



The Angel Hotel, Chippenham SN15 3HD  
ROOF BALUSTRADE: STRUCTURAL REPORT

[1121GE]

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## Document

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# 1 Introduction

Giraffe Engineering was appointed by The Angel Hotel, Chippenham to carry out a structural inspection of stone balustrade on the roof of the Georgian building facing onto Market Place which forms part of the hotel.

The aims of this report are:

- To describe the condition of the existing structure
- To discuss the likely causes of any observed defects
- To give recommendations for any remedial works required to ensure the ongoing safety and serviceability of the structure.

## 1.1 Inspections

Giraffe Engineering carried out a visual inspection of the roof balustrade on Friday 24<sup>th</sup> September.

# 2 Observations

The three storey Georgian property faces onto Market Place to the east and has a painted front elevation with a stone parapet which runs along the east elevation and the north elevation which faces a narrow alleyway between buildings. Behind the stone parapet, the property has a hipped stone tiled roof.

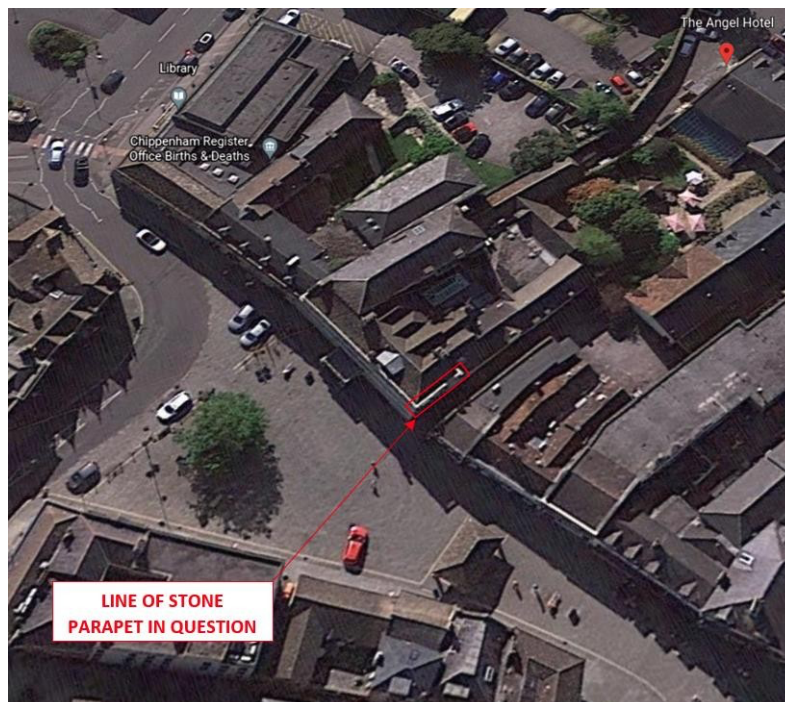


*Figure 1: Aerial view of the hotel building.*

## Balustrade System Components

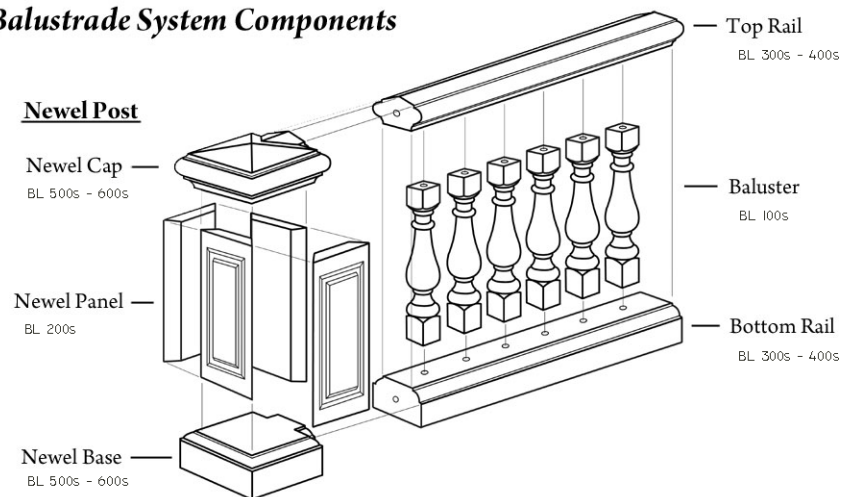


Figure 2: Balustrade system component.

The balustrade consists of a large stone top rail, 6 carved balusters between each solid newel post, on a stone bottom rail/plinth built off the external stone wall.

The stone balustrade along the east elevation has some evidence of aging but is generally in good condition. It has also undergone previous strengthening work which takes the form of vertical steel supports behind each primary baluster or newel post.

The balustrade on the north elevation is in much worse condition and has not undergone previous strengthening work.

