General Construction Notes and Guidance:

1. Calculations are not to be used for the purpose of ordering materials and should only be used for Building Regulations submissions. All dimensions should be checked by the contractor on site.

2. All steelwork to be mechanically wire brushed and painted two coats of red oxide. Steelwork located in the cavity or below DPC to be suitably protected with 2 coats of bituminous paint.

3. All timber to be graded C24 (SC4) unless stated otherwise. Preservative treated to Architect´s details

4. To be read in conjunction with architect's drawings, any inconsistencies should be reported.

5. For details of fire protection to steelwork, see Architects drawings.

6. The contractor is to ensure that all existing construction is adequately supported, using needles and props as required. Where a new beam supports the existing construction adequate pre-load is to be applied and suitable packs such as driven dry-state introduced, then pointed up with mortat.

7. All blockwork to be 7.3 N/mm^2 in class III mortar below DPC in accordance with BS5628:Part3:2005 or suitable 7.0 N/mm^2 foundation quality blocks in class II mortar in accordance with the manufacturer's instructions. All brickwork below DPC to be engineering bricks DPC in accordance with BS 5628: Part 3: 2005.

8. The builder is to take into consideration the placement of the structural elements, ensuring that the method of lifting and placement is safely carried out. Responsibility for this element lies with the Contractor. As the existing walls need to be propped in order to introduce some of the lintels, this should also be considered in relationship to the risk assessment of the Contractor. Safe working procedures must be adopted. Responsibility for this element lies with the Contractor. Splice details for long-span beams can often be accommodated if required.

9. By using these calculations you agree to have read and agreed to our terms and conditions. Details of these can be found at https://www.pmce.co.uk/terms-and-conditions should you have any queries relating to our terms and conditions please inform us in writing prior to commencing structural works

Party Wall Act 1996

If part of the work is adjacent to the boundary, the adjacent neighbours right to support could be affected; the issues associated with Party Wall Act may need to be considered. This may include providing information to the adjoining owner, giving sufficient notice of works in compliance with the Act. If the following list applies to this project then the Party Wall Act will apply.

1. Installing a new beam into the shared wall between properties
2. Demolishing, building or under-pinning an existing shared wall
3. Building a new wall at or on the boundary or junction of two properties
4. Damp-proofing all the way through a party wall
5. Digging foundations that are within 3m of a Party Wall, where the new foundations are deeper than the existing ones
6. Where the new foundations are within 6m and lower than a 45° line from the bottom of the existing foundations.

Codes

BS EN 1990+A1:2006/NA: 2005-06	Basis of structural design
BS EN 1991-1-1	Part 1-1: General actions - Self-weight, imposed loads for buildings
BS EN 1991-1-3/NA: 2005-12	Part 1-3: General actions - Snow loads
BS EN 1995-1-1+A1:2008/NA: 2006	Part 1-1: General - Common rules and rules for buildings
BS EN 1995-1-2	Part 1-2: General - Structural fire design
BS EN 1991-1-4/NA: 2006	Part 1-4: General actions - Wind loads
BS EN 14080:2013-08	Timber structures - Glued laminated timber and solid timber - Requirements
BS EN 338:2010-03	Structural timber - Strength classes

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Loading

Roof1a

	Tiles	g_1=		0.65 kN/m^2			
	Rafters,felt,insulation etc	g_2=		0.30 kN/m^2			
	Plasterboard	g_3=		0.25 kN/m^2			
		g_0=		1.20 kN/m^2			
	Roof pitch	a=		20 °			
		g_k=	g_0/COS(a)		=	**1.28 kN/m^2**	
	Roof snow loading	q_k=	0,60*((60-a)/30)		=		**0.80 kN/m^2**

