WB CIVIL STRUCTURAL ENGINEERS
PRIYAN WIJEYERATNE
EC 19060

115, MAIN ROAD WEST, ST ALBANS, 16 APARTMENT COMPLEX
LOAD CALCULATIONS ON A RC PIER:
TOTAL STRUCTURE LOAD - (1.2DL+1.5LL)/52
-NO OF PIERS 52-

ALTERNATIVE METHOD 1

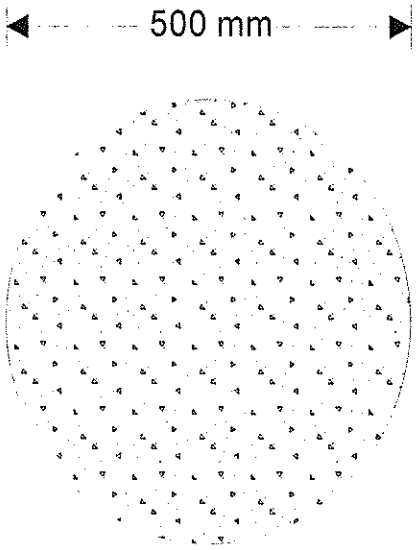
DEAD LOAD					
ROOF DW	=	16.900	KN		
2ND FLOOR DW+walls	=	3139.200	KN		
1ST FLOOR DW+walls	=	3844.200	KN		
GF DW+walls	=	3900.900	KN		
IMPOSED LOAD ON ROOF	=	0.845	KN		
IMPOSED LOADS ON 2ND FLOOR	=	156.960	KN		
IMPOSED LOADS ON 1ST FLOOR	=	192.210	KN		
IMPOSED LOADS ON GF	=	195.045	KN		
TOTAL DL ON PIERS	=	**11446.260**	**KN**		
LIVE LOAD					
ROOF	=	65	KN		
2ND FLOOR	=	495	KN		
1ST FLOOR	=	685.5	KN		
GF	=	1750	KN		
TOTAL LL ON PIERS	=	**2995.5**	**KN**	**2**	
DESIGN LOAD ON PIERS	=	**18228.762**	**KN**	**3**	**1.2*DL + 1.5*LL**
DESIGN LOAD PER PIER (500mm DIA.)	=	**350.553**	**KN**	**4**	

WB CIVIL STRUCTURAL ENGINEERS Priyan Wijeyeratne EC 19060	Project GEOTECHNICAL DESIGN OF RC PIERS (ALTERNATIVE)				Job Ref. MEGA/2015/St ALBANS	
	Client MEGA HOMES - APARTMENT COMPLEX				Sheet no./rev. 1	
	Calc. by PW	Date 14/11/2015	Chk'd by PW	Date 14/11/2015	App'd by PW	Date 14/11/2015

RC PIERS IN FOUNDATION

In accordance with Australian Standard: Piling-Design and installation per AS 2159-2009

Tedds calculation version 1.0.00



Pile details

Installation method	Driven
Shape	500 mm diameter
Length	L = **2500** mm

Material details

Material	Concrete
Concrete strength	f'_c = **32** MPa
Concrete in situ strength	f_{cmi} = **35** MPa
Concrete density	ρ = **2400** kg/m^3
Modulus of elasticity	$E = (\rho / 1\ kg/m^3)^{1.5} \times 0.043 \times \sqrt{(f_{cmi} \times 1\ MPa)}$ = **29910** MPa

Geometric properties

Assume top 1.5 x h ineffective (Cl. 4.4.1)	Yes
Pile section depth	h = **500** mm
Bearing area	$A_{bearing} = \pi \times h^2 / 4$ = **1963** cm^2
Pile perimeter	$Perim_{pile} = \pi \times h$ = **1571** mm
Moment of inertia	$I = \pi \times h^4 / 64$ = **306796** cm^4
Section modulus	$S = \pi \times h^3 / 32$ = **12272** cm^3

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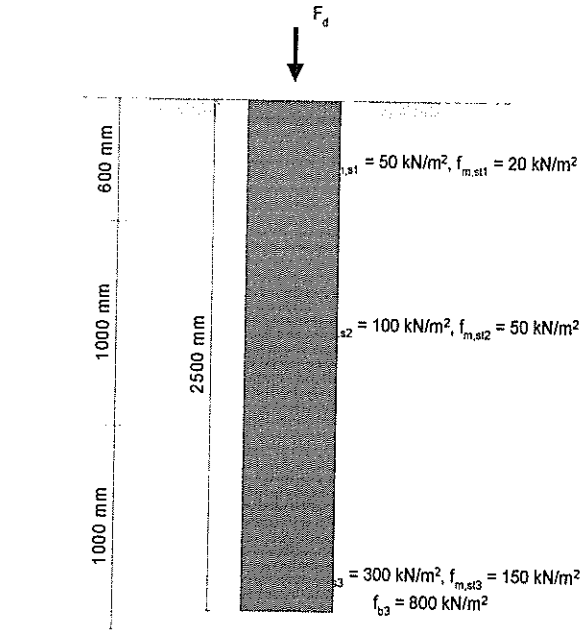
	Client MEGA HOMES - APARTMENT COMPLEX				Sheet no./rev. 2	
	Calc. by PW	Date 14/11/2015	Chk'd by PW	Date 14/11/2015	App'd by PW	Date 14/11/2015



$f_{m,si}$ = Average unit skin friction, compression, f_{bi} = Ultimate unit end bearing
$f_{m,sti}$ = Average unit skin friction, tension

Stratum details

Stratum	Geomaterial	Thickness, $t_{stratai}$ (mm)	Ultimate unit bearing, f_{bi} (kN/m²)	Average skin friction, compression, $f_{m,si}$ (kN/m²)	Average skin friction, tension, $f_{m,sti}$ (kN/m²)	Strength reduction factor, comp. $\phi_{c,g}$	Strength reduction factor, tension $\phi_{t,g}$
1	Cohesive	600	-	50	20	0.5	0.5
2	Cohesive	1000	-	100	50	0.5	0.5
3	Cohesive	1000	800	300	150	0.5	0.5

Design action details

Design action, compression $F_{c,d}$ = **355** kN

Design action, tension $F_{t,d}$ = **25** kN

Axial compression resistance

Design ultimate axial bearing resistance $R_b = A_b \times f_b$ = **157.1** kN

Design ultimate axial friction resistance per stratum

Stratum 1 $R_{s1} = f_{m,s1} \times Perim_{pile} \times 0$ mm = **0** kN

Stratum 2 $R_{s2} = f_{m,s2} \times Perim_{pile} \times (t_{strata2} - (1.5 \times h - D_{strata2}))$ = **133.5** kN

Stratum 3 $R_{s3} = f_{m,s3} \times Perim_{pile} \times (L - D_{strata3})$ = **424.1** kN

Design ultimate axial friction resistance, total $R_s = R_{s1} + R_{s2} + R_{s3}$ = **557.6** kN

Design ultimate axial geotechnical strength, comp $R_{d,ug} = R_b + R_s$ = **714.7** kN

Geotechnical strength reduction factor $\phi_{c,g}$ = **0.5**

Design geotechnical strength in compression $R_{d,g} = \phi_{c,g} \times R_{d,ug}$ = **357.4** kN

$F_{c,d} / R_{d,g}$ = **0.993**

PASS - Design ultimate axial resistance exceeds factored axial load

Axial uplift resistance

Design ultimate axial friction uplift resistance per stratum

Stratum 1	$R_{st1} = f_{m,st1} \times Perim_{pile} \times 0\ mm =$ **0** kN
Stratum 2	$R_{st2} = f_{m,st2} \times Perim_{pile} \times (t_{strata2} - (1.5 \times h - D_{strata2}))$ = **66.8** kN
Stratum 3	$R_{st3} = f_{m,st3} \times Perim_{pile} \times (L - D_{strata3})$ = **212.1** kN
Design ultimate axial friction uplift resistance, total	$R_{st} = R_{st1} + R_{st2} + R_{st3}$ = **278.8** kN
Design ultimate axial geotechnical strength, uplift	$R_{d,ug,st} = R_{st}$ = **278.8** kN
Geotechnical strength reduction factor	$\phi_{t,g}$ = **0.5**
Design geotechnical strength in uplift	$R_{d,g,st} = \phi_{t,g} \times R_{d,ug,st}$ = **139.4** kN
	$F_{t,d} / R_{d,g,st}$ = **0.179**

