

# TY YNNOS SELF BUILD

## INTRODUCTION

The Ty Ynnos self build system is essentially a modular portal frame structure which maximises the use of readily available, standard lengths and sections of sitka spruce. The finished room modules add up to a hybrid modular volumetric frame which would then be finished by an individual self builder. The possibilities for creating house types are numerous as shown opposite.

## DESIGN CONCEPT - ADAPTABLE MODULAR DWELLINGS

The concept behind the scheme is about making the duration, costs and experience of undertaking a self build project more manageable for the individual self builder. The key to increasing simplicity starts with prefabrication. Historically, prefabricated systems have been criticised because of their inability to adapt to varied situations. However, if you prefabricate the structural frame of the house which can adapt to each site, this problem disappears. Each self builder, when building the rest of their house would then be responsible for customising the final solution. If the house is designed and well framed to begin with, the self build 'finishing' should be able to happen in a safe, quick and economical way.

## DESIGN FLEXIBILITY & FUTURE ADAPTABILITY

The system is based on modules of one standard size of 3600 x 3600mm. Each module is 13 sqm, therefore 6 modules is approx 81sqm (78sqm room modules+3sqm of space gained between the internal frame) which is roughly the stated space requirements for a 3 bedroom, 4 person house. The modules enable simple and varied spatial arrangements to be created with minimal structural intrusion into spaces. The method could create a variety of one or two storey buildings, for example with pitched or flat roofs, double height spaces and courtyards. The system is designed to be flexible in use and can be adapted in the future by building into the provided additional portal frames.

## SIMPLIFIED SELF BUILD CONSTRUCTION PROCESS

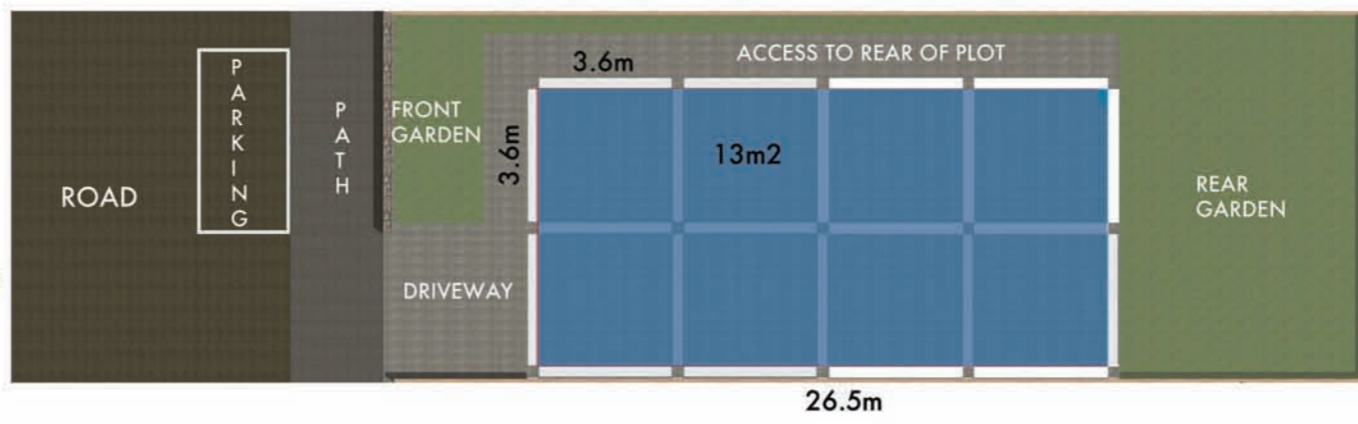
The modular dimensions are kept as simple as possible to minimise cost, time, mistakes and accidents. The portal frames are envisaged to take one day to assemble on site so to minimise bought-in labour costs. The building envelope is designed to use standard sized components in very lean system based on a module measure of 600mm. The transparency of the building process means it would be easily understood and could be finished by relatively unskilled labour.

## SUSTAINABILITY & THE TY YNNOS SYSTEM

The system is designed to be resource lean and uses readily available material - sitka spruce, resourced through local supply chains, reducing product miles. This would add value to UK timber as well as reducing the environmental impact of imports. The system is designed to be reusable and adaptable by clever wall, window and door positioning and by using basic mechanical fixings to maximise the potential for disassembly. The envelope design is a fabric first approach to sustainability, designed for excellent energy efficiency and durability, aiming to achieve passivhaus standards in order to reduce energy demands and carbon emissions during the lifetime of the finished home.

