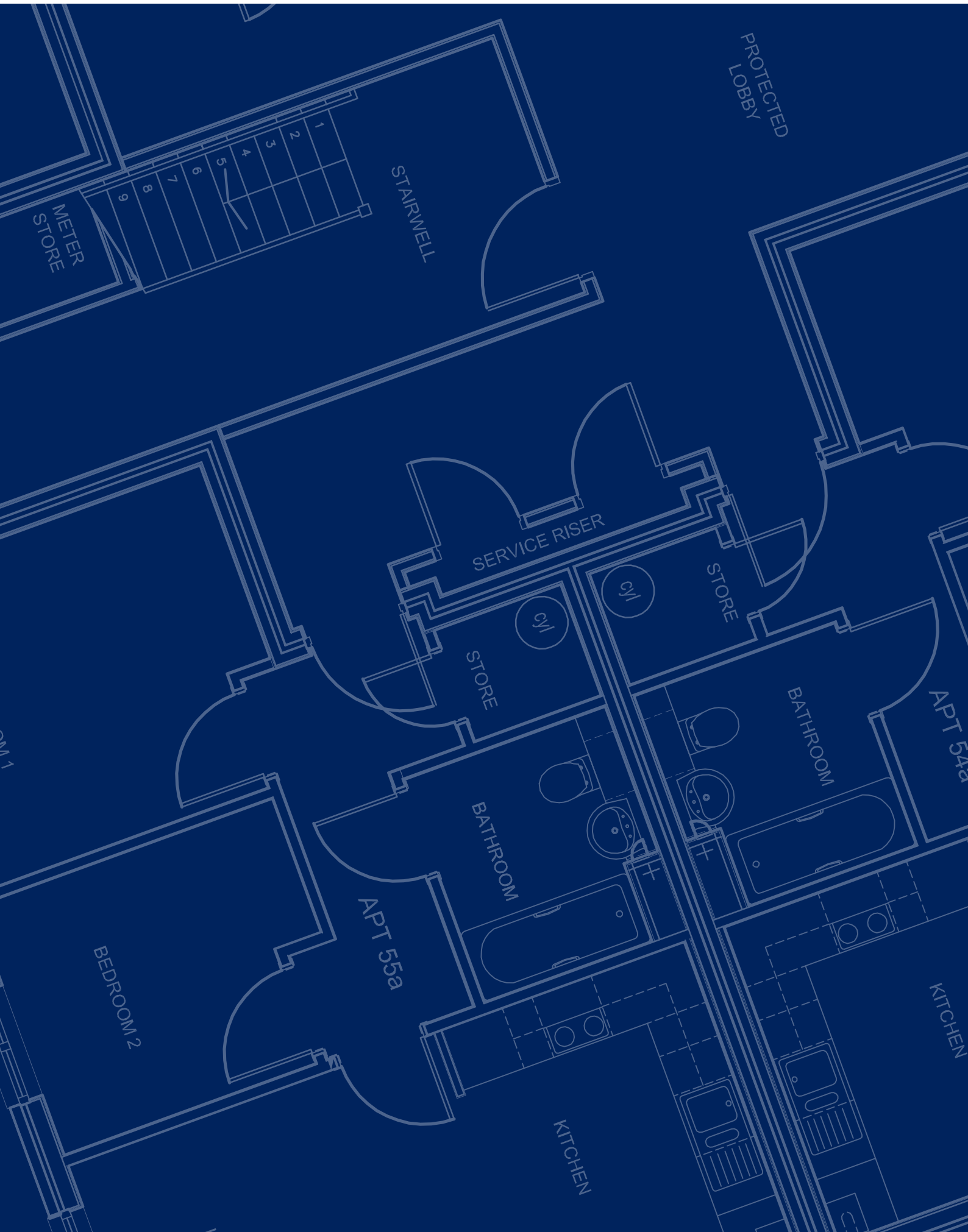


A photograph of a structural timber building frame under construction, overlaid with a dark blue tint. The frame consists of numerous vertical studs and horizontal beams, creating a grid-like structure. The background shows a cloudy sky through the open structure.

STRUCTURAL TIMBER

ESTIMATING GUIDE 2019



CONTENTS

1	Introduction	4
2	About this guide	5
3	The structural timber industry	6
4	Engineering the value of structural timber	8
5	How to use the estimates within the guide	10
6	Timber frame model projects	12
7	Summary of worked examples	15
8	Apartments - model project	16
9	Housing - model project	20
10	Hotel - model project	26
11	Information on fire risk mitigation	30
12	Costs associated with fire risk mitigation	31
13	Benefits of building in timber frame	32
14	Other types of structural timber	34
	- Cross-laminated timber (CLT)	34
	- Structural insulated panels (SIPs)	36
	- Glulam (engineered wood)	37
15	Contributors to this guide	38

1 INTRODUCTION

Rider Levett Bucknall (RLB) are an award winning leading independent firm providing our clients with some of the most comprehensive and forward-thinking advice available. Our core skills are in cost management, project management, building surveying and associated advisory services.

With 600 UK staff and 4500 worldwide RLB has a truly global reach, and with such scope can offer a local presence to its clients almost without exception. We are committed to our core services and pride ourselves on our dedication to customer care and leading-edge service provision. We are an award winning leading independent firm providing our clients with some of the most comprehensive and forward-thinking advice available.

As well as the day to day services undertaken we also share our experiences and knowledge across various sectors publishing papers and reports annually on current issues.

With the Government's announcement regarding their presumption in favour for off-site manufacture from 2019, the demand for structural timber systems has increased year on year. This guide provides information for estimating and budget preparation to be established at the earliest possible time in the construction life cycle. It also furnishes cost managers and estimators with a range of values and data that can be used to promote and demonstrate value for money.

RLB produced the first guide in 2016 with the support of members from the Structural Timber Association (STA). Again, we acknowledge the support of these members and the new contributors to the guide who have again provided information to allow this update. The list of contributors is included at the end of the document.

Further guides are being prepared covering CLT and SIPs systems and these will be issued in the Autumn of 2019.

As with anything new there were challenges as to why we were producing the guide. The feedback from the 2016 guide has been positive and hence this update. The overall rationale is to create a report giving brief technical information and costs for structural timber

to a greater audience and ensure that the "estimated costs" are readily available to people in the construction industry who are designing and calculating and preparing budgets. As we said in 2016 all other forms of construction materials are covered in the current range of industry pricing documents, but not structural timber. We are aiming to fill the gap and give estimated rates for the use of structural timber.

As in 2016 there are still differences in the way the timber industry and those preparing budgets for clients evaluate the cost of the structure, but the guide aims to overcome this and allows "benchmarking" and "cost checking" to take place. It has to be said, this is only a guide: the most accurate way to establish the cost for a structural timber solution, and for any supporting technical details, is to engage with an STA member for a design or a tender price. As you will appreciate the individual project specifics such as performance criteria, design, location and access, and the market economies of supply and demand, may affect the actual project price and as such there may be times when you receive a price outside of the ranges included within the guide. This happens within the industry and RLB can only cover the typical ranges expected for the typical project. Experienced professionals within the construction industry can allow for these variances and include within the budgets accordingly.

We hope the guide will support the continued use of structural timber for the construction industry. The governments presumption in favour for off-site manufacture will further advance the use of structural timber and through collaboration and benchmarking, including the sustainability benefits, we foresee the timber industry going from strength to strength in the future

As with the first issue if anyone has any observations for the future we would be pleased to hear them as this will benefit the content and inclusion for future issues.

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2 ABOUT THIS GUIDE

When pricing or tendering for a project, structural timber companies provide an all-inclusive service and price that incorporates the design, manufacture, delivery and installation of the structural frame, creating a single point of responsibility.

