



VIADUX, MANCHESTER
LISTED BUILDING STRUCTURAL REPORT
VIA-REN-0-XX-RP-S-00001

Project No: 1910-12
April 2020
Rev P01

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Rev	Date	Purpose
P01	28.04.2020	Listed Building Structural Report

Author: Patrick Clayton



Date: 28th April 2020

Reviewer: Kevin Gilsenan



Date: 29th April 2020

EXECUTIVE SUMMARY

Renaissance have been commissioned by Ask Central Ltd. to provide structural engineering services in connection with the development of the Viadux project.

The overall Viadux development includes the construction of a 39-storey residential tower, 14 storey office building, connecting podium structure, and conversion of the Grade II listed masonry Viaduct. The proposed buildings are to be built over the existing Viaduct structure that dates from the late 1860's and was constructed as part of Manchester Central Station.

This document provides an overview of the work required to facilitate the development and identifies the proposed mitigation measures to ensure the fabric, load bearing capacity and the stability of the existing Grade II listed structure is maintained both permanently and during the course of the works. The main body of the report should be read in conjunction with the RIBA Stage 3 drawing pack appended.

Key interventions proposed to the listed structure comprise of;

1. Localised removal of the existing bridge over Great Bridgewater Street
2. Enlargement of openings within the existing abutment to Great Bridgewater Street
3. New tower penetrations through the arches
4. Podium structure support works
5. New Foundation works

Penetrations through the arches are required in order to found the proposed tower structure into the ground. The superstructure arrangement of the tower has been developed in order to minimise the number and size of the openings through the listed building by providing a transfer structure at level 02.

Openings are to be centred on the crowns of the existing segmental arches to minimise works to the existing viaduct pier structures.

In order to safeguard the existing structures it is proposed to provide a movement joint between the new tower structure and the existing viaduct. This approach allows any differential movement between the two systems to be accommodated.

RC saddle beams are proposed to trim the new openings provided and shall be designed to accommodate the thrust forces present within the arch structures. The magnitude of the forces are to be derived through a detailed back assessment of the arch structures.

The new tower structures are to be founded via a piled foundation solution, with the length of piles designed by the Contractor to ensure that the group pile settlements are within acceptable limits.

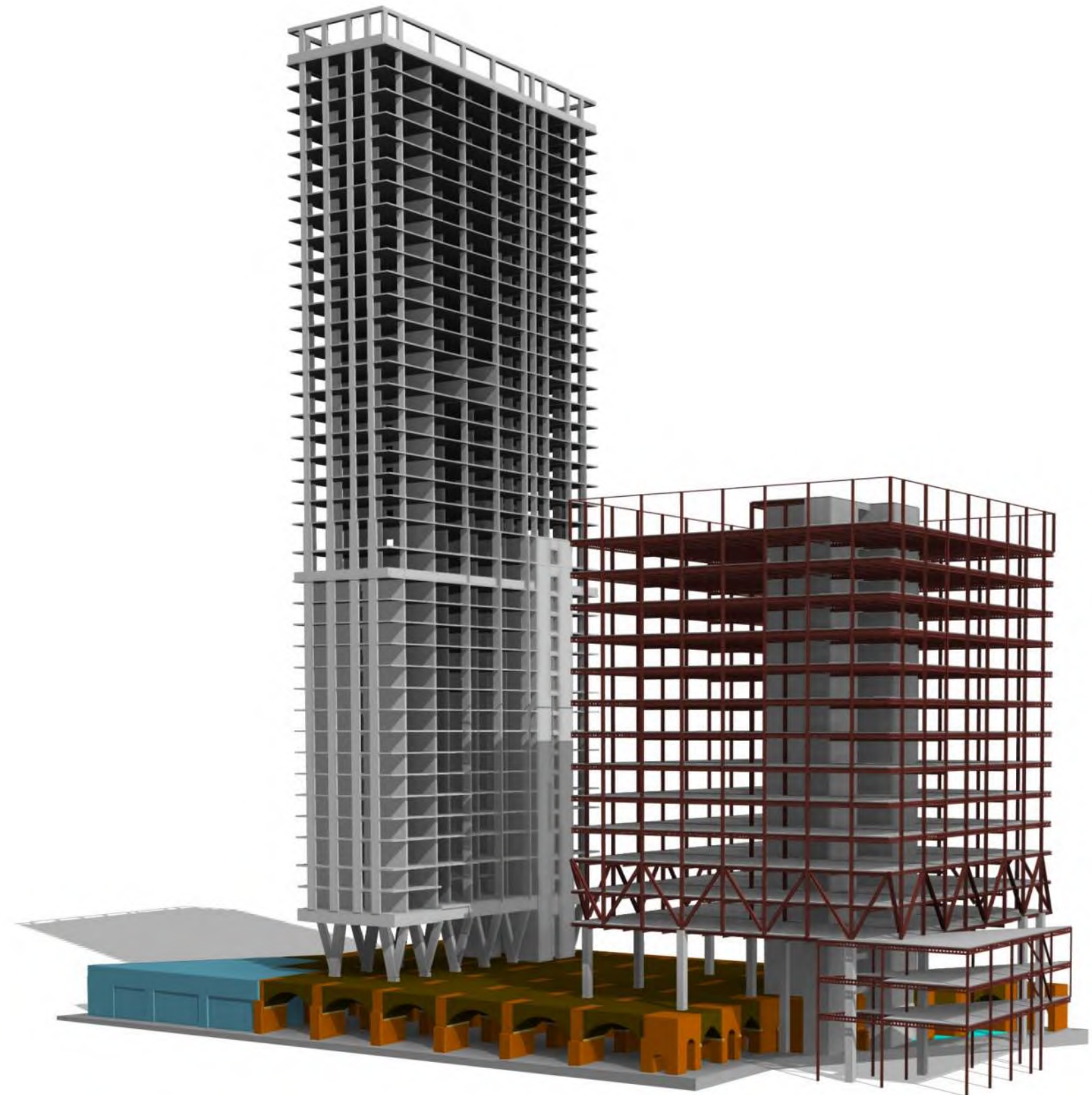


Figure 1.1 - Scheme Overview

1.0 INTRODUCTION

Renaissance have been commissioned by Ask Central Ltd. to provide structural engineering services in connection with the development of the Viadux project.

This document provides an overview of the work required to facilitate the development and identifies the proposed mitigation measures to ensure the fabric, load bearing capacity and the stability of the remaining structure is maintained both permanently and during the course of the works.

The development is subject to an extant Planning Permission and Listed Building consent (Ref. 115871/FO/2017 and 115872/FO/2017 respectively). Through detailed design development, amendments are sought to the approved scheme, which will be progressed as a Minor Material Amendment to the approved development. The evolved structural approach and interventions to the listed viaduct detailed in this document form part of those amendments. A new application for Listed Building Consent will also be progressed to secure the necessary consents to carry out the proposed strategy.

2.0 SITE DESCRIPTION

The Viadux development is located in the city centre of Manchester (National Grid Reference: 383572, 397621 & Postcode M1 5NZ). The site is bounded by Great Bridgewater Street to the north, Albion Street and the Metrolink to the east, Trafford Street and Deansgate Tram Station to the south, and the Hilton Hotel to the west.

The site is presently occupied by a single storey Grade II listed viaduct, formed by arches at ground floor level and an active service yard above at first floor level that is in use by Manchester Central Conference Centre. The topographical survey indicates that the ground floor level in the proposed is at circa 35.3m AOD and that the first-floor level to the service yard is 43.4m AOD.

The viaduct is Grade II listed and is therefore considered of historic importance. The arches comprise segmental arches supported on piers with pointed arches provided in the orthogonal direction. The construction of the arches is currently being ascertained with specialists appointed to undertake the investigation works, subject to when access is available. Based upon research to date it is anticipated that the arches comprise 550mm thick masonry arch barrels supported on masonry piers and abutments. The masonry piers and abutment are founded on mass concrete footings and the current ground investigation indicates that these are founded within the top of the weathered sandstone at circa 4.5-6.0m depth.

3.0 PROPOSED DEVELOPMENT

The proposed development comprises of the following elements:

Residential Block - 40 story residential building accommodating 375 no. 1, 2 and 3 bed apartments located to the west of the site.

Commercial Building - 14 storey office building comprising 342,087 sqft Grade A floor space to the east of the site.

Podium Deck - Single storey landscaped deck above the existing service yard constructed in between the residential and the office block.

Stair and Lift Cores – Stairs and a lift are proposed to provide a connection between Great Bridge Water Street and the elevated Deansgate-Castlefield tram stop.

Removal of bridge sections over Great Bridgewater Street – sections of the cast iron bridge are to be removed to provide open space and improved environment to the retail units on Great Bridgewater Street.

4.1 GREAT BRIDGEWATER STREET BRIDGE REMOVAL

The existing bridge structure comprises a single span, curved cast iron girders at 1.8m centres supported on masonry abutments either side of the Great Bridgewater Street.

- The proposals include the removal of a number of girders to the western end of the bridge and within the central section to provide an improved open environment to the proposed retail units on Great Bridgewater street.

In addition to the bridge removal works, localised works to form new edge protection to the Level 01 areas are required.

Figure 4.1 below provides an overview of the proposals. Refer to the Appendices for further details.

Where the bridge sections are to be removed, the existing openings within the Great Bridgewater Street abutment to the Viadux development site are to be enlarged.

Figure 4.2 below demonstrates the proposed approach including consideration of the temporary works required to carry out the intervention.

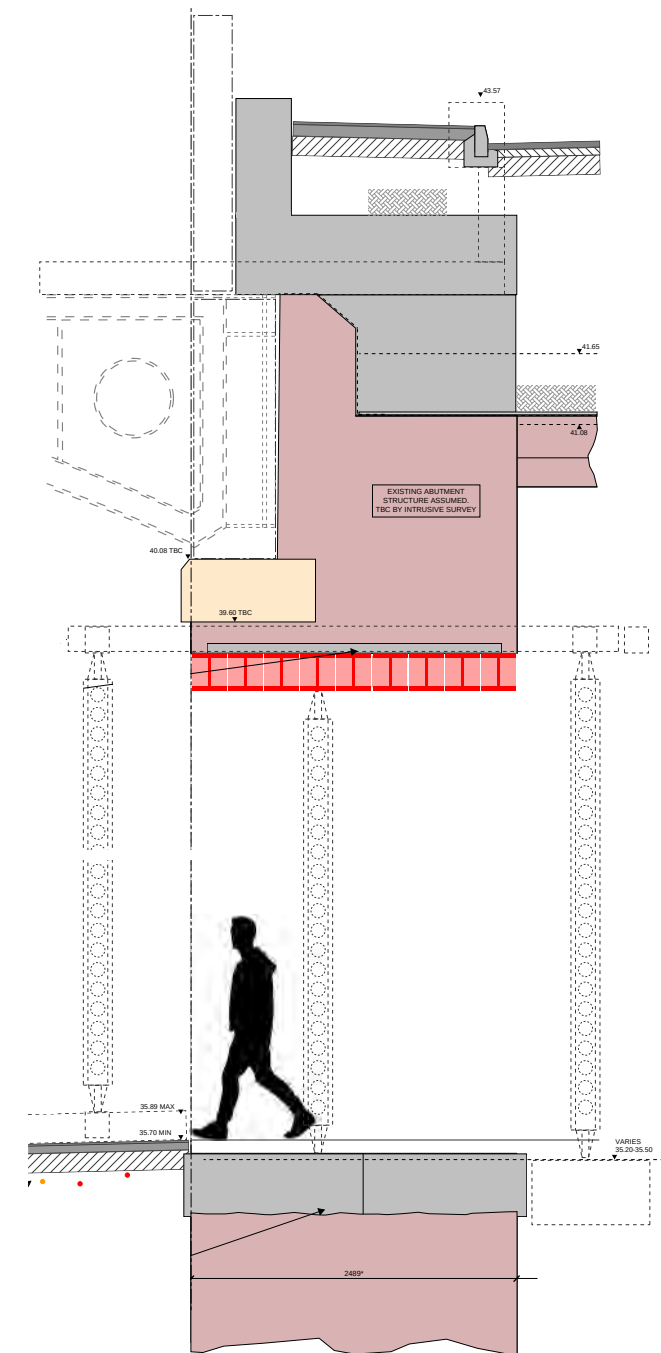


Figure 4.2 – Great Bridgewater Street Abutment Opening - Section

4.3 PENETRATIONS THROUGH ARCHES

New Penetrations through the arches are required in order to found the proposed tower structure into the ground. The superstructure arrangement of the tower has been developed in order to minimise the number and size of the openings through the listed building by providing a transfer structure at level 02.

Openings are to be centred on the crowns of the existing segmental arches to minimise works to the existing viaduct pier structures.

In order to safeguard the existing structures it is proposed to provide a movement joint between the new tower structure and the existing viaduct. This ensures that any differential movement between the two systems can be allowed for.

RC saddle beams are proposed to trim the new openings provided and shall be designed to accommodate the significant thrust forces present within the arch structures. The magnitude of the forces are to be derived through a detailed back assessment of the arch structures.

The construction sequencing of this element works requires careful consideration to ensure the forces are transferred safely into the new structure. The drawings presented within the appendices provide details of the new trimming structures and the 'Pynford Stool' technique proposed to carry out the works.

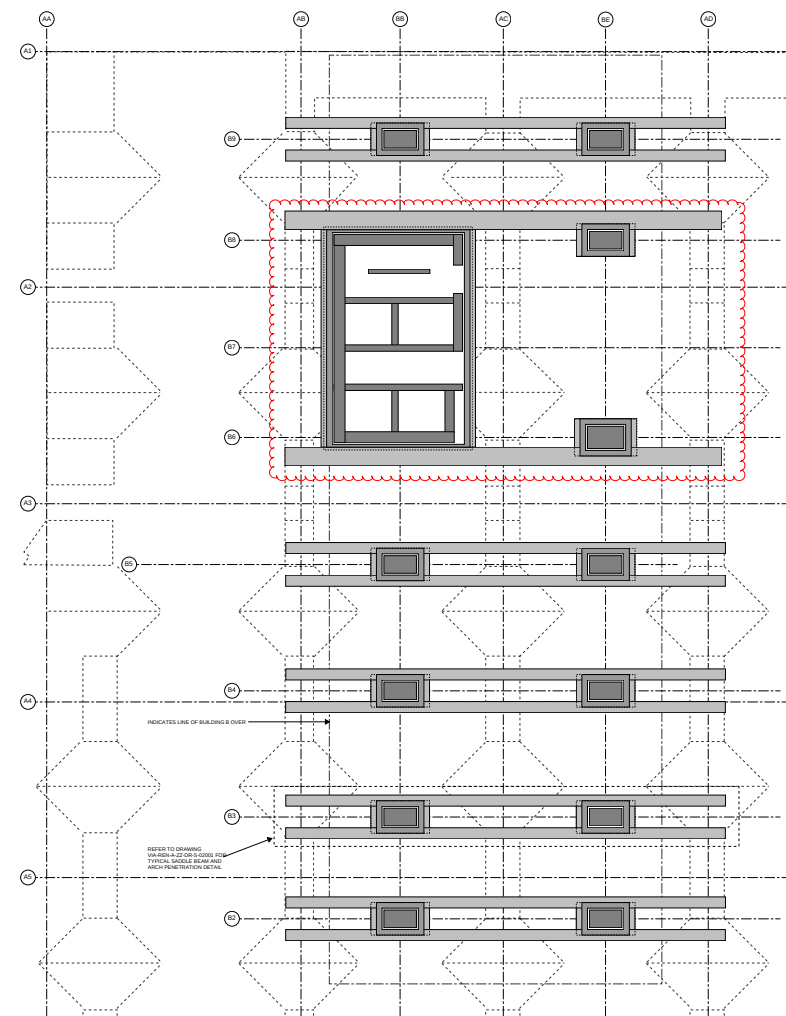


Figure 4.3 - Arches Penetration Plan Extract

4.5 NEW FOUNDATIONS IN BETWEEN THE PIERS

The previous ground investigation on the site indicates weathered sandstone at circa 4.5-6.0m depth, with drift deposits and made ground above. As the made ground and drift deposits between the arch foundation are highly variable a pile assisted raft has been discounted due to the risk of excessive settlement of the drift deposits.

The proposals are therefore to provide a piled foundation solution, with the length of piles designed by the Contractor to ensure that the group pile settlements are within acceptable limits.

