wall(s)		
5.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s		
6.	Significant and or number of opening(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

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Case study 1

Consider the matter carefully (assume no below ground movement) and then, using the 'above ground movement *protocol*', answer the following questions for each defect:

1. What is the cause of the movement?
2. Is the defect likely to get worse?
3. What is the Condition Rating?

Then consider some paragraphs that would go into the report

FEEDBACK

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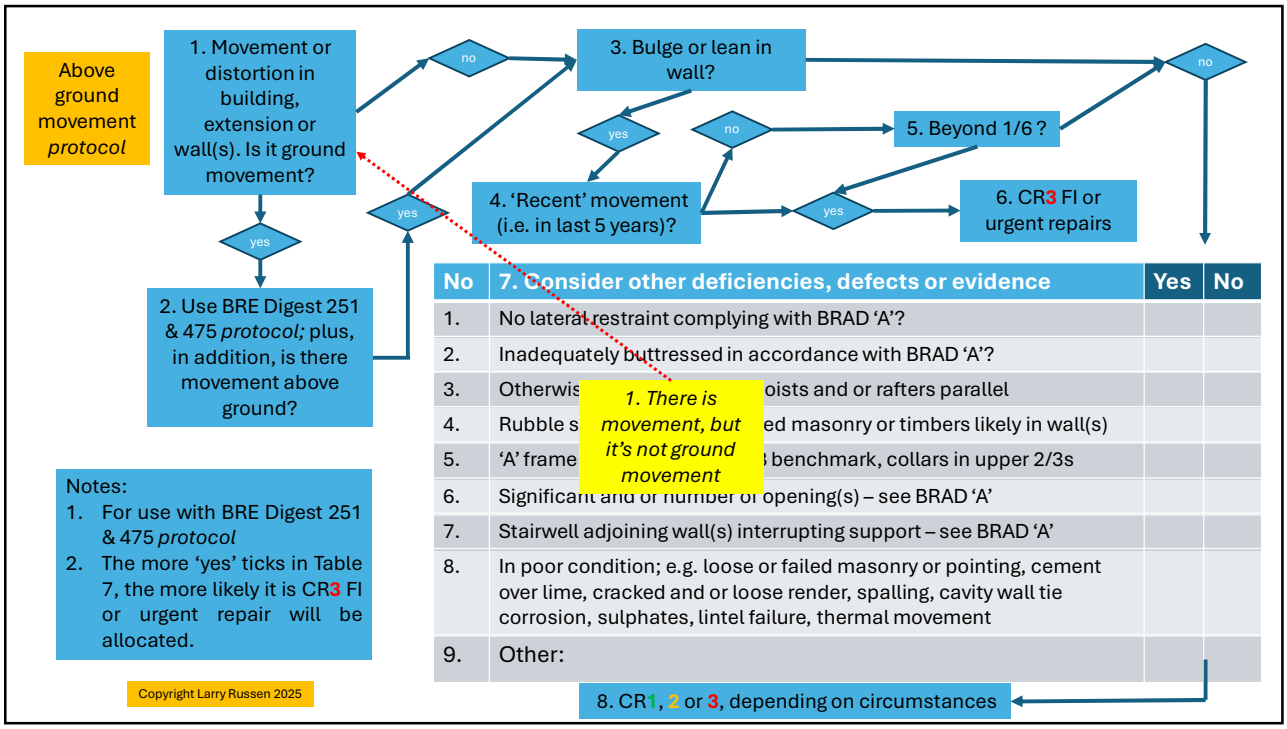
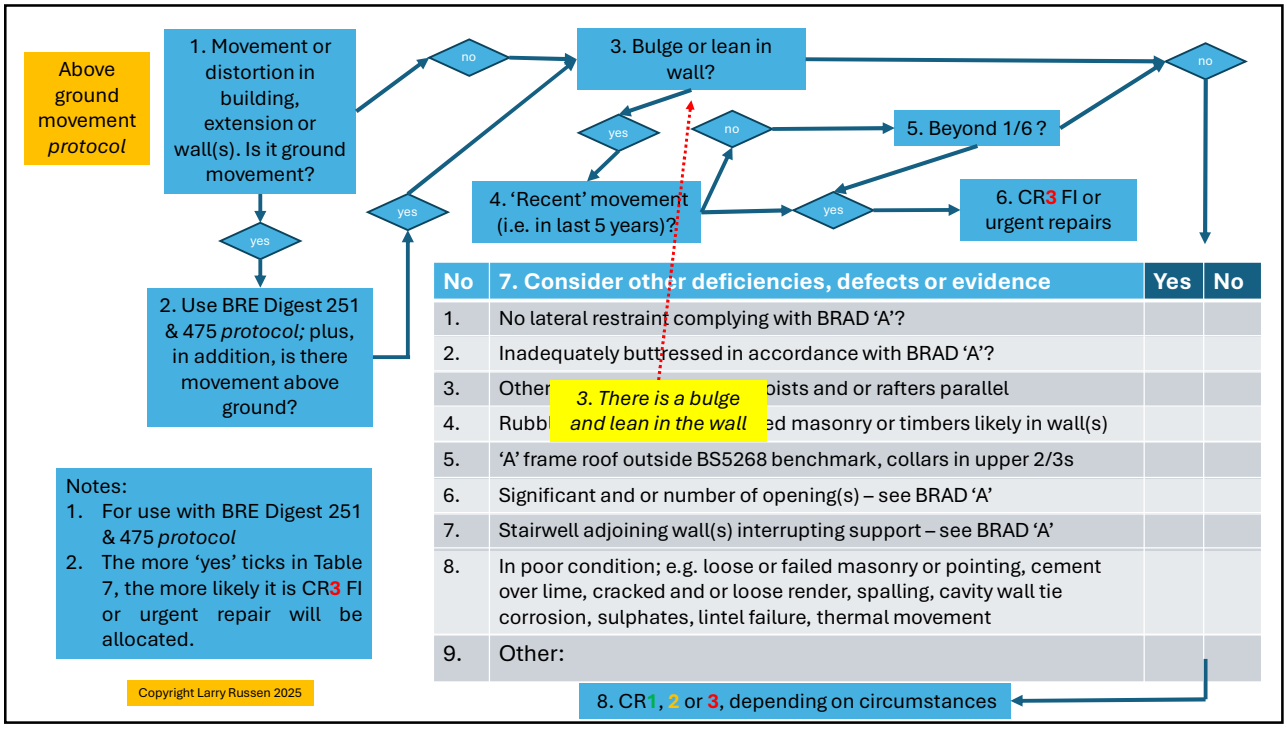


