MORGAN

ENGINEERING CONSULTANTS

Structural Calculations

Wivenhoe Offices

Ref: 2207-20

18.07.2022

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MORGAN ENGINEERING CONSULTANTS	Job: Wivenhoe Offices	Job No: 2207-20
	Element: Structural Calculations	Date: 18.07.2022

Document Review Sheet:

Project: Wivenhoe Offices

Client: C/O Duncan Clark & Beckett Ltd

Calculations Prepared By: Berkan Sirel BSc (Hons) GMICE

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Signature: 

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Revision: -

Design Codes: Building Regulations Part A, BS5268, BS5628, BS5950, BS6399, BS8004, BS8110

Drawings Referenced: Duncan Clark & Beckett Ltd Drawings

Notes: -

1. Introduction

1.1. Morgan Engineering Consultants Ltd has been instructed by the client to undertake the structural design for the proposed;

- Internal structural alterations to the two storeys detached property.
- Single storey extension to the rear.

1.2. The general building materials are; concrete foundations, concrete ground floor, timber joists, timber roof and masonry load bearing walls.

1.3. Vertical loads are transferred from the roof & floors into the load-bearing walls and down into the foundations.

1.4. Horizontal loads are transferred by diaphragm action of the roof & floors transferring the horizontal load into the load-bearing masonry walls and down into the foundations.

2. Loadings (BS6399)

2.1. General Loads

	Dead Load (kN/m)	Live Load (kN/m)
Roof	1.25	0.85
Upper Floor	0.75	2.00
Ground Floor	5.00	2.50
Internal Wall	2.50	0.00
External Wall	4.50	0.00
Timber Wall	0.75	0.00

3. Calculations

3.1. Item 1 – Foundations

DESKTOP STUDY
THE BRITISH GEOLOGICAL SURVEY – *GEOLOGY VIEWER*

ADDRESS: WIVENHOE TOWN, COUNCIL OFFICE

SUPERFICIAL DEPOSITS: COVER SAND - CLAY, SILT AND SAND
BEDROCK FORMATION: THAMES GROUP - CLAY, SILT AND SAND

The British Geological Survey – Local Boreholes (approx. 300m from the site) shows Topsoil over Firm Clay.

TM 02 SW 14 0445 2366 North-east of Wivenhoe Cross Block D

Surface level (+33.5 m) +110 ft*
Water struck at (+30.2 m) +99 ft
Wirth B0, 8 inch diameter
November 1970

Overburden (4.6 m) 15 ft
Mineral (2.7 m) 9 ft
Bedrock (0.9 m+) 3 ft+

		Thickness (m)	ft	Depth (m)	ft
Loam	Soil and gravel contaminated by black clay and silt.	(4.0)	13	(4.0)	13
	Grey silt.	(0.6)	2	(4.6)	15
Glacial Sand and Gravel	Sandy gravel. Gravel: fine with some coarse; sub-angular to subrounded flints and sub-rounded quartzites and quartz. Sand: pale brown, mostly medium.	(2.7)	9	(7.3)	24
London Clay	Brown weathered clay.	(0.9+)	3+	(8.2)	27

We have not been informed of any local trees (within 25m) but if there are trees within this radius then the tree type, height & distance to the foundation need to be confirmed back to the Structural Engineer for review.

The client is advised to undertake a detailed site investigation by a suitably qualified Geotechnical Engineering Consultant. If a detailed site investigation is not provided, then prescriptive geotechnical characteristics have been presumed based on the available information. Reliance on the prescriptive values is at the client's risk.

PRESCRIPTIVE VALUE =
Sands & gravels with an allowable bearing capacity of **100kN/m2.**

TF1

ℓ: 5000 mm

LOADING

kN/m UDL

GF	DL	5	x	5.5	=	27.5
	IL	2.5				13.75
TW	DL	0.75	x	2.5	=	1.875

Σ_D: 29.38 Σ_I:13.8 Σ_Δ: 43.13 kN/m

Minimum width of foundation = 43.13/100 = 0.44m.

USE A 450mm WIDE GEN3 CONCRETE TRENCH FILL FOUNDATION BEARING A MINIMUM OF 1.0m BELOW EXISTING GROUND LEVEL INTO VIRGIN SANDS & GRAVELS WITH AN ALLOWABLE BEARING PRESSURE OF 100kN/m².

3.2. **Item 2 – Ground floor**

USE A 150mm BEAM AND BLOCK FLOOR WITH A 150mm VENTILATED VOID. THE BEAM AND BLOCK FLOOR IS TO BE DESIGNED BY THE MANUFACTURER TO BS8110, THE SPAN DIRECTIONS SHOWN & A DESIGN LOAD OF DL 2.00kN/m² + SELF WEIGHT, IL 2.50kN/m².

3.3. Item 3 – L1

L1

ℓ: 1400 *mm*

LOADING kN/m							
UDL	RF	DL	1.25	x	1.9	=	2.375
		IL	0.85				1.615
	EW	DL	4.5	x	1.5	=	6.75

Σ_D: 9.125 Σ_I: 1.6 Σ_Δ: 10.74 kN/m

1.1 x 10.74 x 1400 = 16.54 kN

USE STANDARD DUTY CATNIC CAVITY WALL LINTEL

3.4. Item 4 – L2

L2

ℓ: 1800 *mm*

LOADING kN/m							
UDL	RF	DL	1.25	x	1.9	=	2.375
		IL	0.85				1.615
	EW	DL	4.5	x	1.5	=	6.75

Σ_D: 9.125 Σ_I: 1.6 Σ_Δ: 10.74 kN/m

1.1 x 10.74 x 1800 = 21.27 kN

USE HEAVY DUTY CATNIC CAVITY WALL LINTEL

3.5. Item 5 – FR1

INPUT

Span Of Member. (m).	3
U.D.L. (kN/m).	1.1
Grade Of Timber.	C24
Timbers At 600mm crs or less?	Yes
Number Of Timbers.	>4
Long / Med. / Short Term.	Long
Width Per Timber. (mm).	47
Depth. (mm).	150

OUTPUT

Actual Stress. (N/mm^2).	7.02
Permissible Stress. (N/mm^2).	8.90
Deflection. (mm).	8.44
Span / 333. (mm).	9.00
	Stress
Beam Status	**PASS**
	Deflection
	PASS
Overall Beam Status:	**PASS**

USE 47X150 C24 @400 CTRS

3.6. Item 6 – T1

INPUT

Span Of Member. (m).	3.2
U.D.L. (kN/m).	2.6
Grade Of Timber.	C24
Timbers At 600mm crs or less?	Yes
Number Of Timbers.	>4
Long / Med. / Short Term.	Long
Width Per Timber. (mm).	141
Depth. (mm).	150

OUTPUT

Actual Stress. (N/mm^2).	6.29
Permissible Stress. (N/mm^2).	8.90
Deflection. (mm).	8.57
Span / 333. (mm).	9.60
	Stress
Beam Status	**PASS**
	Deflection
	PASS
Overall Beam Status:	**PASS**

USE 3X47X150 C24

3.7. Item 7 – SB1

SB1

ℓ: 3630 *mm*

LOADING UDL kN/m

RF	DL	1.25	x	6.2	=	7.75
	IL	0.85				5.27
FL	DL	0.75	x	1	=	0.75
	IL	2				2
EW	DL	4.5	x	2.5	=	11.25

SLS = Σ_D: 19.8 Σ_I: 7.3 Σ_Δ: 27 kN/m

ULS = 39.282 kN/m

R_A = 71.2968 kN

SLS,udl = 27.0 kN/m

ℓ = 3630 *mm*

δp = 14.52 *mm*

$$I_{x,req} \geq \frac{5 \times w \times l^4}{384 \times EI \times \delta p} = \quad 2003.4 \quad cm4$$

LTB - **CHECK FOR 203X203X46 UC S355(Ixx:4413cm4)**

USING STEEL BLUE BOOK Le= 3630 *mm*

$$\frac{W, uls\ x\ l\text{^}2}{8} = \quad 64.70\ kN\text{m}$$

$M_b =$ 130.1 kNm

$M_b \geq M_d$ **PASS**

USE 203X203X46 UC S355 WITH A 10mm MILD STEEL TOP PLATE TO SUPPORT FULL WIDTH OF MASONRY OVER

3.8. Item 8 – SB2

SB2

ℓ: 5200 *mm*

LOADING UDL kN/m

RF	DL	1.25	x	0	=	0
	IL	0.85				0
FL	DL	0.75	x	3.75	=	2.8125
	IL	2				7.5
IW	DL	2.5	x	2.5	=	6.25

SLS = Σ_D: 9.1 Σ_I: 7.5 Σ_Δ: 16.6 kN/m

ULS = 24.6875 kN/m

R_A = 64.1875 kN

SLS,udl = 16.6 kN/m

ℓ = 5200 *mm*

δp = 20.8 *mm*

$$I_{x,req} \geq \frac{5 \times w \times l^4}{384 \times EI \times \delta p} = \quad 3609.9 \quad cm4$$

