

## Spalding Gentlemen's Society Structural Condition Report

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## 1.0 INTRODUCTION AND BACKGROUND

- 1.1 Spalding Gentlemen's Society is a Grade II listed museum building (Listing NGR: TF2481222798) located at Broad Street, Spalding as indicated on the site location plan below.



Figure 1 - Site Location Plan

- 1.2 The building was constructed in 1910 and is a two-storey structure formed of load bearing brickwork walls with the ground floor comprising of ground bearing concrete slabs in the Maples Room, Strong Room and Side Gallery with suspended timber floors elsewhere.
- 1.3 At First Floor level the floors are primarily suspended timber with the floor of the Turner Gallery being formed of suspended precast concrete with areas of solid insitu concrete. The Main Library stands on the concrete Strong Room roof.
- 1.4 The vaulted timber roof is covered with welsh slate tiles.
- 1.5 The building was extended in the 1920s with the addition of the ground floor strong room at the rear North Eastern corner. Further additions were also added in the 1960's to provide more gallery space (Turner Room and Maples Room). At the same time, an extra storey was added above the strong room to form the first-floor library.
- 1.6 The masonry walls are supported on shallow strip footings bearing onto Made Ground at approximately 500-700mm below ground level. The foundations to the original construction are formed of corbelled brickwork with the later rear / side addition having concrete footings.

- 1.7 The site generally falls from the front of the building to the back with a slight cross fall towards New Road to the North.
- 1.8 The ground conditions recorded on the site comprise of made ground to a depth of approximately 1.0m above a layer of clayey silt / sand.
- 1.9 From background research of British Geological Survey data the ground conditions in Spalding generally comprise of superficial deposits of clay and silt overlying Oxford Clay formation.

## 2.0 SUMMARY OF HISTORIC INVESTIGATIONS

- 2.1 The following previously completed reports / investigations have been reviewed:

|                              |                                     |               |
|------------------------------|-------------------------------------|---------------|
| Preliminary report           | Sidebotom Richardson Cheng ('SRC')  | November 2011 |
| Survey plan (A1)             | SRC                                 | November 2011 |
| Monitor readings             | SRC                                 | February 2013 |
| Site investigation report    | CET                                 | June 2014     |
| Letter report                | Smithers Purslow ('SP')             | December 2016 |
| Letter report & level survey | SP                                  | March 2017    |
| Drain and foundation survey  | The Drainage Repair Company ('DRC') | March 2017    |
| Indicative cost study        | SP                                  | April 2017    |
| Progress report No 1         | Focus                               | August 2017   |
| Letter re insurance claim    | Crawfords                           | August 2017   |

### 2.2 Summary of Ground Investigations

Investigations of the ground conditions and existing foundations have been undertaken as part of the previous investigations by others: SRC Structural Report (dated November 2011), CET Site Investigation Report (dated June 2014) and the Drain and Foundation Survey by DRC (dated March 2017).

## SRC Structural Report

A single hand augered borehole was undertaken adjacent to the Maples Room Northern external wall which found a concrete foundation bearing onto Made Ground at approximately 600mm below ground level. The ground conditions were categorised as being very soft silty fill.

## CT Ground Investigation

The CET investigations included 2no. trial pits to a depth of approximately 3.3m below ground level, the locations of the trial pits are shown in Figure 2 below.

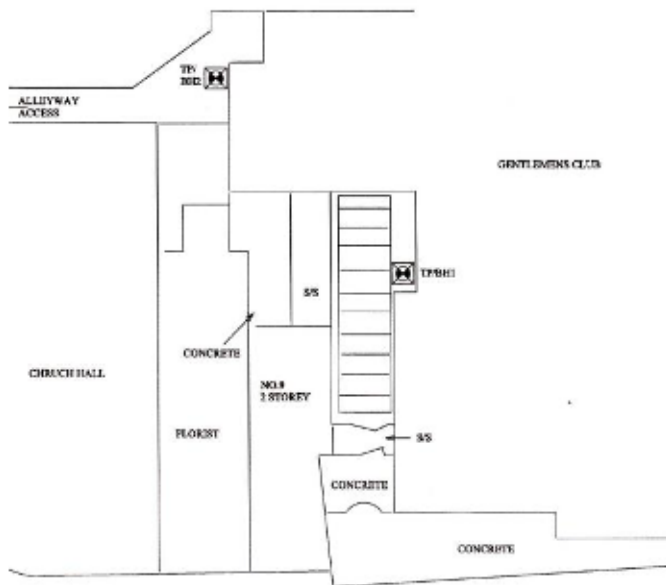


Figure 2 - CET Ground Investigation Locations

The ground investigation found that the existing foundations were founded on Made Ground at 0.7m below ground level. The foundations comprised of concrete strip footings and extended 200-250mm beyond the face of the wall.

Generally, the ground conditions comprised of Made Ground to a depth of 1.0m overlying a combination of clayey silt and sand. The laboratory testing results found the clayey, silty Made Ground to have a plasticity index of 21-23% which means that it would be categorised as having Medium Volume Change Potential.

