APPENDIX B

STRUCTURAL STRATEGY DOCUMENT

Parnell Square Cultural Quarter
Central Library

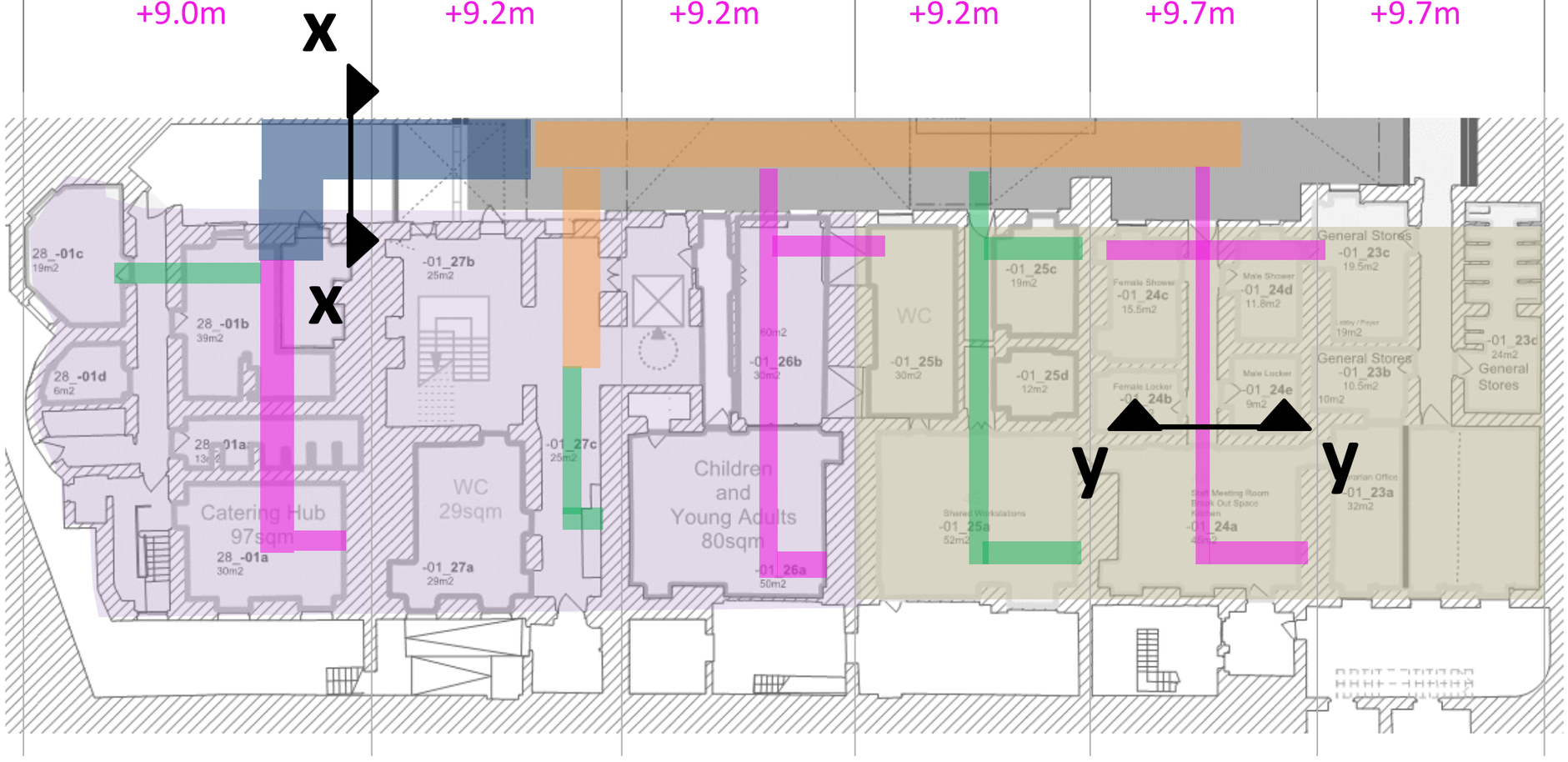
Parnell Square Cultural Quarter
Architectural & Urban Heritage Report

APPENDIX B
STRUCTURAL STRATEGY
Georgian Buildings Structure Planning Strategies

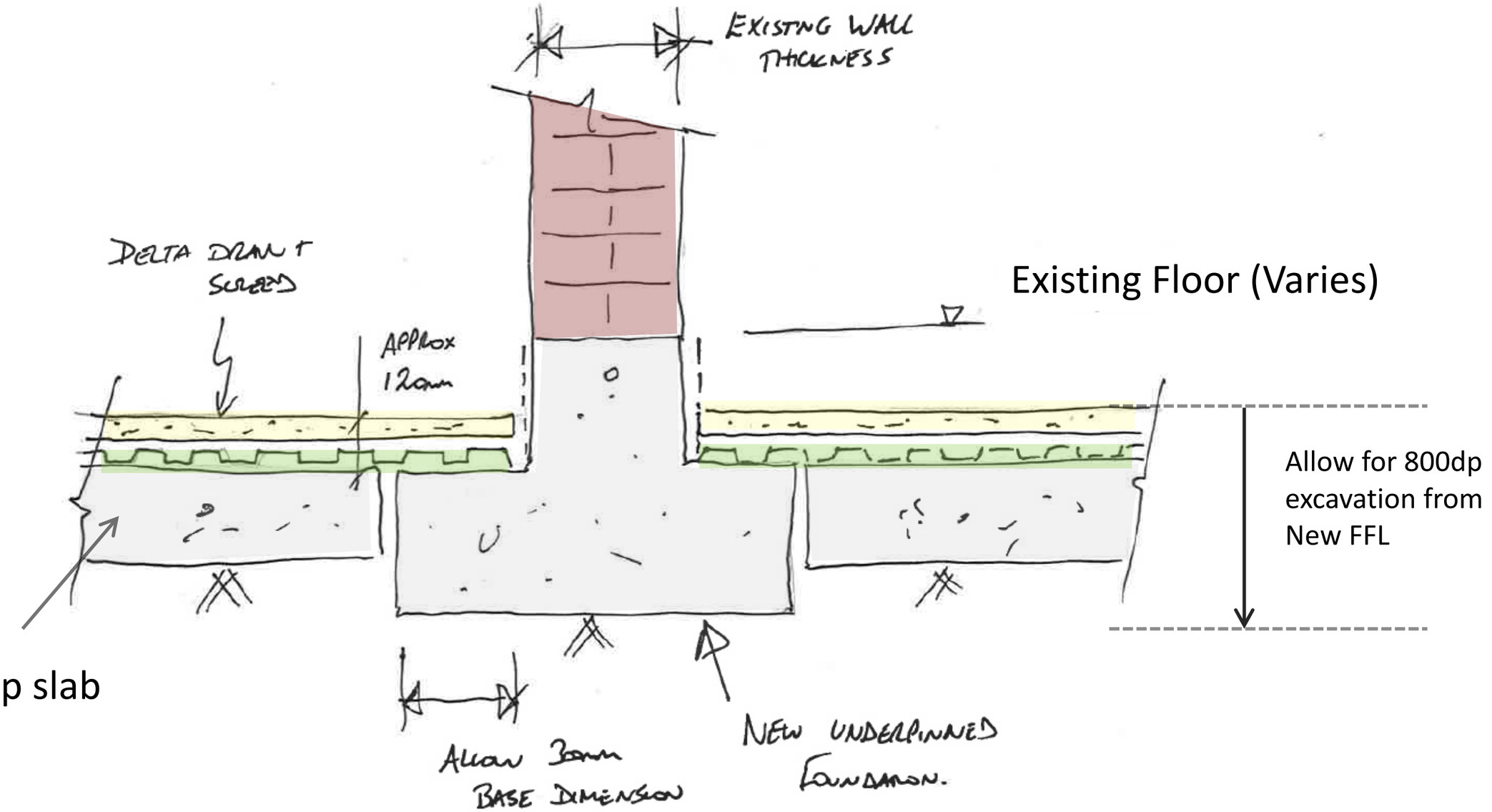
Authors: David Madden, Peter Flynn & Conor Lyons
Date: 13th June 2018
Revision: 5
Updates to Interventions in House 27

Existing Buildings Substructure

House No.	28	27	26	25	24	23
Avg. Existing Levels	+9.7m	+9.8m	+10.1m	+10.4m	+10.45m	+10.5m
Proposed FFL Levels	+9.8m	+10.0m	+10.0m	+10.0m	+10.5m	+10.5m
Base of underpinning	+9.0m	+9.2m	+9.2m	+9.2m	+9.7m	+9.7m



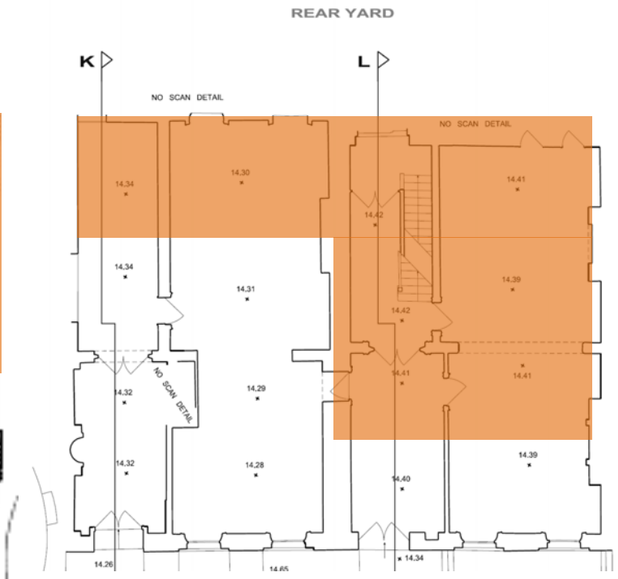
Underpinning of Existing Foundations



Dropping of Basement Floor Levels

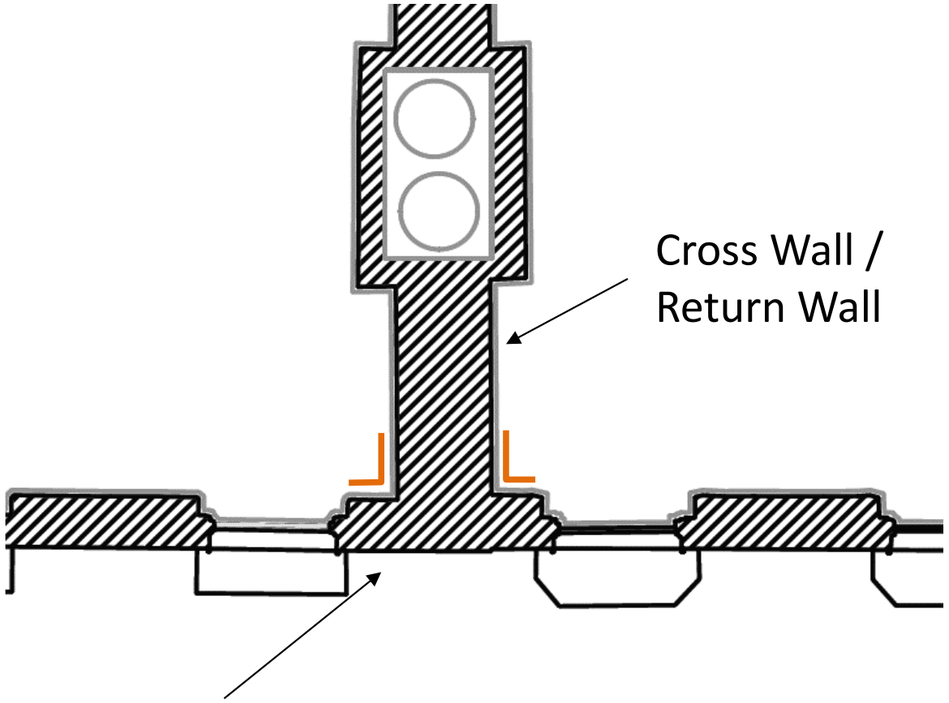
Existing Buildings Walls, Balconies & Lintels

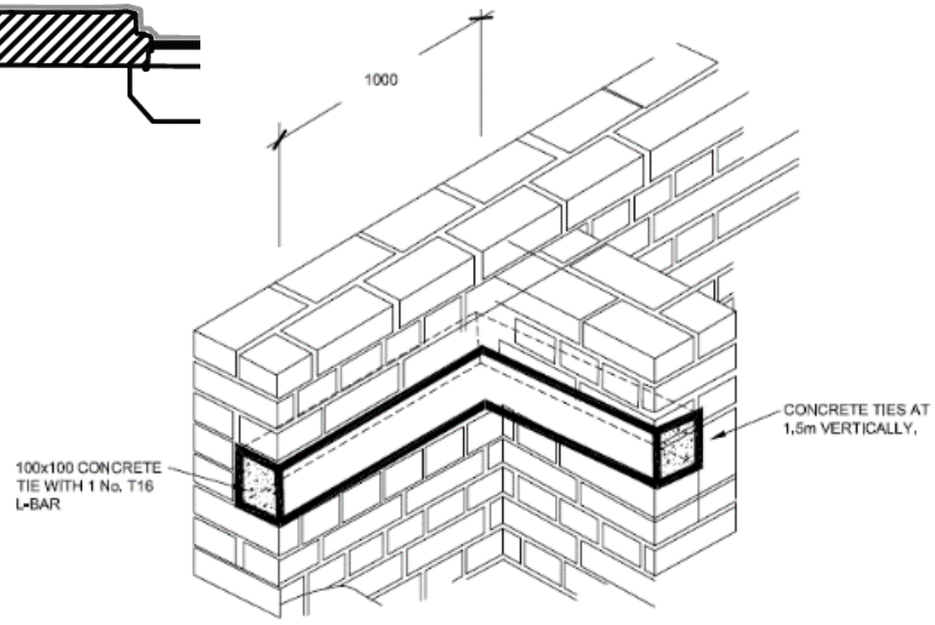
Areas of Recorded Water Ingress / Damage



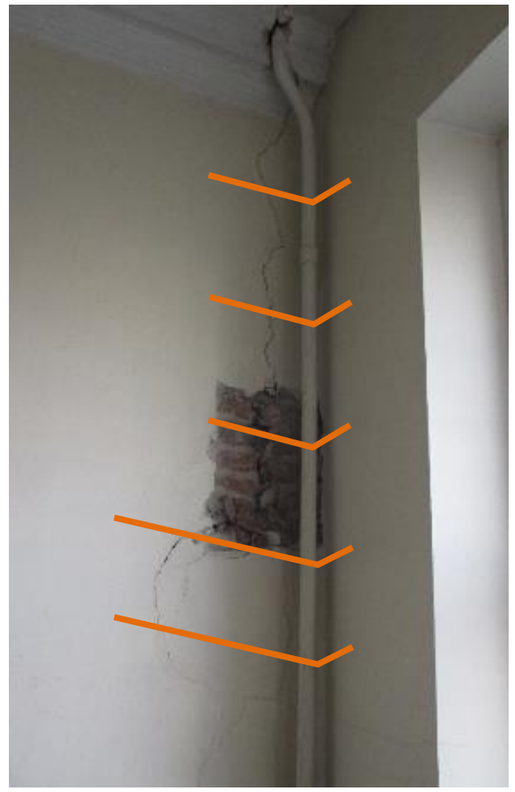
No. 28 No. 27 No. 26 No. 25 No. 24 No. 23 No. 21 No. 20