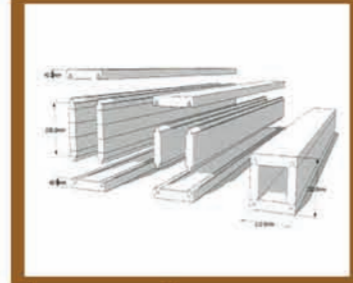


Allocated Build area



**THE BRIEF SITE RESPONSE EXPLAINED**  
The allocated build area is made up of 8 modules which is based on the 6 module, 1 storey option (with 2 module possible extension) The modules can be used to create a wide variety of house types. The allocated build area can be simplified or rationalised depending on the plot size and should be designed according to site conditions and orientation.

## SITE PLAN



design & approvals



manufacture and project planning



foundations, delivery & assembly of frame



infill panel components & pod installed



joinery, insulation and weatherproofing



external / internal finishes & services

## PROCESS



**AXONOMETRIC** 3 design options showing before and after self build 'finishing'

6 modules - 81m2 - 3 bedrooms - 1 storey - DDA compliant lime render and timber cladding.



6 modules - 81m2 - 3 bedrooms - 2 storeys natural stone and timber cladding.



6 modules - 81m2 - 3 bedrooms - 2 storeys brick and timber cladding.

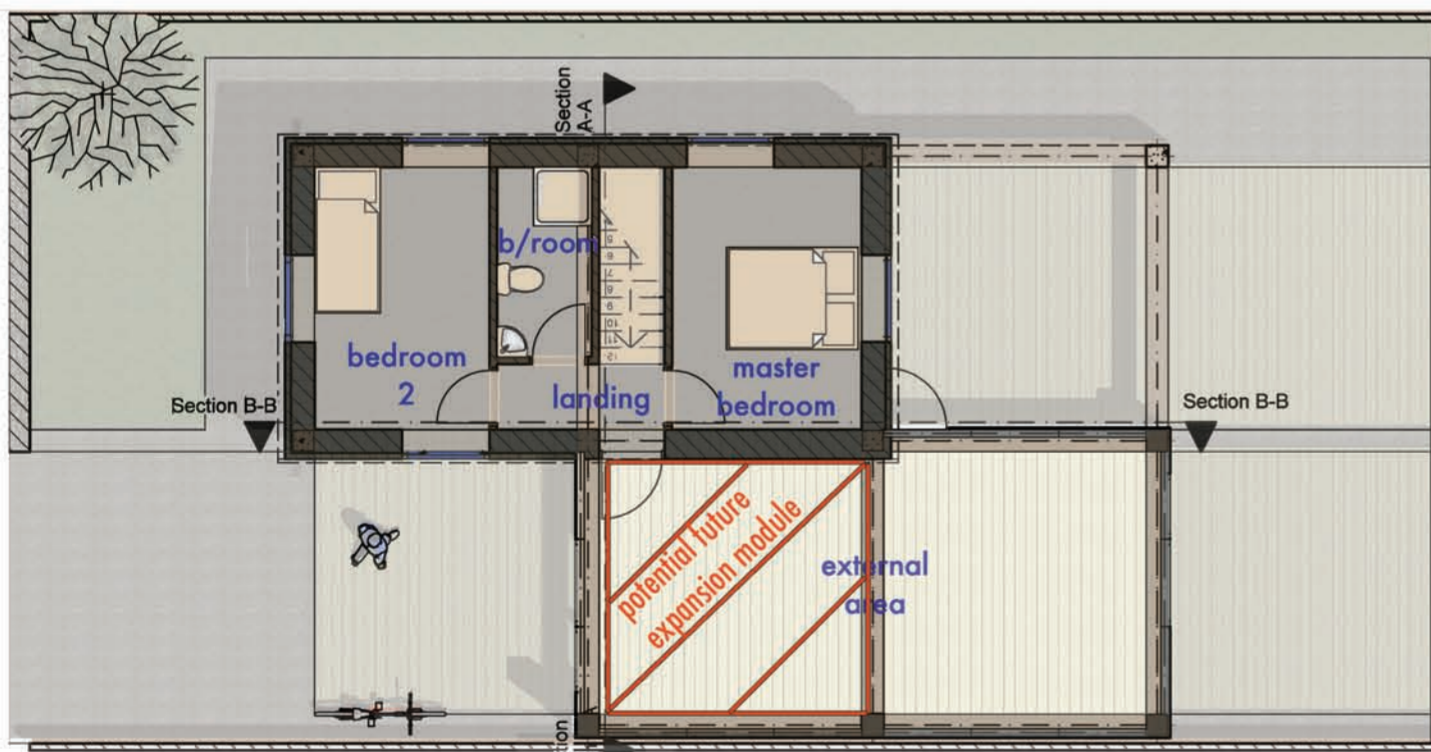


**MANUFACTURED FRAME TO FINISHED SOLUTION**  
The Ty Ynnos manufacturer supplies and erects the frame and foundations. Additional manufacturer supplies the self contained pod (bathroom, kitchen and stairs)

The self builder would then 'finish' the property to be site/brief specific with finishes sympathetic to the local planning conditions and/or vernacular, a range of which are shown above.

## STREET PERSPECTIVES

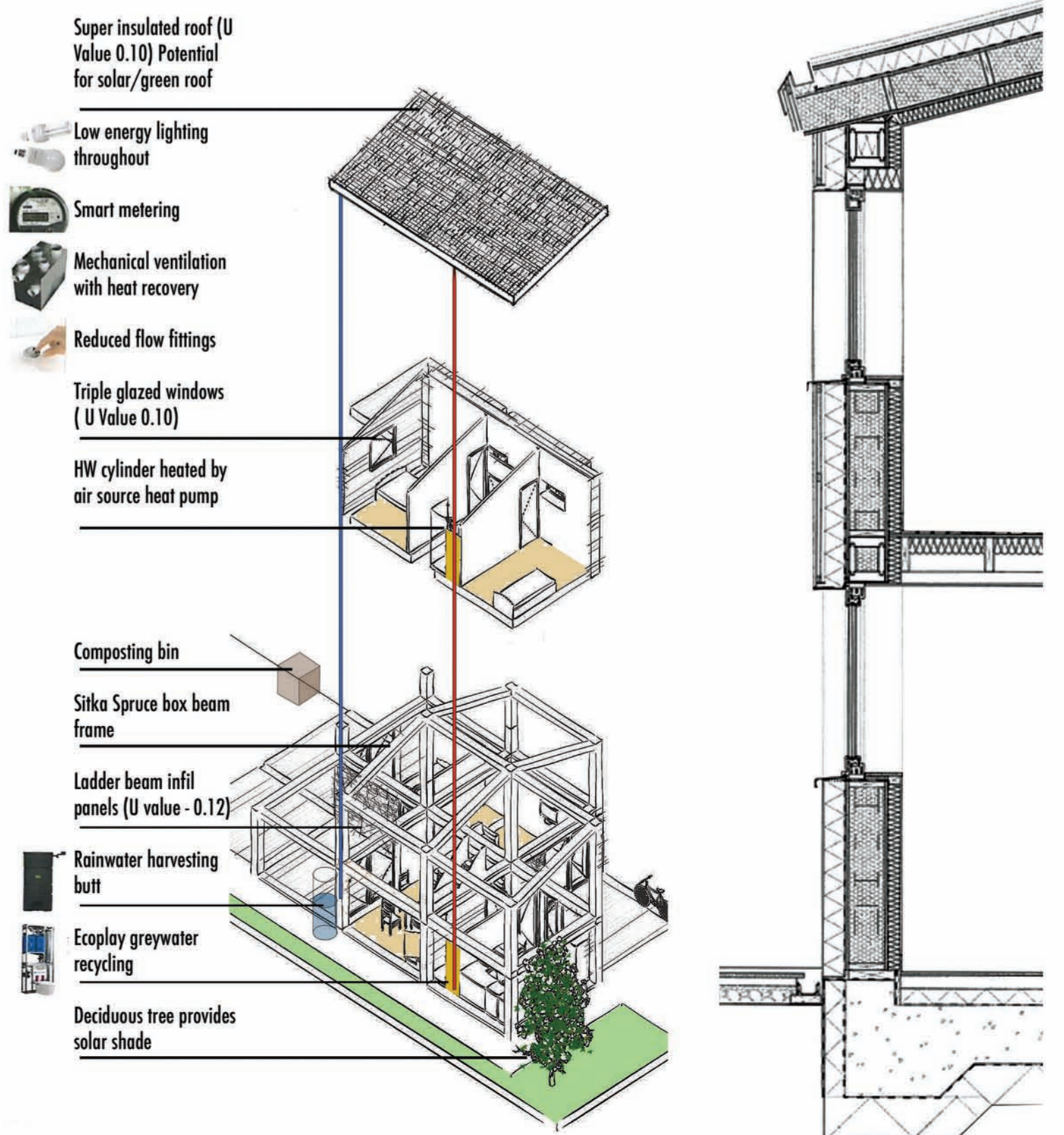
The above option was chosen for a detailed study shown below