### DRC Ground Investigation

The DRC Investigation comprised of 2 no. external and 2 no. internal trial pits which extended to depths of 4.5m and 3.0m respectively. The locations of the trial pits are shown in Figure 3 below.

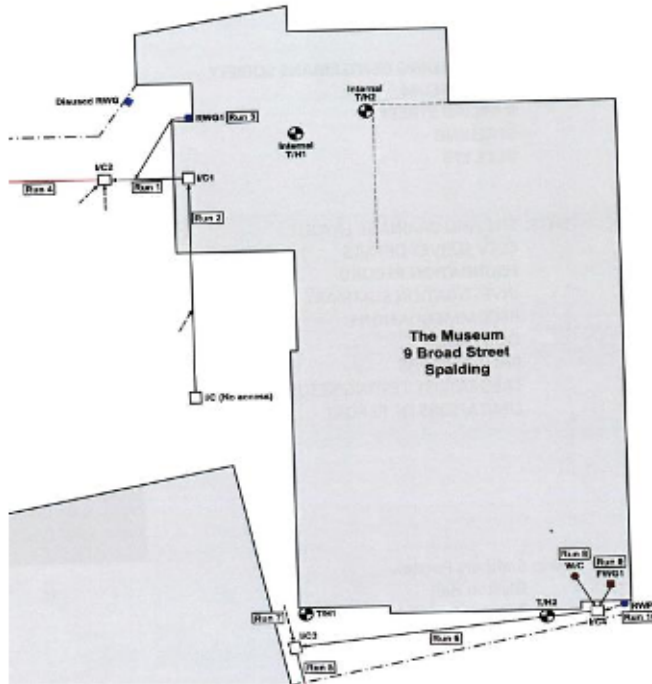


Figure 3 - DRC Ground Investigation Locations

The existing foundations to the front elevation were found to be formed of corbelled brickwork founded at 0.7m below ground level. The corbelled brick foundation to the Strong Room was founded at 0.55m below floor level.

The report categorised the ground as either silt or clay and all samples tested were found to have a Medium Volume Change Potential.

The ground floor slab within the Maples Room was found to be 150mm thick unreinforced concrete and is formed on 200mm of fill material.

### 2.3 Summary of Previous Movement Monitoring

SRC surveyed the building in October 2011, following which a range of tell-tale demec studs were fixed across a number of visible cracks. The monitoring continued until February 2013 following which SRC concluded that the readings showed minor differences and further monitoring was not required. Figure 4 below shows the SRC monitoring readings.

Summary of Gauge Readings

|   | Location                                          | 31/10/2011 | 25/04/2012 | $\Delta$ | 19/07/2012 | $\Delta$ | 11/02/2013 | $\Delta$ |  | $\Delta$ | $\Sigma \Delta$ |
|---|---------------------------------------------------|------------|------------|----------|------------|----------|------------|----------|--|----------|-----------------|
| 1 | External - Above Fire Exit Door First Floor       | 43.87      | 43.94      | +0.07    | 43.90      | -0.04    | 44.03      | +0.13    |  |          | +0.16           |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
| 2 | External - Above Ground Floor Window On Fire Exit | V 46.74    | 46.86      | +0.12    | 46.82      | -0.04    | 47.12      | +0.30    |  |          | +0.38           |
|   |                                                   | H 88.92    | 88.95      | +0.03    | 88.87      | -0.08    | 89.14      | +0.27    |  |          | +0.22           |
|   |                                                   | D 56.74    | 56.88      | +0.14    | 56.79      | -0.09    | 56.82      | +0.03    |  |          | +0.08           |
| 3 | Above Cupboard In Turner Room                     | H 44.49    | 44.72      | +0.23    | 44.70      | -0.02    | 44.84      | +0.14    |  |          | +0.35           |
|   |                                                   | D 60.11    | 60.07      | -0.04    | 60.04      | -0.03    | 60.27      | +0.23    |  |          | +0.16           |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
| 4 | Entrance Into Turner Room                         | V 67.32    | 66.68      | -0.64    | 66.36      | -0.32    | 66.09      | -0.27    |  |          | -1.23           |
|   |                                                   | H 151.78   | 152.07     | +0.29    | 151.97     | -0.10    | 152.50     | +0.53    |  |          | +0.72           |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
| 5 | Library - To Right Hand Side Of Window            | 65.83      | 65.63      | -0.20    | 65.80      | +0.17    | 65.59      | -0.21    |  |          | -0.24           |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
| 6 | Library - Below Window                            | 47.24      | 47.31      | +0.07    | 47.23      | -0.08    | 47.46      | +0.23    |  |          | +0.22           |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |
|   |                                                   |            |            |          |            |          |            |          |  |          |                 |

Figure 4 - SRC Movement Monitoring

## 2.4 Summary of Drainage Surveys

Several drainage investigations have been carried out since 2011, the most recent of which was undertaken by DRC in February 2017.

All investigations highlighted problems with the existing drainage network and suggested several repairs. It is understood that all recommended repairs have now been completed.

