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14.08.2022

Structural Report

A structural report prepared to inspect the site and appraise the condition of the south front boundary walls.

Property located in Land to west of 2 King's road N17 8NP.

Undertaken by Kenan Taylan(BEng).



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Project

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Introduction

1.1 Instructions

This report concentrates specifically on structural issues. Thus, a number of matters which may be considered in reports on property are outside the scope of this report, such as historic, planning, legal, decoration, windows, doors, fences, contamination, asbestos, services (electrical, gas, water, phones, etc.) and party wall matters.

This report is prepared in accordance with information gathered from the owner of property and via a visual site inspection and together with measurement of the cracking and making standard assumptions. All assumptions are based on visual inspection only and no opening up of areas was carried out. No below ground investigations were carried out, no drainage survey has been undertaken and geotechnical report was not provided.

1.2 Brief

We have been requested by the owner to carry out Specific Structural Inspection for the garden wall to assess the collapsed front garden wall, analyse the remaining leaning bit. Purpose of this report is limited to the analysis of front garden walls and provide recommendation for remediation work.

1.3 Site inspection

Site inspection of the property was carried out on 23rd July 2022. The prevailing weather at the time of our inspection was sunny, dry. The elevation of the property is facing south.

Where the terms “front” are used, they assume that the reader is directly facing the element being described. It should be noted that only the front wall was required to be inspected for the LBC. The site has been granted planning application to rebuilt all north, east and west wall for the proposed 2x2 bed house for artists. Planning reference number HGY/2021/3038



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General Description of Property

The property is located in Land to west of 2 Kings Rd London N17 8NP. For detail please check Annex 1. Planning application and conditions were discharge to commence work on site. The opening for the gates which are part of application HGY/2021/3038, the wall has been observed to be leaning and Upon making opening for access into the site the C19 wall has collapsed. The part of the wall has been taken to the ground by contractor as due to poor nature and safety of any passerby on the pavement area. Most of bed joint for brick wall losing their bonding capacity and the pier was supposed to strengthen wall laterally but unfortunately due to wall movement pier lose functionality. The wall was constructed with brick with 1700 mm height with 250mm width but due to lateral load and approved planning works with opening access to the site a portion of wall collapsed and deviated laterally more than the permissible deviations for masonry elements tolerances (BS EN 1996-2:2006.

3 Observation / Damages

Structural Observations

Front Wall (*C19 roadside boundary wall*)

The front boundary walls are 215mm thick constructed with London bricks with 1700 mm height with two pier and bricks was collapsed and removed around the centre area. A pier (450x450 mm) to the left hand end forms the return corner to the left hand side wall and a concern as it is currently leaning out into the pavement.

Initially, before work started on 15th July 2022, the front wall was previously horizontally deflected at the top by 100 mm to 130 mm. Due to planning approach and suggestion from the conservation officer the front was to be retain and repair. However, as noted in the previous structural report in the planning application, it's work actually would require rebuilding as the most of the mortar are crumple and the wall was leaning.

It is noted in the previous structural report: “a result of sulphate damage causing the wall to deteriorate. As a result of the initial tree(which is now removed in the site clearance) was pushing against the wall. This is indicating that tree roots are beneath the wall lifting the wall upwards or alternatively shallow foundations to the pier and front wall have suffered from subsidence. Because the effect of tree roots in shrinkable clay is a common occurrence. Especially, the water demand of the trees causes seasonal fluctuations in the clay bearing strata which result in volumetric changes in the ground on which the building and external works are founded. In summer when the water demand of the trees is high the ground shrinks, while in winter when the water demand of the trees is very low the ground swells. These seasonal changes occurring over a long period are commonly responsible for the type of structural movement evident at this property.”



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Refer to Image 1

4 Discussion

Classification of damages

In general, there are three broad categories of damages should initially be considered when reviewing building cracks: 'aesthetic', 'serviceability' and 'stability'.

1. *The first* comprises damage which affects only the appearance of the property.
2. *The second* includes cracking and distortion which impair the weather tightness or other function of the wall (sound insulation of a party wall may be degraded), fracturing of service pipes and jamming of doors and windows.
3. *The third* category are cases where there is an unacceptable risk that some part of the structure will collapse unless preventative action is taken.