LTB - **CHECK FOR 203X203X46 UC S355(Ixx:4413cm4)**

USING STEEL BLUE BOOK Le= 5200 *mm*

$$\frac{W,uls\ x\ l\text{^}2}{8} = \quad 83.44\ kN\text{m}$$

$M_b =$ 103 kNm

$M_b \geq M_d$ **PASS**

USE 203X203X46 UC S355

3.9. Item 9 – RB1

RB1

ℓ: 3500 *mm*

LOADING UDL kN/m

RF	DL	1.25	x	2.5	=	3.125
	IL	0.85				2.125
FL	DL	0.75	x	0	=	0
	IL	2				0
IW	DL	2.5	x	0	=	0

SLS = Σ_D: 3.1 Σ_I: 2.1 Σ_Δ: 5.25 kN/m

ULS = 7.775 kN/m

R_A = 13.6063 kN

SLS,udl = 5.3 kN/m

ℓ = 3500 *mm*

δp = 14 *mm*

$$I_{x,req} \geq \frac{5 \times w \times l^4}{384 \times EI \times \delta p} = \quad 348.9 \quad cm4$$

LTB - **CHECK FOR 152X89X16 UB S355(Ixx:854cm4)**

USING STEEL BLUE BOOK Le= 3500 *mm*

$$\frac{W,uls\ x\ l\text{^}2}{8} = \quad 11.91\ kN\text{m}$$

$M_b =$ 16.8 kNm

$M_b \geq M_d$ **PASS**

USE 152X89X16 UB S355

3.10. Item 10 – RR1

INPUT

Span Of Member. (m).	2.2
U.D.L. (kN/m).	1.26
Grade Of Timber.	C24
Timbers At 600mm crs or less?	Yes
Number Of Timbers.	>4
Long / Med. / Short Term.	Long
Width Per Timber. (mm).	47
Depth. (mm).	150

OUTPUT

Actual Stress. (N/mm^2).	4.33
Permissible Stress. (N/mm^2).	8.90
Deflection. (mm).	2.88
Span / 333. (mm).	6.60
	Stress
Beam Status	**PASS**
	Deflection
	PASS
Overall Beam Status:	**PASS**

USE 47X150 C24 @600 CTRS

3.11. Item 11 – T2

INPUT

Span Of Member. (m).	2.2
U.D.L. (kN/m).	3.1
Grade Of Timber.	C24
Timbers At 600mm crs or less?	Yes
Number Of Timbers.	>4
Long / Med. / Short Term.	Long
Width Per Timber. (mm).	94
Depth. (mm).	150

OUTPUT

Actual Stress. (N/mm^2).	5.32
Permissible Stress. (N/mm^2).	8.90
Deflection. (mm).	3.55
Span / 333. (mm).	6.60
	Stress
Beam Status	**PASS**
	Deflection
	PASS
Overall Beam Status:	**PASS**

USE 2X47X150 C24

3.12. Item 12 – SB3

SB3

ℓ: 3650 *mm*

LOADING UDL kN/m

RF	DL	1.25	x	2.5	=	3.125
	IL	0.85				2.125
FL	DL	0.75	x	2.5	=	1.875
	IL	2				5
EW	DL	4.5	x	2.5	=	11.25

SLS = Σ_D: 16.3 Σ_I: 7.1 Σ_Δ: 23.4 kN/m

ULS = 34.15 kN/m

R_A = 62.3238 kN

SLS,udl = 23.4 kN/m

ℓ = 3650 *mm*

δp = 14.6 *mm*

$$I_{x,req} \geq \frac{5 \times w \times l^4}{384 \times EI \times \delta p} = \quad 1761.9 \quad cm4$$

LTB - **CHECK FOR 203X133X30 UB S355(Ixx:2890cm4)**

USING STEEL BLUE BOOK Le= 3650 *mm*

$$\frac{W,uls\ x\ l\text{^}2}{8} = \quad 56.87\ kN\text{m}$$

$M_b =$ 60.7 kNm

$M_b \geq M_d$ **PASS**

USE 203X133X30 UB S355 WITH A 10mm MILD STEEL TOP PLATE TO SUPPORT FULL WIDTH OF MASONRY OVER

3.13. Item 13 – SB4

SB4

ℓ: 3000 *mm*

LOADING UDL kN/m

RF	DL	1.25	x	0	=	0
	IL	0.85				0
FL	DL	0.75	x	4.1	=	3.075
	IL	2				8.2
EW	DL	4.5	x	0	=	0

SLS = Σ_D: 3.1 Σ_I: 8.2 Σ_Δ: 11.3 kN/m

ULS = 17.425 kN/m

R_A = 26.1375 kN

SLS,udl = 11.3 kN/m

ℓ = 3000 *mm*

δp = 12 *mm*

$$I_{x,req} \geq \frac{5 \times w \times l^4}{384 \times EI \times \delta p} = \quad 471.9 \quad cm4$$

LTB - **CHECK FOR 203X133X25 UB S355(Ixx:2140cm4)**

USING STEEL BLUE BOOK Le= 3000 *mm*

$$\frac{W,uls\ x\ l\text{^}2}{8} = \quad 19.60\ kN\text{m}$$

$M_b =$ 40.4 kNm

$M_b \geq M_d$ **PASS**

USE 203X133X25 UB S355

3.14. Item 14 – SB6 – C2

SB6 - C1

ℓ: 1800 mm

LOADING UDL kN/m

RF	DL	1.25	x	1.5	=	1.875
	IL	0.85				1.275
FL	DL	0.75	x	0	=	0
	IL	2				0
EW	DL	4.5	x	0.5	=	2.25

SLS = Σ_D: 4.1 Σ_I: 1.3 Σ_Δ: 5.4 kN/m

ULS = 7.815 kN/m

R_A = 7.0335 kN

C2 – USE 100X100X6.3 SHS S355

SB6 – USE 100X100X6.3 SHS S355

3.15. Item 15 – C1 – SB5

SB5 - C1

ℓ: 3000 mm

LOADING UDL kN/m

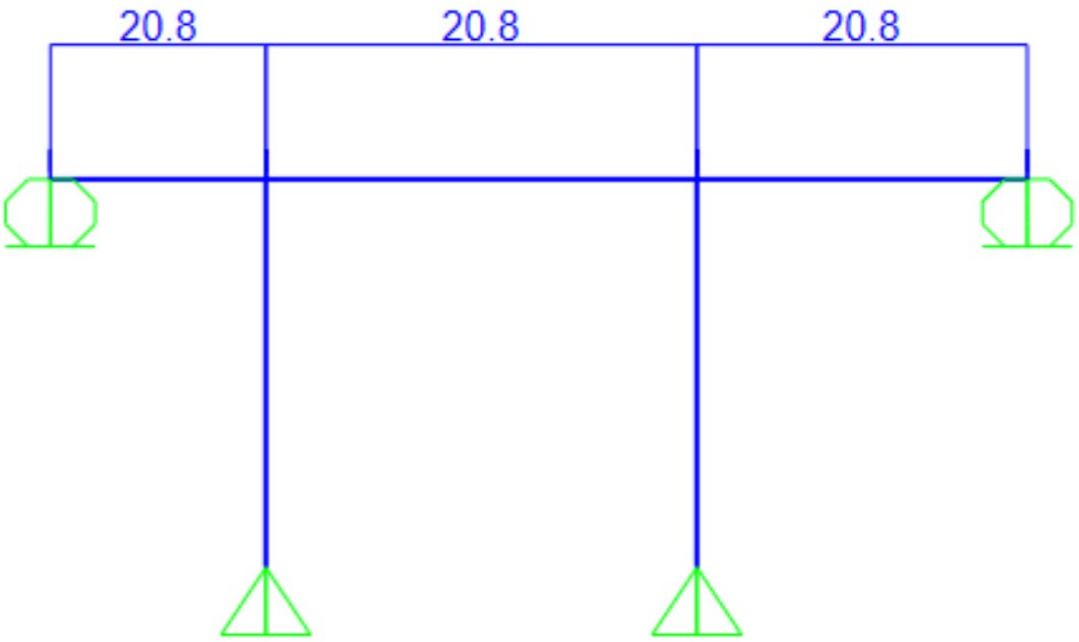
RF	DL	1.25	x	6.1	=	7.625
	IL	0.85				5.185
FL	DL	0.75	x	2.6	=	1.95
	IL	2				5.2
EW	DL	4.5	x	2.5	=	11.25