## 3.0 RECENT MONITORING STRATEGY

- 3.1 Monitoring of the building has been undertaken by Survey Solutions in order to determine the extent and pattern of ongoing building movements. Many of the demec studs installed by SRC in 2011 were found to still be in place and therefore the readings at these locations have been continued as part of the more recent monitoring which commenced in November 2018.
- 3.2 Readings have also been taken for several further cracks as well as levels surveys of the external damp proof course and internal Maples Room floor. Figure 5 below shows the locations of the monitoring undertaken.

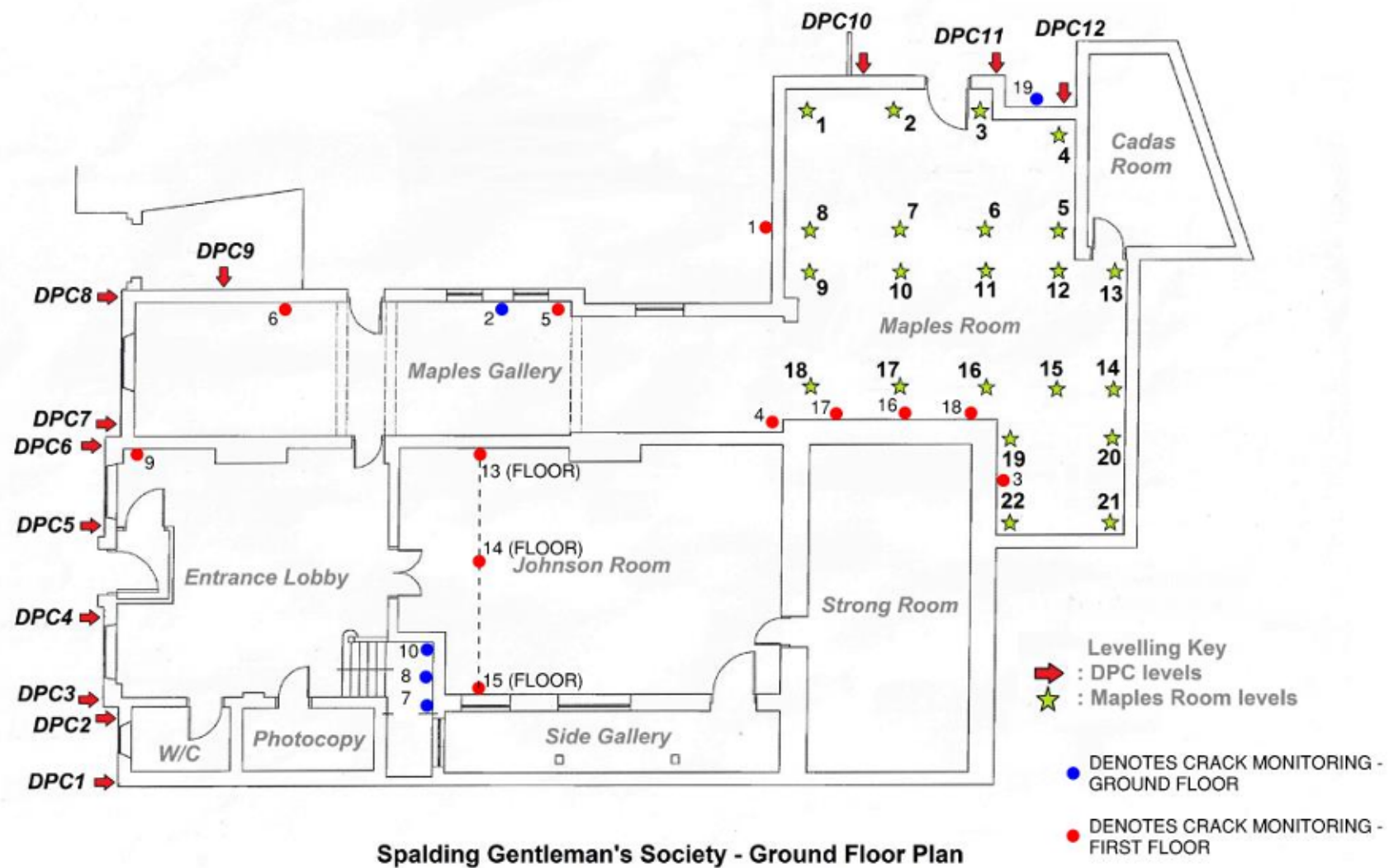


Figure 5 - Monitoring Key Plan

#### 4.0 DISCUSSION OF MONITORING SURVEY RESULTS

- 4.1 The readings from the monitoring undertaken are included in Appendix A and graphs 1-7 showing the trends / patterns of the movement observed are included in Appendix B.
- 4.2 Refer to Figure 5 for locations of specific monitoring points referred to below.