Table 1. Damage classification of building, based on limiting tensile strain levels and expected crack width.

Category of Damage Damage Class Approximate Crack Width Limiting Tensile Strain Levels (%)

Aesthetic damage	Negligible	Up to 0.1 mm	0–0.05
	Very slight	Up to 1 mm	0.05–0.075
	Slight	Up to 5 mm	0.075–0.15

Functional damage, affecting serviceability	Moderate	5 to 15 mm or several	0.15–0.3
Severe	15 to 25 mm, but also depends on number of cracks	>0.3	

Structural damage, affecting stability	Very severe	Usually > 25 mm, but depends on number of cracks	>0.3
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Due to the trees roots next to the wall effect shrinkage of clay subsoil ground which is resulting to foundation movement. (Bre Digest 251).



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5 Recommendations.

Demolition works

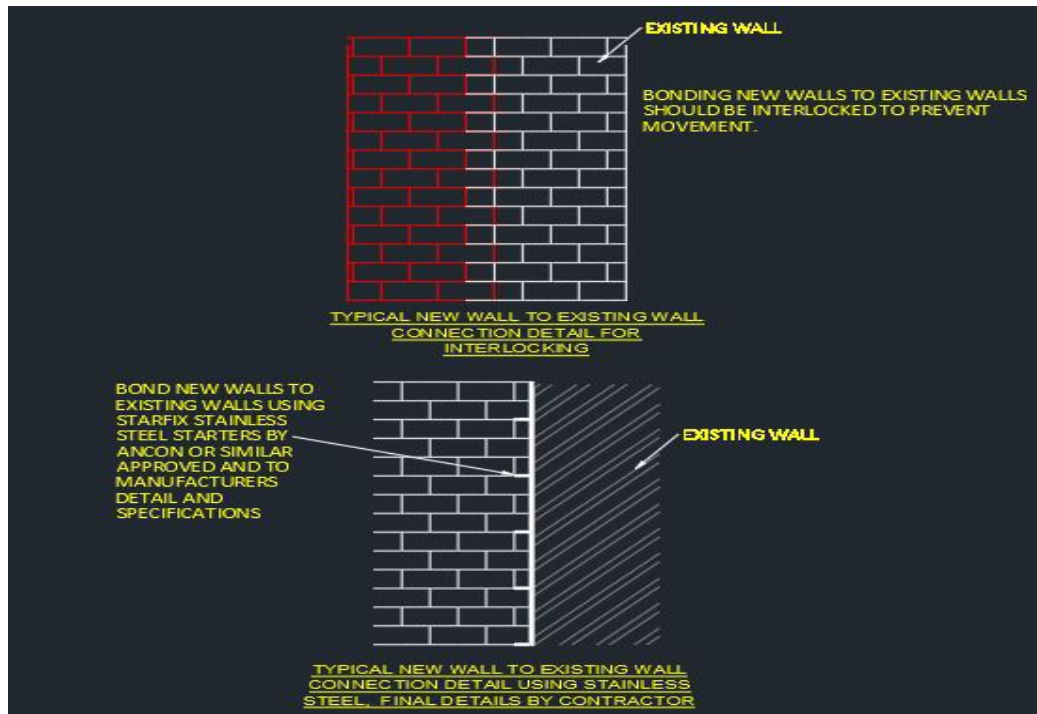
1. Carefully remove all the remaining brick wall and pier by hand and, only using hand tools, clean them of existing mortar and stack on pallets in the immediate area for re-use.
2. Brickwork to be taken down carefully in sections from east wall, north wall then to the western side.
3. Unusable bricks to be removed from site.
4. The works are to remove the concerning walls and re-built them with the reclaimed bricks on site. Contractor to reinstate the wall and piers at original location with the approved design for the 2 gates with letter box towards the street.