						Dead	Live
Roof1c							
	Tiles	g_1=		0.65 kN/m^2			
	Rafters,felt,insulation etc	g_2=		0.30 kN/m^2			
	Plasterboard	g_3=		0.25 kN/m^2			
		g_0=		1.20 kN/m^2			
	Roof pitch	a=		20 °			
		g_k=	g_0/COS(a)+g_4		=	**1.28 kN/m^2**	
	Attic	g_4=		0.25 kN/m^2			
	Roof snow loading	q_k=	0,60*((60-a)/30)		=		**1.05 kN/m^2**
Floor							
	Joist & boarding,finishes	g_1=		0.25 kN/m^2			
	Plasterboard	g_2=		0.25 kN/m^2			
		g_k=	g_1+g_2		=	**0.50 kN/m^2**	
	Imposed	q_k=			=		**1.50 kN/m^2**

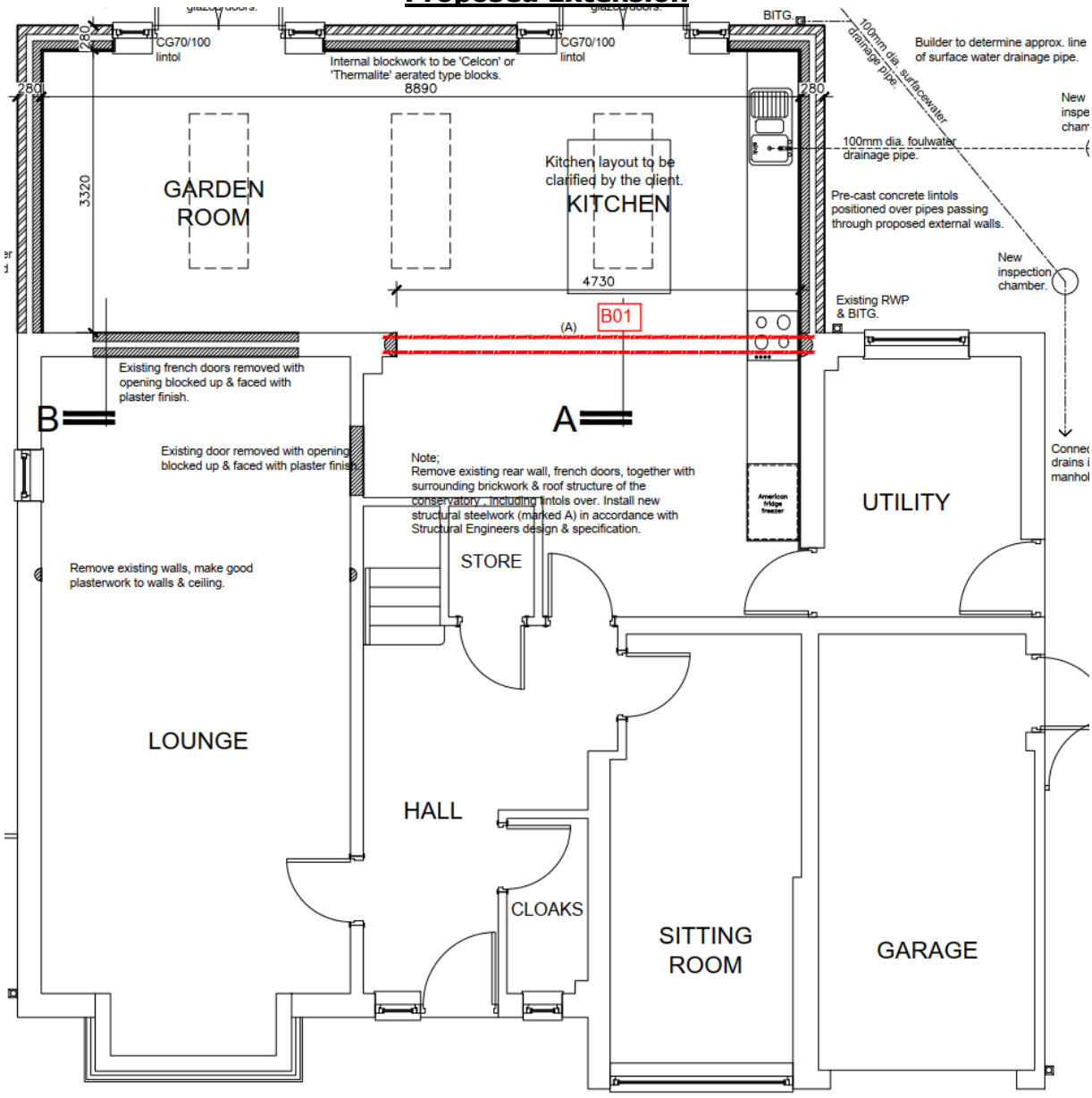
Walls

W1	External cavity blockwork	g_1=	2,7*(2,1+1,4)=	9.45 kN/m		
	Plasterboard	g_2=	2,4*0,25	0.60 kN/m		
		g_k=	g_1+g_2		=	**10.05 kN/m**