##### **Crack monitoring – Continuation of monitoring points established October 2011**

- 4.3 The movement of these cracks appears to be reasonably stable with the maximum change since November 2018 being 0.89mm (Location 2) and since October 2011 being 1.99mm in the same location.
- 4.4 The overall crack movements recorded since both October 2011 and the commencement of the latest monitoring in November 2018 are shown in Figure 6 below.

|   | Location                                                                                    |   | Movement Since Oct' 11 | Movement Since Nov '18 |
|---|---------------------------------------------------------------------------------------------|---|------------------------|------------------------|
| 1 | External:<br>Above Fire Exit Door First Floor                                               |   | 0.24                   | 0.14                   |
| 2 | External:<br>Above Ground Floor Window next to Fire Escape                                  | V | 1.99                   | 0.89                   |
|   |                                                                                             | H | 0.48                   | -0.09                  |
|   |                                                                                             | D | 0.17                   | 0.21                   |
| 3 | Internal First Floor:<br>Above Cupboard in Turner Room                                      | H | 1.25                   | 0.25                   |
|   |                                                                                             | D | -0.01                  | -0.07                  |
|   |                                                                                             |   |                        |                        |
| 4 | Internal First Floor:<br>Entrance into Turner Room<br><b>Lost: Internal Plaster Failure</b> | V |                        |                        |
|   |                                                                                             | H |                        |                        |
| 5 | Library - To right hand side of window (Turner Room end)                                    |   | 0.34                   | 0.28                   |
| 6 | Library - Below window adjacent to steps down from Balley Room                              |   | 1.25                   | 0.36                   |

Figure 6 - SRC Crack Monitoring Points Summary

- 4.5 It should also be noted that some of these cracks are not widening continuously but are opening and closing over time which we would suggest the movement may be related to seasonal thermal expansion/contraction of the masonry in addition to the vertical movements of the foundations (discussed below). Graphs 1 and 2 in Appendix B show the seasonal movement patterns of cracks 1 and 5.

# Crack monitoring – New monitoring points established by Survey Solutions

## November 2018

- 4.6 The cracks have widened slightly since the initial visit in November 2018 by a maximum of 0.73mm (Location 12). Again, there appears to be a degree of opening / closing of these cracks between readings as shown by the fluctuations on graphs 3 and 4 in Appendix B.
- 4.7 Several cracks have also reduced in width when compared to the initial set of readings in November 2018. This is shown in Figure 7 below with the negative values indicating readings where the crack widths have decreased.

|    | Location                                                                |             | Movement Since Nov '18 | Movement Since Feb '20 | Movement Since May '20 |
|----|-------------------------------------------------------------------------|-------------|------------------------|------------------------|------------------------|
| 7  | Internal: Entrance Lobby; Stairs Landing approx 2.0metres high          | V           | -0.08                  |                        |                        |
|    |                                                                         | H           | -0.23                  |                        |                        |
| 8  | Internal: Entrance Lobby; Stairs Landing approx 2.0metres high          |             | 0.54                   |                        |                        |
| 9  | Internal: Lecture Room; Top left corner of door through to Balley Room  | H           | 0.32                   |                        |                        |
|    |                                                                         | V           | -0.10                  |                        |                        |
|    |                                                                         | D           | 0.59                   |                        |                        |
| 10 | Internal: Entrance Lobby; Stairs Landing approx 0.5metres high          |             | -0.75                  |                        |                        |
| 11 | Internal: Cadex Room; Floor crack (under loose carpet) <i>See Photo</i> |             | 0.36                   |                        |                        |
| 12 | Internal: Cadex Room; Floor crack (under loose carpet) <i>See Photo</i> | 1 to 2      | 0.15                   |                        |                        |
|    |                                                                         | 2 to 3      | 0.73                   |                        |                        |
|    |                                                                         | 1 to 3      | 0.48                   |                        |                        |
| 13 | Lecture Room Floor; Next to Librarian's Room w/all <i>See Photo C13</i> |             | -0.06                  |                        |                        |
| 14 | Lecture Room Floor; Centre Aisle <i>See Photo C14</i>                   |             | -0.37                  |                        |                        |
| 15 | Lecture Room Floor; Next to External wall to Side Gallery <i>See</i>    |             | 0.33                   |                        |                        |
| 16 | Turner Room; Upper Left of Library Archway                              | 1 to 2      |                        | 0.14                   |                        |
|    |                                                                         | 2 to 3      |                        | 0.21                   |                        |
|    |                                                                         | 1 to 3      |                        | 0.11                   |                        |
| 17 | Turner Room; Upper Right of Library Archway                             | a           |                        | 0.00                   |                        |
|    |                                                                         | b           |                        | 0.00                   |                        |
| 18 | Turner Room; High level approx 1 metre to left of 16                    |             |                        | 0.04                   |                        |
| 19 | External; Outside wall of Cadex Room (adjacent to                       | 1 to 2      |                        | -0.13                  |                        |
|    |                                                                         | 2 to 3      |                        | 0.24                   |                        |
|    |                                                                         | 1 to 3      |                        | -0.06                  |                        |
| 20 | Maples Gallery; To the left of entrance door                            |             |                        |                        | 0.19                   |
| 21 | Stairwell; Overhead Arch on first landing (adjacent to 7 & 8)           |             |                        |                        | -0.04                  |
| 22 | Strong Room; Cupboard mitres                                            | Front Left  |                        |                        | -1.02                  |
|    |                                                                         | Front Right |                        |                        | 1.02                   |
|    |                                                                         | Back Left   |                        |                        | 0.10                   |

Figure 7 - Survey Solutions Monitoring Points Summary

- 4.8 During the monitoring period further cracks were observed within the building and additional demec studs were installed to record the movement of these cracks in February 2020.
- 4.9 Additional monitoring points were also set up within the Strong Room in May 2020 and the in this location a movement of 1mm was recorded over 6 months.

