



## SEQUENCE OF DESIGN

Date: 23rd November 2016

Reference: STRUCTURAL REPAIRS TO WALKWAY, CHALK FARM BUILDING  
Stables Market, Chalk Farm Road, London NW1 8AH

This document describes the sequence of the following design events which has led to the requirement for the submission of this application for Listed Building Consent:

1. Crash-deck and Scaffolding Erected – June 2016
2. Steel-work Deterioration Observed – June 2016
3. Existing Concrete Deck Removed – July 2016
4. Structural Reinforcement Proposals Issued – July 2016
5. Materials Testing – August 2016
6. Revised Structural Reinforcement Proposals Issued – August and September 2016
7. Draft Structural Report and Drawings Issued – October 2016
8. Secondary Beams Repaired, Painted and Investigated – October 2016
9. Secondary Beam Repair Proposals Revised – October and November 2016
10. Final Structural Report and Drawings Issued – November 2016

Reference is made to the following design documents which are included in the following appendices:

- A. Structural Engineer's Report
- B. Structural Engineer's Drawings
- C. Materials Testing Report

## 1. CRASH-DECK AND SCAFFOLDING ERECTED – JUNE 2016

The below crash-deck and scaffolding was erected as part of the previously approved conservation and alteration works to the Chalk Farm Building walkway. The completion of this work enabled the condition of the existing steelwork to the underside of the walkway to be inspected more closely than before by the Structural Engineer and metal-work specialist for the project.



## 2. STEEL-WORK DETERIORATION OBSERVED – JUNE 2016

The closer inspection of the walkway underside revealed severe deterioration to the structural steel-work in several locations.

The primary beam at the west elevation of the walkway was found to be in particularly poor condition.





Weaknesses in the existing perimeter secondary beam were observed where the proposed replacement link bridge to the Provender Store is to be supported by the walkway.



### 3. EXISTING CONCRETE DECK REMOVED – JULY 2016

Further investigations into the deterioration of the structural steelwork were carried out following the removal of the concrete deck to the topside of the walkway.





Structural reinforcement was found to be required where the walkway connects directly to the Provender Store and the Long Stable.



#### **4. STRUCTURAL REINFORCEMENT PROPOSALS ISSUED – JULY 2016**

The Structural Engineer provided outline proposals for the reinforcement of steel-work to the west end beam, the link bridge and the connections to the Provender Store and Long Stable.

Refer to drawings 3788/SK/160726 and 3788/SK/160727 in Appendix B

The following two solutions were initially proposed for the reinforcement of the west end beam.

1. A new square hollow section along the full length of the existing beam – rejected on the grounds of its installation being too disruptive and potentially damaging to the building.
2. A smaller reinforcement supported on a new external steel column - rejected due to being a visually inappropriate addition to a Grade II listed building.

The proposals to reinforce the link bridge and connections to other buildings were initially accepted though modifications would be made later.

#### **5. MATERIALS TESTING – AUGUST 2016**

Following the recommendations of the Structural Engineer, a sample of the walkway structure was tested to confirm whether the structural material had been correctly identified as mild steel.

The recommended specialist carried out the tests and subsequently issued a report which supported the Structural Engineer's assumptions. This enabled the subsequent development of more detailed proposals for structural reinforcement.

Refer to M9662R1 in Appendix C for full report.

#### **6. REVISED STRUCTURAL REINFORCEMENT PROPOSALS ISSUED – AUGUST AND SEPTEMBER 2016**

On completion of the materials testing, the Structural Engineer developed more detailed proposals to reinforce the west end beam, link bridge and building connections to other buildings. Initial proposals for the required secondary beam repairs were also provided.

The initial proposal for the secondary beam repairs was to weld plates to the topsides of the beams which had been found to require reinforcement. To determine the full scope of secondary beam repair works the Structural Engineer also recommended the cleaning of the underside of the secondary beams and the removal of selected adjacent bricks.

Refer to drawing 3788/200/P1 in Appendix B

At this stage the only secondary beams requiring additional reinforcement I-beams to the undersides were those adjacent to the Provender Store and Long Stable connections.

Refer to drawing 3788/SK/160808 in Appendix B

The revised proposal to reinforce the west end beam included a cantilevered square hollow section running along part of the existing beam with additional support provided by tension plates fixed to the brick wall level with the top of the new balustrade. This solution was accepted for inclusion in this application.

Refer to drawing 3788/SK/160908 in Appendix B

## 7. DRAFT STRUCTURAL REPORT AND DRAWINGS ISSUED – OCTOBER 2016

The Structural Engineer prepared and issued a report and detailed drawings to describe and explain the revised proposals for reinforcing the west end beam, the link bridge and the building connections.

Refer to 3788/let/161013, 3788/201/C1 and 3788/200/C4 in Appendix A

## 8. SECONDARY BEAMS REPAIRED, PAINTED AND INVESTIGATED – OCTOBER 2016

The proposal to weld plates to the topsides of the secondary beams had no visual impact on the walkway and was considered by the Conservation Officer to be a minor repair which did not require Listed Building Consent. The Contractor was therefore instructed to carry out this work and to apply galvanized paint to these areas as specified by the Structural Engineer.

On cleaning the underside of the secondary beams and removing the selected adjacent bricks, it was established that the beams had deteriorated further than anticipated.







## 9. SECONDARY BEAM REPAIR PROPOSALS REVISED – OCTOBER AND NOVEMBER 2016

Having found additional deterioration to the secondary beams the Structural Engineer revised their reinforcement proposals for these items. The following four solutions were proposed:

1. Plate welded only to topside of secondary beams – rejected due to the insufficient amount of reinforcement this solution would provide to all except four beams.
2. Plates welded to topside and underside of secondary beams - rejected due to impracticality of welding a plate to the deteriorated beam soffits.
3. Standard I-beams without lower flange bolted to primary beams below underside of secondary beams – rejected on the grounds of the required web height causing the reinforcements to project lower than the underside of the primary beams.
4. Unaltered standard I-beams bolted to primary beams below underside of secondary beams – accepted for inclusion in this application. A mock-up of this solution has been prepared.



For solutions 3 and 4, the Structural Engineer's proposals include a supporting beam running perpendicular to the reinforcement -beams in the two locations where recently installed gas pipes run alongside the existing primary beam before entering either the Provender Store or the Long Stable.

Refer to drawings 3788/SK/161031 and 3788/SK/161103 in Appendix B

## 10. FINAL STRUCTURAL REPORT AND DRAWINGS ISSUED – NOVEMBER 2016

The Structural Engineer prepared and issued a report and detailed drawings to describe and explain the proposals for reinforcing the west end beam, the link bridge, building connections and secondary beams. These documents form the basis of this application.



## APPENDIX A - STRUCTURAL ENGINEER'S REPORT

3788/let/161013

Prepared and issued by Walsh

## APPENDIX B - STRUCTURAL ENGINEER'S DRAWINGS

3788/SK/160726

3788/SK/160727

3788/200/P1

3788/SK/160808

3788/SK/160908

3788/200/C4

3788/201/C1

3788/SK/161031

3788/SK/161103

Prepared and issued by Walsh



## APPENDIX C – MATERIALS TESTING REPORT

M9662R1

Prepared and issued by ESG