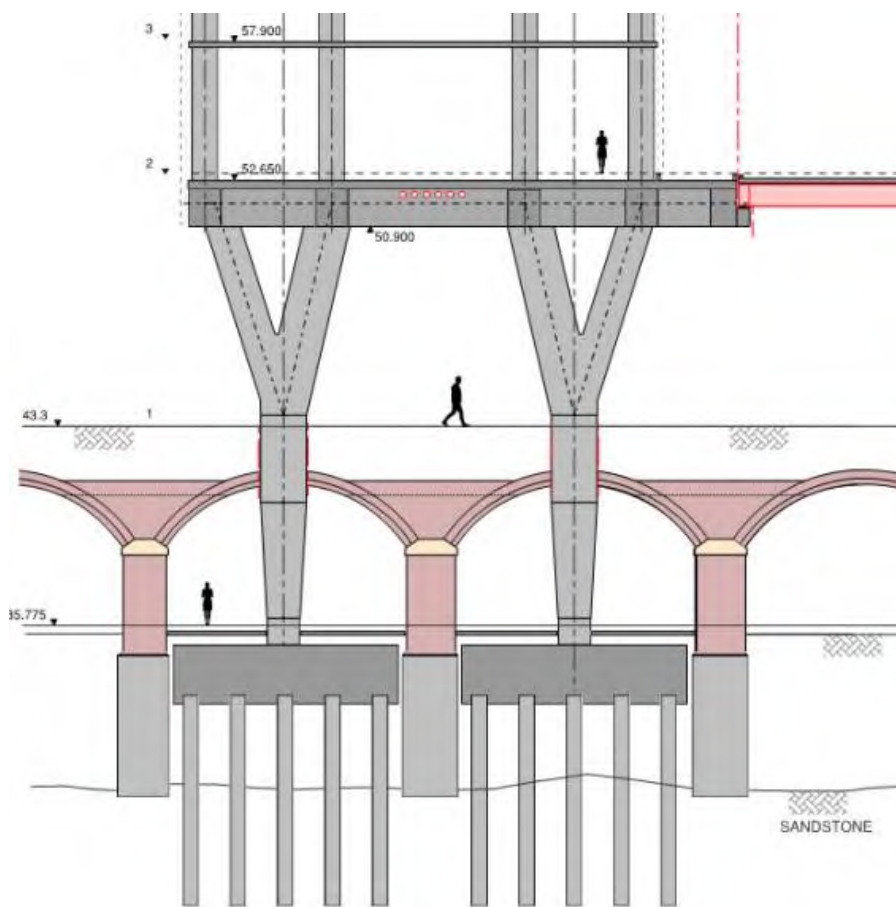


Figure 4.5 - Proposed Foundation GA Section

4.4 PODIUM STRUCTURE INTERFACE

A landscaped podium structure connecting the residential tower and office building is to be constructed at 2nd floor level. To minimise the impact on the operation of the service yard the structure is to comprise long span steel beams supporting a concrete deck. The long spans combined with minimal columns results in an increase in axial loads on the supporting piers.

A detailed geotechnical ground investigation and material testing is in the process of being procured. The findings will allow the Engineer to undertake a detailed assessment to determine if foundation strengthening is required to accommodate the increase in pier stress and limit additional settlements to within acceptable limits.

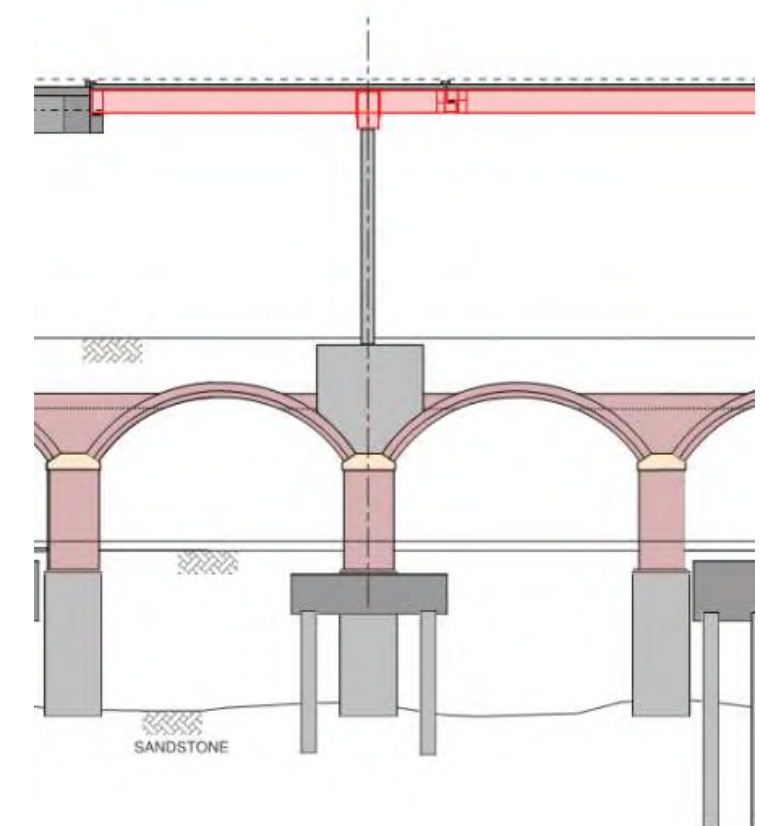
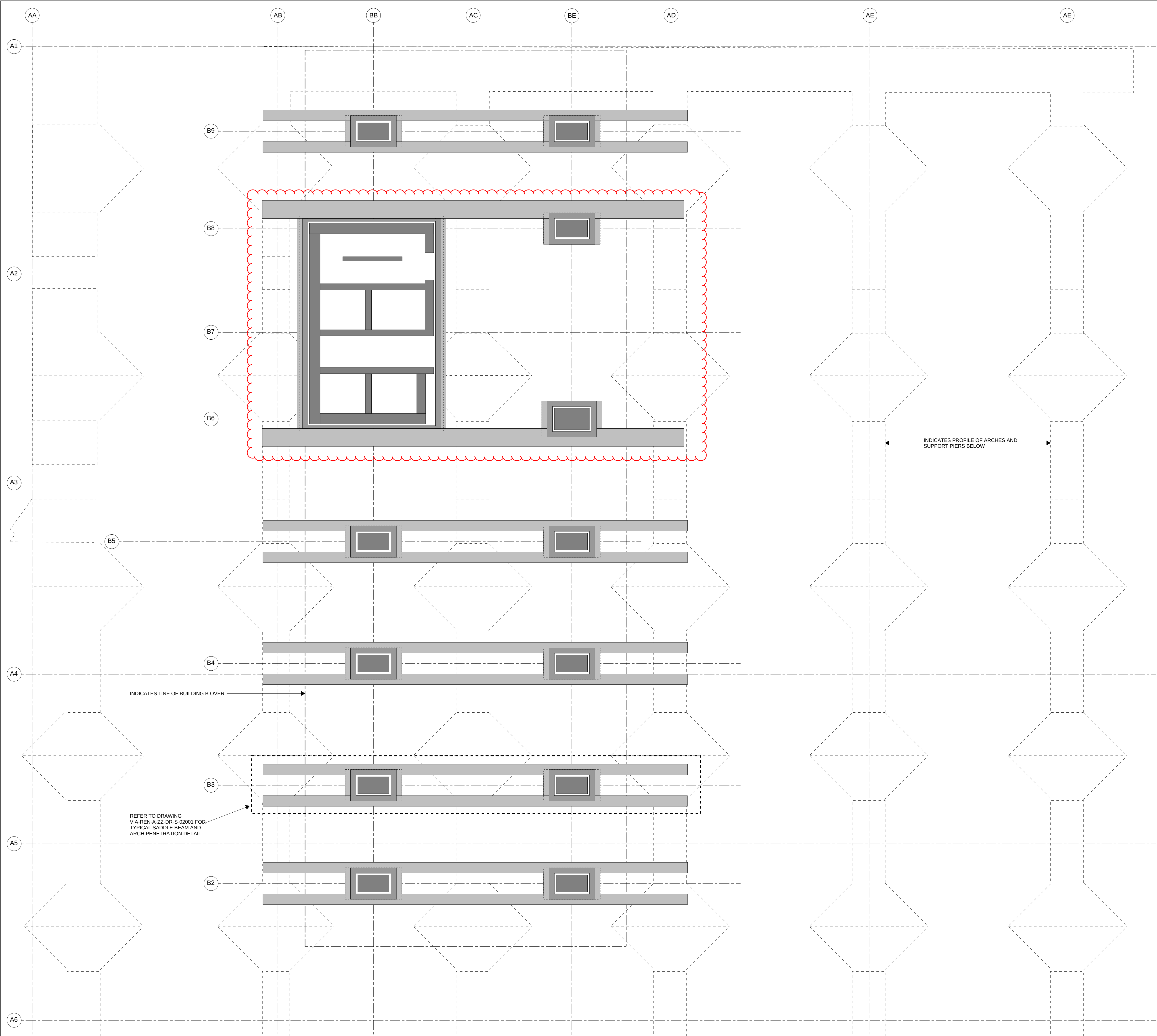


Figure 4.6 – Podium Structure Interface

APPENDIX A
STRUCTURAL GAS AND DETAILS



- NOTES:**
- THIS DRAWING IS INTENDED FOR RIBA STAGE 3 'DEVELOPED DESIGN' AND IS INTENDED TO GIVE AN INDICATION OF THE ANTICIPATED WORKS. GIVEN THE STAGE OF THE PROJECT THIS SHOULD BE CONSIDERED AS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT AS FURTHER SURVEY INFORMATION BECOMES AVAILABLE AND THE DESIGN IS CO-ORDINATED WITH THE TEAM.
 - ALL CONCRETE WORKS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE 'NATIONAL STRUCTURAL CONCRETE SPECIFICATION' AND RENAISSANCE CONCRETE SPECIFICATION.
 - CONCRETE TO GENERALLY BE RC32/40 AIR ENTRAINED.
 - WHERE FEASIBLE EXISTING GOOD QUALITY MASONRY UNITS ARE TO BE SALVAGED AND CLEANED FOR REUSE WITHIN THE WORKS.
 - WHERE NEW BRICKS ARE REQUIRED THAT ARE NOT EXPOSED IN THE FINISHED WORKS THESE ARE TO BE SOLID CLASS B CLAY ENGINEERING BRICKS. ALL EXPOSED MASONRY TO BE SUITABLY SOURCED MASONRY TO MATCH EXISTING.
 - NO CEMENT BASED MORTAR IS PERMITTED FOR USE WITHIN REINSTATEMENT WORKS OF MASONRY. ALL NEW AND REPAIR WORKS UNDERTAKEN ARE TO BE WITH A LIME MORTAR:
HLM 3.5 - GENERAL MASONRY WORKS 150mm ABOVE GROUND LEVEL
HLM 5.0 - WORKS BELOW GROUND
 - ALL TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAIL.

RIBA STAGE 3
THE INFORMATION IS APPROPRIATE FOR RIBA STAGE 3 AND INTENDED TO COMMUNICATE THE STRUCTURAL PRINCIPLES OF THE PROPOSAL. THE DESIGN AND DETAILS WILL BE UPDATED AS FURTHER SURVEYS ARE UNDERTAKEN AND INITIAL STRUCTURAL ANALYSIS AND DESIGN CO-ORDINATIONS IS UNDERTAKEN WITH THE DESIGN TEAM DURING RIBA STAGES 4 AND 5.

MANCHESTER CENTRAL ARCHES - SURVEYS
DETAILED DIMENSIONAL SURVEY TO BE UNDERTAKEN TO MANCHESTER CENTRAL ARCHES WITHIN 30m OF ABUTMENT TO GREAT BRIDGEWATER STREET. SURVEY AND OPENING UP ALSO TO BE UNDERTAKEN TO VERIFY EXISTING CONSTRUCTION. THIS INFORMATION IS REQUIRED TO VERIFY IF THE EXISTING BRIDGE PROVIDES PROPPING TO THE ARCHES. AT THIS STAGE IT HAS BEEN ASSUMED THAT THE ABUTMENTS ARE ADEQUATE TO RESIST THE ARCH THRUSTS. HOWEVER, A RISK ALLOWANCE SHOULD BE MADE FOR INTRODUCING PERMANENT PROPS BETWEEN BRIDGE ABUTMENTS IF THE ARCHES ARE FOUND TO REQUIRE ADDITIONAL SUPPORT.

P02	RIBA STAGE 3 ISSUE FOR COMMENT	29.04.20	RW	KG
P01	FOR COMMENT	07.02.20	PC	KG
Rev:	Description:	Date:	By:	Chk'd:



Renaissance Associates Ltd
Carvers Warehouse
77 Dale Street
Manchester
M1 2HG

Project:

**VIADUCT
MANCHESTER**

Drawing Title:

**VIADUCT PENETRATION
PLAN**

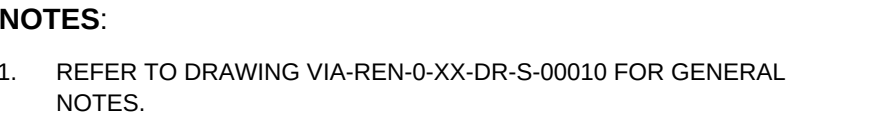
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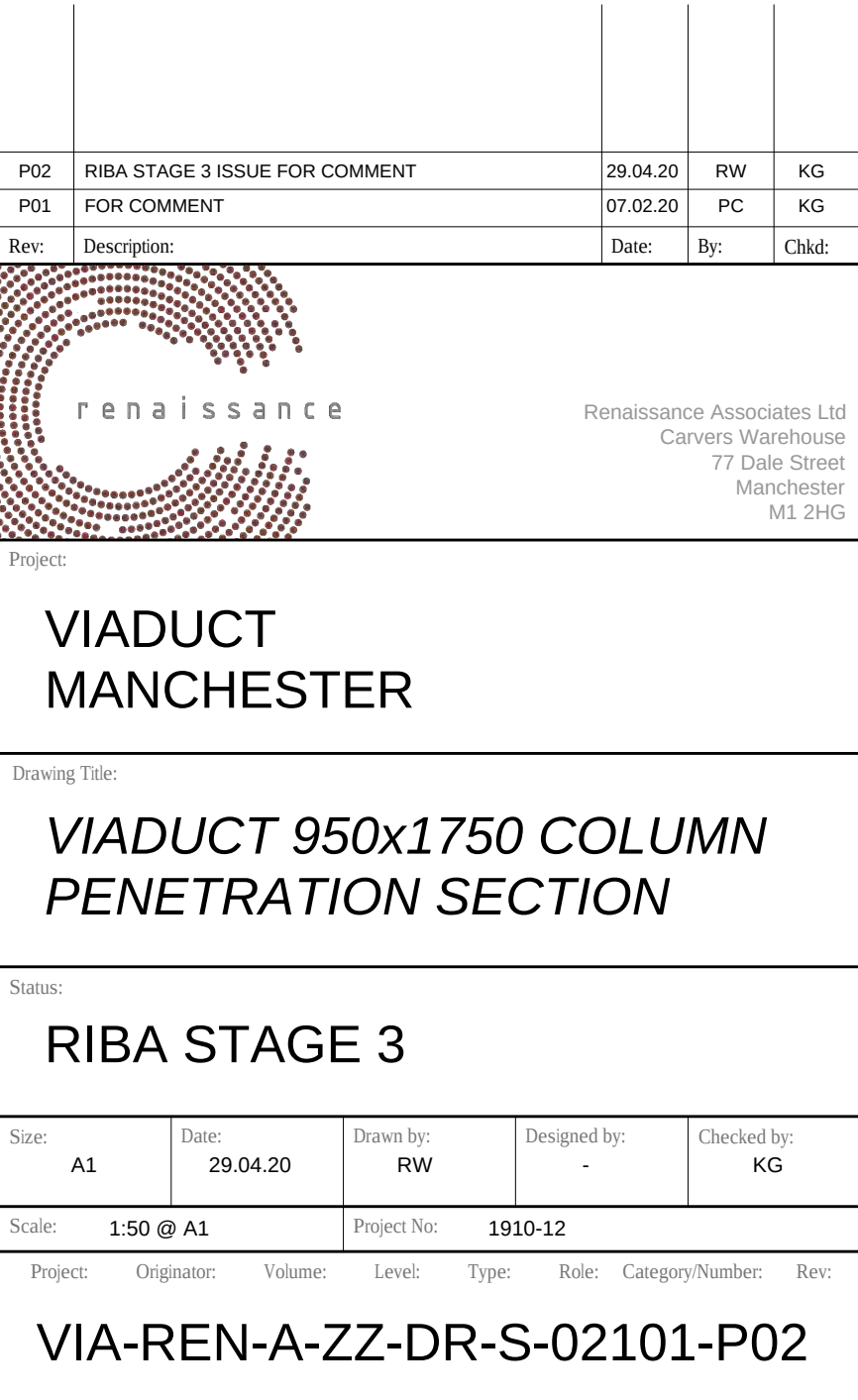
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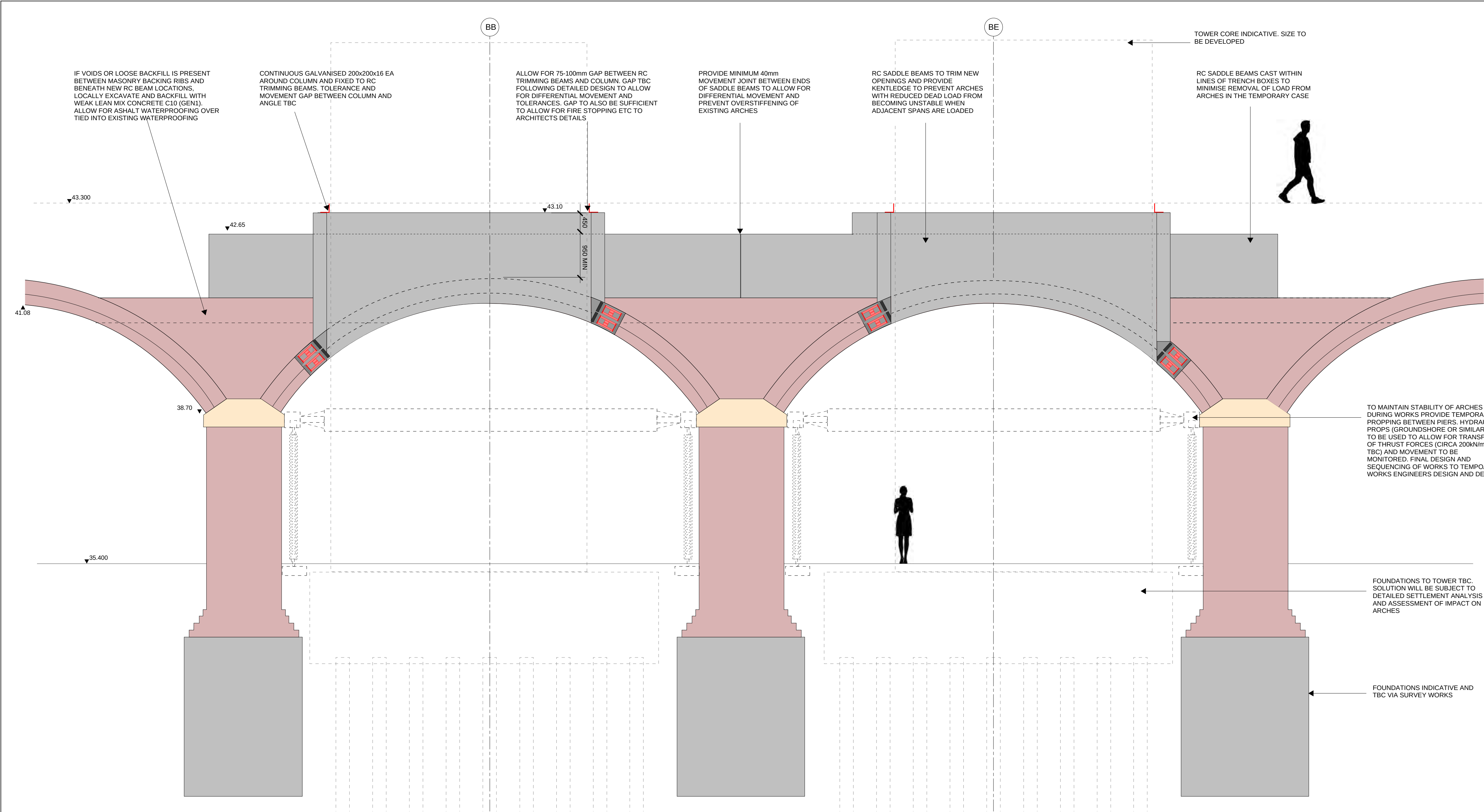
VIA-REN-0-01-DR-S-01101-P02



DETAILS - SURVEYS
ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING.
THE DETAILS ARE DEPENDANT ON THE FINDINGS FROM THE SURVEY WORKS.
THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.