The quantity surveyors / cost managers, supporting clients in the preparation of budgets, will evaluate the projects utilising other methods of itemisation allowing comparison to other forms of construction. These methods could be elemental breakdowns or fully inclusive but either way needs to be in a form that is able to be “benchmarked” to an industry standard. The guide aims to give sufficient data to allow for this comparison and benchmarking.

The guide also aims to explain the benefits and value that can be brought to a project by using structural timber.

We thank again the companies that have contributed to the updated information for the guide and gratefully acknowledge the new contributors, all listed on page 38 for the timber frame pricing.

Oakworth Homes and Stewart Milne Timber Systems have provided the invaluable detailed technical and specification information for the timber frame elements used within this guide. We also thank Stewart Milne Homes and Whitbread for the timber frame example projects.

Thank you again to Andrew Carpenter, Chief Executive of the STA, and the STA Board in allowing RLB to approach their members and obtain the invaluable technical information making this guide possible.

The team who collectively prepared and supported the author include:



Ian Dacre
Rider Levett Bucknall UK Ltd



John Smith
Stewart Milne Timber Systems



John Capper
Oakworth Homes



Martin Milner
Milner Associates



3 THE STRUCTURAL TIMBER INDUSTRY

The structural timber industry is responding positively to the recent government announcement of the presumption in favour for off-site manufacture from 2019 for all publicly funded projects. The drive for off-site manufacture is forever increasing as the benefits are increasingly becoming known to all.

The timber industry is in a prime position to support and ultimately benefit from this announcement with STA members at the forefront of the research and development in the field. The industry continues to evolve and has adapted to the changing market demands. It has intelligent design for manufacture and assembly principles and provides excellent integrated off-site construction solutions with a single point of responsibility to the market place.

With the forever increasing demands on sustainable construction, the timber industry is the only structural solution that can provide a truly balanced approach to commercial and environmental considerations.

The beauty of structural timber systems is they can be combined to great effect. Indeed, in recent years there has been a trend toward using a hybrid solution using Timber Frame, CLT, SIPS and Glulam in combination to deliver against architectural vision and engineering requirements. Given the number of entries to the Structural Timber Awards adopting this approach in recent times, and the possibilities that structural timber offers designers, these options will continue for the future.

Structural timber is already a favoured solution in many sectors such as medium rise hotels, student accommodation, education, self-builders, residential and others; all indications suggest that it will extend further in the future once the benefits are seen to all.



4 ENGINEERING THE VALUE OF STRUCTURAL TIMBER

To realise the full value and potential of structural timber, the industry needs to be consulted early in the design stages of the project. This is where the true collaboration, improved value and efficiencies can be incorporated into the design at the earliest possible time. Effectively the structural timber manufacturers will work with the client's design team to engineer the structural value into the project.

The thermal, acoustic and airtightness properties of the project can be designed into the specification of the structural timber frames. This adds to the 'one-stop shop' approach and value of the single point of responsibility for the structural frame.

The Timber and Masonry Cost Comparison published by RLB in May 2018 demonstrated that significant programme savings can be achieved through using timber frame. A download copy is available from the Publications section of the RLB website www.rlb.com

Not only are there financial and programme efficiencies but also improved health and safety on site through the off-site manufacturing process leading to a reduction in man-hours on site.

The above factors improve the programme for the return on investment for the client and funders for any project utilising structural timber.



TYPICAL STAGE PROCESS / TIMELINE FOR A STRUCTURAL TIMBER PACKAGE

This is an **approximate** timeline for a typical structural timber installation from start to finish. It is dependent on the approval process at the design stage and any reworking and the size and complexity of the project regarding the installation time on site.

WEEK No.	PHASE	PROCESS
Week 0 ↓	Order placement	Design time and delivery date scheduled Structural engineering procured
Week 2 - 6 ↓	Preliminary design	Plans and elevation drawings produced and submitted for approval to confirm the outline design and structural elements
Week 7 ↓	Design approval	Fully approved drawings returned by this date to confirm the scheduled delivery date
Week 8 - 9 ↓	Final drawings	3D model (or BIM if required) is generated to the approved design, production and site information produced
Week 10 - 11 ↓	Manufacture	Off-site manufacture of the components commences
Week 12 ↓	Delivery / installation	Structural building system is delivered to site and installation commences by STA approved contractor with regular visits and supervision
Project dependent ↓	Completion	Handover meeting

Note: The above indicative timeline is dependent on the overall complexity of the engineering solution, sign off, inclusion of M&E requirements and manufacturing schedules.

5 HOW TO USE THE ESTIMATES WITHIN THE GUIDE

The estimating guide is intended to support those undertaking budgets, cost planning / management and value for money or benchmarking exercises. The rates and prices have been provided by the structural timber industry and RLB and tabulated by the author Ian Dacre of Rider Levett Bucknall.

To align with other pricing documents and to set a baseline the costs included are current at the 1st quarter 2019.

For illustration and comparison purposes the costs are based on a project in central England, on a relatively flat site within reasonable access from a major 'A' road.

Within this guide it is assumed that the main contractor will provide the following preliminary type items:

- All site welfare
- Storage and security for the structural frame components
- Labour attendances
- Crane bases / supports
- Overall site Health & Safety
- Safety and background lighting
- Overall site security
- Foundations / supporting structures
- Scaffolding / access / temporary staircase provisions
- Power at 110v

Other specific exclusions are:

- Main contractor's overheads and profit
- On costs associated with the project requirements
- Remaining follow-on trade costs to fully complete the project
- Risks and contingency allowances

Unless otherwise stated the cost per m² rates given throughout the guide are calculated using the Gross Internal Area (GIA) of the finished building.



6 TIMBER FRAME MODEL PROJECTS

The costs are based on three separate projects constructed in timber frame. The worked examples provide a detailed breakdown of the elements included in the price for a structural timber frame. For each example we have included a plan and elevation drawings to give an indication of the scale, design and arrangement of the buildings.

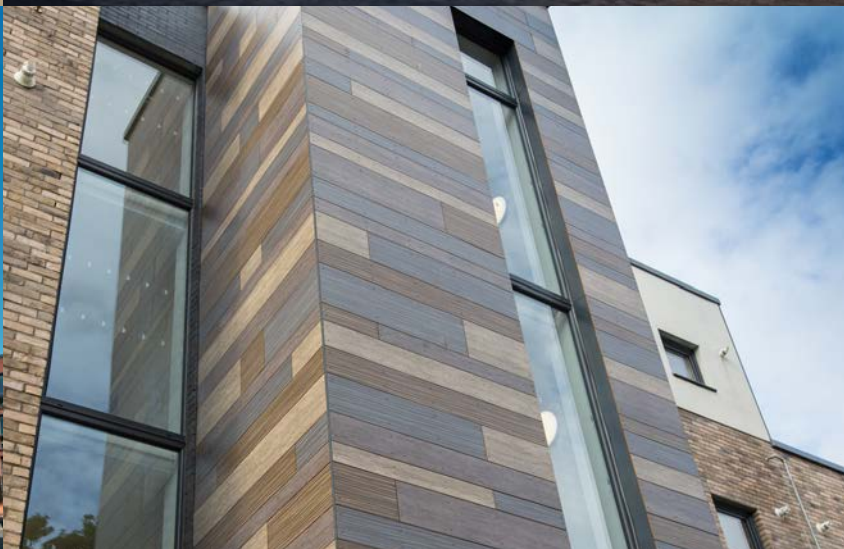
The model projects are as follows:

- Apartment block, three storey, 12 units
- Housing development, two storey, 100 detached and semi-detached units
- Hotel, two storey, 40 en-suite bedrooms with reception area

For ease, we have provided a summary specification of all services, materials, plant and labour that is included within the costs for three model projects. We have also included within the costing tables the commonly selected extras and options required by clients and specifiers. There is a final typical summary, for each model, of all elements and services deemed as exclusions and not included or provided by the timber frame supplier.