SLS = Σ_D: 20.8 Σ_I: 10.4 Σ_Δ: 31.2 kN/m

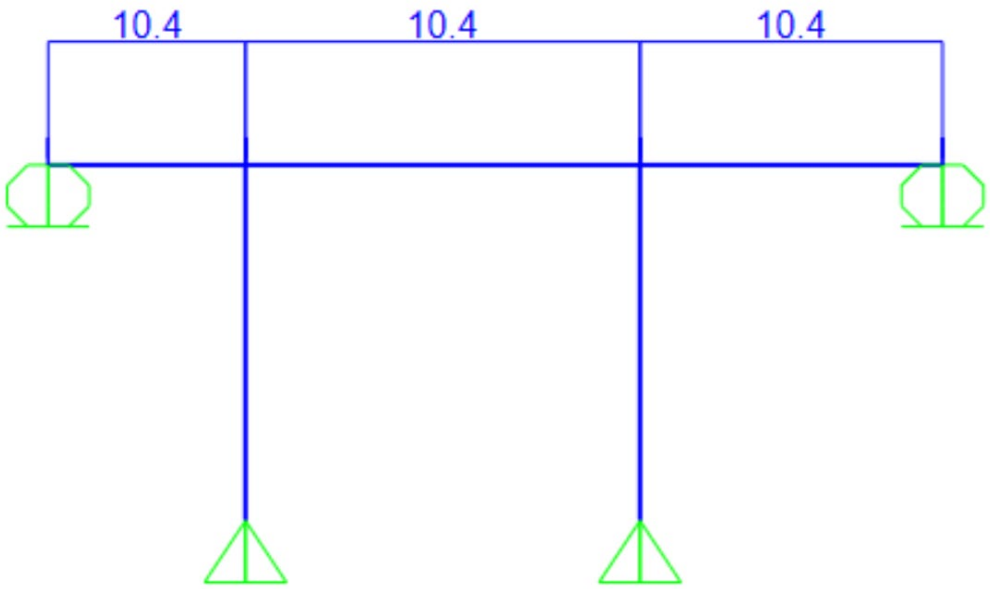
ULS = 45.771 kN/m

R_A = 68.6565 kN

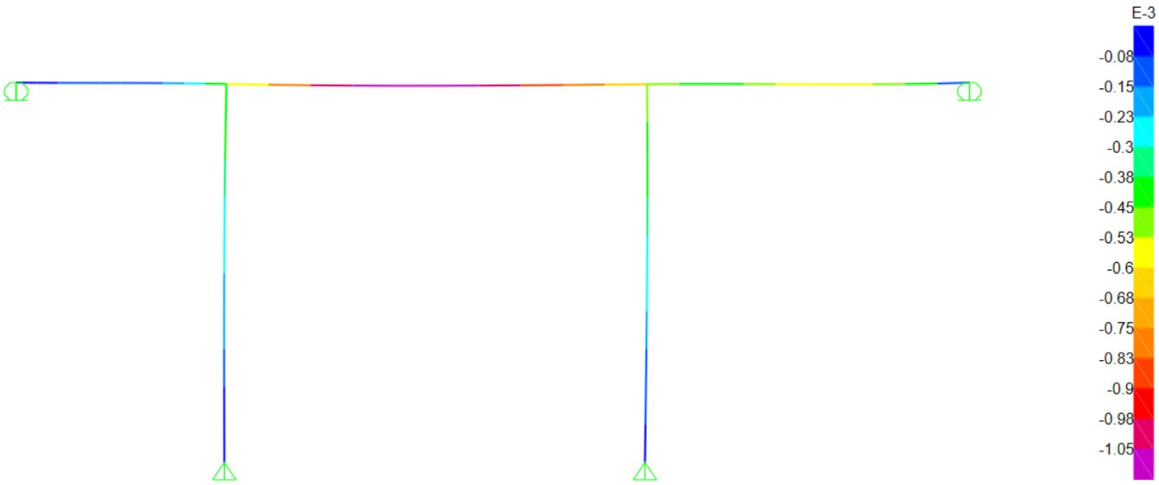
DEAD LOADS:



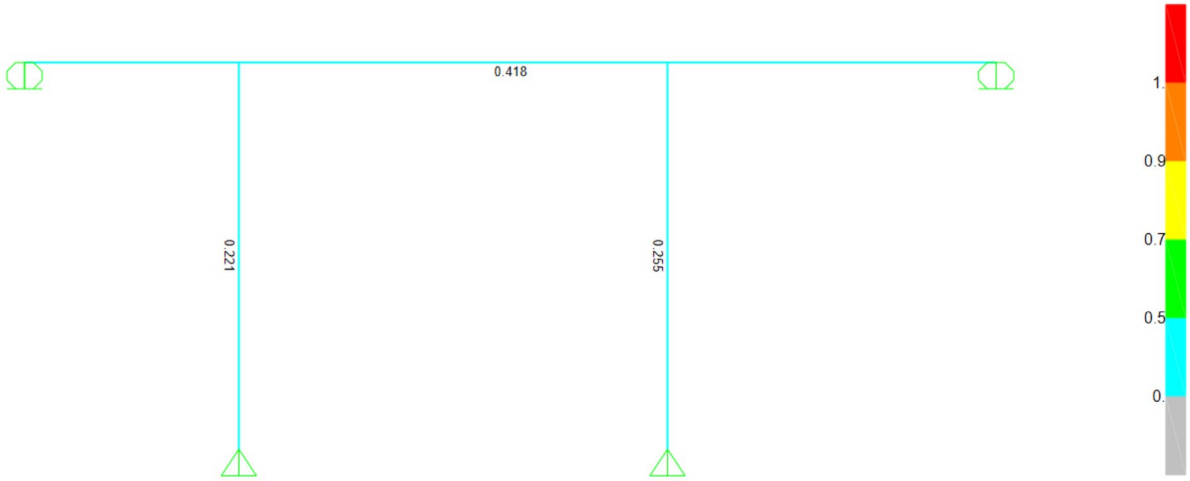
IMPOSED LOADS:



DEFLECTIONS (SLS):



DESIGN CAPACITY (BS5950):



C1 – USE 100X100X6.3 SHS S355

SB5 – USE 203X133X30 UB S355 WITH A 10mm MILD STEEL TOP PLATE TO SUPPORT FULL WIDTH OF MASONRY OVER

THE CLIENT IS ADVISED TO UNDERTAKE A DETAILED SITE INVESTIGATION BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEERING CONSULTANT. IF A DETAILED SITE INVESTIGATION IS NOT PROVIDED THEN PRESCRIPTIVE GEOTECHNICAL CHARACTERISTICS HAVE BEEN ASSUMED BASED ON AVAILABLE INFORMATION. RELIANCE ON THE PRESCRIPTIVE VALUES IS AT THE CLIENT'S RISK

REFERENCE IS TO BE MADE TO ALL CONSTRUCTION NOTES, STRUCTURAL DRAWINGS, ARCHITECTURAL DRAWINGS AND NOTES. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER AND ARCHITECT FOR COMMENT BEFORE COMMENCING

IT IS ASSUMED THAT ALL STANDARDS SET OUT WITHIN BUILDING REGULATIONS (TYING ETC) WILL BE UNDERTAKEN AS PART OF THE GENERAL BUILD

ALL MATERIALS & WORKMANSHIP ARE TO BE TO APPROVED DOCUMENT 7 & THE STANDARDS SET OUT WITHIN

BUILDING REGULATION APPROVAL & PARTY WALL AWARD WILL BE REQUIRED PRIOR TO THE CONSTRUCTION WORKS BEING UNDERTAKEN

CONTRACTOR IS TO CONFIRM ALL DIMENSIONS ON SITE PRIOR TO ORDERING / FABRICATION. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER AND ARCHITECT FOR COMMENT BEFORE COMMENCING.