Areas of Recorded Water Ingress / Damage





CONCRETE 'ELBOW TIES'
CONNECTING FACADE TO THE
CROSS WALL



Strengthening of Walls

Strengthening Strap

Masonry Stitching – All cross wall locations

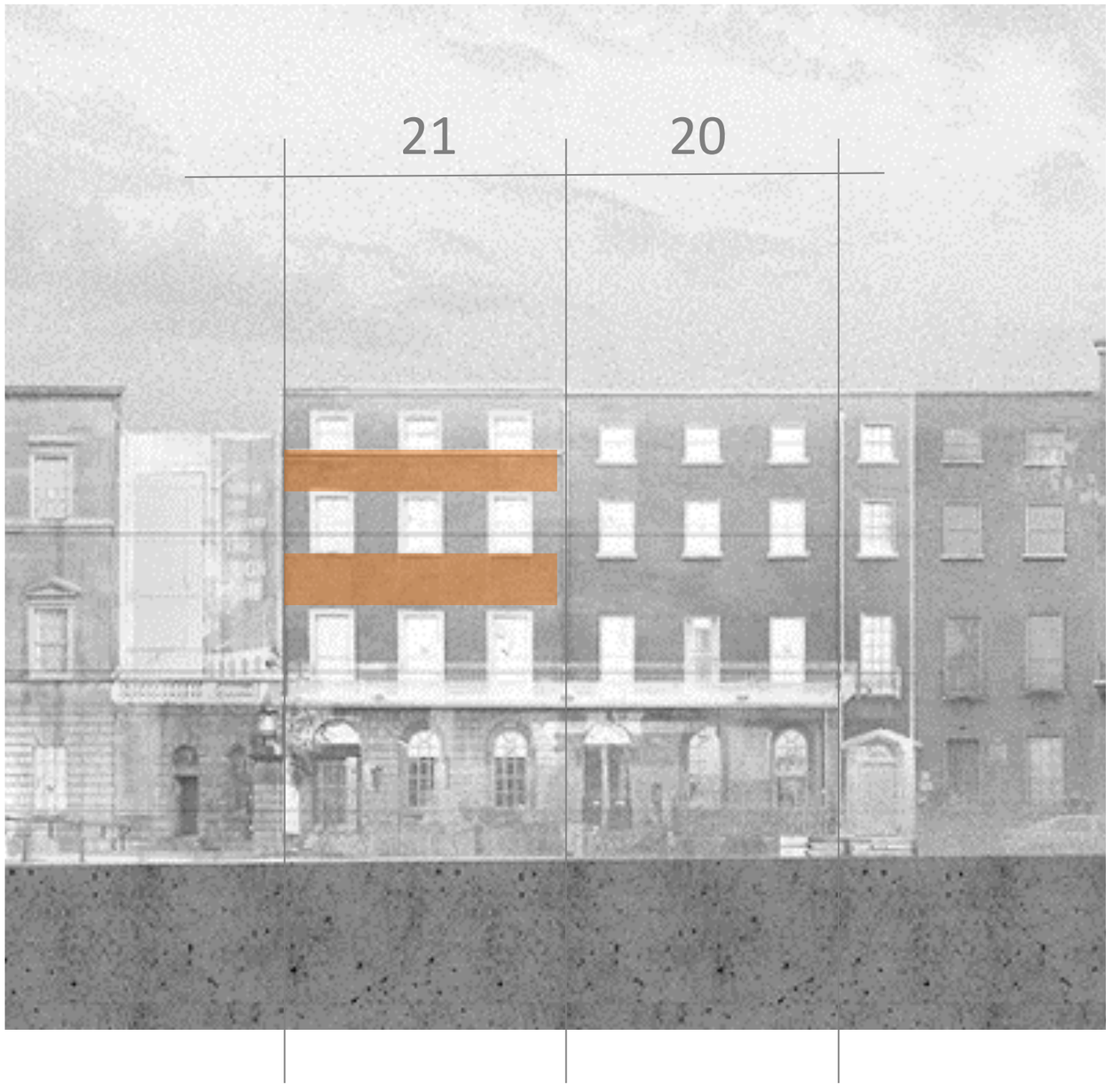
www.specifiedby.com

Helibar Installation

MASONRY STITCHING – FRONT NO. 23-28

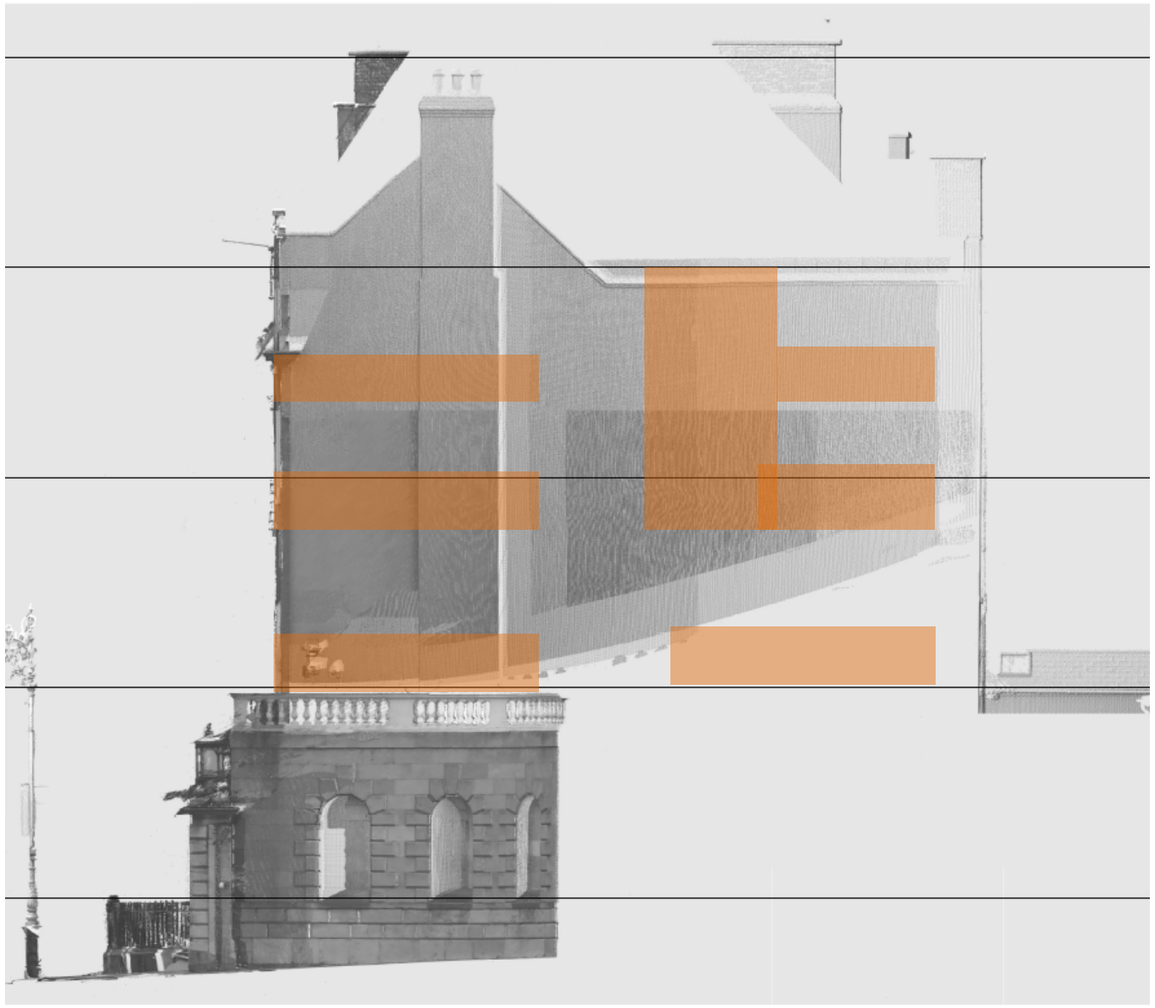
MASONRY STITCHING – GRANBY ROW

MASONRY STITCHING – REAR NO. 23-28

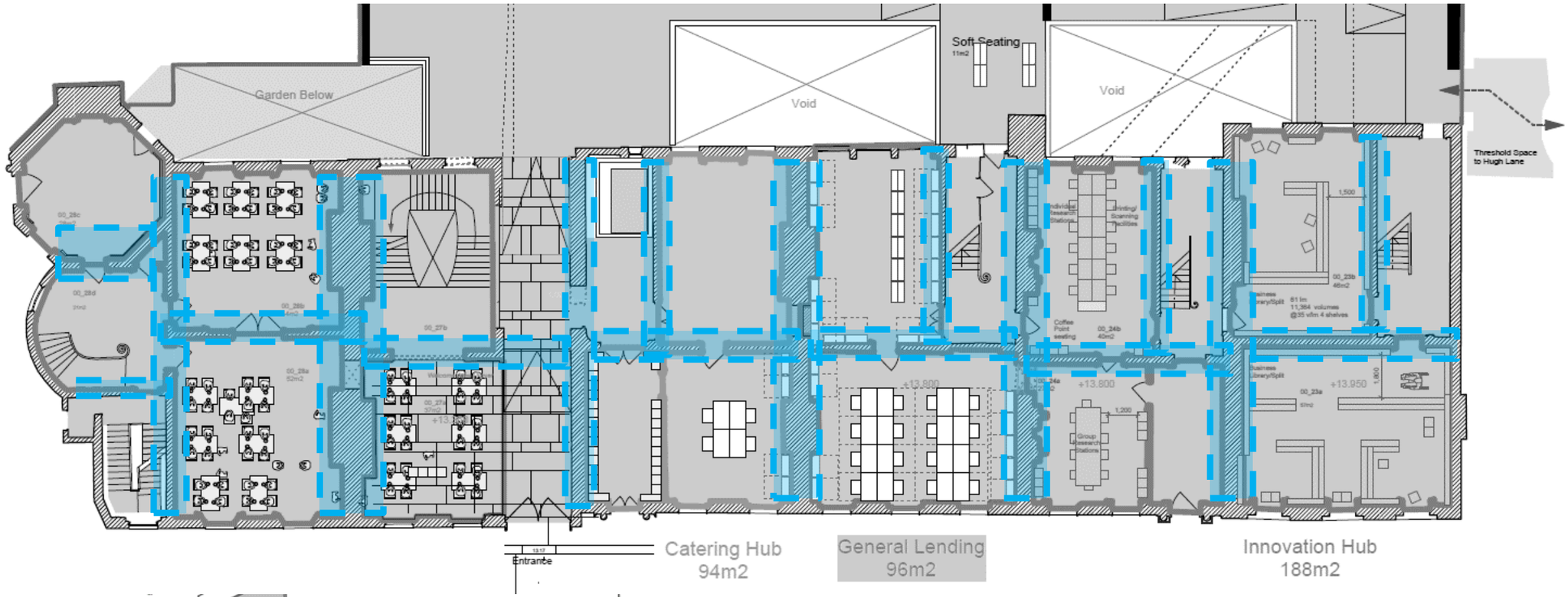


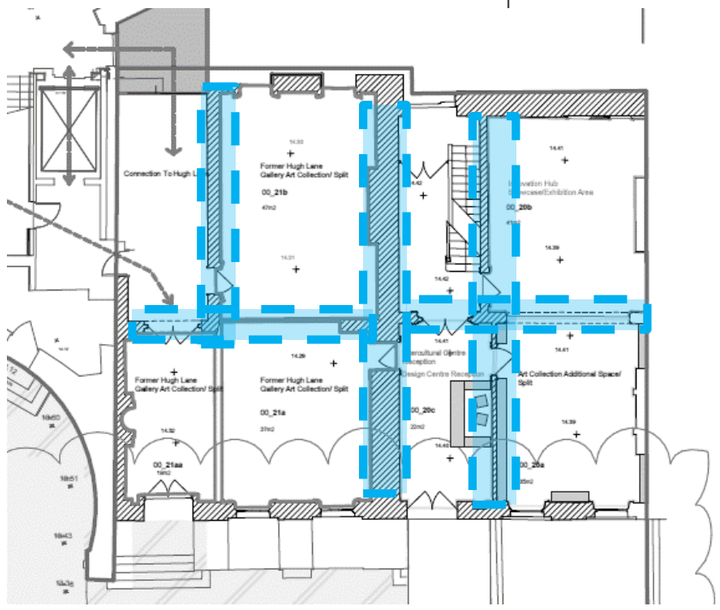
MASONRY STITCHING – FRONT NO. 20-21

MASONRY STITCHING – REAR NO. 20-21



MASONRY STITCHING – GABLE NO 21 / 23



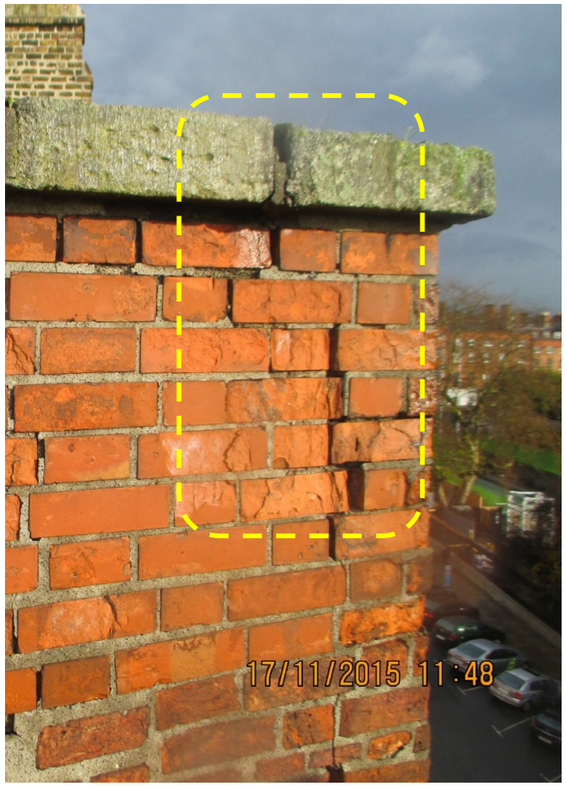


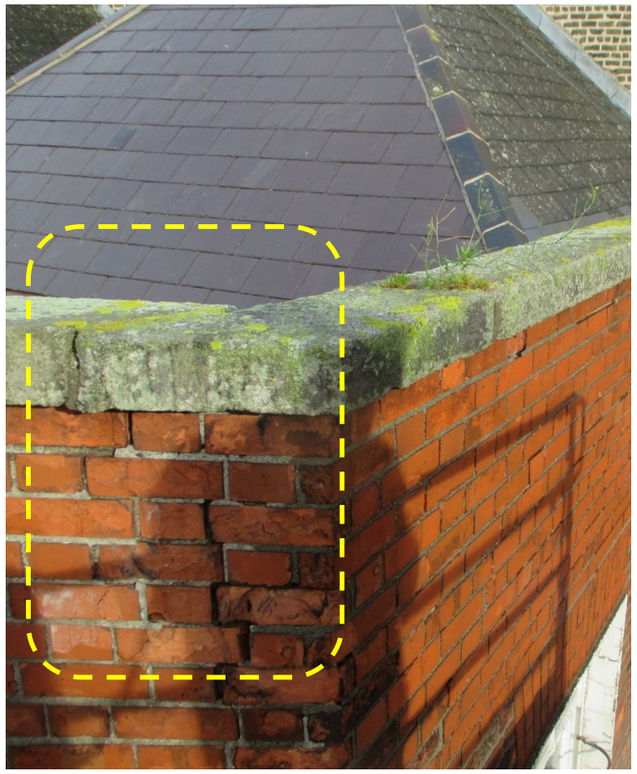
MASONRY STITCHING – INTERNAL WALLS

Chimney No. 24/23

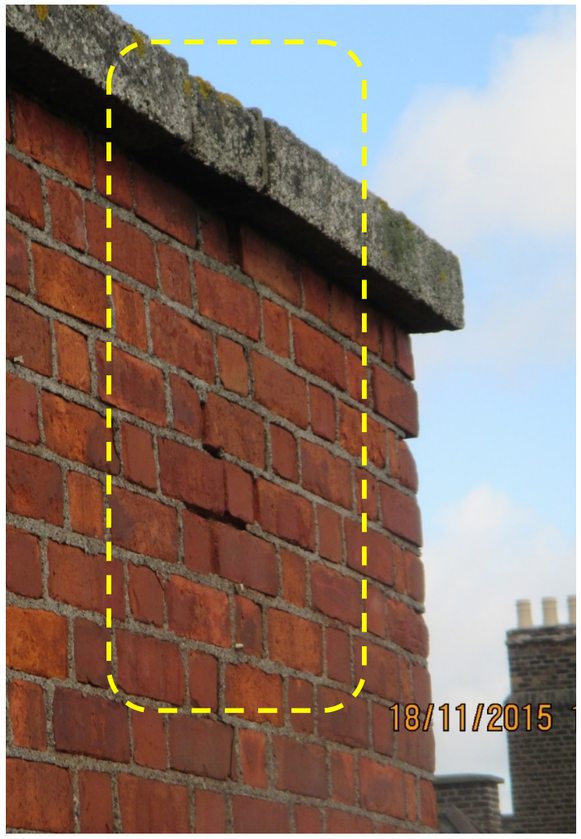
Chimney No. 24/25

CHIMNEYS





Parapets No. 28



Parapets No. 23

Allowance considers parapets to new roof gardens area

PARAPETS

No. 23

No. 23

No. 21

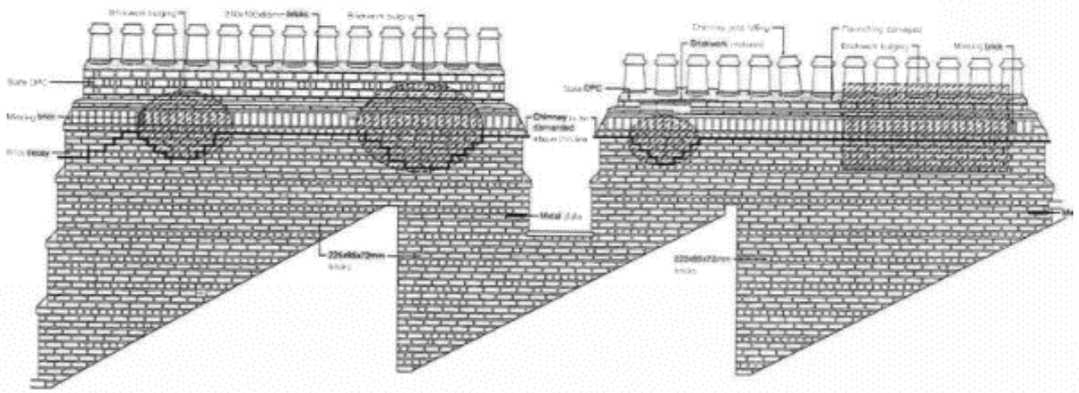
Stone Window Heads No. 21/23

- Hammer Tap test of all brickwork to be undertaken to establish any hollow section of potential spalling material.
- Flat arches to be replaced with galvanised steel plate lintels.
- Brickwork façade to be washed and mechanical nylon brushed.

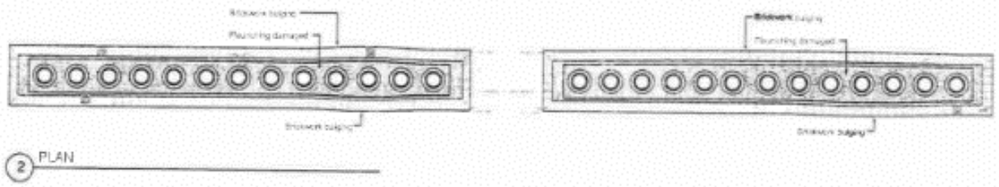
Façade Restoration/Replacement

Images from Georgian Buildings Report ~2012

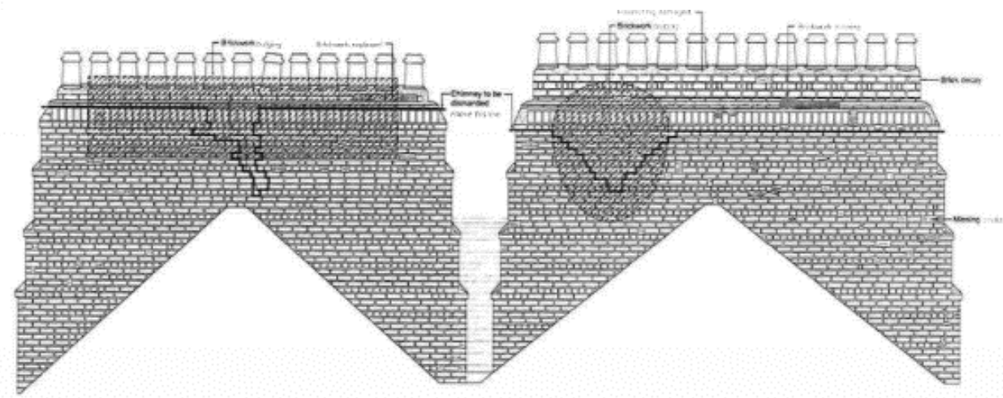
Parapets/Chimneys



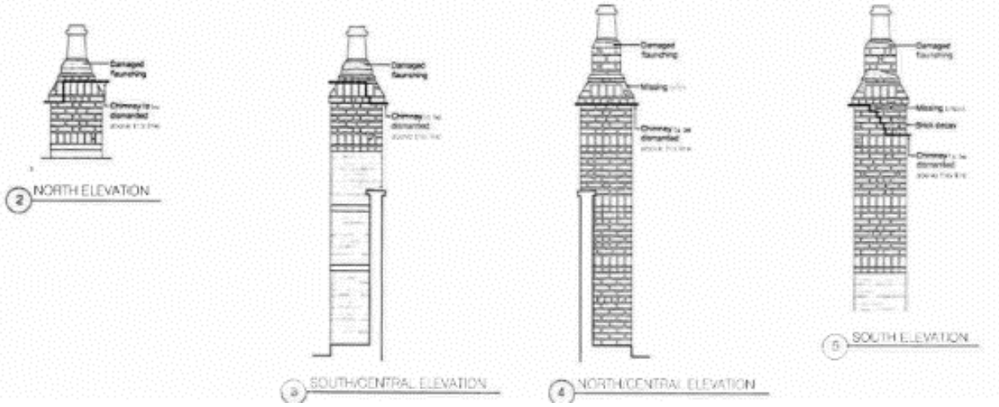
1 EAST ELEVATION



2 PLAN



1 WEST ELEVATION



2 NORTH ELEVATION

3 SOUTH/CENTRAL ELEVATION

4 NORTH/CENTRAL ELEVATION

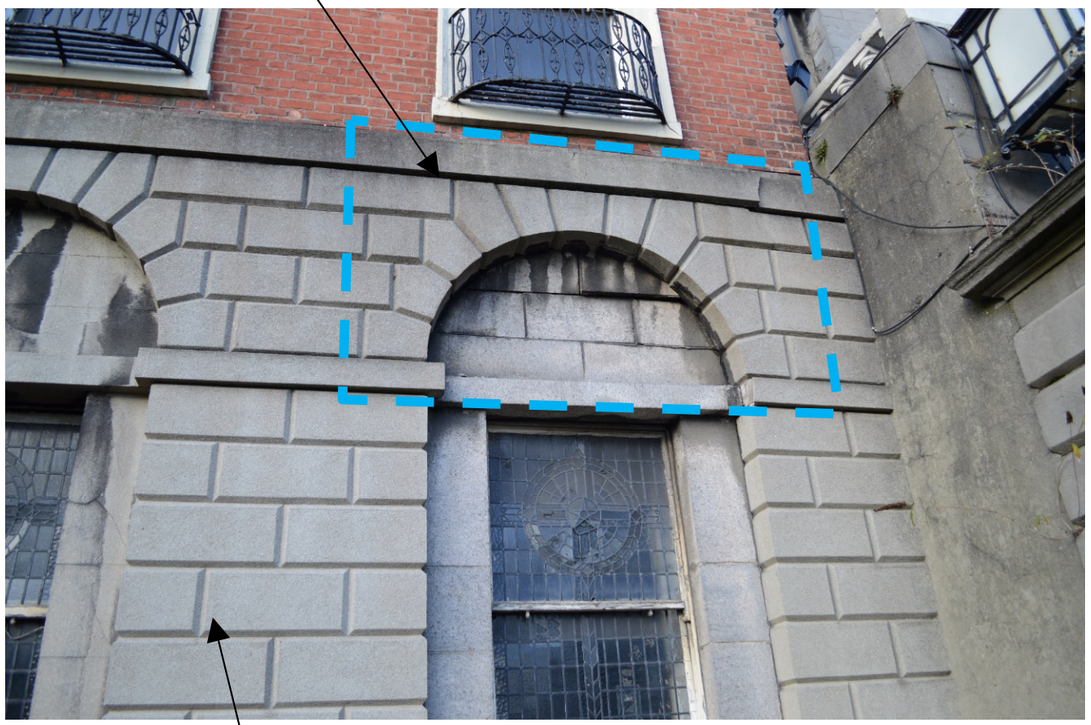
5 SOUTH ELEVATION

Drawings indicating repairs from Georgian Buildings Report ~2012

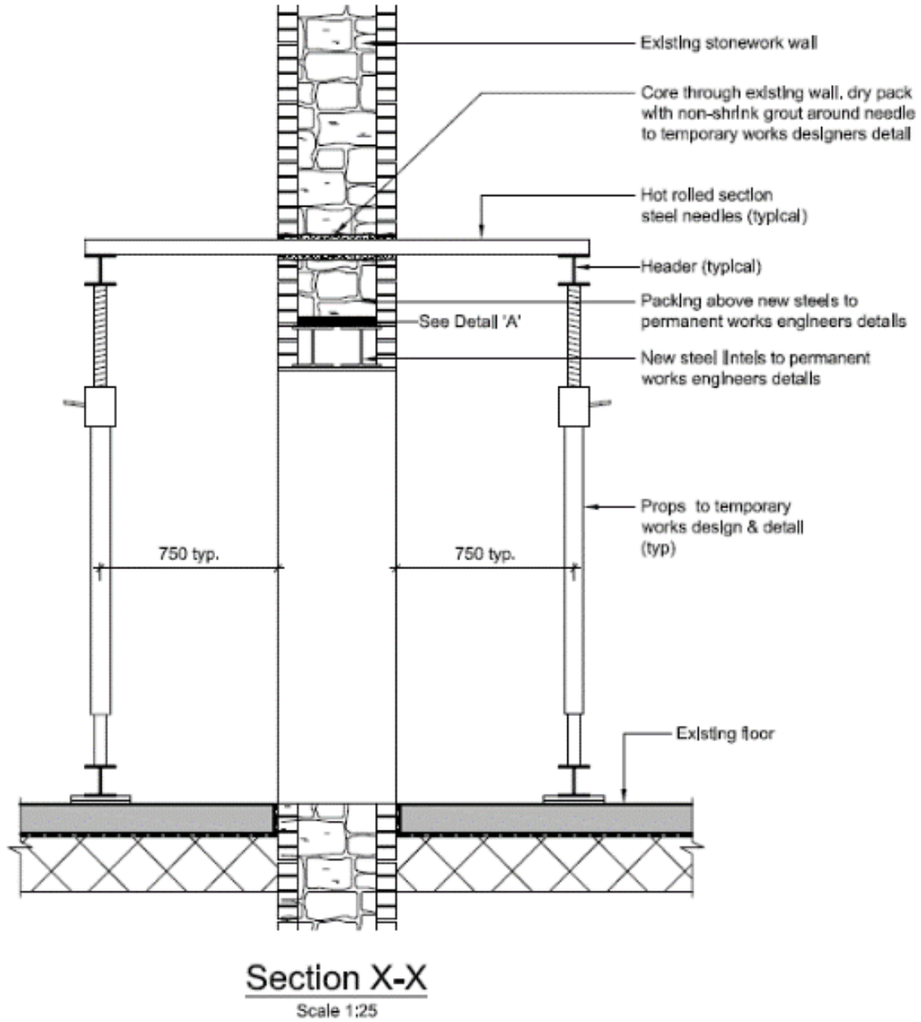
Parapets/Chimneys

Following Investigative Works, distress is suspected to be due to corrosion of steel beam behind façade (steel beam inserted as part of 1930's school works).

Beam to be replaced.



Existing Façade remove cementitious render and repair historic stone which survives under this.



Section X-X
Scale 1:25

Strengthening of No. 23

Hugh Lane

No. 23 Level 0

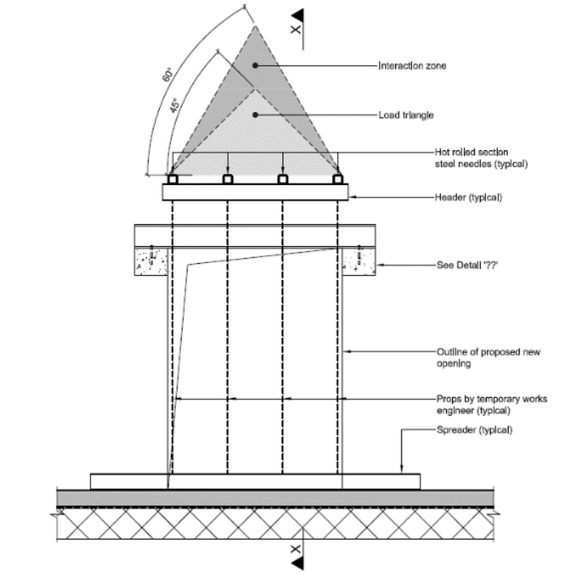
Level 0 to Level -1
Replace cementitious render with lime render

No. 23 Level -1

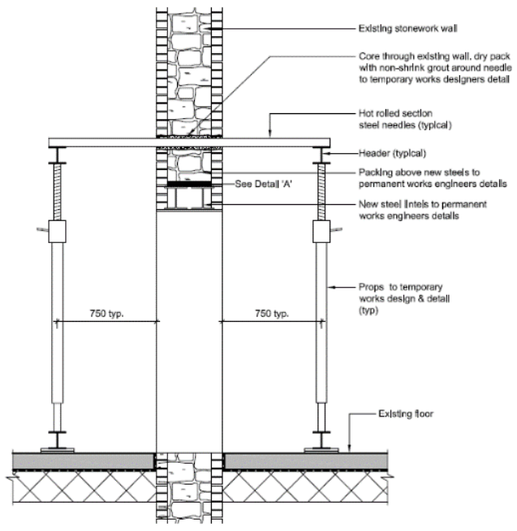
Foundations
Unknown

Parnell Square North

Strengthening of No. 23

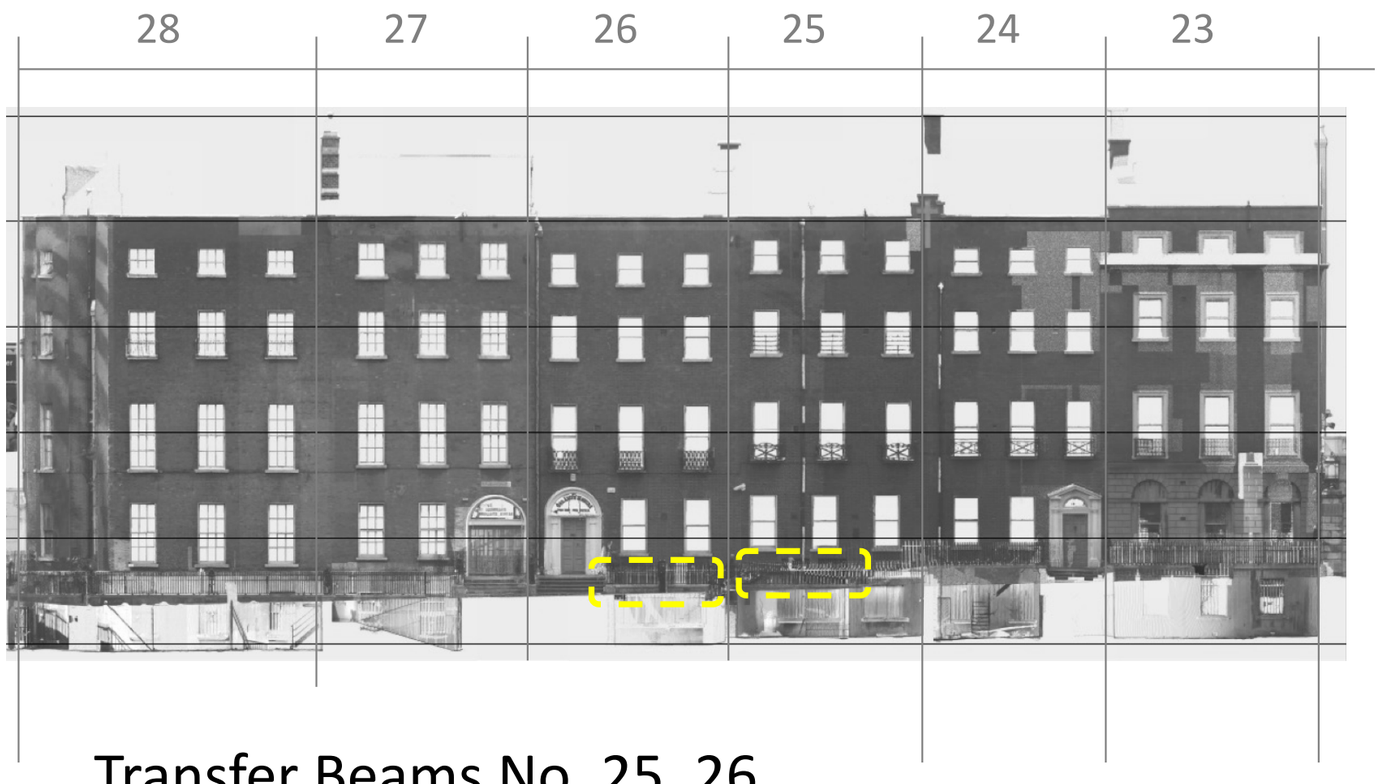


Generic Temporary Works for Installation Proposed New Beams
(all temporary works to temporary works engineer detail)
Scale 1:25



Section X-X
Scale 1:25

- Existing Transfer Beams potentially supporting **4 stories/floors** above.



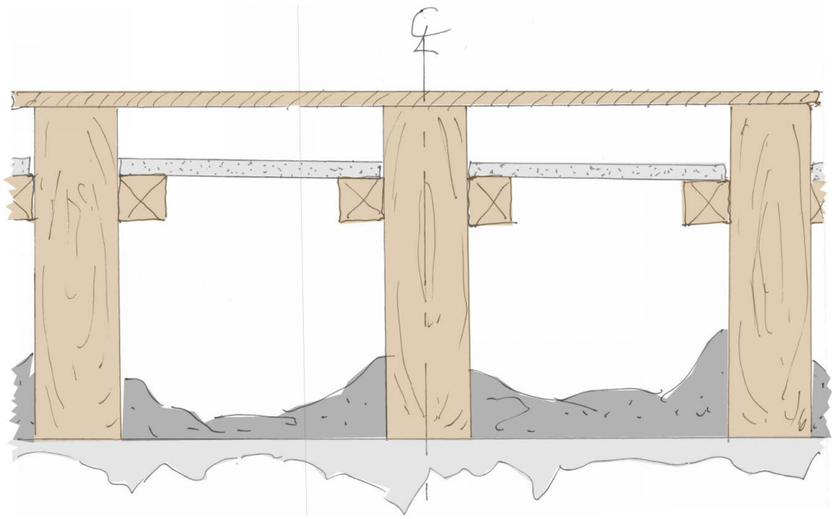
Transfer Beams No. 25, 26

- Replacement of decayed lintels (assume up to 80%**)**

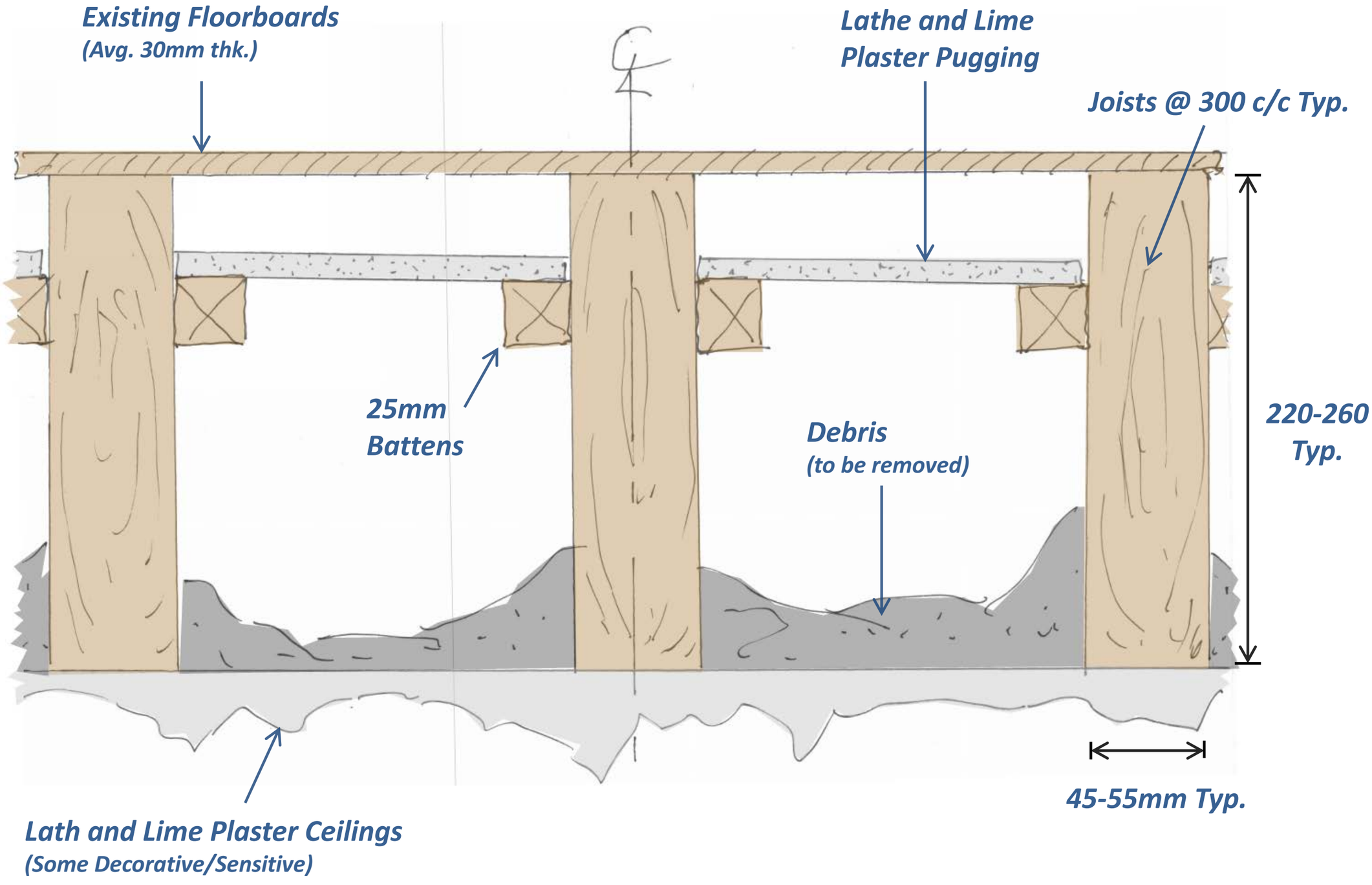
Replacement of Lintels

Timber Floor Strengthening Strategy

- Joists are typically at **300mm centres**
- Joists **vary in depth and width** – Typically **220-260**mm in depth, **45-55**mm in width
- Surveyed **deflections** in centre of rooms is **large** in some instances (50mm +)
- Areas of **rot** have been noted at **bearing** ends of joists near stairs in No. 23, 24 and 28
- These areas will require **repairs** to ends of timbers, and in some cases **replacement**
- **Generally**, joists are in **sound** condition and bearing conditions are good (>100mm)
- Joists typically have lathe and lime pugging (see section)
- **Floorboards** vary in depth (typically 25mm – 40mm)
- **Strength Grading** given to timbers is **C24**