PASS - Design ultimate axial uplift resistance exceeds factored axial uplift load

Registered Structural Engineer Priyan Wijeyeratne - EC 19060	Project PIER REINFORCEMENT DESIGN (ALTERNATIVE)				Job Ref. MEGA/2015/ST ALBANS	
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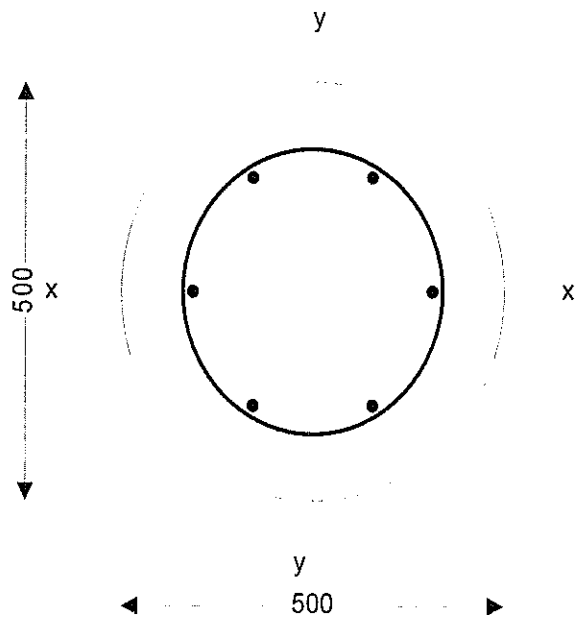
CIRCULAR RC COLUMN DESIGN (AS 3600)

TEDDS calculation version 1.0.07



6 no. 16 mm dia. longitudinal bars

10 mm dia. fitments

Maximum fitment spacing = 240 mm

75 mm cover to fitments

Geometry

Column state	**Braced**
Unsupported length of column	L_u = **2500** mm
Diameter of column	D = **500** mm
Effective height factor	k = **0.85**

Reinforcement

Number of longitudinal bars	N_{long} = **6**
Diameter of longitudinal bar	d_{b_long} = **16** mm
Diameter of fitments / helices	d_{b_lat} = **10** mm

Material details

Yield strength of longitudinal reinforcement	f_y = **500** MPa
Yield strength of fitments	$f_{y,f}$ = **500** MPa
Compressive strength of concrete	f'_c = **32** MPa
Density of concrete	ρ = **2400** kg/m^3
Mean insitu compressive strength	f_{cmi} = **35** MPa
Modulus of elasticity of concrete (cl. 3.1.2)	$E_c = \rho^{1.5} \times 0.043 \times \sqrt{(f'_{cmi})}$ = **29910** MPa
Modulus of elasticity of reinforcement (cl. 3.2.2)	E_s = **200000** MPa
Ultimate concrete strain (cl. 10.6.1)	ε_c = **0.003**

Loads and moments (AS 3600 cl. 10.1.2)

Design axial force	N^*_d = **350.0** kN
Smaller end moment	M^*_1 = **50.0** kNm
Larger end moment	M^*_2 = **100.0** kNm
Smaller design end moment	$M^*_{d1} = \max(M^*_1, N^*_d \times 0.05 \times D)$ = **50.0** kNm
Larger design end moment	$M^*_{d2} = \max(M^*_2, N^*_d \times 0.05 \times D)$ = **100.0** kNm
Curvature of column bending	**Double**

Ratio of smaller to larger design moments	M_{Ratio} = **0.50**
Ratio of axial dead load to total axial load	β_d = **0.90**
Check for area of steel (AS 3600 cl. 10.7.1)	
Gross area of column	$A_g = \pi \times D^2 / 4$ = **196350** mm^2
Area of longitudinal steel	$A_s = N_{long} \times (\pi \times d_{b\_long}^2) / 4$ = **1206** mm^2
Net area of concrete	$A_{cg} = A_g - A_s$ = **195143** mm^2
Minimum area of longitudinal steel required	$A_{st\_min} = 0.01 \times A_g$ = **1963** mm^2
	WARNING - Area of reinforcement is less than minimum to cl. 10.7.1
Maximum area of longitudinal steel limited	$A_{st\_max} = 0.04 \times A_g$ = **7854** mm^2
	PASS - Provided longitudinal steel is less than maximum allowable
Area of steel in tension	$A_{st} = A_s / 2$ = **603** mm^2
Area of steel in compression	$A_{sc} = A_s / 2$ = **603** mm^2
Effective cover to reinforcement	$d' = c + d_{b\_lat} + (d_{b\_long} / 2)$ = **93** mm
Effective depth of column	$d_o = D - d'$ = **407** mm
Compressive strength factor	$\alpha_1 = \max(0.72, \min(1.0 - 0.003 \times f'_c/1MPa, 0.85))$ = **0.850**
Compressive strength factor	$\alpha_2 = \max(0.67, \min(1.0 - 0.003 \times f'_c/1MPa, 0.85))$ = **0.850**
Rectangular stress block factor	$\gamma = \max(0.67, \min(1.05 - 0.007 \times f'_c/1MPa, 0.85))$ = **0.826**
Slenderness check (AS 3600 cl. 10.5)	
Maximum permissible slenderness ratio	sr_{max} = **120**
Radius of gyration	$r_{min} = 0.25 \times D$ = **125** mm
Actual slenderness ratio	$sr_{act} = k \times L_u / r_{min}$ = **17.0**
	PASS - Slenderness ratio is less than maximum permissible
Concrete cover	
Clear cover to fitments	c = **75** mm
Exposure classification	**A2**
Formwork and compaction	**Standard formwork and compaction**
Min cover for exposure class (Table 4.10.3.2)	c_{min_exp} = **25** mm
	PASS - The cover provided is adequate for the exposure classification
Fire resistance period	FRP = **60** mins
Column exposure to fire	**Assumed 'More than one side' for circular column**
Load level in fire situation	$N^*_f/\phi N_u$ = **0.7**
Min allowable column diameter (Table 5.6.3)	D_{min} = **250** mm
Minimum axis distance (Table 5.6.3)	a_s = **40** mm
Minimum cover required for fire	$c_{min\_fire} = a_s - d_{b\_long}/2 - d_{b\_lat}$ = **22** mm
	PASS - The cover provided is adequate for fire
Braced column slenderness effect (AS 3600 cl. 10.3.1(a))	
Ultimate strength in compression without bending	$N_{uo} = \alpha_1 \times f'_c \times (A_g - A_s) + f_y \times A_s$ = **5911.1** kN
Limiting slenderness factor	$\alpha_c = \sqrt{[1 / (3.5 \times N^*_d / (0.6 \times N_{uo}))]}$ = **1.702**
Slenderness limit	$sr = \max[25, \min(120, \alpha_c \times (38 - f'_c/15\ MPa) \times (1 + M_{Ratio}))]$ = **91.5**
	sr_{act} <= sr, hence column is short
Design moment	
Design moment	$M^*_d = abs(M^*_{d2})$ = **100.0** kNm

Balance point compression strength

NA depth factor to find ultimate strength in comp. $k_{uo\_b} = 0.003 / (0.003 + (f_y / E_s)) =$ **0.545**

Depth of NA from extreme compression face $d_{n\_b} = k_{uo\_b} \times d_o =$ **222** mm

Depth of equivalent rectangular stress block $a_b = \min((\gamma \times d_{n\_b}), D) =$ **183** mm

Angle made by compression zone $\theta_b =$ **1.30** rad

Area of compression zone $A_{c\_b} =$ **65259** mm^2

Forces carried by steel layers

Layer no.	Angle	Depth (mm)	Strain	Stress (MPa)	Force (kN)
1	0.0	93	0.001743	348.65	70.10
2	60.0	171	0.000682	136.49	54.88
3	120.0	328	-0.001439	-287.84	-115.75
4	180.0	407	-0.002500	-500.00	-100.53

Capacity of concrete in compression $C_{b\_c} = \alpha_2 \times f'_c \times A_{c\_b} =$ **1775.06** kN