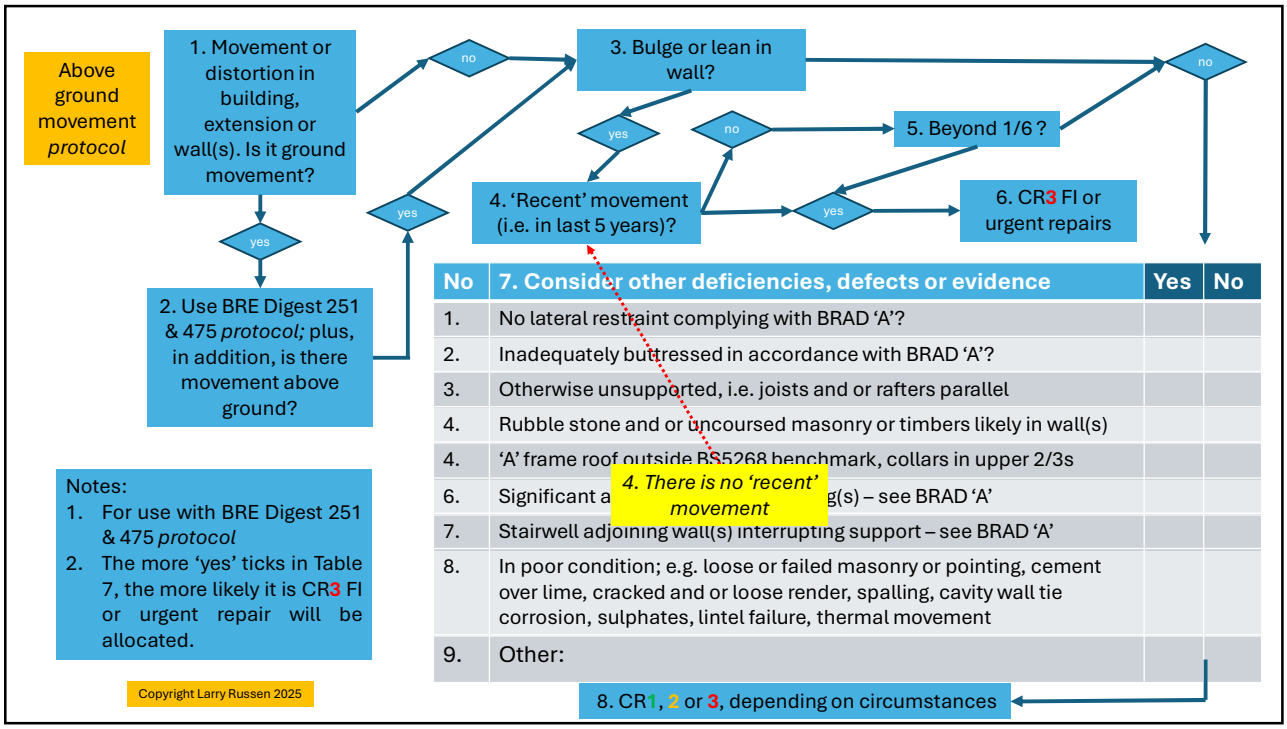
No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwis…oists and or rafters parallel		
4.	Rubble s…ed masonry or timbers likely in wall(s)		
5.	'A' frame…benchmark, collars in upper 2/3s		
6.	Significant and or number of opening(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

55



No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Other…oists and or rafters parallel		
4.	Rubbl…ed masonry or timbers likely in wall(s)		
5.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s		
6.	Significant and or number of opening(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

56



No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsupported, i.e. joists and or rafters parallel		
4.	Rubble stone and or uncoursed masonry or timbers likely in wall(s)		
4.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s		
6.	Significant a g(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

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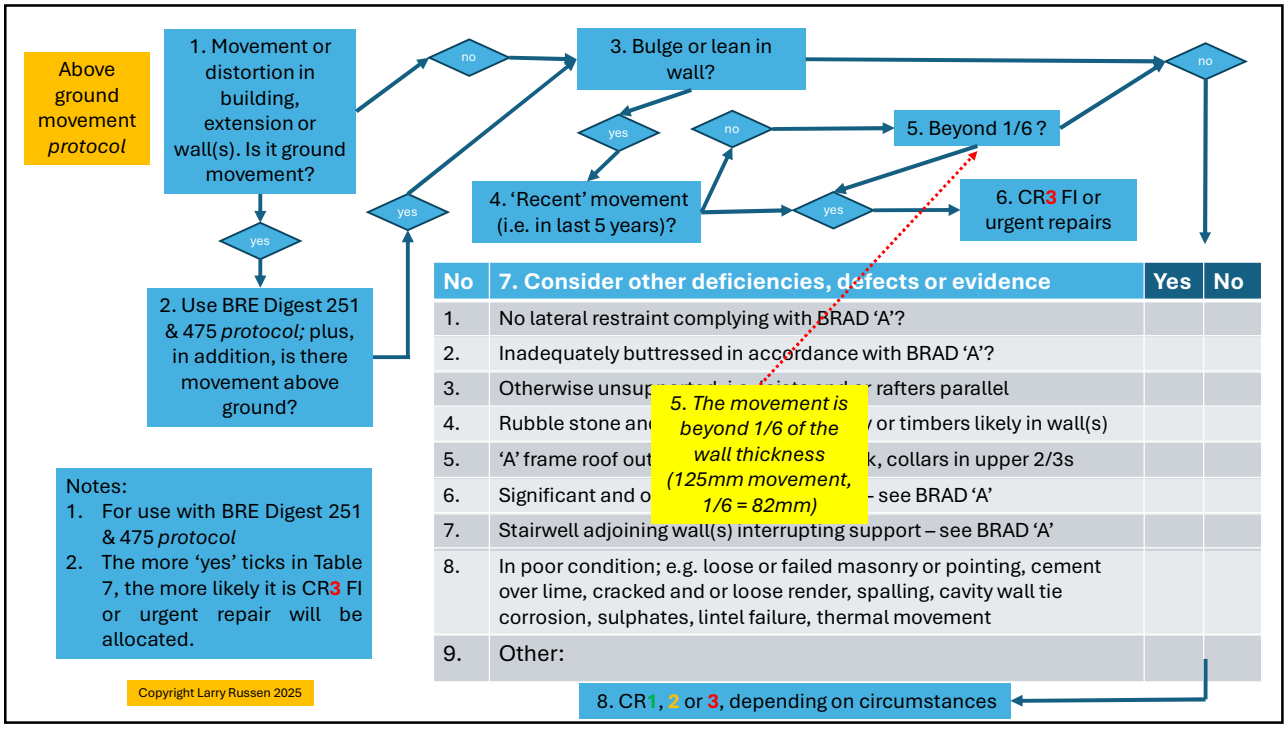
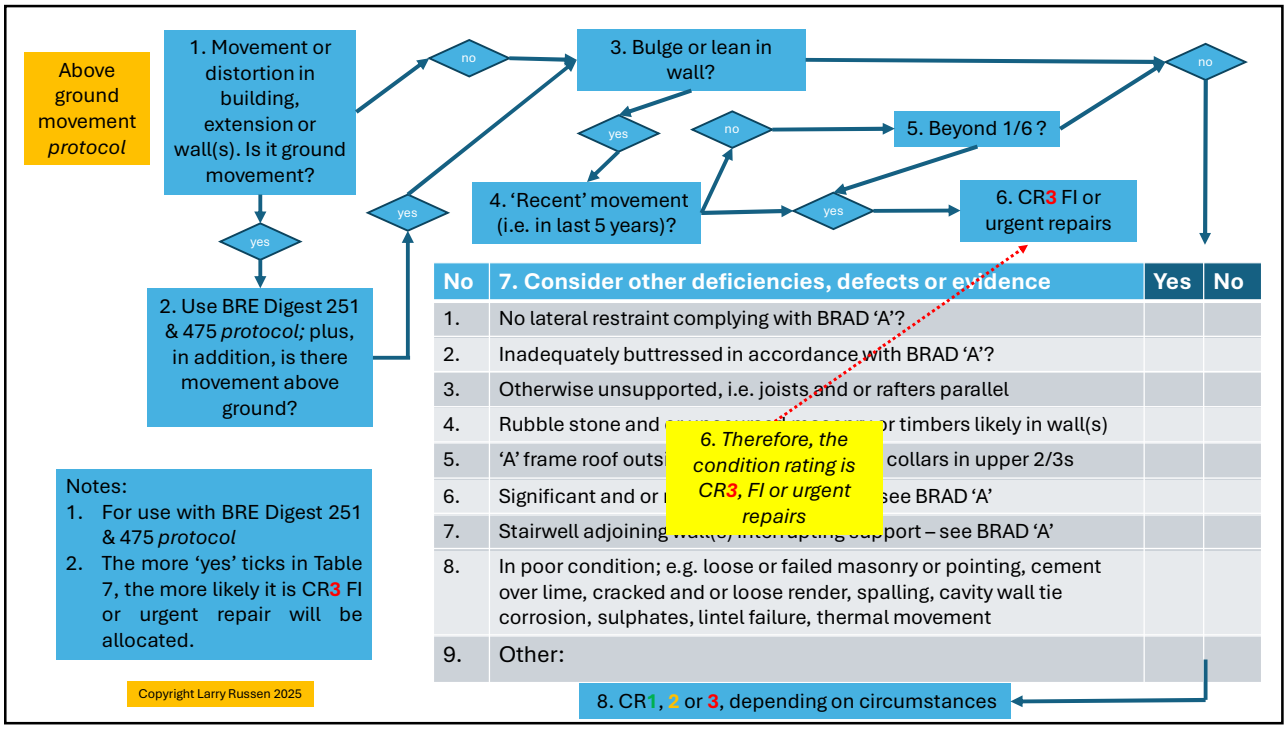


