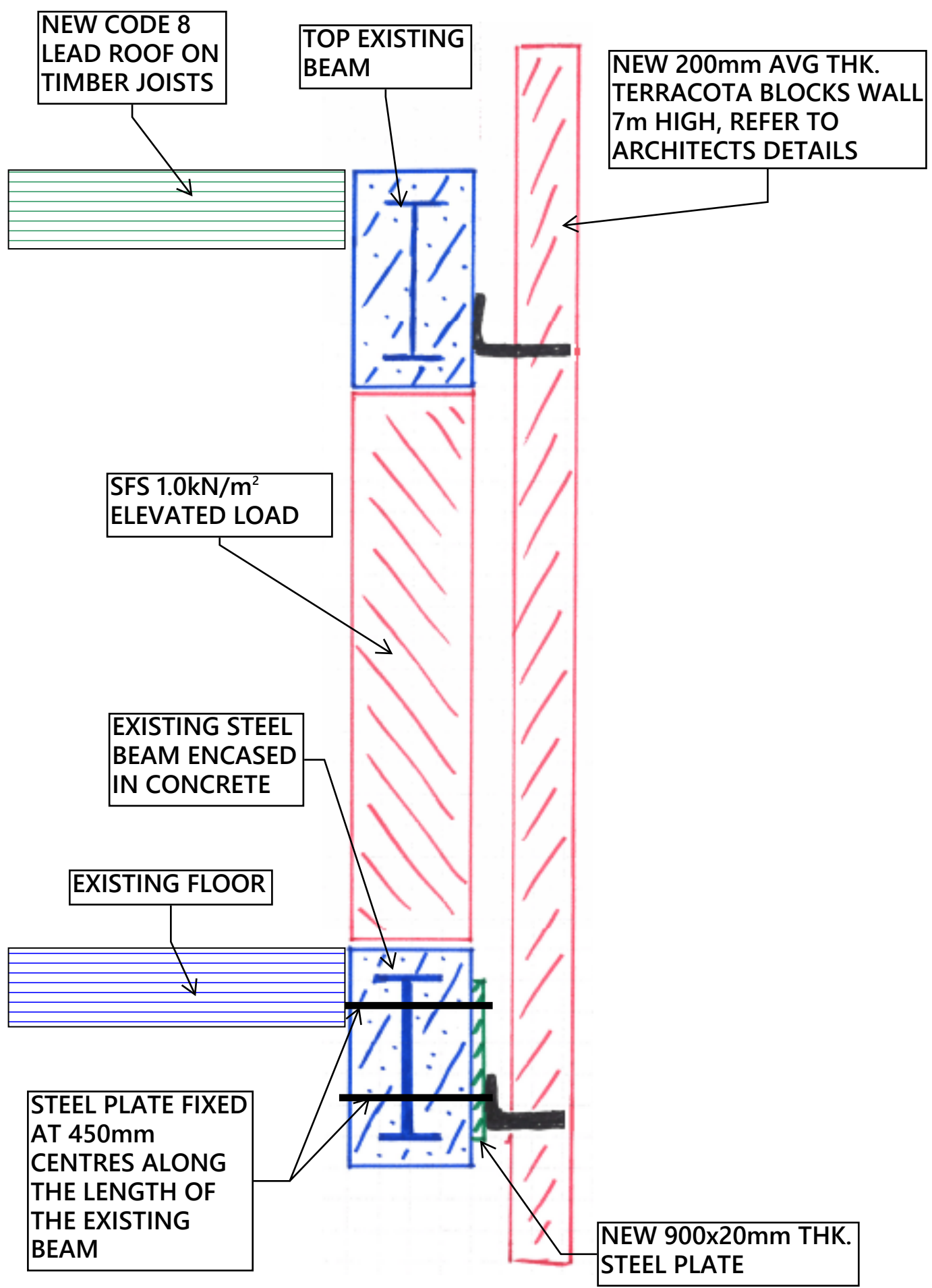