TYPICAL SADDLE BEAM PLAN

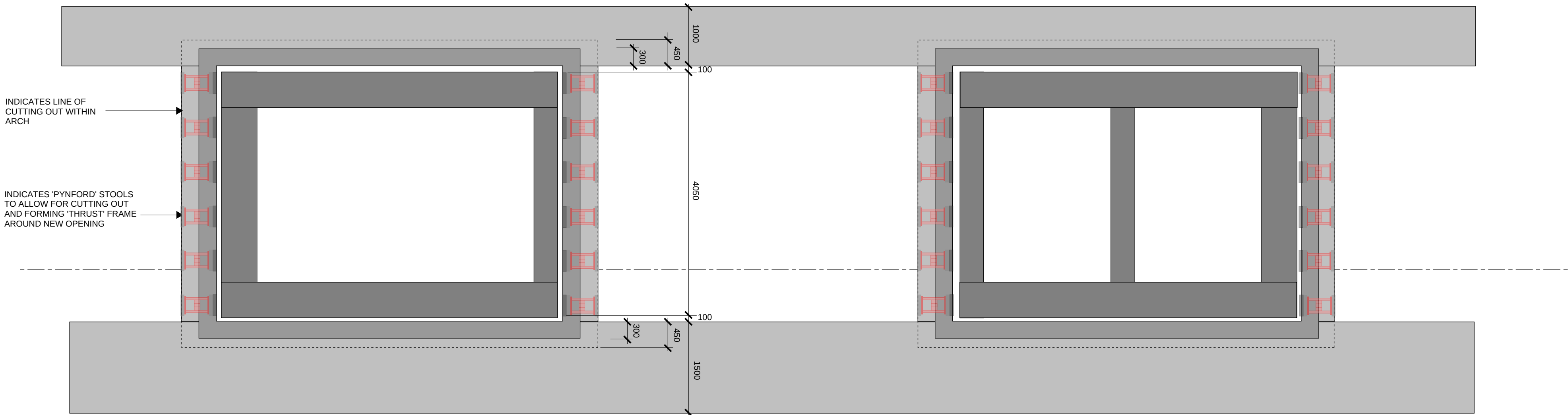




- NOTES:**
- REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.

DETAILS - SURVEYS
ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDANT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 3 AND 4.

DETAIL 102
CORE TRIMMING SADDLE BEAM ELEVATION
1:50



TYPICAL CORE PENETRATION PLAN
1:50

P02	RIBA STAGE 3 ISSUE FOR COMMENT	29.04.20	RW	KG	
P01	FOR COMMENT	07.02.20	PC	KG	
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renaissance Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG					
Project: VIADUCT MANCHESTER					
Drawing Title: VIADUCT CORE PENETRATION SECTION					
Status: RIBA STAGE 3					
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NOTES:

- THIS DRAWING IS INTENDED FOR RIBA STAGE 3 'DEVELOPED DESIGN' AND IS INTENDED TO GIVE AN INDICATION OF THE ANTICIPATED WORKS. GIVEN THE STAGE OF THE PROJECT THIS SHOULD BE CONSIDERED AS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT AS FURTHER SURVEY INFORMATION BECOMES AVAILABLE AND THE DESIGN IS CO-ORDINATED WITH THE TEAM.
- ALL STEELWORK TO BE FABRICATED IN ACCORDANCE WITH THE LATEST EDITION OF THE 'NATIONAL STRUCTURAL STEELWORK SPECIFICATION' AND RENAISSANCE STEELWORK SPECIFICATION.
- ALL STEELWORK TO BE S355 JO. FINAL SUBGRADE TO BE CONFIRMED DURING TECHNICAL DESIGN.
- CONCRETE TO FOUNDATIONS AND ENCASEMENT TO STEELWORK TO BE RC32/40.
- WHERE FEASIBLE EXISTING GOOD QUALITY MASONRY UNITS ARE TO BE SALVAGED AND CLEANED FOR REUSE WITHIN THE WORKS. THE GLAZED BRICKS TO GREAT BRIDGEWATER STREET ARE TO ALSO BE SALVAGED AND REUSED FOR REINSTATEMENT OF BRICKWORK AROUND THE NEW OPENINGS.
- WHERE NEW BRICKS ARE REQUIRED THAT ARE NOT EXPOSED IN THE FINISHED WORKS THIS ARE TO BE SOLID CLASS B CLAY ENGINEERING BRICKS. ALL EXPOSED MASONRY TO BE SUITABLY SOURCES MASONRY TO MATCH EXISTING.
- NO CEMENT BASED MORTAR IS PERMITTED FOR USE WITHIN REINSTATEMENT WORKS OF MASONRY. ALL NEW AND REPAIR WORKS UNDERTAKEN ARE TO BE WITH A LIME MORTAR:
HLM 3.5 - GENERAL MASONRY WORKS 150mm ABOVE GROUND LEVEL
HLM 5.0 - WORKS BELOW GROUND
- PACKING WORKS BETWEEN STEELWORK AND EXISTING MASONRY TO BE UNDERTAKEN WITH NON-SHRINK PROPRIETARY GROUT INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
- ALL TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAIL.

STEELWORK PROTECTION SYSTEM

ALL STEELWORK TO BE RECEIVE THE FOLLOWING CORROSION PROTECTION SYSTEM:
- MINIMUM 85 µm HOT-DIP GALVANISING TO BS EN ISO 1461

IN ADDITION ALL NON-VISIBLE STEELWORK AND STEELWORK IN CONTACT WITH GROUT AND THE EXISTING MASONRY ARCHES IS TO BE PROTECTED WITH:
- TWO COATS HEAVY DUTY BITUMENT, 200 µm TOTAL

THE END FRAMES AND INTERNAL FACES THAT ARE ARCHITECTURALLY EXPOSED ARE TO RECIEVE THE FOLLOWING ADDITIONAL PAINT PROTECTION SYSTEM:
- MORDANT WASH
- ETCH PRIMER 40 µm
- HIGH BUILD EPOXY MIO 100 µm

FINAL DESIGN AND TECHNICAL REQUIREMENTS TO BE DEVELOPED DURING RIBA STAGE 4. COMPATIBILITY OF PAINT PROTECTION SYSTEMS TO GALVANISED STEELWORK TO BE CONFIRMED OR ALTERNATIVE PROPOSED BY STEEL FABRICATORS PAINT SUPPLIER.
ALL NON-ACCESSIBLE STEELWORK IS TO HAVE A MINIMUM CORROSION PROTECTION LIFE OF 60 YEARS WITH NO MAINTENANCE. ARCHITECTURAL EXPRESSED STEELWORK IS TO HAVE A MINIMUM LIFE TO FIRST MAINTENANCE OF 20+ YEARS.

DETAILS - SURVEYS

ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDANT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.

FACADE WORKS TO GRADE II LISTED BUILDING

FOR CLEANING, LOCALISED REPAIR AND REPOINTING WORKS TO THE GRADE II LISTED VIADUCT STRUCTURE REFER TO ARCHITECTS AND HERITAGE ARCHITECTS DRAWINGS, DETAILS AND SPECIFICATION.

P02	RIBA STAGE 3 ISSUE FOR COMMENT	29.04.20	RW	KG
P01	FOR COMMENT	07.02.20	PC	KG
Rev:	Description:	Date:	By:	Chkd:



Project:

VIADUCT MANCHESTER

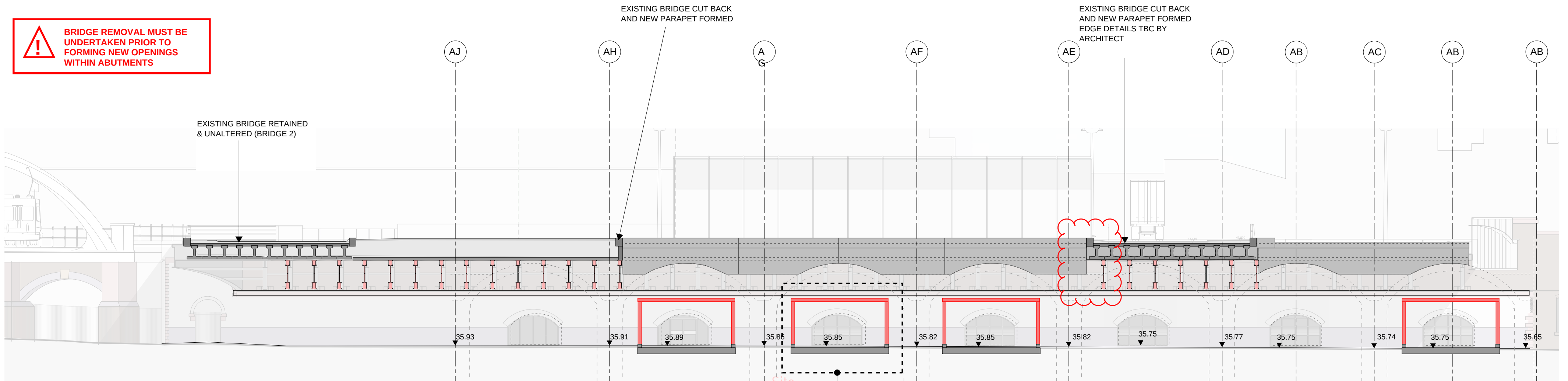
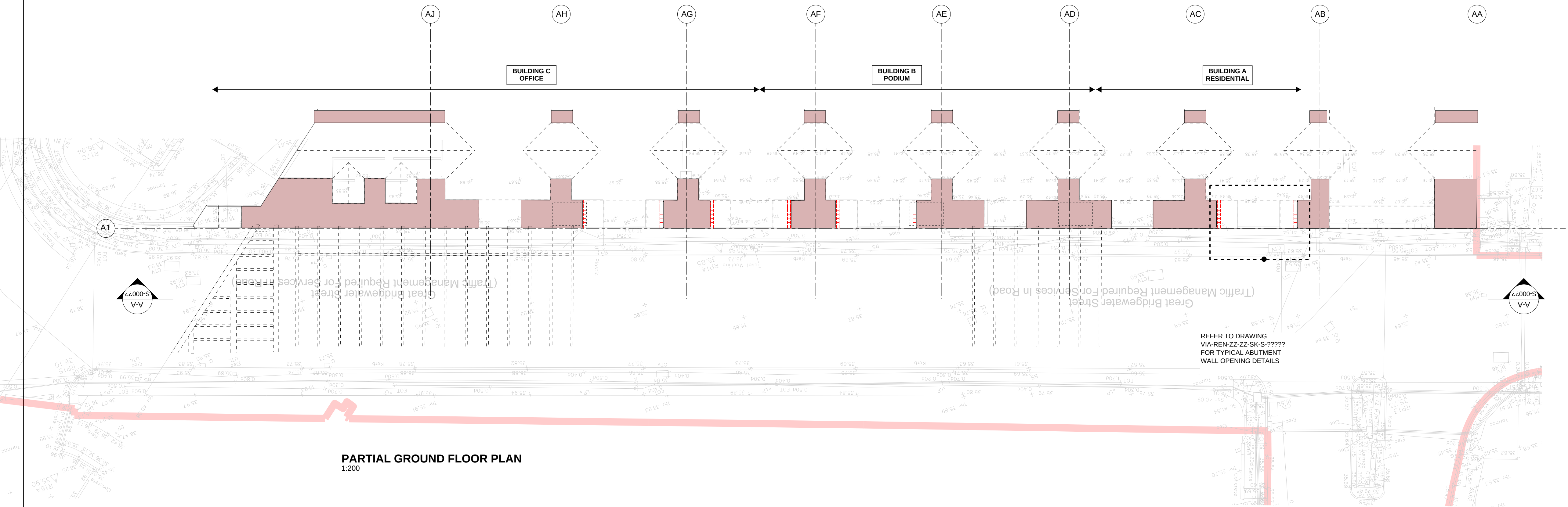
ABUTMENT OPENINGS
PLAN & SECTION

RIBA STAGE 3

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VIA-REN-A-ZZ-DR-S-01100-P02



BRIDGE REMOVAL MUST BE UNDERTAKEN PRIOR TO FORMING NEW OPENINGS WITHIN ABUTMENTS

EXISTING BRIDGE RETAINED & UNALTERED (BRIDGE 2)

EXISTING BRIDGE CUT BACK AND NEW PARAPET FORMED

EXISTING BRIDGE CUT BACK AND NEW PARAPET FORMED
EDGE DETAILS TBC BY ARCHITECT

REFER TO DRAWING VIA-REN-A-ZZ-SK-S-77777 FOR TYPICAL ABUTMENT WALL OPENING DETAILS

THRESHOLD & SETTING OUT
ALL THRESHOLD AND SETTING OUT DIMENSIONS ARE INDICATIVE. REFER TO ARCHITECTS DETAILS FOR FULL SETTING OUT.

INDICATES COLUMN BEYOND SUPPORTING TOWER.
PROFILE TO BE DEVELOPED TO SUIT DESIGN AND
CO-ORDINATION WITH THE ARCHITECT

REFER TO BRIDGE REMOVAL WORK DRAWINGS FOR
DETAILS OF ALTERATIONS TO ABUTMENT AT HIGH
LEVEL

EXISTING BRIDGE BEAMS TO BE REMOVED PRIOR TO
START OF WORKS ON SITE TO FORM NEW OPENINGS.
THIS IS REQUIRED TO REDUCE LOADING FROM CIRCA
500kN/m (SLS) DOWN TO CIRCA 100kN/m (SLS) ON NEW
STEEL FRAMES

INDICATES MAIN VIADUCT MASONRY ARCHES BEYOND

EXISTING STONE COURSING FORMING PADSTONES TO
EXISTING BRIDGE. ALLOW FOR CLEANING,
REPOINTING IN LIME MORTAR, AND FLAUNCHING TO
SHED WATER TO ARCHITECTS DETAILS

INDICATES ASSUMED LOCATION OF LOCALISED
POCKETS TO ALLOW INSERTION OF NEEDLES FOR
TEMPORARY WORKS TO ALLOW FORMATION OF
OPENING. FINAL REQUIREMENTS TO TEMPORARY
WORKS ENGINEERS DESIGN AND DETAIL. GLAZED
BRICKWORK TO BE REINSTATED BETWEEN TOP OF
NEW BEAMS AND STONE COURSING USING HLM 3.5
LIME MORTAR AND SALVAGED GLAZED BRICKWORK

