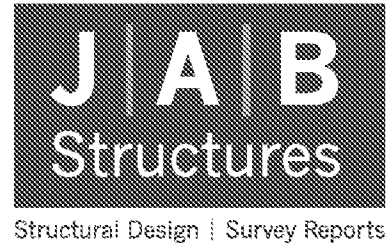


Mr Andrew Batty
Carleton House
15, Maltravers Street
Arundel
West Sussex
BN18 9AP



Structural Design | Survey Reports

19 Cheviot Close, Worthing
West Sussex, BN13 2LL

Ref:- 21-132

Tuesday 23rd November 2021

Dear Mr Batty,

RE: 70A TARRANT STREET, ARUNDEL

We confirm visiting the above property on Friday 22nd October 2021 to carry out a visual inspection and to report on cracking and movement to the retaining wall to the rear of the property. The inspection and report have been carried out in accordance with the Terms of Business which are attached. We comment as follows:-

1. General

- 1.1 In describing the property all references to the front, rear, left and right assume that it was viewed from Tarrant Street. For the purposes of this report the front of the property was assumed to face South.
- 1.2 The single storey building, which was being used as a domestic garage, was of masonry external walls beneath a pitched slate covered roof which spanned side to side. The building was situated against the East side elevation of No 70. The external elevations to the front and side of the property were of brickwork with the rear elevation being of a painted rendered finish. The gable wall to the front elevation of the building was tile hung. The original building was thought to have been constructed over 100 years ago. The building was understood to have had various uses in the past and we were made aware that petrol tanks had previously been present below the courtyard to the front of the building, although these were understood to have been removed in the past. The building was understood to have been converted from a commercial shop to a garage over 10 years ago.
- 1.3 The retaining wall on which this report is based was located to the rear of the building and formed the boundary to the garden to the rear of Newburgh House.

- 1.4 This report is associated with an inspection of the retaining wall alone and was not an inspection of the whole building.
- 1.5 We did not have access to carry out an inspection of the retaining wall to the rear of the adjoining properties.
- 1.6 The reporter was unaware as to the history of the property.

2. Topography / Geology

- 2.1 There were falls in the site around the property from North to South and from East to West. There were retaining walls to the North and East boundary lines of the property. The retaining wall to the rear North boundary line was subject to this report.
- 2.2 Data from the British Geological Survey Map indicated that the property was underlain by a Spetisbury Chalk Bedrock Formation made up of Clay, Silt and Sand. The British Geological Survey Map also indicated superficial Raised Marine deposits made up of Clay, Silt, Sand and Gravel in close proximity to the property. If Clay or Silt are present below the property then these could shrink or expand according to the level of moisture in the ground. Shrinkage of the ground under the foundations in times of drought, or when desiccated by tree roots, can cause foundation movement leading to subsidence. The presence of vegetation adjacent to the retaining wall and property would be a potential threat to their stability.

3. Inspection – Retaining wall to the rear boundary

Inspection of the boundary wall from the courtyard to the rear of the garage

- 3.1 The retaining wall, on which this report is based, was located on the boundary line to the rear of the building and separated the courtyard to the rear of the garage from the garden to the rear of Newburgh House located on School Hill. The boundary wall was retaining the garden to the rear of Newburgh House.
- 3.2 The retaining wall was located at approximately 1.2m from the rear elevation of the garage. The concrete path which formed the courtyard to the rear of the garage was situated at approximately 800mm above the garage floor.
- 3.3 The retaining wall was approximately 2.85m in height and had been capped with in-situ concrete. The upper 1.85m section of the wall was formed with brickwork thought to be 215mm wide with the lower 980mm section being of a mortar bound masonry wall with bricks laid at an angle. The low level wall projected by approximately 110mm from the face of the wall above. There were no weepholes to the retaining wall. The retaining wall to the rear boundary line was approximately 7.5m in length. There were return walls to the boundaries of the adjoining properties to both sides of the retaining wall.