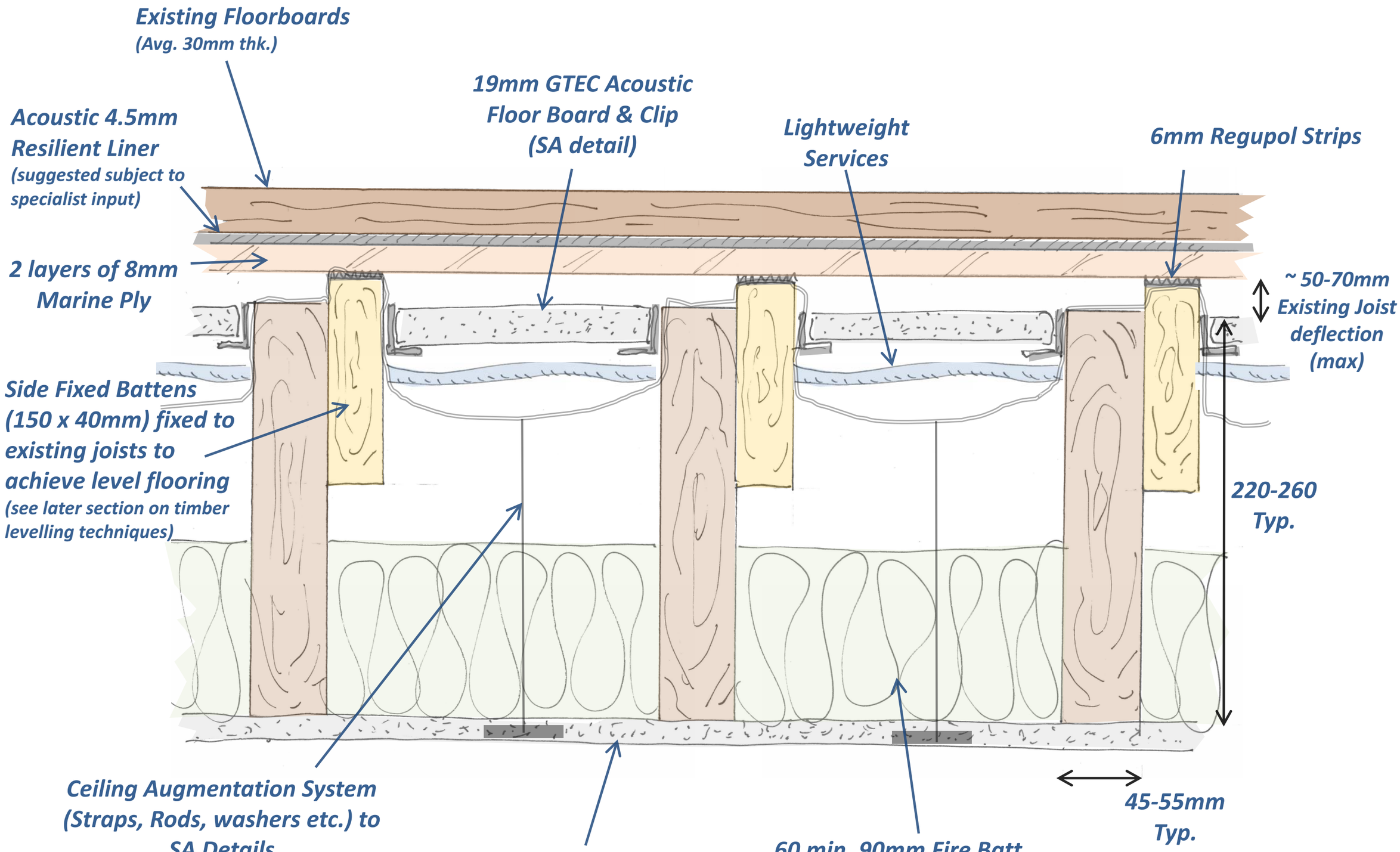


What we now know about the timber floors



Existing Typical Floor Build Up

Proposed Floor Build Up



Proposed Build Up

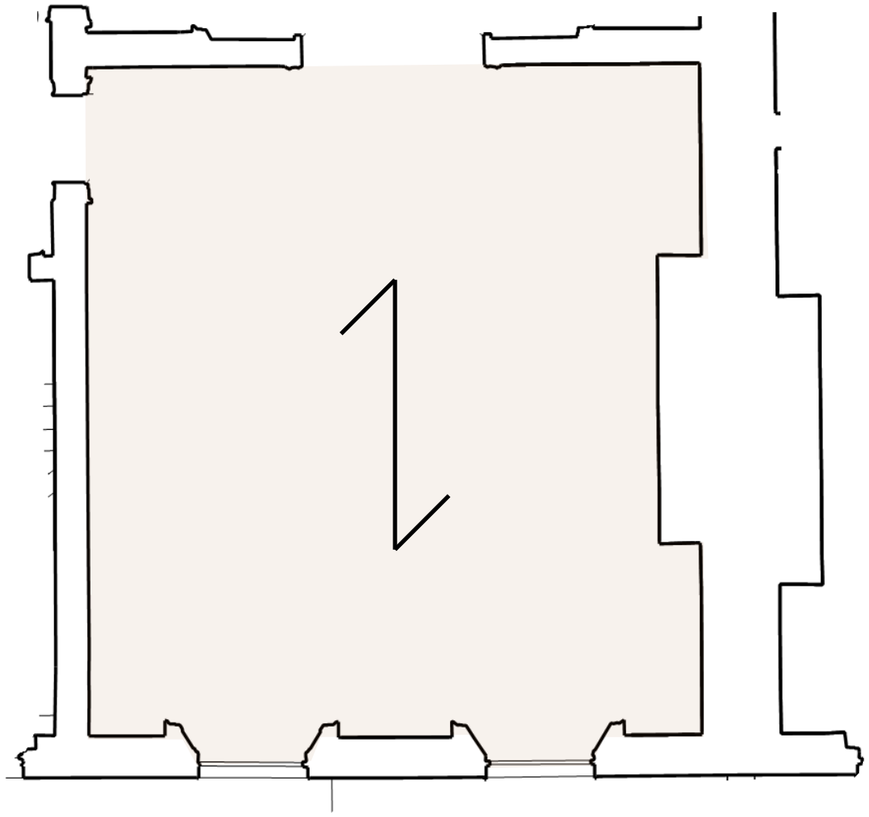
Timber Floor Strengthening Measures

Typical Floor Strengthening measures used in majority of rooms

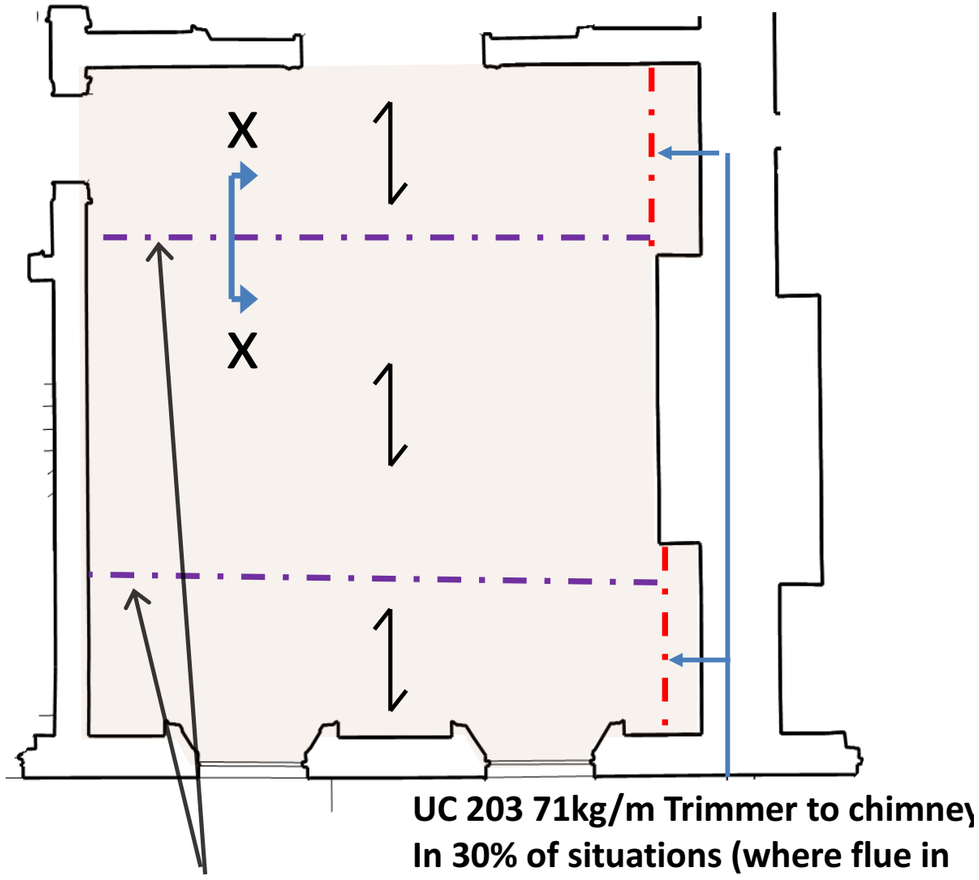
Timber Floor Strengthening Measures

Typical Floor Strengthening measures used in majority of rooms

Existing Floor



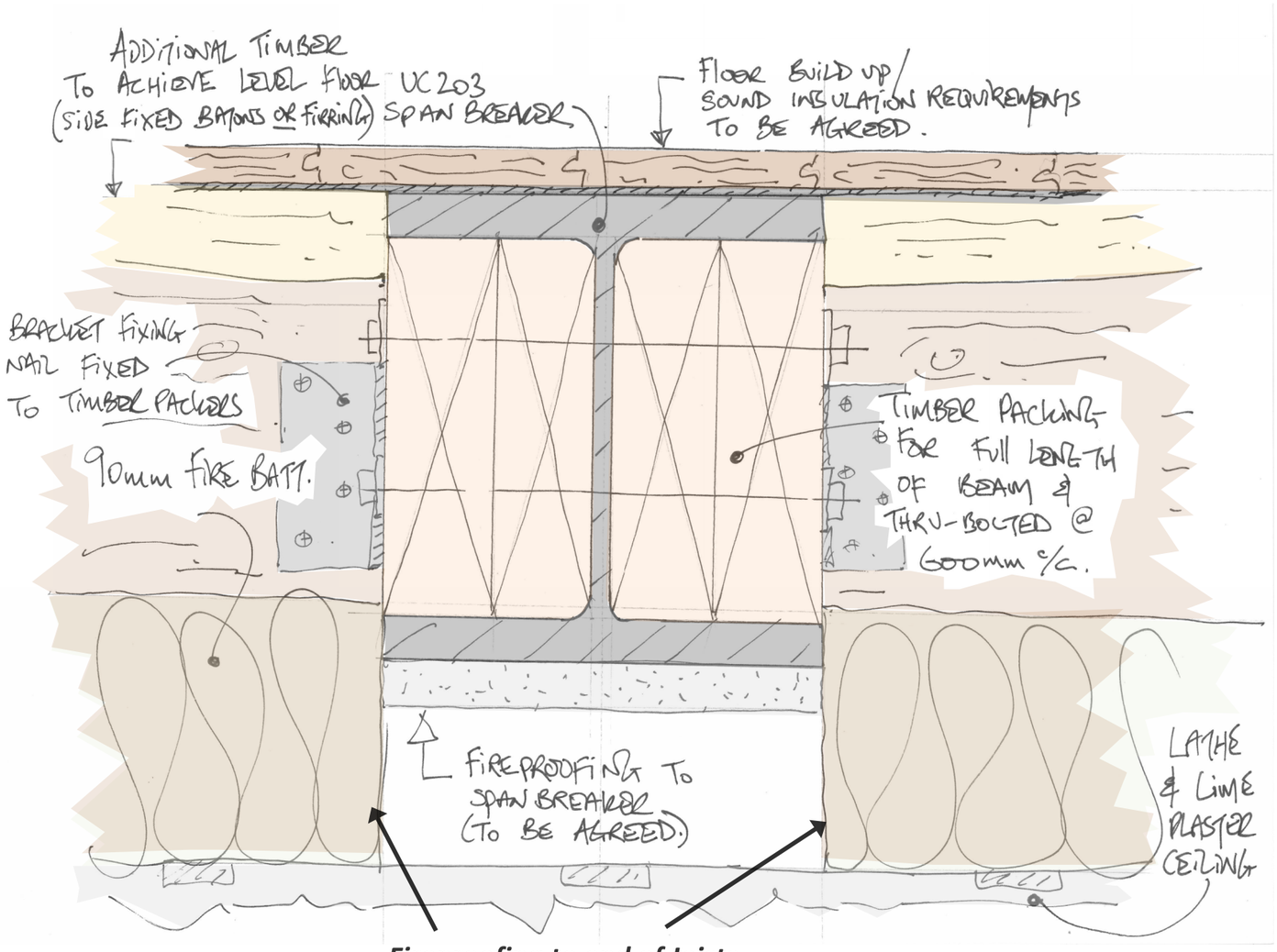
Strengthened Floor



UC 203 71kg/m Trimmer to chimney In 30% of situations (where flue in wall)

UC 203 Span Breakers to span width of room and pick up joists
(see following pages for sizes/weights and connection details)

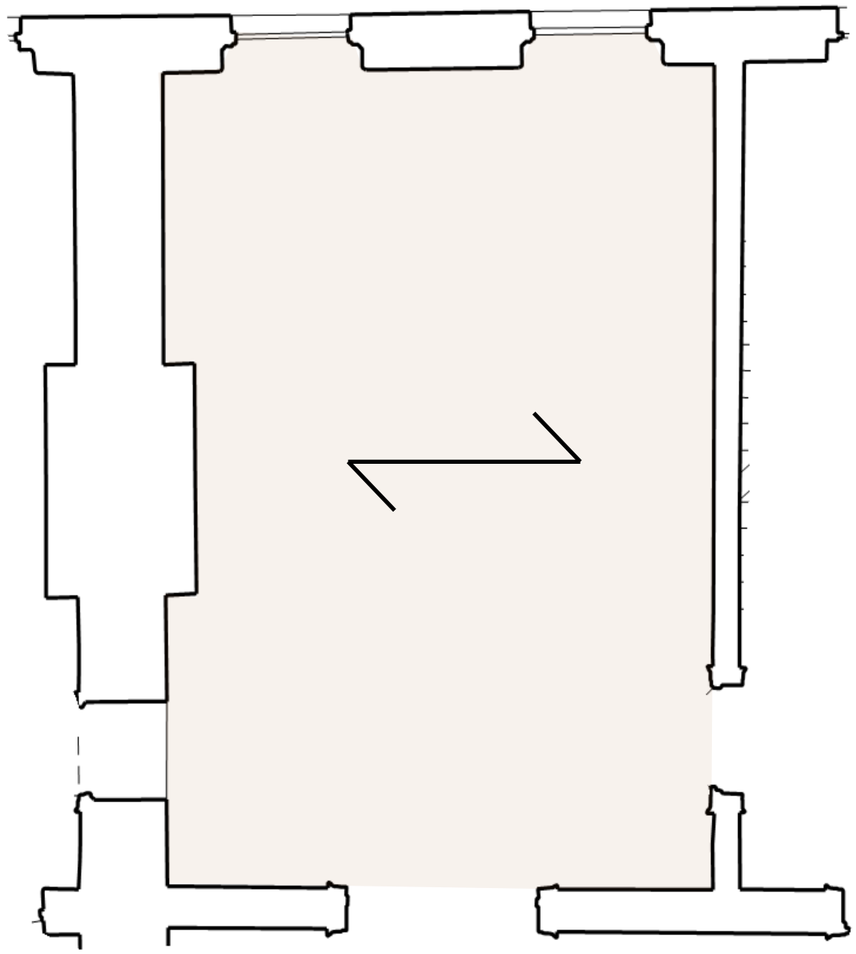
Strengthening Type 1 – Normal Spanbreakers

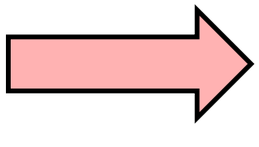


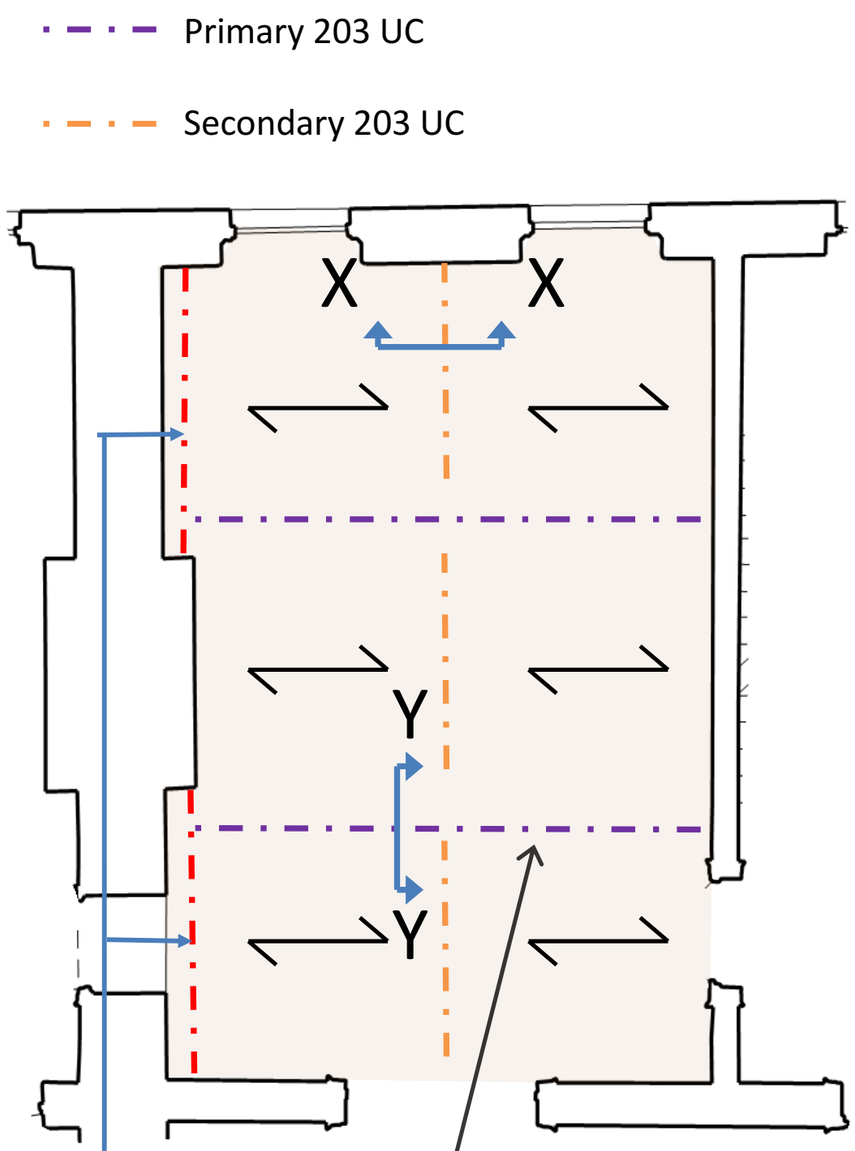
Fireproofing to end of Joists

Section X-X

Strengthening Type 1: Section X-X



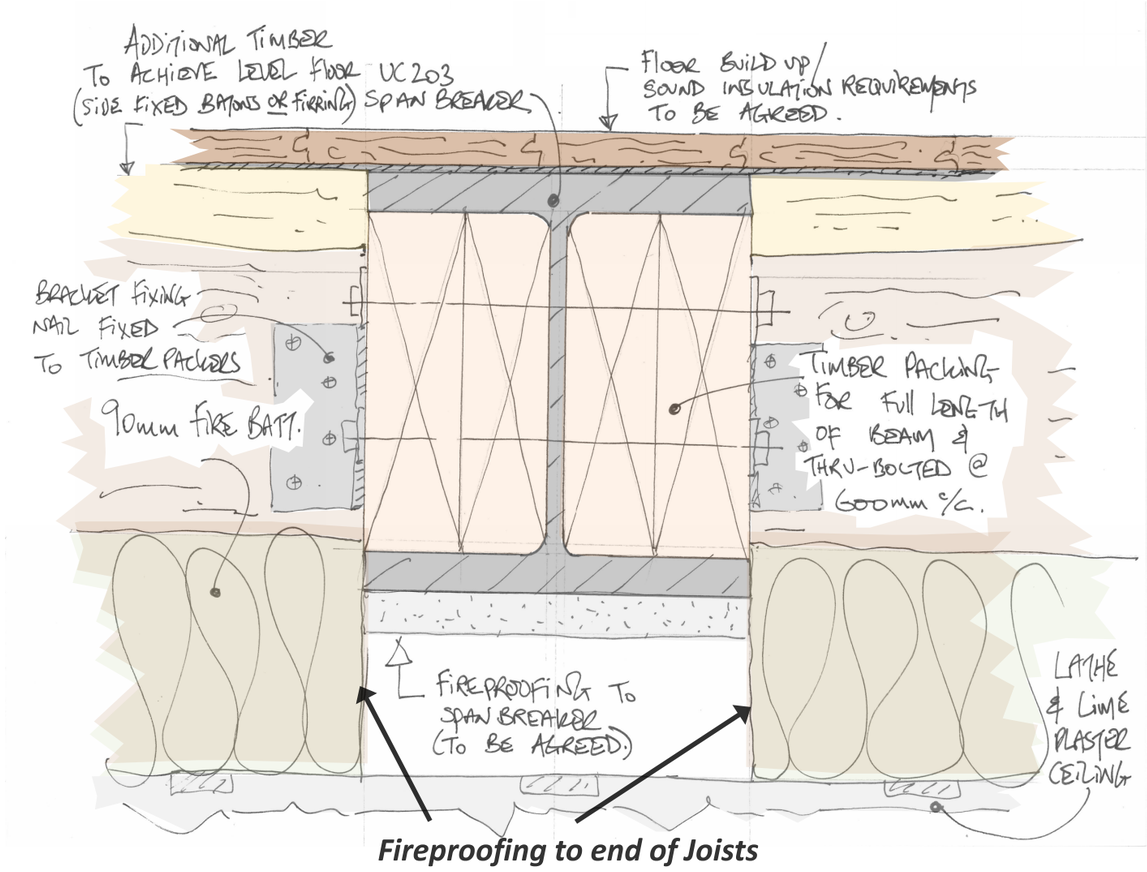




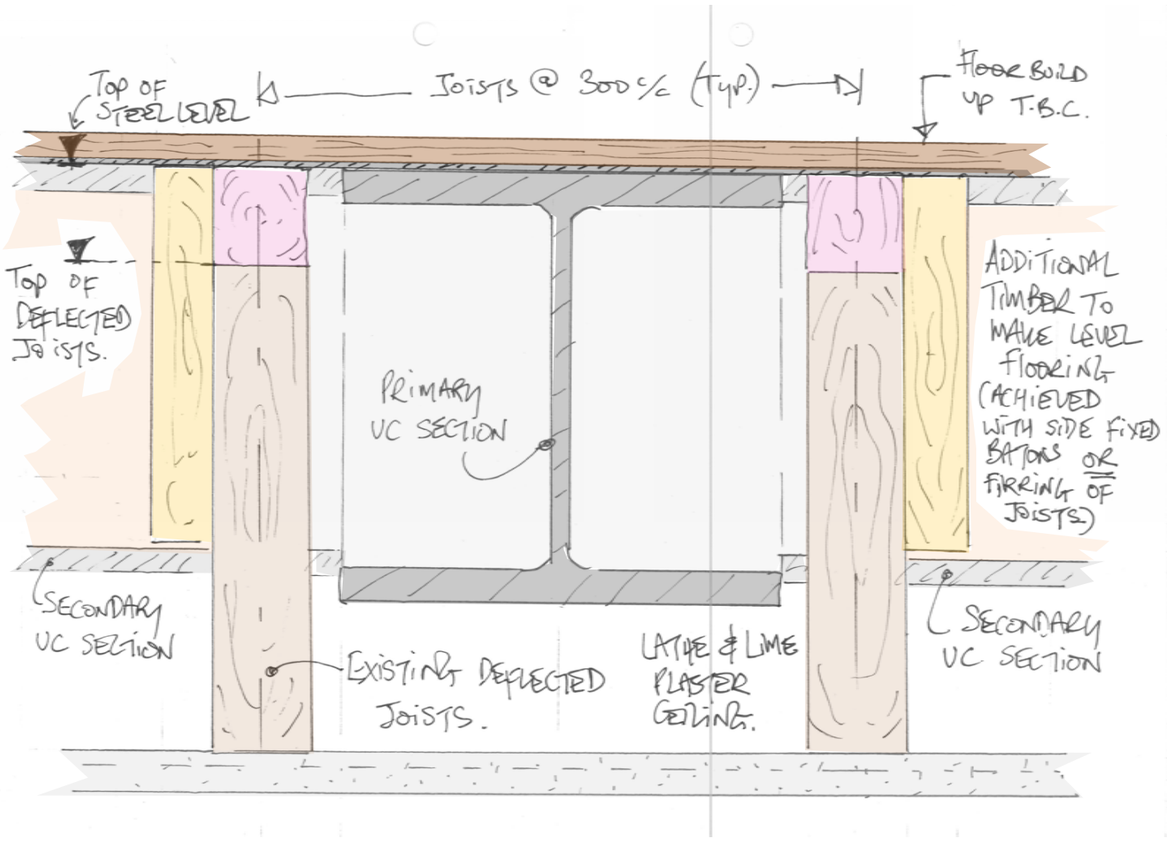
UC 203 71kg/m Trimmer to chimney In 30% of situations (where flue in wall)