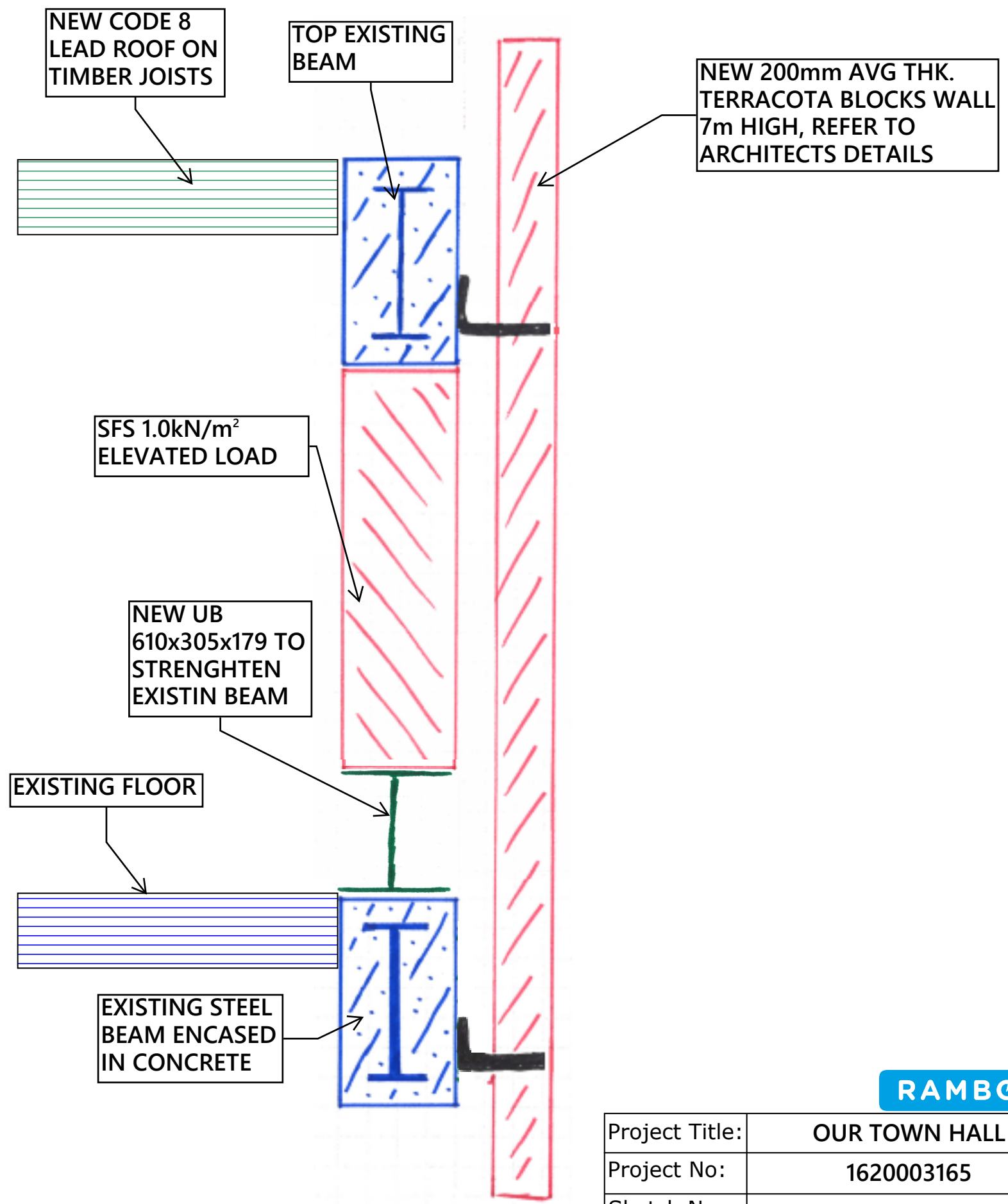