7 SUMMARY OF WORKED EXAMPLES

The table below summarises the range of values from various timber frame suppliers for the model examples. The model examples cost is the mean rate for the prices received.

TRADITIONAL TIMBER FRAME	LOW £ / m ²	MODEL EXAMPLE £ / m ²	HIGH £ / m ²
Apartment block - 3 storeys	£143.00	£174.50	£220.32
Detached house	£138.04	£142.70	£180.50
Semi-detached house	£140.14	£156.45	£207.49
Hotel - 2 storeys	£145.24	£150.44	£162.50

Note: The rates above do not include the optional items within each of the model examples.

In line with the industry standard benchmarking breakdown, we have summarised below the elemental costs for each model as a cost per m².

ELEMENTAL SUMMARY	APARTMENTS £ / m ²	DETACHED HOUSE £ / m ²	SEMI-DETACHED HOUSE £ / m ²	HOTEL £ / m ²
Floor	£65.12	£28.41	£28.41	£35.40
Roof	£20.57	£23.10	£23.56	£33.59
External walls	£24.08	£53.08	£48.80	£25.20
Internal walls	£44.69	£25.51	£40.00	£36.63
Builders works	£0.21	£0.23	£0.35	£0.69
Preliminaries	£19.83	£12.37	£15.33	£18.93
Total £ / m²	£174.50	£142.70	£156.45	£150.44

8 APARTMENTS - SUMMARY OF SPECIFICATION

The rates shown in the table below include for the following elements and specification: design, manufacture and delivery of the timber frame, including plant and site labour to off-load and erect, with internal safety decking / working platforms / fall arrest systems.

EXTERNAL WALLS TO HOUSES

- 140mm wide timber stud panels with 9mm OSB and low emissivity reflective breather paper
- 140mm wide timber soleplates head-binders, and rails
- Timber frame wall-ties to suit 50mm cavity
- Cavity barriers to suit 50mm cavity
- Timber noggins for services

Separate rates are also shown for the following elements:

- Site fitted wool insulation between studs, to achieve a U-value of 0.27W/m²K
- Factory fitted PIR insulation between studs, to achieve a U-value of 0.20W/m²K
- External wall U-values are available in timber frame from 0.27 to 0.10 and beyond

INTERNAL LOAD BEARING WALLS

- 89mm wide timber stud panels with 9mm OSB
- 89mm wide timber soleplates head-binders, and rails

Separate rates are also shown for the following elements:

- 50mm acoustic insulation between studs

PARTY WALLS

- 89mm wide timber stud panels with 9mm OSB to cavity face
- 89mm wide timber soleplates head-binders, and rails
- Full fill cavity insulation, with polythene sleeved cavity barriers to seal edges of party wall cavity

Separate rates are also shown for the following elements:

- Site fitted wool insulation between studs

INTERNAL NON-LOAD BEARING WALLS

- 89mm wide timber stud panels with one row mid-height noggin
- 89mm wide timber soleplates head-binders, and rails

Separate rates are also shown for the following elements:

- 50mm acoustic insulation between studs

INTERMEDIATE FLOOR

- 15mm OSB structural decking
- Nominal 240mm deep timber I-Joists, including trimmers and beams to form upper floor
- Joist hangers and all other associated ironmongery

Separate rates are also shown for the following elements:

- Floating floor build-up incorporating:
 - 22mm P5 chipboard flooring
 - 19mm acoustic plank
 - 75mm acoustic timber battens
 - 25mm acoustic insulation between battens
 - 75mm flanking strip to flooring perimeter
 - Rip-liner board to flooring perimeter

ROOF

- Roof trusses, including valley sets and in-fill timber for hipped-ends, and bracing
- 89mm wide timber spandrel panels with 9mm OSB and breather paper
- 89mm wide timber gable ladders

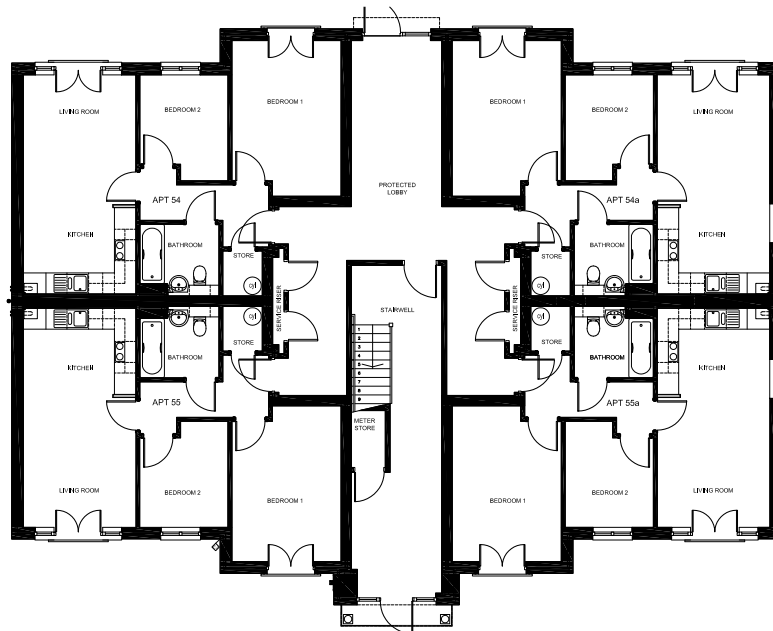
- Truss shoes and all other associated ironmongery
- 300mm wide valley board and supporting timber noggins
- Party wall spandrel panels, pre-clad with two layers 12.5mm plasterboard and polythene protection

8 APARTMENTS - ELEVATIONS AND FLOOR PLANS

Elevation



Ground floor plan



THE FOLLOWING ITEMS ARE EXCLUDED FROM THE RATES SHOWN

- The following items are excluded from the rates shown
- Foundation and all ground floor works up to finished floor / DPC level
- Roofing felt and tile battens, fascia and soffit
- External cladding, doors and windows
- Plasterboard and VCL's
 - Party walls will require two layers 15mm board (or 1 x 12.5mm + 1 x 19mm) to achieve the fire and acoustic performance
 - All external and load-bearing walls (top floor will require two layers 12.5mm plasterboard to achieve 60min fire performance
 - Ceiling of separating floors will require two layer 15mm fireline plasterboard on 16mm resilient bars to achieve fire and acoustic performance
- Acoustic and thermal insulation to mid floor and roof ceilings
 - Separating floors will require minimum 100mm mineral fibre insulation between the joists to achieve acoustic performance
- Stair flights and handrail
 - Timber stairs within apartments will require fire treatment, and increased specification of stringers, treads and risers to achieve fire performance
- First and second fix plumbing and M&E services
- Scaffolding
- Site security and welfare facilities
- Waste disposal

8 APARTMENTS - WORKED EXAMPLE

Apartment block of twelve units over three floors with a central stair core. Gross internal floor area = 889m²