Reconstruction

1. Carefully remove the Tree to the South wall, Southwest turning corner of the site
2. Carefully dig to excavate for the new concrete foundation to structural engineers design and remove all spoil from the site
3. Pour Concrete to form new concrete foundation as Structural Engineer's design
4. Reclaimed/Salvaged stock bricks from west wall to be reused in rebuilding where-ever required to replace unusable existing brick (Refer to the diagram illustrating the design of the proposed walls location)
5. Rebuild the southern front walls brick walls reusing the previously salvaged bricks from front wall. (Refer to the diagram illustrating the design of the proposed walls with reclaimed bricks location)
6. Replace top soil in the area of works

Structural Repair Specifications

Cracks of 1mm wide or less will be filled (internal) or repointed (external). Where the cracks are wider than 1mm, but less than 5mm, the underlying brickwork will be exposed broken or cracked bricks or blocks will be replaced prior to covering with expanded metal and making good the finishes. Where cracks are 5mm across or wider, some form of bed joint lime mortar should be introduced. This will involve disc cutting a 20mm deep chase into the bed joint across a crack. An epoxy resin mortar is then pressure grouted into the open joint, and stainless-steel rods are set into place.



6 Conclusion

The method statement has been prepared as part of the new submission for the listed building consent to demolish and re-construct only the collapsed and leaning front boundary walls with approved planning for opening for access and letter box for a proposal of 2 houses at Land to west of 2 King's road.

The conclusion for the observation and recommended works are:



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The property has suffered from subsidence movement. The prevent further damages/movements to the wall Some action should be taken by

- 1) The installation which underline in **Structural Repair Specifications** section should be carried out properly especially for vertical cracks.

☐ Due to the wall leaning excessively by 130mm over a height of 1700 mm and some part these walls would be dismantled easily by hand.

☐ The whole front wall requires rebuilding.

☐ The tree roots have been removed beneath the wall part of the site-clearance

☐ Lateral deflections have developed due to the previous tree pushing against wall.

☐ The majority of the mortar is loose and requires to be repaired both at the front and rear.

☐ The front wall in its present condition: The safety factors for the stability of the wall have been considerably reduced and vibration from traffic or construction work and a possible increase in wind forces. Thus, the collapse has happened and it is recommended that all of the wall boundary are to be rebuilt as there has been multiple collapse over the years some which are not recorded. The C19 curtilage walls are in a poor condition and are leaning in most areas. It is advisable to rebuild all the C19 walls with the existing bricks (removing any mixed brick which is uncharacteristic with the initial old bricks).

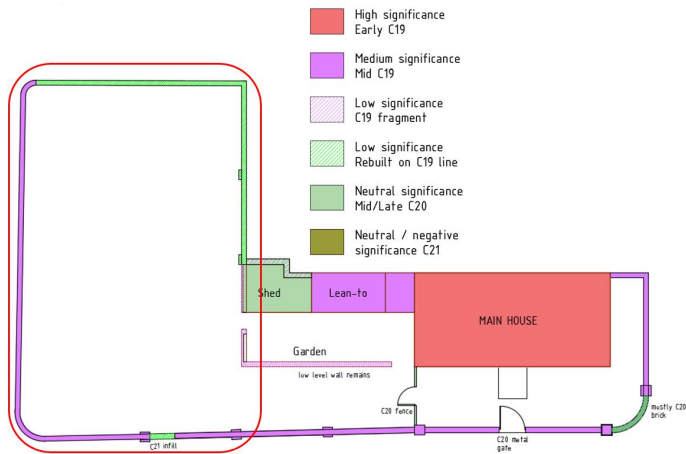
Please see the attached Appendix pdf for summary of all the curtilage condition all around the site. Please note that the listed building is a separate property to Land to west of 2 King's road in terms of title for the past 10 years.