OPTION 1
Strengthening Plate



OPTION 2
Strengthening Beam



Project Title:	OUR TOWN HALL		
Project No:	1620003165		
Sketch No:			
Title:	Kitchen link strengthening options		
Scale:	NTS		
Eng:	Rev:	Date:	Checked:
SK	01	09/08/2019	

Gary Willis

From: Gary Willis
Sent: 19 August 2019 12:27
To: gareth.richings@purcelluk.com; Thomas.Kirby@purcelluk.com
Cc: Davis, Daniel; Isherwood, Kelly; 'David Hanna'; Paul Maddison; Bentley, Liam; Stelios Koukakis
Subject: RE: OTH - Former Bridge Link
Attachments: Ramboll SK 1 (19.08.19).pdf; Ramboll SK 2 (19.08.19).pdf; Ramboll SK 3 (19.08.19).pdf

Hi Gareth, Tom,

Further to last week's Former Kitchen workshop please find attached three sketches showing how the terracotta parapet panels can be laterally restrained. This became a bit more involved as where there is no existing roof beam (along the east elevation), we need to vertically support these panels too (as the SFS inner leaf won't do it!!)

When reviewing these sketches, please note:

SK 1 (west elevation)

- 120SHS posts secured to the existing steel roof beams cantilever up and laterally restrain the terracotta parapet panel. I have shown a 100x100 angle spanning between the tops of the posts, which the coping stone can be secured to via dowels. Any similarly stiff horizontal steel element could be provided at this level that better integrates with the terracotta panel/coping.
- Currently the posts are shown to the rear face of the parapet panel, hence would be dressed/concealed in lead as suggested at the meeting. Given the size, Purcell could now explore integrating this post within the depth of the parapet panel (they are at the same centres as the existing roof beams they are secured to, which is roughly 3m ctrs).
- The vertical load of the parapet panel is supported via a masonry build-up off the top of the existing steel beams (we need to coordinate the gable returns with the location of the existing roof beams)

SK 2 (east elevation)

- With only an SFS inner leaf, there is nothing to vertically support the terracotta parapet panel!!!!
- To laterally restrain the panel we have used double-cranked 120 SHS posts, which are centred on the new steel floor beam at their base and are concealed in the zone of the SFS inner leaf. They have a double crank at the top, to cantilever up at the top to restrain the parapet panel in the same manner as on the west side (with a 100x100 horizontal angle or similar along the top)
- Spanning between these posts, at roof level, are 254 UB's which: vertically support the terracotta parapet panel, vertically support the incoming timber roof joists, and offer a point to secure the SFS to from below.
- There will inevitably be some differential movement between the parapet panel and the terracotta outer leaf spanning up from below. We should therefore allow for a soft horizontal joint between these elements as shown. This should be replicated throughout.

SK3 (Roof & floor plan combined)

- To the east, the 254UB's need to span between cranked posts as shown. A post next to the historic fabric will avoid a major connection of the 254UB to it (just needing a more subtle restraint connection to the historic fabric). The 254UB's run the full outer perimeter, and provide support to the new parapet panel (which I assume runs the full new perimeter)
- These cranked posts must fix to steelwork at their base, but will need to be temporarily braced to remain upright until the timber roof goes on. Once the timber roof is in place and secured to the 254UB's, and the original Waterhouse link via a new supporting timber plate (or reusing the existing one once we establish what it is), the stiff diaphragm formed will stabilise the superstructure.
- I am not quite sure how the southern gable interfaces with the existing buttress to the Great Hall, but if this framework is modelled, we might know.

If this is ok, we can develop our input into a set of structural sketches for issue later this week or sometime next week (subject to finding someone to do it) which F&G could then cost, however hopefully with this you have sufficient to develop your LBC pack now.

Is there need for another review this week, and if so, will it be Tuesday (when Paul M can join us) or Wednesday (when you will have to put up with just me)?