#### **Damp Proof Course Monitoring**

- 4.10 The DPC monitoring points at the front of the building have all moved upwards with the average movement being 9.4mm. With reference to graph 5 most of this movement appears to have taken place between November 2019 and February 2020.
- 4.11 The latest set of data (recorded in November 2020) shows some further upward movement, this corresponds with the November readings in 2018 and 2019 which also showed upward movement.
- 4.12 Despite the small amount of downward recovery generally observed during the summer months the general trend of the front elevation movement is upwards. This could be due to changes in the ground water regime. With reference to the rainfall graph in Figure 8 below there was a prolonged period of heavy rainfall during the second half of 2019 which preceded the occurrence the most significant upward movement at the end of 2019.

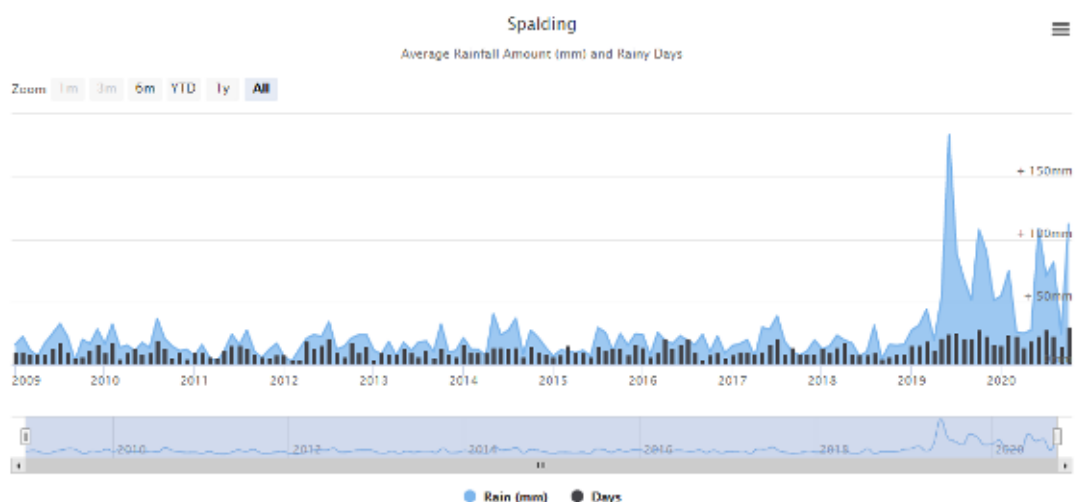


Figure 8 - Spalding Rainfall Data Chart

- 4.13 Similarly, further heavy rainfall was observed during the first half of 2020 which was followed by further upward movement of the front elevation between August and November 2020.

- 4.14 At the rear of the building the wall is generally moving downwards with an average movement of 4.2mm. With reference to graph 6 this movement appears to have occurred relatively consistently since May 2019 with some small amounts of upward recovery shown on some readings.

#### **Maples Floor Monitoring**

- 4.15 In line with the adjacent external wall data discussed above, the Maples Roof floor has also moved downwards, by an overall average of 2.9mm since November 2018 with the largest movements of up to 4.7mm being recorded adjacent to the external wall (points MR1-4).
- 4.16 With reference to graph 7 this movement occurred mainly between May and August 2019 and appears to be stabilising albeit with a small amount of ongoing downward movement.

### **5.0 CONCLUSIONS**

- 5.1 The movement of the cracking was found to be relatively small during the monitoring period however the foundation movement, particularly at the front of the building has been more substantial.
- 5.2 Over the last 18 months the amount of rainfall recorded in Spalding has been significantly above the historic average values and this will most likely have impacted the building movements observed.
- 5.3 A large portion of the foundation movement recorded occurred following an extreme weather event in June 2019. Prior to this period of exceptionally heavy rainfall the readings were relatively stable suggesting that the movements were linked to the climatic conditions.
- 5.4 Historic movements of the building may also have been caused by leaking water from defective drains which we understand have now been repaired.
- 5.5 The structure is founded on poor quality strata (made ground) which is cohesive and can potentially either swell or shrink due to changes in moisture level.
- 5.6 The monitoring data suggests that there is an overall rotational movement of the building where either downward settlement of the rear is causing upward movement of the front elevation or upward movement of the front elevation is in turn pushing down the rear portion of the building. It may be that the movement observed is a combination of both these mechanisms.
- 5.7 The pattern of movement observed is unusual and it is unsurprising that there is resulting widespread cracking of the masonry walls throughout the building.

- 5.8 The strong room at the rear of the building is formed of heavy construction with thick walls and is heavily loaded due to the 1<sup>st</sup> floor library, this could be contributing to the downward movement at rear of the building.
- 5.9 The small degree of movement of the internal cracks appears to be in part due to seasonal fluctuations in ambient temperature causing expansion / contraction of the masonry walls. However, the general trend appears to be that the cracks are widening, particularly those which have been present since the initial monitoring in 2011.
- 5.10 The movement observed does not present an immediate concern in terms of the structural integrity of the building however we understand that there are serviceability / usage issues resulting from sloping floors, doors catching on frames etc.
- 5.11 The cracking observed is widespread throughout the building generally ranging in thickness between 2-5mm and would be classified as 'cracks easily filled' in accordance with BRE Digest 251 'Assessment of damage in low rise buildings'.

