METSEC SFS – BLOCK WORK COST COMPARISON

29 JUNE 2009

CONTENTS

1.0 INTRODUCTION

1.1. Faithful+Gould was commissioned by Metsec plc to produce a report analysing the main construction cost differences between the Metsec SFS walling system and traditional block work to the internal skin of an external wall. Three scenarios have been considered where the external skin is facing brickwork, insulated render or timber cladding.

1.2 The report has been produced in an impartial way and the exclusions identified in section 6.0 must be taken into consideration.

2.0 COMPARISON MODEL USED

2.1 For clarity, the cost comparison has been made on the following basis:-

2.2 A four-storey concrete framed residential building. Each bay to be 7.2m wide by 2.7m high incorporating 2 No. 1.2m x 1.2m punched windows. Total cladding area is 4,000m^2 with 1,000m^2 of facing brickwork on the ground floor, 1,500m^2 of lightweight render and 1,500m^2 of timber cladding to the upper floors. The building itself is in the order of 2,000m^2 and is of simple shape with good site access and circulation.

2.3 All bays are to be the same. Doorways, cross-walls and the like are not considered, on the assumption these would be minimal anyway.

2.4 Structural calculations have already been carried out by Metsec plc and structural issues have not been considered further in this report. The Engineer has considered stability of the block work and wind posts are included to all floors.

2.5 Basis of costs are at today's prices for a building in Birmingham, West Midlands.

2.6 Full sections of the different wall details are contained in Appendix B.

3.0 COST COMPARISON

3.1 The details of the cost comparison are contained in Appendix A. All items have been carefully considered and the data has been collected from relevant sub-contractors and main contractors plus our own in house data sources.

3.2 Facing brickwork (ground floor)

With this example the use of SFS is marginally 4% lower in cost. There are several differences in design and reference should be made to the detailed review in Appendix A. The relatively cheap block is counter balanced with its higher window opening, wind post, head restraint, attendance and preliminary costs.

3.3 Insulated render (upper floors)

This scenario favours the use of SFS by 37%. The differentials tell the same story as before despite the SFS system requiring a relatively expensive cement particle board, the work at higher level requires significantly more wind posts (see note 2.4).

3.4 Timber panelling (upper floors)

Again this scenario favours the use of SFS by 38%. The specification for block work also requires it to have a secondary timber frame as well as relatively expensive plywood backing. Of all the scenarios, the block work/timber panelling has proved to be the most complex and labour intensive, hence the high comparable cost.

3.5 Total comparative cost

With the above combined for the comparison model, block work factors at £129.41/m^2 and the SFS at £88.10/m^2. You are strongly advised to read this in conjunction with all the following sections.

3.6 For clarity, the following items are not considered in the comparison as their cost will be similar for both scenarios. Only the items that differ are compared.

- Plasterboards reveals
- Window boards
- External facing brick work, render and timber cladding
- Decorations
- Windows
- Thermabate cavity closers
- Skirtings
- Sealing

3.0 COST COMPARISON (cont'd)

3.7 It must be understood that this comparison is made on the model identified in section 2.0; however circumstances will vary from project to project and the following issues will affect the outcome identified above:-

- Location of site and availability of materials
- Site restrictions i.e. access, storage, time of day etc. for deliveries and mixing plant
- Size and height of project
- Shape and complexity of the building
- Critical path requirement for water tightness and relationship with the extent of internal finish and mechanical and electrical works
- The need for an earlier programme finish
- Programme risk and weather related issues
- Availability of labour and materials
- Specification i.e., extent of acoustic and fire requirements
- Engineering characteristics of each building

4.0 ADVANTAGES AND DISADVANTAGES

4.1

Metsec SFS - Advantages	Block work - Advantages
• Quick to install	• Fair face can be used as a final finish
• Shorter programme provides earlier watertight building	• Better immediate fire rating
• Cleaner process	• Better immediate acoustic rating
• No site mixer/silo required	• Cheap cost of materials and labour
• Easier manual handling with lighter lifting	• Adaptable to design changes in-situ i.e. differing bay sizes, dog-legs and the like
• No secondary steel required (depending on elevation treatment)	• Easier for fixing F&F items too
• Considerably reduced lorry deliveries	
• Less labour intensive therefore fewer welfare requirements and health & safety issues	
• Re-cyclability	

4.2

Metsec SFS - Disadvantages	Block work – Disadvantages
• Internal lining required	• Internal standing scaffold required
• Linings to meet fire requirements	• Longer programme
• Acoustic treatment required	• Scaffold takes up space further restricting on site activities
• Material costs more expensive (without consideration to programme reductions or associated material requirements)	• Messy process with more waste
	• Manual handling including returning waste materials
	• Lining needs to be on dabs
	• Site mixer/silo required
	• Wind posts and lintels required
	• Dummy window frames required
	• Restricted working during freezing weather
	• High number of delivery lorries
	• Protected storage areas required

5.0 OTHER ASSOCIATED COSTS AND RISKS

5.1 The BRE Green Guide to Specification ratings 2008 give an A+ rating to the three block work scenarios and A+ for SFS/brickwork and SFS/timber cladding; there is no rating for SFS/render construction.

5.2 In a wider environmental context, you would have to consider on the one hand the recognised instant thermal and acoustic performance of block work against its more significant manual handling requirements.

5.3 Although delivery is built into the costs, lorry movements to and from site will be far more significant for block work. This has been calculated for this cost model and is demonstrated in Appendix A which shows that the Metsec components can be delivered in just two deliveries whereas the equivalent block work scenario requires approximately 56 (other factors such as the project specific wall make up need to be considered with a comparison such as this).

5.4 These extra lorry movements will also require additional banks men and site co-ordinators to handle them which also increases site health & safety concerns and would have a negative effect on Environmental Management Plans. Further lorry movements will be required for the carriage of mortar and waste. Although delivery charges are built into the costs this will be a significant factor in the design when for example considering the effect of construction on a local neighbourhood.

5.5 Depending on source of materials this issue can be considered for reducing a construction projects carbon footprint however, you would need to understand where the materials are sourced from. Block work can be manufactured and sourced locally and this will mitigate the impact on the road network but not the significant impact of deliveries to site. For clarity Metsec sections are manufactured in the West Midlands from steel from various sources.

6.0 EXCLUSIONS

- V.A.T.
- Professional fees
- Main contractor overheads and profit.
- Any additional structural measures required by either scenario.
- Items listed in section 3.6.

7.0 CONCLUSION AND RECOMMENDATION

7.1 This study has demonstrated in actual direct construction cost terms that Metsec SFS in lieu of block work is more competitive for this particular model. It has also highlighted several advantageous factors for using Metsec particularly relating to reduced time on site and in respect to direct environmental issues. Building users and clients should seriously consider the consequence of building delivery being earlier and the resultant earlier rental and return income.

7.2 As the model used changes so will the outcome. Smaller and less regular buildings will suit block work whilst high rise city centre construction will suit Metsec SFS as the use of block work becomes more impractical. This is the case with the Shepherd Construction report in Appendix C. This report does demonstrate the advantages to the follow on trades in getting onto site earlier.

7.3 We recommend that this study could be extended and enhanced with a questionnaire sent out to Contractors which would provide further information on this topic. In the current climate we are finding that Contractors are more willing to help, particularly as everyone is keener to innovate, reduce costs, improve health & safety and environmental performance.

7.4 For the Metsec SFS option, we strongly recommend that a study is commissioned into the relative environmental advantages that it can offer, highlighted in this report.

7.5 Similarly research should be directed at reviewing the parallel items i.e. the cement particle board to challenge their requirement and specification and ultimately mitigate their cost.

7.6 The current economic climate is providing new challenges with changing and falling market prices which in time will alter the cost comparisons in this study, so all the factors highlighted need to be constantly reviewed.

APPENDICES

APPENDIX A

COST COMPARISON DETAIL

FAITHFUL GOULD

Metsec Cost Comparison - Comparative Costs

Block cavity wall	Quantity	Unit	Rate(£)	Total(£)	SFS framing	Quantity	Unit	Rate(£)	Total(£)	% Difference
Facing brick (ground floor)					Facing brick (ground floor)					
1 layer 15mm plasterboard on dabs 2.7 high	333	m	53.33	17,757.23	2 layers 15mm plasterboard fixed to Metsec. 2.7 high	333	m	60.75	20,229.75	
140mm Topcrete dense concrete block work (3N/mm2)	766	m2	24.50	18,764.55	Metsec	899	m2	37.65	33,851.36	
Head restraint	333	m	12.50	4,162.50						
Wind post (1 No. Ancon WP2 150 x 70 x 6 angle per panel)	46	No.	265.00	12,256.25						
Galvanised insulated cavity wall lintel	93	No.	100.75	9,319.38	Galvanised steel angle lintel	93	No.	36.75	3,399.38	
Dummy frames	93	No.	28.75	2,659.38						
55mm Kingspan Kooltherm K8	766	m2	19.35	14,820.17	55mm Kingspan Kooltherm K12	766	m2	21.70	16,620.03	
Forming cavity with stainless steel ties	766	m2	2.75	2,106.23	Brick tie channels	899	m2	14.95	13,441.55	
Additional attendance and preliminaries					Additional attendance and preliminaries					
Standing scaffold	766	m2	10.00	7,659.00	Aluminium tower*	899	m2	5.24	4,713.02	
Waste**	1	item	1,072.26	1,072.26	Waste	1	item		included	
Lifting	1	item		ground floor	Lifting	1	item		base	
Programme time increase*	1.01	weeks	5,589.00	5,646.05	Programme time	1	item		base	
Total comparison for facing brickwork (ground floor)	1,000	m2	96.22	96,222.97	Total comparison for facing brickwork (ground floor)	1,000	m2	92.26	92,255.09	- 4.12
Render system (upper floors)					Render system (upper floors)					
1 layer 15mm plasterboard on dabs 2.7 high	500	m	53.33	26,635.84	2 layers 15mm plasterboard fixed to Metsec. 2.7 high	500	m	60.75	30,344.63	
140mm Topcrete dense concrete block work (3N/mm2)	1,149	m2	24.50	28,146.83	Metsec	1,349	m2	37.65	50,777.05	
Head restraint	500	m	12.50	6,250.00						
Wind post (4 No. Ancon 120 x 8 angles per panel)	278	No.	290.00	80,475.00						
Galvanised steel angle lintel	139	No.	36.75	5,099.06						
Dummy frames	139	No.	28.75	3,989.06						
Vapour control layer	1,299	m2	2.50	3,246.75	12mm cement particle board	1,299	m2	17.04	22,135.37	
Additional attendance and preliminaries					Additional attendance and preliminaries					
Standing scaffold	1,149	m2	10.00	11,488.50	Aluminium tower*	1,349	m2	5.24	7,069.54	
Waste**	1	item	1,608.39	1,608.39	Waste	1	item		included	
Lifting***	1	item	500.00	500.00	Lifting	1	item		base	
Programme time increase*	1.52	weeks	5,589.00	8,469.07	Programme time	1	item		base	
Total comparison for render system (upper floors)	1,500	m2	117.27	175,908.50	Total comparison for render system (upper floors)	1,500	m2	73.55	110,326.58	- 37.28
Timber panelling (upper floors)					Timber panelling (upper floors)					
1 layer 15mm plasterboard on dabs 2.7 high	500	m	53.33	26,635.84	2 layers 15mm plasterboard fixed to Metsec. 2.7 high	500	m	60.75	30,344.63	
140mm Topcrete dense concrete block work (3N/mm2)	1,149	m2	24.50	28,146.83	Metsec	1,349	m2	37.65	50,777.05	
Head restraint	500	m	12.50	6,250.00						
Wind post (4 No. Ancon 120 x 8 angles per panel)	278	No.	290.00	80,475.00						
Galvanised steel angle lintel	139	No.	36.75	5,099.06						
Dummy frames	139	No.	28.75	3,989.06						
Vapour control layer	1,299	m2	2.50	3,246.75	Insulation between studs (additional allowance)	1,149	m2	5.00	5,744.25	
Frame of 125 x 50 members	5,182	m	6.25	32,389.45	100mm rigid insulation board	1,299	m2	26.00	33,766.20	
18mm wpb plywood lining	1,299	m2	20.00	25,974.00	12mm cement particle board	1,299	m2	17.04	22,135.37	
125mm Rockwool insulation batts	1,500	m2	7.50	11,250.00						
Additional attendance and preliminaries					Additional attendance and preliminaries					
Standing scaffold	1,149	m2	10.00	11,488.50	Aluminium tower*	1,349	m2	5.24	7,069.54	
Waste**	1	item	1,608.39	1,608.39	Waste	1	item		included	
Lifting***	1	item	500.00	500.00	Lifting	1	item		base	
Programme time increase*	1.52	weeks	5,589.00	8,469.07	Programme time	1	item		base	
Total comparison for timber panelling (upper floors)	1,500	m2	163.68	245,521.95	Total comparison for timber panelling (upper floors)	1,500	m2	99.89	149,837.03	- 38.97
Total comparative cost	4,000	m2	129.41	517,653.41	**Total comparative cost**	4,000	m2	88.10	352,418.69	- 31.92

Notes

*Based on 4 block work gangs constructing 320m2/week above 2 Metsec gangs constructing 650m2/week.
**Additional skip provision for 5% of all block work being 'waste'.
***Allowance for teleporter/forklift working harder with additional manual handling requirements.