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Preliminaries					
Design, manufacturing set up	889	m ²	14.09	12,526.01	
Deliver to site	889	m ²	5.73	5,093.97	
Supply of materials					
External walls, 38x140 mm load bearing, 9mm OSB, 2.4m high (GROUND FLOOR)	76	m	55.95	4,252.20	
External walls, 38x140 mm load bearing, 9mm OSB, 2.4m high (FIRST FLOOR)	76	m	49.51	3,762.76	
External walls, 38x140 mm load bearing, 9mm OSB, 2.4m high (SECOND FLOOR)	76	m	49.51	3,762.76	
External walls, 38x89 mm load bearing, 9mm OSB, spandrel panels	2	m ²	20.97	41.94	
Party walls, 38x89 mm load bearing, 9mm OSB, 2.4m high (GROUND FLOOR)	107	m	37.16	3,976.12	
Party walls, 38x89 mm load bearing, 9mm OSB, 2.4m high (FIRST FLOOR)	107	m	35.46	3,794.22	
Party walls, 38x89 mm load bearing, 9mm OSB, 2.4m high (SECOND FLOOR)	107	m	35.46	3,794.22	
Party walls, 38x89 mm load bearing, 9mm OSB, spandrel panels	194	m ²	21.96	4,260.24	
Internal walls, 38x89mm, load bearing, 9mm OSB, 2.4m high (GROUND FLOOR)	57	m	38.31	2,183.67	
Internal walls, 38x89mm, load bearing, 9mm OSB, 2.4m high (FIRST FLOOR)	57	m	35.54	2,025.78	
Internal walls, 38x89mm, non load bearing, 2.4m high (GROUND FLOOR)	43	m	32.09	1,379.87	
Internal walls, 38x89mm, non load bearing, 2.4m high (FIRST FLOOR)	41	m	30.98	1,270.18	
Internal walls, 38x89mm, non load bearing, 2.4m high (SECOND FLOOR)	97	m	30.98	3,005.06	
Structural racking	1	item	5,434.59	5,434.59	
Roof trussed rafters including straps and bracing (MEASURED ON PLAN)	342	m ²	39.63	13,553.46	

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Extra over items					
Craneage	1	item	7,424.34	7,424.34	
Erection of frame and associated items	1	item	26,154.15	26,154.15	
Gable ladder to roof	4	m	8.53	34.12	
Upper floors, 15mm OSB decking, 240mm deep nominal floor joists, including stair trimmers and noggins	614	m ²	31.79	19,519.06	
Floating floor, 22mm T&G V313 MR chipboard flooring, 19mm plank, 75mm acoustic battens, 25mm acoustic insulation quilt, 75mm flanking strip and rip-liner board to perimeter	614	m ²	38.98	23,933.72	
Wall ties stainless steel, approx quantity, 4.5nr / m ² (SUPPLY ONLY)	1953	nr	0.20	390.60	
Anchor / holding down straps, pre-bent stainless steel	166	nr	2.21	366.86	
Reflective breather membrane	432	m ²	2.80	1,209.60	
Services noggins - 50 per plot (SUPPLY ONLY)	1	item	188.10	188.10	
Plasterboard noggins (SUPPLY ONLY)	1	item	608.15	608.15	
Fire socks	1	item	1,184.29	1,184.29	
Total base cost supply and erect for the timber frame				155,130.04	174.50
Other optional items (to be included if required)					
Fall arrest	1	item	1,335.95	1,335.95	
External walls, insulation to Building Regulations standard, 140mm thick 0.040 lambda value glasswool (SUPPLY AND FIT)	432	m ²	5.76	2,488.32	
Party wall insulation, 60mm between leafs (SUPPLY AND FIT)	770	m ²	6.13	4,720.10	
Internal walls, 50mm thick acoustic insulation (SUPPLY AND FIT)	193	m ²	5.23	1,009.39	
Extra-over for external wall insulation for 110 PIR foil-faced insulation, 0.20 u-value in typical wall make-up (SUPPLY AND FACTORY FIT)	432	m ²	18.75	8,100.00	
Steelwork support may be required but this depends on the specifics of each design - structural engineering advice should be sought					
Total cost supply and erect for the timber frame				172,783.80	194.36

9 HOUSING - SUMMARY OF SPECIFICATION

The rates shown in the tables include for the following elements and specification: design, manufacture and delivery of the timber frame, including plant and site labour to off-load and erect, with internal safety decking / working platforms / fall arrest systems.

EXTERNAL WALLS TO HOUSES

- 140mm wide timber stud panels with 9mm OSB and low emissivity reflective breather paper
- 140mm wide timber soleplates head-binders, and rails
- Timber frame wall-ties to suit 50mm cavity
- Cavity barriers to suit 50mm cavity
- Timber noggins for services

Separate rates are also shown for the following elements:

- Site fitted wool insulation between studs, to achieve a U-Value of 0.27W/m²K
- Factory fitted PIR insulation between studs, to achieve a U-Value of 0.20W/m²K
- External wall U-values are available in timber frame from 0.27 to 0.10 and beyond

INTERNAL LOAD BEARING WALLS

- 89mm wide timber stud panels with 9mm OSB
- 89mm wide timber soleplates head-binders, and rails

Separate rates are also shown for the following elements:

- 50mm acoustic insulation between studs

PARTY WALLS

- 89mm wide timber stud panels with 9mm OSB to cavity face
- 89mm wide timber soleplates head-binders, and rails
- Full fill cavity insulation, with polythene sleeved cavity barriers to seal edges of party wall cavity

Separate rates are also shown for the following elements:

- Site fitted wool insulation between studs

INTERNAL NON-LOAD BEARING WALLS

- 89mm wide timber stud panels with one row mid-height noggin
- 89mm wide timber soleplates head-binders, and rails

Separate rates are also shown for the following elements:

- 50mm acoustic insulation between studs

INTERMEDIATE FLOOR

- 22mm peel-clean P5 chipboard flooring
- Nominal 240mm deep timber I-Joists, including trimmers and beams to form upper floor
- Joist hangers and all other associated ironmongery.

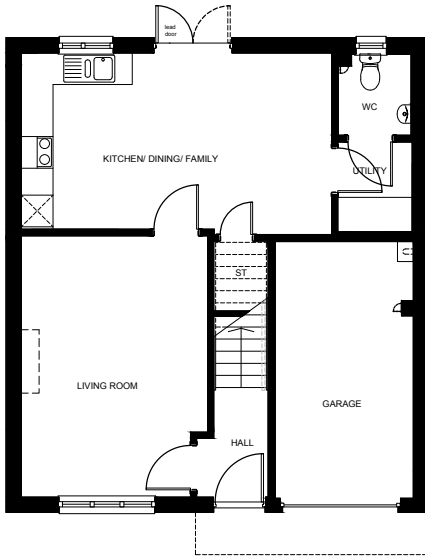
ROOF

- Roof trusses, including valley sets and in-fill timber for hipped-ends, and bracing
- 89mm wide timber spandrel panels with 9mm OSB and breather paper
- 89mm wide timber gable ladders
- Truss shoes and all other associated ironmongery
- 300mm wide valley board and supporting timber noggins
- Party wall spandrel panels, pre-clad with two layers 12.5mm plasterboard and polythene protection

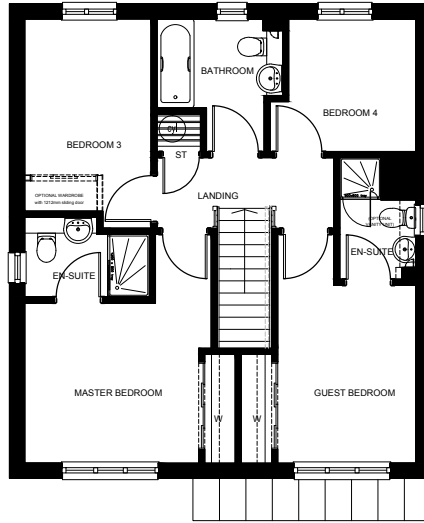
THE FOLLOWING ITEMS ARE EXCLUDED FROM THE RATES SHOWN