Sum of tensile forces by steel $T_{b\_s} =$ **216.28** kN

Sum of compressive forces by steel $C_{b\_s} =$ **124.98** kN

Balance point compression strength $N_{ub} = C_{b\_c} + C_{b\_s} - T_{b\_s} =$ **1683.76** kN

Ultimate strength in compression and bending

NA depth factor to find ultimate strength in comp. $k_u =$ **0.32000**

Depth of NA from extreme compression face $d_n = k_u \times d_o =$ **130** mm

Depth of equivalent rectangular stress block $a = \min((\gamma \times d_n), D) =$ **108** mm

Angle made by compression zone $\theta =$ **0.96** rad

Area of compression zone $A_c =$ **31029** mm^2

Mmt. of area of comp. zone about center of column $A_{cy} =$ **5782625** mm^3

Forces and moments carried by steel layers

Layer no.	Angle	Depth (mm)	Strain	Stress (MPa)	Force (kN)	Moment (kNm)
1	0.0	93	0.000858	171.56	34.49	5.42
2	60.0	171	-0.000950	-190.08	-76.44	-6.00
3	120.0	328	-0.004567	-500.00	-201.06	15.78
4	180.0	407	-0.006375	-500.00	-100.53	15.78

Capacity of concrete in compression $C_{c\_u} = \alpha_2 \times f'_c \times A_c =$ **843.99** kN

Moment carried by concrete $M_{con\_u} = \alpha_2 \times f'_c \times A_{cy} =$ **157.29** kNm

Sum of tensile forces by steel $T_{s\_u} =$ **378.03** kN

Sum of compressive forces by steel $C_{s\_u} =$ **34.49** kN

Ultimate strength in compression $N_u = C_{c\_u} + C_{s\_u} - T_{s\_u} =$ **500.46** kN

Ultimate strength in bending $M_u =$ **188.27** kNm

Capacity reduction factor for $N_u < N_{ub}$

The following has been determined by iteration:-

Pure bending capacity $M_{uo} =$ **119.8** kNm

Corresponding NA factor $k_{uo\_a} =$ **0.225**

Capacity reduction factor for pure bending $\phi_R = \max(0.6, \min(0.8, 1.19 - 13 \times k_{uo\_a} / 12)) =$ **0.800**

Strength reduction factor (table 2.2.2) $\phi_{bc} = 0.6 + ((\phi_R - 0.6) \times (1 - (N_u / N_{ub}))) = \mathbf{0.74}$

Design strength of column

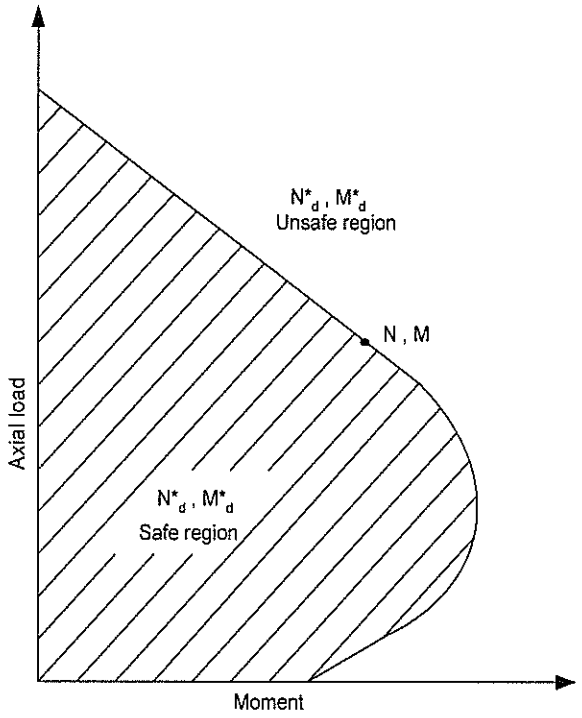
By iteration the position of the neutral axis has been determined at which point the axial load capacity is approximately equal to (but slightly greater than) the design axial load. The moment capacity at this axial load has then been calculated and is compared to the design moment.

Design strength of column in compression $N = \phi_{bc} \times N_u = \mathbf{370.6}$ kN

PASS - Column is safe in axial loading

Design strength of column in bending $M = \phi_{bc} \times M_u = \mathbf{139.4}$ kNm

PASS - Column is safe in bending



Fitment requirements (AS3600 cl. 10.7.3 & 10.7.4)

Minimum diameter of fitments $d_{b\_lat\_min} = \mathbf{6}$ mm

Diameter of fitments specified $d_{b\_lat} = \mathbf{10}$ mm

PASS - Size of specified fitments is adequate

Max allowable fitment spacing $s_{b\_lat\_max} = \min(D, 15 \times d_{b\_long}) = \mathbf{240.0}$ mm

Design status

PASS - Column is safe

PROPOSED DEVELOPMENT: **16 APARTMENT COMPLEX**

PROJECT ADDRESS: 115, MAIN ROAD WEST, ST ALBANS

PROJECT: **CIVIL & STRUCTURAL DESIGN**

CLIENT: **MEGA HOMES**

DATE: 15/10/2015

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CONTENTS (SHEET NOS.):

Rev.	Remarks/comments	Date	Aprv.
C	DRAFT 3 - Foundation Optimised	14/ 11/ 2015	PW.
B	DRAFT 2	06/ 11/ 2015	PW.
A	DRAFT 1	15/ 10/ 2015	PW.

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PROJECT:
APARTMENT COMPLEX
PROJECT ADDRESS:
115, Main Road West,
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SHEET NO: **1/12**

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STANDARDS, MATERIALS, AND WORKMANSHIP REQUIREMENTS

THESE NOTES TO BE FOLLOWED UNLESS NOTED OTHERWISE BY THE ENGINEER

GENERAL NOTES

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATION AND OTHER WORKING DRAWINGS. ANY DISCREPANCIES SHALL BE NOTIFIED TO THE ENGINEER IMMEDIATELY.

G2 ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED. THE ENGINEER'S DRAWINGS SHALL NOT BE SCALED.

G4. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATION, THE CURRENT REVISION OF ALL RELEVANT SAA CODES, THE REQUIREMENTS OF THE VICTORIAN BUILDING REGULATIONS, THE BUILDING CODE OF AUSTRALIA AND THE RELEVANT AUTHORITY

G5 CONTRACTORS SHALL ENSURE THAT LOCATIONS OF ALL UNDERGROUND SERVICES ARE IDENTIFIED PRIOR TO COMMENCEMENT OF WORKS AND EXCAVATIONS. THE WORK COMMENCES.

G6. RELEVANT STANDARDS USED:

1	Structural Steel Design	AS4100
2	Structural Reinforced Concrete Design	AS3600
3	Structural Timber Framing	AS1684
4	Timber Structures Design	AS1720
5	Domestic Slab Design	AS2870
6	Brickwork	AS3700
6	Wind Analysis & Design	AS1170
7	Access & Mobility	AS1428
8	Welding	AS1554
9	Bolts & Nuts	AS1252
10	Cold formed Steel	AS 4600
11	Bolts & Nuts	AS1252
12	Stormwater Drainage	AS3500
13	Glazing	AS1288/AS2047
14	Water Proofing to Wet Areas	AS3740/BCA 4-3-1

LIVE LOADS

L1. THE STRUCTURAL WORK SHOWN ON THESE DRAWINGS HAS BEEN DESIGNED FOR THE FOLLOWING LIVE LOADS:-

ROOF ..... 0.25 kPa OR [1.8/ A+ 0.12] WHICHEVER IS GREATER

FLOOR ... .. 1.5 kPa (OR AS USED FOR COPUTATIONS)

Balcony ..... 2.0 kPa (OR AS USED FOR COPUTATIONS)

TEMPORARY BRACING

TB1 DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVER STRESSED.

TB2. THE CONTRACTOR SHALL PROVIDE AND INSTALL ANY ADDITIONAL BRACING EQUIPMENT NECESSARY TO ADEQUATELY AND SAFELY HOLD THE STRUCTURE IN POSITION DURING CONSTRUCTION.