Lorry movements (only block work and Metsec considered)
Note: this is movements on and off site and does not consider the varying travel distance from material source

Delivery of blocks	Articulated		36
Waste skips (drop off plus pick up)	Rigid	say	14
Mortar	Rigid	say	6
	Total return lorry movements		56

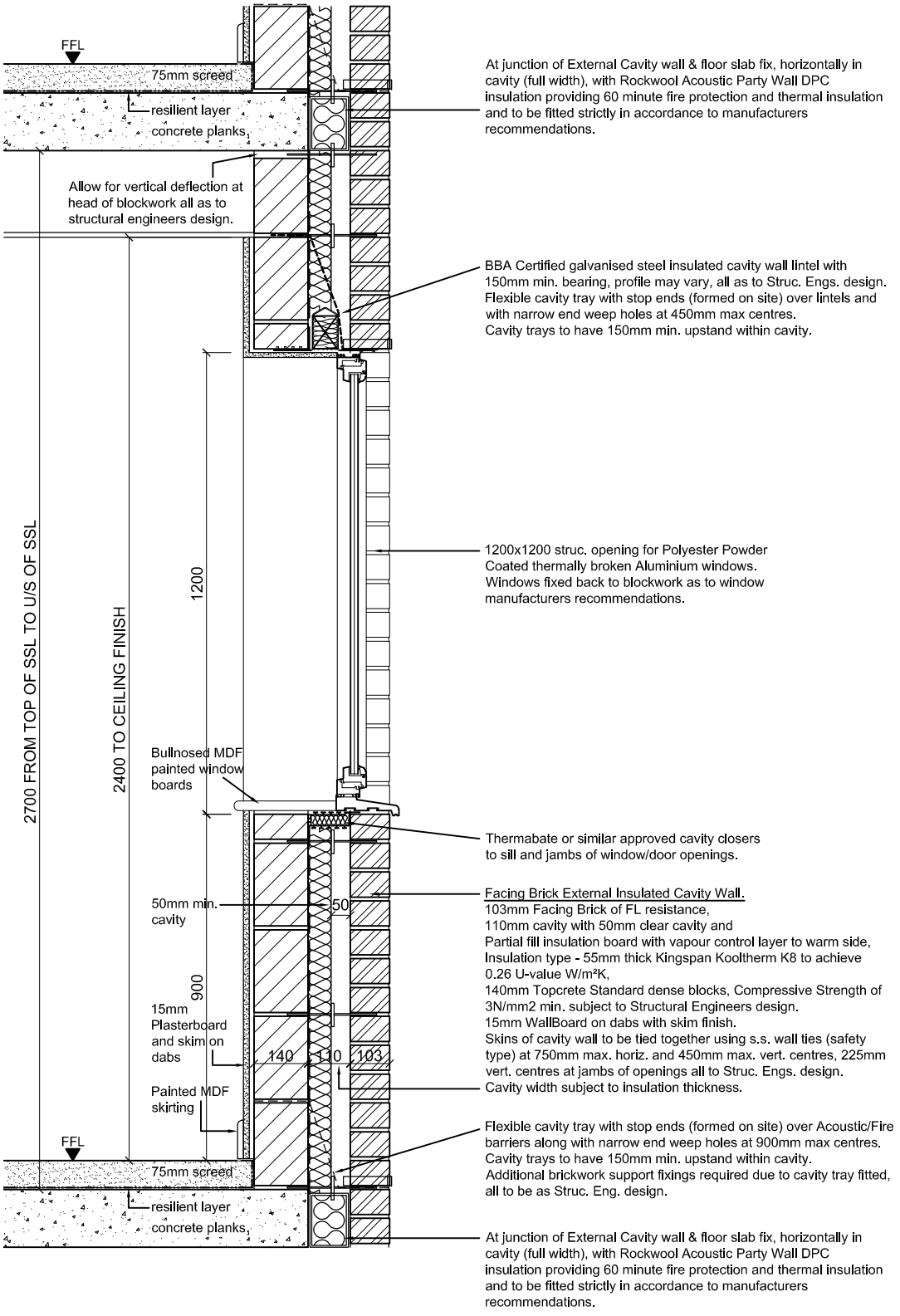
*Based on two towers per gang; two gangs achieving 650m2 per week.

Lorry movements (only block work, particle board and Metsec considered)
Note: this is movements on and off site and does not consider the varying travel distance from material source

Delivery of Metsec	Articulated	1
	Rigid	1
Particle board (render and timber cladding only)	Articulated	2
	Total return lorry movements	4

APPENDIX B

ROBOTHAMS ARCHITECTS AND METSEC - WALL DETAILS



WALL TYPE A1
BRICK FACE EXTERNAL WALL
WITH INNER BLOCK WALL

Robothams Architects - The Old Library, 12 Church Street, Warwick CV34 4AB - T 01926 493843 F 01926 495314 - architects@robothams.co.uk - www.robothams.co.uk

PROJECT TITLE	DRAWING TITLE	STATUS	APPROVED
METSEC SFS / BLOCK COST COMPARISON	WALL TYPE A1 BRICK FACING EXT. WALL Inner Block Wall	SCALE NTS / SHEET SIZE A4	DRAWN KPM
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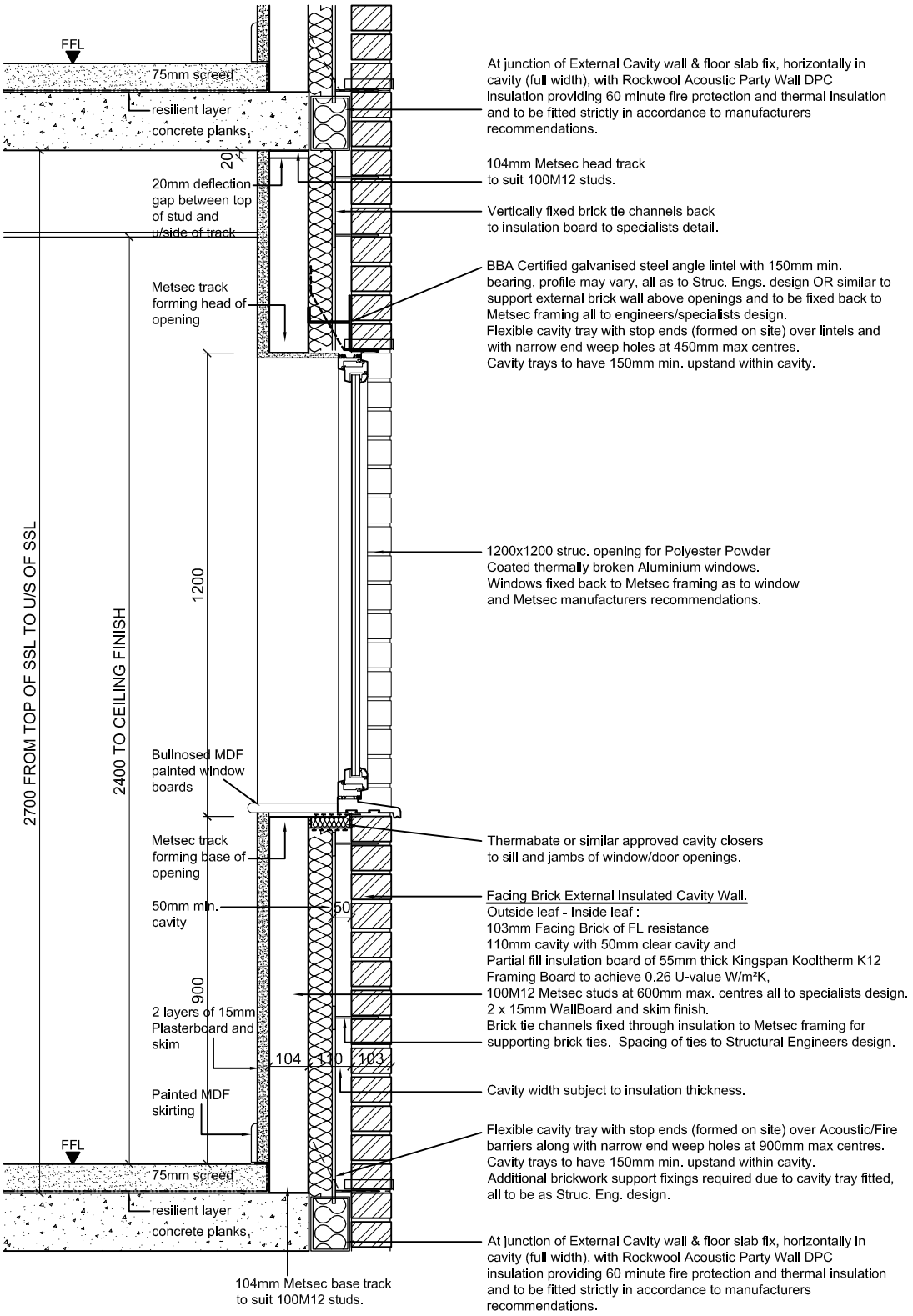
		DWG NO. 2499-001	REVISION