No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsup rafters parallel		
4.	Rubble stone an or timbers likely in wall(s)		
5.	'A' frame roof out k, collars in upper 2/3s		
6.	Significant and o - see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

58



No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsupported, i.e. joists and or rafters parallel		
4.	Rubble stone and … or timbers likely in wall(s)		
5.	'A' frame roof outs… collars in upper 2/3s		
6.	Significant and or … see BRAD 'A'		
7.	Stairwell adjoining … port – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

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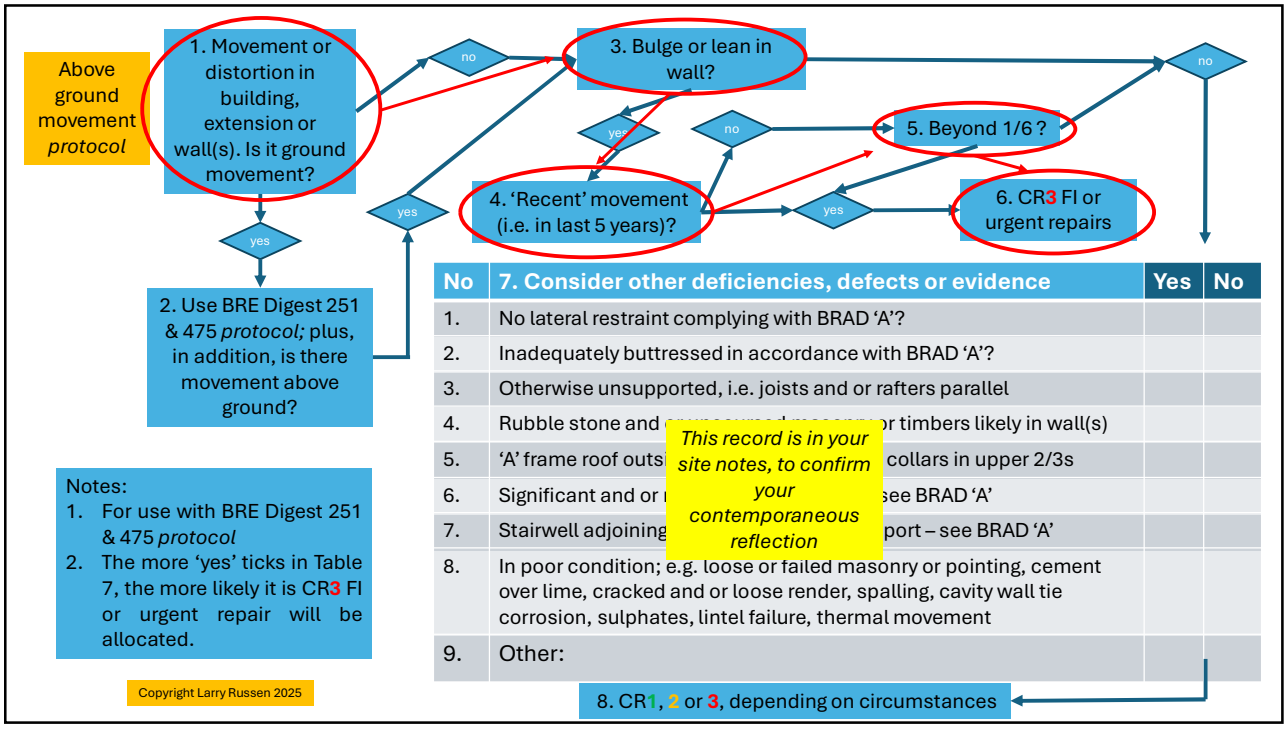

No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsupported, i.e. joists and or rafters parallel		
4.	Rubble stone and … or timbers likely in wall(s)		
5.	'A' frame roof outs… collars in upper 2/3s		
6.	Significant and or … see BRAD 'A'		
7.	Stairwell adjoining … port – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

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Cause of the movement – case study 1

- The roof structure is not 'triangulated' (tie bar and pattress plates are not supporting the front wall);
- The ties to the roof structure are not in the lower '1/3', but in the middle '1/3';
- The 'A' frame roof structure has therefore distorted, and the feet of rafters and trusses have thrust outwards;
- Thereby causing the top of the wall to bulge; and
- The wall generally to lean outwards; so
- Movement is likely to progress, i.e. get worse; thus
- **Condition rating 3**.