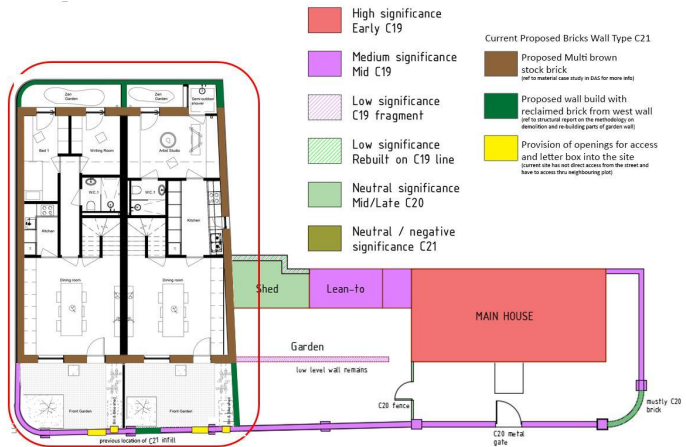
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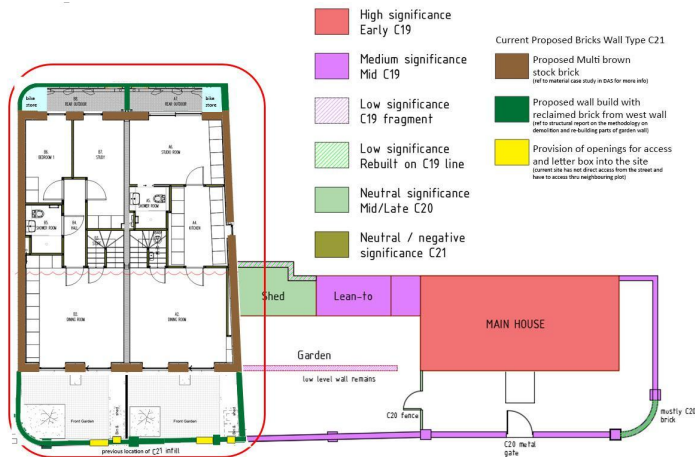
Initial Site Plan 2021



Approved Planning Permission Design 2022

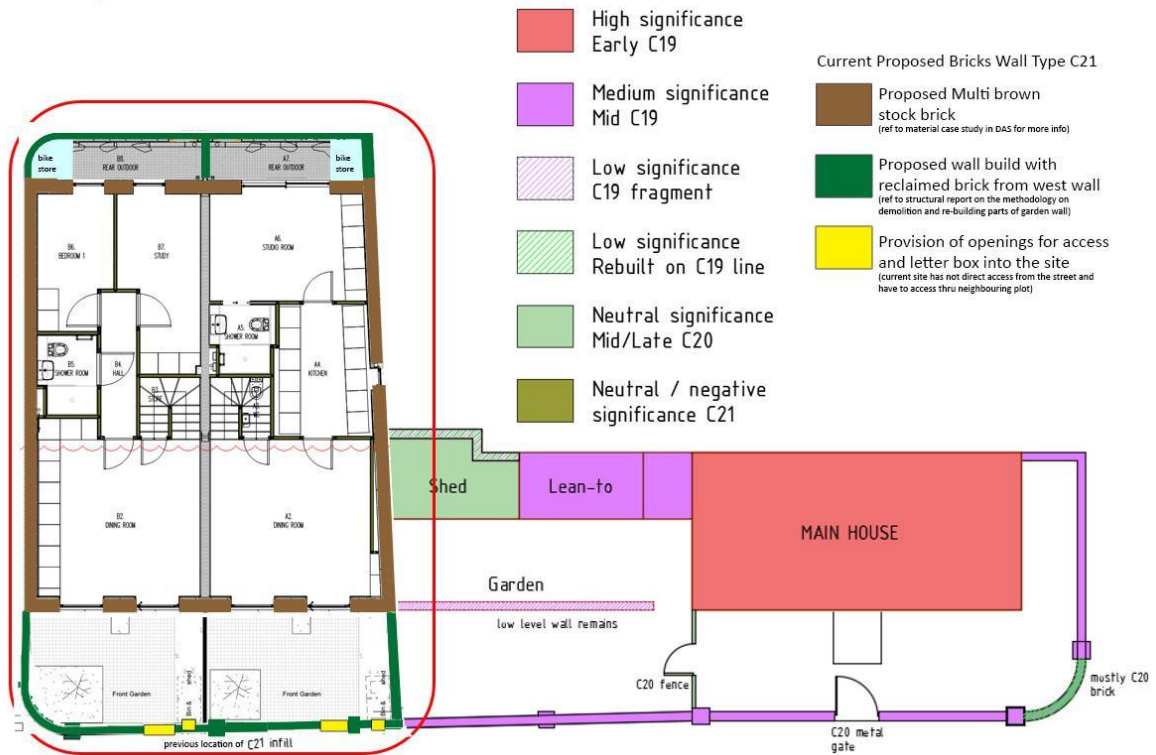


Emerging Proposed front wall rebuilding LBC AUG 2022



Emerging Proposed front wall rebuilding LBC AUG 2022 Enlarged

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http://scans.bgs.ac.uk/sobi_scans/boreholes/803913/images/12532496.html