CONTRACTOR IS TO CONFIRM ALL EXISTING STRUCTURE IS AS ASSUMED PRIOR TO STARTING WORKS ON SITE. ANY DISCREPANCY ARE TO BE NOTIFIED TO THE ENGINEER AND ARCHITECT FOR COMMENT BEFORE COMMENCING

FABRICATION DRAWINGS TO BE PROVIDED TO ENGINEER FOR ALL MANUFACTURED ITEMS (STEELWORK, B&B, TRUSSES ETC) FOR THEIR COMMENT PRIOR TO FABRICATION TAKING PLACE

ALL FINISHES DPC, DPM, WATERPROOFING, INSULATION ETC ARE TO BE SPECIFIED BY OTHERS AND ARE TO MEET BUILDING REGULATIONS STANDARD AS A MINIMUM

TEMPORARY WORKS WILL BE REQUIRED DURING CONSTRUCTION. ALL TEMPORARY WORKS DESIGN AND DETAILS ARE TO BE ALL UNDERTAKEN BY SPECIALIST OTHER CONSULTANT

FOUNDATIONS ARE TO BEAR A MINIMUM OF 1.00m BELOW EXISTING GROUND LEVEL INTO SANDS & GRAVELS WITH A PRESUMABLE BEARING CAPACITY OF 100kN/m2. ENGINEER IS TO BE INVITED TO INSPECT FOUNDATION BEARING DEPTH PRIOR TO THE POURING OF FOUNDATION

ENGINEER TO BE INFORMED IMMEDIATELY IF GROUND CONDITIONS DIFFER TO THAT ASSUMED (SANDS & GRAVELS), IF THERE ARE TREES WITHIN A 20m RADIUS, TREE ROOTS FOUND IN THE EXCAVATIONS OR THE SOIL IS SHOWING SIGNS OF DESICCATION (BEING DRY)

ALL FOUNDATIONS TO BE 450mm WIDE TRENCH FILL WITH GEN3 CONCRETE UNO

MASONRY BELOW DPC - MIN 7.3N BRICKWORK / BLOCKWORK FOUNDATION QUALITY WITH MORTAR DESIGNATION (II). ABOVE DPC - MIN 3.6N BRICKWORK / BLOCKWORK WITH MORTAR DESIGNATION (III)

ALL TIMBER JOISTS, RAFTERS, TRUSSES, ETC ARE TO BE FIXED WITH SIMPSON STRONG TIE HANGERS AS PER MANUFACTURERS SPECIFICATION

ALL STEELWORK IS TO BE GRADE S355

ALL STEELWORK TO HAVE A MINIMUM BEARING OF 150mm ONTO MASONRY UNO

STEELWORK ABOVE GROUND IS TO BE PAINTED IN 75 MICRONS OF ZINC RICH EPOXY BASED PAINT. STEELWORK BELOW GROUND, EXTERNAL OR IN CAVITY IS TO BE PAINTED IN 200 MICRONS OF ZINC RICH EPOXY BASED PAINT

STEEL TO STEEL CONNECTIONS ARE TO BE A MINIMUM 15mm MILD STEEL PLATE, 6mm F/W AND 4 X M16 GRADE 8.8 BOLTS UNO

WHERE STEEL BEARS ONTO MASONRY PROVIDE A 440X215X100 ENGINEERING BRICK B WITH MORTAR DESIGNATION (II) PADSTONE UNO

FOR TENDER PURPOSES ONLY

CONSTRUCTION NOTES

GENERAL

1. The drawings, design and all information contained therein are the sole copyright of Morgan Engineering Consultants Ltd and reproduction in any form is forbidden unless permission is obtained in writing.

2. All drawings shall be read in conjunction with all relevant Civil/Structural Engineering drawings, the project specification and drawings produced by the Architects, Services Engineers and Landscape Architects.

3. For all setting out information refer to the Architect's drawings and details.

4. Any discrepancies between the information given by the Engineer, and that provided by others, must be referred to the Engineer before the affected works proceed.

5. Dimensions must not be scaled from the Engineer's drawings.

6. All dimensions are in millimeters unless noted otherwise.

7. Dimensions marked * are subject to confirmation by site measurement before construction proceeds.

8. All dimensions are given to structural surfaces unless noted otherwise.

9. No holes, chases, cut-outs or the like may be formed in any beam, column, or load bearing wall unless written permission is obtained from the Engineer.

10. Holes smaller than 225 x 225mm through slabs are not necessarily shown on the Engineer's drawings.

11. For size and location of all services refer to the Service Engineer's and Architect's drawings.

12. Inspections made by the Local Authority, NHBC or other Statutory bodies, shall be arranged by the Contractor to suit his programme. Any costs arising out of failing to carry out the work to the satisfaction of the Checking Authority will be the sole responsibility of the Contractor.

13. Non-structural fixings are generally not shown on the Engineer's drawings and if any such detail is indicated it must be confirmed by cross-reference to other specialists before construction.

FOUNDATIONS

1. This drawing to be read in conjunction with all relevant Civil/Structural Engineering drawings, the project specification and drawings produced by the Architects, Services Engineers & Landscape Architects.

2. The Contractor shall verify all site and setting out dimensions before putting work in hand. Where dimensions are shown on the Engineers drawings, any discrepancies shall be reported to him.

3. The foundation design is based on the assumption that strata capable of providing a design bearing capacity of 100kN/m², will be found at the depths indicated. Foundations shall be founded at the depths indicated. The discovery of conditions not in accordance with this assumption shall be reported to the Engineer before proceeding with the construction of the foundations.

4. Bottoms of all foundation excavations shall be trimmed, leveled and protected from inclement weather.

5. Bottoms of excavations to receive reinforced concrete, shall be blinded with not less than 50mm of designated concrete grade GEN1 to BSEN206-1, BS8500-1 and BS8500-2.

6. Foundations taken down lower than the depths indicated shall, with the approval of the Engineer and NHBC, Building Control or other statutory bodies, be made up with designated concrete grade FND2 to BSEN206-1, BS8500-1 and BS8500-2.

7. Foundation excavations and the surrounding site shall be kept free of water.

8. In order to suit levels, the bottoms of foundation excavations may be stepped a maximum of 500mm high by a minimum 1000mm long unless otherwise noted on the drawings.

9. The Contractor is responsible and liable for ensuring the stability of the works and services at all stages of construction.

10. Reinforced concrete shall be compacted by means of a mechanical vibrating poker and the workability shall be such that, when compacted, a dense concrete, free from voids shall be produced.

11. Construction joints in mass concrete foundations shall be located at least 1.5m from any foundation junction, pad base or step in underside of foundation. Joints to be formed against a vertical grout tight shutter and shall incorporate 4No. T16 bars x 900 long (2 top, 2 bottom) with 100mm cover to sides.

12. Footings to be founded 300mm below the invert of any adjacent/perpendicular existing or proposed drainage, or as shown on the drawing, whichever is the deeper.

13. The Contractor is to ensure, so far as reasonably practical, that the client has obtained all necessary Building Regulations and/or similar approval before he commences work on site.

STEELWORK

1. All materials, fabrication, workmanship and erection of steelwork shall be in accordance with the National Steelwork Specification for Building Construction, 3rd Edition as published by the British Constructional Steelwork Association.

2. Steelwork connections shall comprise not less than:
2 no. M16 dia. Gr. 8.8 bolts for members up to 25 kg/m
4 no. M16 dia. Gr. 8.8 bolts for all other members, except where otherwise shown on the drawings.

3. Steel beams shall at least have the minimum bearings on masonry walls as shown on the drawings. Where no details of bearings are shown provide bearings to the full width of the supporting leaf or 150mm whichever is greater.

4. Site modifications to structural steelwork shall not be carried out unless prior approval has been obtained from the Engineer.

5. All structural steelwork shall be blast cleaned to B.S.7079: part A1, preparation grade SA21/2 and, except where specified as galvanised, shall be painted with a suitable good quality high build epoxy zinc phosphate primer to provide a dry film thickness of not less than 75 microns. A pre-fabrication primer may be used at the fabricators discretion. The Contractor shall ensure that the primer used is compatible with subsequent coatings specified by others. (e.g. intumescent paint).

6. Steelwork specified as galvanised shall be blast cleaned as above & hot dip galvanised to B.S.729 minimum coating thickness 85 microns.

7. All steelwork below DPC level or built within the masonry wall cavity shall be site painted with a compatible high build epoxy zinc phosphate primer to provide a dry film thickness of not less than 125 microns, to achieve an overall primer coating of 200 microns. i.e. Leighs Paints Epigrip C400 zinc phosphate primer/build coat or equal. Steelwork below DPC shall also be encased in not less than 100mm of concrete not weaker than specified on the drawings.

8. Internal steelwork to be clad with two layers of 12.5mm plasterboard, with 16 gauge wire bindings at 100mm centres and plaster skimmed to a minimum thickness of 5mm.