WALL TYPE A2
BRICK FACE EXTERNAL WALL WITH INNER METSEC FRAMING

robothams

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PROJECT TITLE	DRAWING TITLE	STATUS	APPROVED		
METSEC SFS / BLOCK COST COMPARISON	WALL TYPE A2 BRICK FACING EXT. WALL Inner Metsec Framing	SCALE	NTS	SHEET SIZE A4	DRAWN KPM
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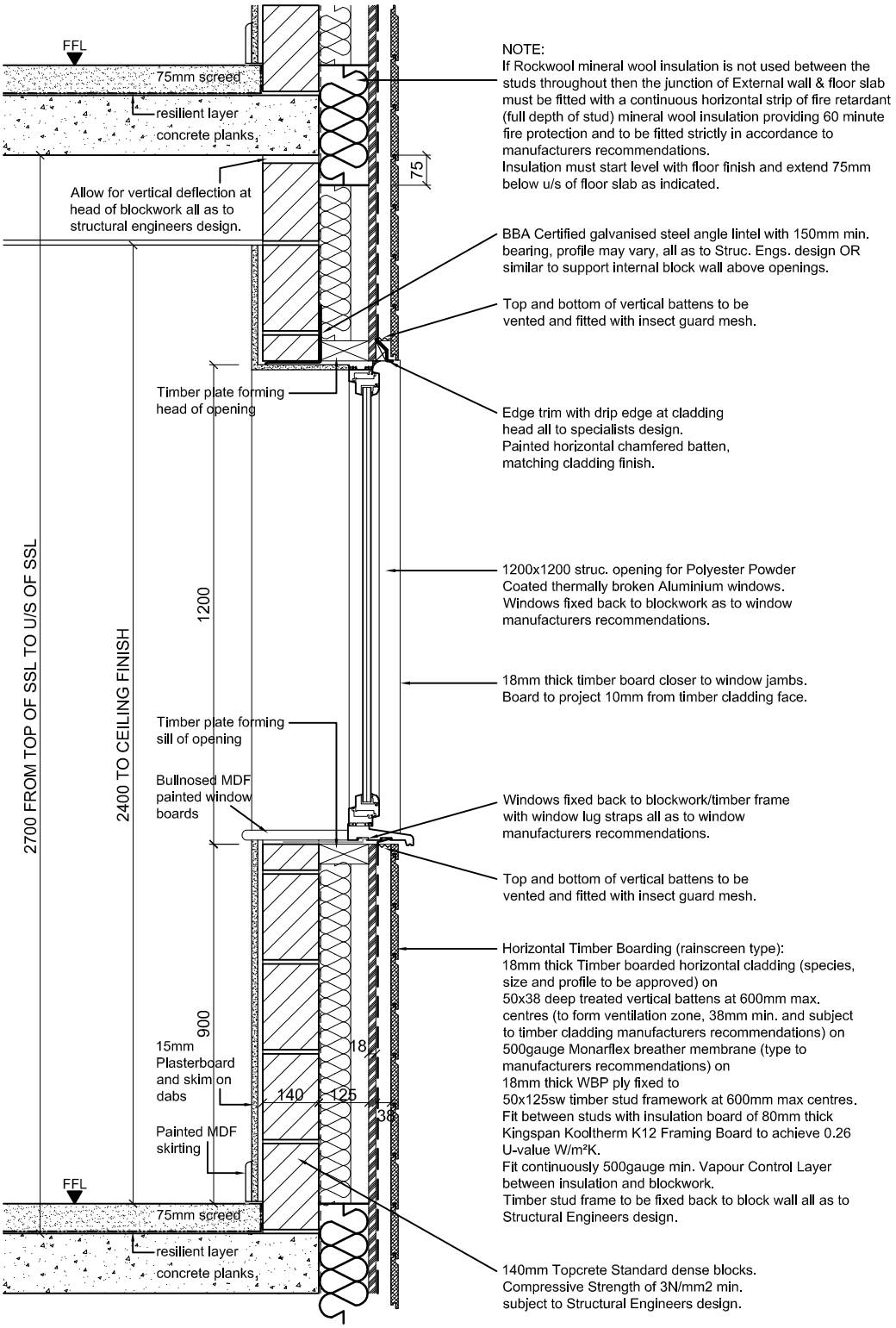

WALL TYPE B1
TIMBER CLADDING EXTERNAL WALL
WITH INNER BLOCK WALL

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PROJECT TITLE	DRAWING TITLE	STATUS	APPROVED		
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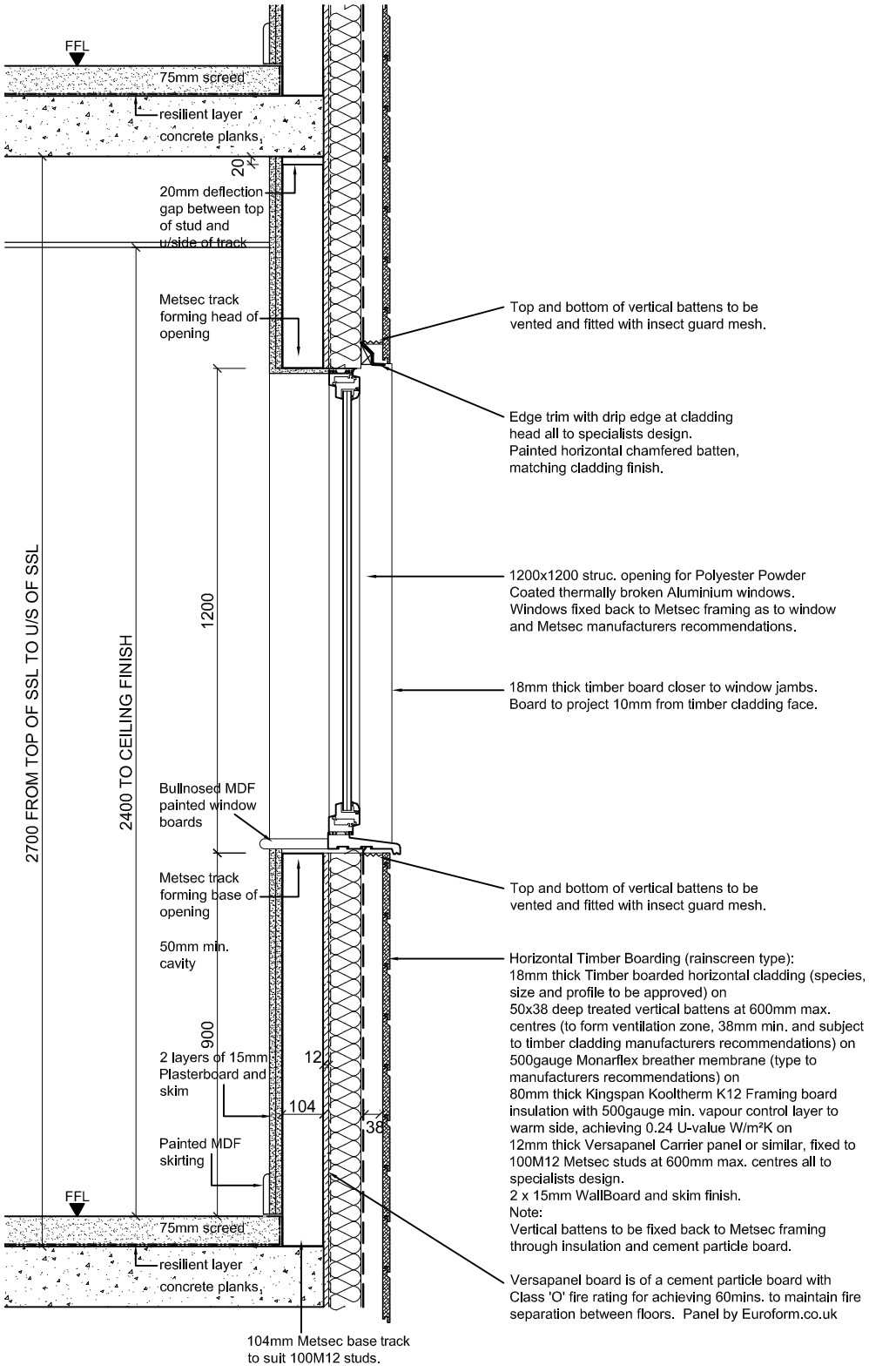

WALL TYPE B2
TIMBER CLADDING EXTERNAL WALL
WITH INNER METSEC FRAMING

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PROJECT TITLE	DRAWING TITLE	STATUS	APPROVED		
METSEC SFS / BLOCK COST COMPARISON	WALL TYPE A1 TIMBER CLADDING EXT. WALL Inner Metsec Framing	SCALE	NTS	SHEET SIZE A4	DRAWN KPM
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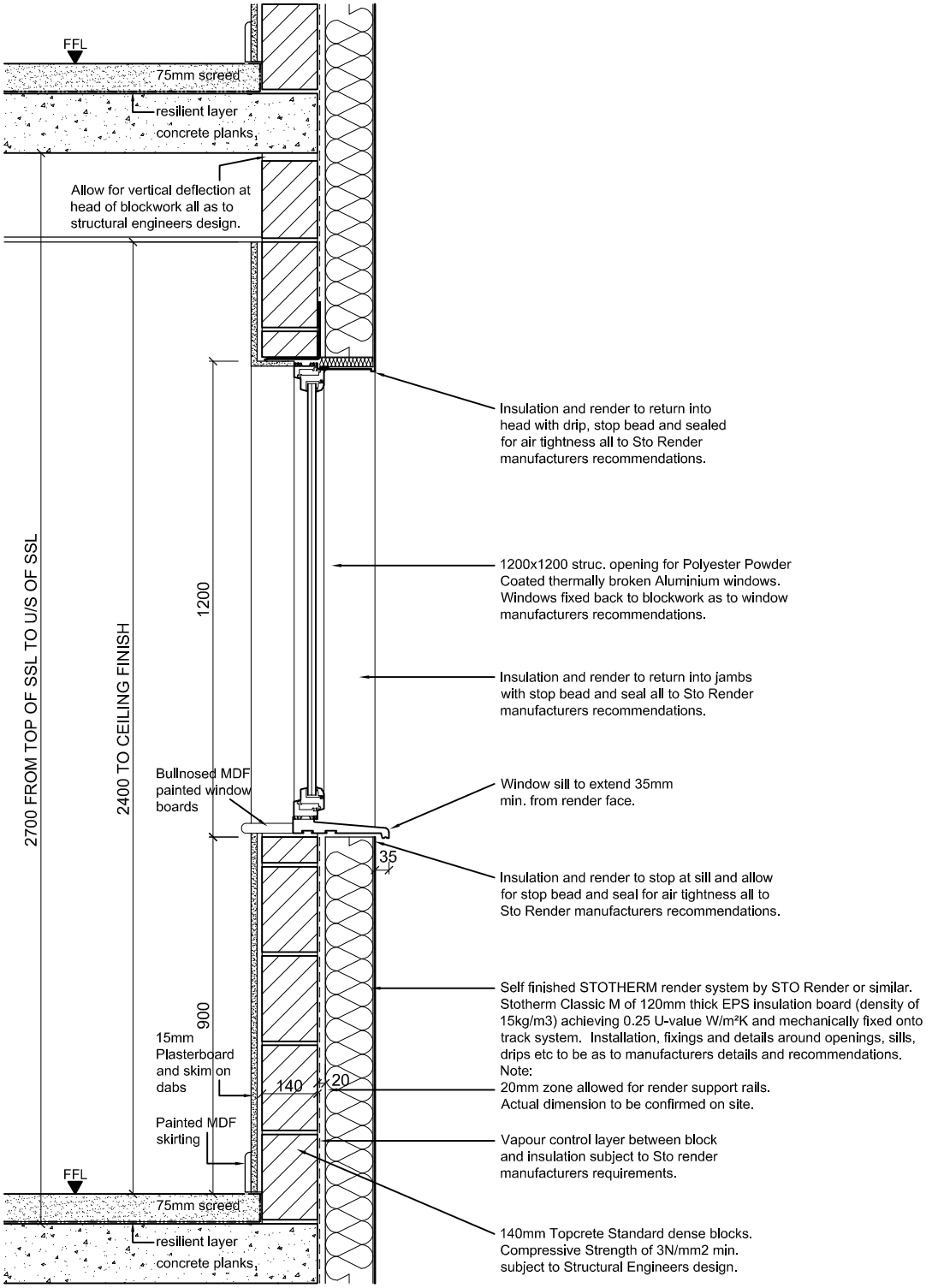