FIRST FLOOR PLAN @ 1:100



GROUND FLOOR PLAN @ 1:100



ENVIRONMENTAL SERVICES DIAGRAM

TYPICAL WALL SECTION @ 1:25

Works Package	Construction Element	Materials	Labour	Total
Works Package 1	Set up, Clearance, Demolitions....	£-	£300.00	£300.00
Works Package 2	Foundations ( <i>up to DPC</i> )	£600.00	£250.00	£850.00
Works Package 3	Ground Floor Slab or Suspended Floor	£435.00	£-	£435.00
Works Package 4	Drainage & Service Trenchwork	£390.00	£-	£390.00
Works Package 5	Specialist Building System ( <i>eg timber frame, SIPs, etc if applicable</i> )	£12,200.00	£8,600.00	£20,800.00
Works Package 6	External & Internal Walls	£3,030.00	£-	£3,030.00
Works Package 7	Intermediate Floor Zone ( <i>if applicable</i> )	£480.00	£-	£480.00
Works Package 8	Fireplace & Chimney ( <i>if applicable</i> )	£-	£-	£-
Works Package 9	Roof Structure, Insulation & Covering	£2,810.00	£-	£2,810.00
Works Package 10	Joinery ( <i>Windows, doors, stairs, skirtings...</i> )	£6,050.00	£-	£6,050.00
Works Package 11	Specialist Products ( <i>eg; Eco products...</i> )	£480.00	£-	£480.00
Works Package 12	Electrical Installation	£1,020.00	£375.00	£1,395.00
Works Package 13	Plumbing Installation	£1,320.00	£250.00	£1,570.00
Works Package 14	Heating Installation	£3,370.00	£450.00	£3,820.00
Works Package 15	Plastering ( <i>or dry-lining</i> )	£1,030.00	£-	£1,030.00
Works Package 16	Kitchen and Utility Units ( <i>+ appliances</i> )	£3,000.00	£-	£3,000.00
Works Package 17	Decorations & Wall Ceramics	£1,130.00	£-	£1,130.00
Works Package 18	Floor Finishes	£1,245.00	£-	£1,245.00
	<b>TOTAL</b>	<b>£38,590.00</b>	<b>£10,225.00</b>	<b>£48,815.00</b>

# COST REPORT - TY YNNOS SELF BUILD

## Works Package 1 - Set up, Clearance, Demolition.

**Materials - £0**

**Labour - £300.00**

Mini digger hire - £150

Earth removal from site - £150

### **Comment**

Labour costs to hire a mini digger to dig out allocated build area for the pad foundations and suspended timber ground floor. Also included are earth removal costs.

## Works Package 2 - Foundations (up to DPC)

**Materials - £600.00**

12 pad foundations - £600.00

**Labour - £250.00**

2 labourers install pad foundations in 1 day - £250

### **Comment**

The Ty Unnos frame structure is light but very strong and is easy to erect on the simplest foundations therefore reducing the costs.

## Works Package 3 - Suspended Floor

**Materials - £435.00**

275mm Warm-cell quilt - £340

DPM - £55

Fixings/Brackets - £40

**Labour - £0**

### **Comment**

Ladder floor joists boxed in with plywood and infilled with 275mm Warm-cell insulation. DPM laid underneath system to protect from damp.