9. The Engineer is not responsible for dimensional information except where shown on his drawings. All setting out information dimensions etc. shall be calculated from the Architects drawings.

10. All temporary propping of steelwork is the responsibility of the Contractor.

11. Unless prior written approval is given by the Structural Engineer, the steelwork shall not be used for any temporary lifting or as part of a fall arrest system.

TIMBER JOISTS & RAFTERS

1. All structural timber floor members to be of minimum size as shown on the detail drawings. Sizes shown are nominal timber sizes except as noted on the drawings and will be subject to reductions in finished size to B.S.4471

2. Timber floor joist shall have minimum bearings of 100mm on masonry and 75mm on steel beams or timber plates except as noted on the drawings. Timber floor joists shall not be built into party wall constructions but shall be supported on proprietary joist hangers at such locations. Restraint type joists hangers capable of resisting tensile forces, in accordance with BS 5628-1 appendix C to be used. Alternatively, provide restraint straps at not more than 2.0m centres using 30mm x 5mm galvanised straps with a turn down length of 100mm and straight length of 600mm. Straps fixed to floor joists with 50mm, No.10 screws at not more than 110mm centres and a minimum of 4 fixings.

3. Double joists shall be provided under non-load bearing studwork partitions running parallel with joist spans, under baths and under airing cupboard

4. All members supported on proprietary hangers shall be accurately cut to provide a full contact with the base of the hanger and shall be fixed in accordance with the hanger manufacturer's instructions. Joists shall be rebated to lie flush with underside of hangers.

5. All members fitted into steel beams shall provide a good fit to the web of the beam and shall be notched the minimum amount required to clear the beam flanges. Where steel beams are specified within the floor depth, the underside of joists shall be 5mm below the underside of the beams.

6. External and party walls parallel with joists spans shall be restrained at top of floor joist level at not more than 2.0m centres with galvanised 30 x 5.0mm straps extending over a minimum of 3 joists. Noggins not less then 75% of joist depth and timber blocking adjacent to walls shall be fixed between joists at all strap locations. Straps shall be fixed to members/noggins with not less than 4 no. 32 x 3.5mm galvanised or sherardised square twisted nails.

7. End joists shall be positioned approximately 50mm from masonry walls. Joist centres generally shall be equal and shall not exceed the design centres shown on the drawing. Multiple joists, where shown on the drawings shall be securely nailed together at not more than 600mm centres.

8. Unless specified otherwise, securely fix strutting between joists at centres as follows:

    Joist span of 2.5m to 4.5m: - one row at centre of span.

Joist span over 4.5m: - two rows equally spaced.

Strutting shall take the form of one of the following:

a). 38mm x 38mm softwood herringbone strutting located between 5 & 25mm clear of top and bottom edges of joist.

b). Proprietary galvanised metal strutting fixed in accordance with manufacturer's instructions.

c). Solid softwood strutting not less than 38mm thick at least three quarters of the depth of the joist.

MASONRY

1. Refer to Architectural drawings and specification for masonry requirements in respect of acoustic, thermal insulation and durability requirements. The Engineer shall be notified immediately if this conflicts with structural requirements.

2. Blockwork to have a minimum compressive strength as specified on the drawings. All blockwork to be solid unless specified otherwise on the drawings and is to comply with BS5628, Table 4, requirements for special category of manufacture. The maximum weight of an individual masonry unit must not exceed 20kg. Blockwork should be adequately protected on site to avoid saturation and possible increase in lifting weight. Reference shall be made to the Project Architect/Acoustic Consultant for compliance with Part E of the Building Regulation - Sound Transmission.

3. Blockwork below dpc to be of foundation quality (refer to manufacturers guidelines) and to be of at least equal minimum compressive strength to that indicated between ground and first floor and in no case less than 7.3N/mm².

4. BriXckwork to have a minimum compressive strength of 20N/mm² and is to comply with BS5628 requirements for special category of manufacture.

5. Mortar designation as follows:
above dpc mortar designation iii
below dpc mortar designation ii

6. The contractor shall verify all site dimensions, setting out dimensions and levels with the architect and inform the engineer of any amendments required.

7. Refer to the Architects drawings for details of dpc's, dpm's, waterproofing and insulation.

8. The Contractor is responsible for the stability of the works during construction.

9. Movement joints.

Allow for full height movement joints to masonry walls as follows:

Expansion joints in brickwork typically at maximum 12m crs (6m from corners and returns).
Shrinkage joints in blockwork typically at maximum 6m crs (3m from corners and returns)

Joint spacings are based on the provision of a 10mm wide joint incorporating expandite expandafoam or equal approved closed cell polyethylene joint filler sealed on external faces with expandite thioflex 600 or equal approved elastomeric sealant. Internal finishes must be severed at joints with plaster stops or dry wall stop beads provided.

10. Lintels

External walls: provide proprietary IGd lintels as specified on the drawings or equivalent approved by alternative manufacturer.

Internal walls: provide proprietary IG box lintels to loadbearing internal walls as specified on the drawings or equivalent approved by alternative manufacturer.

Provide proprietary IG internal lintel to small openings in non loadbearing blockwork walls or equivalent approved by alternative manufacturer.

All steel lintels to be fully galvanised and have a minimum 150mm bearing to each end unless noted otherwise.

STRUCTURAL KEY

FOUNDATIONS & GROUND FLOOR

SJ – SLIP JOINT – SLIP JOINT TO BE PROVIDED AT JUNCTION BETWEEN ALL NEW AND EXISTING FOUNDATIONS PROVIDE 10mm EXPANDED FOAM FILLER BOARD AND A DPM SLIP MEMBRANE

TF1 – TRENCH FOUNDATION – 450mm WIDE GEN3 CONCRETE TRENCH FILL FOUNDATION BEARING A MINIMUM OF 1.0m BELOW EXISTING GROUND LEVEL INTO VIRGIN SANDS & GRAVELS WITH AN ALLOWABLE BEARING PRESSURE OF 100kN/m^2.

PF1 – PAD FOUNDATIONS – 1.0m x 1.0m - GEN3 CONCRETE PAD FOUNDATION BEARING A MINIMUM OF 1.0m BELOW EXISTING GROUND LEVEL INTO VIRGIN SANDS & GRAVELS WITH AN ALLOWABLE BEARING PRESSURE OF 100kN/m^2.

B&B – BEAM & BLOCK – 150mm BEAM & BLOCK FLOOR WITH A 150mm VENTILATED VOID. B&B FLOOR TO BE DEISGNED BY THE MANUFACTURER TO BS8110, THE SPAN DIRECTIONS SHOWN AND A DESIGN LOAD OF DL 2.00kN/m2 + SW, IL 2.5kN/m2

MB1 – MASONRY BELOW DPC – ALL MASONRY BELOW DPC TO BE FOUNDATION QUALITY, MINIMUM 7.3N CAPACITY WITH MORTAR DESIGNATION (II)

DW – DWARF WALL – 215mm SOLID BLOCK MASONRY TO SUPPORT GROUND FLOOR

CB - COLUMN BASE - 15mm MILD STEEL BASE PLATE, 6mm FILLET WELD & 4No. M16 GRADE 8.8 RAWL R-KEM RESIN ANCHORS. BASE PLATE TO BEAR ONTO THE CONCRETE FOUNDATION WITH A HIGH STRENGTH NON-SHRINK LEVELING GROUT

GROUND FLOOR SHOWING FIRST FLOOR FRAMING

MJ – MOVEMENT JOINT – ANCON DEBONDED TIES @ 225 VERT CTRS, 10mm EXPANDED FOAM FILLER & A WATERPROOF MASTIC SEAL

MG – MASONRY ABOVE DPC – TO BE MINIMUM 3.6N CAPACITY WITH MORTAR DESIGNATION (III)