CONCRETE

C1 All CONCRETE AND WORKMANSHIP TO CONFORM TO THE REQUIREMENTS OF AS 3600.

C2 ALL INSET CONCRETE SHALL BE A CHARACTERISTIC STRENGTH TO BE AS NOTED BELOW AT 28 DAYS UNLESS NOTED OTHERWISE -

BLINDING CONCRETE	15 MPa
STRIP FOOTINGS	20 MPa.
PAD FOOTINGS	20 MPa
SLAB ON GROUND	20 MPa
ALL OTHER MEMBERS	TO BE 32 MPa (OR AS NOTED OTHERWISE)

MAXIMUM SLUMP TO BE 75mm
MAXIMUM AGGREGATE TO BE 20mm

C3. CONCRETE ELEMENTS SHOWN ON THE DRAWINGS MUST NOT BE REDUCED IN ANY WAY WITHOUT THE ENGINEER'S APPROVAL. NO HOLES, CHASES DRY EMBEDMENT'S OTHER THAN THOSE SHOWN WILL BE PERMITTED IN ANY CONCRETE ELEMENTS WITHOUT THE ENGINEER'S APPROVAL

C4. REINFORCEMENT NOTATION:-
N - DENOTES HOT-ROLLED DEFORMED BARS TO AS 4671
RL - DENOTES RECTANGULAR REINFORCEMENT FABRIC TO AS/NZS 4671
SL - DENOTES SQUARE REINFORCEMENT FABRIC TO AS/NZS 4671
LXTM - DENOTES TRENCH MESH REINFORCEMENT TO AS/NZS 4671.

LAPPING REINFORCEMENT:-

REINFORCEMENT SPLICES SHALL BE LAP SPLICES AS REQUIRED BY THE CURRENT CONCRETE CODE UNLESS NOTED IN THE DRAWINGS. FOR FABRIC, THE MINIMUM SPLICE SHALL BE 220mm MINIMUM WITH THE OVERLAP MEASURED BETWEEN THE OUTERMOST WIRES AND NOT LESS THAN THE PITCH OF THE SECONDARY WIRES.

C5. CLEAR COVER TO REINFORCEMENT AS NOTED ON THE DRAWINGS.

C6. CONCRETE COVER TO BE MAINTAINED BY THE USE OF APPROVED BAR CHAIRS AND/OR CONCRETE BLOCKS SPACED AT APPROXIMATELY 1000 CROSS CTS. CONDUITS, PIPES ETC. ARE NOT TO BE PLACED IN CONCRETE COVER.

C7 CONCRETE TO BE KEPT FREE OF SUPPORTING BRICKWORK BY TWO LAYERS OF A SUITABLE MEMBRANE; VERTICAL FACES OF CONCRETE TO BE KEPT FREE BY 12mm THICKNESS OF BITUMINOUS CANEITE.

C8 ALL MILD STEEL BRACKETS, SLOTS ETC EMBEDDED IN THE CONCRETE SHALL BE HOT-DIP GALVANISED.

C9. DIRECTION OF MESH ON PLAN INDICATES THE DIRECTION OF MAIN WIRES WHICH SHOULD BE PLACED NEAREST THE RELEVANT SLAB SURFACE.

C10. ALL CONCRETE SHALL BE PROPERLY COMPACTED BY MEANS OF APPROVED VIBRATORS.

C11. CONSTRUCTION JOINTS WHERE NOT SHOWN, SHALL BE LOCATED TO THE APPROVAL OF THE ENGINEER.

C12. FORM WORK SHALL NOT BE STRIPPED UNTIL 3 DAYS HAS ELAPSED FROM TIME OF POUR - UNLESS APPROVED OTHERWISE BY THE ENGINEER. NO LOADS APPLIED FOR 28 DAYS.

C13. ENGINEER TO BE NOTIFIED 48 HOURS PRIOR TO POURING CONCRETE.

C14. ALL PIPE WORK CAST INTO CONCRETE IS TO BE SLEEVED OR LAGGED WITH APPROPRIATE COMPRESSIBLE MATERIAL FOR THE FULL LENGTH OF EMBEDMENT

BRICKWORK - BLOCKWORK

B1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH 3700.

B2 LOAD BEARING BRICKS SHALL HAVE A MINIMUM CHARACTERISTIC UNCONFINED STRENGTH OF 20 MPa AND LOAD BEARING BLOCKS SHALL HAVE A CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF 15 MPa. UNLESS OTHERWISE NOTED

B3. MORTAR SHALL BE FRESHLY PREPARED AND UNIFORMLY MIXED IN THE RATIO OF ONE PART CEMENT, ONE PART LIME AND SIX

B4. BLOCKWORK CORE FILLING CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS SHALL BE: 20 MPa.

B5. BRICKWORK OR BLOCKWORK SUPPORTING CONCRETE SHALL BE TROWELLED SMOOTH AND SEPARATED AT THE BEARING SURFACE BY A LAYER OF GALVANIZED STRIP OR TWO LAYERS OF BITUMINOUS BUILDING PAPER.

B6. JOINT REINFORCEMENT WHERE SHOWN ON THE PLAN SHALL BE AT EVERY 600mm. WITH AN EXTRA COURSE OVER AND UNDER WINDOW OPENINGS USING 'RECTOR', 'BLOTTER' OR SIMILAR.

B7 NO BRICKWORK OR BLOCKWORK WHICH IS SUPPORTED BY CONCRETE SHALL BE ERECTED UNTIL SUPPORTING FORMWORK HAS BEEN REMOVED.

B8. CAVITY WALL TIES TO BE IN ACCORDANCE WITH THE CURRENT BCA REQUIREMENTS.

STRUCTURAL STEELWORK

S1. ALL WORKMANSHIP, FABRICATION, ERECTION AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 4100.

S2. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER AND APPROVED BEFORE FABRICATION IS COMMENCED.

S3 EXCEPT AS SHOWN, STEEL MEMBERS SHALL NOT BE SPLICED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

S4. WELDING OF STEELWORK TO BE IN ACCORDANCE WITH AS 1554 AND UNLESS OTHERWISE NOTED, SHALL BE 6mm FILLET WELD ALL AROUND.

S5. ALL HIGH STRENGTH BOLTS SHALL BE ASSEMBLED AND INSPECTED IN ACCORDANCE WITH AS 125
8.8/S BOLTS ARE HIGH STRENGTH BOLTS
8.8/TB BOLTS ARE HIGH STRENGTH BEARING TYPE SLOTS
8.8/FT BOLTS ARE HIGH STRENGTH FRICTION TYPE BELTS.

S6. STEEL WORK TO BE ENCASED IN CONCRETE SHALL NOT BE PAINTED BUT SHALL BE GIVEN ONE COAT OF CEMENT WASH.

S7. STEEL WORK NOT ENCASED OR OTHERWISE NOTED SHALL BE GIVEN ONE COAT OF APPROVED METALLIC PRIMER AT LEAST 48 HOURS BEFORE DISPATCH.

S8. STEEL WORK TO BE ENCASED SHALL BE WRAPPED WITH 3mm WIRE AT 100mm PITCH AND ENCASED IN 4:2:1 CONCRETE WITH A MINIMUM COVER OF 50mm.

S9. ALL STEEL WORK BELOW GROUND SHALL BE ENCASED IN CONCRETE AND IF EXPOSED, GALVANISE TO HAVE 600 g/sq.m OF GALVANISE.

S10. ALL CLEATS AND DRILLING FOR FIXING OF ARCHITECTURAL ELEMENTS, TIMBER FRAMING ETC SHALL BE PROVIDED BY THE FABRICATOR. THE STRUCTURAL DRAWINGS ARE DEEMED TO PROVIDE FOR ALL THE NECESSARY MAJOR STRUCTURAL STEEL WORK AND CONNECTIONS. MINOR NON-STRUCTURAL ITEMS SUCH AS TRIMMERS, CLEATS AND OTHER ITEMS SHOWN ON THE ARCHITECTURAL DRAWINGS, BUT NOT SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE ALLOWED FOR BY THE CONTRACTOR IN HIS TENDER PRICE, AND DETAILED.