- Foundation and all ground floor works up to finished floor / DPC level
- Roofing felt and tile battens, fascia and soffit
- External cladding, doors and windows
- Plasterboard and VCL's
 - Party walls will require two layers 15mm board (or 1x12.5mm + 1x19mm) to achieve the fire and acoustic performance
- Acoustic and thermal insulation to mid floor and roof ceilings
- Stair flights and handrail
- First and second fix plumbing and M&E services
- Scaffolding
- Site security and welfare facilities
- Waste disposal

9 HOUSING - ELEVATIONS AND FLOOR PLANS



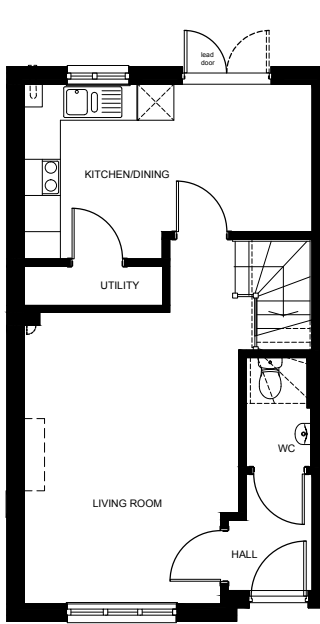
Ground floor



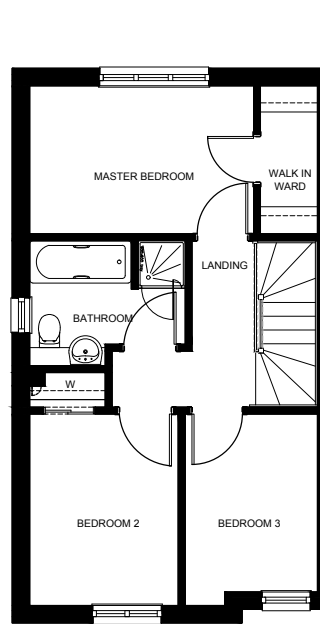
First floor



House type F (detached)



Ground floor



First floor



House type B (semi-detached)

9 HOUSING - WORKED EXAMPLE (DETACHED)

House type F (detached). Gross Internal Floor Area (including garage area) = 126m²

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Preliminaries					
Design, manufacturing set up	126	m ²	6.83	860.58	
Deliver to site	126	m ²	5.53	696.78	
Supply of materials					
External walls, 38x140 mm load bearing, 9mm OSB, 2.4m high	66	m	50.61	3,340.26	
External walls, 38x89 mm load bearing, 9mm OSB, spandrel panel	23	m ²	22.06	507.38	
Internal walls, 38x89mm, load bearing, 9mm OSB, 2.4m high	13	m	33.87	440.31	
Internal walls, 38x89mm, non load bearing, 2.4m high	50	m	31.99	1,599.50	
Structural racking	1	item	182.09	182.09	
Roof trussed rafters inc straps and bracing (MEASURED ON PLAN)	81	m ²	21.14	1,712.34	
Extra over items					
Craneage	1	item	1,200.87	1,200.87	
Erection of frame and associated items	1	item	3,963.95	3,963.95	
Gable ladder to roof	29	m	7.49	217.21	
Upper floors, 22mm Peelclean T&G chipboard, 240mm nominal floor joists, including stair trimmers and noggins	67	m ²	35.70	2,391.90	
Wall ties stainless steel - approx quantity, 4.5nr / m ² (SUPPLY ONLY)	738	nr	0.19	140.22	

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Extra over items... cont/					
Anchor / holding down straps - pre-bent stainless steel	72	nr	2.22	159.84	
Reflective breather membrane	141	m ²	2.65	373.65	
Services noggins - 50 per plot (SUPPLY AND FIT)	1	item	29.34	29.34	
Plasterboard noggins (SUPPLY ONLY)	1	item	77.98	77.98	
Fire socks	1	item	85.39	85.39	
Total base cost supply and erect for the timber frame				17,979.59	142.70
Other optional items (to be included if required)					
Fall arrest	1	item	290.84	290.84	
External walls, insulation to Building Regulations standard, 140mm thick 0.040 lambda value glasswool (SUPPLY AND FIT)	141	m ²	5.76	812.16	
Internal walls, 50mm thick acoustic insulation (SUPPLY AND FIT)	72	m ²	5.23	376.56	
Extra-over for external wall insulation for 110 PIR foil-faced insulation, 0.20 u-value in typical wall make up (SUPPLY AND FACTORY FIT)	141	m ²	18.75	2,643.75	
Steelwork support may be required but this depends on the specifics of each design - structural engineering advice should be sought					
Total cost supply and erect for the timber frame				22,102.90	175.42

9 HOUSING - WORKED EXAMPLE (SEMI-DETACHED)

House type B (semi-detached). Gross Internal Floor Area = 84m²

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Preliminaries					
Design, manufacturing set up	84	m ²	7.60	638.40	
Deliver to site	84	m ²	7.73	649.32	
Supply of materials					
External walls, 38x140 mm load bearing, 9mm OSB, 2.4m high	40	m	50.11	2,004.40	
External walls, 38x89 mm load bearing, 9mm OSB, spandrel panel	13	m ²	21.98	285.74	
Party walls, 38x89 mm load bearing, 9mm OSB, 2.4m high	17	m	35.65	606.05	
Party walls, 38x89 mm load bearing, 9mm OSB, spandrel panel	11	m ²	20.74	228.14	
Internal walls, 38x89mm, load bearing, 9mm OSB, 2.4m high	13	m	38.90	505.70	
Internal walls, 38x89mm, non load bearing, 2.4m high	23	m	32.11	738.53	
Structural racking	1	item	213.31	213.31	
Roof trussed rafters inc straps and bracing (MEASURED ON PLAN)	53	m ²	21.92	1,161.76	
Extra over items					
Craneage	1	item	1,200.87	1,200.87	
Erection of frame and associated items	1	item	2,646.00	2,646.00	
Gable ladder to roof	17	m	7.34	124.78	
Upper floors, 22mm Peelclean T&G chipboard, 240mm nominal floor joists, including stair trimmers and noggins	44	m ²	35.88	1,578.72	
Wall ties stainless steel - approx quantity, 4.5nr / m ² (SUPPLY ONLY)	428	nr	0.19	81.32	

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Extra over items cont/...					
Anchor / holding down straps - pre-bent stainless steel	42	nr	2.22	93.24	
Reflective breather membrane	82	m ²	2.65	217.30	
Services noggins - 50 per plot (SUPPLY AND FIT)	1	item	29.34	29.34	
Plasterboard noggins (SUPPLY ONLY)	1	item	63.56	63.56	
Fire socks	1	item	74.95	74.95	
Total base cost supply and erect for the timber frame				13,141.43	156.45
Other optional items (to be included if required)					
Fall arrest	1	item	290.84	290.84	
External walls, insulation to Building Regulations standard, 140mm thick 0.040 lambda value glasswool (SUPPLY AND FIT)	82	m ²	5.76	472.32	
Party wall insulation, 60mm between leafs (SUPPLY AND FIT)	41	m ²	6.13	251.33	
Internal walls, 50mm thick acoustic insulation (SUPPLY AND FIT)	28	m ²	5.23	146.44	
Extra-over for external wall insulation for 110 PIR foil-faced insulation, 0.20 u-value in typical wall make up (SUPPLY AND FACTORY FIT)	82	m ²	18.75	1,537.50	
Steelwork support may be required but this depends on the specifics of each design - structural engineering advice should be sought					
Total cost supply and erect for the timber frame				15,839.86	188.57

10 HOTEL - SUMMARY OF SPECIFICATION

The rates shown in the tables include for the following elements and specification: design, manufacture and delivery of the timber frame, including plant and site labour to off-load and erect, with internal safety decking / working platforms / fall arrest systems.