UC 203 Primary Beams to Span short dimension of room and pick up secondary UC 203 beams which span between primary members and support the timber joists.
(see next page for connection details)

Strengthening Type 2 – Grillage spanbreaker



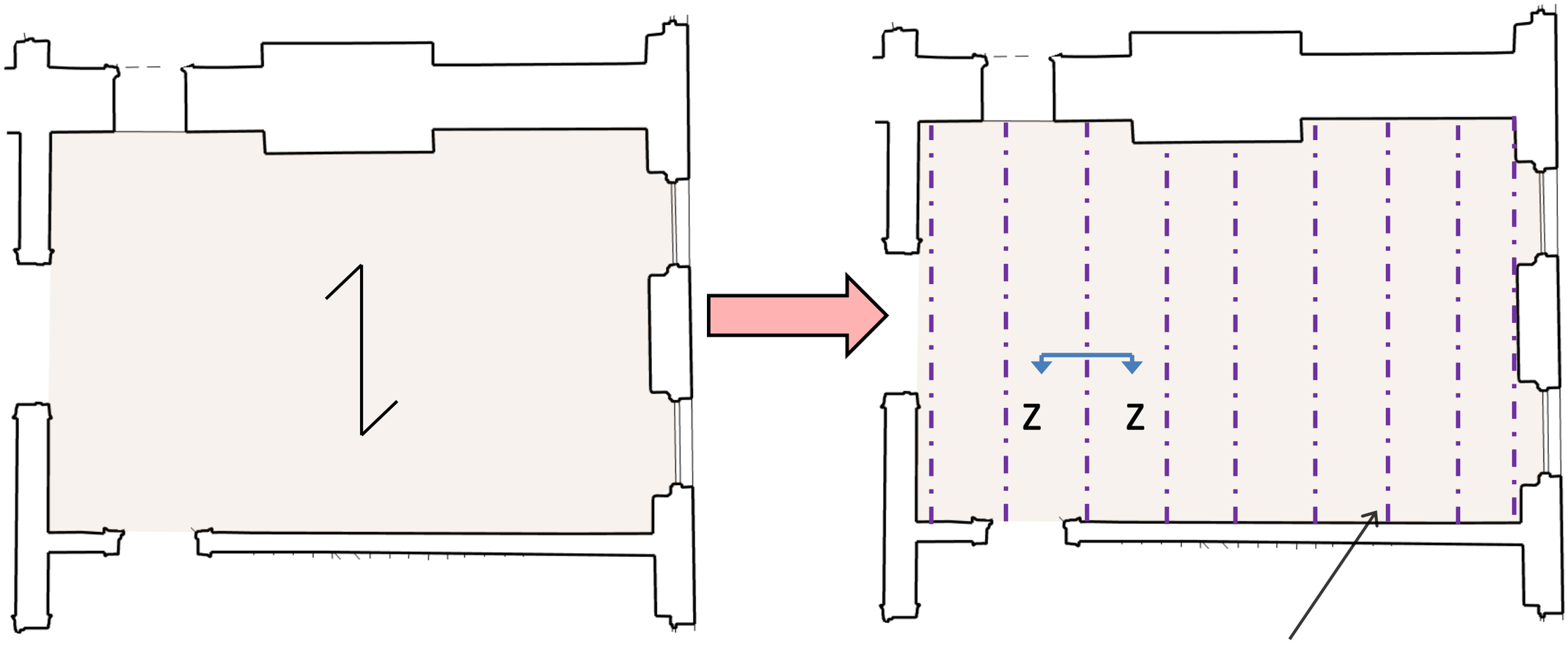
Section X-X



*Section Y-Y**

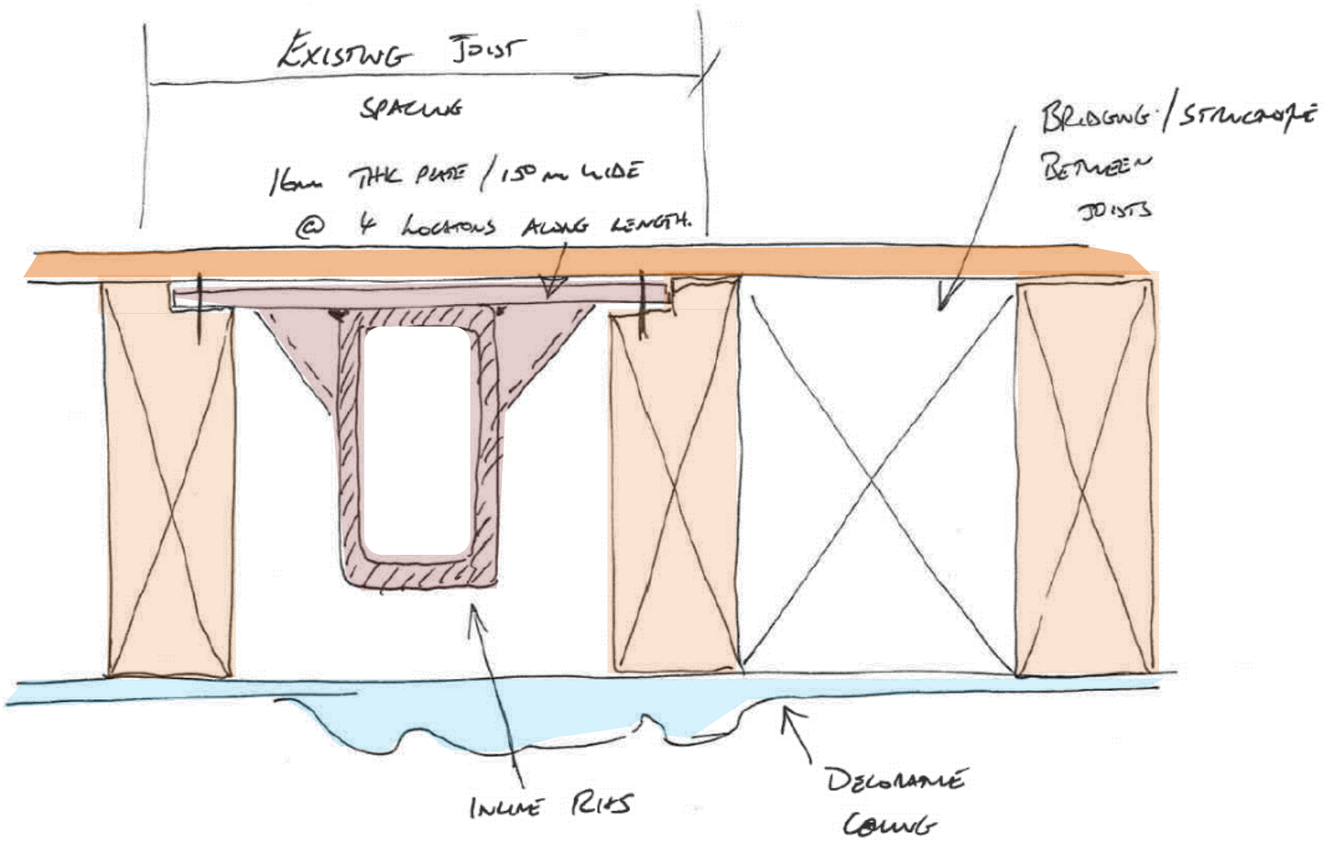
**** Note:***
Insulation and Fireproofing omitted for clarity

Strengthening Type 2: Section Y-Y / Section Z-Z



In Line Beams to run parallel with joists at 600 centres.
(see next page for connection details)

Strengthening Type 3: In-line Strengthening



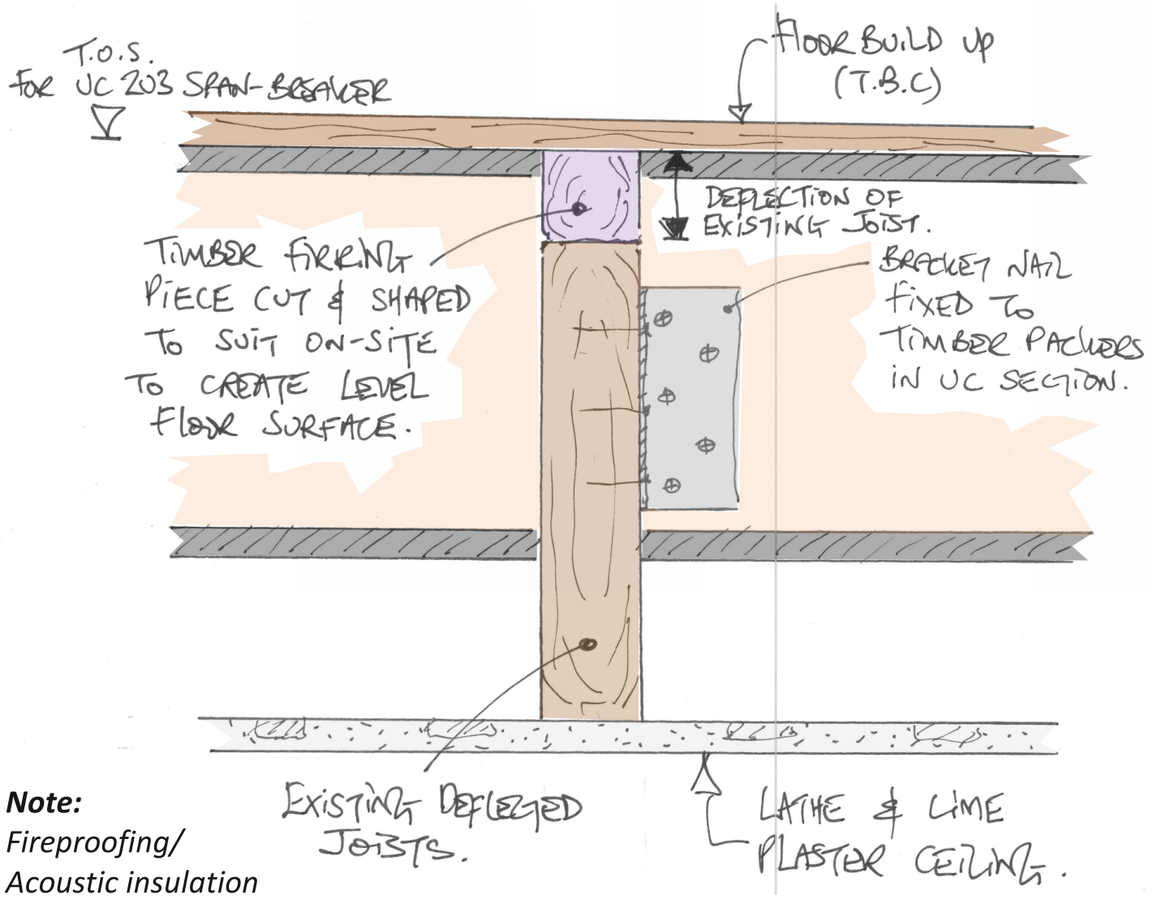
Example of In Line Strengthening

Splice Detail

Strengthening Type 3: Section Z-Z

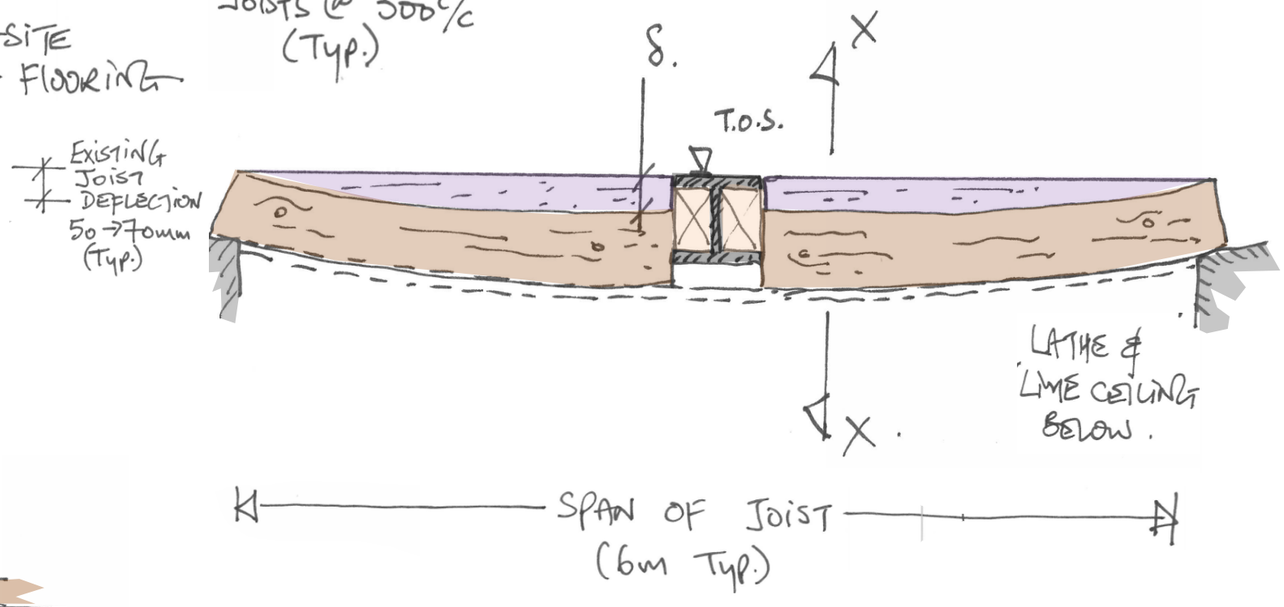
Floor Levelling Options

Methods required to achieve level flooring due to existing deflection in joists

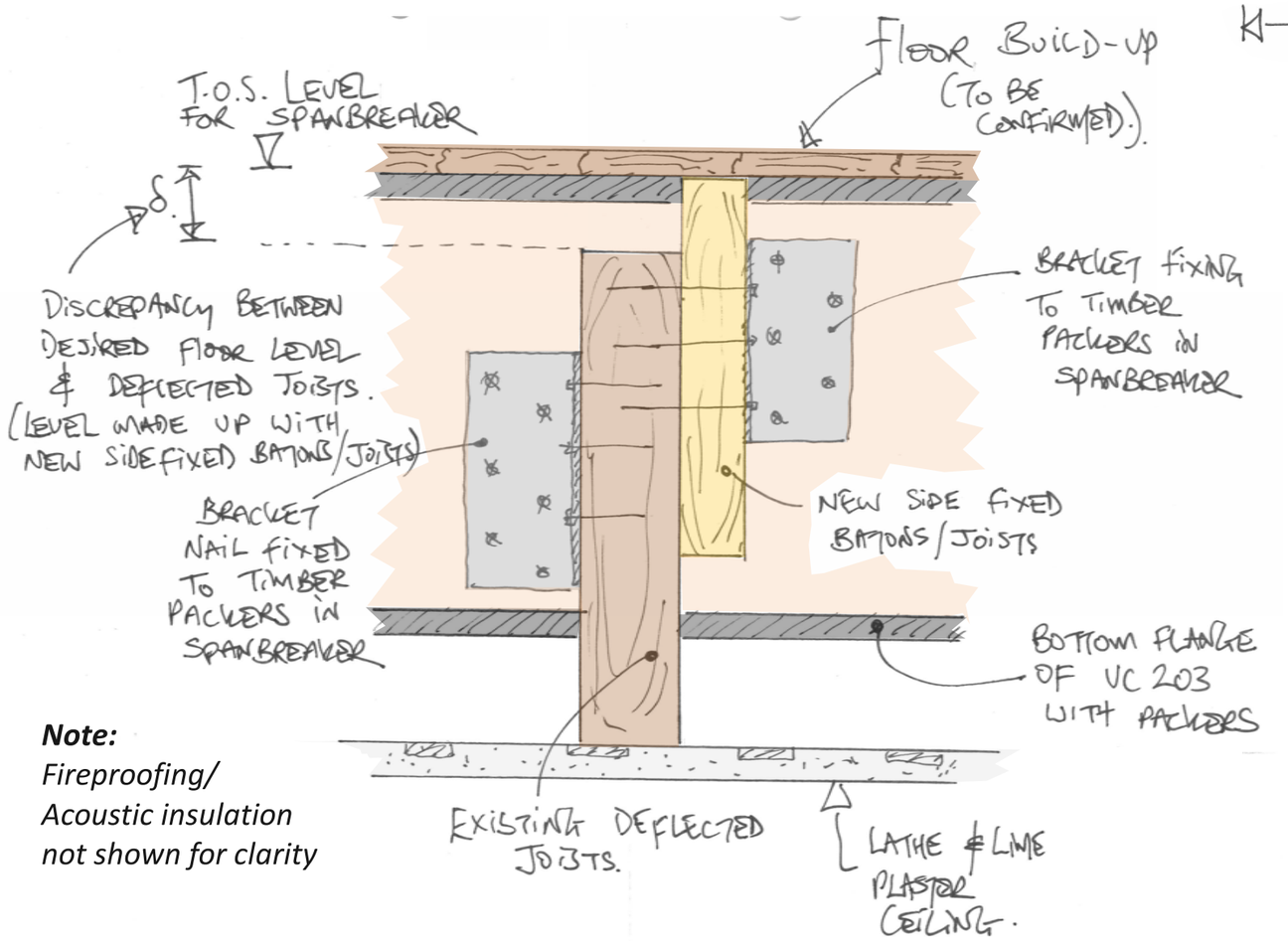


Note:
Fireproofing/
Acoustic insulation
not shown for clarity

<u>*Section X-X*</u>

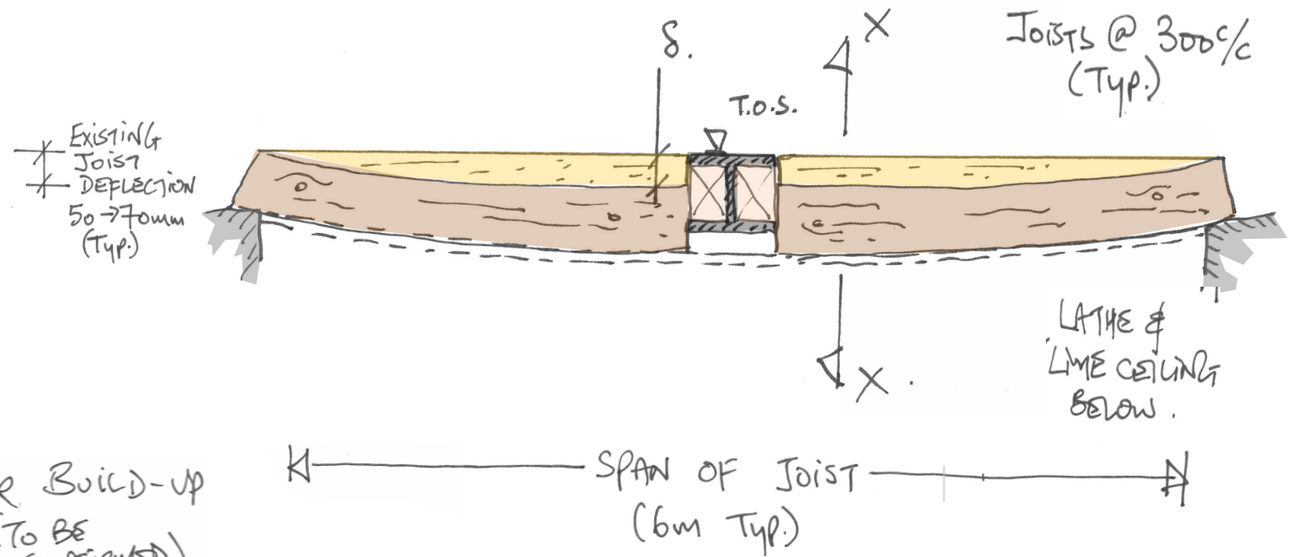


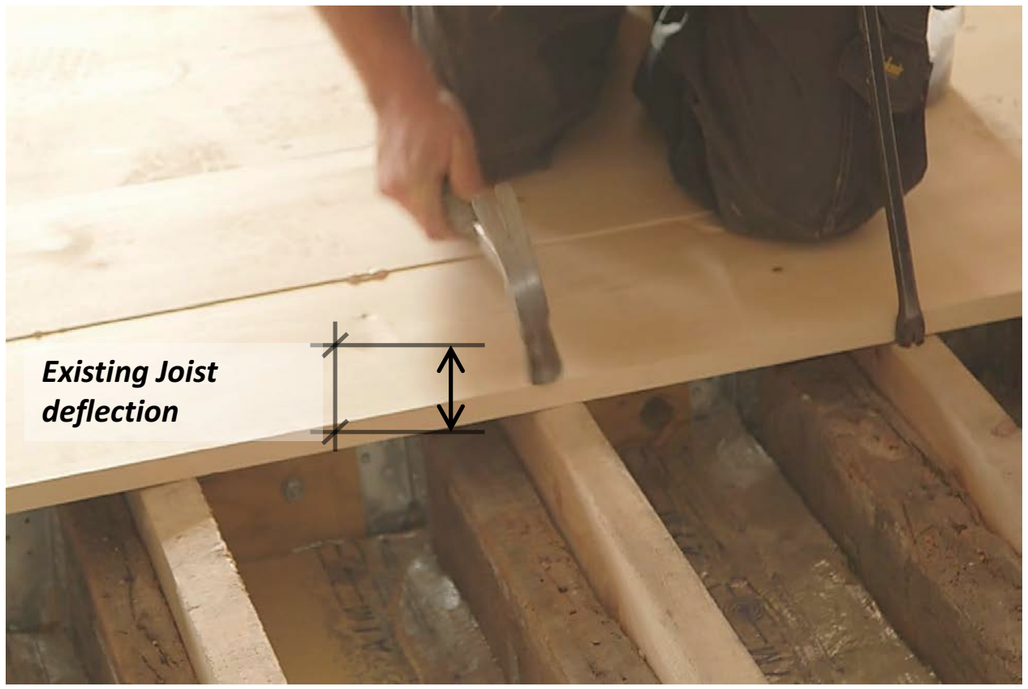
Floor Levelling – Firring Joists option



Note:
Fireproofing/
Acoustic insulation
not shown for clarity

Section X-X





Floor Levelling – New Side Fixed Baton/Joist Option

Proposed Strengthening for Timber Joists

Beam Legend:

UC 203 x 71 kg/m
UC 203 x 46 kg/m
Note Trimmers to Chimneys

Type 1 – Typical Spanbreaker
Type 2 – Grillage Spanbreaker
Type 3 – In Line Spanbreaker

Note:
Span directions and condition of timber in houses 27, 26 and 25 have been assumed based of investigative works to houses 28, 24 and 23.

Vaulted below.
No Strengthening required
(to be confirmed)

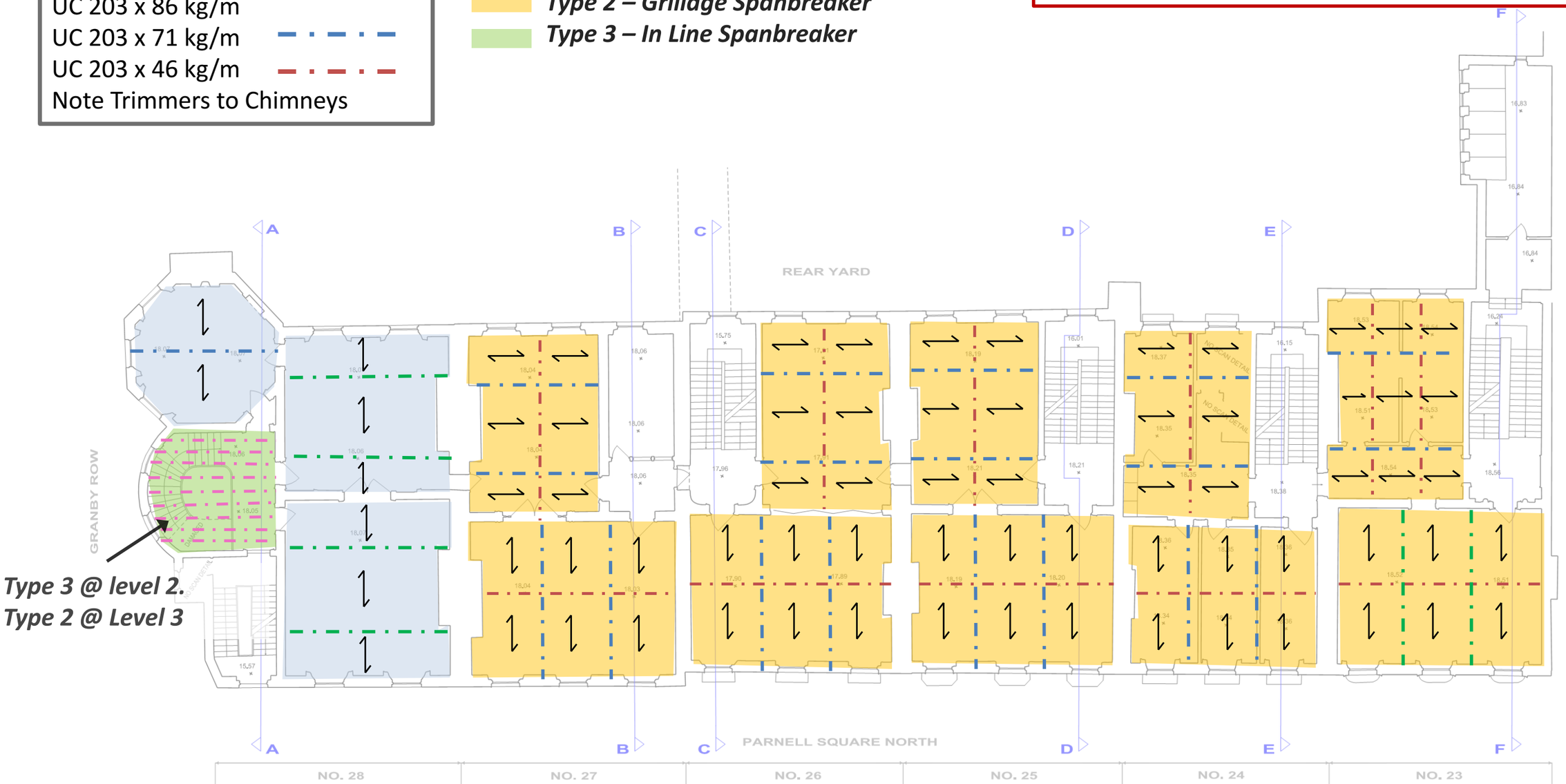
Ground Floor – Proposed Span Breaker Strengthening

Beam Legend:

UC 203 x 86 kg/m
UC 203 x 71 kg/m
UC 203 x 46 kg/m
Note Trimmers to Chimneys

Type 1 – Typical Spanbreaker
Type 2 – Grillage Spanbreaker
Type 3 – In Line Spanbreaker

Note:
Span directions and condition of timber in houses 27, 26 and 25 have been assumed based of investigative works to houses 28, 24 and 23.