EJ – FLOOR JOISTS – ASSUMED EXISTING FLOOR JOIST SPAN DIRECTION. TO BE CONFIRMED BY THE CONTRACTOR

SB1 – STEEL BEAM – 203X203X46 UC S355 WITH A 10mm MILD STEEL TOP PLATE TO SUPPORT FULL WIDTH OF MASONRY OVER

SB2 – STEEL BEAM – 203X203X46 UC S355

SB3 – STEEL BEAM – 203X133X30 UB S355 WITH 10mm MILD STEEL TOP PLATE 6mm FILLET WELD TO SUPPORT MASONRY OVER

SB4 – STEEL BEAM – 203X133X25 UB S355

SB5 – STEEL BEAM – 203X133X30 UB S355 WITH 10mm MILD STEEL TOP PLATE 6mm FILLET WELD TO SUPPORT MASONRY OVER

SB6 – STEEL BEAM – 100X100X6.3 SHS S355

C1 – COLUMN – 100X100X6.3 SHS S355

RR1 – ROOF RAFTERS – 47X150 C24 @600 CTRS

FR1 – FLAT ROOF – 47X150 C24 @400 CTRS

T1 – TRIMMER – 3X 47X150 C24

T2 – TRIMMER – 2X 47X150 C24

L1 – LINTEL – STANDARD DUTY CATNIC CAVITY WALL LINTEL

L2 – LINTEL – HEAVY DUTY CATNIC CAVITY WALL LINTEL

L3 – LINTEL – STANDARD DUTY CATNIC BOX LINTELS

RB1 – RIDGE BEAM – 152X89X16 UB S355

FIRST FLOOR SHOWING ROOF FRAMING

ERT – EXISTING ROOF TRUSS

TW - TIMBER WALL - TIMBER WALLS TO BE FORMED WITH A MINIMUM OF 47X150 C24 STUDS @400 CTRS WITH A 9mm OSB SHEATHING

DO NOT SCALE

WHERE STEEL BEARS ONTO MASONRY PROVIDE A 440X215X100 ENGINEERING BRICK B WITH MORTAR DESIGNATION (II) PADSTONE UNO

ALL STEELWORK TO HAVE A MINIMUM BEARING OF 150mm ONTO MASONRY UNO

STEELWORK ABOVE GROUND IS TO BE PAINTED IN 75 MICRONS OF ZINC RICH EPOXY BASED PAINT. STEELWORK BELOW GROUND, EXTERNAL OR IN CAVITY IS TO BE PAINTED IN 200 MICRONS OF ZINC RICH EPOXY BASED PAINT

STEEL TO STEEL CONNECTIONS ARE TO BE A MINIMUM 15mm MS PLATE, 6mm F/W AND 4 X M16 GRADE 8.8 BOLTS UNO

ALL FINISHES DPC, DPM, WATERPROOFING, INSULATION ETC ARE TO BE SPECIFIED BY OTHERS AND ARE TO MEET BUILDING REGULATIONS STANDARD AS A MINIMUM

TEMPORARY WORKS WILL BE REQUIRED DURING CONSTRUCTION. ALL TEMPORARY WORKS DESIGN AND DETAILS ARE TO BE UNDERTAKEN BY SPECIALIST OTHER CONSULTANT

FOUNDATIONS ARE TO BEAR A MINIMUM OF 1.00m BELOW EXISTING GROUND LEVEL INTO SANDS & GRAVELS WITH A PRESUMABLE BEARING CAPACITY OF 100kN/m². ENGINEER IS TO BE INVITED TO INSPECT FOUNDATION BEARING DEPTH PRIOR TO THE POURING OF FOUNDATION

FOR TENDER PURPOSES

THE CLIENT IS MADE AWARE THAT CHANGES TO THE EXISTING STRUCTURE WILL EFFECT THE CHARACTERISTICS OF THE EXISTING BUILDING. THERE IS THEREFORE A RISK (THAT THE CLIENT ACCEPTS) THAT DIFFERENTIAL SETTLEMENT OCCURS WITHIN THE STRUCTURE, THIS COULD LEAD TO CRACKING IN THE WALLS, WHICH WOULD HAVE TO BE MADE GOOD BY THE CLIENT

IT IS ASSUMED THAT ALL STANDARDS SET OUT WITHIN BUILDING REGULATIONS (TYING ETC) WILL BE UNDERTAKEN AS PART OF THE GENERAL BUILD

REFERENCE IS TO BE MADE TO ALL CONSTRUCTION NOTES, STRUCTURAL DRAWINGS, ARCHITECTURAL DRAWINGS AND NOTES. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER AND ARCHITECT FOR COMMENT BEFORE COMMENCING

CONTRACTOR IS TO CONFIRM ALL DIMENSIONS ON SITE PRIOR TO ORDERING / FABRICATION. ANY DISCREPANCY ARE TO BE NOTIFIED TO THE ENGINEER AND ARCHITECT FOR COMMENT BEFORE COMMENCING

MASONRY BELOW DPC - MIN 7.3N BRICKWORK / BLOCKWORK FOUNDATION QUALITY WITH MORTAR DESIGNATION (II).
ABOVE DPC - MIN 3.6N BRICKWORK / BLOCKWORK WITH MORTAR DESIGNATION (III)

ALL TIMBER JOISTS, RAFTERS, TRUSSES, ETC ARE TO BE FIXED WITH SIMPSON STRONG TIE HANGERS AS PER MANUFACTURERS SPECIFICATION

THE CLIENT IS ADVISED TO UNDERTAKE A DETAILED SITE INVESTIGATION BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEERING CONSULTANT. IF A DETAILED SITE INVESTIGATION IS NOT PROVIDED THEN PRESCRIPTIVE GEOTECHNICAL CHARACTERISTIC HAVE BEEN ASSUMED BASED ON AVAILABLE INFORMATION. RELIANCE ON THE PRESCRIPTIVE VALUES IS AT THE CLIENTS RISK

ENGINEER TO BE INFORMED IMMEDIATELY IF GROUND CONDITIONS DIFFER TO THAT ASSUMED (SANDS & GRAVELS), IF THERE ARE TREES WITHIN A 20m RADIUS, TREE ROOTS FOUND IN THE EXCAVATIONS OR THE SOIL IS SHOWING SIGNS OF DESICCATION (BEING DRY)

CONTRACTOR IS TO CONFIRM ALL EXISTING STRUCTURE IS AS ASSUMED PRIOR TO STARTING WORKS ON SITE. ANY DISCREPANCY ARE TO BE NOTIFIED TO THE ENGINEER AND ARCHITECT FOR COMMENT BEFORE COMMENCING

BUILDING REGULATION APPROVAL & PARTY WALL AWARD WILL BE REQUIRED PRIOR TO THE CONSTRUCTION WORKS BEING UNDERTAKEN

ALL MATERIALS & WORKMANSHIP ARE TO BE TO APPROVED DOCUMENT 7 & THE STANDARDS SET OUT WITHIN

FABRICATION DRAWINGS TO BE PROVIDED TO ENGINEER FOR ALL MANUFACTURED ITEMS (STEELWORK, B&B, TRUSSES ETC) FOR THEIR COMMENT PRIOR TO FABRICATION TAKING PLACE

ALL FOUNDATIONS TO BE 450mm WIDE TRENCH FILL WITH GEN3 CONCRETE UNO

ALL NEW STEELWORK TO BE GRADE S355 U.N.O.

Notes:

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REV	DATE	DESCRIPTION	DRAWN	CHKD
	23.08.22	FIRST ISSUE	BS	OM

REVISIONS

Project

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Title

NOTES

Client

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Scale	Drawn	Date
NTS @ A3	BS	23.08.22