EXTERNAL WALLS

- 140mm wide timber stud panels with 9mm OSB and low emissivity reflective breather paper
- 140mm wide timber soleplates head-binders, and rails
- Timber frame wall-ties to suit 50mm cavity
- Cavity barriers to suit 50mm cavity
- Timber noggins for services

Separate rates are also shown for the following elements:

- Site fitted wool insulation between studs, with 25mm PIR to internal face of studs and 25x50mm vertical battens to achieve a U-Value of 0.15W/m²K
- External wall U-values are available in timber frame from 0.27 to 0.10 and beyond

INTERNAL LOAD BEARING WALLS

- 89mm wide timber stud panels with 9mm OSB
- 89mm wide timber soleplates head-binders, and rails

Separate rates are also shown for the following elements:

- 90mm insulation between studs

INTERNAL NON-LOAD BEARING WALLS

- 63mm wide timber stud panels with one row mid-height noggin
- 63mm wide timber soleplates head-binders, and rails

Separate rates are also shown for the following elements:

- 50mm acoustic insulation between studs

INTERMEDIATE FLOOR

- 18mm OSB structural decking
- Nominal 240mm deep solid timber (140mm deep over corridors), including trimmers and beams to form upper floor
- Joist hangers and all other associated ironmongery

Separate rates are also shown for the following elements:

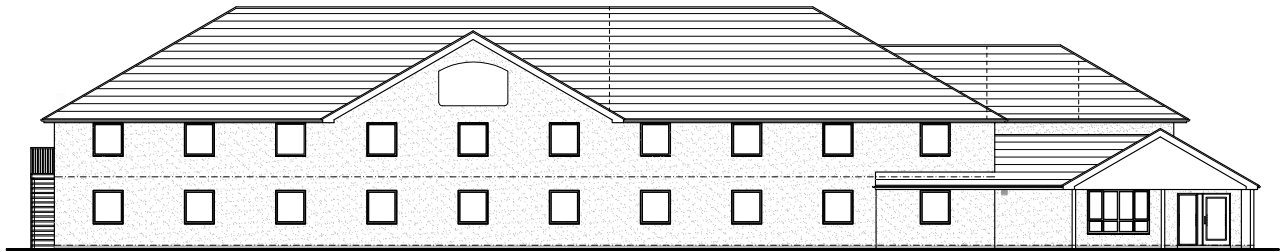
- 50mm acoustic insulation between studs

ROOF

- Roof trusses, including valley sets and in-fill timber for hipped-ends, and bracing
- 89mm wide timber spandrel panels with 9mm OSB and breather paper

- 89mm wide timber gable ladders
- Truss shoes and all other associated ironmongery
- 300mm wide valley board and supporting timber noggins

10 HOTEL - ELEVATIONS AND FLOOR PLANS



Elevation



Ground floor plan

THE FOLLOWING ITEMS ARE EXCLUDED FROM THE RATES SHOWN

- Foundation and all ground floor works up to finished floor / DPC level
- Roofing felt and tile battens, fascia and soffit
- External cladding, doors and windows
- Plasterboard and VCL's two layers 12.5mm plasterboard to achieve 60min fire performance.
 - Internal Bedroom to Bedroom and Bedroom to Corridor walls will generally require two layers 15mm soundblock plasterboard on resilient bars.
 - Ceiling of separating floors will require 1x12.5mm + 1x19mm plasterboard layers on 16mm resilient bars to achieve fire and acoustic performance
- Separating floor build-up
- Acoustic and thermal insulation to mid floor and roof ceilings
 - Separating floors will require min 100mm mineral fibre insulation between the joists to achieve acoustic performance
- Stair flights and handrail
 - Timber stairs within hotels will require fire treatment, and increased specification of stringers, treads and risers to achieve fire performance.
- First and second fix plumbing and M&E services
- Scaffolding
- Site security and welfare facilities
- Waste disposal

10 HOTEL - WORKED EXAMPLE

Premier Inn of 40 bedrooms over two storeys, including reception, ancillary space and circulation.
Gross internal floor area = 1,216m²

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Preliminaries					
Design, manufacturing set up	1216	m ²	14.20	17,267.20	
Deliver to site	1216	m ²	4.72	5,739.52	
Supply of materials					
External walls, 38x140 mm load bearing, 9mm OSB, 150 wide 2000 gauge embossed polythene dpc, 2.4m high (GROUND FLOOR)	125	m	68.11	8,513.75	
External walls, 38x140 mm load bearing, 9mm OSB, 2.4m high (FIRST FLOOR)	118	m	61.53	7,260.54	
External walls, 38x89 mm load bearing, 9mm OSB, 2.4m high - (ROOF SPANDREL PANELS)	25	m ²	24.40	610.00	
Internal walls, 38x90mm, load bearing, 9mm OSB, 2.4m high (GROUND FLOOR)	232	m	47.57	11,036.24	
Internal walls, 38x90mm, load bearing, 9mm OSB, 2.4m high (FIRST FLOOR)	192	m	44.93	8,626.56	
Internal walls, 38x90mm, load bearing, 9mm OSB, spandrel panels	46	m ²	14.84	682.64	
Internal walls, 38x63mm, non load bearing, 2.4m high (GROUND FLOOR)	95	m	31.32	2,975.40	
Internal walls, 38x63mm, non load bearing, 2.4m high (FIRST FLOOR)	98	m	30.69	3,007.62	
Structural racking	1	item	4,131.76	4,131.76	
Roof trussed rafters including straps and bracing (MEASURED ON PLAN)	748	m ²	36.02	26,942.96	
Extra over items					
Craneage	1	item	10,091.41	10,091.41	
Erection of frame and associated items	1	item	42,600.54	42,600.54	
Gable ladder to roof	22	m	9.45	207.90	

ELEMENT	QTY	UNIT	RATE £	TOTAL £	COST M ²
Extra over items...cont/					
Timber joists, size 50x225mm at 400 ccs, bracing / blocking pieces, 18mm OSB 3 decking, generally spanning between 3.5m and 4.0m	592	m ²	47.80	28,297.60	
Wall ties stainless steel, to suit 50mm cavity, approx quantity, 4.5 nr / m ² (SUPPLY ONLY)	2394	nr	0.24	574.56	
Anchor / holding down straps and all associated fixings	1	item	237.10	237.10	
Reflective breather membrane	507	m ²	4.17	2,114.19	
Services noggins (SUPPLY ONLY)	1	item	841.40	841.40	
Plasterboard noggins (SUPPLY ONLY)	1	item	903.34	903.34	
Fire socks	1	item	273.94	273.94	
Total base cost supply and erect for the timber frame				182,936.17	150.44
Other optional items (to be included if required)					
Fall arrest	1	item	1,708.75	1,708.75	
External walls, 0.032 lambda glasswool insulation, 140mm thick, between studs (SUPPLY AND FIT)	507	m ²	13.64	6,915.48	
External walls, Xtratherm thin-R XT/TF zero ODP rigid insulation with 25x50 vertical battens, 25mm thick, over studs (SUPPLY AND FIT)	507	m ²	9.02	4,573.14	
Internal walls, 0.040 lambda glasswool insulation, 90mm thick (SUPPLY AND FIT)	1061	m ²	5.13	5,442.93	
Internal walls, 50mm thick acoustic insulation (SUPPLY AND FIT)	392	m ²	5.89	2,308.88	
Steelwork support may be required but this depends on the specifics of each design - structural engineering advice should be sought					
Total cost supply and erect for the timber frame				203,885.35	167.67

11 INFORMATION ON FIRE RISK MITIGATION

All projects in the UK regardless of construction materials and methods are to comply with the Construction and Design Management Regulations (CDM). CDM 2015 clause 29 requires that suitable and sufficient steps must be taken to prevent, so far as is reasonably practicable, the risk of injury to a person, during the carrying out of construction work, arising from fire.