## 6.0 NEXT STEPS

- 6.1 As discussed above the pattern of movement observed is unusual and it is not clear whether movement in one localised area of the building is having knock on effects elsewhere or if there are overall changes occurring within the underlying soil.
- 6.2 We have discussed the findings of the previous ground investigations and the monitoring survey with a specialist geotechnical engineer who have advised that further ground investigations are unlikely to definitively confirm the cause of the movement. They have suggested that it is likely that downward movement is occurring at the rear of the building which in turn is causing uplift of the front elevation, however the possibility of upward movement due to heave at the front of the building cannot be discounted.
- 6.3 The remediation options discussed in section 7.0 below have been developed in conjunction with a specialist underpinning contractor who have recently carried out work on a similar project in Spalding. They have advised that due to the ground conditions present in Spalding driven piles are the most appropriate means of underpinning, for this method the piles are driven to a specified resistance (set) and therefore ground investigations to inform the pile design are not required. We have been advised that vibrations due to the driven piles are not a concern as the upper layers of soil are very soft.
- 6.4 From our discussions with the specialists referred to above it has also been concluded that due to the ground conditions in Spalding injection grouting and underpinning with needle beams (which relies on piles resisting tension loads) are not suitable remediation methods.

- 6.5 It would also be prudent to arrange a further CCTV survey of the drains in order to confirm that the repairs carried out have been effective.

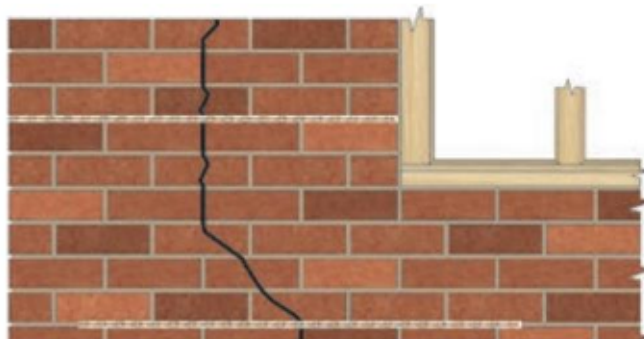
## 7.0 LONG TERM REMEDIATION OPTIONS

- 7.1 Given the general trends of the monitoring data the foundation movement appears to be ongoing and we would therefore suggest that some level of intervention is required to extend the useful working life of the building. The following intervention options could be considered, and the final option selected will also depend on the strategy adopted for the existing side extensions which is discussed in section 8.0.

- 7.2 Indicative approximate budget estimate costs for the remedial works are included in Appendix A,

### **Option 1- Repair existing cracks using helical bed joint reinforcement**

- 7.3 This option (as shown in Figure 9 below) would involve installing stainless steel reinforcement within the bed joints of the masonry walls to stitch the existing cracks, the cracks would then be filled and the reinforcement would help mitigate the risk of the cracks reopening in future.



Crack stitching

Figure 9 - Indicative Crack Stitching Detail

- 7.4 Repairing the cracks would however not arrest the apparent movement of the foundations and there is therefore a reasonable possibility that the ongoing foundation movement could cause further cracking in other areas of the building.

**Option 2 - Piled raft underpinning to whole building with repair of existing cracks**

- 7.5 The most extensive remediation option would involve installing a new reinforced concrete ground floor slab throughout the whole footprint of the building. The slab would be supported on piled foundations, possibly with the top section sleeved to prevent upward movement due to heave of the cohesive soils. The slab would be 'toothed' under the existing internal and external masonry walls to provide support to the existing structure.

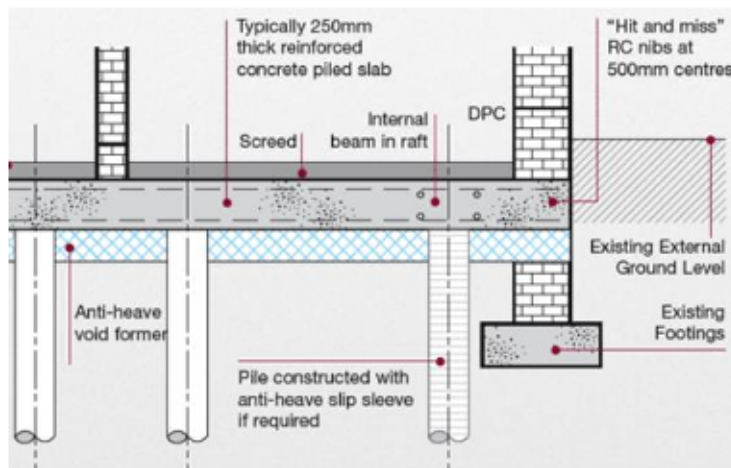


Figure 10 - Raft Underpinning Indicative Section

- 7.6 This proposal would minimise the risk of future ground movements causing further damage to the building and would also reduce the likelihood of differential movements between different sections of the building. It would however be the most intrusive, disruptive and expensive choice of the underpinning interventions discussed.