Level 1 to 3 Typical – Proposed Span Breakers

Beam Legend:

UC 203 x 86 kg/m
UC 203 x 71 kg/m
UC 203 x 46 kg/m
Note Trimmers to Chimneys

Note:
*Very **limited** investigative works carried out to Level 2 Joists **ONLY** for Houses 20 & 21. Condition of timber, span directions and depth of structural zone has been **assumed** based of findings in Houses 23, 24 and 28 and is subject to change.*

Type 1 – Typical Spanbreaker
Type 2 – Grillage Spanbreaker
Type 3 – In Line Spanbreaker

GROUND FLOOR PLAN
PARNELL SQUARE NORTH - PROPERTY NOS 20-21

Ground Floor – Proposed Span Breakers (No. 20 & 21)

Beam Legend:

UC 203 x 86 kg/m
UC 203 x 71 kg/m
UC 203 x 46 kg/m
Note Trimmers to chimneys

Note:
*Very **limited** investigative works carried out to Level 2 Joists **ONLY** for Houses 20 & 21. Condition of timber, span directions and depth of structural zone has been **assumed** based of findings in Houses 23, 24 and 28 and is subject to change.*

Type 1 – Typical Spanbreaker
Type 2 – Grillage Spanbreaker
Type 3 – In Line Spanbreaker

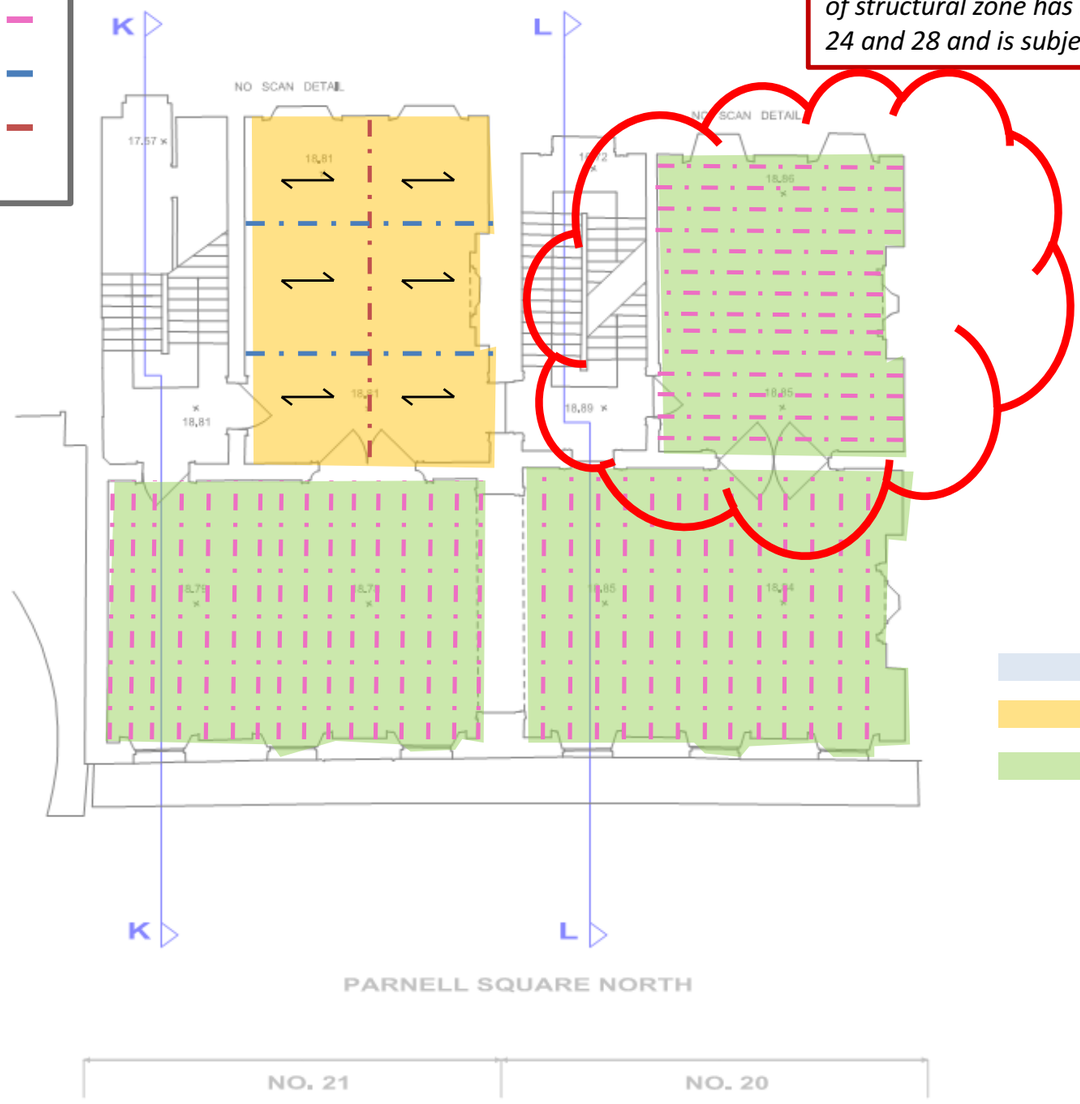
FIRST FLOOR PLAN
PARNELL SQUARE NORTH - PROPERTY NOS 20-21

Level 1 & 3 Typical – Proposed Span Breakers (No. 20 & 21)

Beam Legend:

RHS 200 x 100 x 12.5 (@600c/c)
UC 203 x 71 kg/m
UC 203 x 46 kg/m
Note Trimmers to Chimneys

Note:
*Very **limited** investigative works carried out to Level 2 Joists **ONLY** for Houses 20 & 21. Condition of timber, span directions and depth of structural zone has been **assumed** based of findings in Houses 23, 24 and 28 and is subject to change.*



Type 1 – Typical Spanbreaker
Type 2 – Grillage Spanbreaker
Type 3 – In Line Spanbreaker

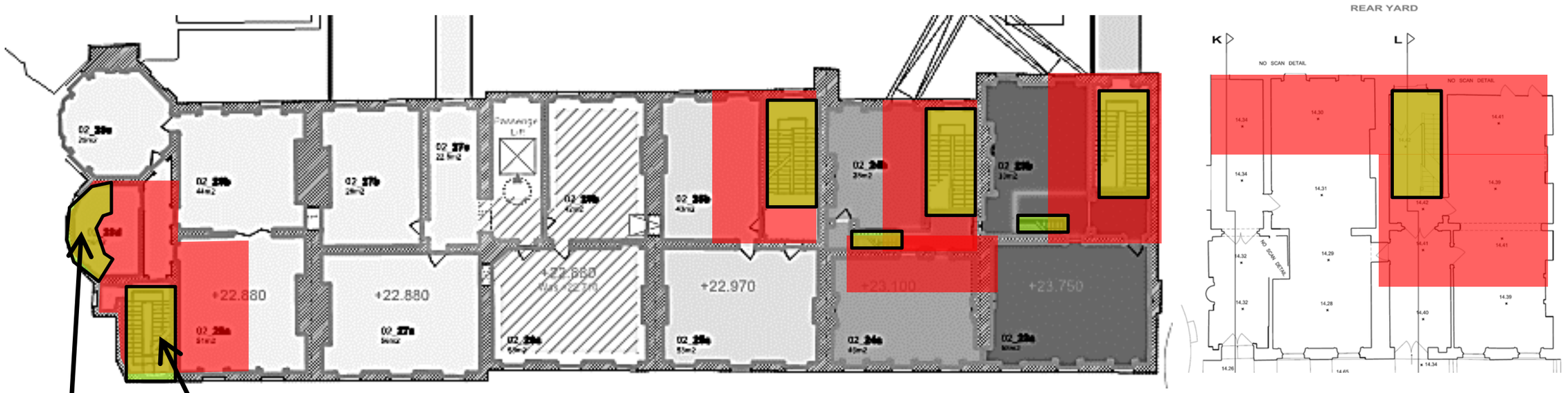
FIRST FLOOR PLAN
PARNELL SQUARE NORTH - PROPERTY NOS 20-21

Level 2– Proposed Span Breakers above first floor Decorative Ceilings (No. 20 & 21)

Stair Strengthening Strategy

Areas of Recorded Water Ingress / Damage

Stairs Requiring Strengthening



No. 28 | No. 27 | No. 26 | No. 25 | No. 24 | No. 23 | No. 21 | No. 20

Allow for full rebuild of No. 28 entrance stairs reusing any sound timber sections and using same for replacement templates

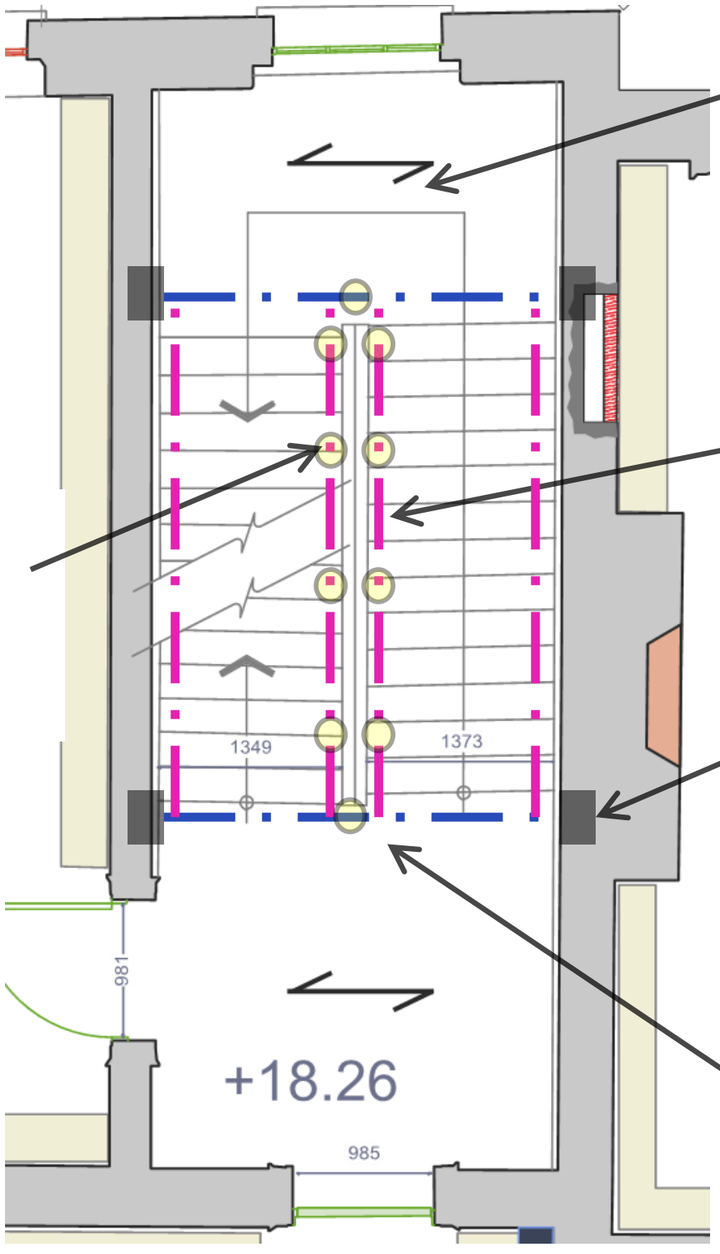
Granite stairs Will require load testing to establish capacity and potential steel support strengthening.

Assume following details apply to **all** handrails, stairs and landings (Note varying support detail required for granite stairs in No. 28).

Due to water ingress, assume all landings and half landings are to be upgraded with C24 timber.

Due to potential decay, it may be necessary to replace up to 50% of stair timbers (timber treads, risings, timber stringers etc)

Areas of Water Ingress & Stair Locations



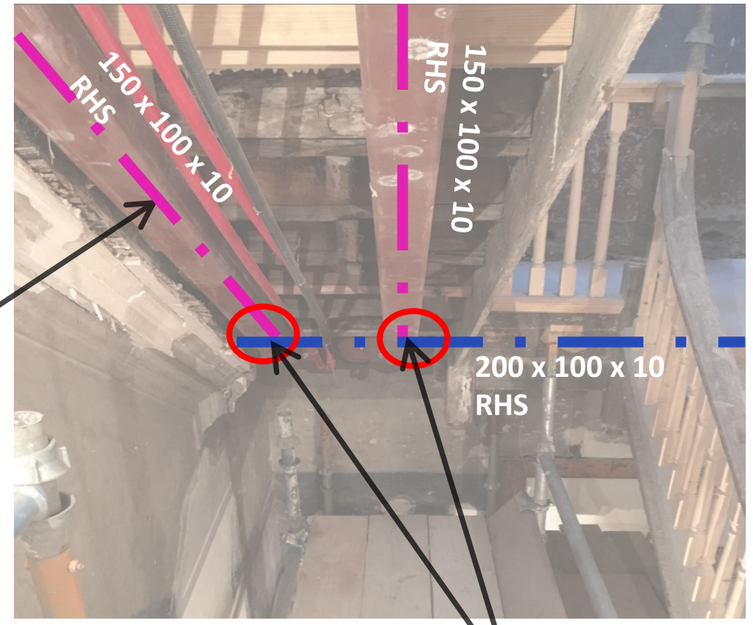
Due to water ingress, allow for the existing Timber Landings & Half Landings to be fully rebuilt with equivalent C24 timber joists (270 X 45 C24 Joists @ 300 c/c.)

Indicative locations for handrail strengthening connections (1m c/c)

150 x 100 x 10 S355 RHS sections to underside of stairs (2 No. per flight)

Allow for 450 x 450 pockets to be formed in walls for landing beams & filled with high strength 50N/mm2 grout

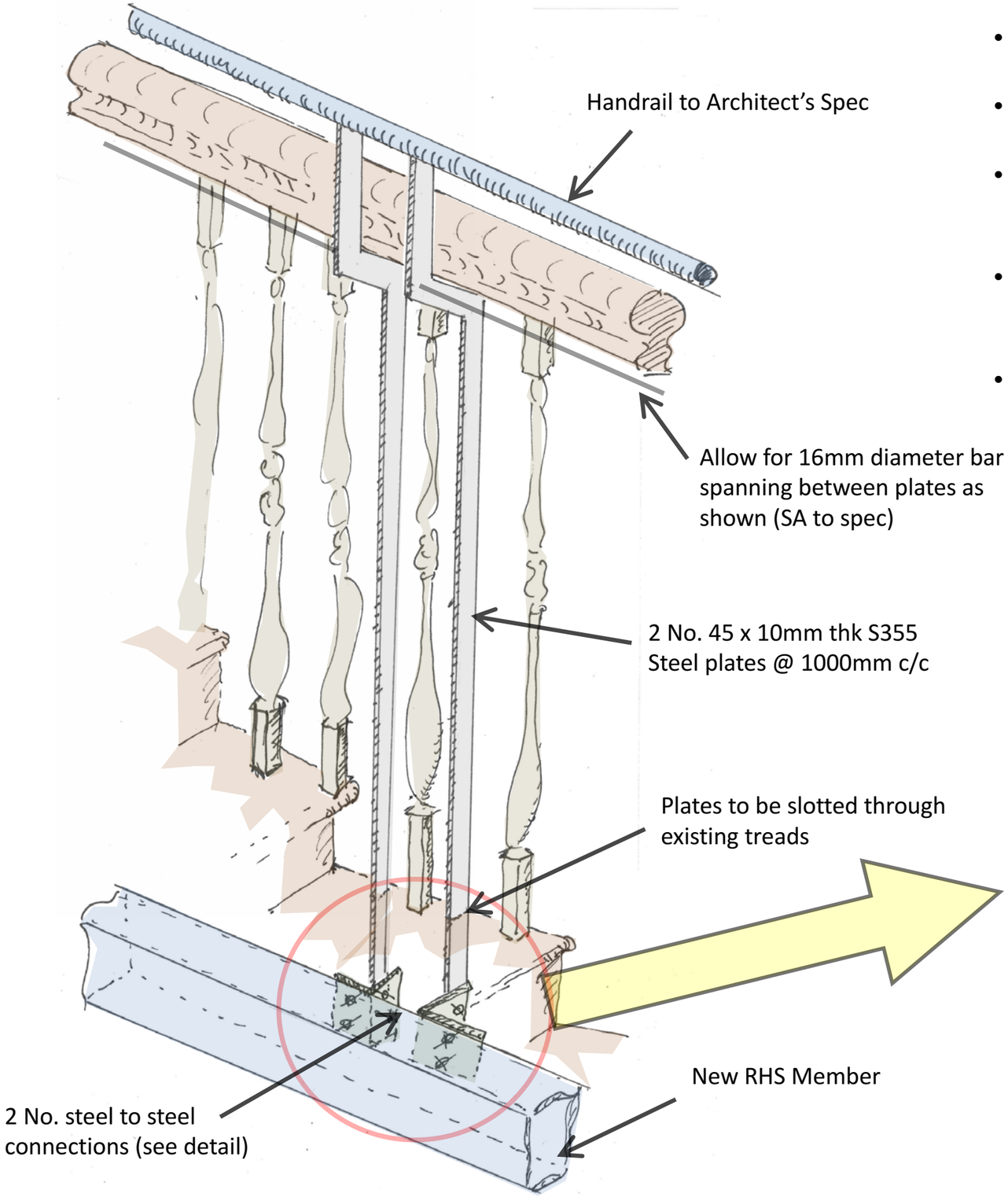
200 x 100 x 10 S355 RHS sections to support stair steel in landings



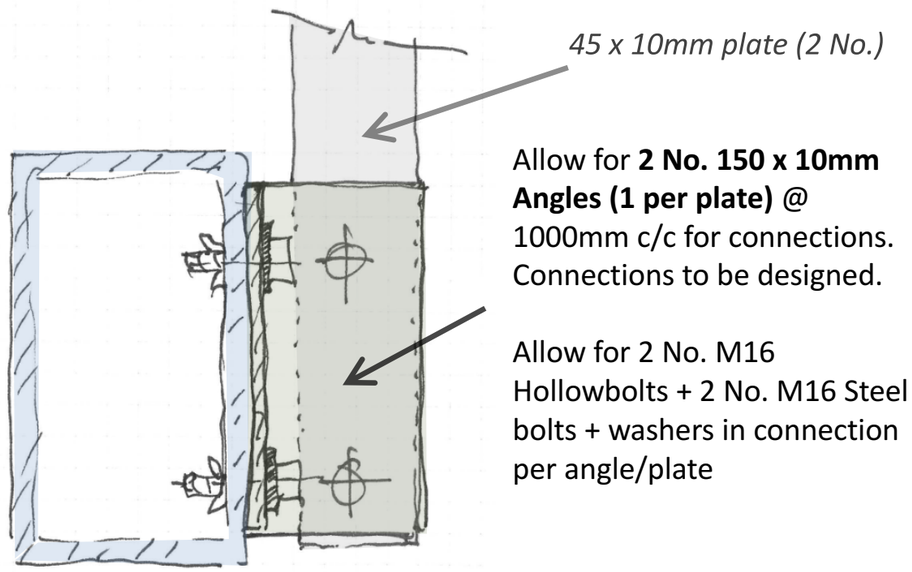
Allow for steel to steel connection with 4 No. M16 Hollo-bolts

Stair Strengthening Strategy – Typical Plan View

Handrail Strengthening Strategy



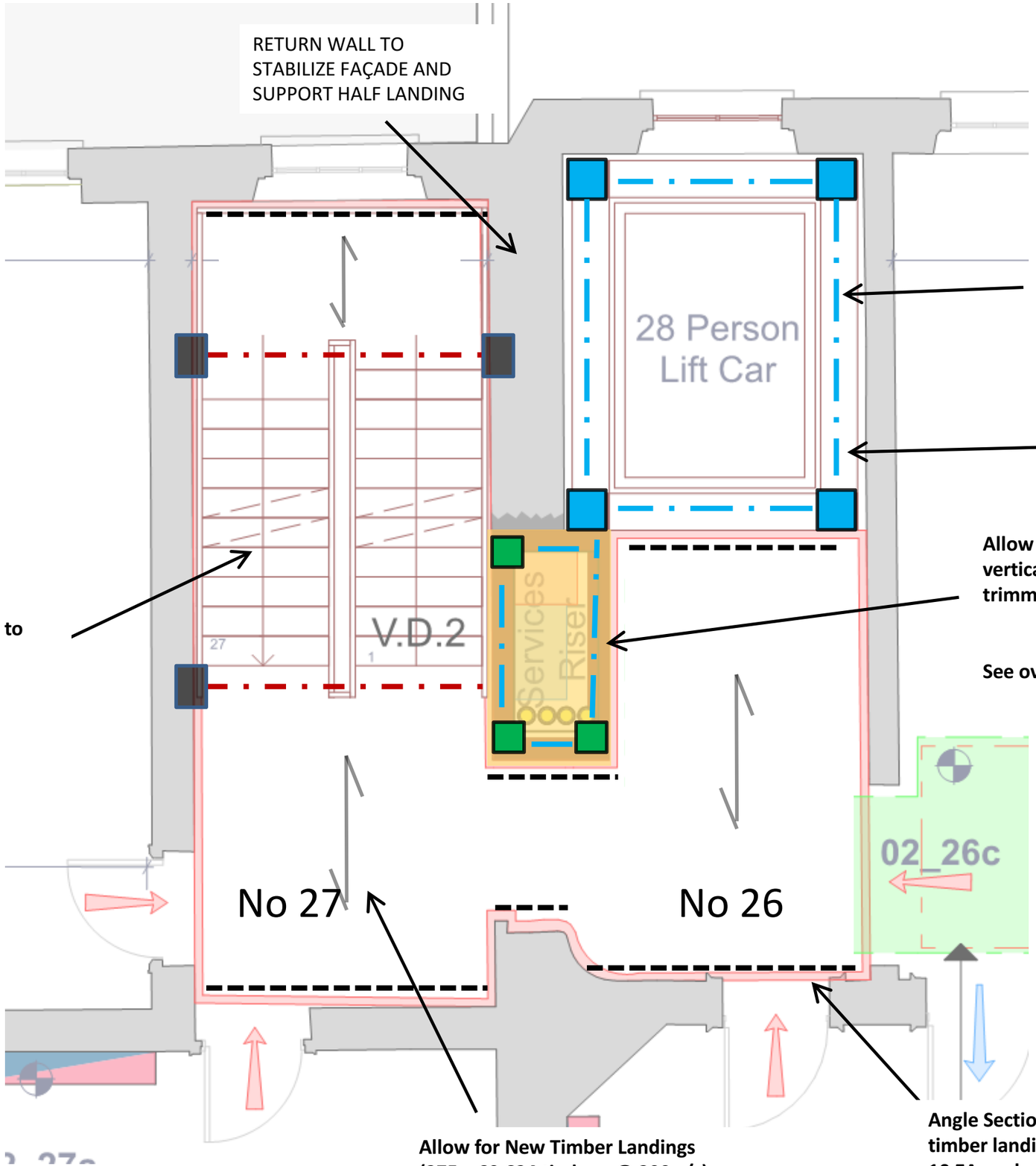
- 2 No. 45 x 10mm thk S355 Steel plates @ 1000mm c/c
- Plates run vertically in same plane as balusters.
- Plates to bend out and around existing handrail to create 1100mm barrier height
- Plates are slotted through existing timber treads and connected to steel RHS strengthening beam as shown below
- Solution required at all landings, half landings and flights



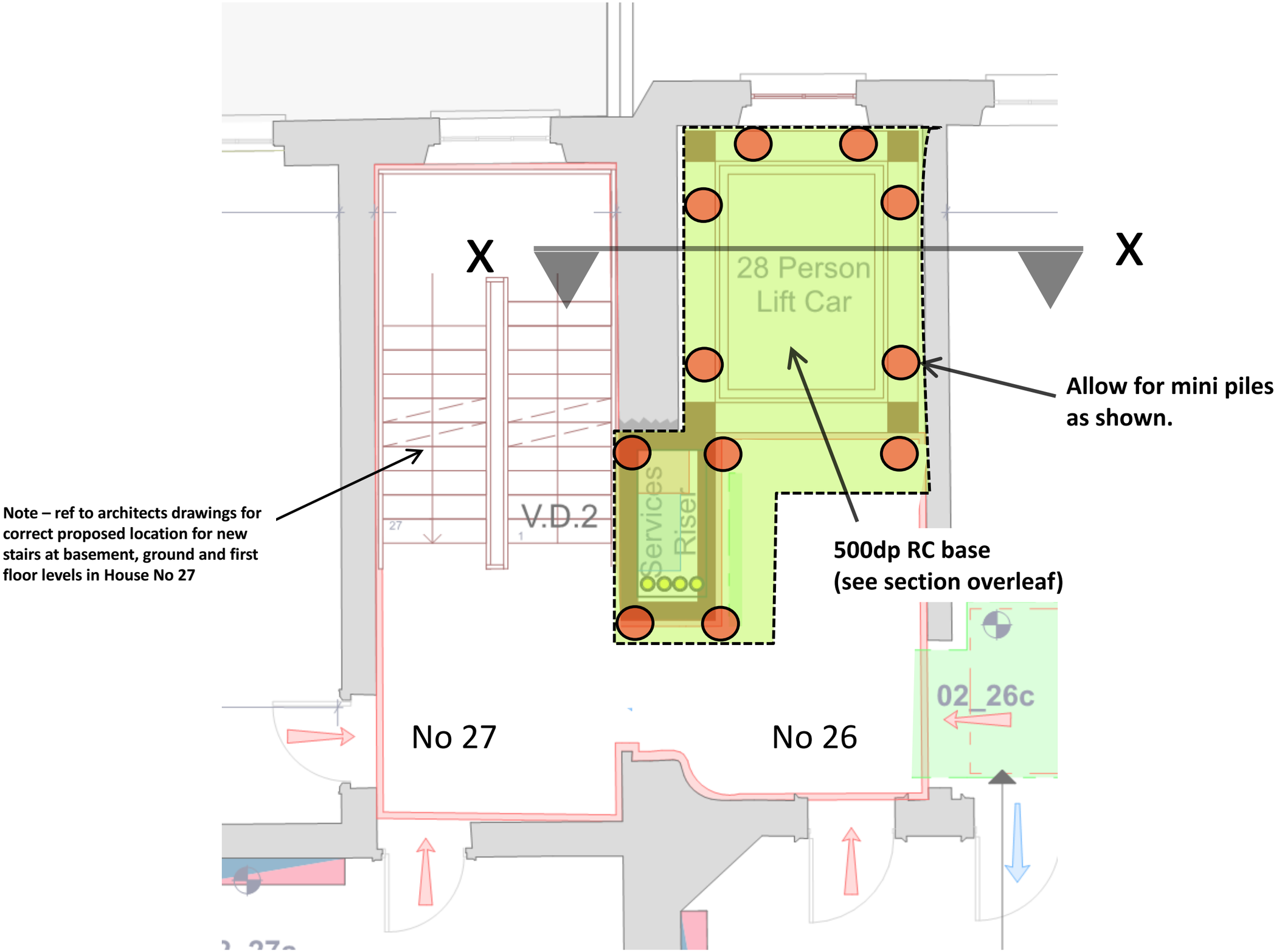
Plat to RHS indicative connection (1 no. per plate)