The HSE have guidance (HSG168) on Fire Safety in Construction which requests that fire safety is required both on the site and also to persons in neighbouring properties outside the site boundary; the CDM regulations and HSG168 are for all building materials and forms of construction.

The Structural Timber Association (STA) has, in conjunction with the Fire Service, HSE and insurance bodies, produced a set of guidance on fire safety during construction for structural timber buildings. STA members follow what is called Site Safe, which is a mandatory membership compliance to support the Principal Designer and Principal Contractor in fire safety during construction.

The STA member will provide the appropriate persons involved with the project access to on-site fire safety guidance (STA 16 Steps, plus Advice Notes) and risk mitigation guidance on fire spread to properties outside the site boundary (STA Separation Guidance).

Structural timber buildings will need to be assessed for the fire risk for which the Principal Designer refers to the STA guidance and selects either the following in the tender process:

- 1 Full fire risk assessment for the project to cover outside the boundary fire spread risk mitigation, which may be compliance with the STA separation guidance or a bespoke fire engineering approach from a specialist member of the design team.
- 2 The site has been assessed in the design process to have a fire spread risk and as a result fire risk mitigation is required, which shall be priced accordingly. Options for the fire risk mitigation are to be presented by the supply chain in the tender process, with clear indication as to the method of assessment; be it from the STA guidance or bespoke fire engineering assessment.

For option 2 additional costs may be incurred as the contractor covers the commercial fire risk. In addition, a higher variation of tender costs may occur if non STA members are invited to tender who will not be under the Site Safe conditions, which is there to safeguard the client.

Note: It is not acceptable under CDM 2015 and HSG168 for the principal designer to issue a tender that has not been assessed initially for an outside the site boundary fire risk assessment.

12 COSTS ASSOCIATED WITH FIRE RISK MITIGATION

For the example building types included in this document, the following guide provides outline cost uplift on top of the base costs associated with fire mitigation for separation distances:

HOUSING

No cost implications as below 600m² threshold

APARTMENTS

No cost implication on typical housing development site

1% to 2% uplift if within 18m of an occupied building

3% to 5% uplift if within 8m of an occupied building

HOTEL

No cost implication on typical new-build brownfield site

1% to 2% uplift if gable within 13m of an occupied building

3% to 5% uplift if elevation within 18m of an occupied building

3% to 5% uplift if gable within 7m of an occupied building

5% to 10% uplift if elevation within 7m of an occupied building

Careful site planning and sequencing of dwelling construction can help reduce any potential cost meaning that, unless the project is within a heavily built up location, it is possible to minimise costs of complying with CDM requirements. In areas where the new building is to be in a densely built location, careful planning and communication with any Structural Timber Association member company can help you understand your options to ensure you are planning a safe, cost effective project.



13 BENEFITS OF BUILDING IN TIMBER FRAME

Timber frame is a load-bearing, structurally engineered building solution utilising structural timber and sheathing materials. A structural timber frame can be used in most places a masonry, steel or concrete solution is found, with the typical exception of works below ground. Building in structural timber delivers a whole host of advantages, in both the long and short term. There are many advantages, credentials and considerations.

Structural timber solutions offer;

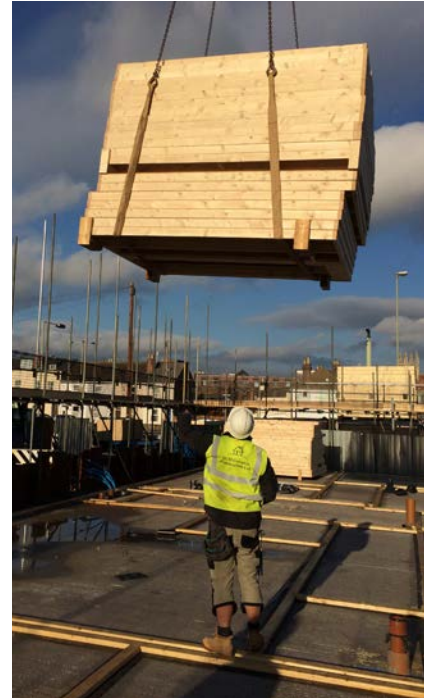
- Fabric-first approach to low carbon construction and thermal performance
- Single point responsibility for structural integrity of the frame
- Whole frame solutions for walls, floors and roofs from one company
- Health and Safety benefits of off-site construction
- Sustainable materials with chain of custody certification
- Open, pre-insulated, closed panel and advanced panel options

THE BENEFITS INCLUDE

- Short lead times, reduced speed and continuity of build programme
- Availability of supply from an established off-site manufacturing sector
- Up to 30% reduction in build programme and prelim costs
- Wind and watertight within five days and not weather or temperature dependent
- Allows early deployment and reduced reliance on follow-on trades
- Savings in site labour allowing multiple trades working simultaneously
- Reduced site deliveries, traffic management and supplier call-offs
- Off-site manufacturing consistency and quality control
- Less reliance on site supervision to check quality

WHERE TIMBER FRAME IS USED

- Buildings typically 1-6 storeys, up to a maximum of 18m (3m x 6 storeys = 18m)
- Where sustainable low carbon building solutions are required
- Where exceptional thermal performance is required such as Passivhaus construction
- To deliver a secure and weatherproof envelop quicker
- For lightweight solutions on poor ground or transfer slabs
- To provide “whole-house” solutions
- As infill panels for concrete, steel, glulam frame



WHAT ELSE TO CONSIDER

- Early design team integration and use of BIM as required
- Preparation and completeness of designs to allow early off-site manufacture
- Understanding timber frame opportunities for the remaining supply chain and follow on trades
- A full understanding of the programming opportunities for follow-on trades
- Site Safe fire risk mitigation considered at cost stage, design stage and on-site
- The need for accurate and level foundation / slab setting out
- Other materials to provide external envelope and internal finishes

DESIGN FLEXIBILITY AND VALUE ENGINEERING

The design of lightweight structural timber is inherently flexible, with the system suited to brownfield and greenfield locations. Additionally, the off-site manufacture of system components offers ample opportunity to provide value engineering of designs whilst maintaining the specific requirements of the project. Typical examples of value engineering opportunities include; standardisation, optimised wall and floor designs offering reduced under-building to minimise foundations and less work for follow-on trades.

OFF-SITE MANUFACTURING CAPABILITY

The UK timber sector is made up of several hundred small, medium and large UK firms, involved in the design, manufacture and construction of buildings which use structural timber. The industry utilises the latest in automated manufacturing techniques, CAD/CAM technology and quality assured processes.

SITE ERECT AND PROJECT MANAGEMENT

The sector has a heritage in on-site construction and project management supervision. This is coupled to a UK network of trained and qualified erect teams with the support of experienced craneage and plant suppliers to ensure safe and controlled site erect service.

ENGINEERING CERTIFICATION AND SUPERVISION

Timber frame designers will engage with the client's design team from an early stage in any project. They will work with clients from initial enquiry, through tender stage and then through to project commencement and throughout the programme of the works. This includes the provision of structural appraisals, line and point loads structural certification for use at building warranty stage.

COST EFFICIENCIES

Structural timber guarantees a faster construction time, requiring around 20% fewer on-site labour days and a shorter construction period overall. This results in reduced disruption to local communities and tidier, safer sites.