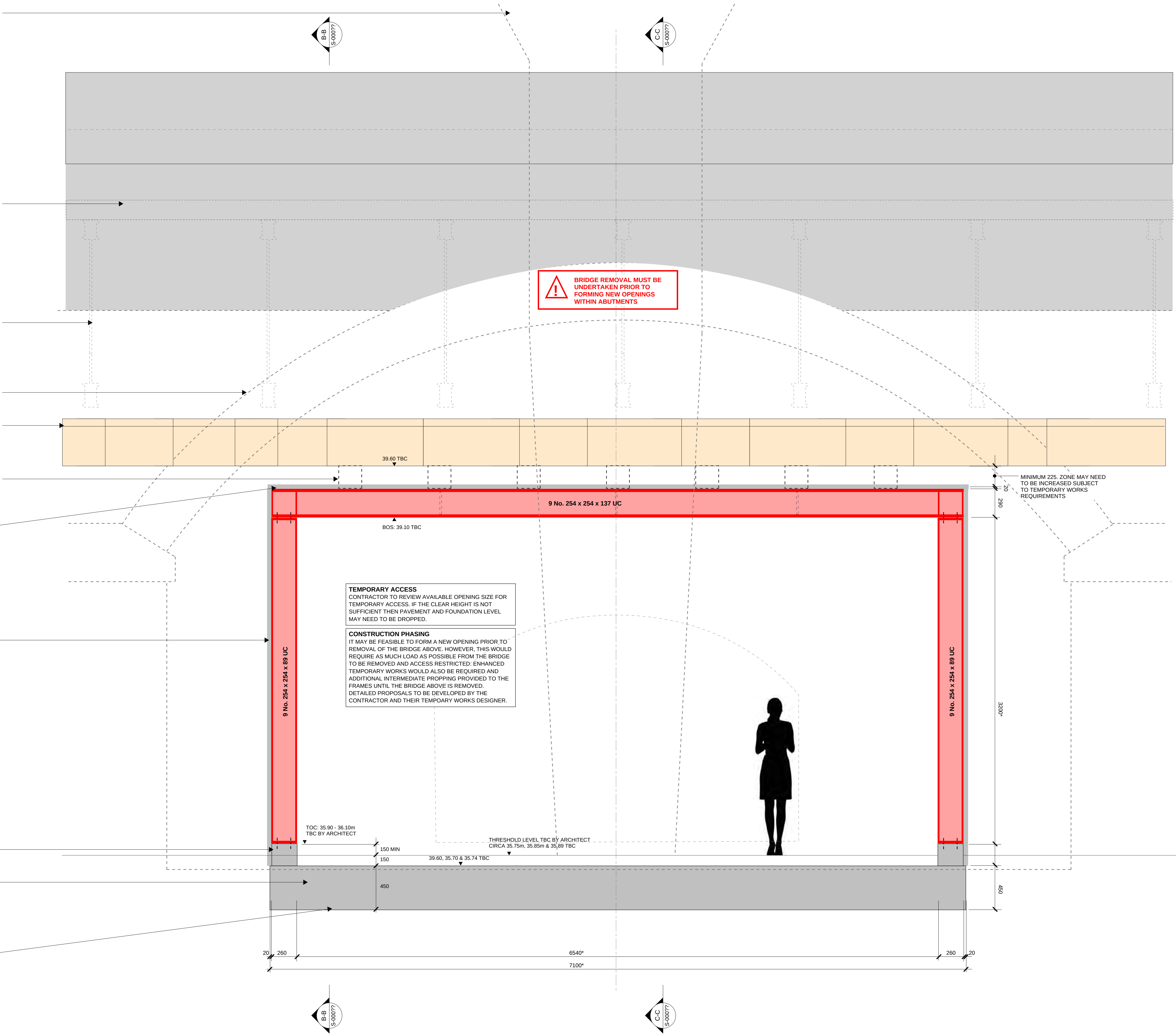
50-80mm GAP BETWEEN TOP OF BEAMS AND EXISTING
BRICKWORK SHIMMED AND SOLIDLY PACKED WITH
NON-SHRINK GROUT. FOSROC CONBEXTRA OR
SIMILAR INSTALLED IN ACCORDANCE WITH
MANUFACTURERS INSTRUCTIONS. EACH FRAME TO BE
FULLY SHIMMED AND PACKED PRIOR TO
INSTALLATION OF NEXT FRAME. PACKING TO BE KEPT
120mm SHORT AT ENDS TO ALLOW FOR
REINSTATEMENT OF GLAZED BRICKWORK TO FORM
FINISHED FACE

20-40mm GAP BETWEEN BEAMS AND EXISTING
BRICKWORK SHIMMED AND SOLIDLY PACKED WITH
NON-SHRINK GROUT. FOSROC CONBEXTRA OR
SIMILAR INSTALLED IN ACCORDANCE WITH
MANUFACTURERS INSTRUCTIONS. EACH FRAME TO BE
FULLY SHIMMED AND PACKED PRIOR TO
INSTALLATION OF NEXT FRAME. PACKING TO BE KEPT
120mm SHORT AT ENDS TO ALLOW FOR
REINSTATEMENT OF GLAZED BRICKWORK TO FORM
FINISHED FACE

RC UPSTAND TO BE A MINIMUM 150mm ABOVE
FINISHED PAVEMENT LEVEL. EXTERNAL JOINT
BETWEEN STEEL BASEPLATE AND CONCRETE TO BE
SEALED WITH A SUITABLY POLYSULPHIDE EXTERNAL
GRADE SEALANT TO ARCHITECTS SPECIFICATION

RC SPREADER BEAM TO EVENLY TRANSFER POINT
LOADS FROM FRAMES INTO FOUNDATIONS

TO ENSURE EVEN LOAD TRANSFER INTO EXISTING
FOUNDATIONS TOP OF EXISTING
BRICKWORK/CONCRETE TO BE BROKEN DOWN TO
LEVEL, FULLY CLEANED AND PRE-WETTED PRIOR TO
CASTING OF NEW RC SPREADER BEAM.



DETAIL 101
TYPICAL ABUTMENT WALL OPENING ELEVATION
1:20

NOTES:

1. REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.

STEELWORK PROTECTION SYSTEM

ALL STEELWORK TO RECEIVE THE FOLLOWING CORROSION PROTECTION SYSTEM:

- MINIMUM 85 µm HOT-DIP GALVANISING TO BS EN ISO 1461

IN ADDITION ALL NON-VISIBLE STEELWORK AND STEELWORK IN CONTACT WITH GROUT AND THE EXISTING MASONRY ARCHES IS TO BE PROTECTED WITH:

- TWO COATS HEAVY DUTY BITUMEN, 200 µm TOTAL

THE END FRAMES AND INTERNAL FACES THAT ARE ARCHITECTURALLY EXPOSED ARE TO RECIEVE THE FOLLOWING ADDITIONAL PAINT PROTECTION SYSTEM:

- MORDANT WASH
- ETCH PRIMER 40 µm
- HIGH BUILD EPOXY MIO 100 µm

FINAL DESIGN AND TECHNICAL REQUIREMENTS TO BE DEVELOPED DURING RIBA STAGE 4.

COMPATIBILITY OF PAINT PROTECTION SYSTEMS TO GALVANISED STEELWORK TO BE CONFIRMED OR ALTERNATIVE PROPOSED BY STEEL FABRICATORS PAINT SUPPLIER.
ALL NON-ACCESSIBLE STEELWORK IS TO HAVE A MINIMUM CORROSION PROTECTION LIFE OF 60 YEARS WITH NO MAINTENANCE. ARCHITECTURAL EXPRESSED STEELWORK IS TO HAVE A MINIMUM LIFE TO FIRST MAINTENANCE OF 20+ YEARS .

DETAILS - SURVEYS

ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDENT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.

FACADE WORKS TO GRADE II LISTED BUILDING

FOR CLEANING, LOCALISED REPAIR AND REPOINTING WORKS TO THE GRADE II LISTED VIADUCT STRUCTURE REFER TO ARCHITECTS AND HERITAGE ARCHITECTS DRAWINGS, DETAILS AND SPECIFICATION.

P02	RIBA STAGE 3 ISSUE FOR COMMENT	29.04.20	RW	KG
P01	FOR COMMENT	07.02.20	PC	KG
Rev:	Description:	Date:	By:	Chkd:



Project:

VIADUCT MANCHESTER

Drawing Title:

ABUTMENT OPENINGS ELEVATION

Status:

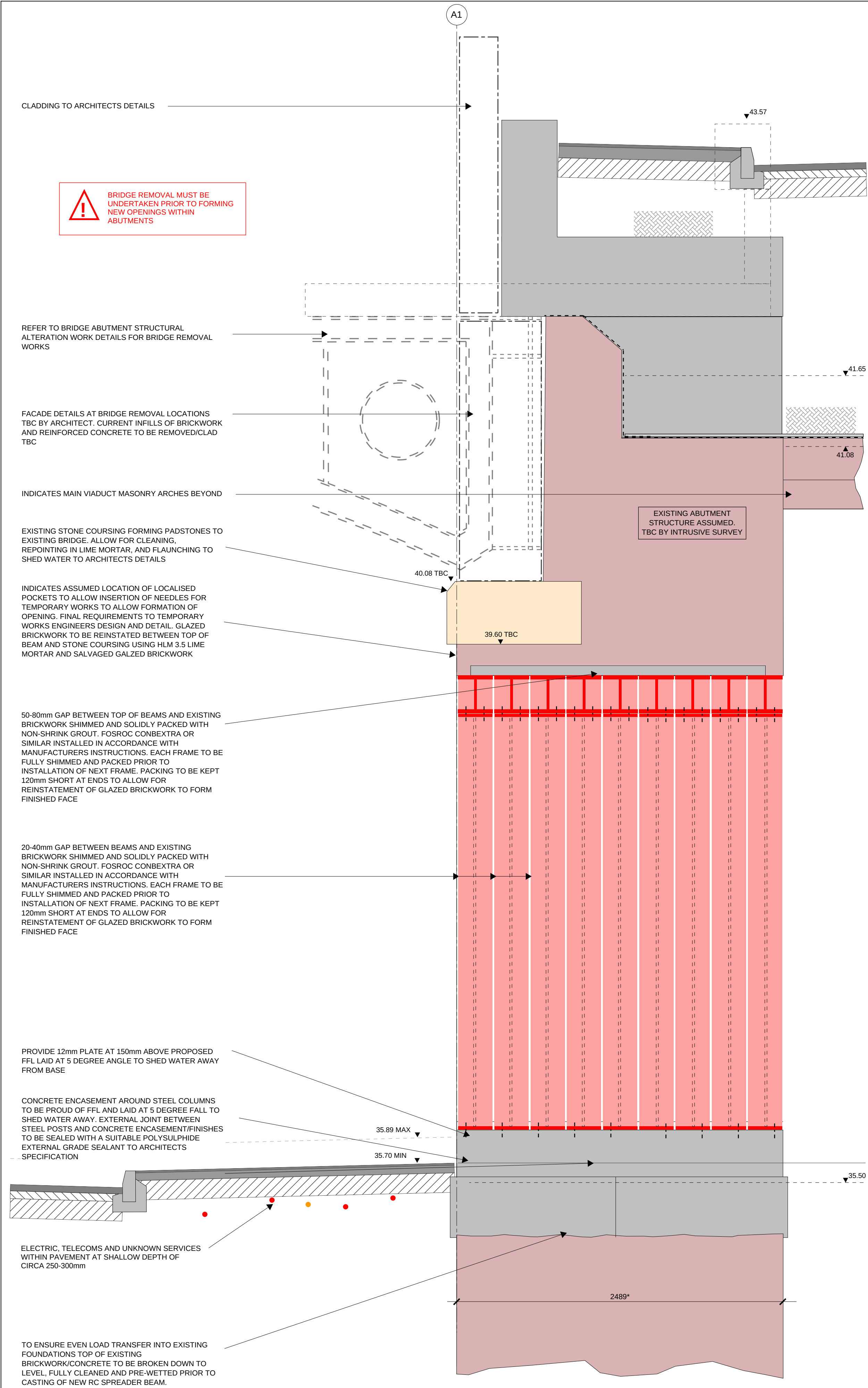
RIBA STAGE 3

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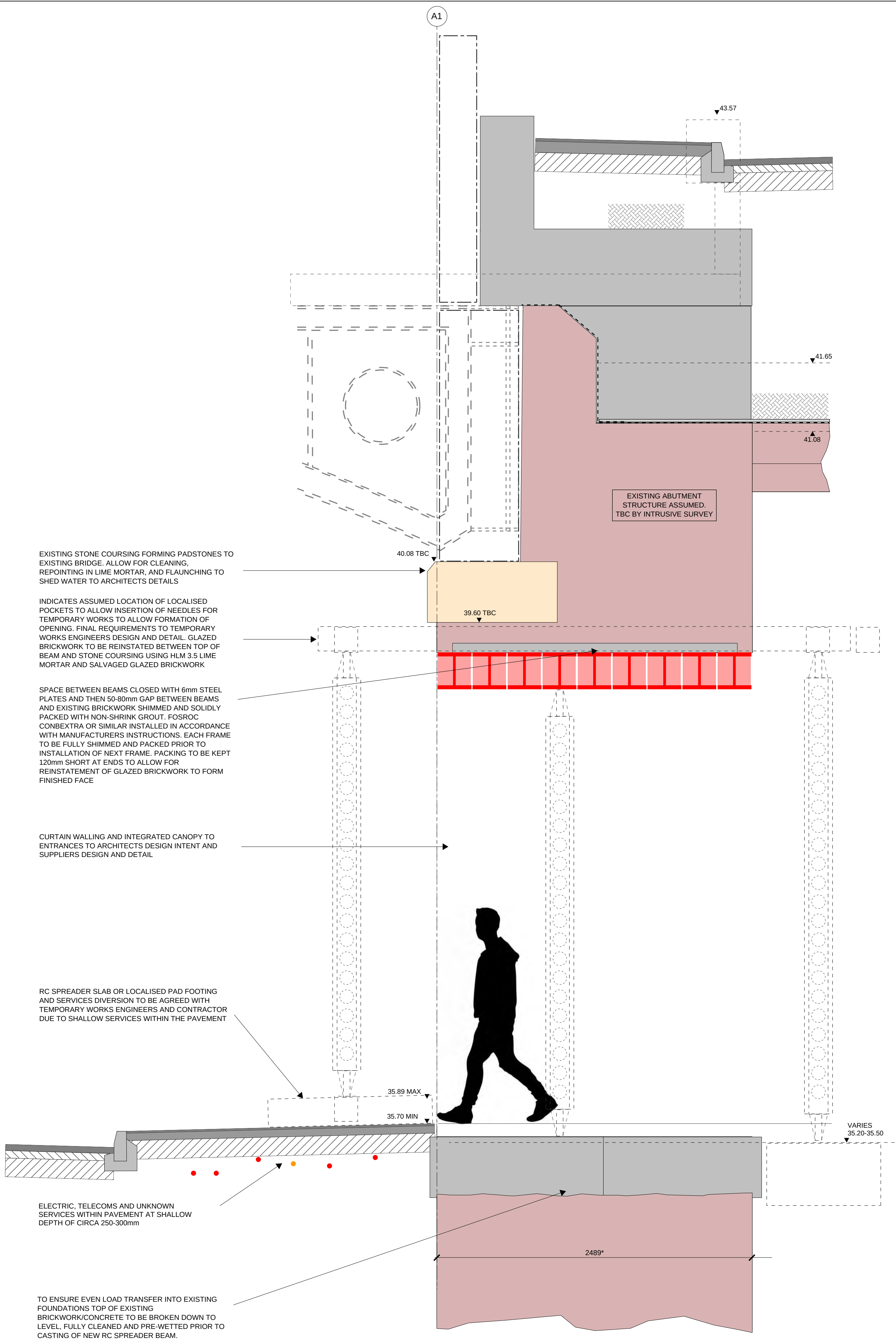
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VIA-REN-A-ZZ-DR-S-04300-P02



SECTION A-A
1:20



SECTION B-B
1:20

- NOTES:**
- REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.

STEELWORK PROTECTION SYSTEM
ALL STEELWORK TO RECEIVE THE FOLLOWING CORROSION PROTECTION SYSTEM:
- MINIMUM 85 µm HOT-DIP GALVANISING TO BS EN ISO 1461

IN ADDITION ALL NON-VISIBLE STEELWORK AND STEELWORK IN CONTACT WITH GROUT AND THE EXISTING MASONRY ARCHES IS TO BE PROTECTED WITH:
- TWO COATS HEAVY DUTY BITUMEN, 200 µm TOTAL

THE END FRAMES AND INTERNAL FACES THAT ARE ARCHITECTURALLY EXPOSED ARE TO RECEIVE THE FOLLOWING ADDITIONAL PAINT PROTECTION SYSTEM:
- MORDANT WASH
- ETCH PRIMER 40 µm
- HIGH BUILD EPOXY MIO 100 µm

FINAL DESIGN AND TECHNICAL REQUIREMENTS TO BE DEVELOPED DURING RIBA STAGE 4.
COMPATIBILITY OF PAINT PROTECTION SYSTEMS TO GALVANISED STEELWORK TO BE CONFIRMED OR ALTERNATIVE PROPOSED BY STEEL FABRICATORS PAINT SUPPLIER.
ALL NON-ACCESSIBLE STEELWORK IS TO HAVE A MINIMUM CORROSION PROTECTION LIFE OF 60 YEARS WITH NO MAINTENANCE. ARCHITECTURAL EXPRESSED STEELWORK IS TO HAVE A MINIMUM LIFE TO FIRST MAINTENANCE OF 20+ YEARS.