	Profile	Padstone
B01	2 No. 254x146 UB 31 [Grade 43]	To The Left Hand Side: 330 long x 300 wide 2 Course Eng. Bwk Padstone To The Right Hand Side: 440 long x 102.5 wide 2 Course Eng. Bwk Padstone

Plans:

Proposed Extension



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Pos: B01

Span length l= 4.75 m

Loading:

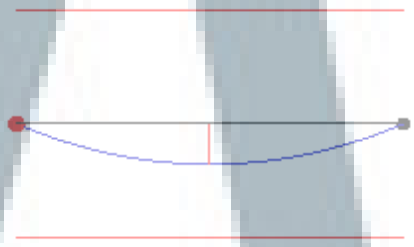
				Dead	Live
Roof 1a	g=	3.30 / 2 * 1.28	=	2.11 kN/m	
Roof 1c	g=	3.30 / 2 * 1.28	=	2.11 kN/m	
Floor	g=	3.30 / 2 * 0.50	=	0.83 kN/m	
Wall Ext	g=		=	10.05 kN/m	
				15.10 kN/m	
Roof 1a	q=	3.30 / 2 * 0.80	=		1.32 kN/m
Roof 1c	q=	3.30 / 2 * 1.05	=		1.73 kN/m
Floor	q=	3.30 / 2 * 1.50	=		2.48 kN/m
					5.53 kN/m

AXIAL WITH MOMENTS (MEMBER)
Initial Design for 1 Loading Cases
B01
Member 1 (N.1-N.2) @ Level 1 in Load Case 1

Member Loading and Member Forces

Loading Combination : 1 UT + 1.25 D1 + 1.5 L1

D1 UDLY -015.100 (kN/m)
L1 UDLY -005.530 (kN/m)



Member Forces in Load Case 1 and Maximum Deflection from Load Case 2

Member No.	Node End1	End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1		0.323T	64.529	0.000	76.628	7.374
	2		0.323T	-64.529	0.000	@ 2.375	@ 2.375

Classification and Effective Area (EN 1993: 2006)

Section (31.14 kg/m)	2 No. 254x146 UB 31 [Grade 43]		
Class = Fn(b/T,d/t,f_y,N,M_y,M_z)	8.49, 36.5, 275, 0, 76.62, 0	(Axial: Non-Slender)	Class 1
Auto Design Load Cases	1		

Local Capacity Check

$V_{y.Ed}/V_{pl.y.Rd}$	0.004 / 519.627 =	0	Low Shear
$M_{c.y.Rd} = f_y.W_{pl.y}/\gamma_{M0}$	275 x 786.2/1	216.205 kN.m	
$N_{pl.Rd} = Ag.fy/\gamma_{M0}$	79.34x275/1	2181.85 kN	
$n = N_{Ed}/N_{pl.Rd}$	-0.323 / 2181.85 =	0.000	OK
$W_{pl.N.y} = Fn(W_{pl.y}, A_{vy}, n)$	786.2, 32.728, 0	786.2 cm^3	
$M_{N.y.Rd} = W_{pl.N.y}.f_y/\gamma_{M0}$	786.2 x 275/1	216.205 kN.m	
$(M_{y.Ed}/M_{N.y.Rd})+(M_{z.Ed}/M_{N.z.Rd})$	$(76.624/216.205)^2+(0)^1$=	0.126	OK