### 2.1 North Elevation Balustrade

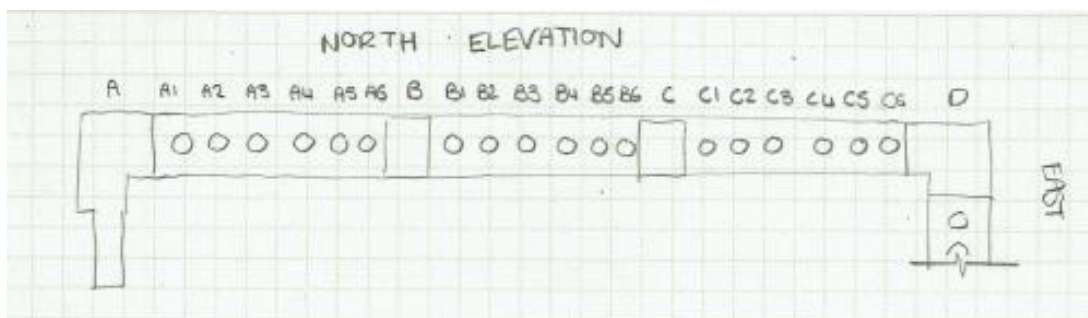


Figure 3: Diagram to label balusters and newel posts on north elevation.

The level of damage to each baluster and newel post has been categorised as follows:

|   |                                                          |
|---|----------------------------------------------------------|
| 1 | No significant spalling of stonework.                    |
| 2 | Some local spalling of stonework requiring patch repair. |
| 3 | Major cracking requiring replacement.                    |

Balusters and newels posts labelled as above and severity of damage is scheduled below:

|       |       |       |
|-------|-------|-------|
| A: 2  | B: 3  | C: 3  |
| A1: 1 | B1: 1 | C1: 3 |
| A2: 1 | B2: 1 | C2: 3 |
| A3: 1 | B3: 1 | C3: 3 |
| A4: 2 | B4: 2 | C4: 3 |
| A5: 1 | B5: 1 | C5: 3 |
| A6: 1 | B6: 3 | C6: 3 |
|       |       | D: 2  |

When repair works are undertaken the contractor may identify more severe damage to a baluster upon closer inspection, in which case the category of damage should be increased to the relevant level and action taken accordingly.

The schedule of observations is given in Appendix A.

### 3 Discussion

The condition of the balustrade on the north elevation is significantly worse than that on the east elevation. The damage is thought to have been caused by repeated freeze/thaw action over a number of years in the more shaded north facing position.

It is recommended that the repair works to the north elevation should be undertaken within the next 6-12 months. Within that timeframe, it is considered that there is not a significant risk of the wholesale collapse of the balustrade. However, within that timeframe there is a risk of falling debris in the form of small chunks of loose spalling stone falling into the alleyway below. Hence wrapping of the balustrade to provide debris protection is recommended to be carried out immediately (Recommendation 4).

The repairs should be undertaken by a stonemason with experience of working with historic buildings and lime mortar. The severity of damage in section 2.1 is given as a guide and the scope of the necessary repair works should be confirmed by the contractor following inspection and clearing of spalled stone and paintwork.

Similar repair work has previously been undertaken to the roof of the external porch structure on the front (east) elevation of the building. The repair works recommended in this report of the minimum works which must be undertaken to ensure the ongoing safety and serviceability of the structure. The client may decide to undertake more extensive repair works to the balustrade to improve the visual appearance, such as

replacing more of the balusters and all or part of the top and bottom rails, similar to the work seen on the front porch.

As an essential repair which will not alter the character of the building, Listed Building Consent may not be required for this work, however it is recommended that a Listed Building Officer is consulted to confirm this.

## 4 Recommendations

The schedule of recommendations is given in Appendix B.

Where a timeframe is given, this is an indication of the period of time during which a measure should be undertaken to avoid further deterioration. The following guide may be used:

|             |                 |
|-------------|-----------------|
| Immediate   | Safety critical |
| Short term  | 0-1 year        |
| Medium term | 1-5 years       |
| Long term   | 5-20 years      |

## 5 Appendix A: Schedule of Observations

Observations are listed below. The 'action' column refers to the items listed in the schedule of recommendations in the subsequent section.

| Ref | Location                   | Description                                                                                             | Figure                                                                      | Action  |
|-----|----------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------|
| 1   | Balustrade east elevation  | Some wearing of stone top course, not requiring repair                                                  | Figure 4                                                                    | N/A     |
| 2   | Balustrade east elevation  | Entire balustrade is coated with impermeable paint, which is spalling in many locations.                | Figure 5                                                                    | 1       |
| 3   | Balustrade north elevation | Some damage/spalling/cracking of balusters and newels posts. See section 2.1 for itemised observations. | Figure 6,<br>Figure 7,<br>Figure 8,<br>Figure 9,<br>Figure 10,<br>Figure 11 | 1, 2, 3 |
| 4   | Balustrade north elevation | Risk of falling stone from balustrade into alleyway below.                                              | N/A                                                                         | 4       |