BOREHOLE SECTION SHEET

BOREHOLE N^o. 3 (C)

LOCATION: TOWN ROAD/PLEINHA ROAD, DISTRICT D. WATER LEVEL STRUCK: _____

DATE: NOVEMBER, 1982 WATER LEVEL STANDING: None on completion

DESCRIPTION OF STRATA	SECTION	DEPTH		THICKNESS	SAMPLE NO.	TYPE	SAMPLE DEPTH (METRE)
		From	To				
FILL. (Bricks, CLAY, concrete, etc.)		GL	- 1.20	1.20			
Dense coarse to medium to fine GRAVEL with coarse to medium SAND and some cobbles		1.20	- 4.10	2.90	1 2	B B	1.50 (BPT) 3.00 (GP)
Stiff grey silty fissured CLAY		4.10	- 7.00	2.90 NP	3 4 5 6 7	D U U U D	4.10 4.50 - 4.95 5.00 6.50 - 6.95 7.00
TOTALS			7.00m				

SCALE: 1:50 metric

LEVEL O.D. = _____

BH DIAMETER = 200mm

RIGS: Shell and Claypiston

WEATHER: Fair

REMARKS: - See p. 10b for extract ground.
Borehole lined to a depth of 4.50m, collapsed when lining withdrawn.

B - BULK SAMPLE
D - UNDISTURBED SAMPLE
U - DISTURBED SAMPLE
W - WATER SAMPLE
NP - STRATA NOT PENETRATED



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Image 1 Leaning wall June 2022





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Image 2 Leaning pier June 2022





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Image 3 Collapse and to be reclaimed; poor condition wall been brought to ground by contractor due to hazardous concerns. Remaining piers to the southwest are still leaning on to the street.



Extracts from structural report for planning for 'Land plot Boundary Wall'

Front Wall (C19 roadside boundary wall)

The boundary walls are 215mm thick constructed with London bricks with 1700 mm height with two piers. A pier (450x450 mm) to the left hand end forms the return corner to the left hand side wall.

The front wall was horizontally deflected at the top by 100 mm to 130 mm. This is probably as a result of sulphate damage causing the wall to deteriorate. As a result of the tree pushing against the wall. This is indicating that tree roots are beneath the wall lifting the wall upwards or alternatively shallow foundations to the pier and front wall have suffered from subsidence. Because the effect of tree roots in shrinkable clay is a common occurrence. Especially, the water demand of the trees causes seasonal fluctuations in the clay bearing strata which result in volumetric changes in the ground on which the building and external works are founded. In summer when the water demand of the trees is high the ground shrinks, while in winter when the water demand of the trees is very low the ground swells. These seasonal changes occurring over a long period are commonly responsible for the type of structural movement evident at this property. **Refer to Image 1**

Rear Wall

The rear wall appears, generally to be in good condition, but the mortar has significantly deteriorated to the point where it barely functions and bricks can be readily removed by hand. The reason for this deterioration could be to do with the age of the wall itself – lime mortars do deteriorate with age – but the lean and bowing are almost certainly associated with the sulphate attack or ground movement. **Refer to Image 2**

Left Site Wall (Western end of C19 roadside boundary wall).