WALL TYPE C1
INSULATED RENDER EXTERNAL WALL
WITH INNER BLOCK WALL

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PROJECT TITLE	DRAWING TITLE	STATUS APPROVED			
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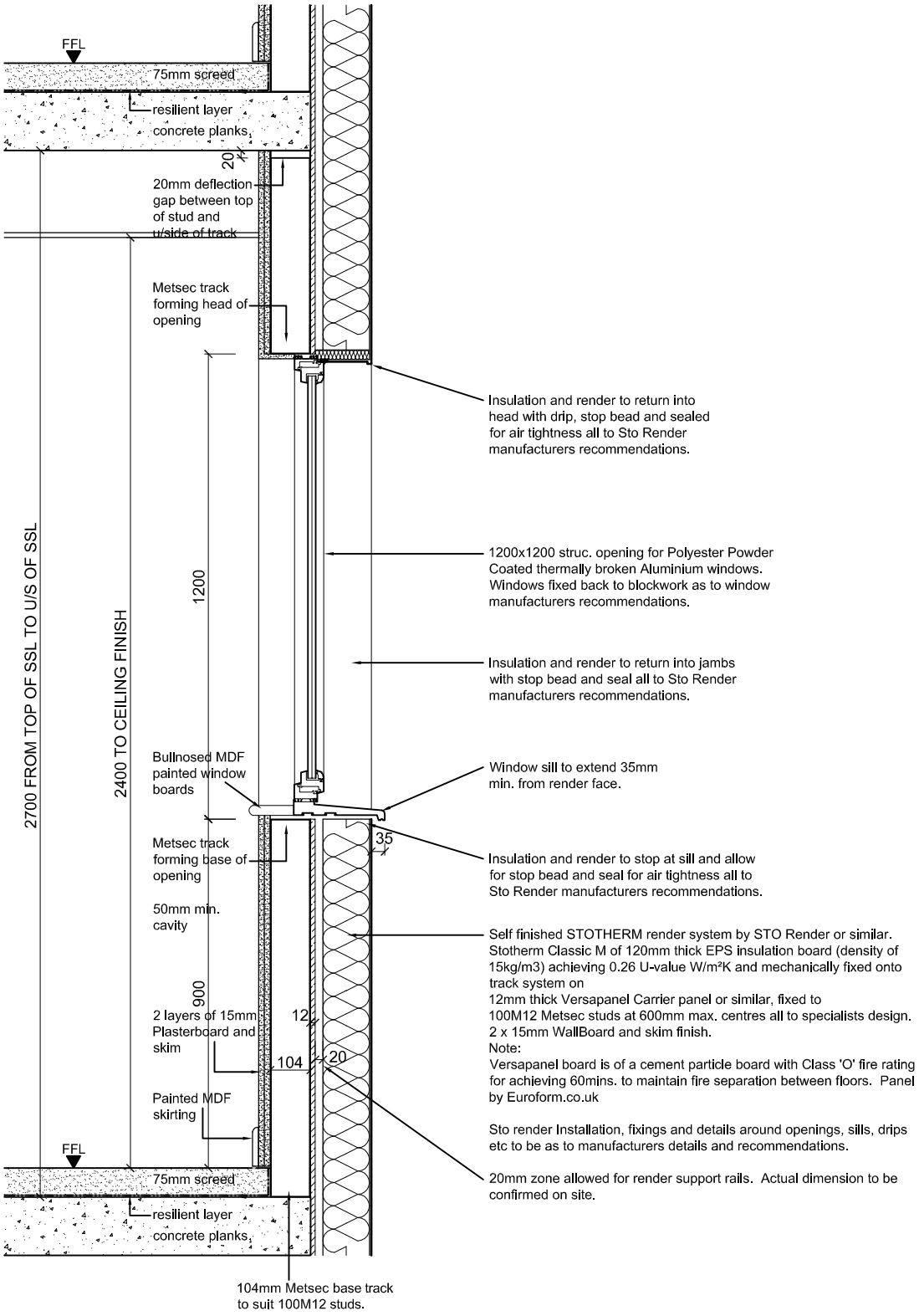

WALL TYPE C2
INSULATED RENDER EXTERNAL WALL
WITH INNER METSEC FRAMING

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PROJECT TITLE	DRAWING TITLE	STATUS	APPROVED		
METSEC SFS / BLOCK COST COMPARISON	WALL TYPE C2 RENDER FACING EXT. WALL Inner Metsec Framing Wall	SCALE	NTS	SHEET SIZE A4	DRAWN KPM
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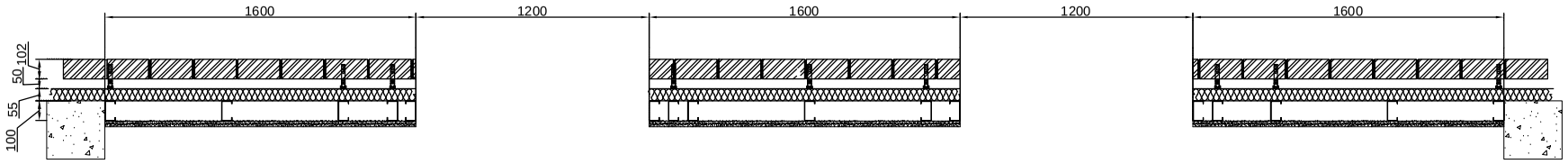

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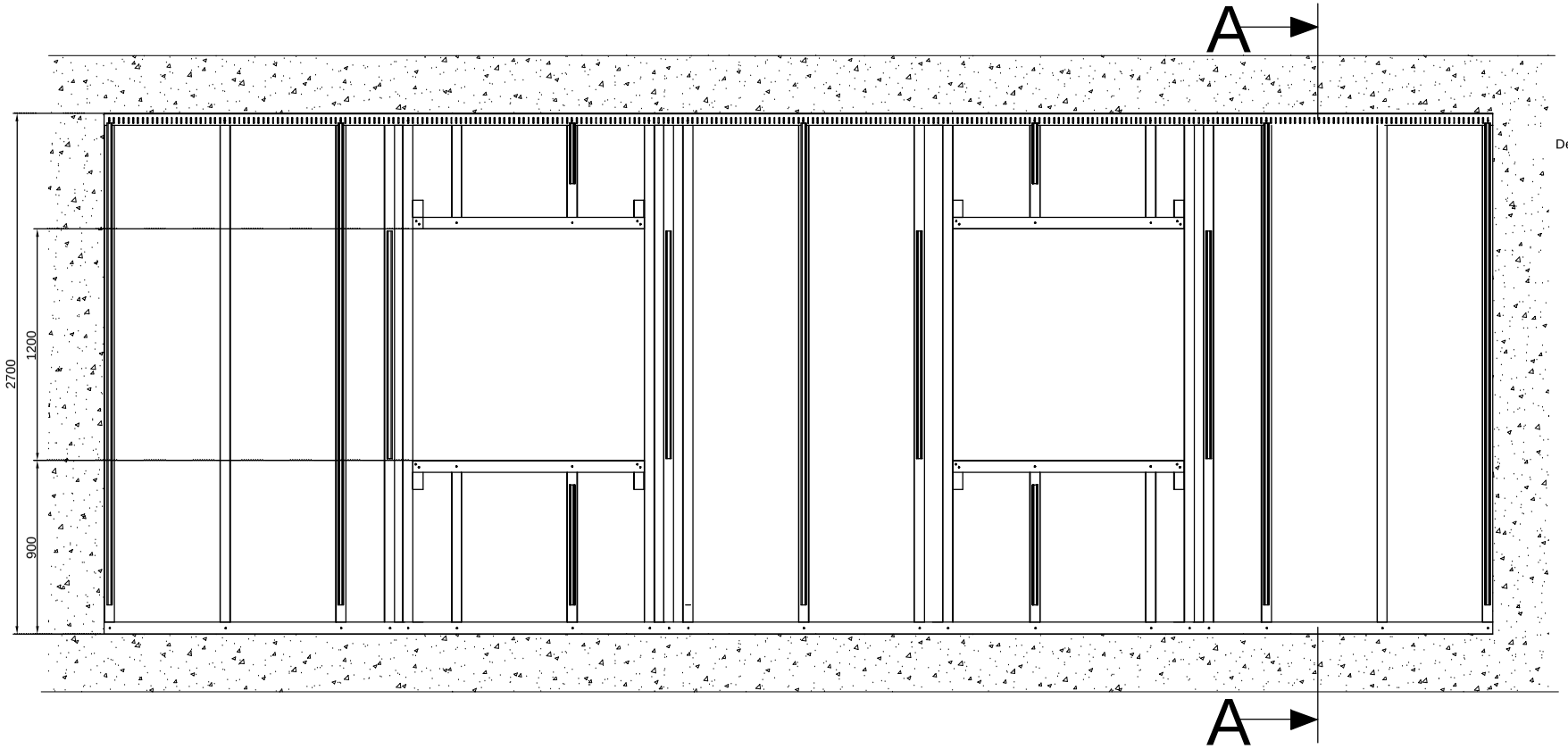

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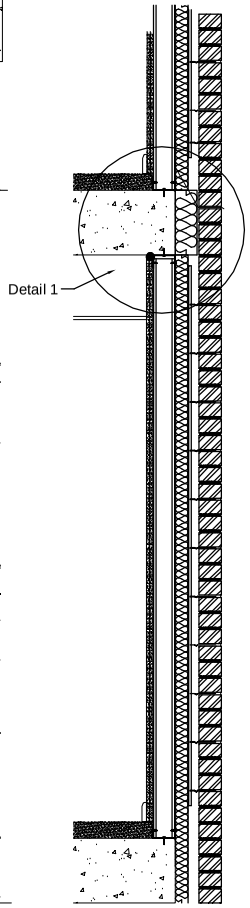

SECTION
A-A

REVISION	DATE	DESCRIPTION

NOTES

DRAWN	JH
DATE	11/06/09
CHECKED	
DATE	

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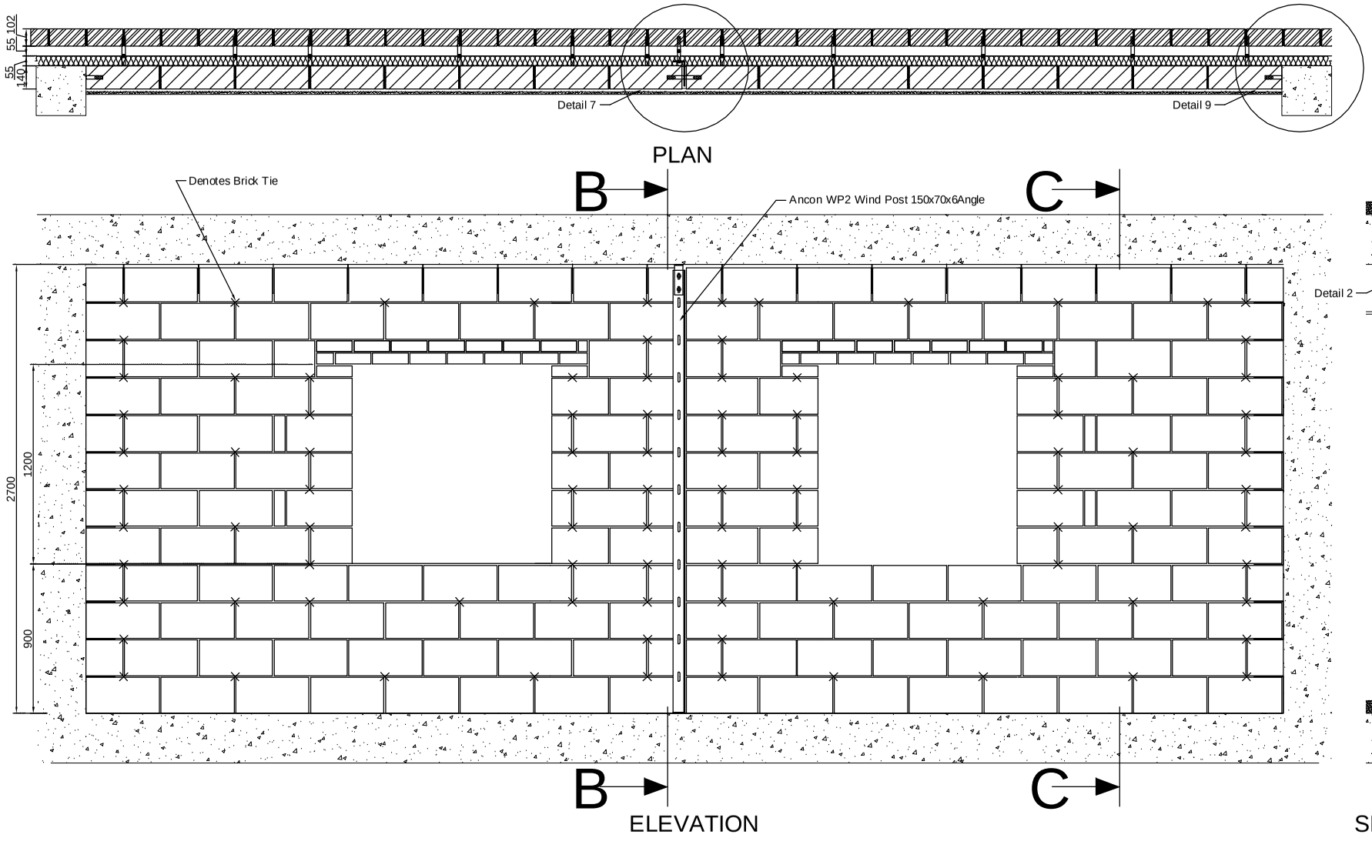
voestalpine
ONE STEP AHEAD.

