BARRY HONEYSETT
Consulting Structural & Civil Engineers

THE DRILL HALL, PORT ROYAL, SIDMOUTH

REPORT ON STRUCTURAL CONDITION

for

Vision Group for Sidmouth

July 2018 **18140**

Bathurst House, Smythen Street, Exeter, Devon, EX1 1BN Tel: 01392 272510
Also at Lower Woodbeare, Kennerleigh, Crediton, Devon, EX17 4RS Tel: 01363 866230
website: barryhoneysett.co.uk email: engineers@barryhoneysett.co.uk

The Drill Hall, Port Royal, Sidmouth
- for Vision Group for Sidmouth

1.00 Introduction

1.01 The above property was visited by the writer of this report on the 20th July 2018 to carry out a visual inspection of the building to determine its structural condition and the presence of structural defects. The inspection and the writing of this report have been carried out under the instructions from Mary Walden-Till on behalf of Vision Group for Sidmouth in relation to the proposed acquisition and renovation of the building with the retention of the existing construction. This follows several years of disuse and dilapidation of the building which has led to its deterioration.

1.02 This report has been written specifically for the above mentioned client. No responsibility will be extended to any third party. The contents of this report are not to be relied upon by a third party and no part of this report is to be reproduced without written consent from this Practice.

1.03 It should be noted that this report is based upon the visual information obtained during the visit and that this Practice cannot be held responsible for any item of structure or defect therein that was hidden from view, obscured, inaccessible or unobserved at the time of the visit. Unless otherwise stated, no surface finishes such as plaster or render were removed and no floor coverings or boarding were lifted. No excavations were carried out to determine the form of construction and depth of the foundations or the nature of the ground upon which they bear. This report does not constitute a survey of the general condition of the fabric of the building, weather proofing or damp proofing and does not constitute a survey of wood boring insects or timber decaying fungi, services, wiring, plumbing, drainage etc. The inspection and report will not address the presence of dangerous chemicals or material such as asbestos. This Practice reserves the right to alter or amend any comments, conclusions and recommendations should further information come to light.

1.04 For the purposes of this report, the elevation facing the Esplanade and sea will be referred to as the south side of the building and all other parts referred to accordingly.

2.00 Observations

Roof Structure

2.01 The slate roof covering is provided with bitumen sarking felt and this is supported on 75 x 50 mm common rafters at approximately 400 mm centres. In the southern part of the building, over the two storey section, ceiling joists span from east to west and are fixed to the side of each common rafter. At approximately mid height between the ceiling and the apex, a line of 100 x 50 mm timbers are laid against the underside of the common rafters and these are supported on the southern gable and the internal wall plus a series of raking struts (see Plate 1). The raking struts bear on the bottom chord of a king post truss which spans from the southern gable onto the internal wall and rises up to the ridgeboard. The common rafters also appear to be supported by

the bulkhead partitions on the east and west side of the first floor room. Daylight can be seen through the apex of the roof indicating that ridge tiles missing. This has been allowing rainwater to enter the roof and this appears to have caused decay in the top of the king post (see Plate 2). The southern end of the king post truss has had the top edge of the bottom chord cut just beyond its meeting with the principal rafter (see Plate 3). This leaves a short section between the tenon and notch in the bottom of the rafter to resist the horizontal thrust.

Plate 1

Plate 2

Plate 3

2.02 Above the hall, the common rafters are supported by three lines of purlins on each pitch which are 200 x 125 mm in size (see Plate 4). The purlins are supported by six trusses. Each truss has a principal rafter which runs down to a horizontal timber which is built into the walls and is provided with an upper collar at ceiling height (see Plate 5). Tie bars emerge from the ends of the horizontal members of the trusses while the northern two have this tie member removed and replacement ties are attached to the principal rafters near their lower end and rise to meet a vertical hanger just below ceiling level (see Plate 6). This appears to be an alteration to allow greater headroom.