- 3.4 The brickwork to the retaining wall was weathered and had eroded with areas of loose and missing pointing to the structure with efflorescence and staining to the wall. There were large areas of loose and missing pointing to the wall below the upper ground level. There was also spalling to the brickwork on the upper section of the retaining wall.
- 3.5 There was stepped cracking with distortions to the top of the retaining wall. The stepped cracking, which continued through bricks, was thought to be upto 15mm wide and was present from the top of the wall to 9 brick courses below. The boundary wall was bulging and leaning outwards at high level by upto 1:22 when checked with a spirit level and towards the garage to the South. The wall was thought to be leaning outwards at high level by upto 100mm over its full height from the top of the wall to the courtyard to the rear of the garage.
- 3.6 The cracking and movement at high level to the boundary wall was at the location of a Fig tree growing on the upper ground level and within the back garden of Newburgh House. The retaining boundary wall was cracked and noted to bulge outwards at high level at the location of the Fig tree.
- 3.7 The cracking and movement which had taken place to the upper section of the retaining boundary wall was at the location of a Fig tree which was growing directly behind the wall on the upper ground level, within the back garden of Newburgh House. The wall was bulging outwards at the location of the tree which was situated towards mid span along the length of the wall.
- 3.8 There was vegetation growing against the face of the retaining wall. There was also an ivy growing against the wall to the West side of the courtyard. A detailed inspection was not possible due to the vegetation covering this section of the wall. There was also vegetation, although to a lesser extent, growing against the wall to the East side of the courtyard.
- 3.9 There was a 2m long section of decorative fence panel which was fixed with timber posts onto the face of the retaining wall to the East side of the courtyard.
- 3.10 A rainwater downpipe which served the roof slope to the West side of the garage building discharged into a gully and drainage below ground to the West side of the courtyard.

Inspection of the boundary wall from the back garden to Newburgh House

- 3.11 The retaining wall which formed the boundary line to the rear of 70A Tarrant Street extended by approximately 600mm above the upper ground level and the garden to Newburgh House.
- 3.12 There was a Fig tree, upto 6m in height, which was growing directly adjacent to the middle and back of the retaining wall. There were trunks from the Fig tree which were in direct contact with the back of the retaining wall and which had been growing over the structure. There was also a Broadleaf tree, upto 5m in height, towards the West side of the wall with an arch, formed with apple trees, approximately 2m from the back face of the retaining wall.

- 3.13 The retaining boundary wall which extended above the upper ground level was leaning at high level to the South by upto 1:18 when checked with a spirit level. The wall was bulging outwards at the location of the Fig tree where the wall was leaning by upto 35mm over its height above the upper ground level.
- 3.14 The wall which extended above the upper ground floor level was weathered with missing pointing to the brickwork and spalled bricks. This was at the location of the Fig tree.
- 3.15 There was a concrete capping to the top of the retaining wall which was cracked and which had moved over the brickwork below at the location where the Fig tree was growing directly adjacent to the wall.
- 3.16 There were fence panels with timber posts into the ground behind the retaining wall to both sides of the Fig tree.
- 3.17 There was shingle in place directly behind the retaining wall with paving within the back garden.

4. **Conclusions**

Retaining wall to the rear boundary

- 4.1 The brickwork structure which formed the boundary wall between the courtyard to the rear of No 70A Tarrant Street and the back garden of Newburgh House was retaining the upper ground level to a height of approximately 2.25m. The retaining structure was of 215mm wide brickwork at the top of the wall with the lower section being a mortar bound masonry wall with bricks laid at an angle.
- 4.2 It was thought possible that the upper section of the retaining wall may have been introduced above an original garden boundary wall with the raised ground level to the back garden of Newburgh House having been added at some point in the past. However, the history of the boundary wall which is retaining the back garden to Newburgh House was unknown.
- 4.3 There was stepped cracking and movement at high level to the boundary wall which was retaining the back garden to Newburgh House. The wall was leaning and bulging outwards at the location of a Fig tree which was growing directly against the back face of the retaining structure within the back garden of Newburgh House. The wall had rotated outwards at high level at the location of the Fig tree by approximately 100mm over its full height. The majority of movement had taken place at high level on the wall.
- 4.4 The brickwork to the retaining wall was in a poor condition being weathered and had deteriorated with areas of eroded, loose and missing pointing to the structure with efflorescence and staining to the wall together with spalled bricks.