Kind regards

Gary Willis

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From: Gary Willis <Gary.Willis@ramboll.co.uk>

Sent: 09 August 2019 18:59

To: gareth.richings@purcelluk.com; Thomas.Kirby@purcelluk.com

Cc: Davis, Daniel <Daniel.Davis@lendlease.com>; Isherwood, Kelly <Kelly.Isherwood@lendlease.com>; 'David Hanna' <David.Hanna@purcelluk.com>; Paul Maddison <Paul.Maddison@ramboll.co.uk>; Bentley, Liam <Liam.Bentley@lendlease.com>; Charlotte Smith <Charlotte.Smith@ramboll.co.uk>; Stelios Koukakis <Stelios.Koukakis@ramboll.co.uk>

Subject: RE: OTH - Former Bridge Link

Hi Gareth, Tom,

Further to the workshop on Wednesday (7th Aug) we confirm the advice given on cladding weights, and possible options forward as follows. This should be read in conjunction with our email (below) and the sketch (attached) as originally sent to Purcell on 22nd July. The sketch included helps identify where the loads described are applied to the west elevation.

West elevation load limits

Based on the original sketch, the allowable loading for the new wall line and roof build-up remain as before, i.e.

- 11.7 kN/m (1170kg/m) – wall allowance at the floor beam
- 2.7 kN/m (270kg/m) – wall allowance at the roof beam
- 0.8 – 1.0 kN/m² (80 – 100 kg/m²) – general roof allowance

If the existing the floor and roof beams were linked, the total capacity could be made available at the base, hence would be able to support 14.4 kN/m (1440 kg/m) – almost half a tonne every metre.

Review of the proposals tabled at 31/07 workshop

For Terracotta units (100mm thk), restrained back to SFS system, this would give an area load of 3 kN/m² (300 kg/m²), hence based on the total capacity noted above, this would allow a maximum height of cladding of 4.8m

For a timber roof finished in code 8 lead roof the self-weight is likely to be similar to that of the above

Items discussed at 07/08 workshop

As discussed, the existing beam capacities do not provide for the current architectural visuals which might have thicker areas of terracotta locally, and with inclusion of a 1.1m high parapet and an arched soffit below, would generate cladding total cladding heights of 7m approx. These would exceed the demonstrated capacities of the existing structure.

The options reusing the existing structure would be to:

1. Reduced the loading on the beam

- Consider thinner terracotta units. We think the minimum thickness of masonry that can be designed as stacked masonry and not a facing is 75mm, so reduced weights can be derived on a pro-rata basis,
- Reduce the parapet wall height (return to the rail shown on the previous Purcell sketch, or protect the edge from fall via other means)
- Use a 35mm thk terracotta rain screen as shown on the previous Purcell sketch and explore the jointing options to achieve a solid stacked masonry effect (we recognise this is not preferred based on feedback from Purcell & the Vic Soc)
- Explore a terracotta "slip" option, with units mounted on an jointed on a carrier board, supported from below & secured back to the SFS

2. Strengthen the beam

We do understand your preference is to strengthen the beam to allow your preferred detailing to be supported.

Strengthening options and scheme design information

Assumptions:

- Terracotta (200mm avg. thk) + SFS system would give an area load of 4.6 kN/m² (460kg/m²)
- Maximum cladding height of 7m (incorporating the parapet & arch). This would apply a load of = 32.2 kN/m (3220kg/m²) to the existing beams
- A roof finish of code 8 lead on timber joists, with a lightweight ceiling an nominal services (no heavy plant on the roof or hung from it)
- Deflection allowance = Span/1000 (total load) = 11mm (as the finishes as considered as "brittle")

Results:

- Plate fixed to the face of the existing 1000mm deep concrete encased steel beam = 900x20mm (or 850x25mm), see attached sketch titled Alternative Options*
- Beam section attached to the top of the 450mm wide concrete encased steel beam (hidden within the wall line) could be; UB 686x254x170, UB 610x305x179 or a UC 356x406x467

* the plate could also provide a fixing points for the masonry support angle. See below.