CLIENT: METSEC FRAMING	PROJECT: Metsec SFS vs Block Work Comparison	JOB No.: RT001	
STATUS: EXAMPLE	TITLE: Typical SFS Panel with Brick Cladding	DWG No.: GA01	REV:



REVISION DATE DESCRIPTION

NOTES

DRAWN JH	DATE 11/06/09
CHECKED	DATE

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CLIENT: METSEC FRAMING	PROJECT: Metsec SFS vs Block Work Comparison	JOB No.: RT001	
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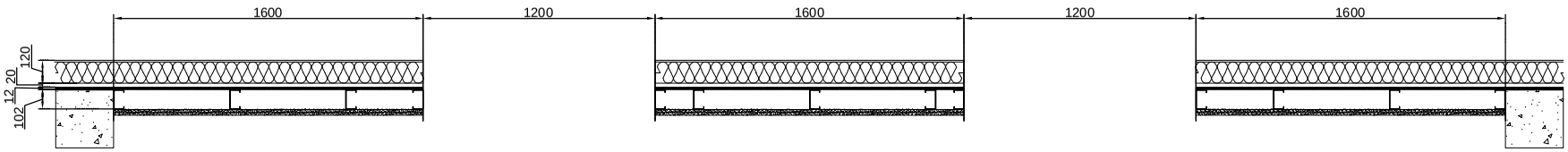
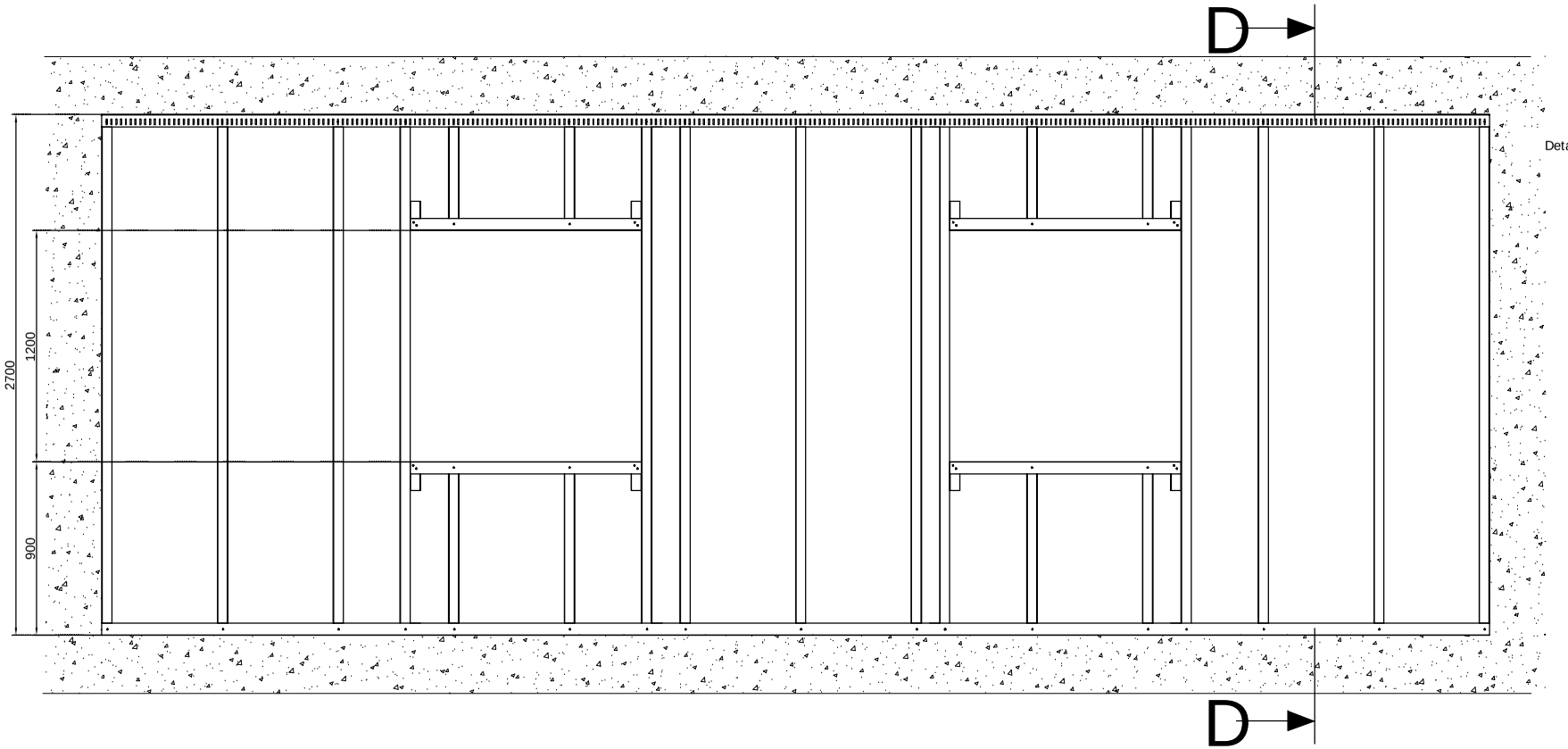
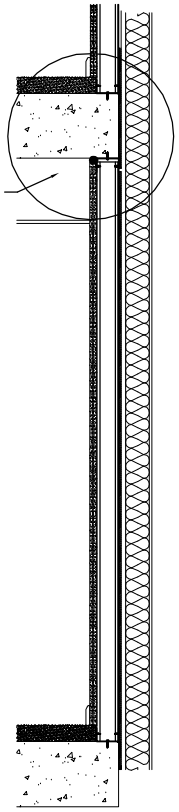


PLAN



ELEVATION



SECTION
D-D

REVISION	DATE	DESCRIPTION

NOTES

DRAWN	DATE
JH	11/06/09
CHECKED	DATE

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CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
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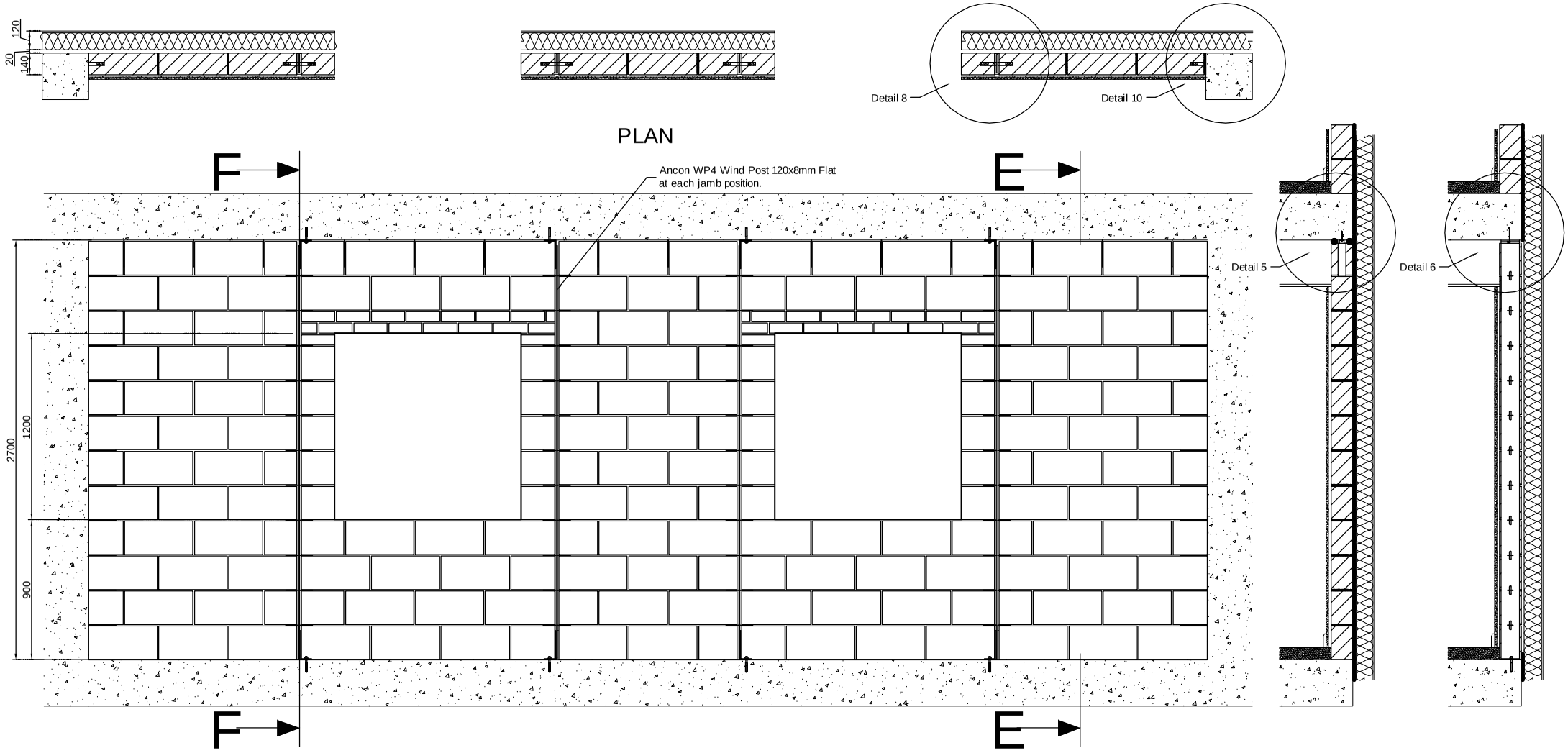

REVISION	DATE	DESCRIPTION

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VAT Registered No. GB 428 7252 36.
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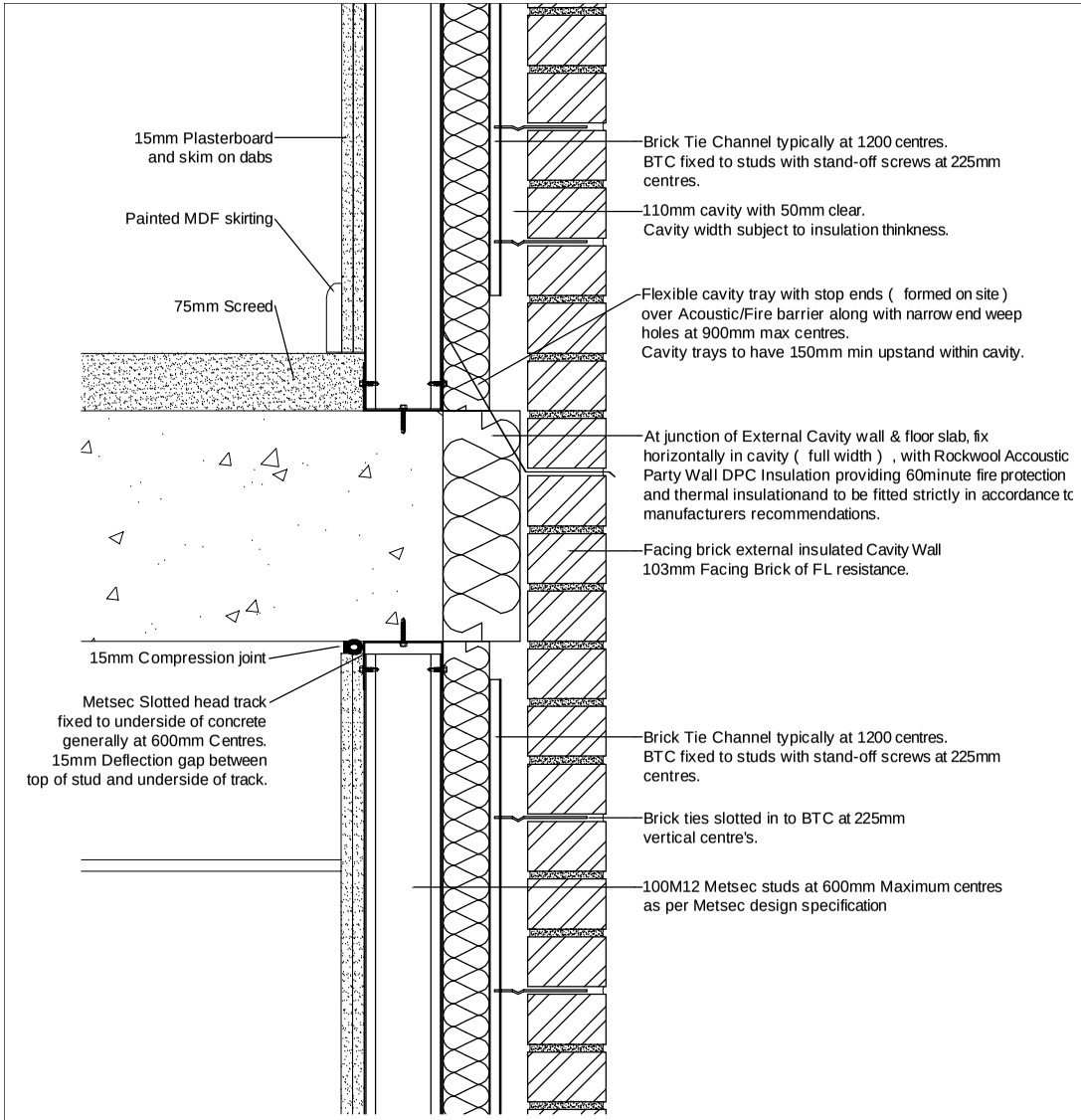
ONE STEP AHEAD.

CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
STATUS	TITLE	DWG No.	REV
EXAMPLE	Typical Block work Panel with Insulated Render	GA04	



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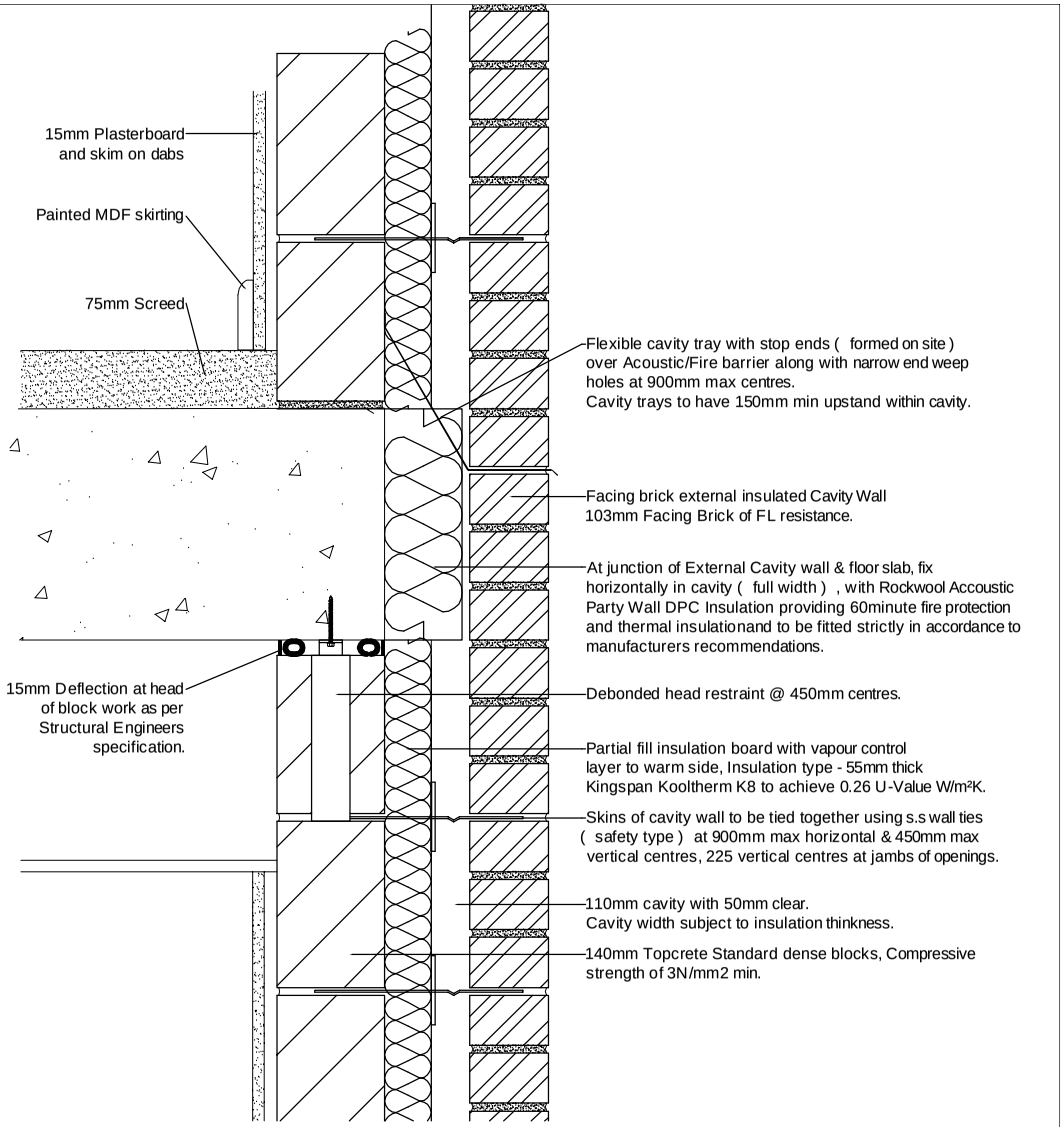

Detail 3

REVISION	DATE	DESCRIPTION

NOTES

DRAWN	DATE
JH	11/06/09
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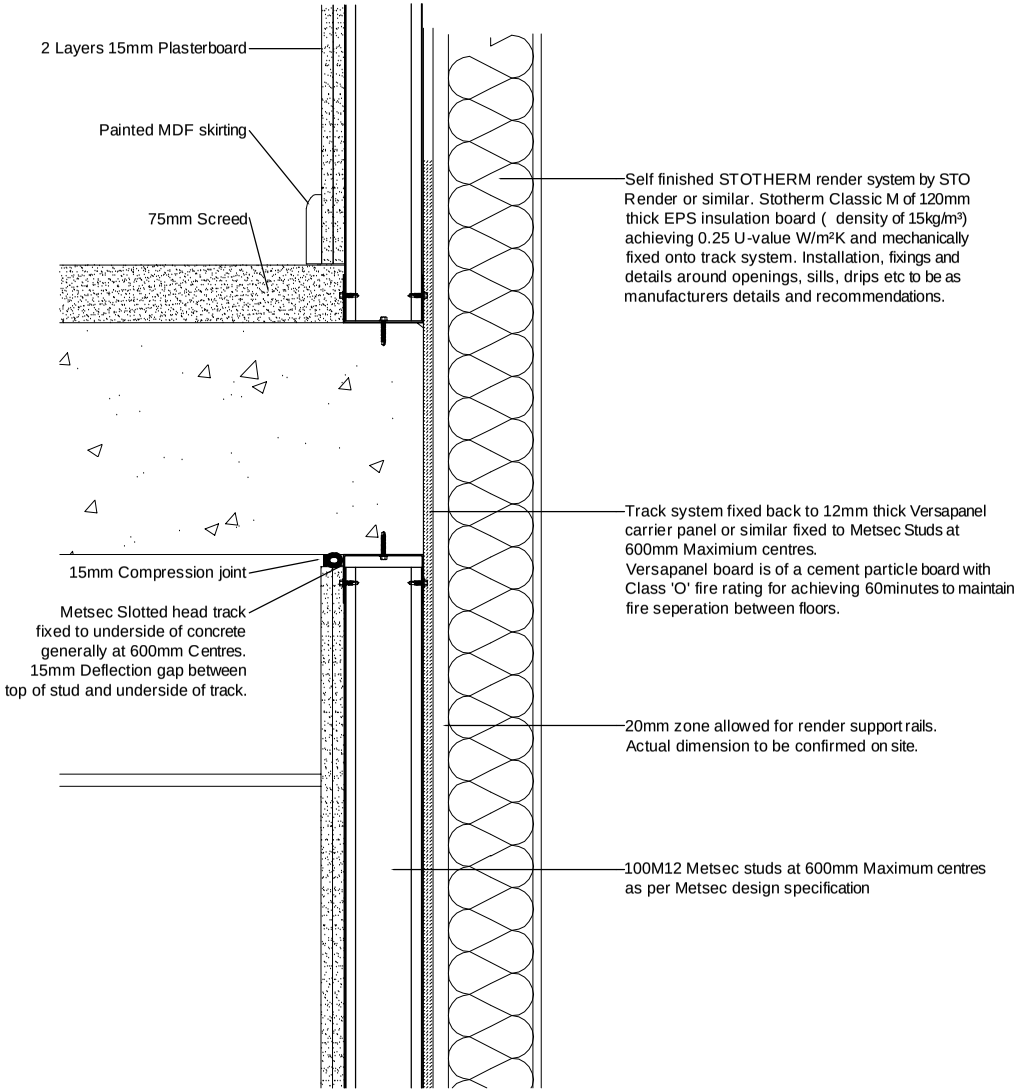
ONE STEP AHEAD.

CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
STATUS	TITLE	DWG No.	REV
EXAMPLE	Brick work Cladding Details	GA05	



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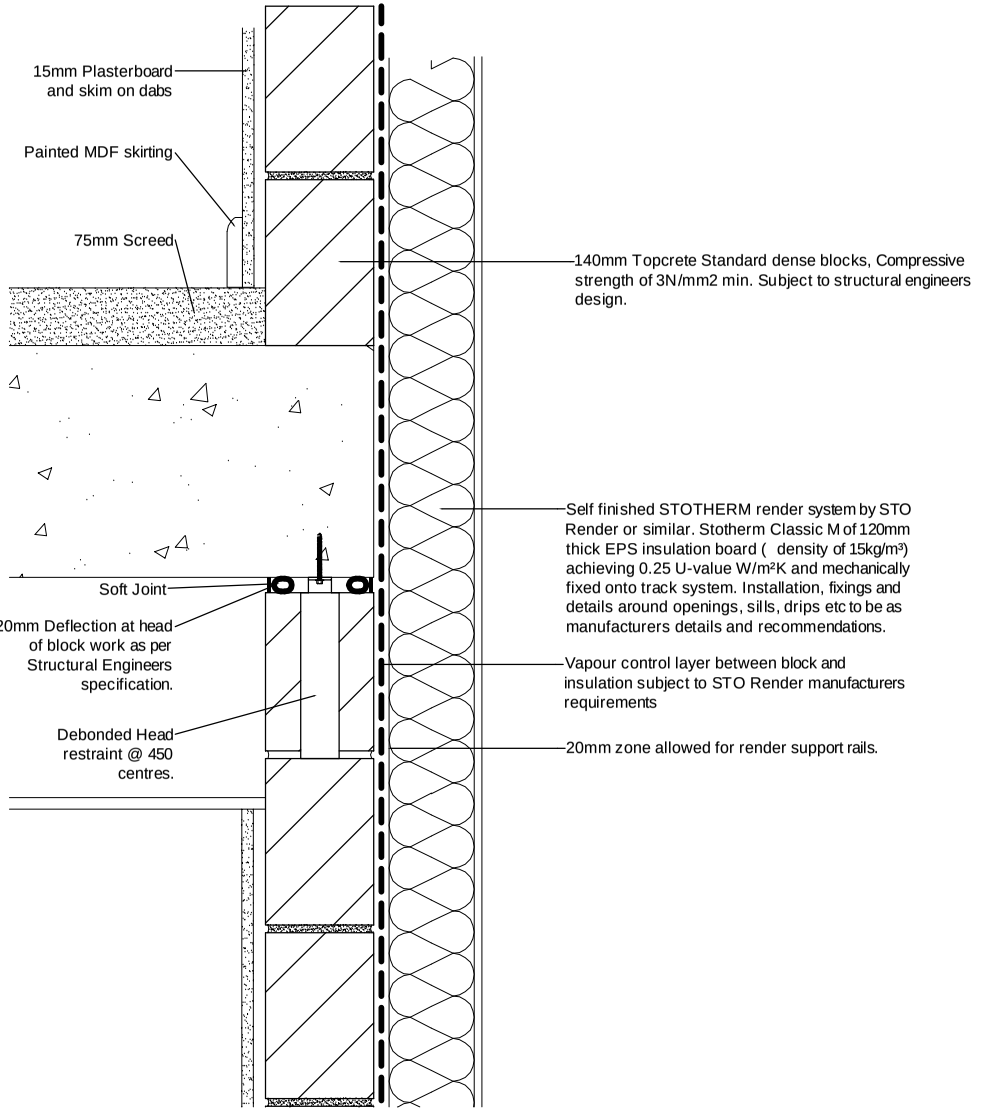