**Option 3 - Piled raft underpinning of side extension and strong room with repair of existing cracks**

- 7.7 This option would be less intrusive when compared to option 2 where a piled raft would be installed (as described in section 7.5) within the non-original extensions where the monitoring shows the maximum downward movement. This would however provide no guarantee that the movement in the original portion of the building would be arrested.
- 7.8 The partial underpinning would reduce the disruption to the remainder of the building however would introduce a 'hard spot' which could result in localised cracking should the adjacent section of the building continue to move.

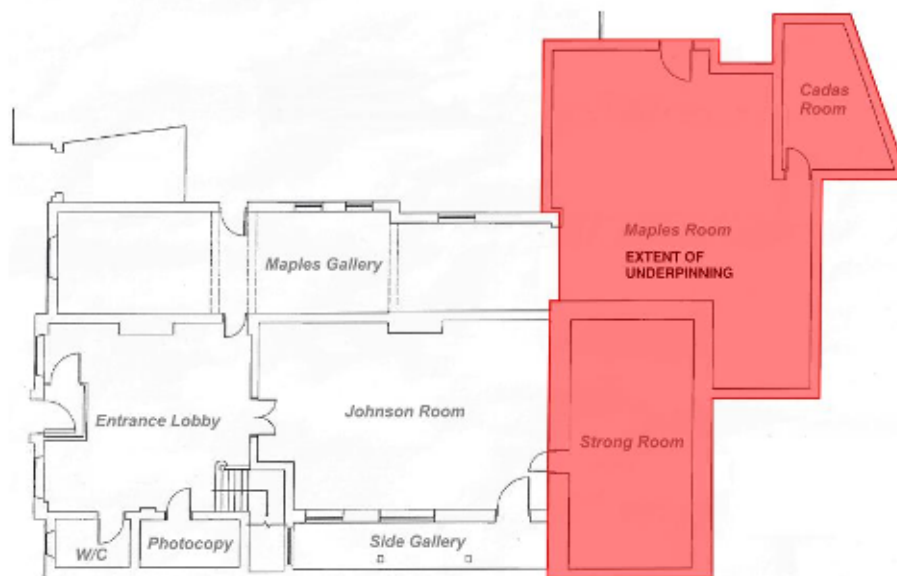


Figure 11 - Remediation Option 3

**Option 4 - Piled raft underpinning of original building footprint with repair of existing cracks**

- 7.9 This option assumes that the existing 'non original' extensions are to be removed and replaced with a structurally independent new extension supported on suitable piled foundations. In this scenario the original section of the building will be supported on a new reinforced concrete raft slab supported on piled foundations as described previously.



Figure 12 - Remediation Option 4

**Option 5 - Piled raft underpinning of original building footprint and strong room with repair of existing cracks**

- 7.10 This option assumes that the strong room is retained and the remaining 'non original' extensions are removed and replaced with a structurally independent new extension supported on suitable piled foundations. In this scenario the original section of the building and the strong room will be supported on a new reinforced concrete raft slab supported on piled foundations as described previously.



Figure 13 – Remediation Option 5

**Option 6 – Replacement of non-original extensions with repair of existing cracks**

- 7.11 This scenario assumes that the more recent extensions are removed and replaced with new construction structurally separated from the original footprint. It is assumed that the new extensions would be supported on piled foundations.
- 7.12 In this case a phased approach could be adopted where the extension development is completed and the cracking within the retained original section of the building is repaired. Following this initial phase further monitoring of the original building would be undertaken to assess the need for any underpinning of the original footprint.

## 8.0 COMMENTS ON POTENTIAL REMOVAL OF NON 1910 EXTENSIONS

8.1 It is understood that the Spalding Gentlemen's Society would like to explore the possibility of removing the extensions to the original 1910 section of the building and constructing a new extension in the same location. We have not received any information showing the proposals and therefore the comments in this section are intended to generally assess the viability of a potential new construction and its impacts on the retained section of the building.

8.2 With reference to section 1 of this report we understand the following timeline with regards to the building modifications:

|        |                                                                                                                                                                                                                                           |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1910   | Original two storey construction comprising of the entrance lobby, WC, side gallery, photocopy room, Johnson Room and Maples Gallery at Ground Floor with the lecture room, side gallery, Bailey Room and Librarian's Room at First Floor |
| 1920's | Ground floor Strong Room added                                                                                                                                                                                                            |
| 1960's | First floor library added above Strong Room. Rear extension added comprising of Maples Room and Cadas Room at Ground Floor and Turner Room at First Floor.                                                                                |

8.3 The previous investigations carried out show the shallow footings to the extension elements are typically founded 500-600mm below ground level whereas the foundations to the original construction are slightly deeper at 700mm below ground level.

8.4 In the current condition it is likely that the behaviour of the structure forming the extensions has a knock-on effect on the original construction.

8.5 As noted in section 5.6 above there appears to be an overall rotational movement of the building and it may be the case that downward movement of the rear section of the building (which includes the heavily loaded strong room / library) is causing the upward movement observed at the front elevation.