The sizes of steelwork noted above are driven but limiting deflection rather than have sufficient strength, over this almost 12m span. With a better understanding of permitted deflections (use of solf/lime mortar) and when deflections occur) these sizes might reduce. Similarly if the cladding weight is reduced from 200mm thick and 7m high the steel sizes could reduce.

Masonry support information: see attached Ancon brochure

We can discuss these at the next workshop. Hanging masonry without see the support angle is relatively easy. The decision would be if the angle were in curved sections to follow the profile of the arch below, or is set higher, is straight/level, and the units hanger further down from this to form the profile.

Rear (Eastern) Side of the Original Link

The existing beam appear to be ok in the currently proposed arrangement (as more load is being removed than is being re-applied)

The new diagonal beam, based on same assumptions as above, would be a UB533x312x150 (again limiting total working deflections to span/1000)

Steel Framing System (SFS) – Noting Liam’s record of the chat (albeit I can’t recall this)

With only 2400mm between the floor and underside of the existing roof beam, any proprietary SFS solution will do to resist wind pressures applied. I would allow at this stage for a 150mm deep stud zone. This are a proprietary system, and you can select from their safe load tables (i.e. stud spacing/thickness for various spacings and loadings). When the design is more developed we can explore if the SFS connect the beams together, or if we use hot rolled posts to do this.

Workshop on 13th Aug (which Paul M and I should be at)

As well as review all the above, at next week’s meeting we would like to discuss further:

- the gable ends
- positioning of proposed beams to support the gable
- the cladding allowance for the gable
- removal of existing beams close to the historic building

Kind regards

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From: Paul Maddison <Paul.Maddison@ramboll.co.uk>

Sent: 22 July 2019 17:45

To: 'David Hanna' <David.Hanna@purcelluk.com>

Cc: Davis, Daniel <Daniel.Davis@lendlease.com>; Isherwood, Kelly <Kelly.Isherwood@lendlease.com>; Gary Willis <Gary.Willis@ramboll.co.uk>

Subject: RE: OTH - Former Bridge Link

David,

Further to the initial sketch details you have sent through, please find attached our initial structural comments to show how we think the structure would work, to ensure that the proposed loading in the remaining structures is not exceeded.

On the face of it, the kind of material build ups you are showing look achievable. There are a few things for us to discuss to assist you in developing your details:

- Roof buildup – span of the timbers and the lead spec
- Loading limits to the top and bottom existing beams
- Vertical support to the terracotta cladding
- The existing floor (is this to be modified, ie removal of existing finishes to accommodate new?)

Perhaps we can have a catch up between meetings tomorrow (I am free between 11:30 and 14:00).

Kind regards

Paul Maddison

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From: David Hanna <David.Hanna@purcelluk.com>

Sent: 19 July 2019 09:27

To: Paul Maddison <Paul.Maddison@ramboll.co.uk>

Cc: Davis, Daniel <Daniel.Davis@lendlease.com>; Isherwood, Kelly <Kelly.Isherwood@lendlease.com>

Subject: OTH - Former Bridge Link

Paul

Please find attached an indicative sketch detail sections through the former kitchen bridge link to show the proposed build-ups and materials.

Teracotta block façade, built as conventional masonry with mortar joints. Blocks are 35mm thick minimum but with thickened edges – see photo.

For roof, timber deck with lead covering.

Plan and vertical setting out is shown on the current model.

Any questions please let me know – If you could progress with you design we could develop at a workshop on Tuesday after the cluster.

Gareth is also working on this next week for issue on Friday / Monday latest.

Another thought for LBC that we will need some details / description from you on the structural demolition of the existing beams. To explain the impact of the intervention. I recall Jamie mentioning that the beams were steel encased in concrete so the connection to the existing stone buttress would be minimal.

DAVID HANNA

B(Arch) MSc.