- 4.5 Due to the extent of movement which had already taken place at high level to the boundary retaining wall we believe that the structure will continue to move outwards under its own weight. The wall appeared to have rotated outwards at high level to the South, from the upper ground level to the courtyard, by approximately 70mm which is falls outside the middle third of the wall. The potential for ongoing movement, particularly with the tree in place behind the wall, is considered high.
- 4.6 We believe that the retaining wall will be of inadequate design and construction to support the lateral loadings which could be placed upon it from the ground and imposed loadings to the back garden of Newburgh House. The fill material which is in place behind the wall will settle under its own weight and the imposed loadings from above which will place lateral loadings onto the back face of the wall. There will also be wind loadings placed onto the top of the wall where fence panels are fixed to the top of the structure. There were also no weepholes to the base of the retaining wall to prevent build-up of water pressure against the back of the structure.
- 4.7 We consider that although the retaining structure may not have been of adequate design and construction that the wall may have performed satisfactorily and remained structurally stable for a number of years. However, the presence of the Fig tree growing directly against the rear face of the wall has applied physical lateral pressure causing the wall to move outwards at high level.
- 4.8 It was noted that the retaining wall extended by only 600mm above the upper ground level and therefore there were only limited barriers in place to prevent falls from the back garden into the courtyard below. Where fencing had been fixed to the top of the wall this will also place loadings from wind onto the retaining structure.
- 4.9 The exact location of drainage was unknown, although there was a downpipe which served the roof over the West side of the garage located within the courtyard to the rear. We understood that the drainage which served this downpipe passed below the garage and to the front of the building.
- 4.10 We were unable to inspect the boundary walls which formed the retaining structures within the properties to both sides of 70A.
- 4.11 We attach Appendix A to the end of this report which includes photographs showing the building and the retaining wall to the rear of the property.

5. **Recommendations**

Retaining wall to the rear boundary

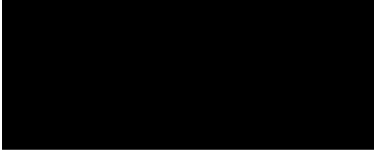
- 5.1 We recommend that a check should be made to confirm who is responsible for the retaining wall which forms the boundary between the courtyard to the rear of the garage to No 70A Tarrant Street and the back garden to Newburgh House.

- 5.2 We also recommend that you submit a claim with the insurers of the building to ascertain whether you will be covered for accidental damage to the wall.
- 5.3 In our opinion due to the extent of movement and deterioration which had already taken place to the retaining wall, presence of the tree behind which has caused physical damage to the wall and the potential of inadequate construction of the retaining structure we recommend that the boundary wall should be replaced. The retaining structure should be replaced in accordance with design and details prepared by a Chartered Structural Engineer / Civil Engineer with the works being carried out with relevant statutory consents including Building Regulations approval. It will be necessary to remove the trees and excavate the land from behind the retaining wall in order to undertake the works. Prior to undertaking any works it will be necessary to check whether any Listed Building or Planning approvals will be required for removal of trees and replacement of the wall. The new retaining structure should include barriers to prevent falls from the back garden on the upper ground level into the courtyard.
- 5.4 The proposed works to replace the retaining boundary wall will prove difficult to undertake due to restricted access, constricted site, changes in ground levels, presence of drainage and the height of the retained upper ground level. The proposed works to replace the retaining structure will be disruptive and will require you to liaise closely with the owners of the adjoining properties.
- 5.5 Unfortunately due to the condition and extent of movement which had already taken place to the retaining boundary wall we cannot guarantee its ongoing stability. If any further movement does take place then the possibility of its collapse cannot be ruled out.
- 5.6 An attempt to carry out repairs to the retaining boundary wall could be made. We also suggest that the trees growing directly adjacent to the back of the retaining boundary wall should be carefully removed. The remedial works to the boundary wall could include to introduce Helibars at every third brick course to full length of the retaining wall which should return to the side walls. The remedial works, which will be superstructure repairs alone, will be subject to confirmation by a Helifix Approved Specialist Contractor. The works should also include to repoint the brickwork and to replace any cracked bricks. The fencing which is fixed to the top of the wall should be removed and fencing provided within the back garden to the upper ground level to prevent access to the rear of the wall. The Contractor appointed to undertake the works should provide temporary propping to the wall during the course of the works. The remedial works to the boundary wall could also be subject to the relevant statutory approvals. It will be necessary to monitor the boundary wall for any future cracking or ongoing movement.

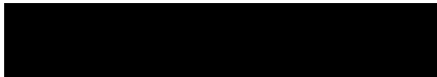
The superstructure repairs will not be a permanent solution and will not address the potential for ongoing movement. We therefore recommend that allowance should be made to replace the retaining boundary wall in the short to medium term and as soon as possible.