Plate 4

Plate 5

Plate 6

2.03 Vertical posts and raking struts rise up from corbels at approximately mid height of the wall to meet the underside of the horizontal timber and there is a further raking strut from the horizontal timber to the underside of the principal rafter with arch braces attached to the upper collar, rafter and raking strut (see Plate 7). The ends of the main trusses are built into the wall construction. Several of these bearings were inspected to check for decay in the visible part of the truss and to a certain extent, into the depth of wall where a gap existed. No decay was found in the trusses that were examined. Some corrosion of the metal strap which is fixed to the side of the bottom chord and principal rafter can be seen on several of the trusses, particularly on the east side of the hall and the west end of the southernmost truss (see Plate 8). There are no particular signs of distress or failure of the trusses and no indication of spreading or opening of the joints.

Plate 7

Plate 8

2.04 On the eastern eaves of the two storey southern part of the building, the common rafters are fixed to a substantial timber wall plate which appears to have rotated on top of the wall (see Plate 9). Some of the bricks below the wall plate are loose and can easily be removed (see Plate 10). On the western eaves, there is a valley gutter between the Drill Hall and the building to the west (see Plate 11). Although there is

some water staining of the boards forming the gutter at its southern end, the timbers forming this valley appear to be generally sound.


Plate 9


Plate 10


Plate 11

First Floor

2.05 The inside face of the first floor is lined with tongue-and-groove boarding. This boarding appears to have been placed on the north wall of the first floor accommodation but much of it is now missing. This has exposed the brickwork (see Plate 12). The central area of the north wall includes a fireplace and chimney breast and it appears that the chimney may have risen through the apex of the roof. This has now been removed below the roof line and two additional common rafters have been put in place to support the roof covering where the chimney is missing. Throughout the brickwork of this internal wall on the north side of this two storey accommodation, there is extensive erosion of the mortar joints and several areas where bricks have become dislodged or are missing. There are holes on the hall/north side of this wall into the voids in the middle section which could lead into the flue (see Plate 13). This internal wall generally appears to be formed with 9-inch brickwork either side of the central chimney breast. The arch former over the fireplace in the north wall has suffered extensively from corrosion. This may have caused some disturbance to the surrounding brickwork. Behind the bulkheads on the east and west side, the top of the brick walls can be seen. These sections of wall contain alternate courses of stretcher and header indicating that it is at least 9 inches thick. At the eaves, it can be seen that there is a further thickness of brickwork beyond the inner 9-inch, possibly indicating that there is 18 inches of brickwork in total. On the south wall, headers and stretchers can also be seen on the inside face. It is therefore possible that the south wall is also formed in 13½ inch thickness of brickwork.

Plate 12

Plate 13

2.06 The first floor construction consists of 200 x 75 mm joists at approximately 400 mm centres spanning from east to west. These appear to be provided with support by the partitions on either side of the entrance lobby and are built into the east and west walls. Some water staining of the joints can be seen where the ceiling has fallen away, particularly adjacent to the stairs and landing (see Plate 14). However, there are no particular signs to indicate that decay has occurred beyond the surface.

Plate 14

Ground Floor

2.07 South east room. Extensive decay has occurred in the battens and boarding forming the dado on the south wall (see Plate 15). A section of ceiling has fallen away in the south west corner (see Plate 16). This reveals that the current ceiling is formed with plasterboard although it is evident that a previous plaster and lath ceiling had been attached to the underside of the first floor. Much of the wall surfaces are concealed with a lining of timber boarding, some of which is the original T & G boards. A fireplace exists in the north west corner.

Plate 15

Plate 16

2.08 Entrance lobby. The internal walls on the east and west side of the entrance lobby are formed in 9-inch brickwork. The floor immediately inside the entrance door has a distinct slope downwards to the north. However, the skirtings appear to follow this line indicating that it had been constructed in this manner. At the southern end of the entrance lobby, just within the entrance door, is a grill which appears to cover a chute which runs down into the basement.