Handrail Strengthening

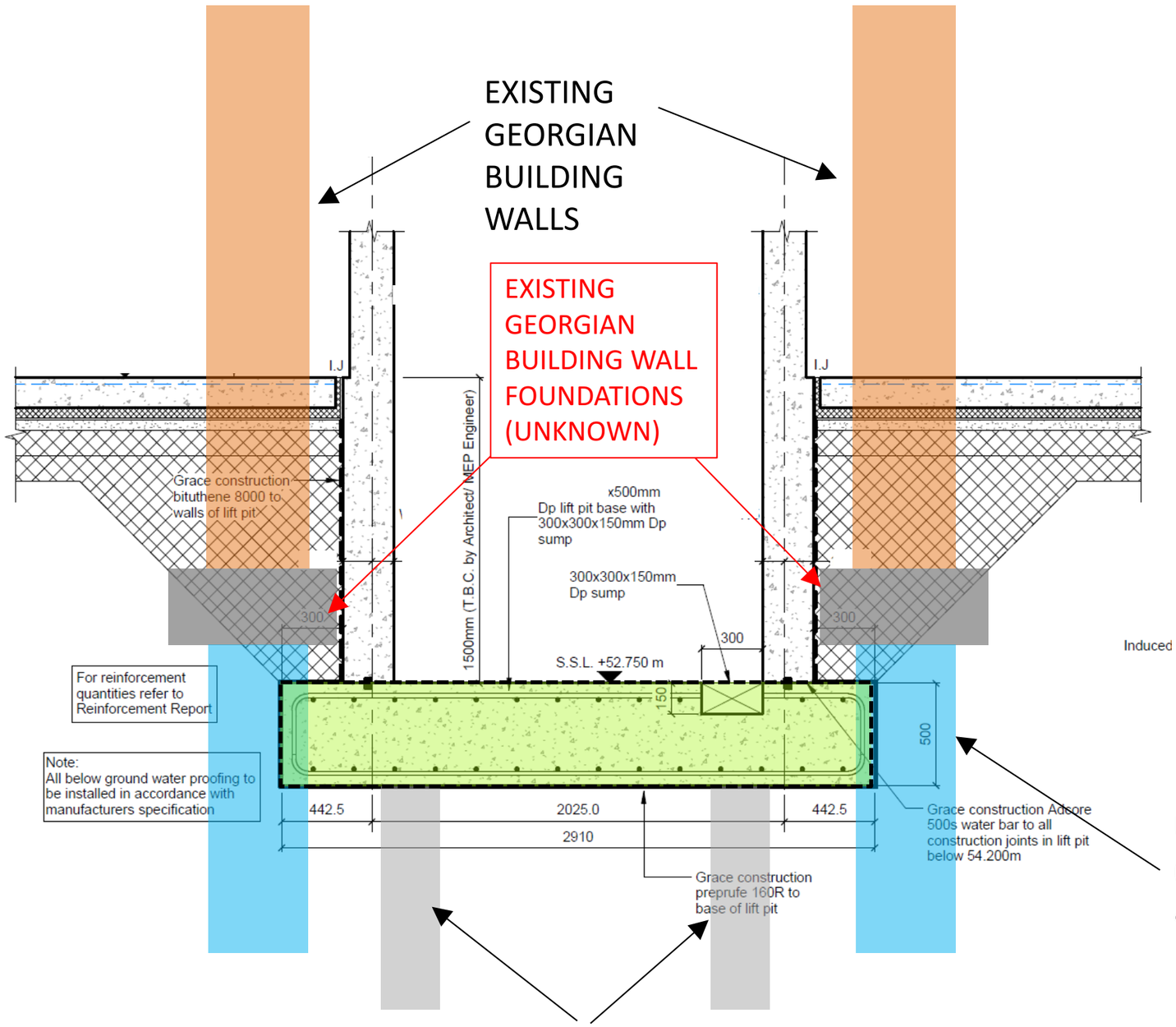
Lift Structure – new lift in No 26



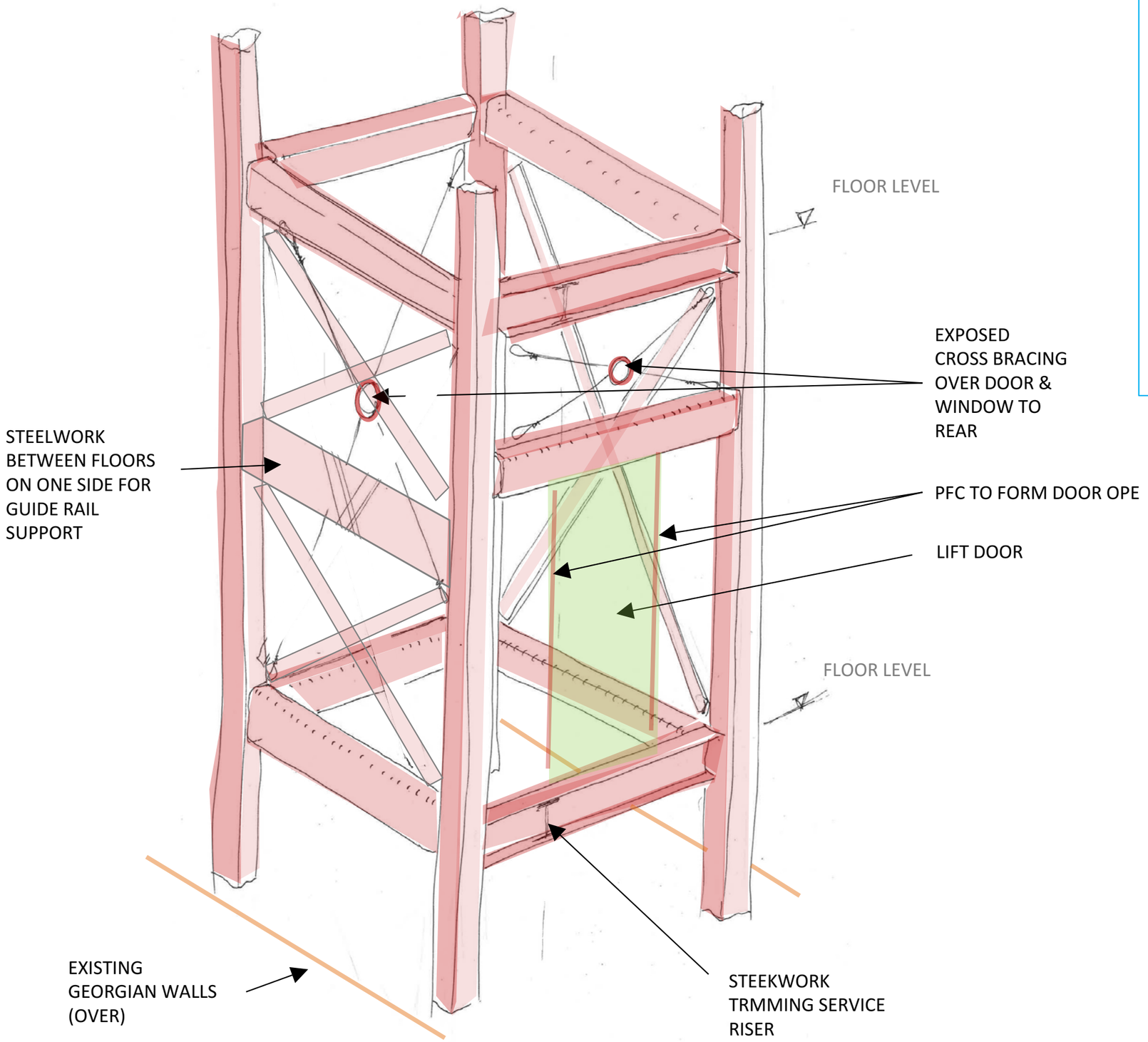
Lift Structure Overview



Lift Structure/Riser Foundations at basement level



Section X-X: Lift Foundations



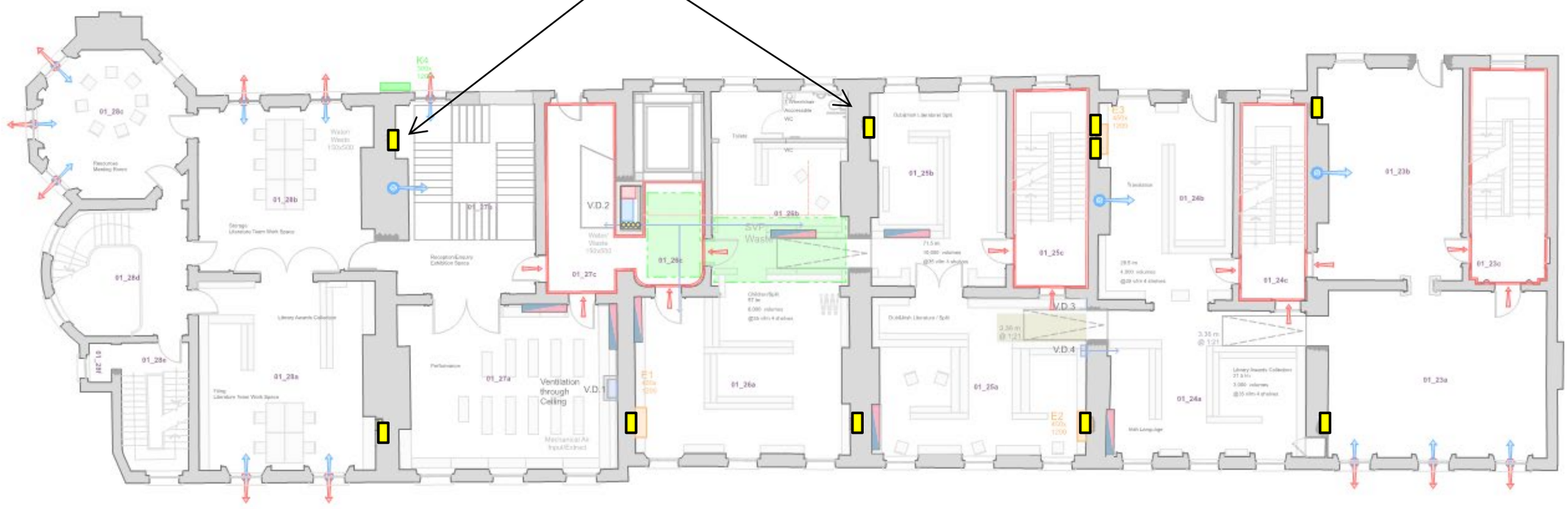
NEW STEEL FRAME FOR LIFT SHAFT:

- COLUMNS – Assume Hollow Section 100 Kg/m
- BEAMS – Assume Hollow Section 90 Kg/m
- MacALLOY CROSS BRACING WHERE VISIBLE (i.e. rear elevation)
- FLAT PLATE BRACING (Bolted together at middle) WHERE HIDDEN

Lift Structure Iso View

Chases Required for M&E routes and risers

Required chase locations

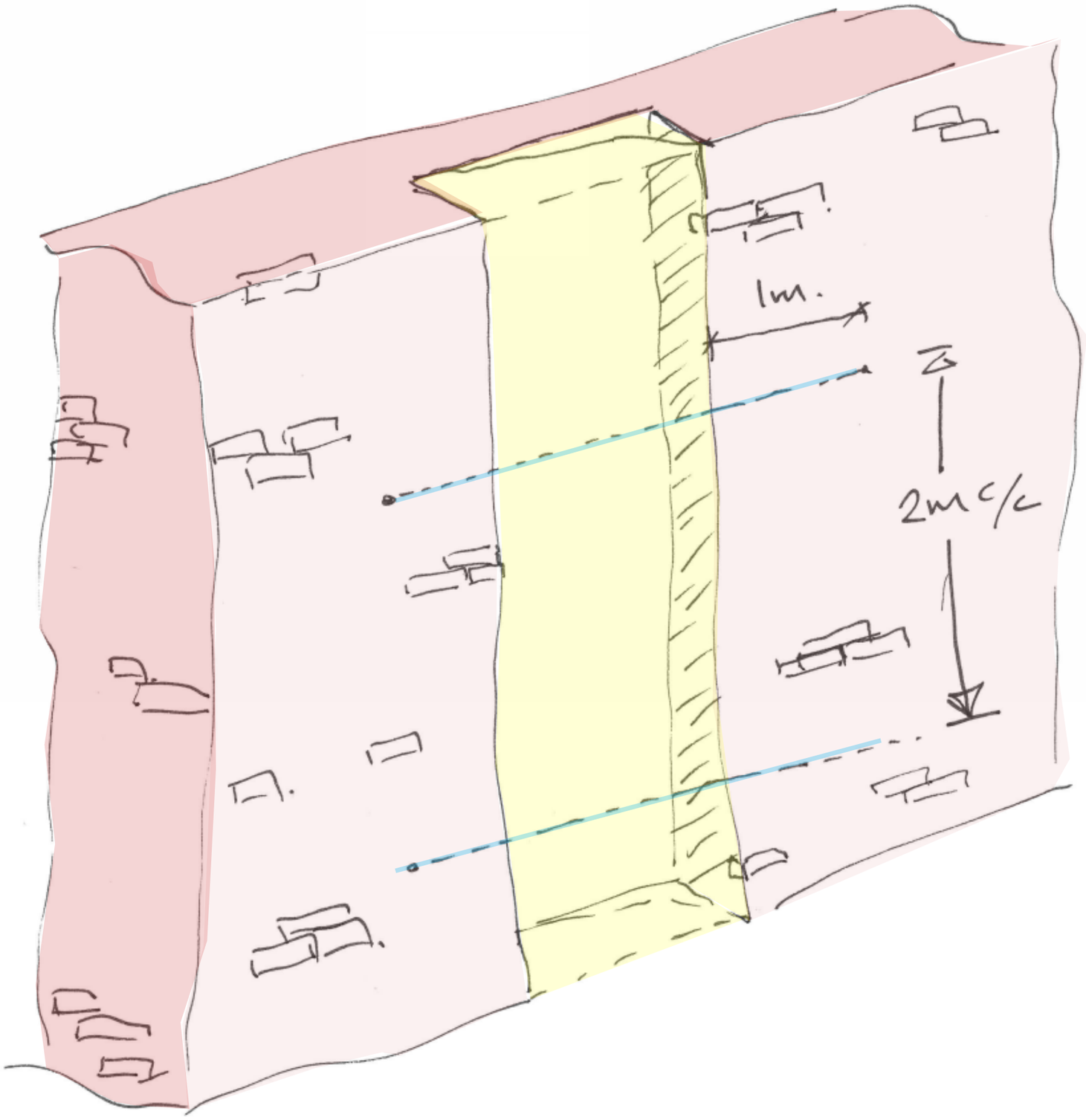


Note:

Indicative locations only.

Refer to M&E Workbooks & Architects Drawings for exact locations, sizes and quantities.

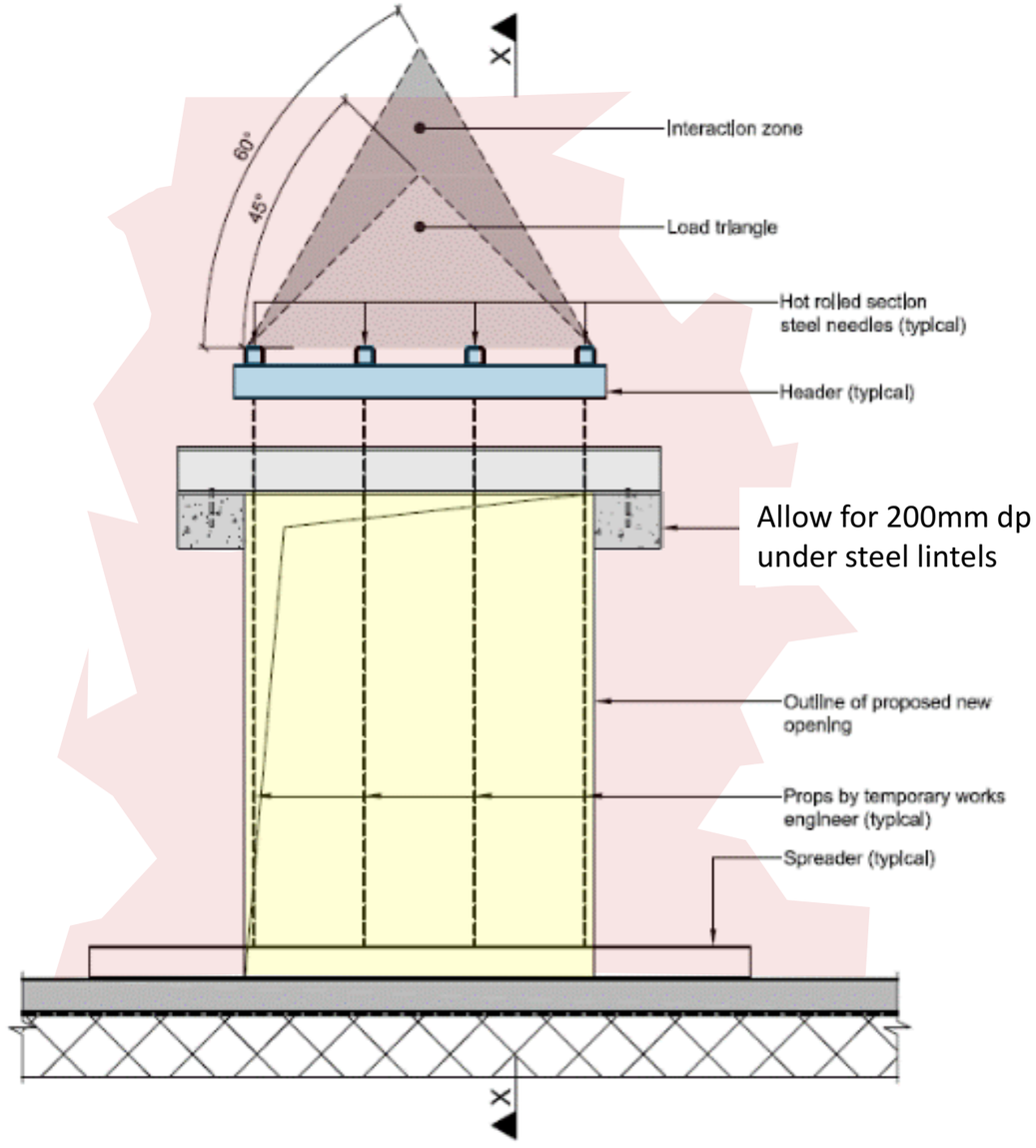
Chase Required for M&E Services



- Refer to architect’s drawings for chase locations, dimensions, internal build up and quantities.
- Allow for helical stitching at 2m c/c (as shown)
- Ope to have masonry infill (to arch. spec)
- Finishes to chases to architects details.

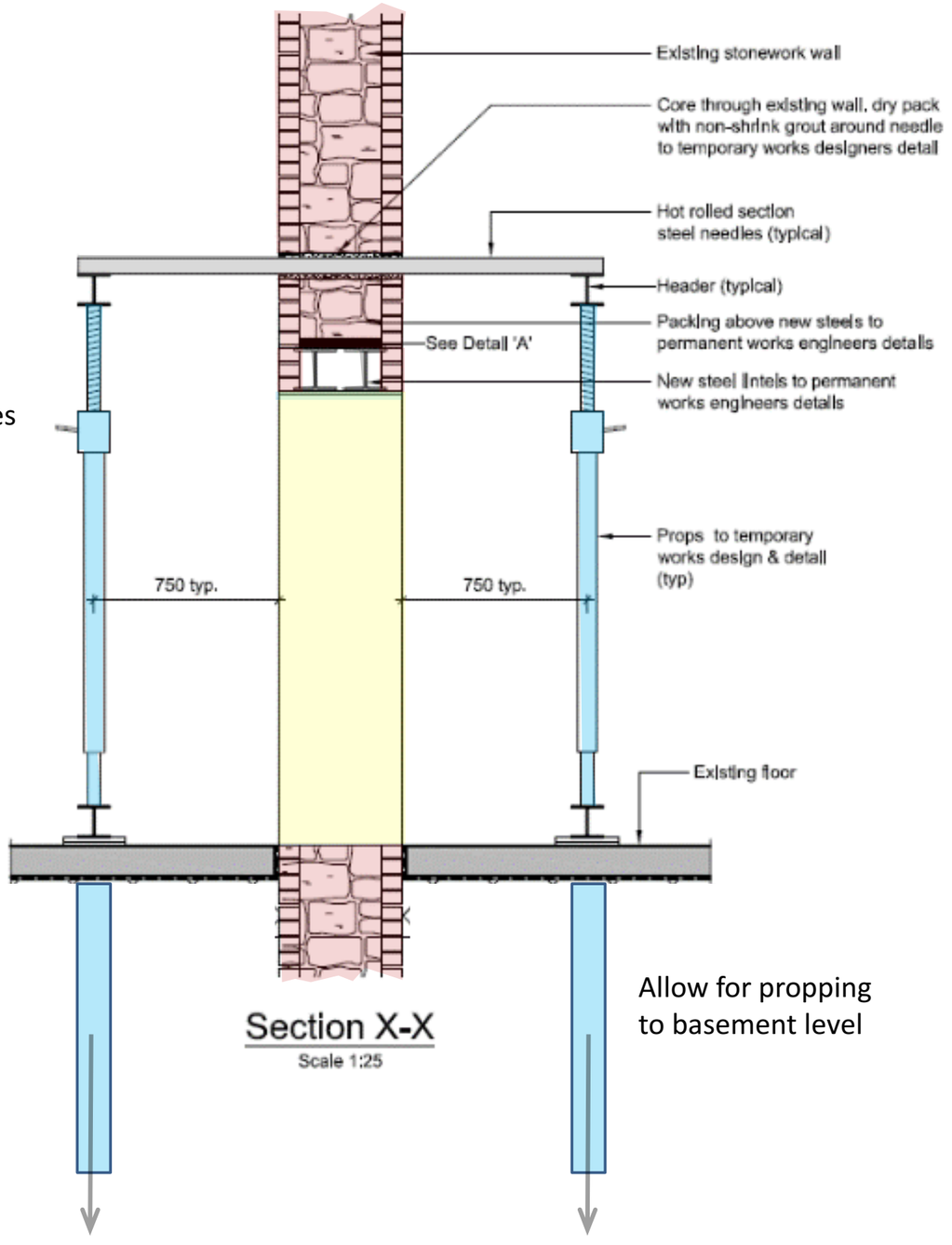
Typical Chase Detail

Transfer Structure for New Openings in existing walls including within party walls



Allow for 200mm dp padstones under steel lintels

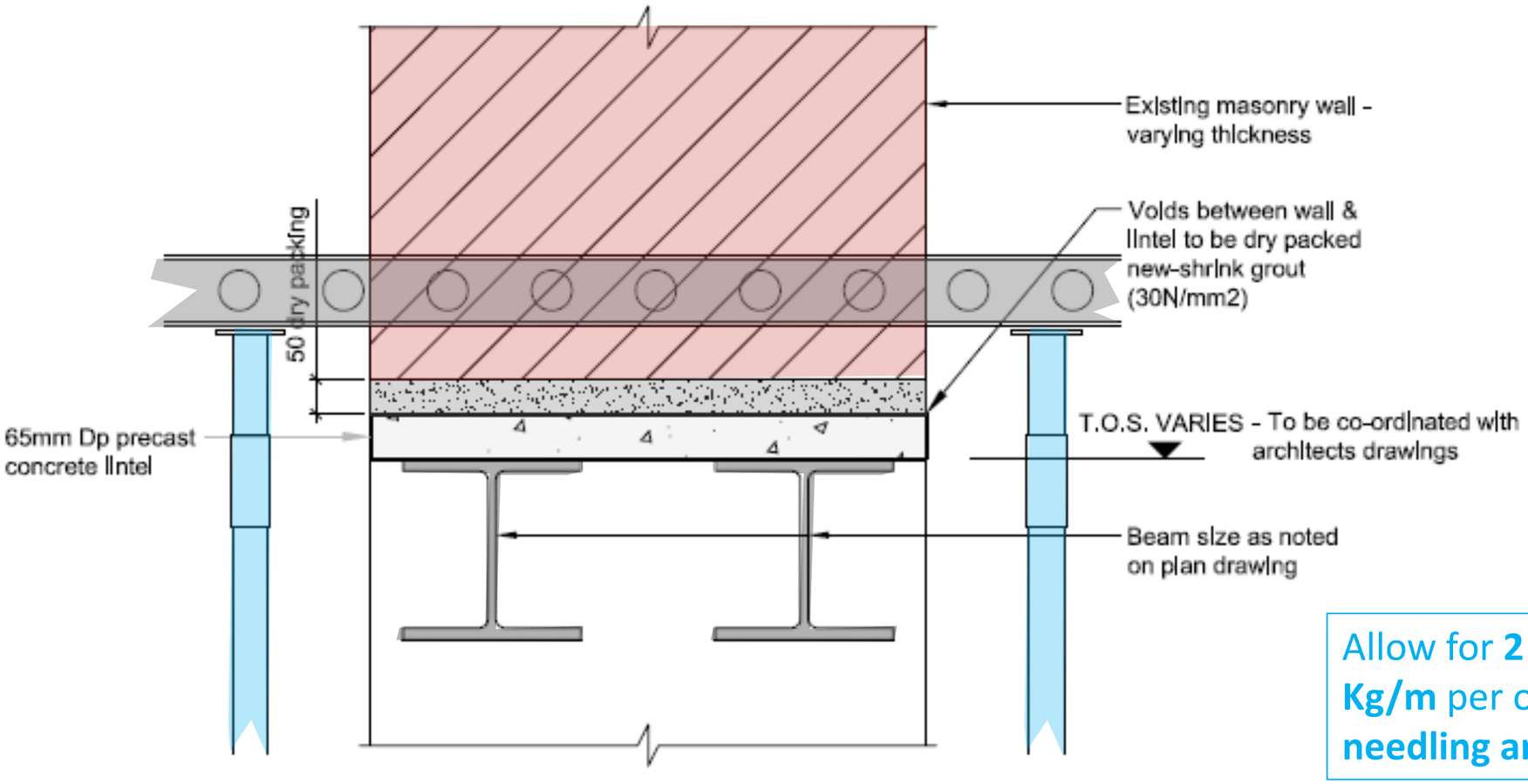
Generic Temporary Works for Installation Proposed New Beams
(all temporary works to temporary works engineer detail)
Scale 1:25



Allow for propping to basement level

Section X-X
Scale 1:25

Transfer Structure Over New Openings



Detail A
(typical section detail for proposed new beam)
Scale 1:10

Allow for **2 No. 203 UC 71 Kg/m** per opening & **needling and propping**

Refer to Architects Drawings for locations/quantity of new openings.