S11 THE CONTRACTOR SHALL PROVIDE BRACING AND LEAVE IN PLACE UNTIL PERMANENT BRACING ELEMENTS ARE CONSTRUCTED OR CLEATS, ETC AS IS NECESSARY TO STABILISE THE STRUCTURE DURING ERECTION.

S12. ALL UB, UC AND PFC MEMBERS TO HAVE F_y = 300 MPa MINIMUM.

TIMBER NOTES

T1. ALL TIMBER MATERIALS, WORKMANSHIP AND PRACTICE SHALL BE IN ACCORDANCE WITH THE TIMBER ENGINEERING CODE AS 1720 AND THE TIMBER FRAMING CODE AS 1684. ALL LINTELS, BEAMS ETC. NECESSARY FOR THE PROPER SUPPORT OF ROOF FRAMING SHALL BE PROVIDED EITHER AS SHOWN ON THE DRAWINGS OR AS REQUIRED IN ACCORDANCE WITH AS 1684.

T2. All TIMBER SHALL BE IN ACCORDANCE WITH THE STRESS GRADE NOMINATED ON THE DRAWINGS AND SHALL BE FREE OF DEFECTS, SPLITS, ROT ETC. THE ENGINEER RESERVES THE RIGHT TO REJECT UNSUITABLE TIMBER.

T3. All BOLTED TIMBER CONNECTIONS SHALL BE MADE WITH M12 BOLTS UNLESS NOTED OTHERWISE MILD STEEL WASHERS SHALL BE PLACED UNDER THE HEAD AND NUT IN ACCORDANCE WITH THE TABLE BELOW:-

WASHER SIZE

50x50x3mm	BOLTS UP TO M12
65x65x5mm	M16, M20 BOLTS
75x75x5mm	BOLTS GREATER THAN M20

ALL EXPOSED BOLTS AND FITTINGS SHALL BE HOT-DIP GALVANISHED.

T4. ALL BOLTS SHALL BE RE-TIGHTENED AT THE COMPLETION OF THE CONTRACT AND AGAIN AT THE END OF THE MAINTENANCE PERIOD. BOLTS WHICH ARE INACCESSIBLE AT THE COMPLETION OF THE STRUCTURAL WORKS SHALL BE RE-TIGHTENED IMMEDIATELY BEFORE BEING BUILT-IN.

T5O ALL PROPRIETARY FIXINGS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS, OR AS NOTED ON THE STRUCTURAL DRAWINGS.

T6. THE STRUCTURAL DRAWINGS ARE DEEMED TO PROVIDE FOR ALL NECESSARY MAJOR STRUCTURAL TIMBER AND CONNECTIONS. MINOR NON-STRUCTURAL ITEMS SUCH AS TRIMMERS, CLEATS AND OTHER ITEMS AS SHOWN ON THE ARCHITECTURAL DRAWINGS, BUT ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS. SHALL BE ALLOWED FOR BY THE CONTRACTOR IN HIS TENDER PRICE, AND DETAILED AT THE SHOP DRAWING STAGE IF REQUIRED

Scale: N/A

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Registered Civil/StructuralEngineer
Priyan Wijeyeratne
EC 19060

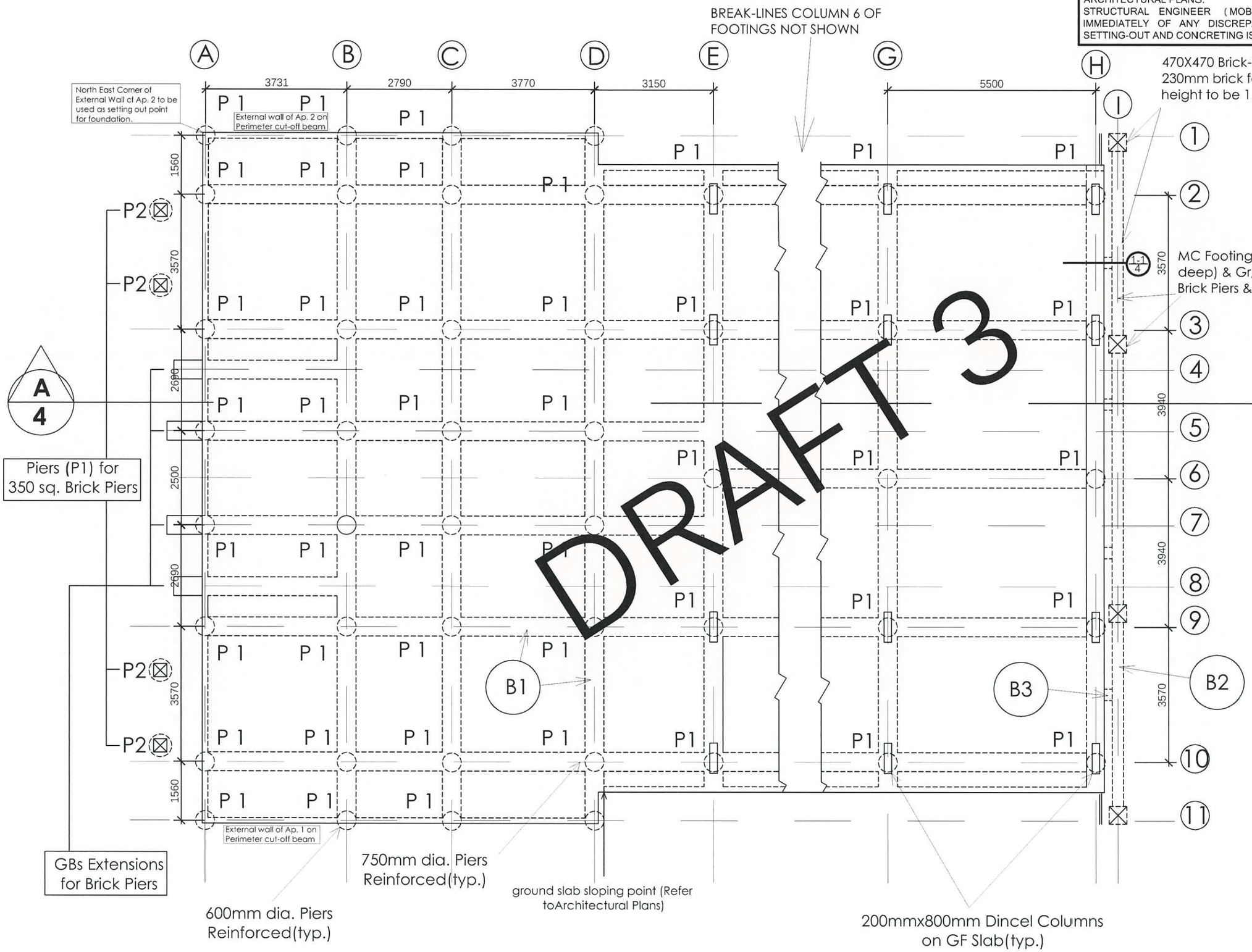
PROJECT:
APARTMENT COMPLEX

PROJECT ADDRESS:
115, Main Road West,
St Albans

SHEET NO: **2/12**

FOUNDATION - PIERS, FOOTINGS, GROUND BEAMS & SLAB

NOTE 1:
SETTING-OUT OF SLAB MUST BE DONE AS PER AIRCHITECTURAL PLANS.
DIMENSIONS PROVIDED ON THIS SHEET MUST ALWAYS BE CHECKED AGAINST ARCHITECTURAL PLANS.
STRUCTURAL ENGINEER (MOBILE: 0401023328) MUST BE KEPT INFORMED IMMEDIATELY OF ANY DISCREPANCY AND CLARIFICATION SOUGHT BEFORE SETTING-OUT AND CONCRETING IS ORGANISED.