2.09 South west room. The boarding has been largely removed from the west wall to reveal the face of the brickwork which has been painted. There is also a large brickwork pier forming part of this wall. Much of the lining and plaster has come away from the bottom of the south wall to reveal the brickwork (see Plate 17). Most of the plasterboard ceiling has fallen away from the underside of the floor joists.

Plate 17

2.10 Main hall. Painted brickwork forms the internal surfaces of the walls of the main hall. Much of the paint has peeled away and there is extensive efflorescence on the internal surface, particularly on the inside of the east wall. Some erosion of the mortar joints has also occurred throughout the brickwork, particularly on the east wall and the five northernmost bays of the west wall. The west wall is formed with a series of brick piers which align with and support the trusses with recesses in between with corbeled brick arches above (see Plate 18). In the northern two bays, the erosion of the brickwork and the mortar joints is such that the daylight can be seen through them (see Plate 19). It appears from this that the infill bays between the piers are formed with 4-inch brickwork. However, there a no actual signs of cracking or movement throughout the brick walls.

Plate 18

Plate 19

2.11 WCs. Attached to the western end of the north wall of the main hall is a WC block. This appears to have a solid floor and where plaster has peeled away from the wall surface, the walls appear to be formed in dense concrete blockwork. The overall thickness of the walls indicates that they may be formed with two leaves of 100 mm thick blockwork. At the door opening into the WCs, it can be seen that the main north wall of the hall is 16 inches thick.

2.12 Hall floor. The floorboarding of the hall is generally intact with only a couple boards having swelled and bowed up at the southern end of the hall. Within the basement below, it can be seen that the floor joists span from east to west and are 200 x 75 mm in size at 400 mm centres. The floor joists are generally supported on a ledge in the brickwork on the west wall and built into the face of the east wall. The maximum span of the joists is 3.25 m. Some decay has occurred in the western end of the southernmost joist where it is built into the brickwork (see Plate 20). The joists are provided with intermediate support across the width of the building by two lines of steel beams which are 10-inch x 5 inch I-section and span up to 6 m between supports. At the southern end of the building, the two steel beams are set closer together and provide direct support for the 9-inch brick walls above. Both of these beams have suffered from extensive corrosion, particularly towards their southern end (see Plate 21). The southern joist spanning eastward from the eastern beam has suffered extensively from decay where it sits on the top of a brickwork ledge. Two steel beams can be seen which span over this eastern section of the basement and probably coincide with the internal wall dividing the hall from the two-storey part. Extensive corrosion has occurred at the eastern end of these beams (see Plate 22). Corrosion has also occurred where the steel floor beams are built into the north wall (see Plate 23).

Plate 20

Plate 21

Plate 22

Plate 23

2.13 Basement. In the south wall of the basement, there are openings which have been filled with blockwork. The west wall is formed with a series of brick arches which are sat on in 18 x 23-inch piers (see Plate 24). The steel beams are supported by two 18-inch square brick piers on each length which are capped with granite padstones (see Plate 25). Adjacent to the eastern of the steel beams, a line of brickwork wall has been formed. To the west of this brickwork wall, the floor is gravel. To the east, a concrete floor has been laid. To the east of this wall, a concrete slab has been laid over the gravel. Arches can also be seen in the east wall but these have all been infilled with brickwork so that it is flush with the inner face of the piers and arches. An area at the southern end of the eastern part of the basement could not be accessed as it appears to be boarded off. There are further brickwork walls at the northern end of the basement. It is not clear whether these are original or have been added. The stairs giving access to the basement have walls formed with a timber frame on the north, west and east sides. This includes more substantial timber posts. Decay has occurred at the bottom of these posts (see Plate 26).