Transfer Structure Over New Openings

Roof Structure – No. 28, 24, 23, 21 & 20.

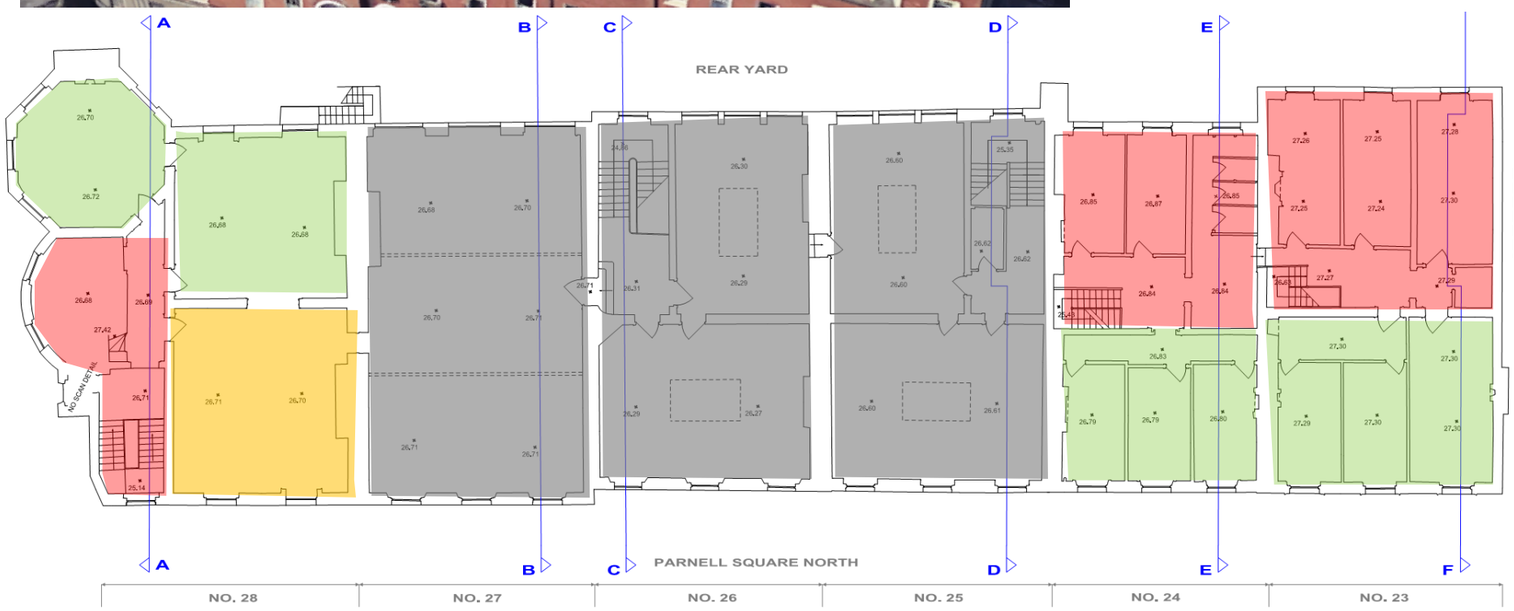
20% Rafter Replacement + 20% Rafter Splicing (page 35)

30% Rafter Replacement + 50% Rafter Splicing (page 35)

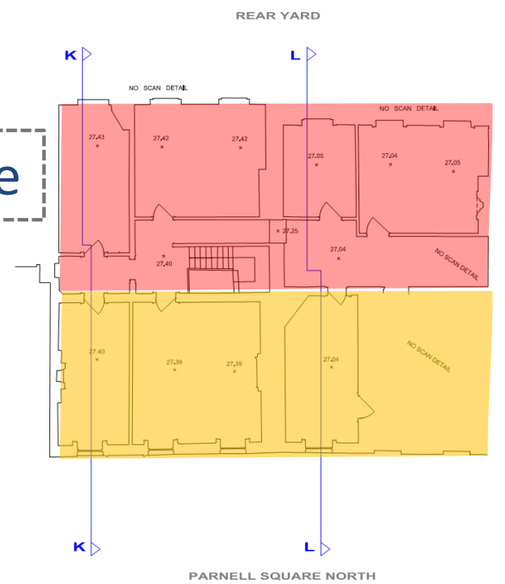
100% Roof Replacement

To be removed as per scheme (see next section)

Note: Evaluation of timber roofs based off of limited opening up works. Contingency should be considered in costing.

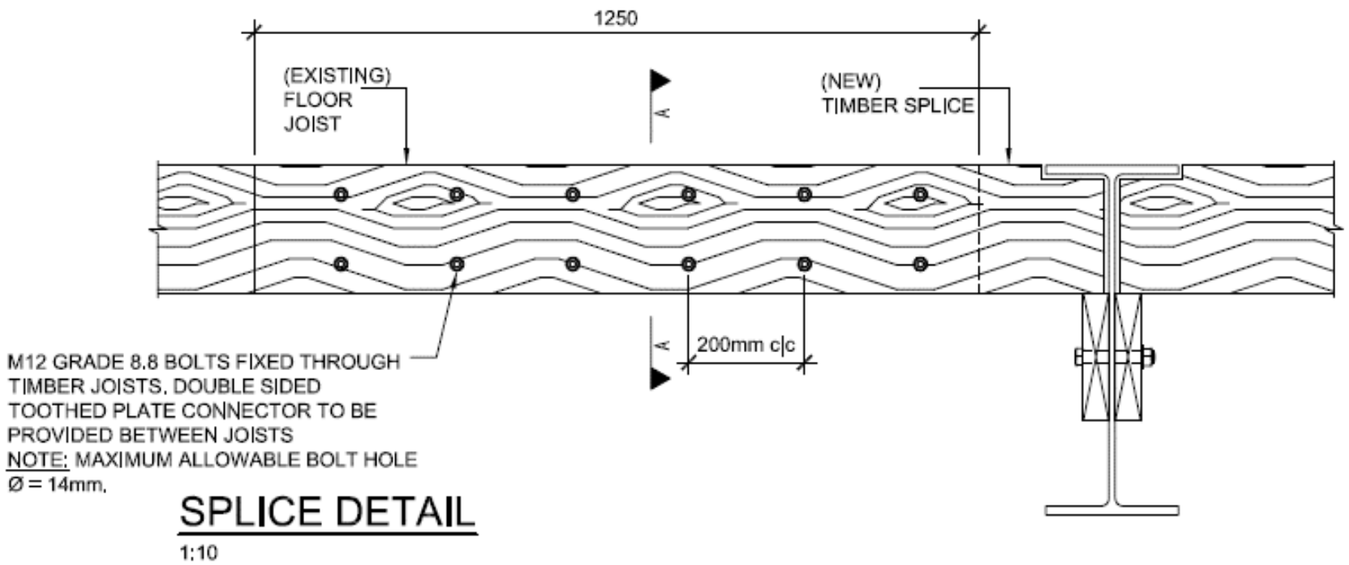


Hugh Lane

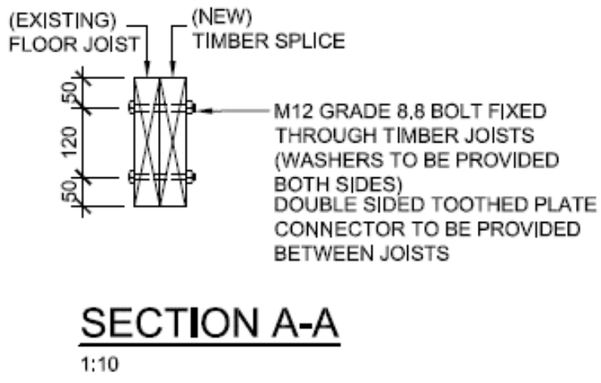


Upgrade of Existing Roofs 20,21, 23, 24 & 28

SPLICING OF FLOOR JOISTS: & Roof Rafters – indicative repair strategy

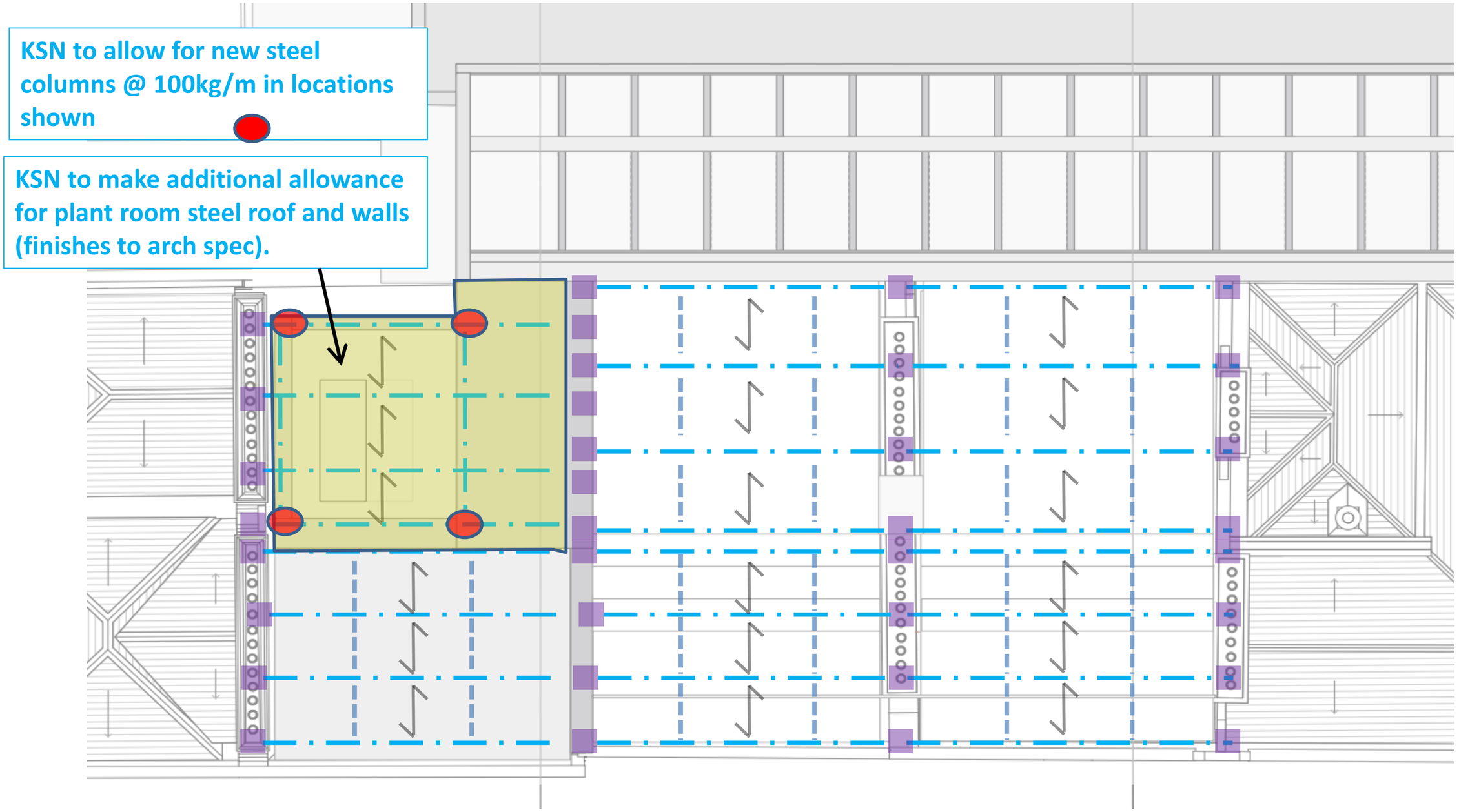


- Standard Splice Detail shown.
- Can be required in areas where span breakers installed
- Allow for splicing and replacement of over half the span.



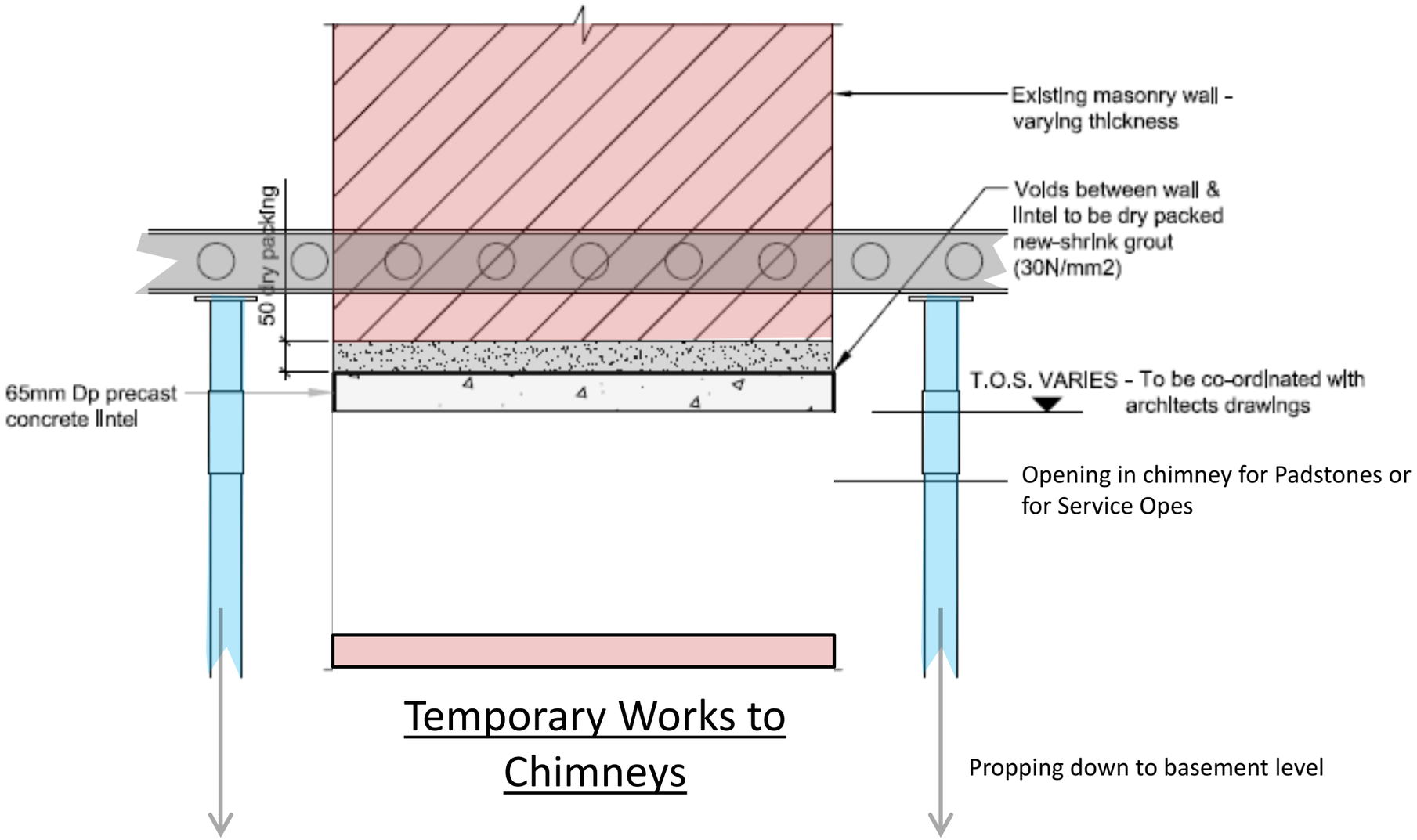
Replacement of Roof Rafters

Roof Structure – No. 27, 26 & 25

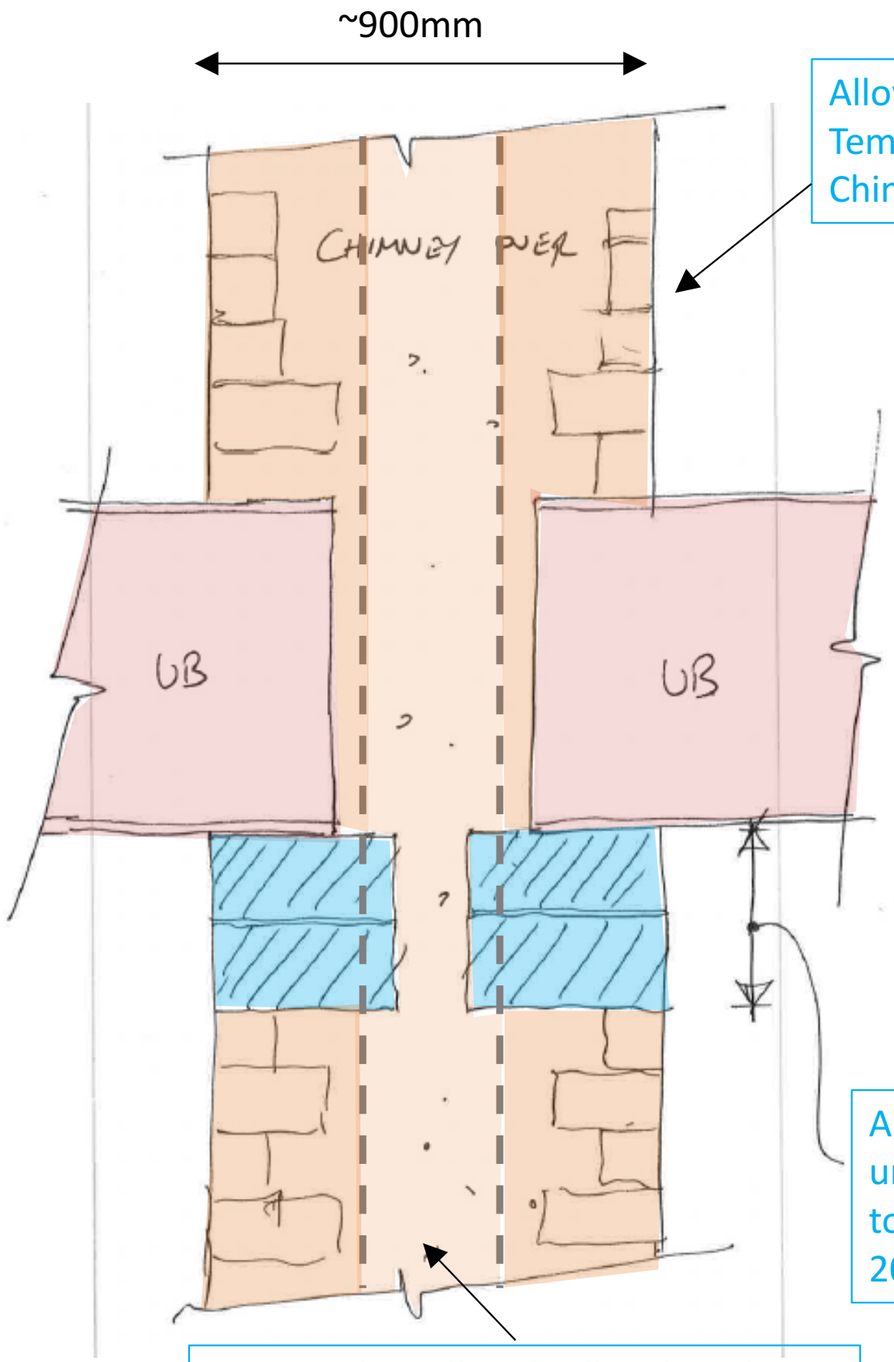


- Steel beams will require <u>padstones</u> under each end bearing and steelwork to be encased in concrete after installation. Allow for holding down / strapping connection detail.

New Roofs 25, 26 & 27



Temp Chimney Works for Padstones & Duct Opes



Allow for above Normal Temporary Works for Chimney in Temporary Case

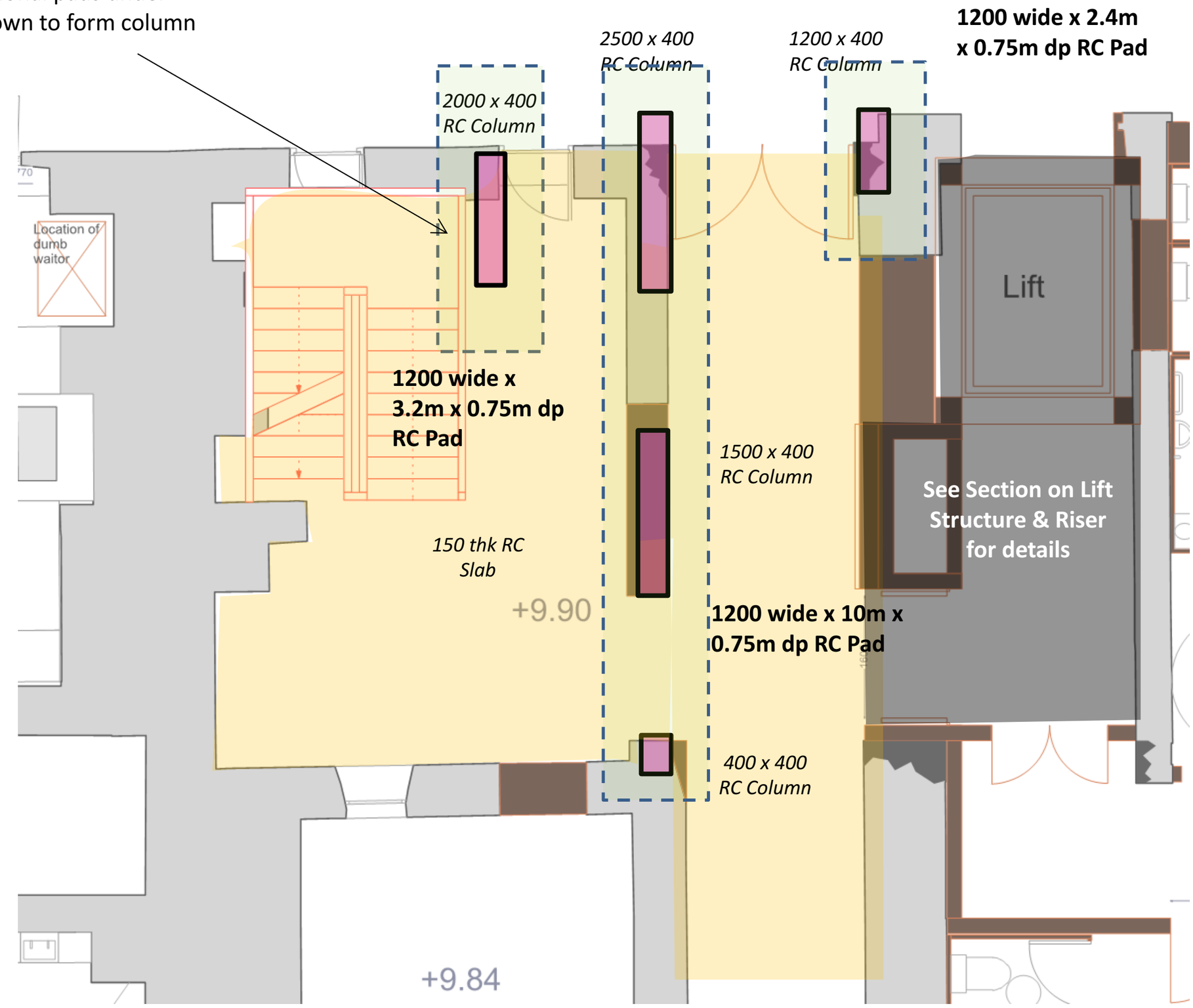
Allow for 2 No. Padstones under all Roof Steel Beams to achieve Min depth of 200mm

Existing Flue, allow for flue directly below UB to be filled with concrete.