## 6 Appendix B: Schedule of Recommendations

| Ref | Description                                                                                                                                                                                                                                                                                                                                                                                                                       | Timeframe to be completed |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1   | To full extent of balustrade on north and east elevations: Remove impermeable paint to reveal the stone below and allow the stone to breathe. Ideally clean the stone and leave exposed, or recoat with a permeable paint e.g. Earthborn Eco Pro Silicate Masonry Paint <a href="https://earthbornpaints.co.uk/product/ecopro-silicate-masonry-system/">https://earthbornpaints.co.uk/product/ecopro-silicate-masonry-system/</a> | Medium term               |
| 2   | For balusters on north elevation with category of damage 2: Clean stone, patch small areas of spalling stone with lime mortar and repoint with lime mortar. Use a natural hydraulic lime NHL2.                                                                                                                                                                                                                                    | Short term                |
| 3   | For balusters on north elevation with category of damage 3: Remove the damaged stone and replace with new to match existing. Dismantle top rail as required to replace balusters. New balusters to have stainless steel pin at each end to provide connection into top and bottom rails. Where top rail is reinstated, replace existing stainless steel connector pins with new.                                                  | Short term                |
| 4   | For entirety of balustrade on north elevation: Wrap entire balustrade in mesh/fabric to provide protection from falling debris.                                                                                                                                                                                                                                                                                                   | Immediate                 |

## 7 Appendix C: Figures



*Figure 4: East elevation showing top rail and steel strengthening.*



*Figure 5: East elevation top of external wall showing paint spalling.*



*Figure 6: West end of north elevation.*



*Figure 7: Balusters A1-A6*



*Figure 8: Newel post B.*



*Figure 9: Newel post B, outside face.*



Figure 10: Balusters C1-C4.

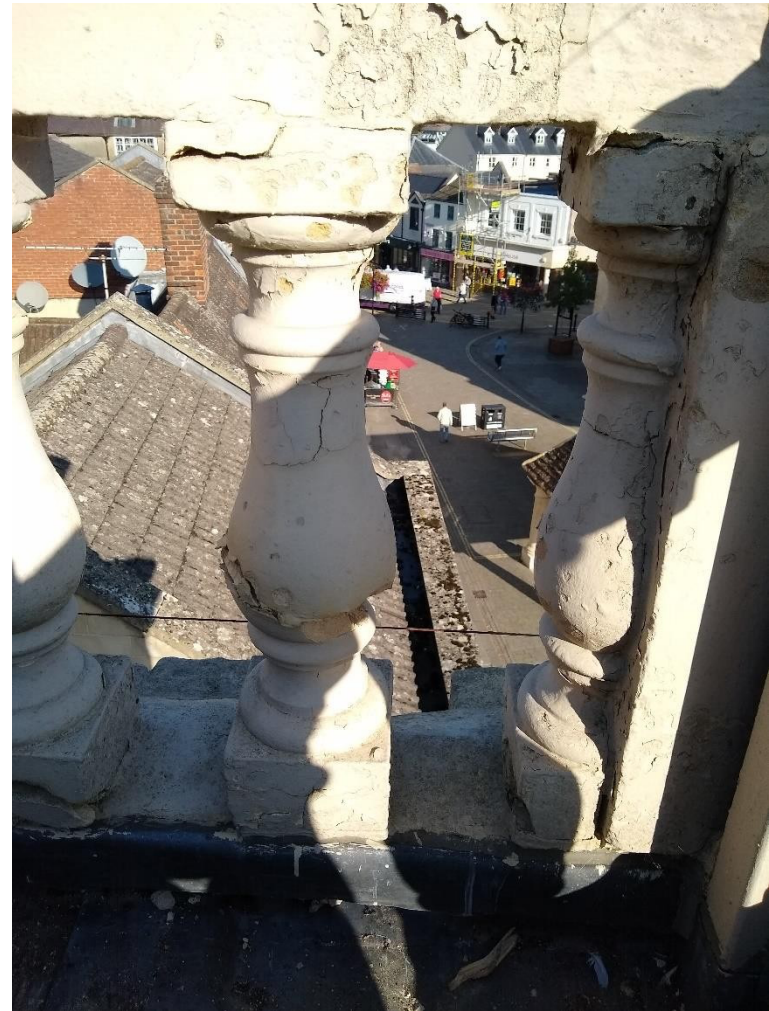


Figure 11: Baluster C6.