Plate 24

Plate 25


Plate 26

External

2.14 East elevation. Much of the brickwork is exposed on the east elevation although it can be seen that it had been rendered which has eroded from the surface. It can also be seen that below the two windows serving the hall, the lower section has been infilled with blockwork (see Plates 27 & 28). It is also noted that the section of wall below the window serving the south east room has also been infilled with blockwork. He blockwork filling the northern door opening is more recent. Throughout the length of the wall, there are projecting buttresses. These roughly coincide with the piers between the arches at the basement level and piers at the upper level but are slightly offset. There are no specific signs of cracking or movement in the wall surface. At the northern end of the east wall, there is a large blocked opening which would have led onto a steel staircase which would probably have been the fire escape. The fire escape has suffered extensively from corrosion and several of the treads have collapsed (see Plate 29).


Plate 27


Plate 28


Plate 29

2.15 To the east of the wall is an open area and approximately 3 m to the east is a retaining wall which appears to be formed with mass concrete which has rounded gravel as the aggregate (see Plate 30). This wall appears to be upright.


Plate 30

2.16 South elevation. A reinforced concrete deck bridges between the retaining wall to the south of the building and the entrance door. Extensive erosion has occurred on the underside of this deck with concrete having spalled away from the underside (see Plate 31). Concrete has peeled away from the edge beam on the west side of the deck to reveal corroding reinforcement (see Plate 32). Corroded steel and missing concrete can also be seen on the underside of the edge beam on the east side of the deck (see Plate 33). The brick piers and walling either side of the bridging deck are formed in much later brickwork.


Plate 31

Plate 32

Plate 33

2.17 The external face of the south wall is coated with a cement-based render which has been painted. Much the paint is peeling away and there are several cracks in the surface of the render. Numerous cracks can be seen throughout the height of the wall and the top of the gable peak appears to be leaning southwards. In particular, there is a line of horizontal cracking just above the level of the sills of the first floor windows (see Plate 34). Some erosion of the capping stones can also be seen at the top of the south elevation. Reinforcing rods have become exposed on the outer surface (see Plate 35).

Plate 34

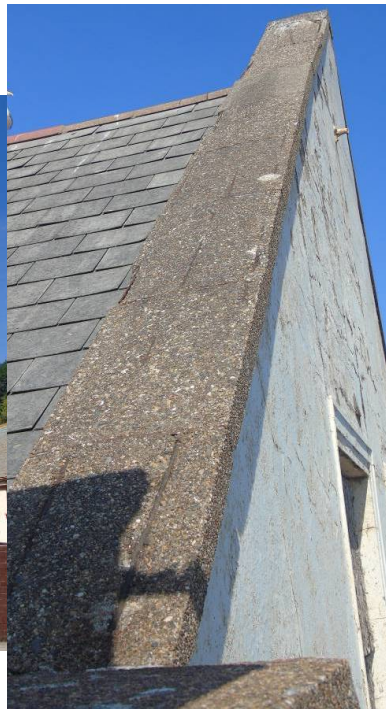

Plate 35

2.18 North elevation. Much of the render has been retained on the north elevation of the hall with some erosion occurring towards the bottom and eastern part. There are no particular signs of cracking or movement in the face of the wall.

2.19 Below the toilet block attached to the north elevation, it can be seen that it is formed with a cast in situ concrete slab with downstand beams. The beams are supported on the north east and north west corners by rendered columns which may conceal reinforced concrete. Some cracking can be seen in the face of the western downstand beam at its southern end (see Plate 36) and towards the north end (see Plate 37). There is also cracking on the face of the southern end of the eastern beam (see Plate 38). Above the reinforced concrete beams, the outer faces of the walls are rendered. Horizontal cracking can be seen either side of the window opening in the east wall (see Plate 39). Cracking can also be seen in the render at window head height in the north wall and there is an area of cracking around and below two steel tubes which pass out through the wall at the centre (see Plate 40). Horizontal cracking can also be seen in the render in line with the head of the window in the west wall (see Plate 41).