U Value calculation shown below:-

### Details of structure

Layer	Thickness (mm)	Conductivity (W/mK)	Resistance (m2K/W)	Condensation risk?
Internal surface			0.12	
Wood, Soft	25	0.130	0.19	
Wood, Soft	50	0.130	0.38	
Warmcell	275	0.040	6.88	
Plywood	18	0.140	0.13	*
Felt	5	0.500	0.01	*
		-	0.00	
		-	0.00	
		-	0.00	
External surface			0.06	
<b>Total resistance</b>			<b>7.77</b>	<b>m<sup>2</sup>K/W</b>

**U-VALUE 0.13 W/m<sup>2</sup>K**

## Works Package 4 - Drainage and Service Trench-work

**Materials - £390.00**

Guttering & Downpipes - £180

Joints, bends, outlets - £10

Drain & Service trench-work contingency - £200

Labour - £0

### **Comment**

Light foundations and suspended ground floor allows service trench-work depth to be minimised. Drainage depends on site condition and mains connections but a contingency has been included.

## Works Package 5 - Specialist Building System - The Ty Unnos self build system

**Materials - £12,200.00**

Cost of sitka spruce materials, sourcing, specification and manufacturing, bolt connections, adhesives to create portal frame structures - £7,900

18mm Moisture grade external plywood - £1890

Floor Ladder joists - £880

Infill wall joists - £980

Roof ladder joists - £380

Brackets & fixings - £170

**Labour - £8,600.00**

Two labourers engineering the box beam portal frame system, ladder joists system, external plywood cut to size at rate of £100 a day each for 4 weeks - £4,000

Associated running costs of workshop - £3,000

Estimated delivery to site and assembly on site in two days with assistance from self builders - £1,600

### **Comment**

The Ty Unnos self build system, the cornerstone of the design is inherently sustainable as detailed in the A2 display board. While the largest aspect of the cost. It will allow the self builder to save time, money and stress over the duration of the project.

## Works Package 6 - External and Internal Walls

**Materials - £3030.00**

### External Walls

Tyvek - £180

Insulation 250mm Warm-cell Quilt - £580

Fixings - £140

Insulated render finish - £625

Cedar Cladding - £650

### Internal Walls

10 x 42 CLS Timber - £110

KN Sound Moisture resistant board - £260

Insulation 80mm Quilt - £220

Door studs - £20

Fixings - £115

Bulkhead framing & top - £130

**Labour - £0**

### Comment

External walls are infilled with 250mm Warm-cell insulation. Tyvek protects the fabric from the elements while the external finish on ground floor is an insulative render and on first floor is clad vertically in cedar.

U Value calculation shown below:-

#### Details of structure

Layer	Thickness (mm)	Conductivity (W/mK)	Resistance (m2K/W)	Condensation risk?
Internal surface			0.12	
Plywood	15	0.140	0.11	
Plywood	15	0.140	0.11	
Warmcell	250	0.040	6.25	
Plywood	18	0.140	0.13	*
Polyurethane	50	0.025	2.00	
Render	6	0.730	0.01	*
	0	-	0.00	
		-	0.00	
External surface			0.06	
<b>Total resistance</b>			<b>8.78</b>	<b>m<sup>2</sup>K/W</b>

**U-VALUE 0.11 W/m<sup>2</sup>K**

### Works Package 7 - Intermediate Floor Zone

#### **Materials - £480.00**

KN Sound Moisture resistant board - £260  
Insulation 120mm Warm-cell Quilt - £220

**Labour - £0**

### Comment

Sound moisture resistant board added to reduce noise disruption between ground and first floor. Warm-cell quilt added for insulation.

### Works Package 8 - Fireplace and Chimney

Not Applicable

### Works Package 9 - Roof Structure, Insulation and Covering

#### **Materials - £2810.00**

High performance Felt - £35  
Timber battening - £220  
Reclaimed roofing slates - £1,500  
Fascia & Soffit Boards - £520  
Adhesive - £20  
Tyvek - £165  
Insulation 300mm Warm-cell - £325  
Fixings - £25  
**Labour - £0.00**

### Comment

Roof Ladder joists infilled with 250mm Warm-cell. Second hand reclaimed slates chosen as a roof finish over timber battens. 6mm plywood internal finish.

U Value calculation shown below:-

#### Details of structure

Layer	Thickness (mm)	Conductivity (W/mK)	Resistance (m2K/W)	Condensation risk?
Internal surface			0.10	
Plywood	13	0.140	0.09	
Warmcell	275	0.040	6.88	
Plywood	13	0.140	0.09	*
Felt	5	0.500	0.01	*
Cavity	50	-	0.18	
Slate	13	1.300	0.01	
		-	0.00	
		-	0.00	
External surface			0.04	
<b>Total resistance</b>			<b>7.40</b>	<b>m<sup>2</sup>K/W</b>

**U-VALUE 0.14 W/m<sup>2</sup>K**

### Works Package 10 - Joinery

#### **Materials - £6050.00**

External doors - £950  
External Windows - £3285  
Timber curtain rails - £25  
Internal doors - £190  
Softwood door frames - £145  
Softwood Architraves - £70  
Timber Staircase - £1,300  
Softwood Skirting boards - £85

**Labour - £0**

### Comment

The prefabricated service pod will house the stairs. All external doors and windows to be timber and triple glazed. Standardised size door and window units used internally and externally where possible.