Scale: 1 : 100

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MEGA HOMES

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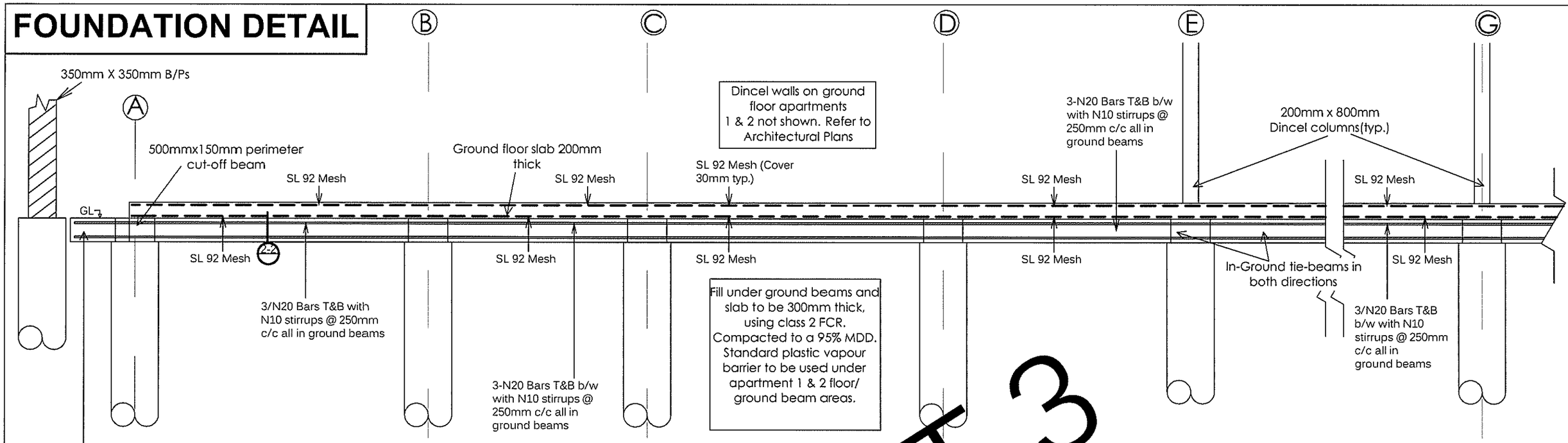
St Albans

SHEET NO: **3/12**

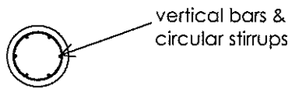
C:\Users\priyanw\Desktop\MEGA\! MEGA-2015-JULY-ST-UNITS- ALBANS\1-MEGA_ST-STRUCT-ALBANS-25-09-2015.dwg

FOUNDATION DETAIL

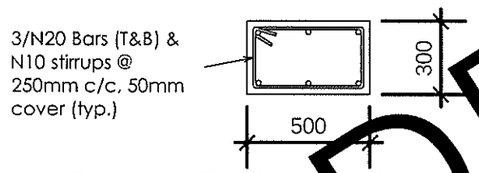


SECTION A - A - GROUND FLOOR FOUNDATION DETAIL

Scale 1 : 50



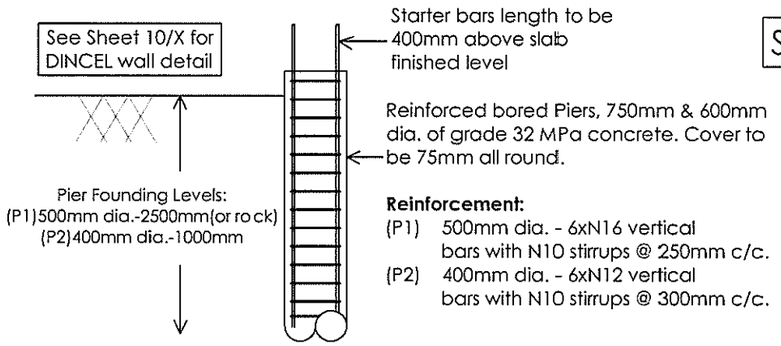
PLAN VIEW



Ground Tie Beams (B1) (typ.)

Scale 1 : 25

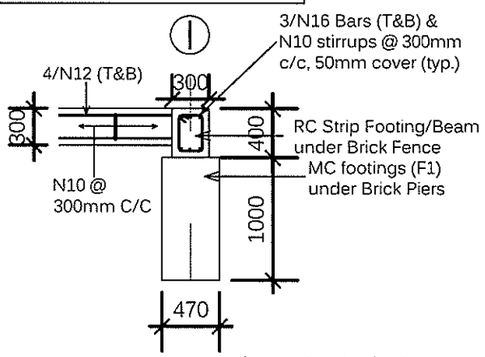
SECTIONAL VIEW 2-2



RC PIERS SECTIONAL VIEW

Section - Typical Bored Piers (P1, P2 & P3)

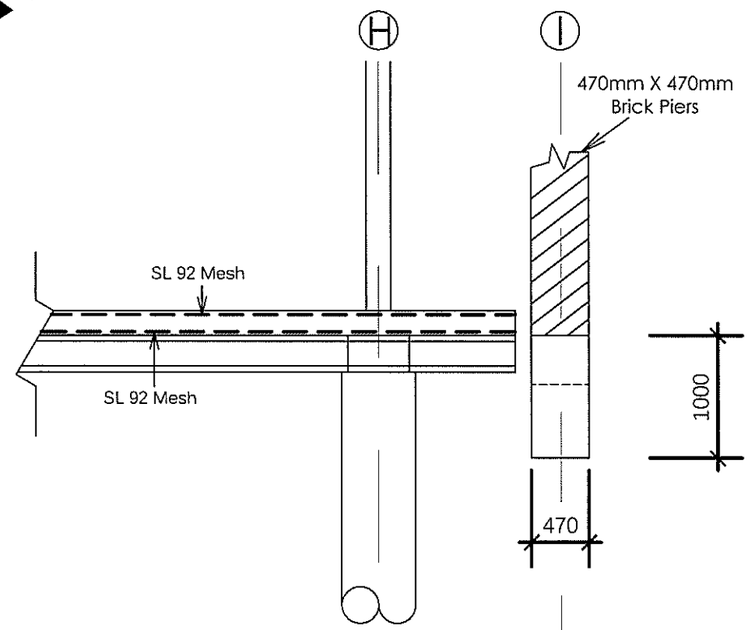
Scale: NTS



Ground Beams (B2 & B3) & Footing (F1) (typ.)