Detail 5

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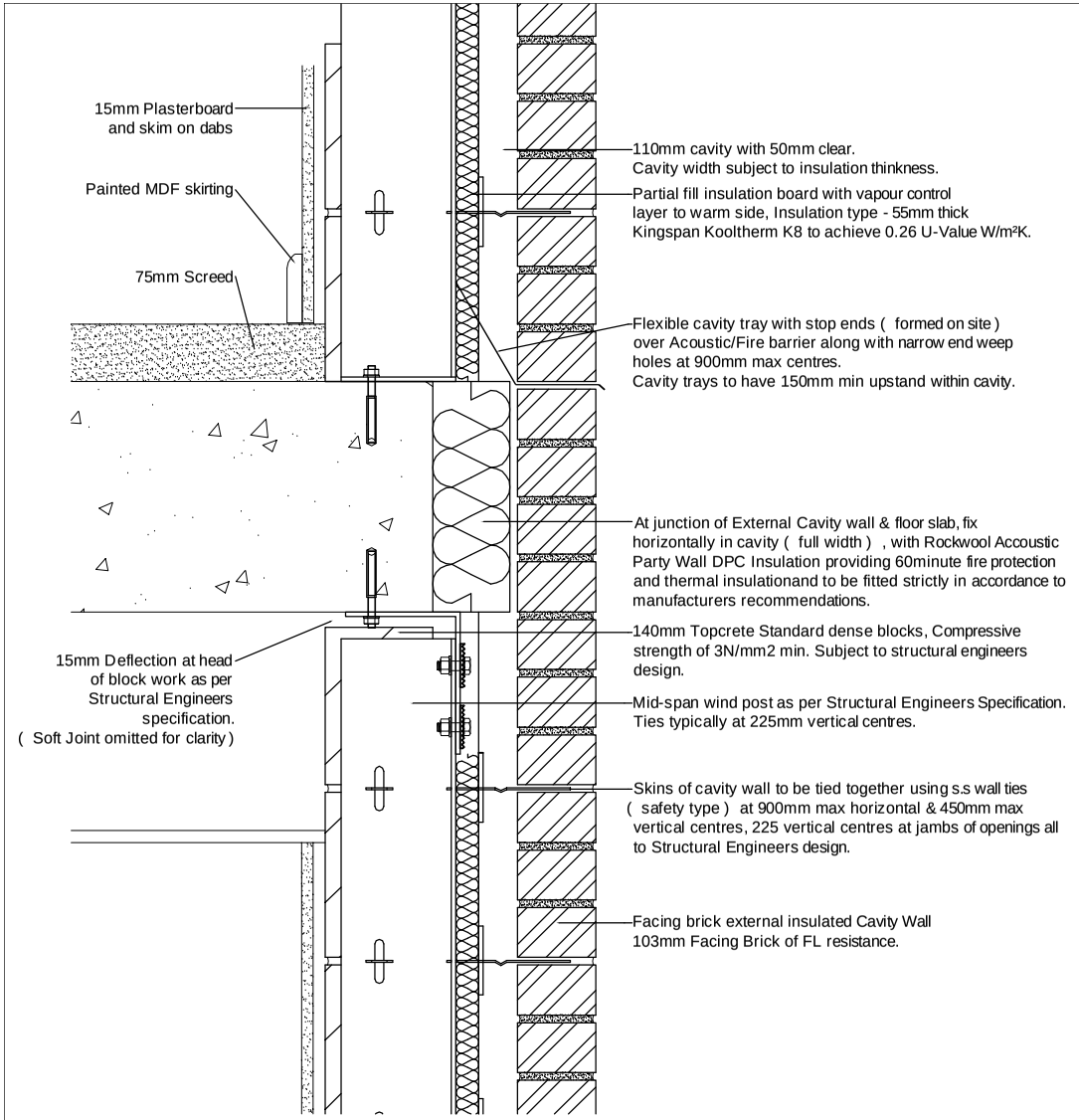
CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
STATUS	TITLE	DWG No.	REV
EXAMPLE	Insulated Render Cladding Details	GA06	



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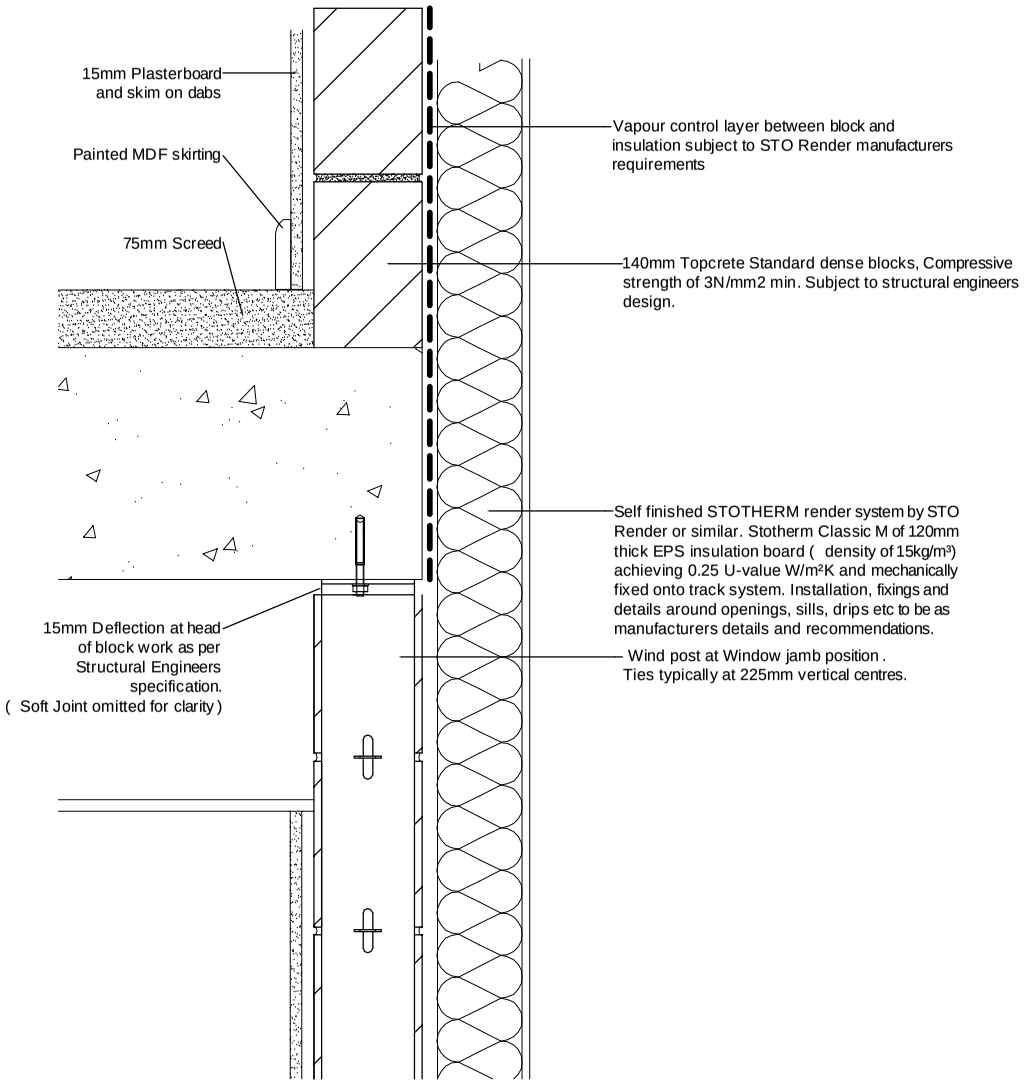

Detail 6

REVISION	DATE	DESCRIPTION

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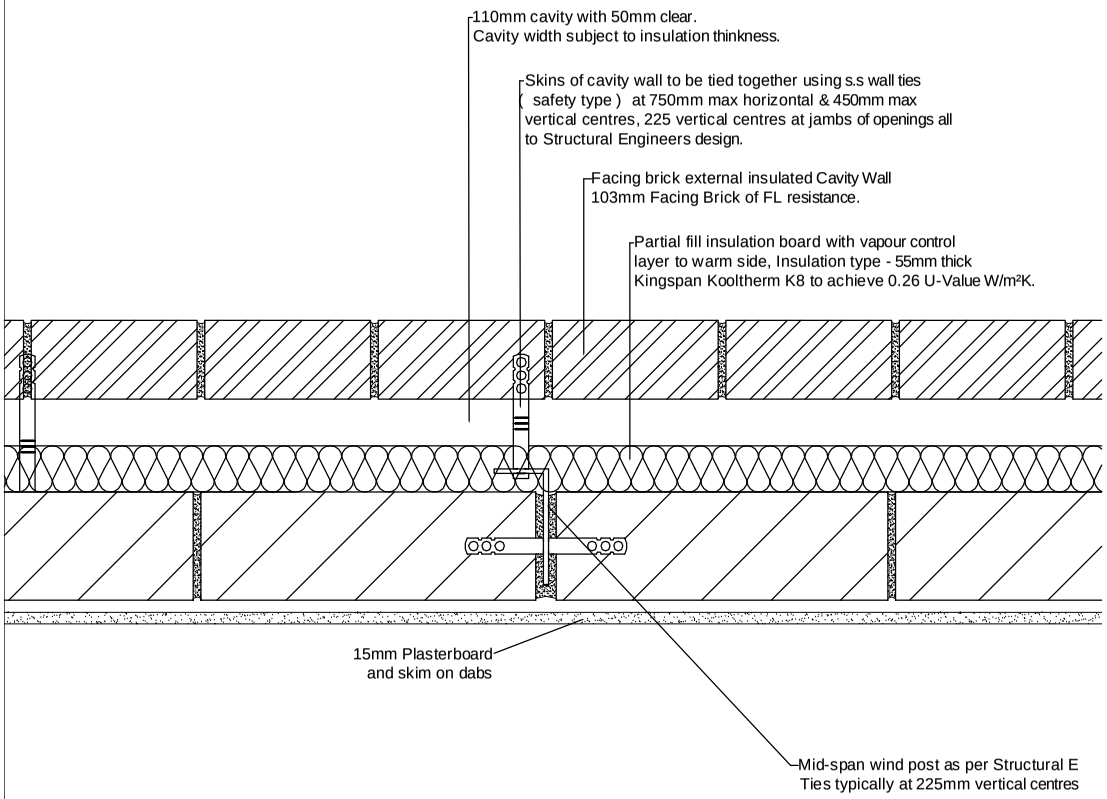
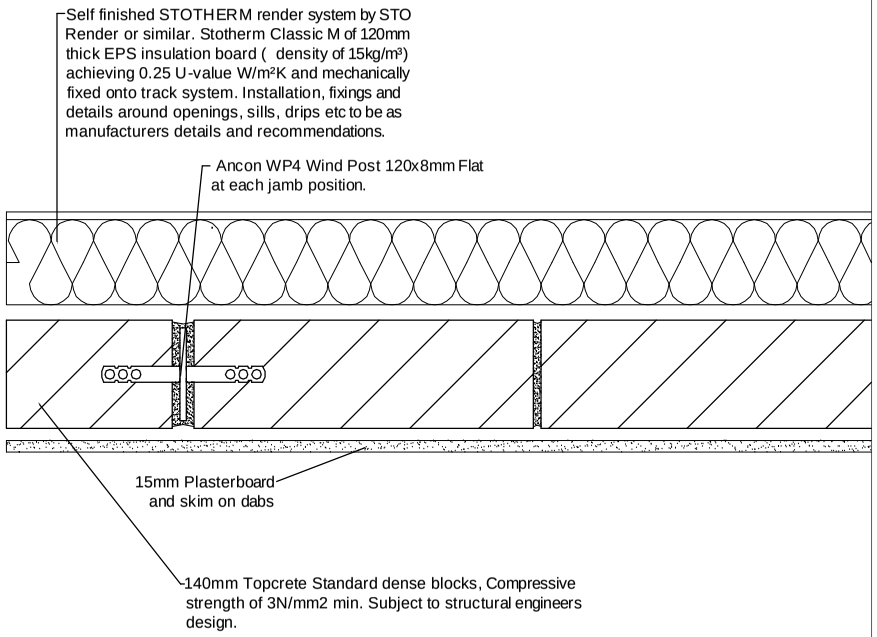
ONE STEP AHEAD.

CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
STATUS	TITLE	DWG No.	REV
EXAMPLE	Blockwork Wind Post details	GA07	



Detail7



Detail8

REVISION	DATE	DESCRIPTION

NOTES

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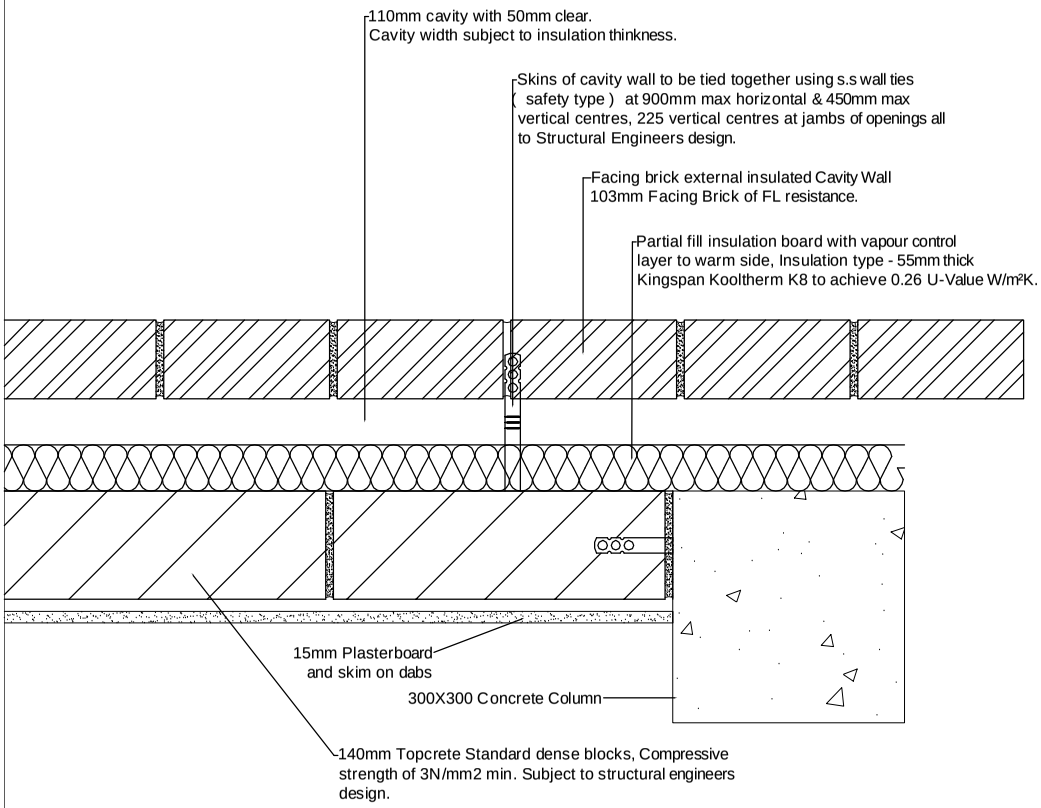
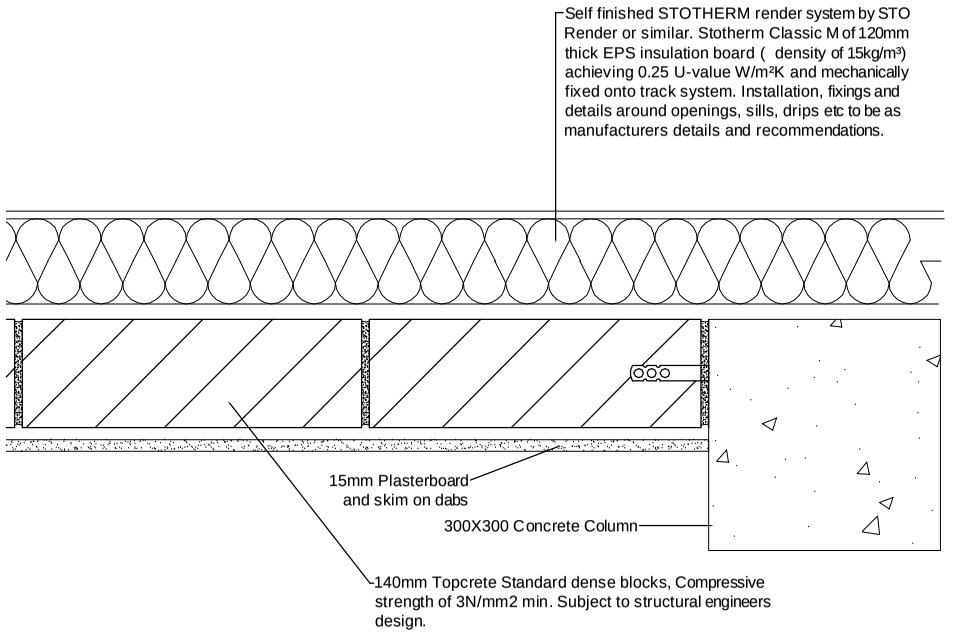
ONE STEP AHEAD.

CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
STATUS	TITLE	DWG No.	REV
EXAMPLE	Blockwork Wind Post details	GA08	



Detail 9



Detail 10

REVISION	DATE	DESCRIPTION

NOTES

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ONE STEP AHEAD.

CLIENT	PROJECT	JOB No.	
METSEC FRAMING	Metsec SFS vs Block Work Comparison	RT001	
STATUS	TITLE	DWG No.	REV
EXAMPLE	Blockwork to concrete Column detail	GA09	

APPENDIX C

SHEPHERD CONSTRUCTION - CASE STUDY

Shepherd

External Walling Options – SFS Metsec v Traditional Masonary Construction

Programme Benefits of using a Metsec frame

- **SFS Metsec** - using the SCL GQ Block 6 project in Manchester as a case study (see Fig 1.) we were achieving 650m2 – 1000m2 per week using 2No gangs (3 man gangs – 2 fixers 1 labourer). This allowed us to target programme the following envelope substrate works (Cement Particle board & EPDM weathering operations) once a number of floors of metsec had been completed. Once 2No floors of the substrate had been completed, we commenced the window installation to a given floor.

- Using this system, on completion of the composite window installation, this dramatically increased the speed in which we had a given floor weather tight than if we had used traditional brickwork / block work.

- **With traditional brick/block work**, we would expect to achieve an output of 16m2 / hour or 80m2 / day for a 2 n 1 gang. Based on using 4No 2 n 1gangs simultaneously, this would mean an output of 320m2 per week would be achieved. However the no of gangs could be determined or limited by the floor area and efficient working space allowances.

- Metsec is significantly quicker than using traditional inner block work skin as the rates above suggest.

- **Both Blockwork & SFS Metsec** can be installed internally from the floor slab, so is unaffected by the ongoing RC works above; thus enabling the external walling system to be installed closely behind the finishing of the RC works to a particular floor.

- On the GQ Block 6 project we programmed the commencement of the SFS Metsec tight behind the removal of the backpropping for the RC concrete floors as the photo below clearly illustrates. This meant dovetailing the start of the building envelope close behind the RC frame (see Fig 2.).

- Fig 1. GQ Block 6 - The advantages of using a SFS Metsec System

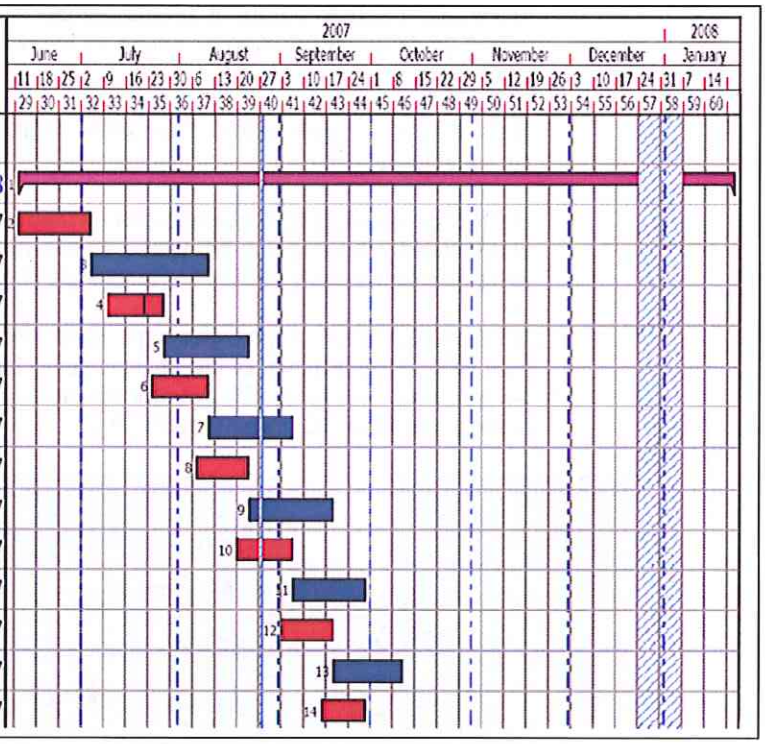
Case Study – Hi-rise Construction - Greenquarter Block 6, Manchester

Using a metsec external walling system with a cement particle viroc board as a substrate, we were able to install the window surround works early on in the programme and closely behind the PT concrete frame. This allowed us to install the windows to the apartments early on in the programme and get each floor fully weathertight to release the internal fit-out dramatically quicker than if a blockwork inner skin had been specified – as block work would need curing time and lintol installation, not to mention the cleaning of reaquired later.

Because we could install the SFS metsec at a faster rate than traditional blockwork, we could programme in the erection of the external access, which enabled us to commence the ensuing envelope subtrate works or "window release works" a lot earlier on than if a brickwork external wall had been specified.

This enabled us to programme in the window installation earlier on, which ultimately allowed us to commence the internal fit-out works earlier on in the programme.

Line	Name	Start	Duration	End
	PCH Sub-Contract			
1	Block A (28 weeks)	12/06/2007	165d	22/01/2008
2	Podium	12/06/2007	18d	04/07/2007
3		04/07/2007	29d	09/08/2007
4	Level 2	10/07/2007	14d	26/07/2007
5		27/07/2007	21d	22/08/2007
6	Level 3	24/07/2007	14d	09/08/2007
7		10/08/2007	20d	05/09/2007
8	Level 4	07/08/2007	13d	22/08/2007
9		23/08/2007	20d	18/09/2007
10	Level 5	20/08/2007	13d	05/09/2007
11		06/09/2007	18d	28/09/2007
12	Level 6	03/09/2007	13d	18/09/2007
13		19/09/2007	17d	10/10/2007
14	Level 7	14/09/2007	11d	28/09/2007



- **Fig 2. An extract from a RC works backpropping programme compiled for the GQ Block 6 project. The blue bars signified the timing of the installation, duration and removal of the backpropping to a given floor. Upon the completion & removal of the backpropping, this would signify the start of the erection of the SFS metsec external walling system & the start of the building envelope works.**

The information supplied in this report can be heavily influenced by specific project requirements such as U values / Fire strategy / Acoustic performance.

APPENDIX D

ACKNOWLEDGEMENTS

ACKNOWLEDGEMENTS

- Shepherd Construction Limited
- Moss Construction
- Robothams Architects
- Atkin Trade Specialists
- Mansell Finishes
- Chartway Specialist Contractors Limited
- Baynham Meikle Partnership
- Kier Southern

VERIFICATION
Approved for issue   Job Manager – Philip Muir Date – 29 June 2009

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