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Possible paragraph – case study 1

The outside front wall of the extension has suffered distortion due to bulging and leaning. This is due to the roof structure pushing (thrusting) the top of the outside wall outwards. This has caused some distortion inside (to the ceiling and the walls) and outside. The movement is mainly associated with, and situated around, the weak points in the outside wall, i.e. window openings. In this regard, the works associated with the roof structures (see section dealing with the roof structure) must include further investigation to the lower edges of the roof to ensure the rafters are satisfactorily attached to the timber at the top of the wall, to help prevent further thrust occurring. That work is required now. I cannot yet confirm the exact nature of the work, but it might include, for example, introduction of further timber or metal tie beams, strengthening and improvements to other timbers and or substantial repairs at the bottom of the main tie beams and rafters. Condition rating **3**.

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Defects noted

Case study 2

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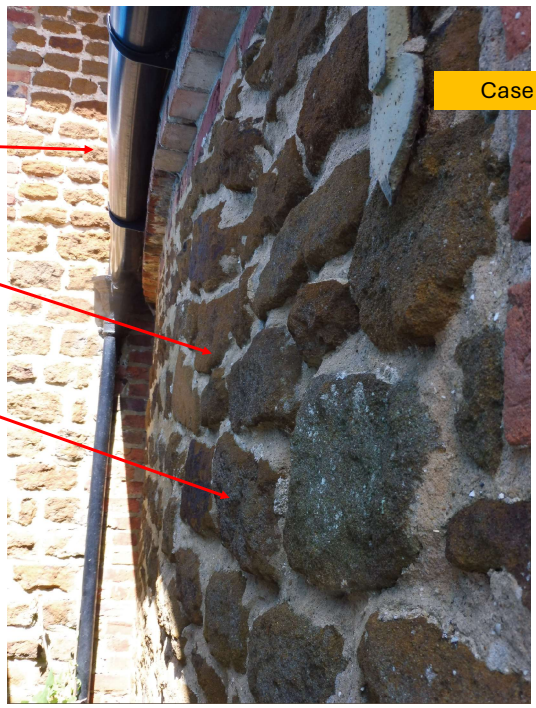


64

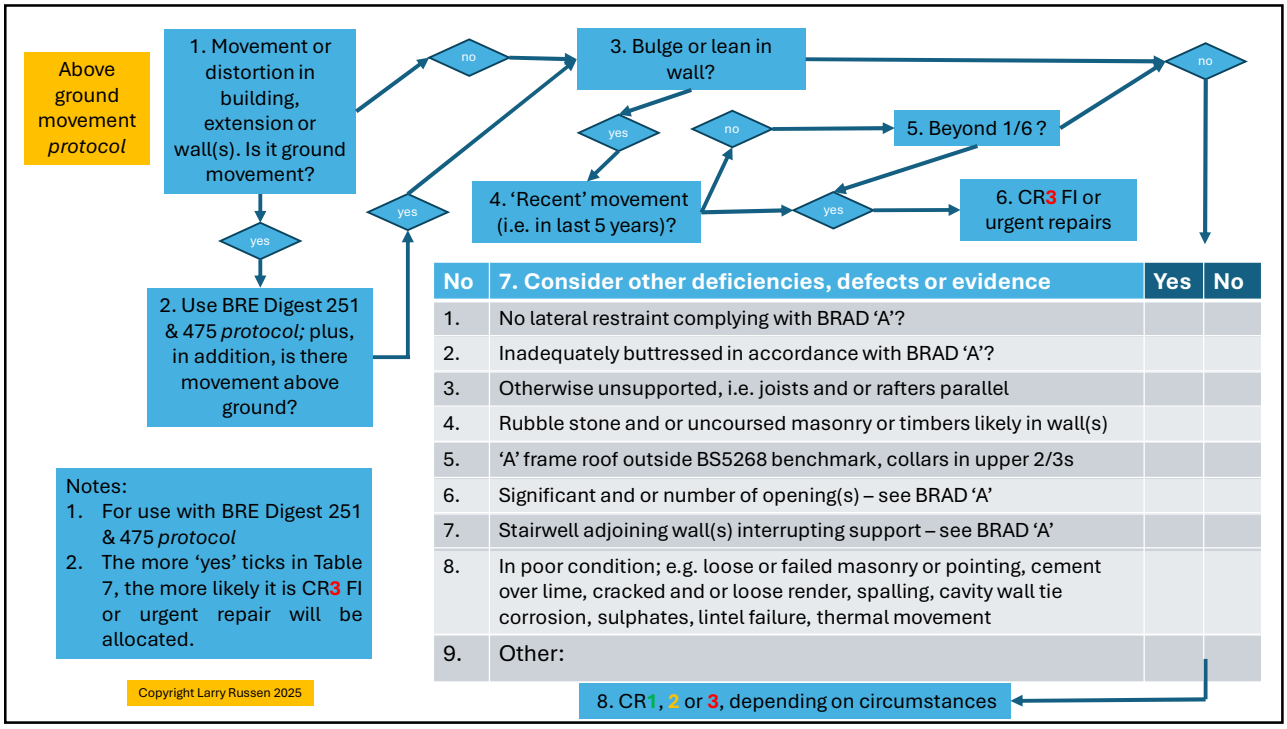
Case study 2

Consider the matter carefully (assume no below ground movement) and then, using the 'above ground movement *protocol*', answer the following questions for each defect:

1. What is the cause of the movement?
2. Is the defect likely to get worse?
3. What is the Condition Rating?

Then consider some paragraphs that would go into the report

65



No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsupported, i.e. joists and or rafters parallel		
4.	Rubble stone and or uncoursed masonry or timbers likely in wall(s)		
5.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s		
6.	Significant and or number of opening(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