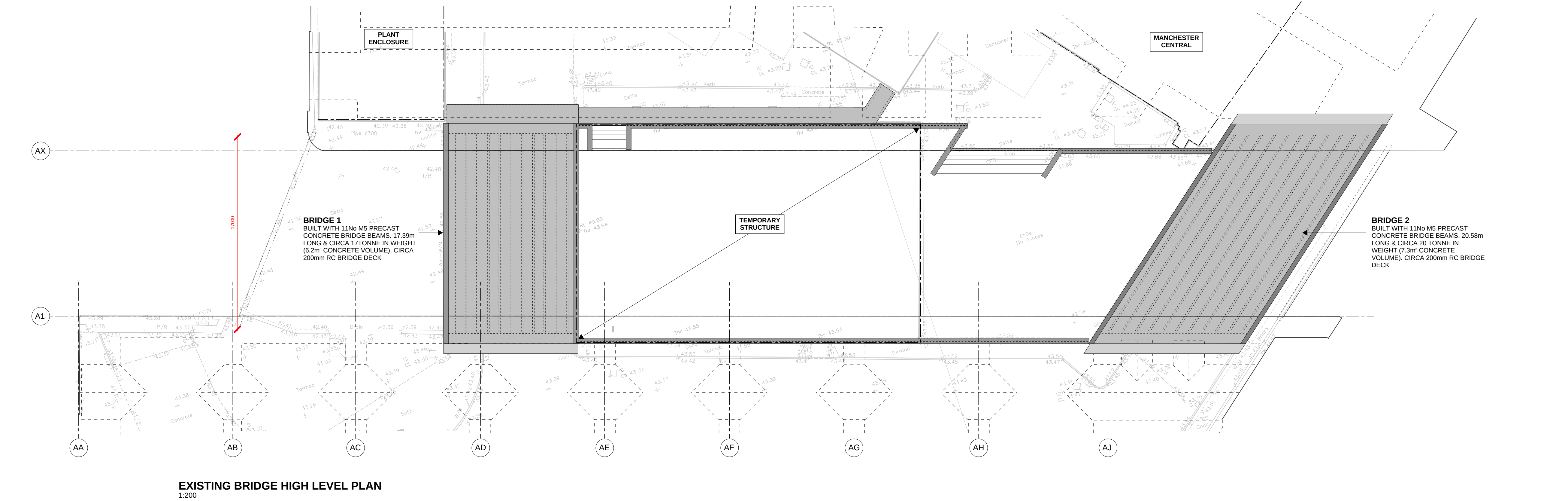
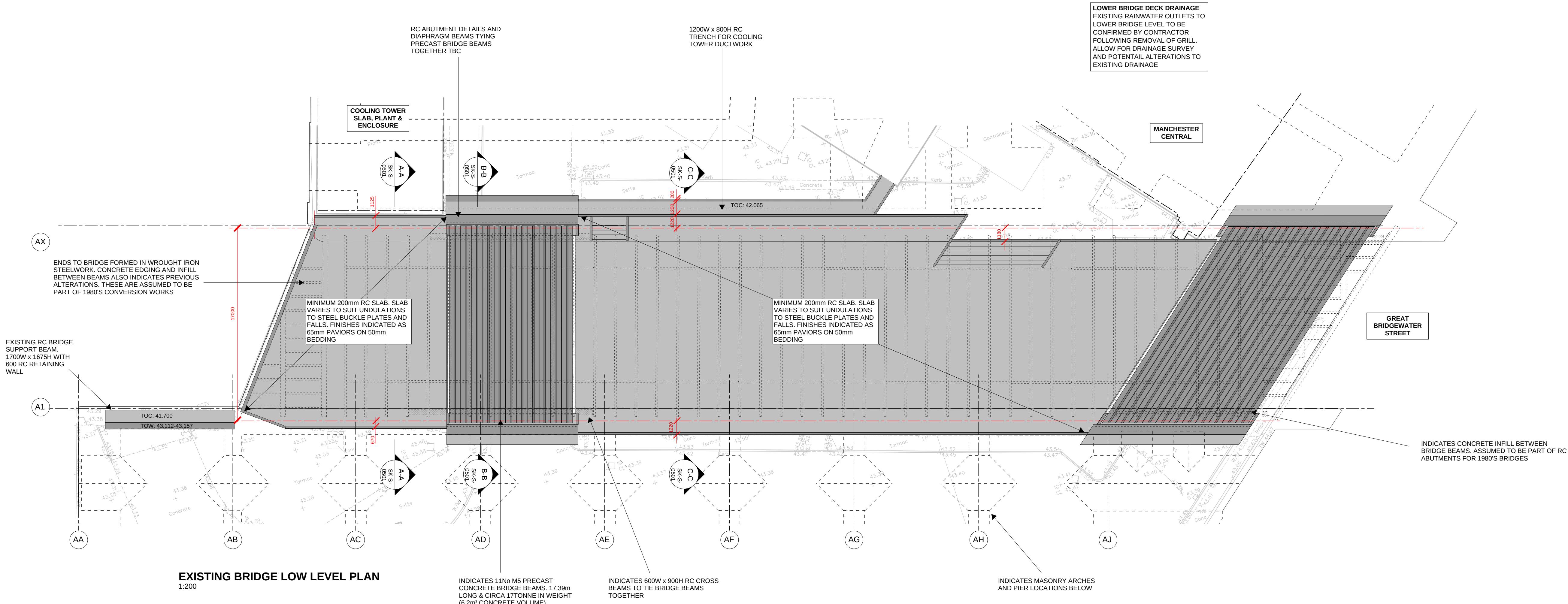
DETAILS - SURVEYS
ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDENT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.

FACADE WORKS TO GRADE II LISTED BUILDING
FOR CLEANING, LOCALISED REPAIR AND REPOINTING WORKS TO THE GRADE II LISTED VIADUCT STRUCTURE REFER TO ARCHITECTS AND HERITAGE ARCHITECTS DRAWINGS, DETAILS AND SPECIFICATION.

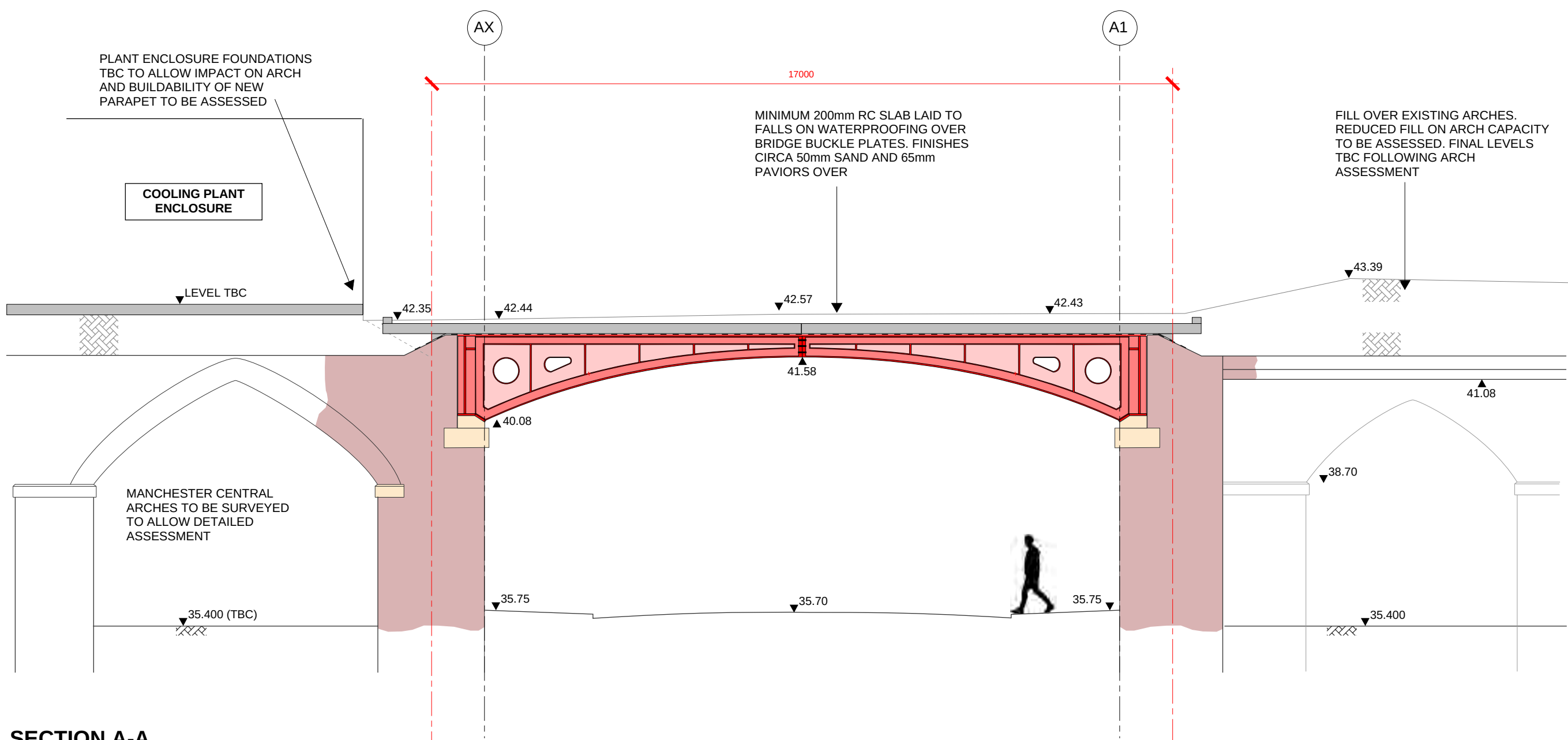
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P01	FOR COMMENT	07.02.20	PC	KG	
Rev:	Description:	Date:	By:	Chk:	
 Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG					
Project: VIADUCT MANCHESTER					
Drawing Title: ABUTMENT OPENINGS SECTIONS					
Status: RIBA STAGE 3					
Size:	A1	Date:	29.04.20	Drawn by:	RW
				Designed by:	-
				Checked by:	KG
Scale:	1:20 @ A1	Project No:	1910-12		
Project:	Originator:	Volume:	Level:	Type:	Role: Category/Number: Rev:
VIA-REN-A-ZZ-DR-S-02301-P02					

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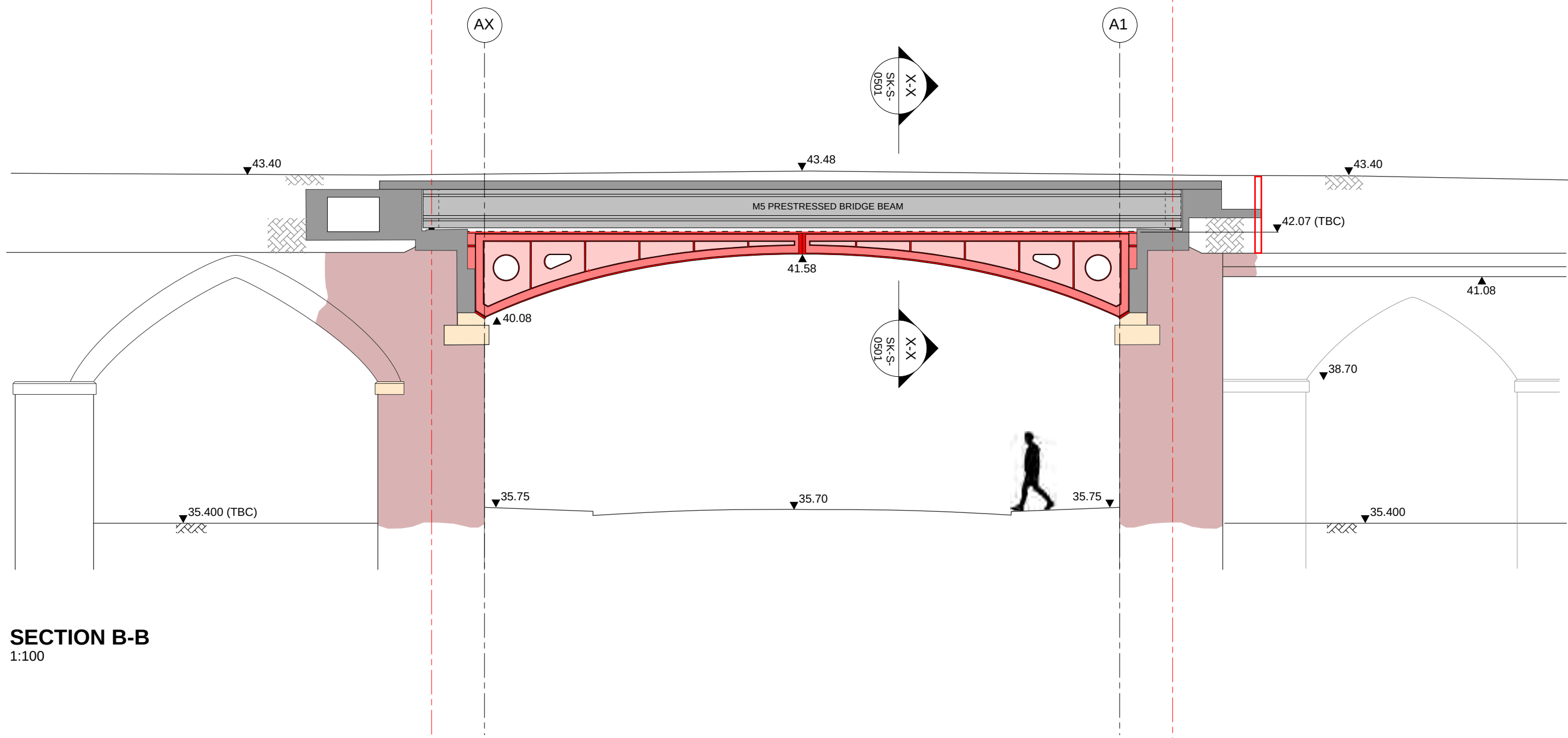
1. THE DRAWINGS SHOWING THE EXISTING STRUCTURE AND ARE BASED UPON THE 1980'S DRAWINGS CONTAINED WITHIN MANCHESTER CENTRALS ARCHIVES AND ORIGINAL 1870'S DRAWINGS FOR THE CAST-IRON BRIDGE OVER GREAT BRIDGEWATER STREET. THE ARCHIVE DRAWINGS ARE INCOMPLETE OR OF POOR QUALITY. THE INFORMATION SHOWN ON THESE DRAWINGS SHOULD THEREFORE BE CONSIDERED AS INDICATIVE AND TO GIVE AN UNDERSTANDING OF THE LIKELY CONSTRUCTION AND DETAILS THAT MAY BE ENCOUNTERED. WHERE EXISTING DETAILS ARE CRITICAL TO THE DETAILING OF NEW INTERFACES THESE SHOULD BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS SO THAT ANY ANOMILISE BETWEEN THE ARCHIVE DRAWINGS AND AS-BUILT STRUCTURE OR SUBSEQUENT ALTERATIONS OR ADDITIONS CAN BE ADDRESSED.



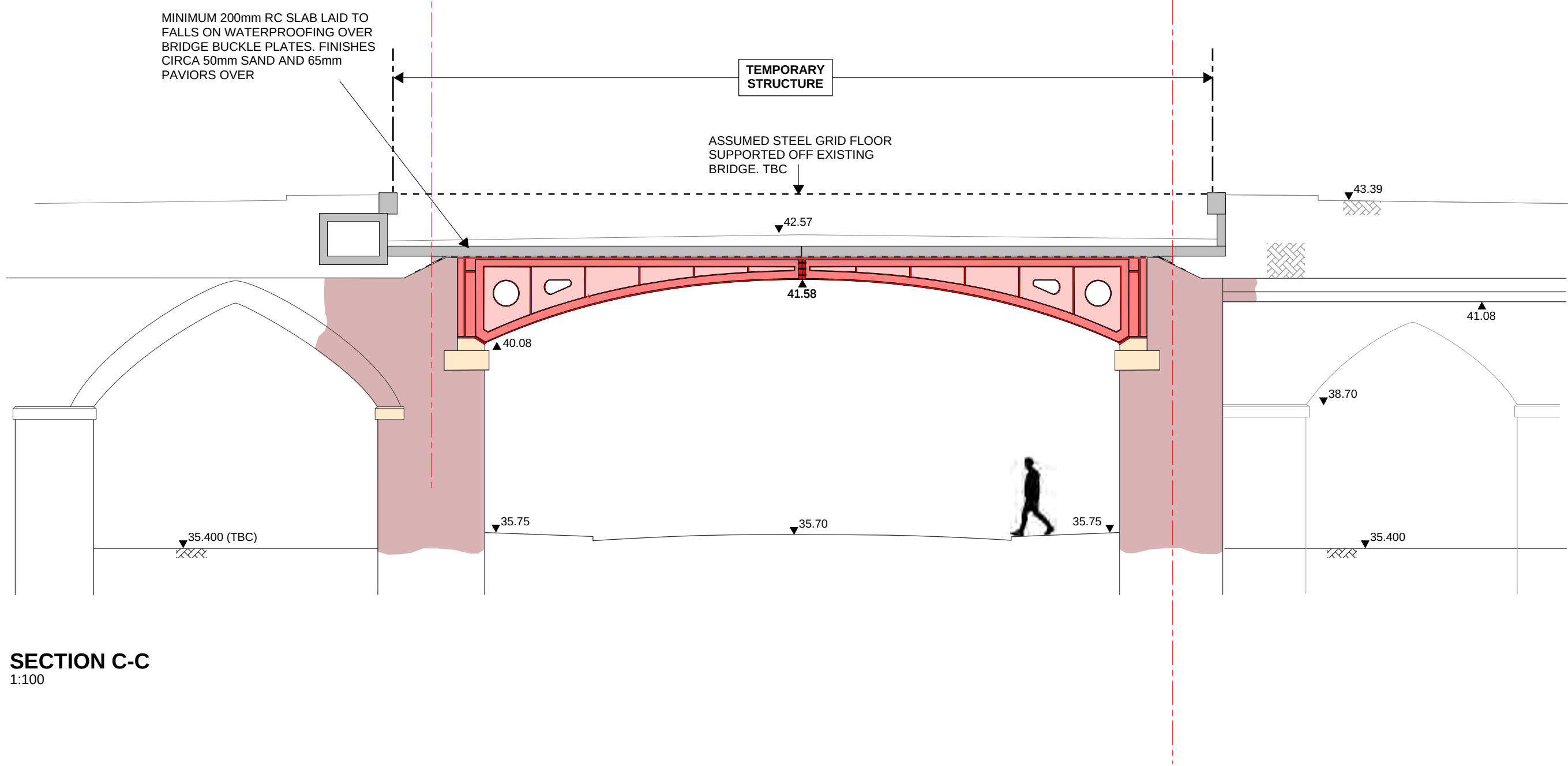
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P01	FOR INFORMATION	10.02.20	PC	KG	
Rev:	Description:	Date:	By:	Chkd:	
renaissance Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG					
Project:					
VIADUCT MANCHESTER					
Drawing Title:					
EXISTING GBS BRIDGE PLAN					
Status:					
STAGE 3					
Size:	A1	Date:	29.04.20	Drawn by:	RW
				Designed by:	-
				Checked by:	KG
Scale:	1:200 @ A1	Project No:	1910-12		
Project:	Originator:	Volume:	Level:	Type:	Rate: Category/Number: Rev:
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SECTION A-A
1:100