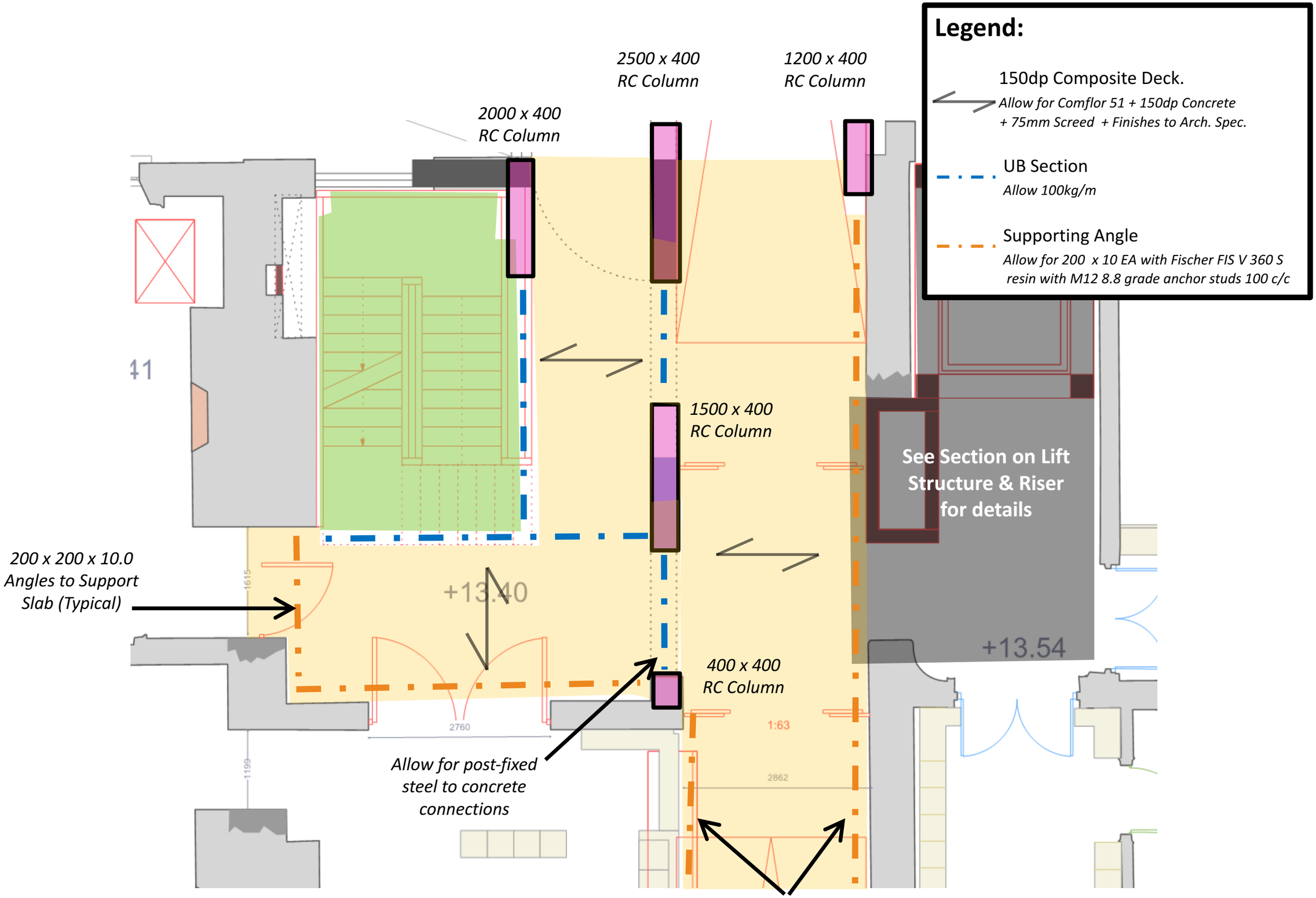
Roof Garden Roof Level

Interventions to No 27

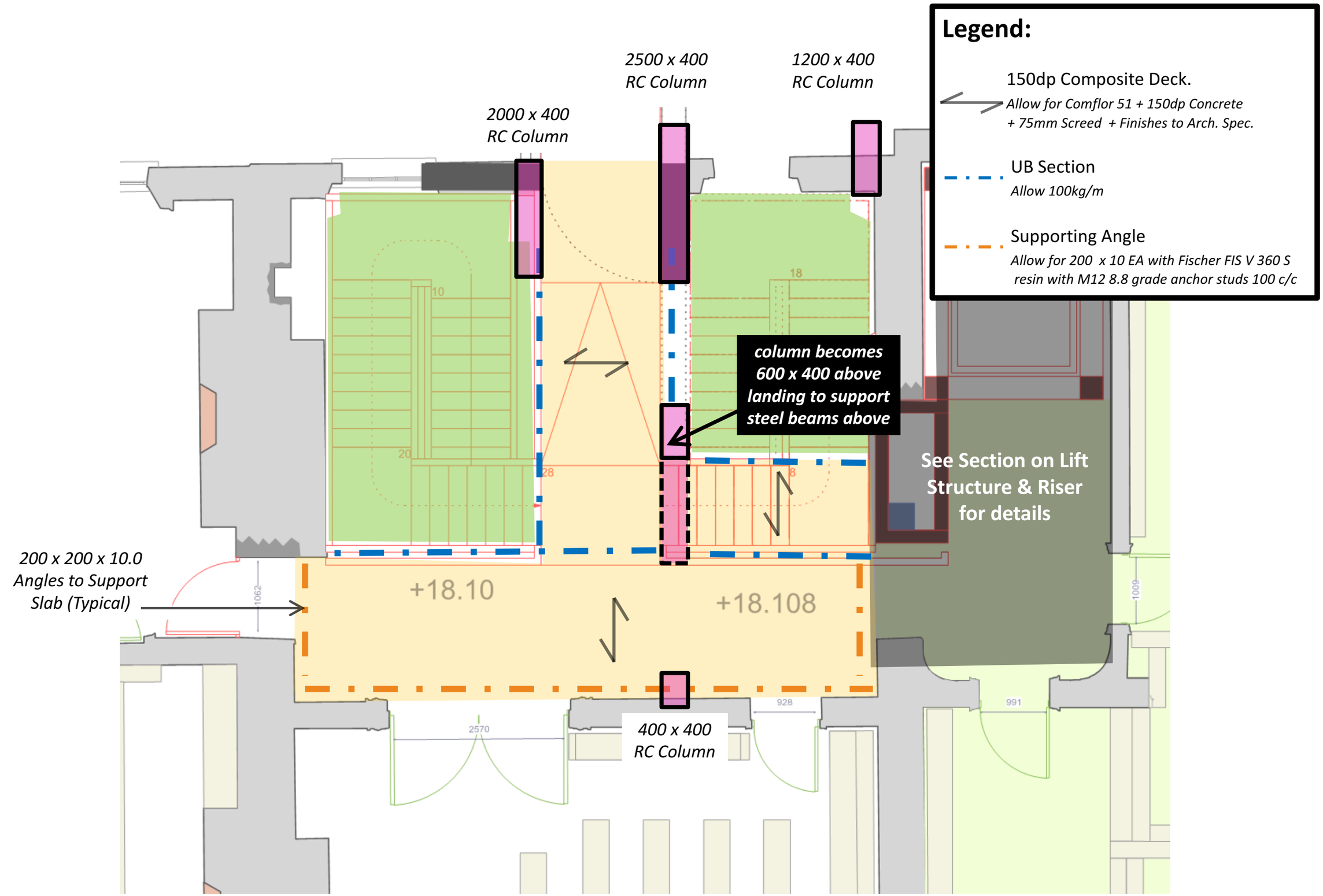
Allow for additional pads under columns as shown to form column foundations.



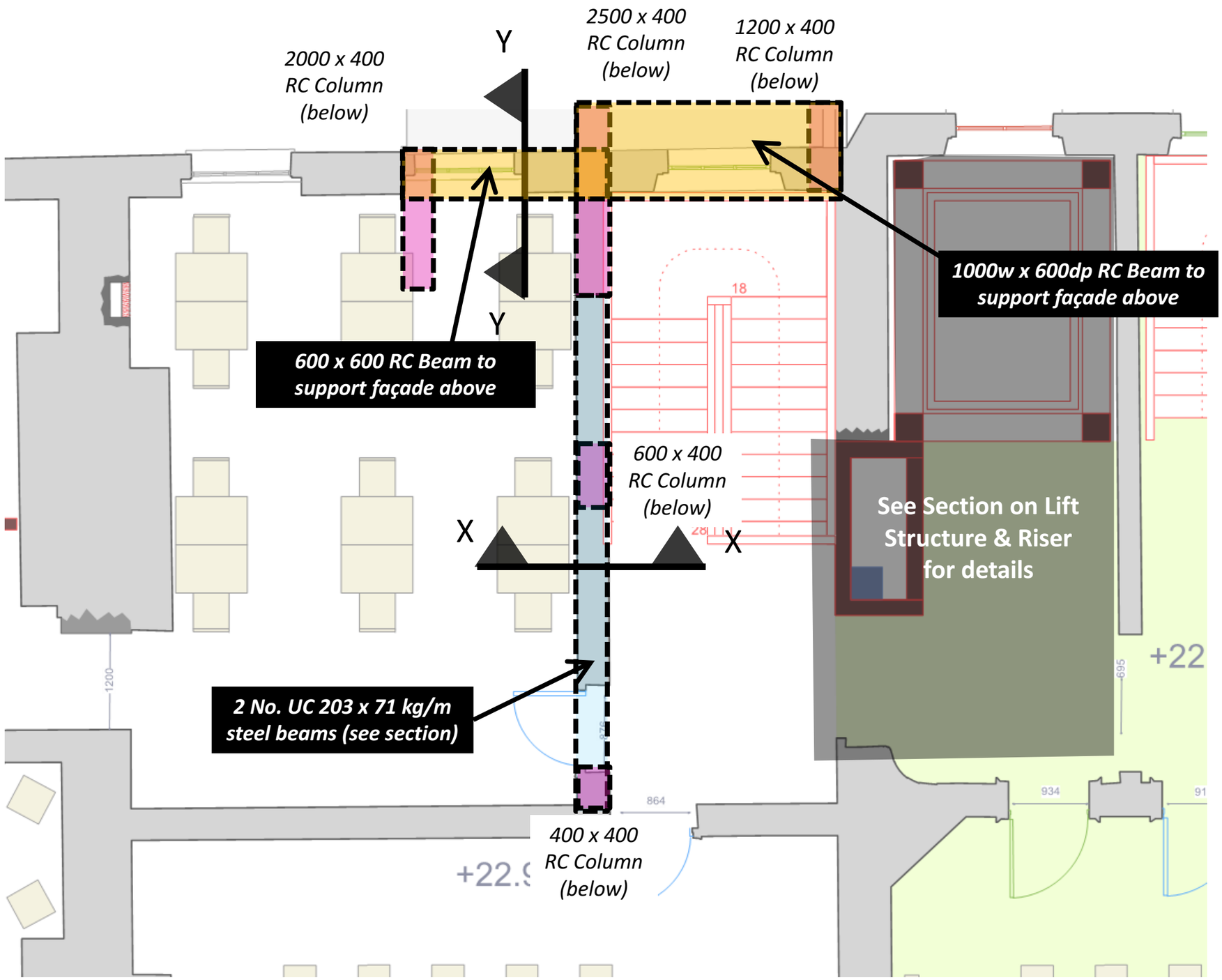
Interventions to No. 27: Basement Level



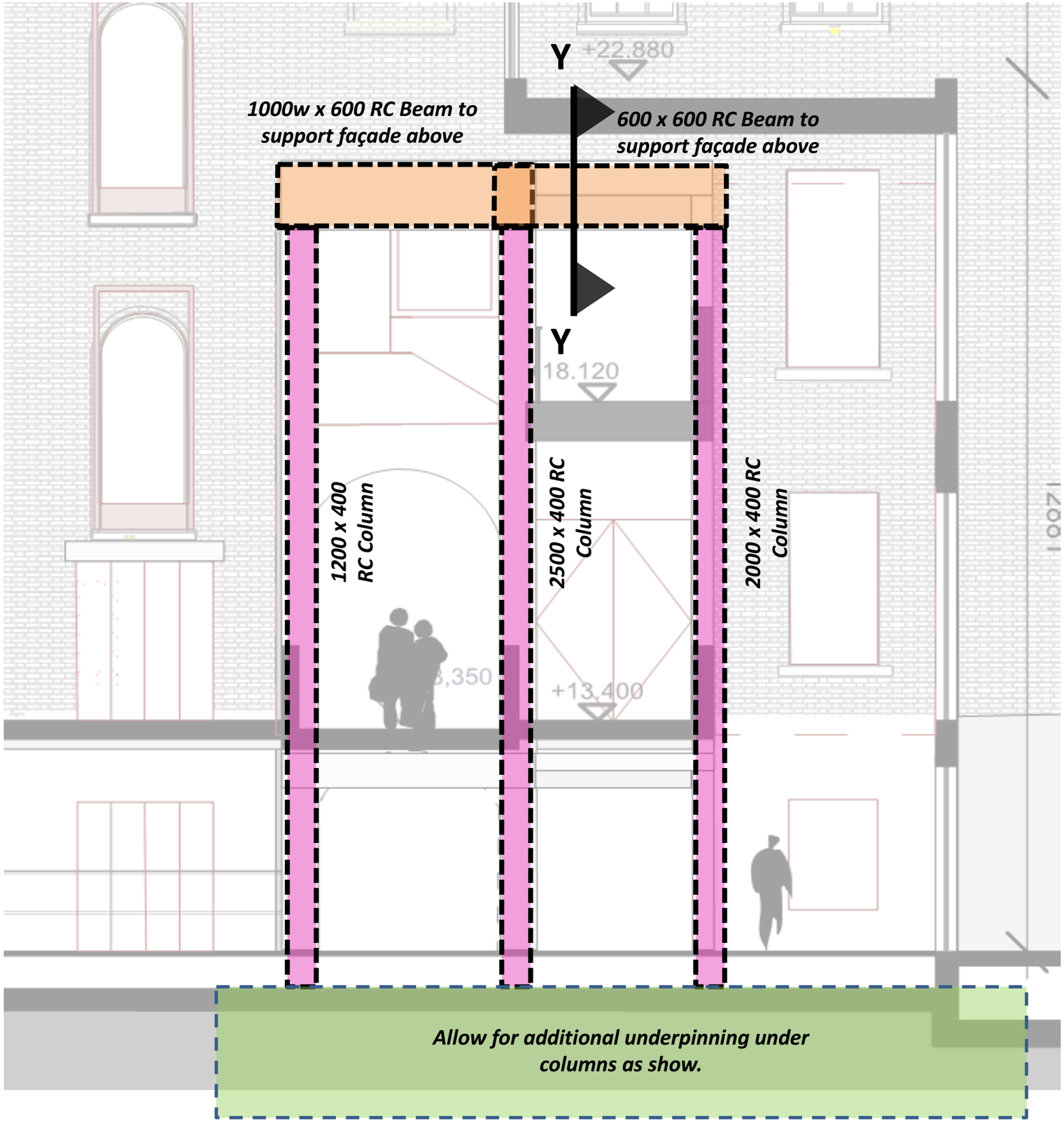
Interventions to No. 27: Ground Floor Level



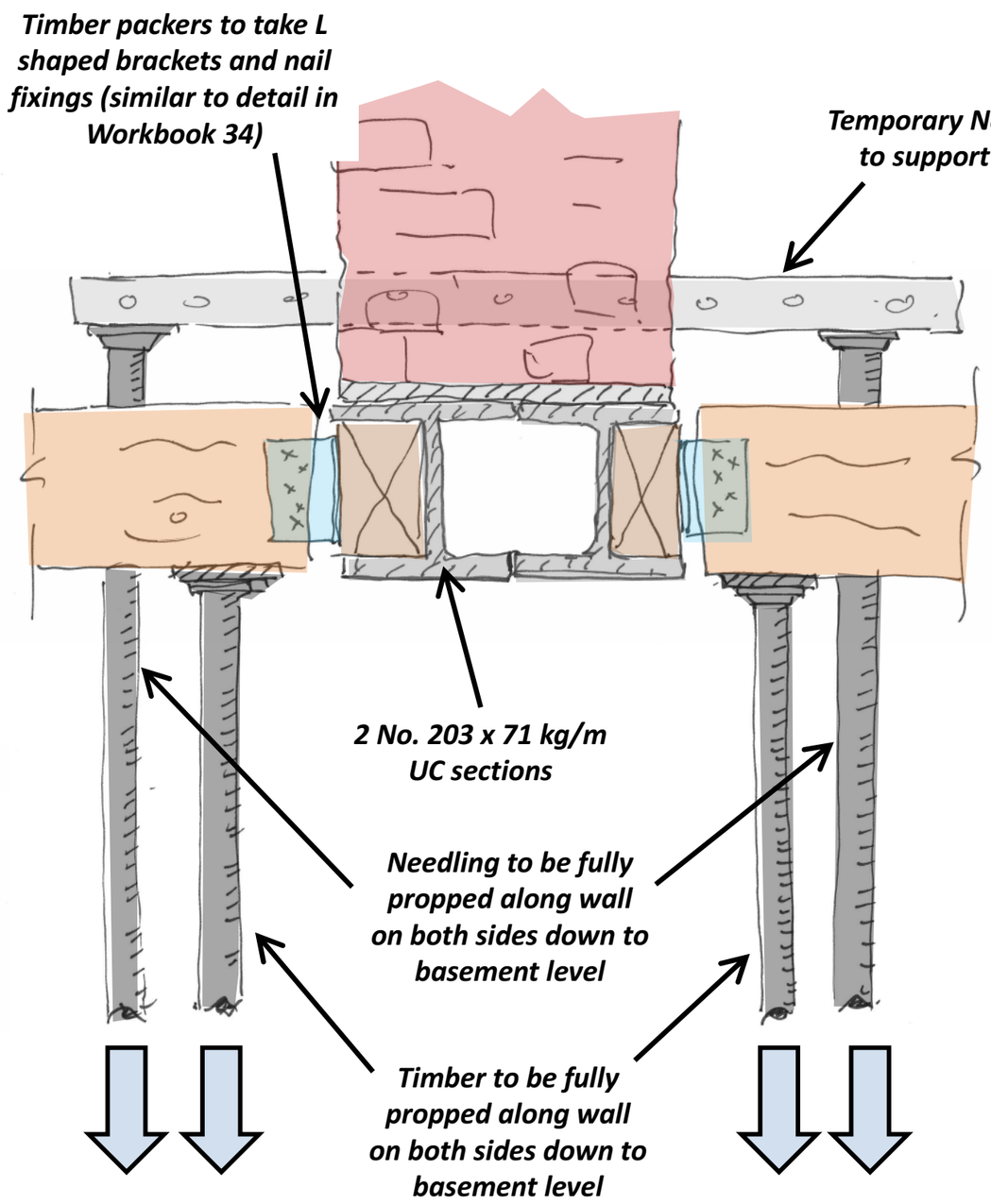
Interventions to No. 27: Level 1



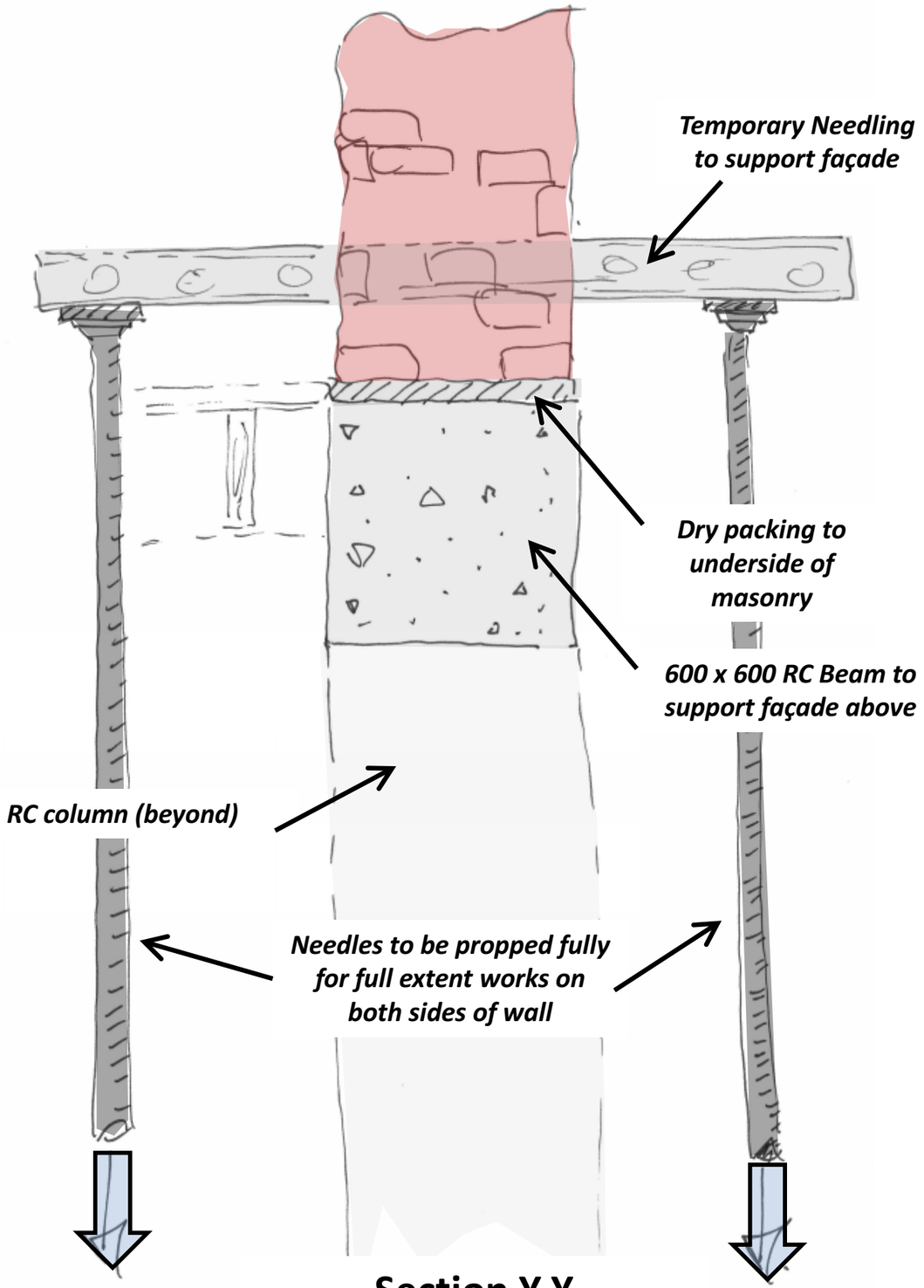
Interventions to No. 27: Level 2



Interventions to No. 27: Rear Façade Elevation

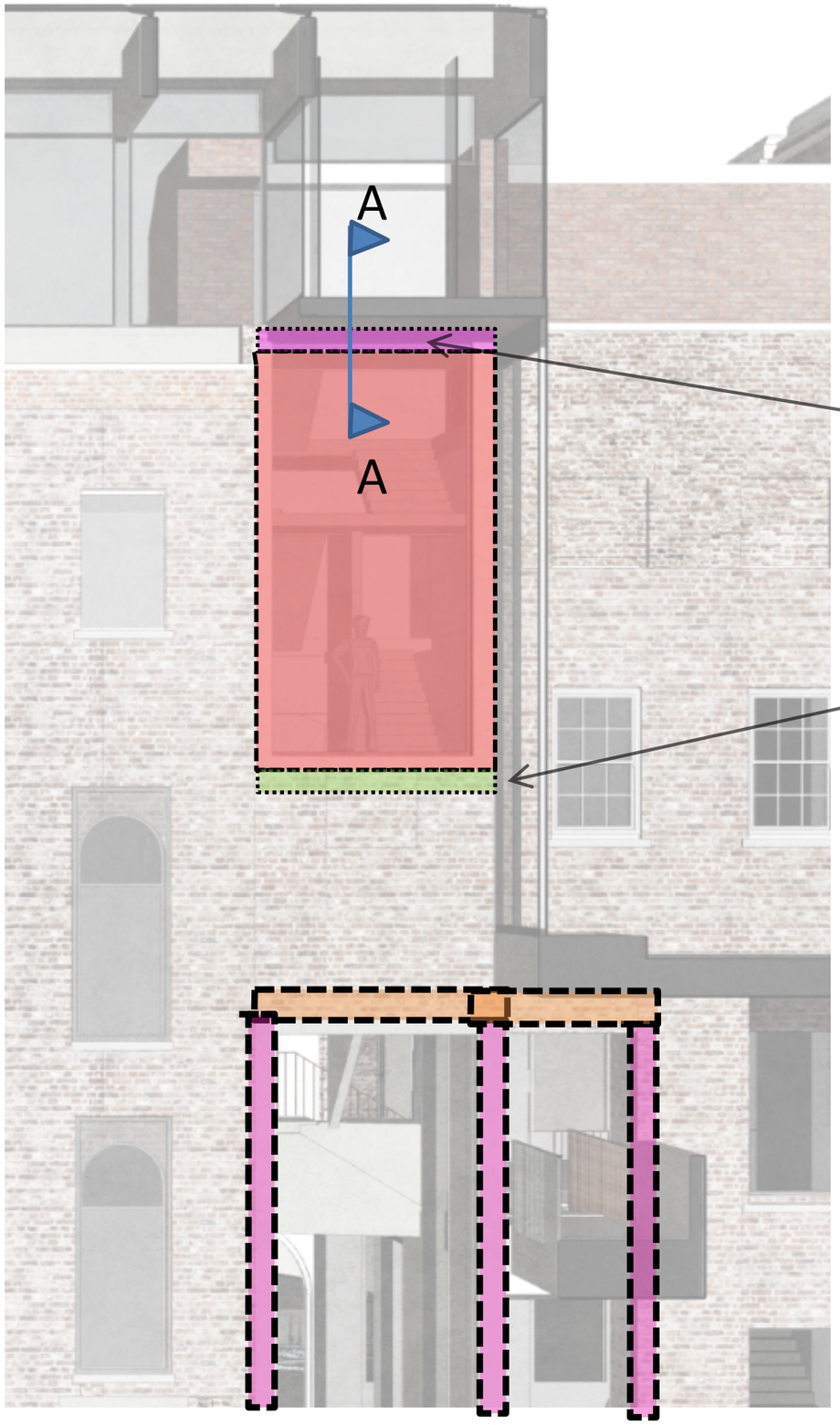


Section X-X



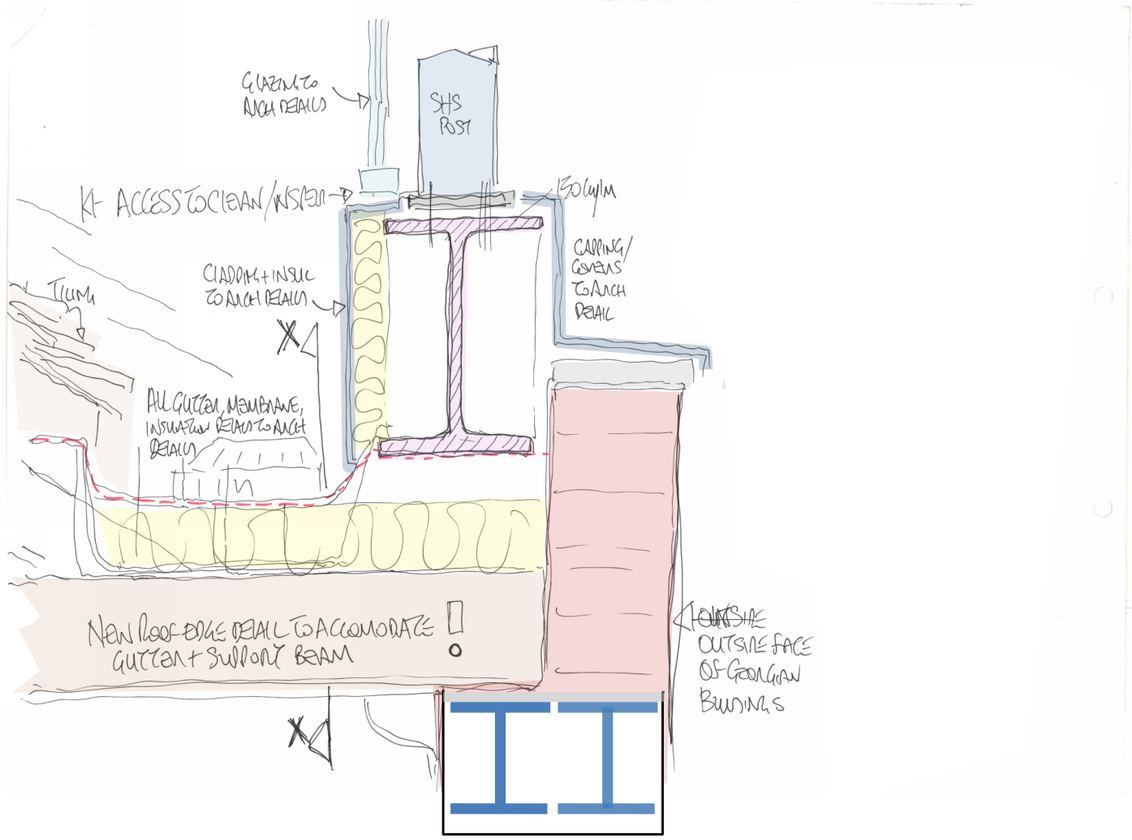
Section Y-Y

Sections



Allow 2 no. 203 x 71 kg/m UC sections on Padstones.
Cladding by architect.

Allow for 500 x 300dp In-Situ RC lintel to cap existing masonry and to support glazing.



Section A-A