66

Case study 2

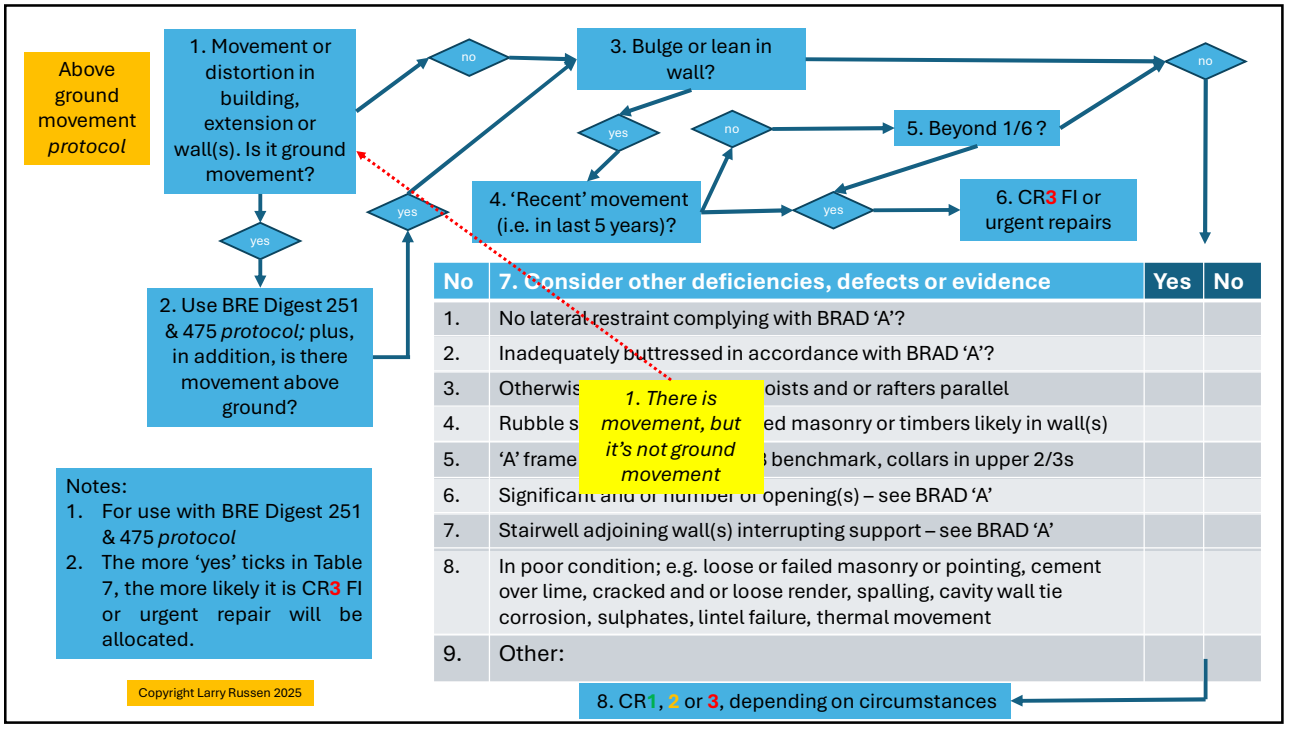
Consider the matter carefully (assume no below ground movement) and then, using the 'above ground movement *protocol*', answer the following questions for each defect:

1. What is the cause of the movement?
2. Is the defect likely to get worse?
3. What is the Condition Rating?

Then consider some paragraphs that would go into the report

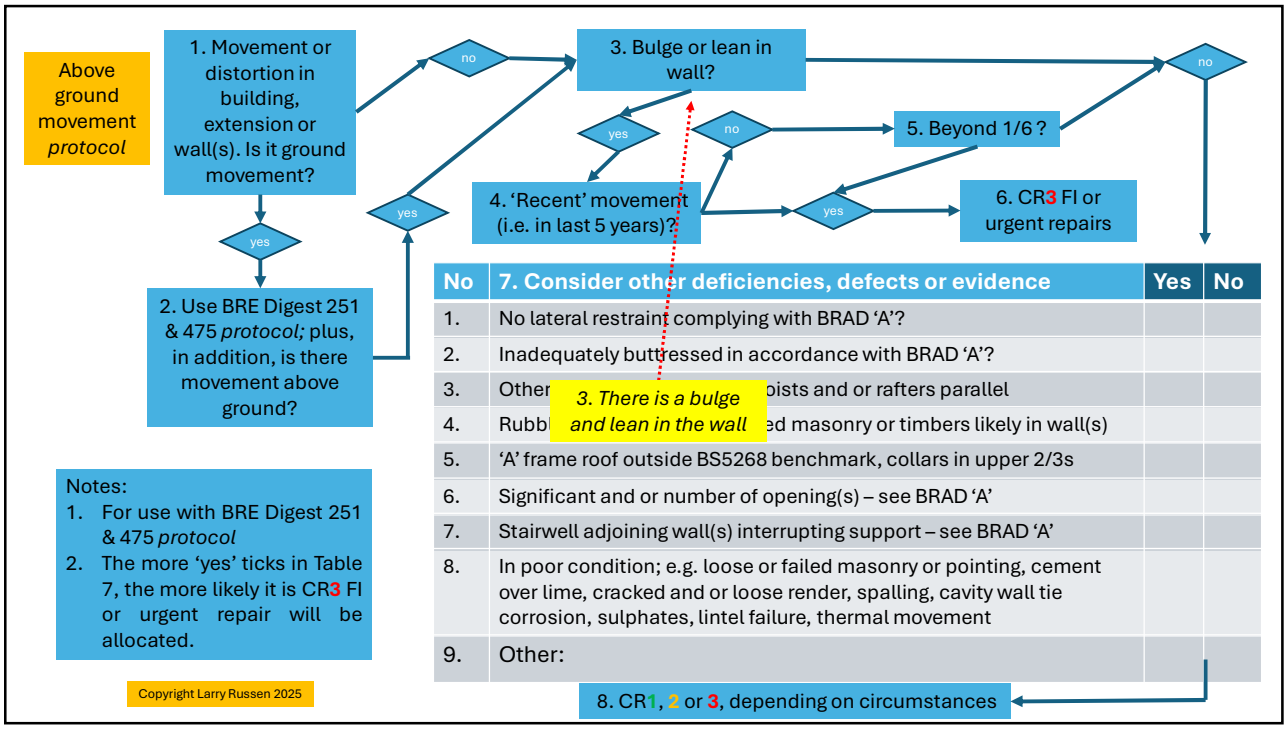
FEEDBACK

67



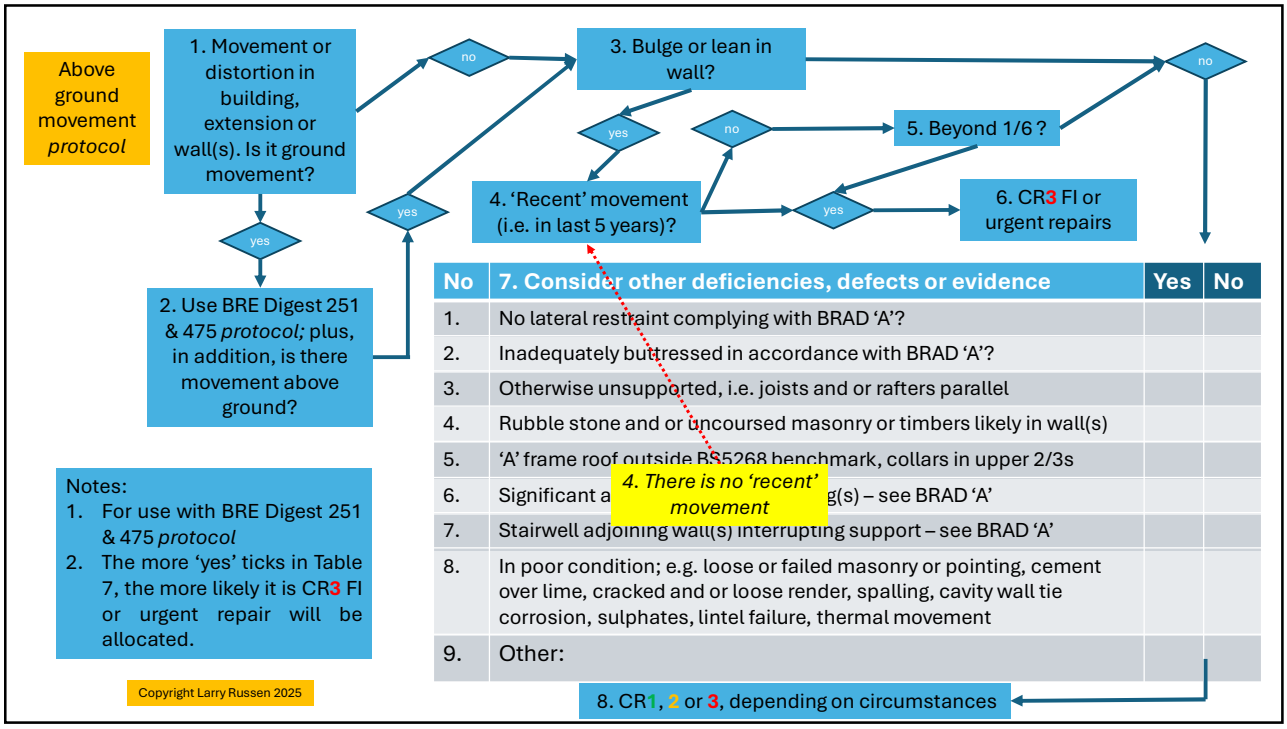
No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwis… …oists and or rafters parallel		
4.	Rubble s… …ed masonry or timbers likely in wall(s)		
5.	'A' frame… …benchmark, collars in upper 2/3s		
6.	Significant and or number of opening(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

68



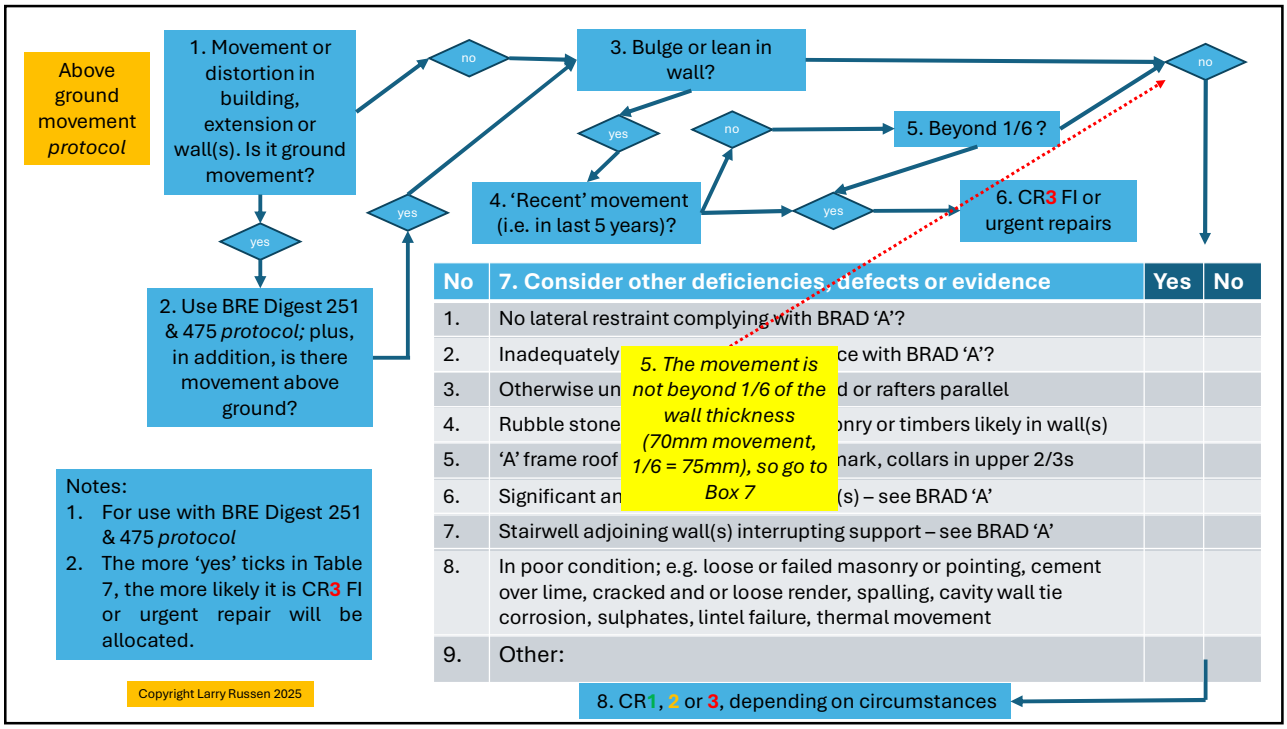
No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Other ...oists and or rafters parallel		
4.	Rubbl ...ed masonry or timbers likely in wall(s)		
5.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s		
6.	Significant and or number of opening(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

69



No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately buttressed in accordance with BRAD 'A'?		
3.	Otherwise unsupported, i.e. joists and or rafters parallel		
4.	Rubble stone and or uncoursed masonry or timbers likely in wall(s)		
5.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s		
6.	Significant a ...g(s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

70



No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?		
2.	Inadequately ce with BRAD 'A'?		
3.	Otherwise un d or rafters parallel		
4.	Rubble stone nry or timbers likely in wall(s)		
5.	'A' frame roof nark, collars in upper 2/3s		
6.	Significant an (s) – see BRAD 'A'		
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement		
9.	Other:		

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No	7. Consider other deficiencies, defects or evidence	Yes	No
1.	No lateral restraint complying with BRAD 'A'?	✓	
2.	Inadequately buttressed in accordance with BRAD 'A'?		✓
3.	Otherwise unsupported, i.e. joists and or rafters parallel		✓
4.	Rubble stone and or uncoursed masonry or timbers likely in wall(s)	✓	
5.	'A' frame roof outside BS5268 benchmark, collars in upper 2/3s	✓	
6.	Significant and or number of opening(s) – see BRAD 'A'		✓
7.	Stairwell adjoining wall(s) interrupting support – see BRAD 'A'		✓
8.	In poor condition; e.g. loose or failed masonry or pointing, cement over lime, cracked and or loose render, spalling, cavity wall tie corrosion, sulphates, lintel failure, thermal movement	✓	
9.	Other:		✓

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Cause of the movement – defect 2

- The roof structure is not ‘triangulated’;
- The ‘A’ frame roof structure has distorted and has thrust outwards;
- Thereby causing the top of the wall to bulge; and
- The wall generally to lean… however, in addition
- The sandstone blocks have loosened away from the chalk inside (‘de-bonded’), possibly affected by sulphates from the chimney breast; so
- Movement is likely to progress, i.e. get worse; thus
- **Condition rating 3**.