SECTION B-B
1:100

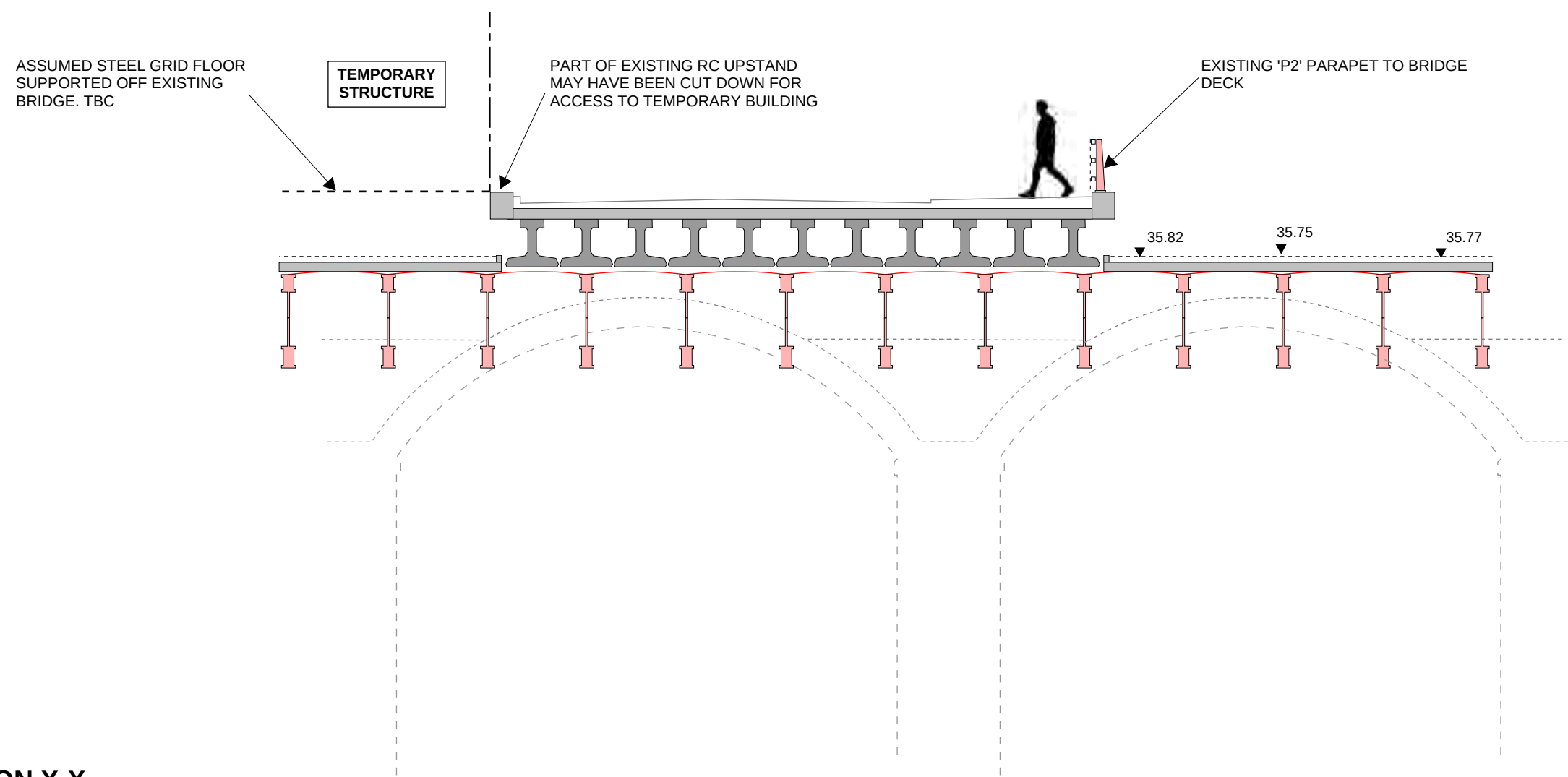


SECTION C-C
1:100



NOTES:

1. THE DRAWINGS SHOWING THE EXISTING STRUCTURE ARE BASED UPON THE 1980'S DRAWINGS CONTAINED WITHIN MANCHESTER CENTRALS ARCHIVES AND ORIGINAL 1870'S DRAWINGS FOR THE CAST-IRON BRIDGE OVER GREAT BRIDGEWATER STREET. THE ARCHIVE DRAWINGS ARE INCOMPLETE OR OF POOR QUALITY. THE INFORMATION SHOWN ON THESE DRAWINGS SHOULD THEREFORE BE CONSIDERED AS INDICATIVE AND TO GIVE AN UNDERSTANDING OF THE LIKELY CONSTRUCTION AND DETAILS THAT MAY BE ENCOUNTERED. WHERE EXISTING DETAILS ARE CRITICAL TO THE DETAILING OF NEW INTERFACES THESE SHOULD BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS SO THAT ANY ANOMALIES BETWEEN THE ARCHIVE DRAWINGS AND AS-BUILT STRUCTURE OR SUBSEQUENT ALTERATIONS OR ADDITIONS CAN BE ADDRESSED.



SECTION X-X
1:100



P02	RIBA STAGE 3 ISSUE FOR COMMENT	29.04.20	RW	KG
P01	FOR INFORMATION	10.02.20	PC	KG
Rev:	Description:	Date:	By:	Chkd:



Project: **VIADUCT MANCHESTER**

Drawing Title: **EXISTING GBS BRIDGE SECTIONS**

Status: **STAGE 3**

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	29.04.20	RW	-	KG

Scale:	Project No:
1:100 @ A1	1910-12

Project:	Originator:	Volume:	Level:	Type:	Role:	Category/Number:	Rev:
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VIA-REN-A-ZZ-DR-S-02200-P02



1:200



1:200

INDICATES CONCRETE INFILL BETWEEN
BRIDGE BEAMS. DETAILS TO BE CONFIRMED
BY SURVEY AND MAY IMPACT ON NEW
ALTERATION WORKS

INDICATES CONCRETE INFILL BETWEEN
BRIDGE BEAMS. ASSUMED TO BE PART OF RC
ABUTMENTS FOR 1980'S BRIDGES

1. THIS DRAWING IS INTENDED FOR RIBA STAGE 3 'DEVELOPED DESIGN' AND IS INTENDED TO GIVE AN INDICATION OF THE ANTICIPATED WORKS. GIVEN THE STAGE OF THE PROJECT THIS SHOULD BE CONSIDERED AS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT AS FURTHER SURVEY INFORMATION BECOMES AVAILABLE AND THE DESIGN IS CO-ORDINATED WITH THE TEAM.
2. ALL CONCRETE WORKS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE 'NATIONAL STRUCTURAL CONCRETE SPECIFICATION' AND RENAISSANCE CONCRETE SPECIFICATION.
3. CONCRETE TO GENERALLY BE RC23/40 AIR ENTRAINED.
4. WHERE FEASIBLE EXISTING GOOD QUALITY MASONRY UNITS ARE TO BE SALVAGED AND CLEANED FOR REUSE WITHIN THE WORKS.
5. WHERE NEW BRICKS ARE REQUIRED THAT ARE NOT EXPOSED IN THE FINISHED WORKS THIS ARE TO BE SOLID CLASS 5 BAY ENGINEERING BRICKS. ALL EXPOSED MASONRY TO BE SUITABLE SOURCES MASONRY TO MATCH EXISTING.
6. NO CEMENT BASED MORTAR IS PERMITTED FOR USE WITHIN REINSTATEMENT WORKS OF MASONRY. ALL NEW AND REPAIR WORKS UNDERTAKEN ARE TO BE WITH A LIME MORTAR:
HLM 3.5 - GENERAL MASONRY WORKS 150mm ABOVE GROUND LEVEL
HLM 5.0 - WORKS BELOW GROUND
7. ALL TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAIL.

THE INFORMATION IS APPROPRIATE FOR RIBA STAGE 3 AND INTENDED TO COMMUNICATE THE CONCEPT AND FEASIBILITY OF THE PROPOSALS. THE PLANS, SECTIONS AND DETAILS ARE THEREFORE INDICATIVE AND BASED ON LIMITED INFORMATION. THE DESIGN AND DETAILS WILL BE UPDATED AS FURTHER SURVEYS ARE UNDERTAKEN AND STRUCTURAL ANALYSIS AND DESIGN CO-ORDINATION IS UNDERTAKEN WITH THE DESIGN TEAM DURING RIBA STAGES 4 AND 5.

SURVEY AND OPENING UP WORKS TO BE UNDERTAKEN TO VERIFY EXISTING CONSTRUCTION. THIS INFORMATION IS REQUIRED TO VERIFY IF THE EXISTING BRIDGE PROVIDES PROPPING TO THE ARCHES.

AT THIS STAGE IT HAS BEEN ASSUMED THAT THE ABUTMENTS ARE ADEQUATE TO RESIST THE ARCH THRUSTS. HOWEVER, A RISK ALLOWANCE SHOULD BE MADE FOR INTRODUCING PERMANENT PROPS BETWEEN BRIDGE ABUTMENTS IF THE ARCHES ARE FOUND TO REQUIRE ADDITIONAL SUPPORT.

SURVEY AND OPENING UP WORKS ARE REQUIRED TO BE UNDERTAKEN TO VERIFY EXISTING CONSTRUCTION DETAILS. THIS INFORMATION IS REQUIRED TO ALLOW THE NEW INTERVENTION WORK DETAILS TO BE DEVELOPED AND TO ASSIST THE CONTRACTOR IN DEVELOPING DETAILED CONSTRUCTION SEQUENCING AND TO CALCULATE MEMBER WEIGHT FOR DEMOLITION.

THE FOLLOWING INDICATES THE ASSUMED CONSTRUCTION SEQUENCING THAT WILL BE ADOPTED WITHIN THE PERMANENT DESIGN AND TO INDICATE A VIABLE WAY OF UNDERTAKING THE WORK. THE CONTRACTOR IS TO DEVELOP A DETAILED CONSTRUCTION METHODOLOGY WITH THEIR TEMPORARY WORK ENGINEER TO ENSURE THAT THE WORKS CAN BE UNDERTAKEN SAFELY.

1. INSTALL CRASH DECK BELOW BRIDGE TO PROTECT PEDESTRIAN AND VEHICLES. REQUIREMENTS TO BE AGREED WITH MCC HIGHWAYS.
2. LOCALLY INSTALL SPREADER BASES TO NEW RC BEAMS, USING TRENCH BOXES TO MINIMISE EXCAVATION. EXCAVATED FILL MATERIAL IS NOT TO BE STOCKPILED ON THE ARCHES.
3. INSTALL NEW RC BRIDGE PARAPET BEAMS AND CROSS BEAMS USING TRENCH BOXES TO REDUCE EXTENT OF FILL REMOVAL. ONCE BEAMS HAVE GAINED FULL STRENGTH, BACKFILL TO REQUIRED LEVEL AND FORM TIE SLAB.
4. REMOVE FILL MATERIAL FROM BRIDGE SECTIONS TO BE DEMOLISHED. EXCAVATION SHOULD BE UNDERTAKEN EVENLY IN MAXIMUM 0.5m INCREMENTS ACROSS THE COMPLETE AREA TO ENSURE UNBALANCED LOADING ON THE EXISTING CAST IRON ARCHES IS MINIMISED.
5. LOCALLY BATTER BACK FILL MATERIAL OVER THE TOP OF THE BRIDGE ABUTMENTS AND EXPOSE ENDS OF BRIDGE BEAMS AND ARCHES. WHERE REQUIRED FOR STABILITY, INSTALL TEMPORARY BRACING AS WORKS PROCEED.
6. CLOSE ROAD, ERECT MOBILE CRANE AND CAREFULLY REMOVE BRIDGE BEAMS ONE AT A TIME WORKING FROM ONE END. STEEL DECK PLATE IS TO BE LOCALLY CUT OUT IN SECTIONS AS THE WORKS PROCEED TO ENSURE STABILITY OF ADJACENT ARCHES IS MAINTAINED.
7. INSTALL RC INFILL TO STABILISE REMNANT BRIDGE BEARING EDGE AND INSTALL RC PARAPET AND RETAINING WALL ABOVE. BACKFILL ONCE RC HAS GAINED FULL STRENGTH. INSTALL FACING BRICKWORK AND OTHER MATERIAL AS REQUIRED.
8. REMOVE CRASH DECK

ALL EXCAVATED FILL MATERIAL IS **NOT** TO BE STOCKPILED ON THE ARCHES. LOCALISE STOCKPIILING MAY BE FEASIBLE OVER PIER LOCATIONS SUBJECT TO DETAILED ASSESSMENT BY THE TEMPORARY WORKS ENGINEER.

AT THIS STAGE ASSUME ALL WORKS TO BE UNDERTAKEN WITH SMALL DIGGERS AND DUMP TRUCKS. DETAILED ASSESSMENT OF ARCHES REQUIRED IN THE TEMPORARY CASE IF SUPPORT OF HIGHER PLANT MACHINERY IS REQUIRED.

COMPLETE ALL SURVEYS AND UNDERTAKE ADDITIONAL INVESTIGATION WORKS AS REQUIRED TO ENSURE THE TEMPORARY WORKS ENGINEER HAS ALL THE INFORMATION REQUIRED TO UNDERTAKE THE TEMPORARY WORKS DESIGN.