MORGAN ENGINEERING CONSULTANTS

Drawing No. 2207-20-S-00

Revision -

Drawing Status

- ☐ INFORMATION
- ☐ APPROVAL
- ☐ COSTING
- ☒ TENDER
- ☐ CONSTRUCTION
- ☐ AS CONSTRUCTED

A3

DO NOT SCALE

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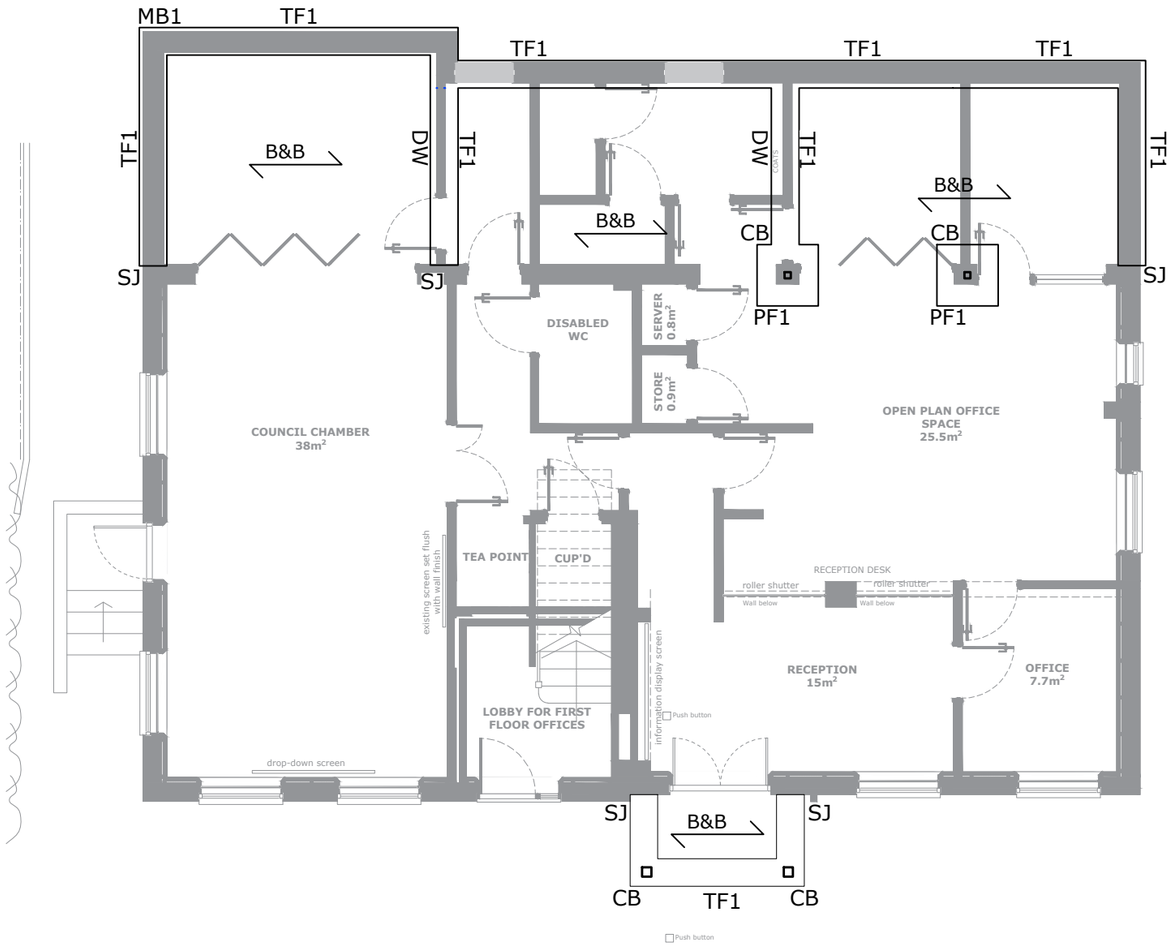
REFERENCE IS TO BE MADE TO CONSTRUCTION NOTES AND STRUCTURAL NOTES 2207-20-S-00



FOUNDATIONS & GROUND FLOOR LAYOUT
1:100@A3

SJ - SLIP JOINT - SLIP JOINT TO BE PROVIDED AT JUNCTION BETWEEN ALL NEW AND EXISTING FOUNDATIONS PROVIDE 10mm EXPANDED FOAM FILLER BOARD AND A DPM SLIP MEMBRANE

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FOUNDATION & GROUND FLOOR LAYOUT

Client

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Scale	Drawn	Date
NTS @ A3	BS	23.08.22

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Drawing No.	Revision
2207-20-S-01	-

Drawing Status

- ☐ INFORMATION
- ☐ APPROVAL
- ☐ COSTING
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- ☐ AS CONSTRUCTED

A3

DO NOT SCALE

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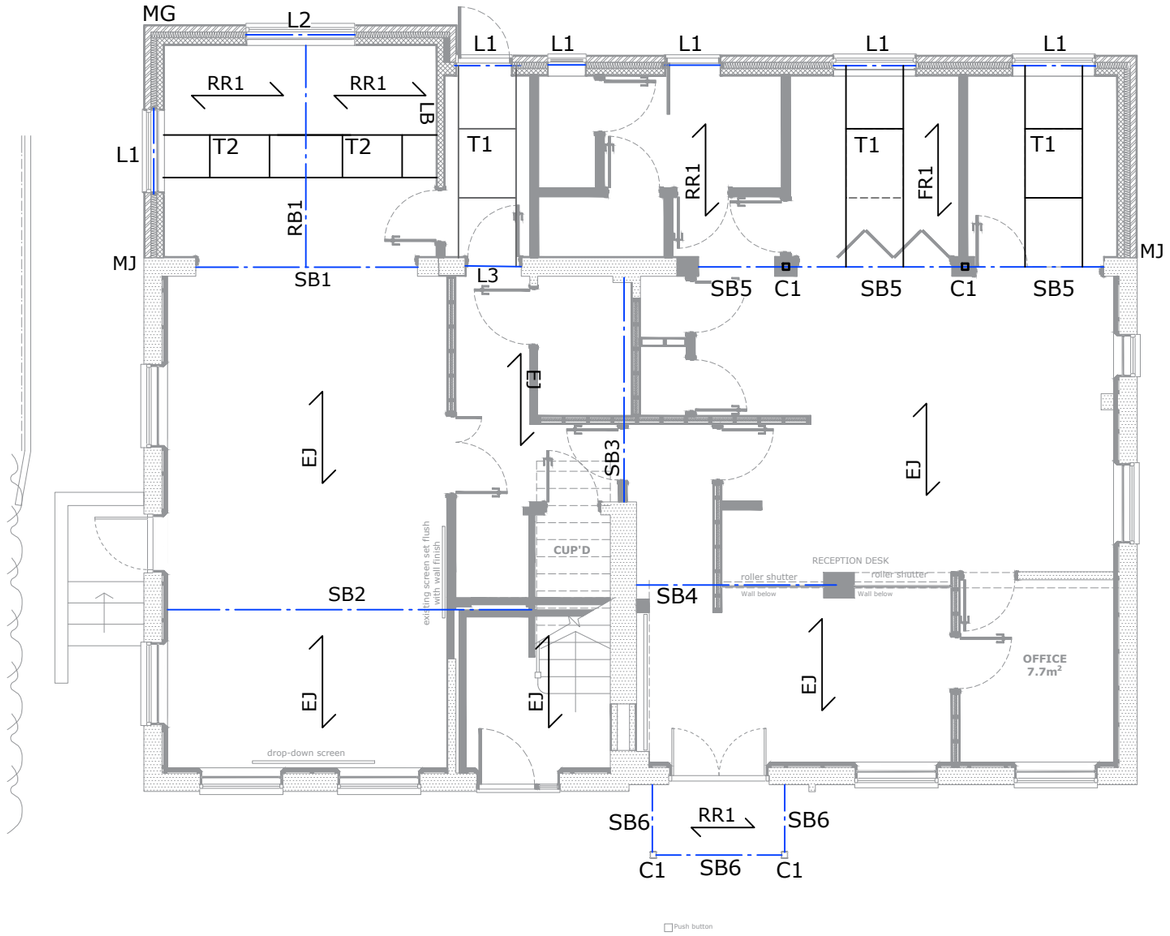
REFERENCE IS TO BE MADE TO CONSTRUCTION NOTES AND STRUCTURAL NOTES 2207-20-S-00



GROUND FLOOR SHOWING FIRST FLOOR FRAMING LAYOUT 1:100@A3

MJ - MOVEMENT JOINT - ANCON DEBONDED TIES @ 225 VERT CTRS, 10mm EXPANDED FOAM FILLER & A WATERPROOF MASTIC SEAL

MG - MASONRY ABOVE DPC - TO BE MINIMUM 3.6N CAPACITY WITH MORTAR DESIGNATION (III)

EJ - FLOOR JOISTS - ASSUMED EXISTING FLOOR JOIST SPAN DIRECTION. TO BE CONFIRMED BY THE CONTRACTOR

SB1 - STEEL BEAM - 203X203X46 UC S355 WITH A 10mm MILD STEEL TOP PLATE TO SUPPORT FULL WIDTH OF MASONRY OVER

SB2 - STEEL BEAM - 203X203X46 UC S355

SB3 - STEEL BEAM - 203X133X30 UB S355 WITH 10mm MILD STEEL TOP PLATE 6mm FILLET WELD TO SUPPORT MASONRY OVER

SB4 - STEEL BEAM - 203X133X25 UB S355

SB5 - STEEL BEAM - 203X133X30 UB S355 WITH 10mm MILD STEEL TOP PLATE 6mm FILLET WELD TO SUPPORT MASONRY OVER

SB6 - STEEL BEAM - 100X100X6.3 SHS S355 WITH 10mm MILD STEEL TOP PLATE 6mm FILLET WELD TO SUPPORT MASONRY OVER

C1 - COLUMN - 100X100X6.3 SHS S355

RR1 - ROOF RAFTERS - 47X150 C24 @400 CTRS

L1 - LINTEL - STANDARD DUTY CATNIC CAVITY WALL LINTEL

L2 - LINTEL - HEAVY DUTY CATNIC CAVITY WALL LINTEL

L3 - LINTEL - STANDARD DUTY CATNIC BOX LINTELS

T1- TRIMMER - 3X47X150 C24 C24

T2 - TRIMMER - 2X 47X150 C24

RB1 - RIDGE BEAM - 152X89X16 UB S355

LB - LOAD BEARING MASONRY - 100mm THICK 3.6N BLOCKWORK

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GROUND FLOOR SHOWING FIRST FLOOR FRAMING LAYOUT

Client

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Drawing No.	Revision
2207-20-S-02	-