73

Possible paragraphs – defect 2

The left-hand wall of the front extension is showing signs that parts of the wall are bulging and parts are loose. This type of problem is usual in old walls of rubble stone construction. It usually occurs when the walls have been subjected to water penetration, or when water has been running down from defective roofs or rainwater fittings. Water penetrates into the wall and causes disturbance in the different types of building material including the old mortar within the wall. The problem can be worse if there are different types of stone in the wall, as appears to be the case with this property. This causes the materials to break apart. Over time this can create hollow areas in the wall, and the outer part of the wall can fall away.

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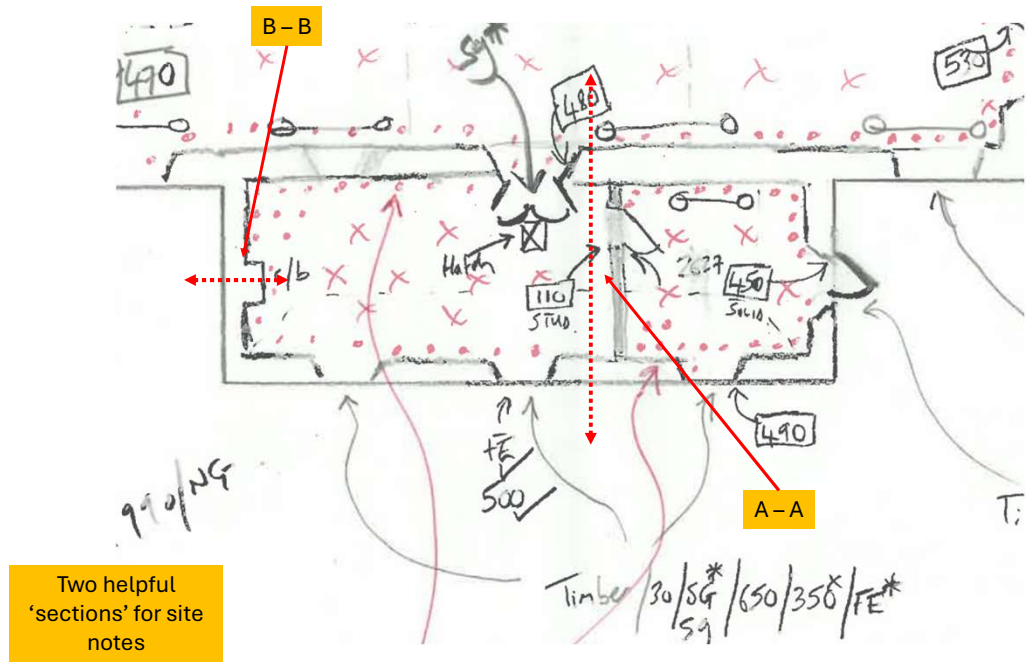
Possible paragraphs – defect 2

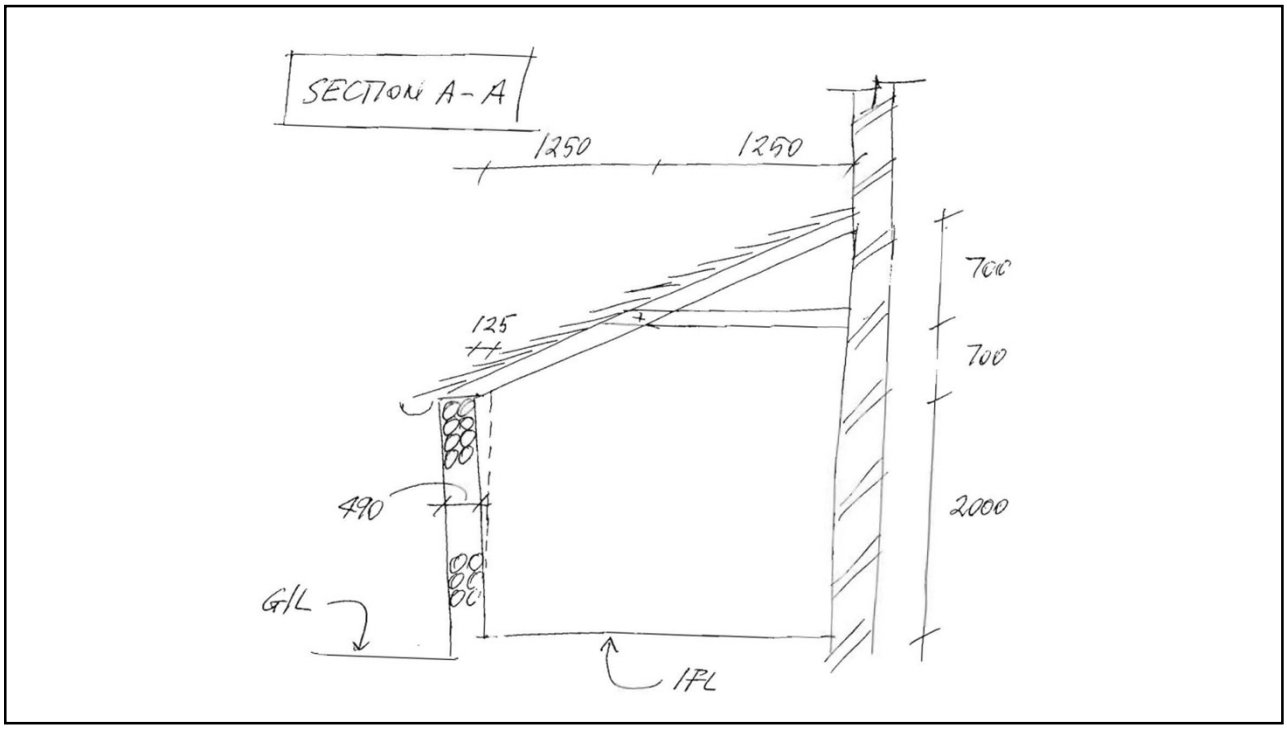
The problem may have been made worse due to the fact the wall originally had a working chimney stack built into it. The old flue lining will probably have been a coating of sand and lime applied to the internal surface of the flue. This coating will have failed many years ago and masonry at the back (left-hand side) of the stack will therefore have been exposed. This can allow salts from condensation, together with soot and tar from wood and coal to contaminate the surrounding walls. This can cause significant deterioration in the internal construction of a chimney stack and any adjacent wall. The centre of the wall has bulged significantly, by around 70mm. The wall needs to be strengthened now, probably by using a proprietary system such as that developed by a company called 'Helifix'. This system usually includes a combination of stainless-steel ties and reinforcing rods and special epoxy glue (called 'resin bonding'). This reinforcement bonds the materials in the wall together and creates a 'beam' system. Condition rating **3**.