### Works Package 11 - Specialist Products

#### **Materials - £480.00**

Rainwater harvesting butt for garden - £130  
Rain-gardens water attenuation - Stone, soil & planting - £100  
Timber and steel railing on first floor amenity space - £250  
**Labour - £0**

### Comment

Low embodied energy and low cost solutions were sought due to budgetary constraints.

### Works Package 12 - Electrical Installation

#### **Materials - £1020.00**

Mechanical extract vents - £110  
Smoke alarms - £45  
Low energy light fittings - £75  
Recessed LED down-lights - £180  
Light Switches - £40  
Pull Cords - £15

Electric Cables - £175  
Sockets/Units - £125  
Switch fuses - £30  
Down-flow heater - £55  
Outlets - £170

**Labour - £375.00**

Electrician/Installers wage for 3 days - £375

**Comment**

The prefabricated service pods houses the main electrical fittings (under the stairs). Additional electrical appliances, fixtures and connections will be then be undertaken on site by a certified electrician.

**Works Package 13 - Plumbing Installation**

**Materials - £1320.00**

Shower trays - £140  
Shower cubicles - £310  
Basins & Taps - £85  
Brackets/Fixings - £30  
WC Pans, Cisterns, Seats - £170  
Shower Bar, mixers riser and hose - £430  
Toilet roll holder & rails - £80  
Access cupboard - £45  
Wall Mirror -£30

**Labour - £250.00**

Plumber /Installers wage for approx 2 day - £250

**Comment**

The prefabricated service pod will house the plumbing fixtures and associated vertical connections. Low cost sanitary systems are specified.

**Works Package 14 - Heating Installation**

**Materials - £3370.00**

Radiators Wet LST - £560  
Combi Boiler - £2,000  
Valves & Poly-pipes - £380  
Connectors, Valves, Traps, Fittings, Clips - £430

**Labour - £450.00**

Electrician/Installers wage for approx 3 days - £450

**Comment**

The prefabricated services pod will also house the heating system and associated vertical connections. Additional radiators, fixtures and connections will then be installed into individual rooms on site by a certified installer.

**Works Package 15 - Plastering (or dry lining)**

**Materials - £1030.00**

12.5mm moisture-shield tapered - £380

12.5mm plasterboard square edge - £310  
6mm internal ply - £200  
Linier and Board Fixings - £140  
**Labour - £0.00**

**Comment**

The living space will be left with a plywood finish for aesthetic purposes, while the bedrooms will have a plasterboard and painted finish.

**Works Package 16 - Kitchen and Utility Units**

**Materials - £3000.00**

Kitchen units - £1,500  
Kitchen Appliances £1,500  
**Labour - £0.00**

**Comment**

DIY Kitchen and Basic kitchen appliances specified. Appliances such as a dryer and a dishwasher not included in the design due to additional unneeded energy costs.

**Works Package 17- Decorations & Wall Ceramics**

**Materials - £1130.00**

Matt White Paint & Undercoat - £190  
Adhesive - £45  
Vinyl Upstand & Capping - £60  
Tape and Fill. Walls & Ceiling - £75  
MDF Window boards 22mm - £15  
Bathroom Wall tiles - £260  
Tile Border - £205  
Primer - £45  
Tile Adhesive - £105  
Tile Grout - £110  
Silicon - £20  
**Labour - £0.00**

**Comment**

Low cost and where appropriate natural materials sought.

**Works Package 18 - Floor finishes**

**Materials - £1245.00**

Bathroom floor tiles - £195  
Featheredge to floor joints - £20  
Fitted Carpets - £580  
Laminate Flooring - £450  
**Labour - £0.00**

**Comment**

Low cost and where appropriate natural materials sought. Fitted Carpets to bedrooms & lounge. Laminate flooring to kitchen, dining area and hallways.