Plate 36

Plate 37

Plate 38


Plate 39


Plate 40


Plate 41

2.20 West wall. The southern part of the wall is obscured by the adjoining building with a valley gutter between the two buildings (see Plate 42). A small gap exists at the northern end which is largely inaccessible. Debris fills the gap between the Drill Hall and the retaining wall forming the area to the west (see Plate 43). However, it can be seen from this side, that the infill panels of brickwork are formed with just 4 inches thickness. The gutter is mostly missing from the eaves and there appears to be some decay of the rafter ends towards the southern end of this area. (see Plate 44)

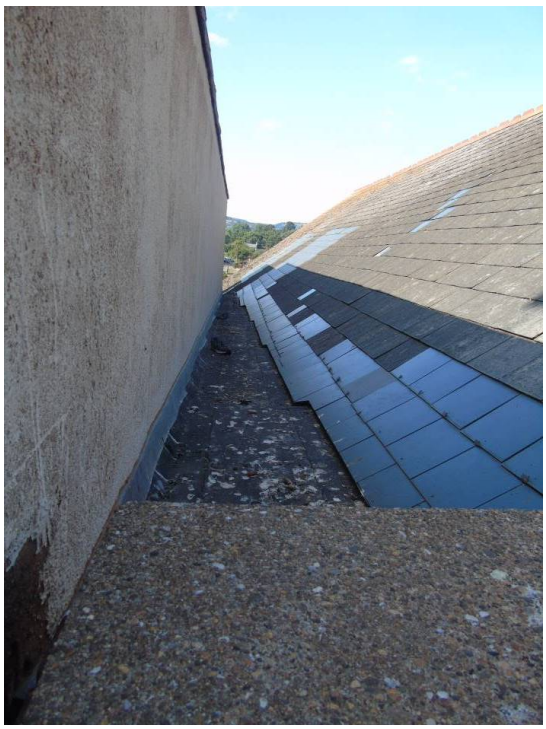

Plate 42

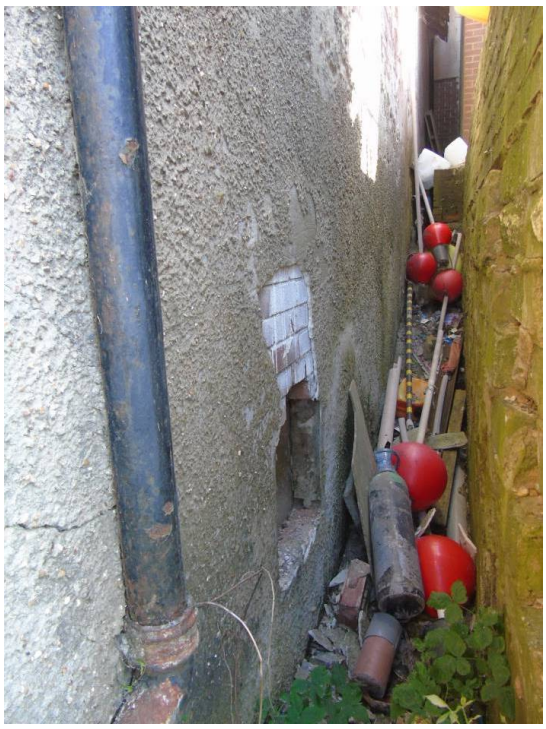

Plate 43

Plate 44

2.21 The current roof covering appears to be asbestos cement slates which have been patched in some areas with later slates. Several of the older slates are also missing and are curling (see Plate 45). There are several ridge tiles missing towards the southern end of the ridge (see Plate 46). Sections of gutter are also missing from the east eaves.