Associate

Design and Procurement Lead – OTH Team

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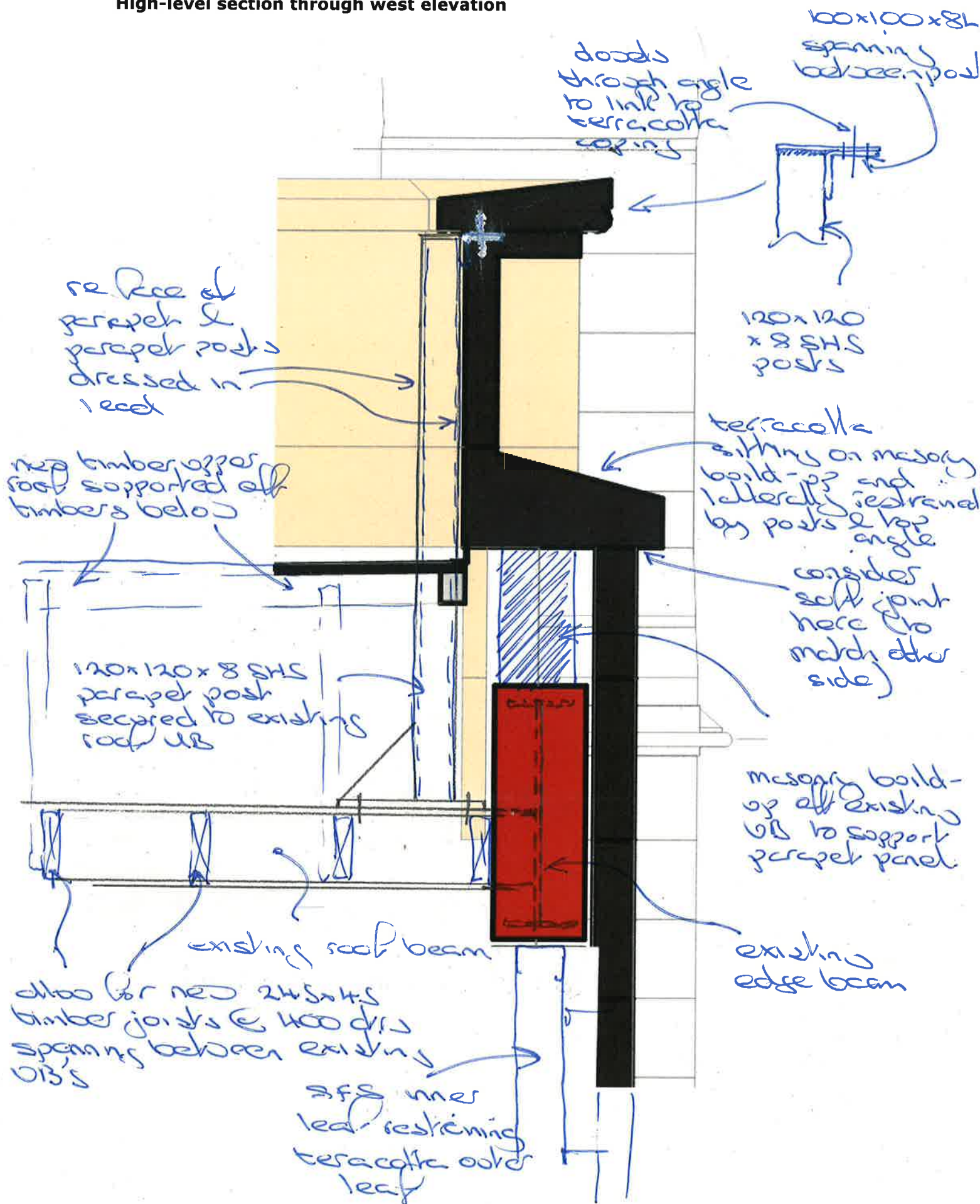
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Ramboll SK1
19/08/19