8.6 It is understood that there have been several issues with drains in the proximity of the side extensions which is likely to have played a part in the historic movement observed.

- 8.7 Removing and replacing the existing extensions presents an opportunity to provide a structural separation between the original building and the potential new extensions which would eliminate the risk of differential movements between the two sections of the building causing further cracking / fabric distress.
- 8.8 Further consideration would need to be given to the measures required in terms of the retained section of the building and whether underpinning would be required. One option may be to adopt a phased approach where the extension development is completed following which further monitoring of the original building is carried out to assess the need for any further intervention (see section 7.0 - remediation option 6).
- 8.9 Structurally it is not foreseen that removing the existing extensions would be likely to destabilise the original building and in fact may provide some benefits in terms of relieving load from the existing foundations.
- 8.10 The demolition and construction methods for any new extension development would need to carefully consider the stability and condition of the existing building. The proposals for the new construction would need to accommodate the constraints of the neighbouring buildings and the limited working space. For example, a prefabricated panelised system would most likely be inappropriate due to the requirement to use a crane to lift large elements into position.
- 8.11 The construction works would also need to minimise vibration to avoid damage to the existing building.
- 8.12 Constructing a new extension adjacent to the original building is certainly feasible however due to the complexities highlighted above the selection of a competent contractor with experience of this type of work would be highly recommended.
- 8.13 The following non-structural items will also need to be considered / resolved as part of any proposed works.
  - Party wall matters
  - Listed building consents
  - Planning applications
  - Archaeology
  - Ground Contamination
  - Existing buried services

- Presence of asbestos

Note: The budget estimates included in Appendix A do not allow for costs associated with any of the items listed above.

## 9.0 APPENDIX A – BUDGET COSTS

### 9.1 Introduction

The costs for remedial works provided below have been estimated following consultation with JB Specialist Refurbishments Limited and DJE Construction. The values included are indicative budget estimates only and will be subject to review following confirmation of the final strategy for the building and the development of the construction level design details.

The fees provided include the structural remedial / repair works only and do not allow for any non-structural works such as internal fit out, reinstatement of decorative finishes etc or the potential new extension works.

The budget estimates assume that there is no asbestos present within the existing building and that there is no ground contamination which will affect the work.

### 9.2 Masonry Repairs

The price below is provided based on the following scope of works, the final value of the works will be subject to a detailed survey of the existing walls / plasterwork.

- Repair of 40 no. cracks allowing for 3 no helibars (1m long) per crack on average
- Remove and reinstate 2.5m<sup>2</sup> of plaster per crack repair
- Preliminaries (excluding access)

The budget estimate figure for the above works is **£20,000 +VAT**

Additional rates have also been provided for further plaster replacement as follows. Please note the plastering rates can vary greatly depending on access, location, size of areas etc.

- 100m<sup>2</sup> - £55.00 Per m<sup>2</sup> - **£5,500.00 +VAT**
- 200m<sup>2</sup> - £45.00 Per m<sup>2</sup> - **£9,000.00 +VAT**

### 9.3 Main Contractor Duties

The prices below are based on the following scope of works. The final value will be dependant on the requirements for temporary support to the existing structure during the works, the amount of work required to remove the existing ground floor structure and the amount of excavation required to reach the formation level for the new raft slab.

- Setting out of piles
- Provision of site security, welfare and storage

- Construction of piling mat.
- Provision of Water and Electricity
- Suitable working areas for rig power packs. Areas to be agreed in pre-contract meetings.
- Protection of roads, pavements and adjacent buildings
- Provision of skip for general waste.
- Excavation and blinding of raft formation prior to piling
- All preparation works for allow rig access
- Traffic management and signage for concrete pours

The budget estimate figures for each option would be as follows.

Option 2 – **£160k +VAT**

Option 3 - **£65k +VAT**

Option 4 - **£90k +VAT**

Option 5 - **£110k +VAT**

#### 9.4 Specialist Underpinning Work

The price below is based on the following scope of works.

- Establishment and preliminaries including mobilisation and provision of method statement and risk assessment
- Design and construction of 300mm thick RC underpinning slab on 150mm steel cased piles at 1.50m centres in both directions. Slab needles under the internal and external walls on a hit and miss basis. Average pile depth allowed 10.00m.

Option 2 (raft area 270m<sup>2</sup>) – **£160k +VAT**

Option 3 (raft area 105m<sup>2</sup>) – **£65k +VAT**

Option 4 (raft area 165m<sup>2</sup>) – **£90k +VAT**

Option 5 (raft area 200m<sup>2</sup>) - **£110k +VAT**

## 9.5 Structural Engineer Consultant Fees

The indicative fee for structural engineering services below is based on the following scope of works:

- Production of a scope of work / performance specification document for the remedial works
- A review of tenders received for the works
- Review of the contractor design information
- Liaising with appointed specialist contractor
- Site visits during the works

Based on a contract value of £300k the fee for structural engineering would be of the order of **5% +VAT**. The percentage fee would be likely to increase for a lower contract value.

The fee above does not allow for providing any of the following services:

- Contract administration
- Project management
- Quantity surveying
- Principal designer role
- Party wall input
- M+E consultant input