Plate 45

Plate 46

3.00 Comments and Conclusions

3.01 The roof covering is coming to the end of its useful life and will need to be replaced. The supporting timber construction generally appears to be sound with no signs of distress or failure in the roof timbers in those sections that are visible and accessible. Some decay has occurred on the ridgeboard and the top of the king post at the southern end of the roof where the ridge tiles are missing. However, this does not appear to have resulted in a failure of the truss or the roof timbers in this area. Although alterations have been carried out to the two northern trusses, they appear to be continuing to function and provide support for the roof. However, the raising of the tie members will have increased the forces in the other members and their connections.

3.02 There are no signs of settlement or substantial movement in the wall construction. There is a slight lean in the top of the south gable peak. The cause of this could not be identified. However, it may relate to steel components that are corroding and lifting the inside edge of the wall. The wall construction generally appears to be in solid brickwork of varying thickness. For most of the north and south gables, the brickwork appears to be one and a half bricks thick, giving an overall thickness of approximately 13½ inches/375 mm. There is the possibility that some areas been formed with cavity work but they have not been positively identified. There is the possibility that some wall ties exist in the south gable and that these or some other steel component is suffering from corrosion and causing the horizontal cracking which can be seen in the external render. Some areas, notably the infill sections between the piers and arches in the west wall, are formed with 4-inch brickwork.

3.03 Extensive erosion of the brickwork and the mortar joints has occurred in various locations within this building. It is likely that spray from seawater containing sea salts has reacted with some of the mortar and caused it to deteriorate. This has led to joints emptying of mortar and there are also several instances of the bricks themselves becoming damaged and eroded. This appears to be particularly so on the internal wall between the two storey section and the main hall. This may be due to the ingress of water through the former chimney stack which has now been removed. However, spray and rain driven against the walls could have allowed them to become saturated throughout the wall thickness, especially once the render had been eroded from the external surface. Where this erosion has occurred, stabilisation of the brickwork may be required which for the most part of may mean the removal of the affected brickwork and its reconstruction. Where the bricks have been damaged or are missing, these will need to be replaced and to some extent, the mortar joints will need to be raked out and refilled with new mortar.

3.04 The floor construction is generally sound with adequate sized floor joists and steel beams. However, the corroded sections of steel beam at the southern end of the building have reached a point where they are beyond repair and will therefore need to be replaced. This will require the temporary support of the floor joists and the internal brickwork walls on either side of the entrance lobby while the beams are replaced. Other sections where corrosion has occurred, such as the northern bearings of the beams and the eastern bearing of the beam supporting the wall between the two storey section and the hall, will need to have the existing corrosion cleared from the surface and removed so that the remaining section can be checked for its adequacy and protected from further corrosion.

3.05 The weatherproofing of this building will be important for its long-term future. Most of the asbestos cement slates are coming to the end of their useful life and the missing ridge tiles will need to be replaced. Furthermore, the cappings on the parapet at the top of the south wall will also need to be replaced. As the wall construction generally appears to be solid brickwork, it will also be important to provide an adequate barrier to rain and spray on the external surfaces of the walls. A cement-based render should be avoided in this situation as it will tend to hold the moisture within the building. A breathable coating system should be adopted and consideration could also be given to improving the thermal performance of the external walls at the same time. There are now many solutions to this situation which could be considered.

3.06 It is evident that the salt-laden water has also caused corrosion in the steel reinforcement for some of the reinforced concrete elements of the building including

the bridge deck in front of the main entrance and the beams supporting the toilet block. The extent of the corrosion in the beams below the toilet block could not be identified as they were still concealed within the concrete. However, it is likely that this reinforcement would need to be the exposed and the corroded metal removed before replacing the cracked concrete. With regard to the bridge deck, the corrosion of the edge beams is such that the beams as a whole will need to be replaced. As the condition of the reinforcement within the deck itself is unknown, it may be prudent to assume that the deck as a whole will require replacement. In view of its location, the replacement should be formed using stainless steel reinforcement.

3.07 The horizontal cracking which can be seen in line with the heads of the windows in the toilet block are likely to be caused by the corrosion of the steel lintels. These lintels will therefore require replacement.