SECTIONAL VIEW 1-1 / 3

Scale 1 : 50



SECTION A - A - CONTINUED

Scale 1 : 50

Scale: As Shown

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SHEET NO: 4/12

FIRST FLOOR SLAB REINFORCEMENT DETAIL

NOTE 1:
SETTING-OUT OF SLAB MUST BE DONE AS PER ARCHITECTURAL PLANS.
DIMENSIONS PROVIDED ON THIS SHEET MUST ALWAYS BE CHIECKED AGAINST ARCHITECTURAL PLANS.
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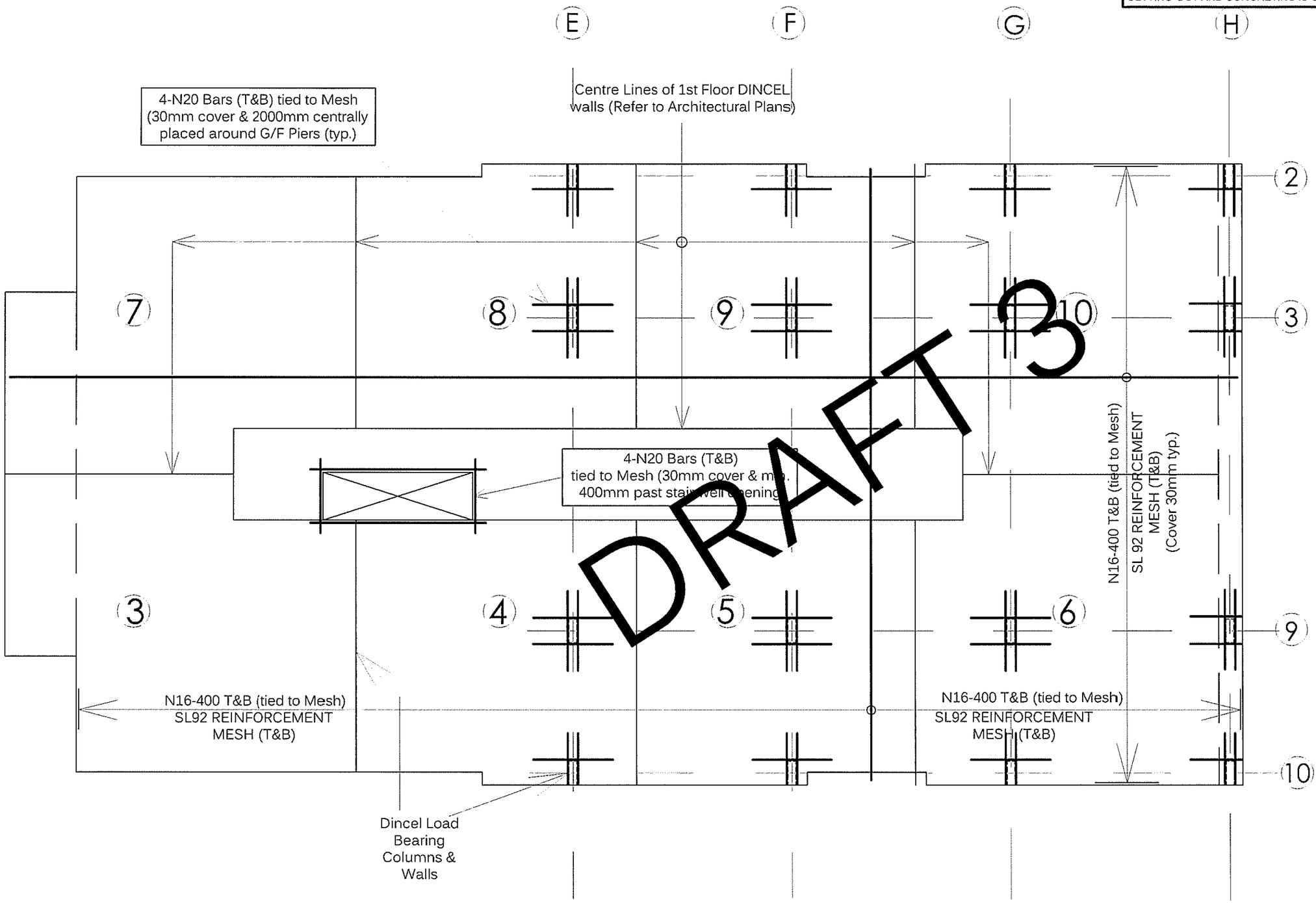

Scale: 1 : 100

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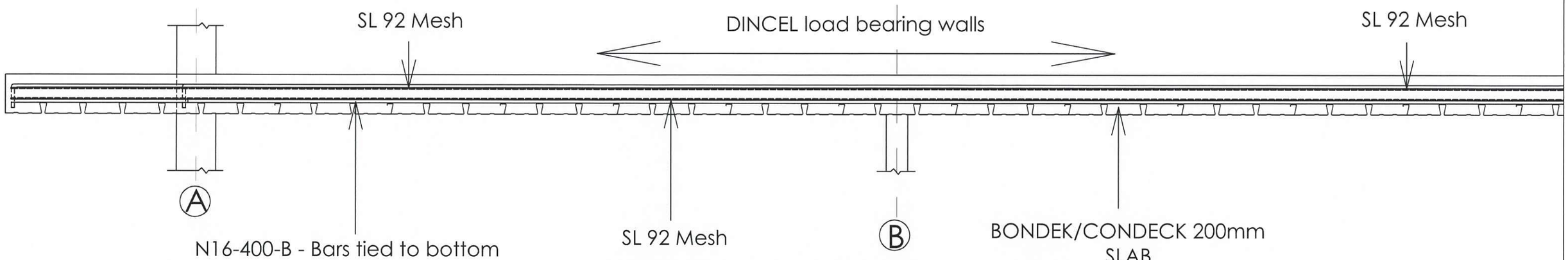
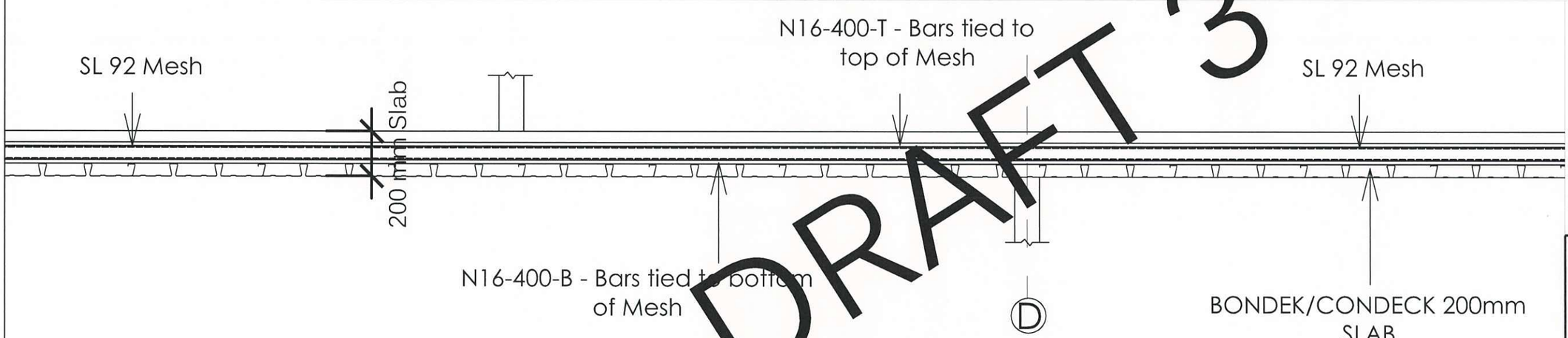
SHEET NO: **5/12**

FIRST FLOOR SECTIONS A-A - REINFORCEMENT



SECTION A - A Scale 1 : 50



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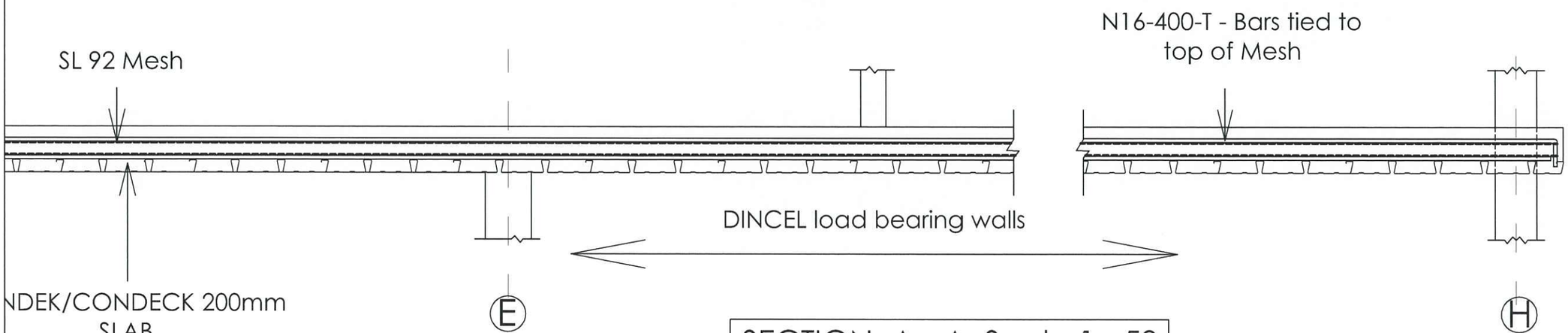