We trust that this report has addressed the concerns raised and is satisfactory for your purposes; however should you have any queries or require any further assistance then please do not hesitate to contact us.

Yours sincerely,



Jason Burstow
BEng. (Hons), C.Eng., M.I.Struct.E.
For and on behalf of JAB Structures Ltd



APPENDIX A PHOTOGRAPHS



Photo No. 1 – Front elevation of the building



**Photo No. 2 – Rear retaining boundary wall.
Note vegetation growing against the wall**



**Photo No. 3 – Rear retaining boundary wall.
Note vegetation growing against the wall**



Photo No. 4 – Bulging and leaning at high level to the rear retaining boundary wall

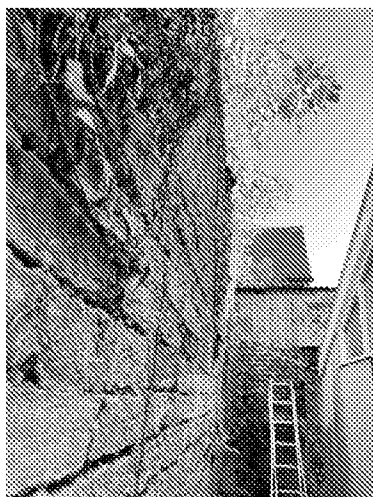


Photo No. 5 – Bulging and leaning at high level to the rear retaining boundary wall

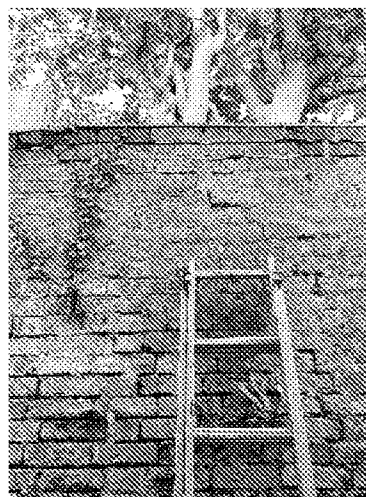


Photo No. 6 – Cracking and movement with bulging at high level to the rear retaining boundary wall

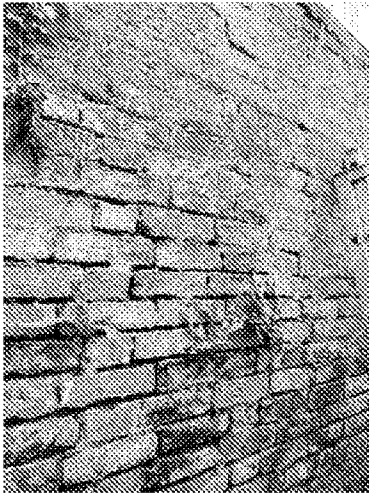


Photo No. 7 - Deterioration of brickwork to the rear retaining boundary wall. Eroded, loose and missing pointing to the wall



Photo No. 8 - Low level mortar bound brickwork to the rear retaining boundary wall



Photo No. 9 - Low level mortar bound brickwork to the rear retaining boundary wall

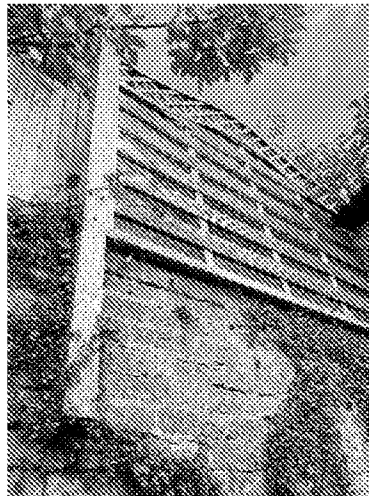


Photo No. 10 - Trellis fencing fixed to the top of the rear retaining boundary wall with panels within the ground behind



Photo No. 11 - Return wall to the West side of the rear retaining boundary wall. Drainage to the roof over the building



Photo No. 12 - Return wall to the East side of the rear retaining boundary wall.