BUILDING REGULATIONS AND LEGISLATION COMPLIANCE

Structural timber provides a fabric first approach to legislation compliance. It minimises the environmental impact of materials, ensures responsible sourcing and delivers airtightness and acoustic insulation. Specifications offer solutions for thermal regulations in England and Scotland. Currently, 85% of all passive houses are built in timber, and timber buildings were the first to reach CSH levels 5 and 6. The material is also well positioned to meet increasingly strict environmental standards, as set out by national, regional and local governments.

ENVIRONMENTAL CREDENTIALS

Timber is the most sustainable form of construction, as wood is effectively carbon neutral, with structural timber benefiting from the lowest embodied CO₂ of any building material. It is also a natural carbon sink and offers a unique low embodied carbon material resource. Structural timber also benefits from being the only organic, non-toxic and naturally renewable building material, whilst minimising energy consumption during the manufacture process.

14 OTHER TYPES OF STRUCTURAL TIMBER

CROSS LAMINATED TIMBER (CLT)

Whilst timber has been used globally in construction for centuries its relevance for the market today can be attributed to its development and evolution. This is well demonstrated with the introduction of Cross Laminated Timber (CLT). It is a multi-cross layered solid timber panel product that can be used for the wall, floor and roof to create the structural superstructure of a building. The layers are glued together alternately at 90° to the previous, to create the solid panel. Thicknesses can vary from 80mm to 300mm in normal installations and tailored to suit individual applications. The number of layers (lamellas) can be 3, 5 or 7 in transverse or longitudinal sections depending on the structural and fire integrity required.

It is, however, more than just a frame as it can be produced with a visual grade, pre-finished and designed to be exposed internally. Utilising the aesthetic appeal of engineered timber can create a warm and inviting building.

CLT panels come in three distinct grades / categories of finish depending on the building design aesthetics required.

- Non-visual (can be used as a finished product)
- Industrial visual
- Domestic visual

The cost information used within this section of the guide has been compiled by RLB using in-house project experiences and by liaising with the CLT experts within the industry.

- Sustainable material
- Reduced site construction / programme time for panel construction
- Door and window opening pre-formed
- Low shrinkage
- Reduced site works and waste
- Ease of airtightness detailing
- Can avoid thermal bridging
- For high rise developments weight reduction for reduced thickness of transfer slabs
- Foundations beam reduction from relatively low self-weight



WHERE USED

- Any building from typically 1 to 12 storey
- External and internal wall construction
- Roof construction
- Floor construction
- Where exposed timber finish is required e.g. ceiling finishes, wall finishes
- Health and Safety benefits of pre-fabricated construction

WHAT TO CONSIDER

- Design freeze at an early point to allow for off-site manufacture
- Accurate foundation / slab setting out
- Requires other materials to provide weatherproof envelope
- Follow-on trades for insulation and fenestration
- Do not use below ground
- Site Safe fire risk mitigation



14 OTHER TYPES OF STRUCTURAL TIMBER

STRUCTURAL INSULATED PANELS (SIPS)

SIPs products have an estimated expected service life of at least 60 years, provided the product is installed and maintained in accordance with manufacturer's instructions.

A SIP is a structural panel comprising structural boards that encase a rigid insulating foam sandwich core. The boards are usually made from OSB (orientated strand board). The insulation (typically Polyurethane) is injected and set to auto-bond the skins (OSB) to the insulation or is adhesively bonded expanded polystyrene.

The SIP panel thicknesses typically range from 100mm to 250mm

- Low carbon design option with both embodied and in-fabric energy performance
- Works can continue through cold weather
- Wet trades reduced or omitted
- Single point responsibility for structure
- Whole frame solutions available for walls, floors and roofs from one company
- Health and Safety benefits of pre-fabricated construction
- Sustainable material chain of information available
- Reduced site construction / programme time for panel construction
- Door and window opening pre-formed

WHERE USED

- Any building from typically 1 to 4 storey
- Sustainable low carbon building solutions
- Where a quicker waterproof envelop required
- Lightweight solutions on poor ground or transfer slabs
- Over existing structures
- Speed on-site to reduce neighbourhood construction nuisance impact
- Whole 'house' solutions
- Infill panels for concrete, steel, glulam frame

WHAT TO CONSIDER

- Design freeze at an early point to allow for off-site manufacture
- Understanding of timber frame in the supply chain
- Sequence and programming follow-on trades
- Site Safe fire risk mitigation considered
- Accurate foundation / slab setting out
- Requires follow-on trades to provide weatherproof envelope



GLULAM (ENGINEERED WOOD)

Glued laminated timber is a way to create large structural timber members that cannot normally and efficiently be sourced direct from the tree. Glulam is often integrated into the structural design of a timber frame enabling large openings and spaces to be formed to meet architectural requirements. It can effectively be used in nearly any location where a steel or concrete product can be used.

Typical standard section sizes range from 45mm to 240mm wide in depths of up to 1200mm. However, larger bespoke sizes are available for projects. Glulam is typically whitewood based but other bespoke forms are available.

- Sustainable material
- Appearance and aesthetic finish
- Structurally stable in fire with large sections
- Good strength to weight ratio
- Many sizes and shapes available

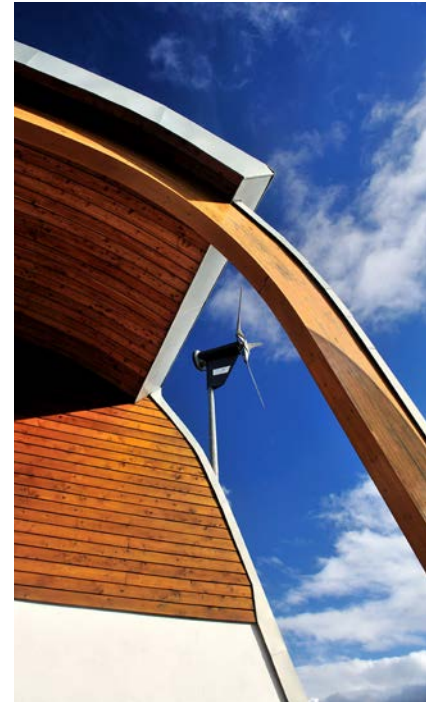
WHERE USED

- Post and beam structures or part of other element methods
- Straight or curved columns and beams as feature members
- Hidden structural floor beams and sometimes joists, roof purlins and sometimes rafters
- Portal frames for specialist activities - salt barns, equestrian, leisure and sports facilities, public spaces for attractive roof aesthetics

WHAT TO CONSIDER

- Generally a finished product so good protection during the construction period required

Note: Similar products are Laminated Veneer Lumber (LVL), Duo Lam, Tri Lam and Laminated Strand Lumber (LSL) except these do not come pre-curved; however curves can be cut out of these products.



15 CONTRIBUTORS TO THIS GUIDE

We are pleased to identify the manufacturers and suppliers who provided rates and pricing of the components included in this guide. Should the reader require more specific costing or tendering information, they will be more than happy to support you with your project.



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www.stewartmilnetimbersystems.com

Thanks to **John Smith**, Head of Product and Innovation



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www.oakworthhomes.co.uk

Thanks to **John Capper**, Managing Director



CCG (OSM) Ltd

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www.c-c-g.co.uk

Thanks to **Steven Earlie**, Managing Director



Deeside Timber Frame

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www.deesidetimberframe.com

Thanks to **Martin Thomson**, Estimator



Flight Timber Products Ltd

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www.flighttimber.com

Thanks to **Graham Fooks**, Senior Estimator



Frame-Tech Structures Ltd

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www.frame-tech.co.uk

Thanks to **Paul Williamson**, Commercial Manager



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Thanks to **Mike Onions**, Technical Director



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RLB.com

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