Renaissance Associates Ltd
Carvers Warehouse
77 Dale Street
Manchester
M1 2HG

Project

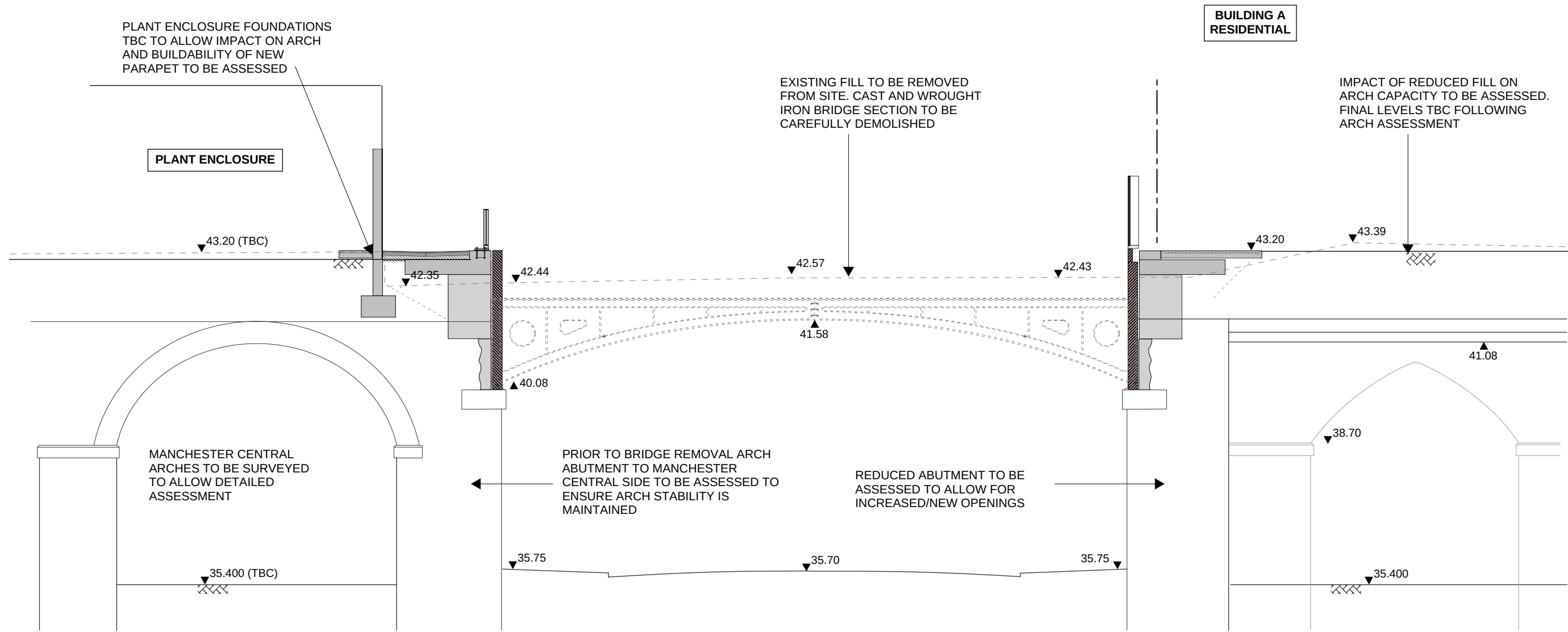
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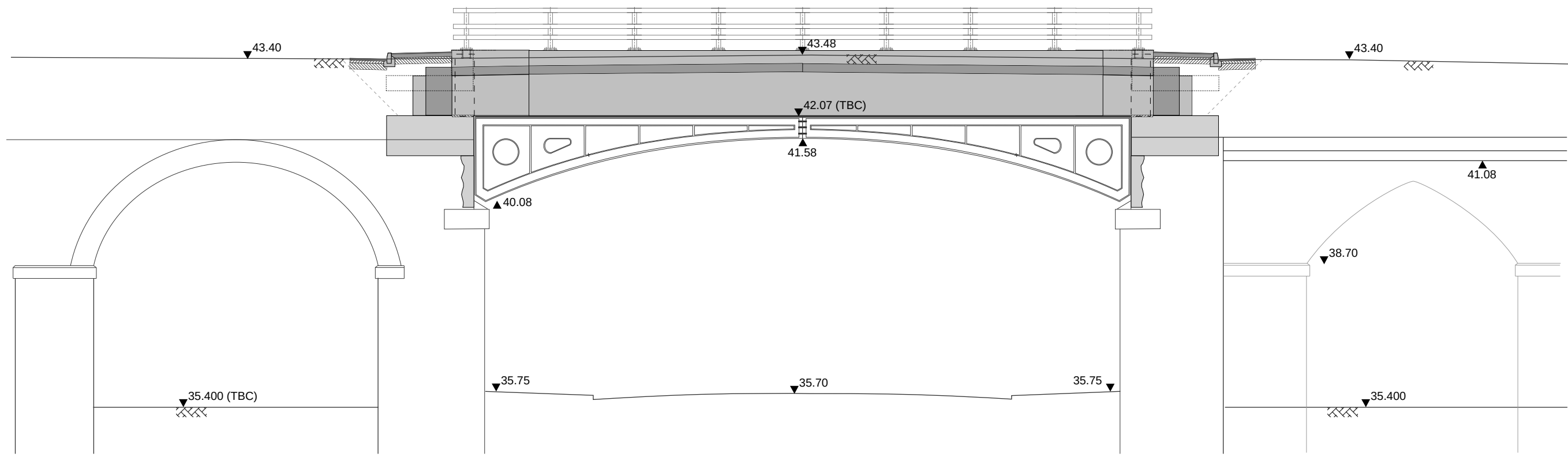
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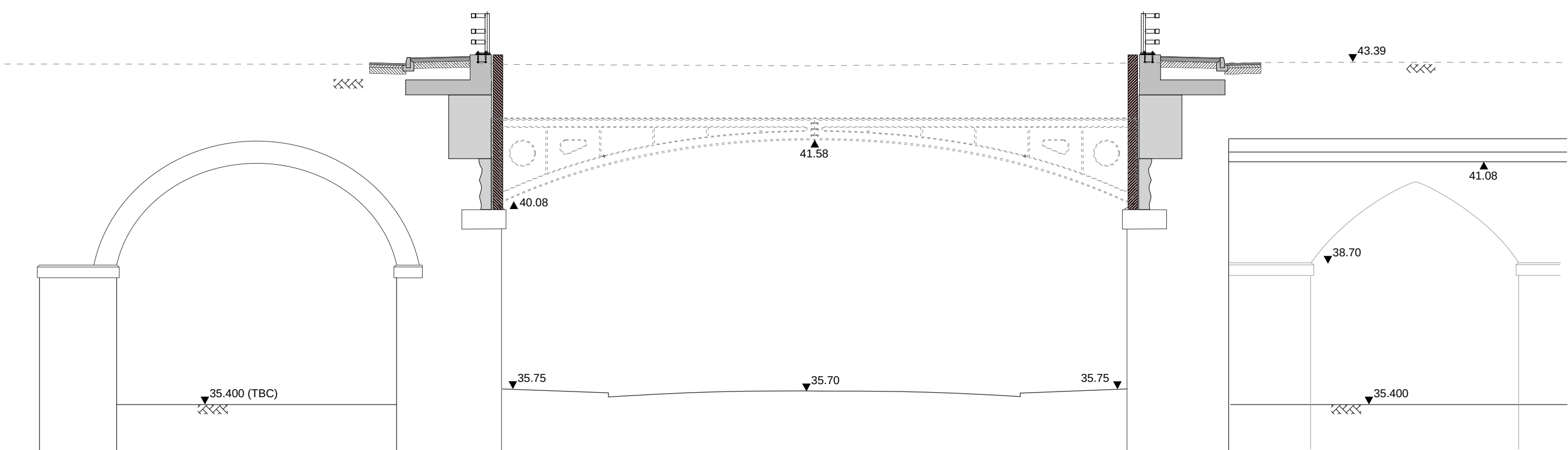
VIA-REN-A-01-DR-S-01201-P02



SECTION A-A
1:100



SECTION B-B
1:100

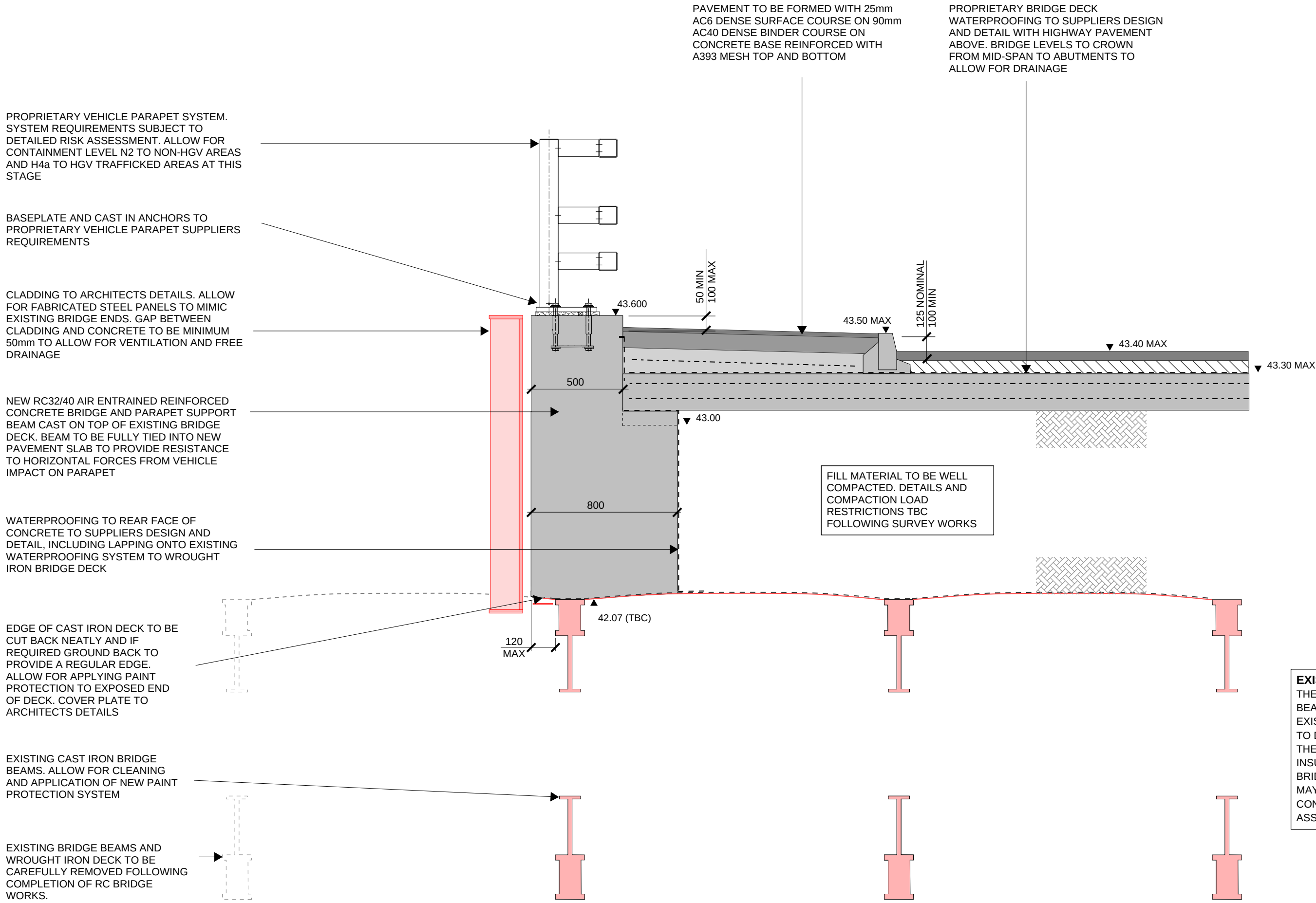


SECTION C-C
1:100

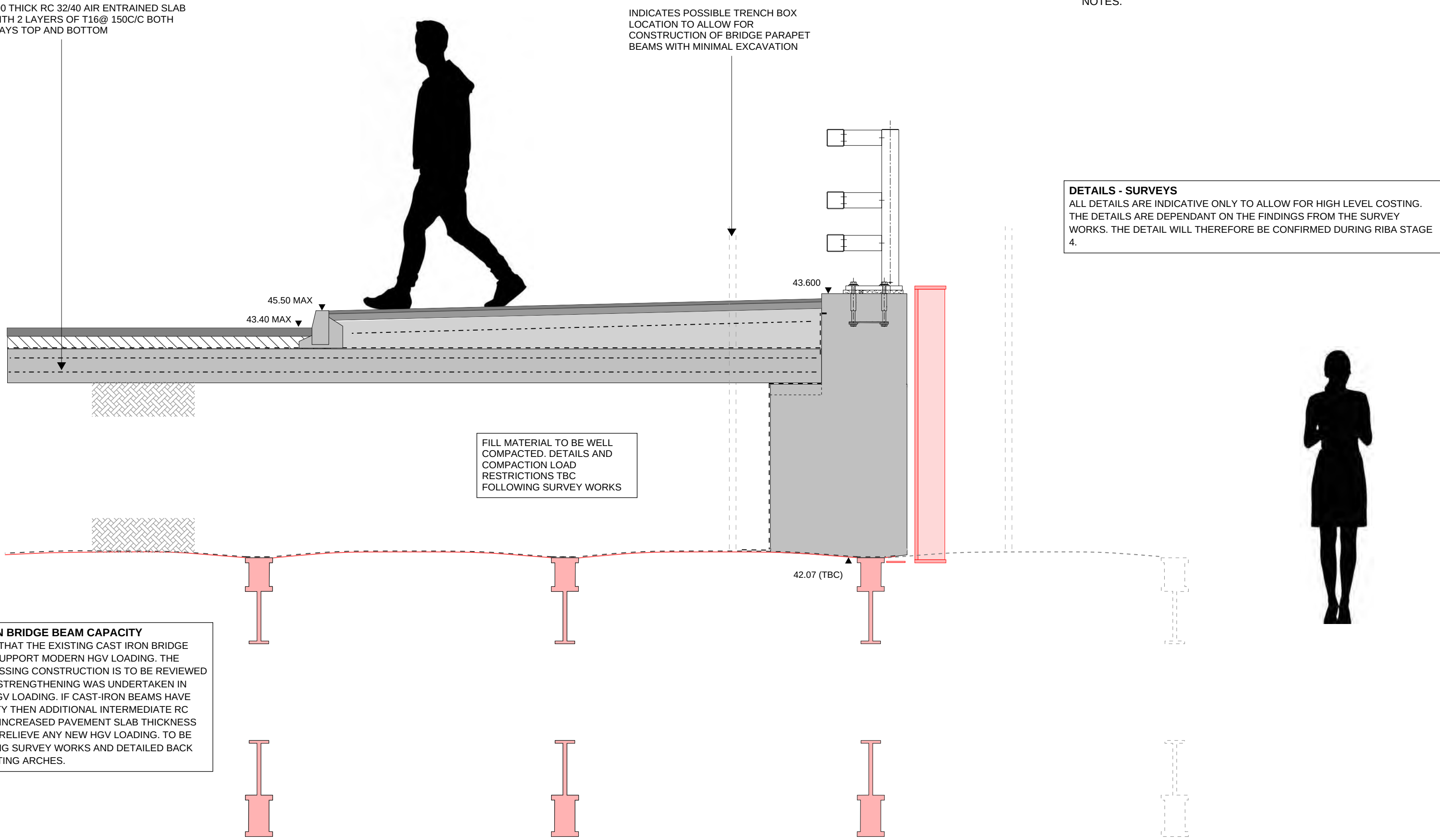
NOTES:

1. REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.

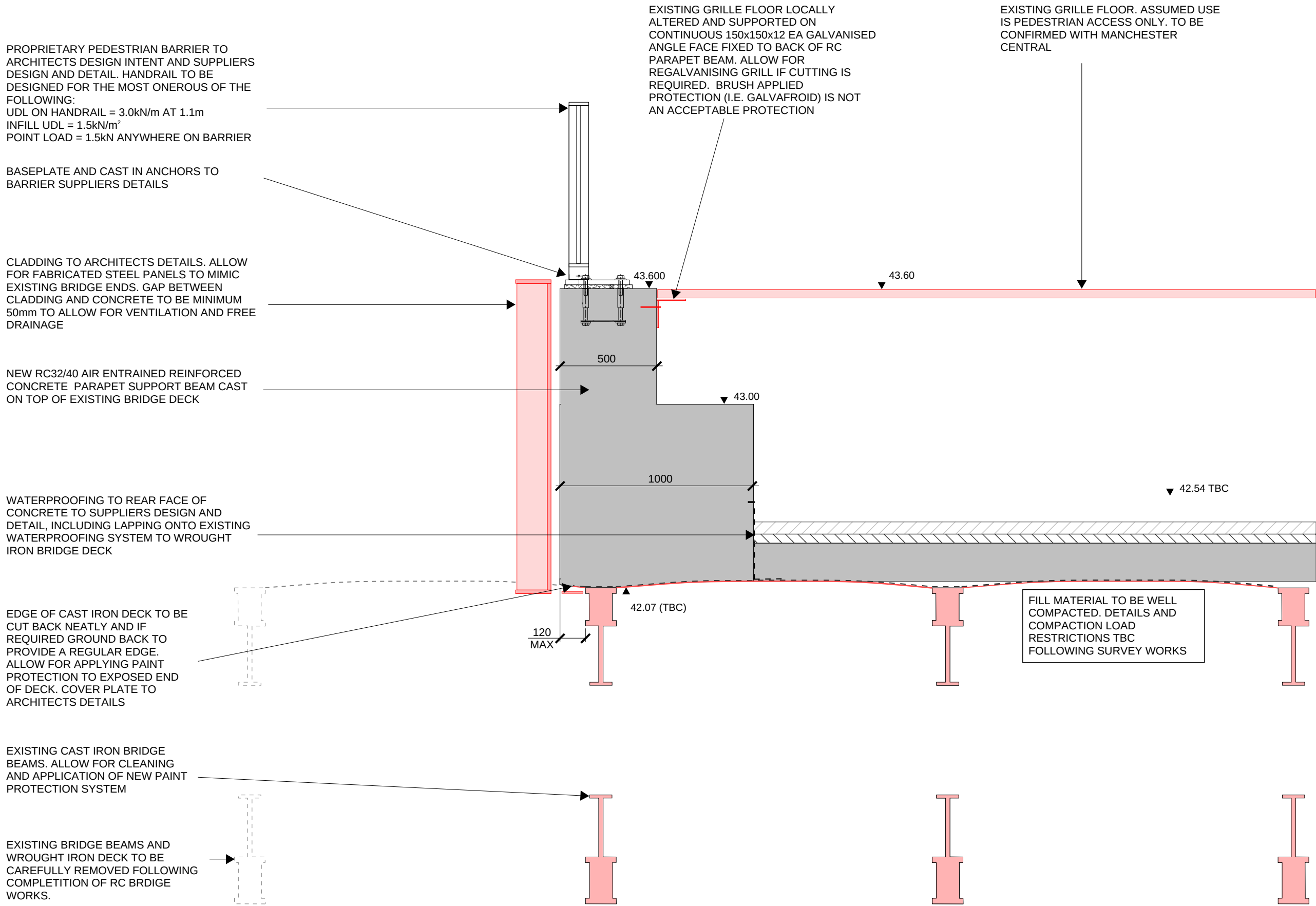
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P01	FOR COMMENT	10.02.20	KG	PC	
Rev:	Description:	Date:	By:	Chkd:	
renaissance Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG					
Project: VIADUCT MANCHESTER					
Drawing Title: PROPOSED GBS BRIDGE SECTIONS					
Status: RIBA STAGE 3					
Size:	A1	Date:	29.04.20	Drawn by:	RW
				Designed by:	-
				Checked by:	KG
Scale:	1:100 @ A1		Project No:	1910-12	
Project:	Originator:	Volume:	Level:	Type:	Role: Category/Number: Rev:
VIA-REN-A-ZZ-DR-S-02210-P02					



DETAIL 101
1:20



DETAIL 102
1:20



DETAIL 103
1:20

NOTES:
1. REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.

DETAILS - SURVEYS
ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDANT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.

EXISTING CAST IRON BRIDGE BEAM CAPACITY
THE DETAILS ASSUME THAT THE EXISTING CAST IRON BRIDGE BEAMS ARE ABLE TO SUPPORT MODERN HGV LOADING. THE EXISTING BRIDGE CROSSING CONSTRUCTION IS TO BE REVIEWED TO DETERMINE WHAT STRENGTHENING WAS UNDERTAKEN IN THE 1980'S TO TAKE HGV LOADING. IF CAST-IRON BEAMS HAVE INSUFFICIENT CAPACITY THEN ADDITIONAL INTERMEDIATE RC BRIDGE BEAM AND AN INCREASED PAVEMENT SLAB THICKNESS MAY BE REQUIRED TO RELIEVE ANY NEW HGV LOADING. TO BE CONFIRMED FOLLOWING SURVEY WORKS AND DETAILED BACK ASSESSMENT OF EXISTING ARCHES.