75

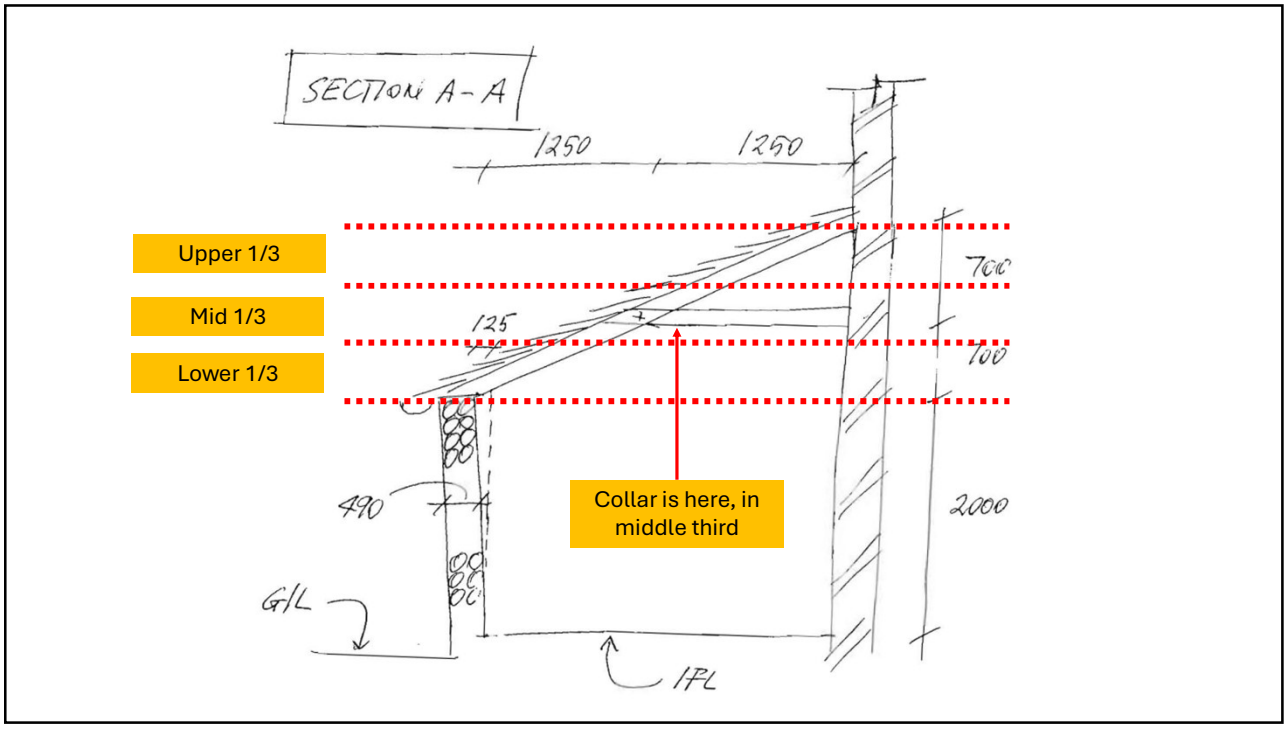


Two helpful 'sections' for site notes

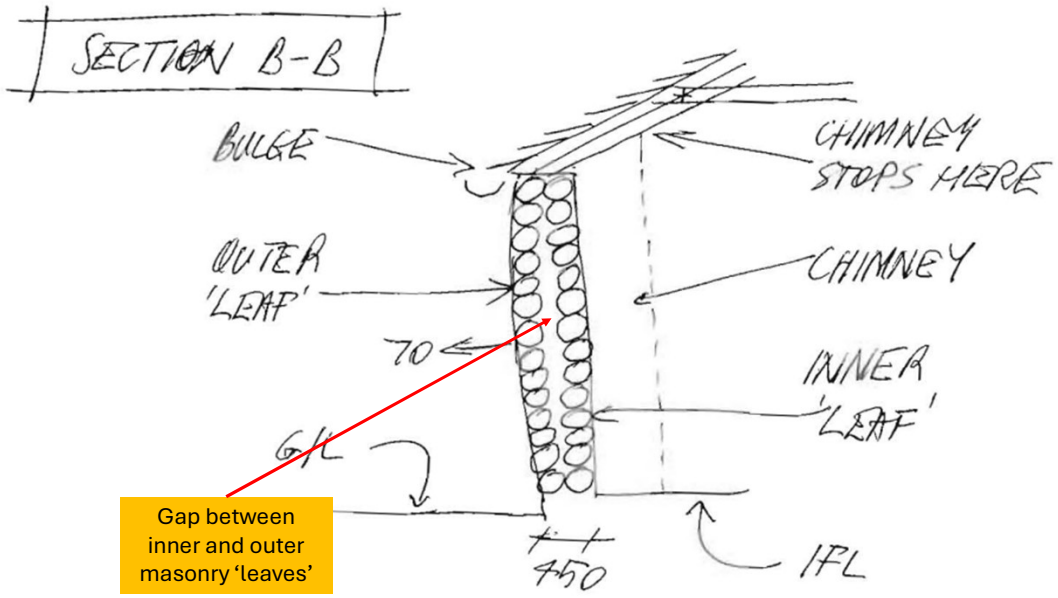
76


SECTION A-A
1250
1250
700
700
125
2000
490
G/L
IPL

77


SECTION A-A
1250
1250
Upper 1/3
Mid 1/3
Lower 1/3
700
125
700
490
Collar is here, in middle third
2000
G/L
IPL

78



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Conclusions

- Read HSS 2 when it comes out;
- Use the benchmarks of good practice, e.g. those in the BRADs (they're usually based on BSI or European or international Codes of practice);
- Have a documented and recorded system based on those benchmarks so you can consider and reflect on the movement and distortion;
- Judges like a system – it demonstrates professional reflection; and
- Use a spirit level!

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END

Back

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