Drawing Status

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- ☒ TENDER
- ☐ CONSTRUCTION
- ☐ AS CONSTRUCTED

A3

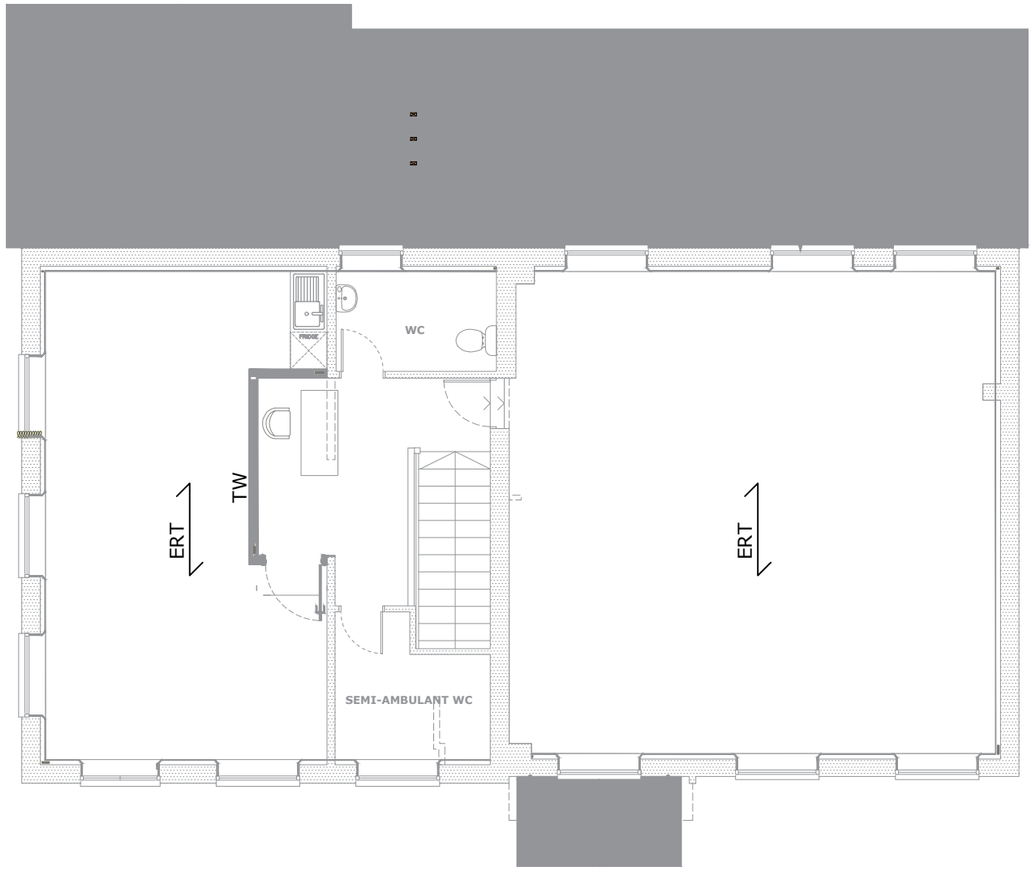
DO NOT SCALE

FOR TENDER PURPOSES

REFERENCE IS TO BE MADE TO CONSTRUCTION NOTES AND STRUCTURAL NOTES 2207-20-S-00

ERT - EXISTING ROOF TRUSS

TW - TIMBER WALL - TIMBER WALLS TO BE FORMED WITH A MINIMUM OF 47X89 C24 STUDS @400 CTRS WITH A 9mm OSB SHEATHING



FIRST FLOOR SHOWING ROOF FRAMING LAYOUT
1:100@A3

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REV	DATE	DESCRIPTION	DRAWN	CHKD
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Title

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Drawing No.	Revision
2207-20-S-03	-

Drawing Status

- ☐ INFORMATION
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- ☒ TENDER
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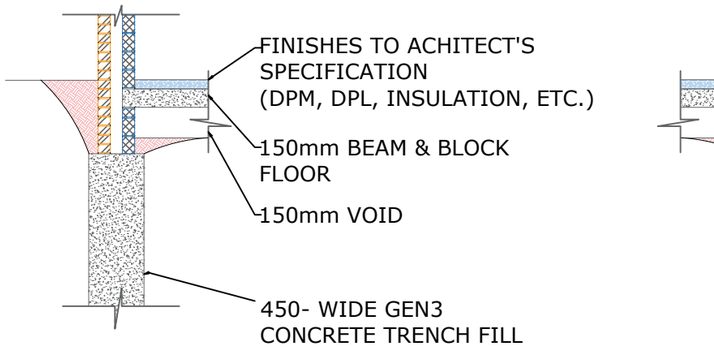
A3

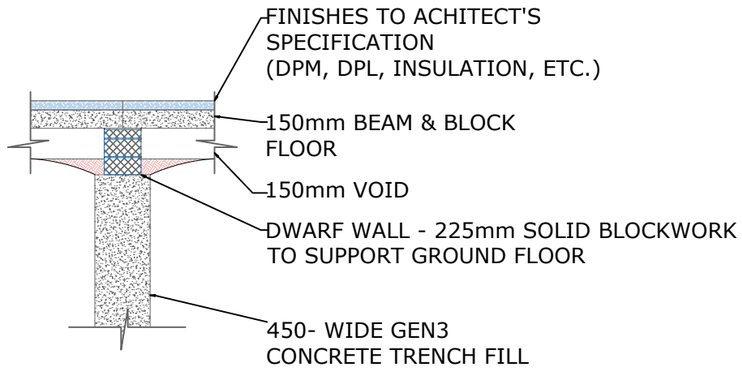
DO NOT SCALE

FOR TENDER PURPOSES

REFERENCE IS TO BE MADE TO CONSTRUCTION NOTES AND STRUCTURAL NOTES 2207-20-S-00



TF1 - DETAIL 1:50 @A3



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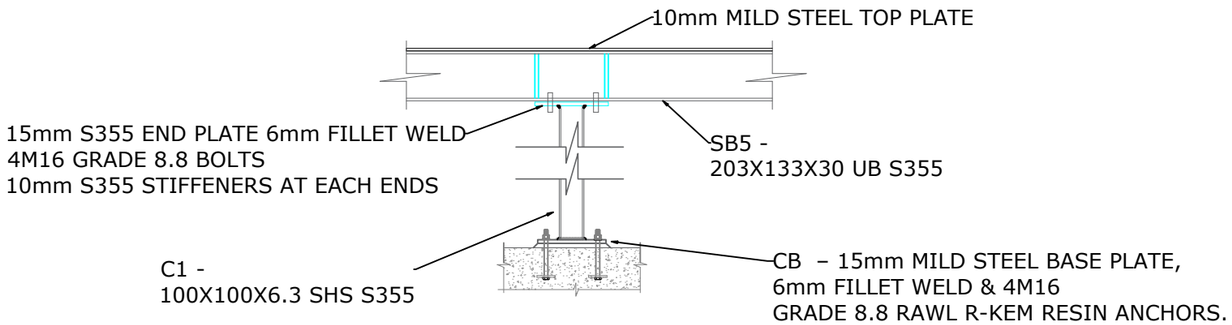
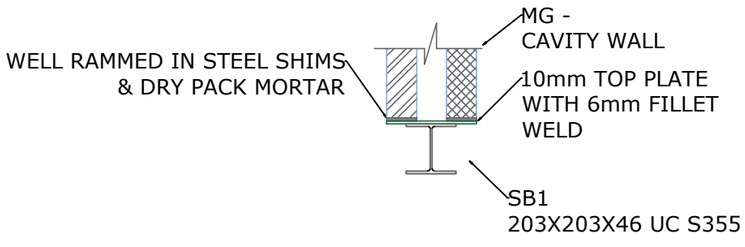


C1 - SB5 CONNECTION DETAIL 1:25@A3



SB1 SECTION 1:25 @A3

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Title

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Client

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2207-20-S-04	-

Drawing Status

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- ☐ CONSTRUCTION
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