3.08 The external fire escape at the northern end of the east wall has suffered corrosion to the point where it requires replacement. The stairs leading from the north of the hall to the basement will require extensive repair work and replacement of decayed sections of timber. However, it may be possible to retain the bulk of the timbers forming this stair and its enclosure.

4.00 Recommendations

4.01 The existing roof covering should be replaced. If a material heavier than thin Welsh slate is used, the existing timbers should be checked for their adequacy to support the additional load. The covering should also be provided with a breathable sarking fabric. The new roof should be provided with a full set of ridge tiles, preferably matching the originals and the gutters and downpipes replaced. Any decayed timbers revealed by the replacement of the roof should be replaced. The ends of the trusses concealed within the walls should be uncovered and revealed so that they can be checked for decay and the metal components checked for excessive corrosion. Any surface corrosion should be removed back to bright metal and corrosion protection coatings applied to the accessible surfaces. Consideration should be given to reinstating the original ties on the two northern trusses. Metal straps should be fixed to either side of the rafters and king post of the truss supporting the roof over the southern parts of building. Where the wall plate has been dislodged and rotated on the top of the wall, as observed at the southern end of the east wall, it should be reset and fixed to the brickwork.

4.02 The two heavily-corroded beams supporting the internal partitions on either side of the entrance lobby should be removed and replaced. The new beams should be isolated from damp conditions as far as possible and provided with corrosion protection suitable for a marine environment. Alternatively, the replacement beams could be formed in stainless steel. The corroded ends of beams built into the north and east walls should be uncovered and the corroded material removed so that an inspection of the remaining section can be made and checked for their adequacy to support the current loading. The remainder of surfaces of the beam supporting the floor should also be cleaned back to clean metal and recoated with a suitable corrosion protection system

4.03 The decayed timbers against the south wall should be replaced and, as far as possible, isolated from the possibility of becoming damp in the future.

4.04 The deck and edge beams forming the bridge to the entrance door should be replaced. If the replacement is formed in reinforced concrete, the reinforcement should be stainless steel. The current brick piers supporting the bridge deck can be retained.

4.05 The loose, eroded and missing bricks should be replaced. Eroded and soft mortar joints should be raked out to a depth of at least 25 mm and refilled with new mortar. New mortar for laying bricks and re-pointing should be a lime-based material and should also be resistant to deterioration due to sea salt.

4.06 The capping stones on the parapet on the south gable should be removed and relaid with a damp proof course installed below them which should be lapped with the roof flashings.

4.07 The cracked and spalled concrete on the reinforced concrete beams below the toilet block should be removed and the reinforcement exposed. If the reinforcement has corroded to the point where it can no longer provide the required strength, the beam will need to be cut out and replaced. If sufficient steel remains, it may be possible to remove the corroded material, provide the remaining steel with corrosion protective paint and reform the concrete cover to the reinforcement.

4.08 The render should be removed from the south elevation and investigations carried out to determine the cause of the horizontal lines of cracking. The investigation should include a search for steel components built into the wall which could be suffering from corrosion. The top section of the gable peak should be reformed in the original upright position. The remaining render on the east, west and north elevations should also be removed back to bare brickwork. Where the mortar joints have been eroded, they should be raked out and refilled with new mortar. The replacement render should be a lime-based material and breathable. Any decorative finishes should also be breathable.

4.09 The outer edge of the lintels of the windows in the toilet block should be exposed to check the degree of corrosion which may have occurred. If this corrosion is severe, it may be necessary to replace the existing lintels.

4.10 The existing fire escape attached to the northern end of the east elevation should be replaced. The replacement should be constructed with materials which will be resistance to damage from the marine environment.

4.11 The timber framing forming the enclosure for the stairs to the basement should have all decayed sections cut out and replaced and the weather protection improved so that timbers cannot become damp in the future.

Barry Honeysett
BSc, CEng, MICE, MIStructE.

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