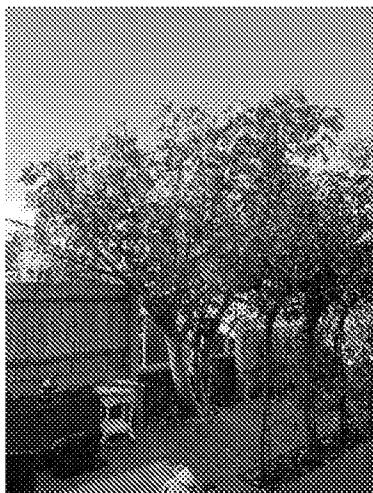


Photo No. 13 – Tree within the back garden of Newburgh House growing directly against the rear retaining boundary wall



Photo No. 14 – Tree within the back garden of Newburgh House growing directly against the rear retaining boundary wall



Photo No. 15 – Cracked concrete capping and movement to the top of the rear retaining boundary wall at the location of the tree within the back garden of Newburgh House

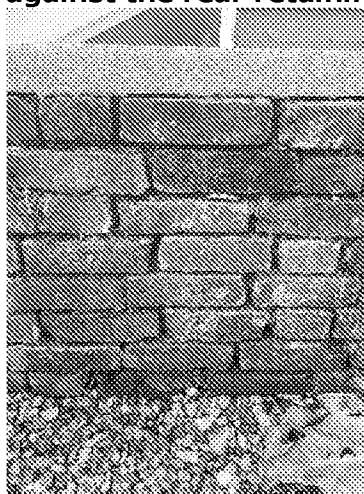


Photo No. 16 –Deterioration of brickwork to the rear retaining boundary wall. Eroded, loose and missing pointing to the wall within the back garden of Newburgh House



Photo No. 17 – Trellis fencing and fence panels to the top of the retaining boundary wall within the back garden of Newburgh House

Our Services

1. Our structural engineers report will be based on visual observations of the property taken externally and internally. You must provide us with access to all necessary areas. We do not normally move furniture, lift floor coverings or make exploratory holes during an inspection. If our engineer considers that access to any area would be unsafe, or potentially unsafe, we will be unable to access the area until safety measures are arranged, which may incur an additional cost.
2. Our work will be carried out by a chartered structural engineer. These are the required qualifications in situations where our report is requested in connection with a lending / mortgage application or a buildings insurance claim.
3. Unless you instruct us to the contrary our report will cover the main load-bearing elements of the property. The inspection will however be limited to the main building and exclude any detached garages, outbuildings, walls, fences etc. unless you specifically instruct us otherwise.
4. Our report will include details of the inspection, our conclusions on the findings and our recommendations for any further investigations, monitoring, repair or remedial works, or other action required.
5. In the event that our report recommends that further investigations are carried out these may include but are not limited to archive research, interviewing persons or organisations, making exploratory holes or excavations, opening up or taking apart, taking samples, undertaking tests and any other activities necessary to determine the extent and cause of the problem(s).
6. In the course of carrying out our work for you we may advise that independent contractors are appointed to perform specialist services such as drains testing, soil testing or excavating trial holes. If so, we will advise you of the costs of the additional services and obtain your approval before proceeding. On completion of their work, we will settle the contractor's account directly and include their costs (along with a 10% administration charge) in our invoice to you.
7. Certain investigation work may cause damage - particularly to finishes and decorations. If you are not the owner of the property and you request us to carry out any investigation work this will indicate to us that you have all necessary permissions from the owner of the property for us to carry out the work. Reinstatement of damaged areas will be included only if specifically agreed.
8. Where estimated costs, budgets or allowances for building/remedial works are provided by us, these are only to indicate the likely order of costs. They should not be considered as an accurate assessment of costs and must not be relied upon as such. Due to the varying complexity of such works you are advised to obtain written estimates, quotations or tenders from suitable contractors with relevant experience before making any financial commitment.
9. We will not inspect the woodwork or other areas of the property which are covered, unexposed or inaccessible and our report will not therefore indicate that any such part of the structure is free from defect.

10. Our report will not include those aspects normally dealt with in a Building Surveyor's report, including but not limited to:
- utilities / services
 - valuation
 - decorations
 - roof coverings and the like
 - the position of the property with respect to local amenities
 - the condition of the property with regard to dry rot, timber infestation, dampness and the like.
11. Furthermore, unless noted in the report to the contrary we will not consider matters such as contaminated land, asbestos or other potentially hazardous or deleterious materials which may have been used in the construction of the property.