P02	RIBA STAGE 3 FOR COMMENT	29.04.20	RW	KG
P01	FOR INFORMATION	??.12.19	KG	PC
Rev:	Description:	Date:	By:	Chkd:
renaissance Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG				

VIADUCT MANCHESTER

Drawing Title:
**PROPOSED GBS BRIDGE
DETAILS - SHEET 1**

Status:
RIBA STAGE 3

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	29.04.20	RW	-	KG

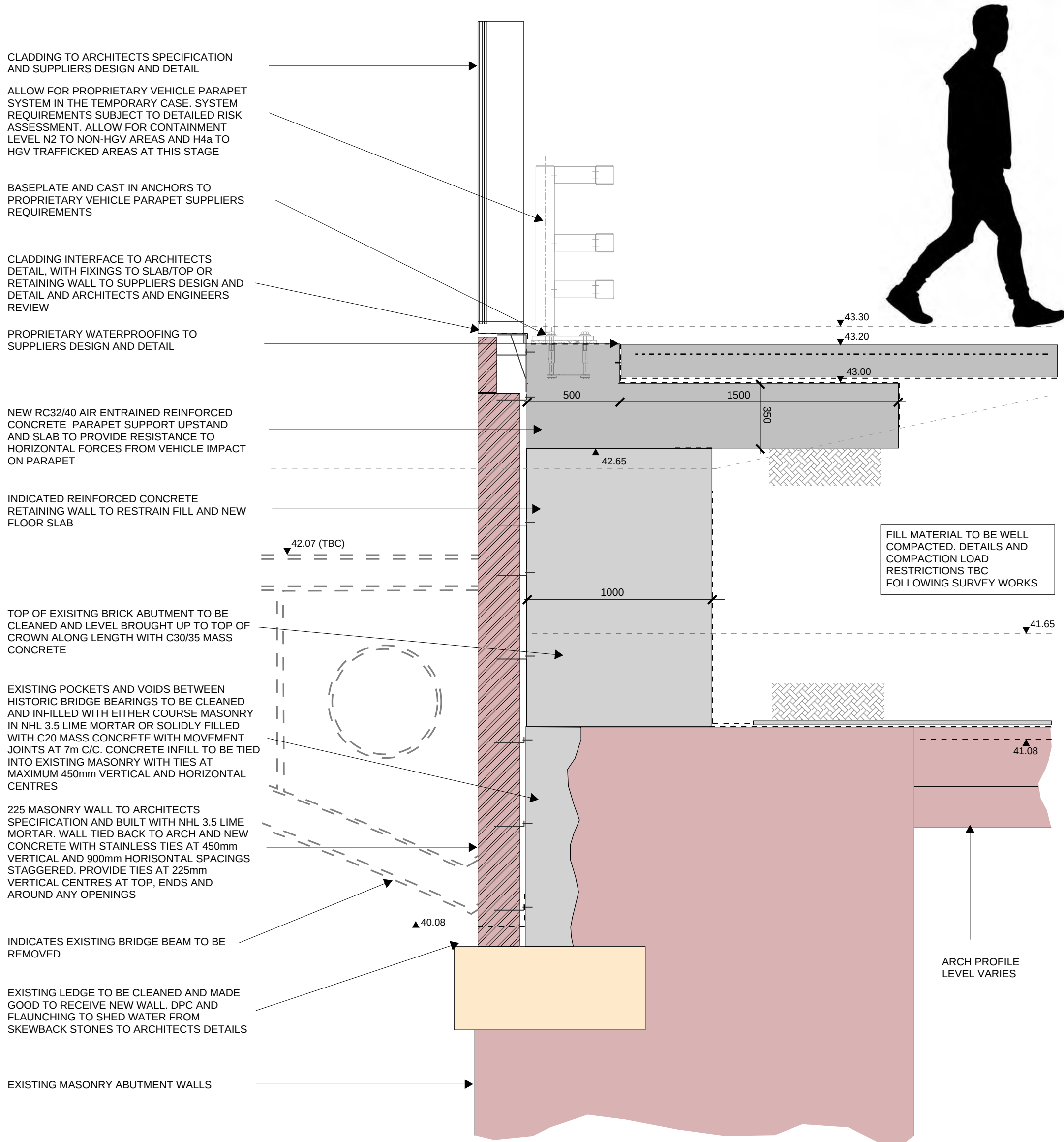
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Project:	Originator:	Volume:	Level:	Type:	Role:	Category/Number:	Rev:
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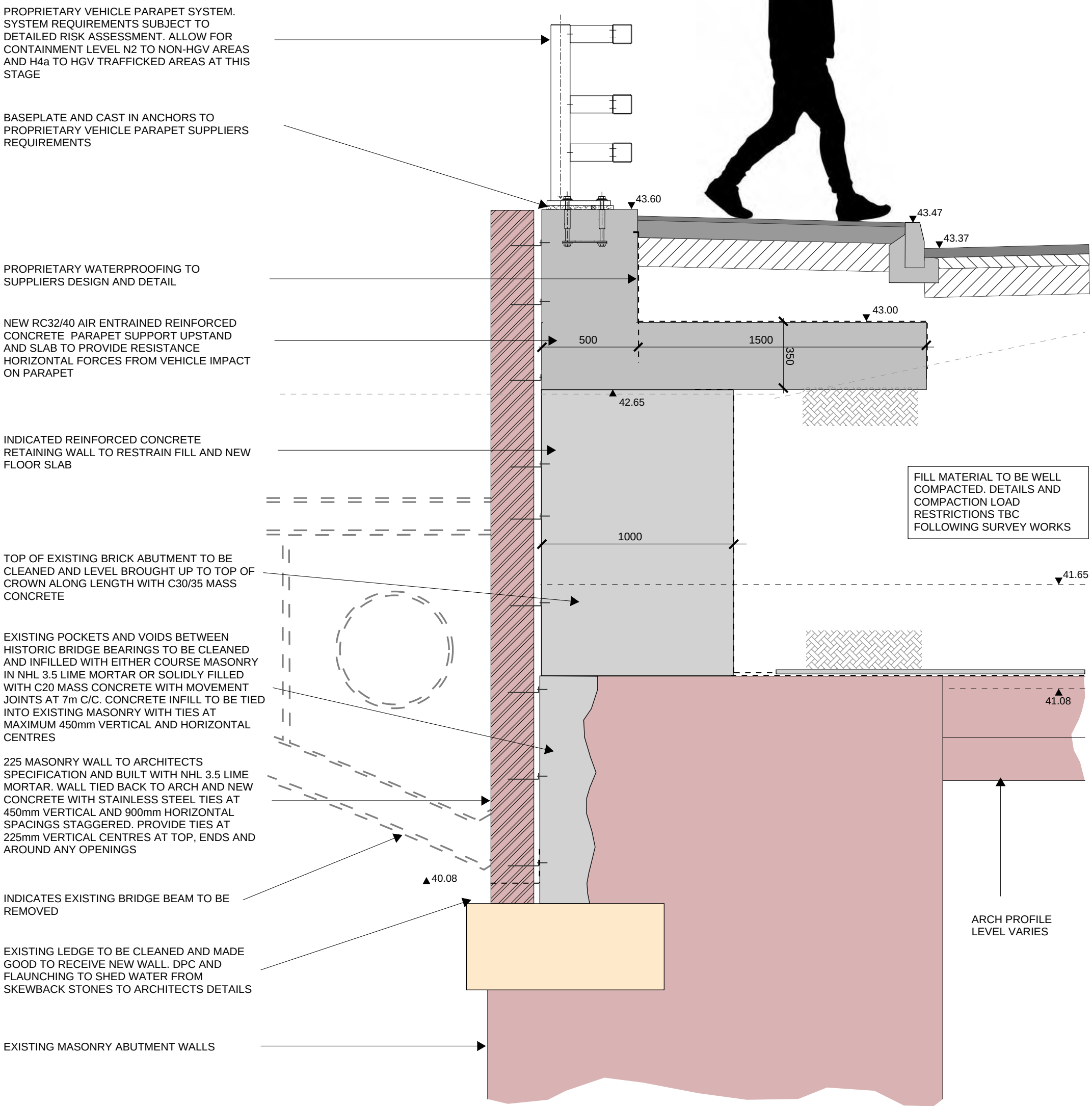
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- NOTES:
- REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.

DETAILS - SURVEYS
ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDANT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.



DETAIL 110
1:20



DETAIL 111
1:20

P02	RIBA STAGE 3 FOR COMMENT	29.04.20	RW	KG
P01	FOR INFORMATION	?? 12.19	KG	PC
Rev:	Description:	Date:	By:	Chkd:



Project:

**VIADUCT
MANCHESTER**

Drawing Title:

**PROPOSED GBS BRIDGE
DETAILS - SHEET 2**

Status:

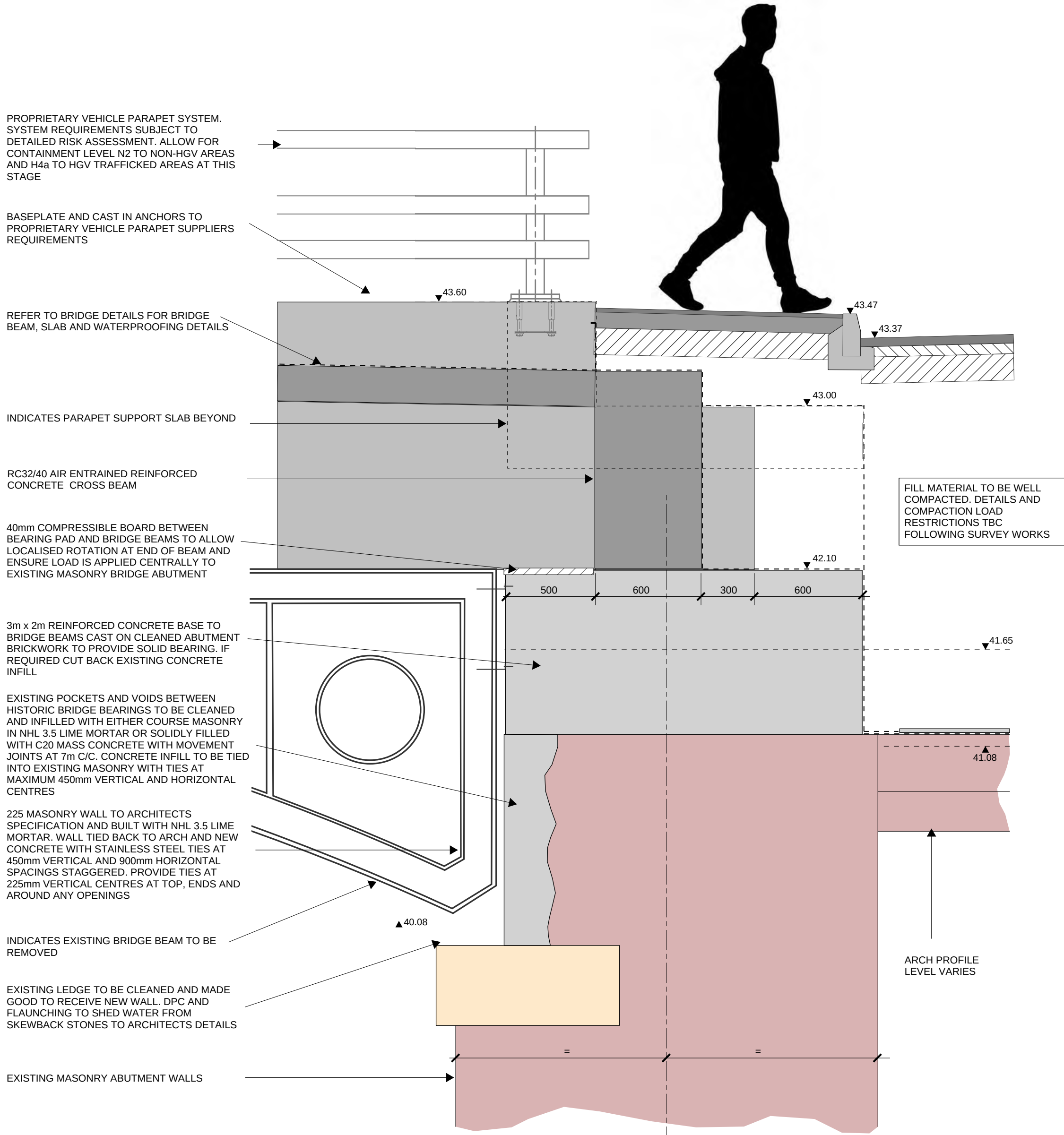
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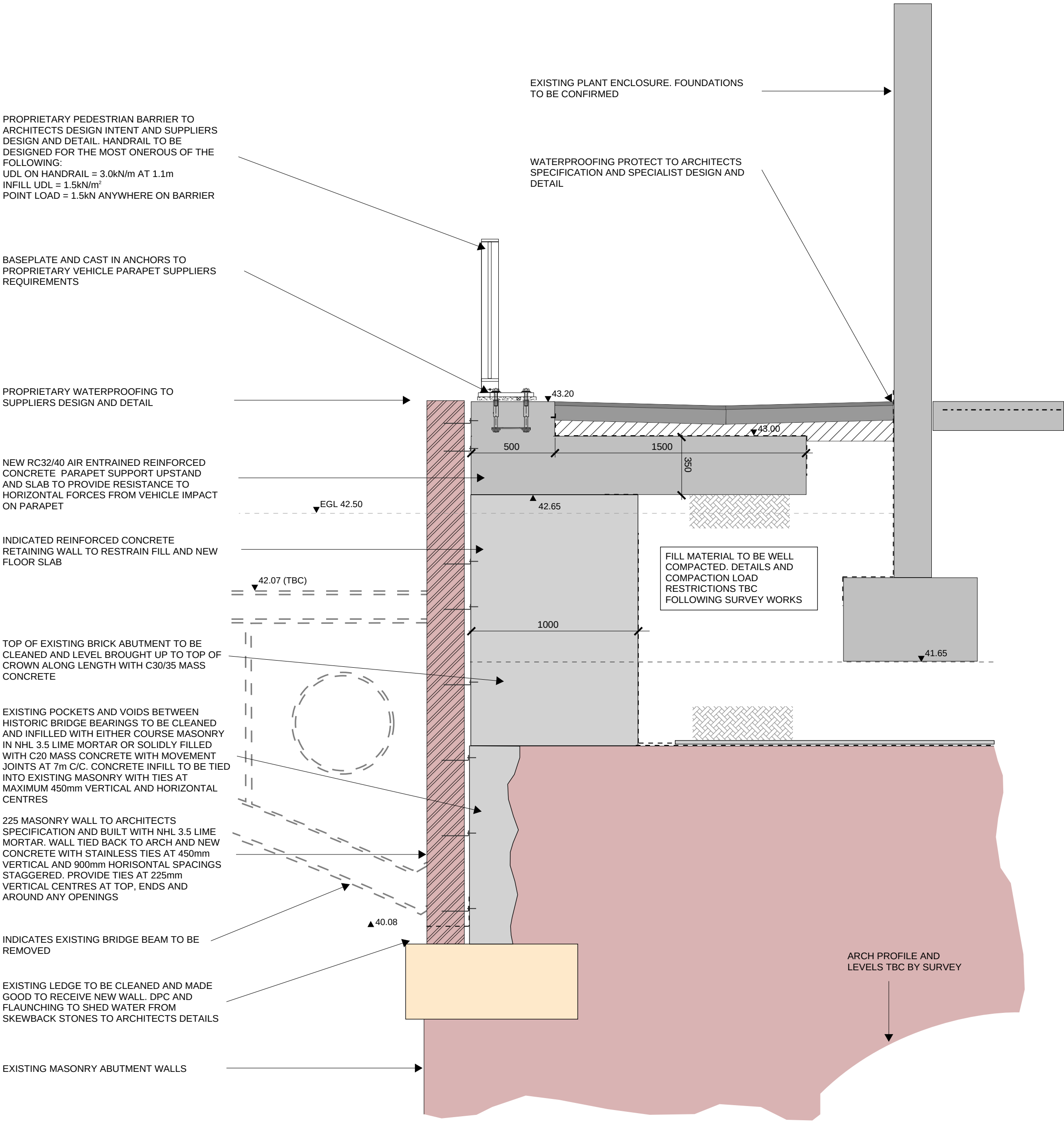
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- NOTES:
- REFER TO DRAWING VIA-REN-0-XX-DR-S-00010 FOR GENERAL NOTES.



DETAIL 112
1:20



DETAIL 113
1:20

DETAILS - SURVEYS
ALL DETAILS ARE INDICATIVE ONLY TO ALLOW FOR HIGH LEVEL COSTING. THE DETAILS ARE DEPENDANT ON THE FINDINGS FROM THE SURVEY WORKS. THE DETAIL WILL THEREFORE BE CONFIRMED DURING RIBA STAGE 4.

P02	RIBA STAGE 3 FOR COMMENT	29.04.20	RW	KG					
P01	FOR INFORMATION	??.12.19	KG	PC					
Rev:	Description:	Date:	By:	Chkd:					
 Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG									
Project:									
VIADUCT MANCHESTER									
Drawing Title:									
PROPOSED GBS BRIDGE DETAILS - SHEET 3									
Status:									
RIBA STAGE 3									
Size:	A1	Date:	29.04.20	Drawn by:	RW	Designed by:	-	Checked by:	KG
Scale:	1:20 @ A1		Project No:			1910-12			
Project:	Originator:	Volume:	Level:	Type:	Rate:	Category/Number:		Rev:	
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