FORMER KITCHEN LINK

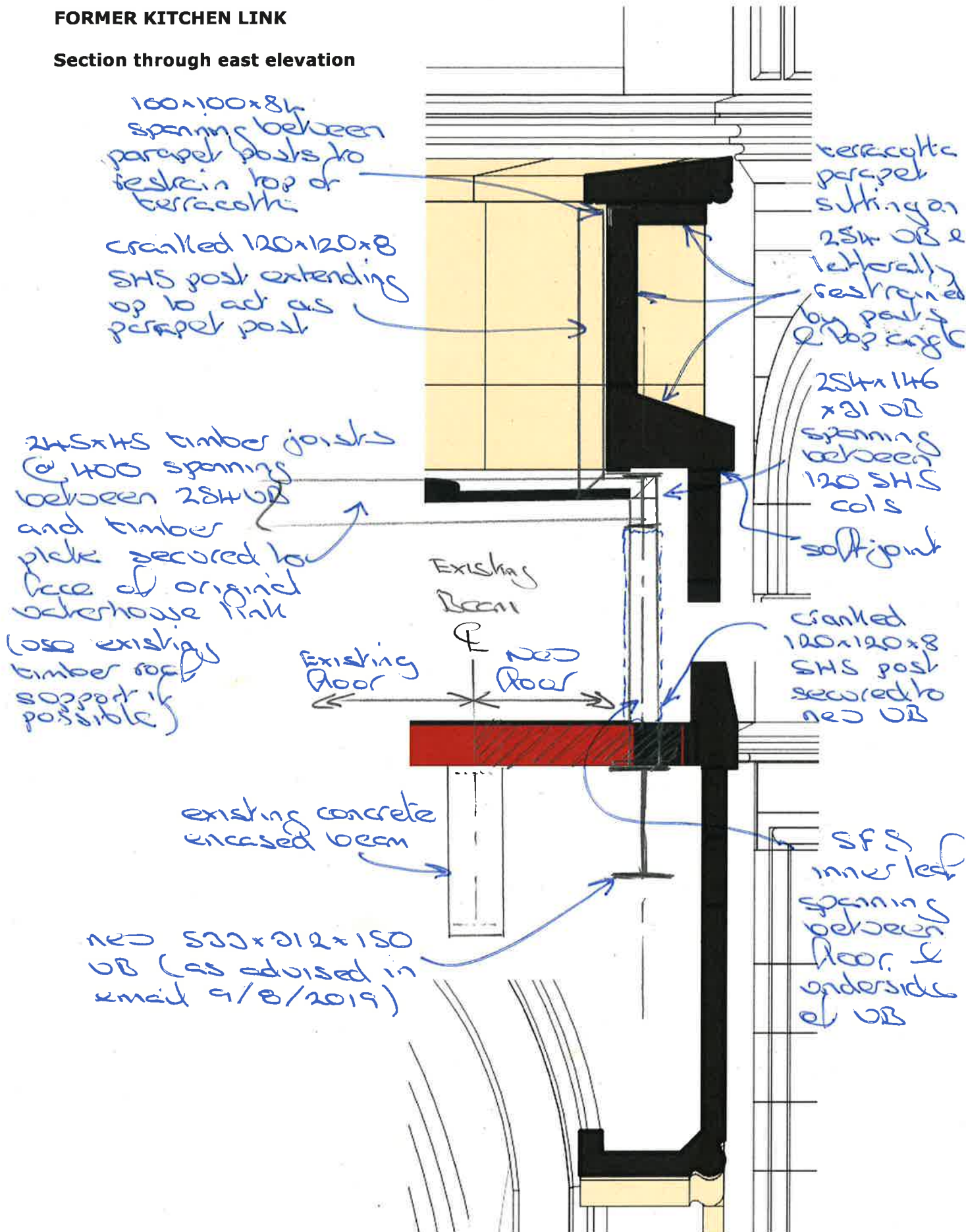
High-level section through west elevation



Ramboll SH2
19/08/19

FORMER KITCHEN LINK

Section through east elevation



15/08/15