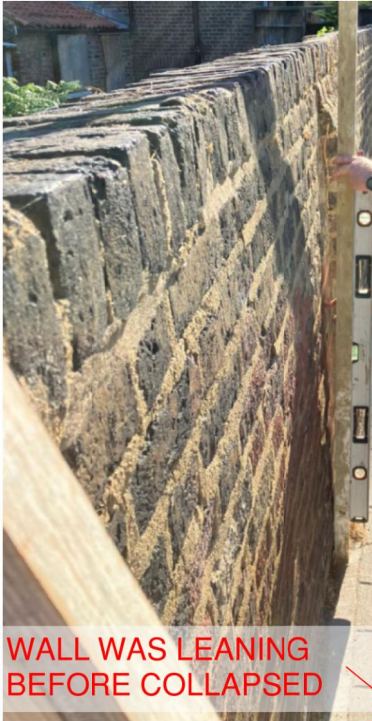
Compare to the front wall and to the rear wall, wall C19 is lower covered in trees and over grown branches overhanging the wall. There is poor access to inspect the wall entirety, with parts of it visible and accessible to the front and rear. Given that the wall is built around the same period, the wall will be in similar condition as the Front wall and likely to be in a poorer condition due to longstanding of plant growth. **Refer to Image 3**

According to 2 structural report submitted in planning for both the Land plot and the listed building. Structural engineer has feedback observation of weakness of boundary wall is evident all around the c19 brick works.



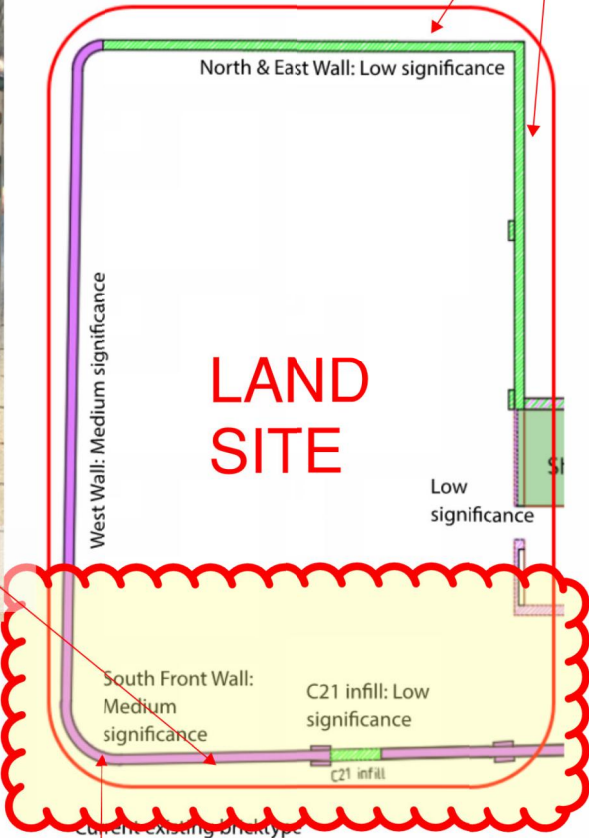
northeast facing

Northern and Eastern Walls collapsed before 2015 and was rebuilt with c20 brick by previous owners without LBC



WALL WAS LEANING BEFORE COLLAPSED

STRUCTURAL ENGINEER ADVISED TO REBUILD FRONT WALL WITH PROPER FOUNDATION AND RECLAIMED BRICKS
18/07/2022



PIER LEANING



Proposed brick types

- High significance Early C19
 - Medium significance Mid C19
 - Low significance C19 fragment
 - Low significance Rebuilt on C19 line
 - Neutral significance Mid/Late C20
 - Neutral / negative significance C21
- Current Proposed Bricks Wall Type C21
- Proposed Multi brown stock brick (ref to material case study in DAS for more info)
 - Proposed wall build with reclaimed brick from west wall (ref to structural report on the methodology on demolition and re-building parts of garden wall)
 - Provision of openings for access and letter box into the site (current site has not direct access from the street and have to access thru neighbouring plot)



Images Extracts from structural report for planning for listed building



Need to be Constructured with existing brick/smlar

Extracts from structural report for planning for ' listed building ' Boundary Wall'

The wall was constructed with brick with 1900 mm height with 250mm width but due to lateral load and ground movement a portion of wall collapsed and deviated laterally more than the permissible deviations for masonry elements tolerances (BS EN 1996-2:2006). Refer to Images. Most of bed joint for brick wall losing their bonding capacity and the pier was supposed to strengthen wall laterally but unfortunately due to wall movement pier lose functionality.

SITE CONDITION AND PROPOSED