Equivalent Uniform Moment Factors C1, C.mLT, C.mz, and C.my

C_1= fn(M_1, M_2, M_o, ψ_μ)	0.1, 0.1, 76.6, 0.984, 300.000	1.127	Uniform
$C_{mLT}=0.95+0.05\alpha_h$	M_h= 0.06, M_s= 76.62, ψ = 0.984, α_s= 0.001	0.95	Table B.3
$C_{mz}=Max(0.6+0.4\psi, 0.4)$	M = 0, ψ = 1.000	1	Table B.3
$C_{my}=0.95+0.05\alpha_h$	M_h= 0, M_s= 76.62, ψ = 1.000, α_s= 0.000	0.95	Table B.3

Lateral Buckling Check M.b.Rd

L_e = 1.2L+2D	1.2 x 4.75 + 2 x 0.251 =	6.203 m	
M_{cr}= Fn(C_1,L_e,I_z,I_t,I_w,E)	1.127, 6.203, 896.8, 17.1, 0.1318, 210000	113.276 kN.m	
λ_{LT}= √ W.f_y/M_{cr}	√ 786.2 x 275 / 113.276	1.382	
χ_{LT}= Fn(λ_{LT}, λ_{LT5950})	1.382, 1.427	0.482	Curve b
χ_{LT}.mod = Fn(χ_{LT},λ_{LT},k_c,f)	0.482, 1.382, 0.942, 0.991	0.486	6.3.2.3
$M_{b.Rd}$ = χ $W_{pl.y}$.f_y≤ $M_{c.y.Rd}$	0.486 x 786.2 x 275 ≤ 216.205 =	105.157 kN.m	

Buckling Resistance

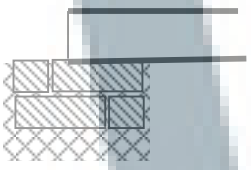
$U_{N.y}$ = N_{Ed}/(χ_y.N_{Rk}/γ_{M1})	0 / 2003.793	0.000	OK
$U_{N.z}$ = N_{Ed}/(χ_z.N_{Rk}/γ_{M1})	0 / 652.371	0.000	OK
$U_{M.y}$ = $M_{y.Ed}$/(χ_{LT}.$M_{y.Rk}$/γ_{M1})	76.624 / 105.157	0.729	OK
$U_{M.z}$ = $M_{z.Ed}$/($M_{z.Rk}$/γ_{M1})	0 / 51.755	0.000	OK
k_{yy}=C_{my}{1+(λ_y-0.2)$U_{N.y}$}		0.950	
k_{zz}=C_{mz}{1+1.4$U_{N.z}$}		1.000	
k_{yz}=0.6 k_{zz}		0.600	
k_{zy}= 1- {0.1λ_z/(C_{mLT}-0.25)}$U_{N.z}$		1.000	
U_{Ny}+k_{yy}.$U_{M.y}$+k_{yz}.$U_{M.z}$	0.000+0.950x0.729+0.600x0.000	0.692	OK
U_{Nz}+k_{zy}.$U_{M.y}$+k_{zz}.$U_{M.z}$	0.000+1.000x0.729+1.000x0.000	0.729	OK

Deflection Check - Load Case 2

δ ≤ Span/360	7.37 ≤ 4750 / 360	7.37 mm	OK

Section (31.14 kg/m) 2 No. 254x146 UB 31 [Grade 43]

Consider Bearings To The Left Hand Side:



Max Load R_d= 65.00 kN

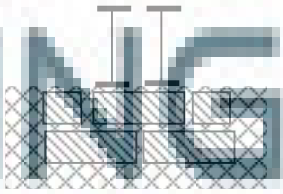
Assuming γ_m = 3.5 f_k = 3.5

Bearing b = 200 mm

Required Bearing length = Rd*E3*γ_m/(f_k*1,5)/b= **216.67 mm**

Provide 330 long x 300 wide 2 Course Eng. Bwk Padstone

Consider Bearings To The Right Hand Side



Max Load R_d= 65.00 kN

Assuming γ_m = 3.5 f_k = 3.5

Bearing b = 100 mm

Required Bearing length = Rd*E3*γ_m/(f_k*1,5)/b= **433.33 mm**

Provide 440 long x 102.5 wide 2 Course Eng. Bwk Padstone