SECTION A - A Scale 1 : 50

Scale: 1 : 20

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SHEET NO: **6/12**

SECOND FLOOR SLAB

NOTE 1:
SETTING-OUT OF SLAB MUST BE DONE AS PER ARCHITECTURAL PLANS.
DIMENSIONS PROVIDED ON THIS SHEET MUST ALWAYS BE CHECKED AGAINST ARCHITECTURAL PLANS.
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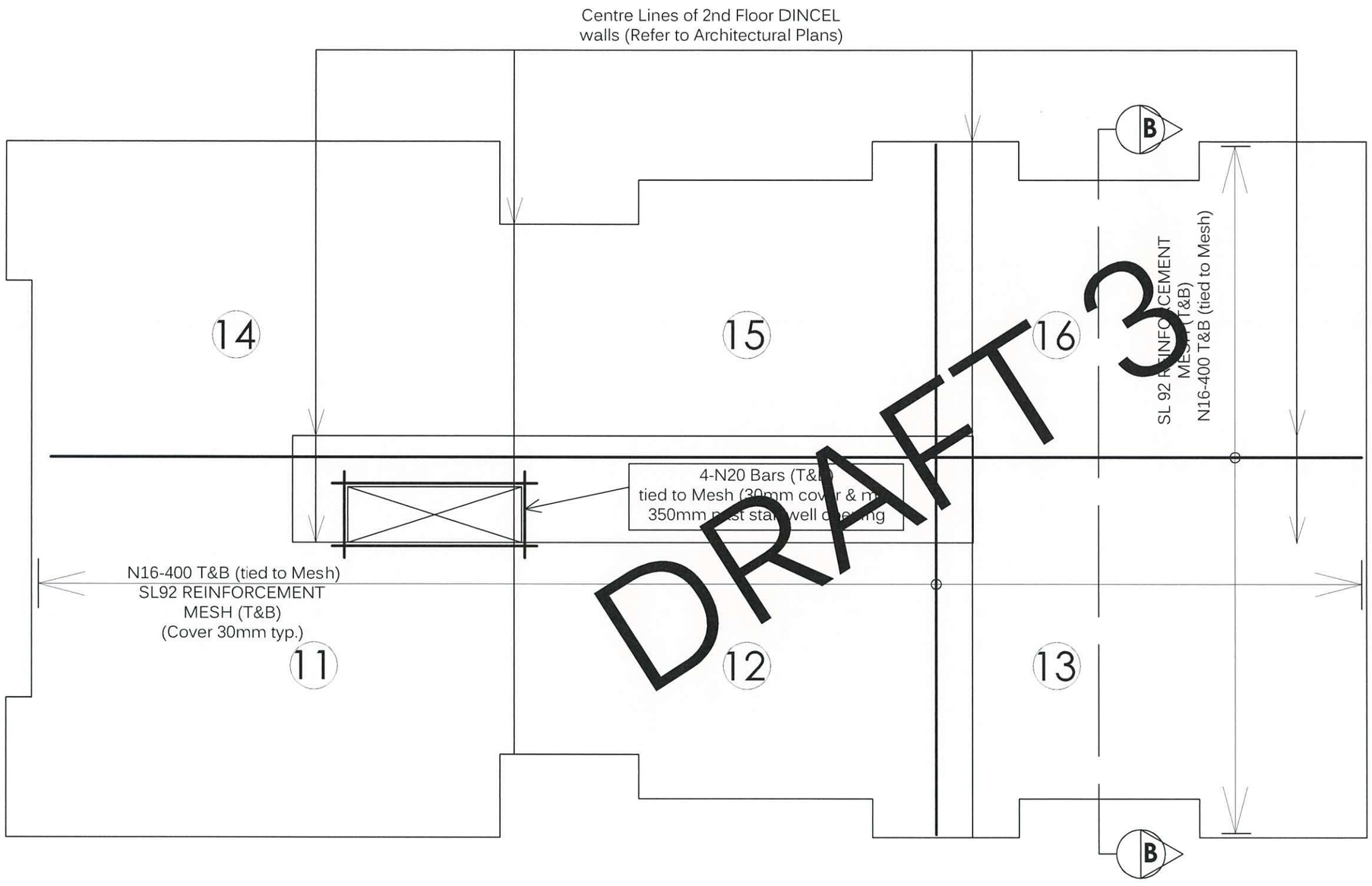

Scale: 1 : 100

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SHEET NO: **7/12**

SECOND FLOOR SECTIONS

NOTE 1:
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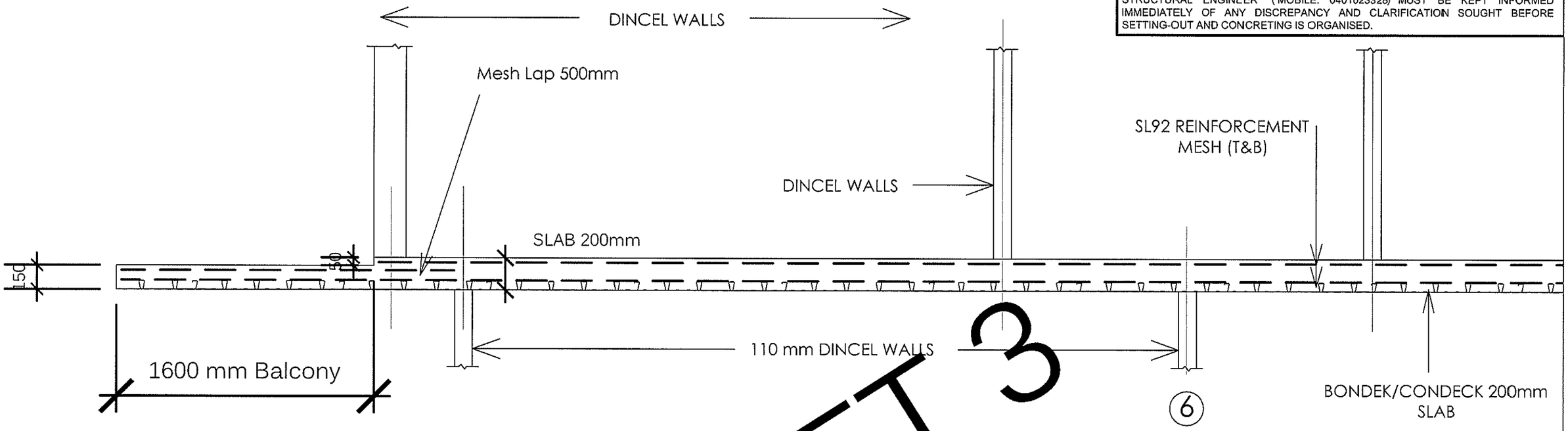
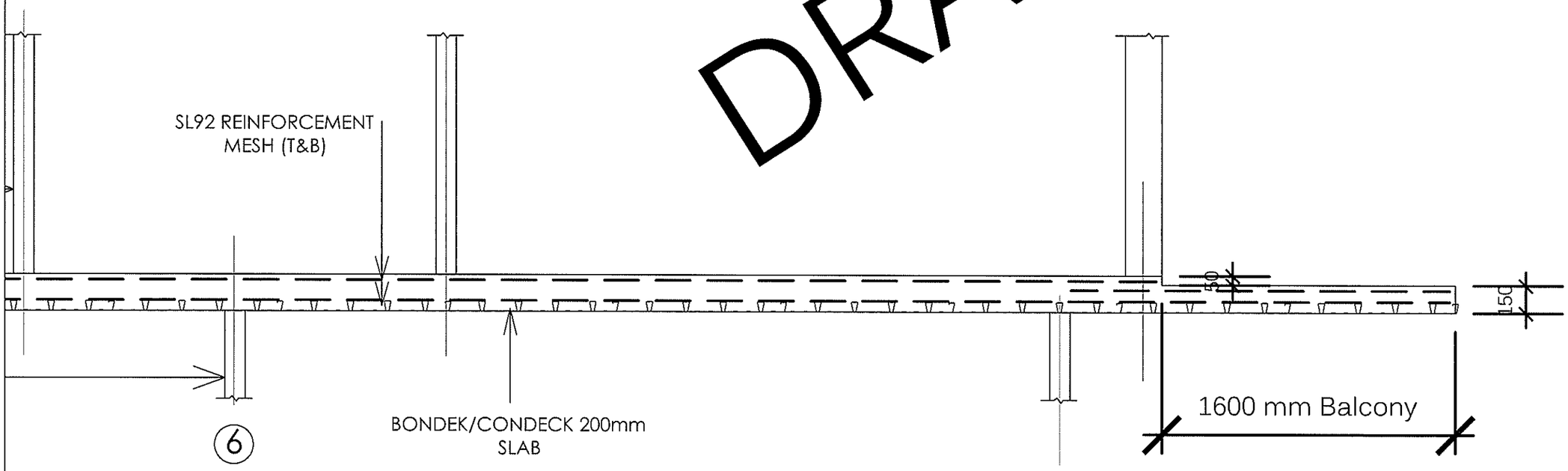


SECTION B - B Scale 1 : 50



SECTION B - B Scale 1 : 50

Scale: 1 : 100

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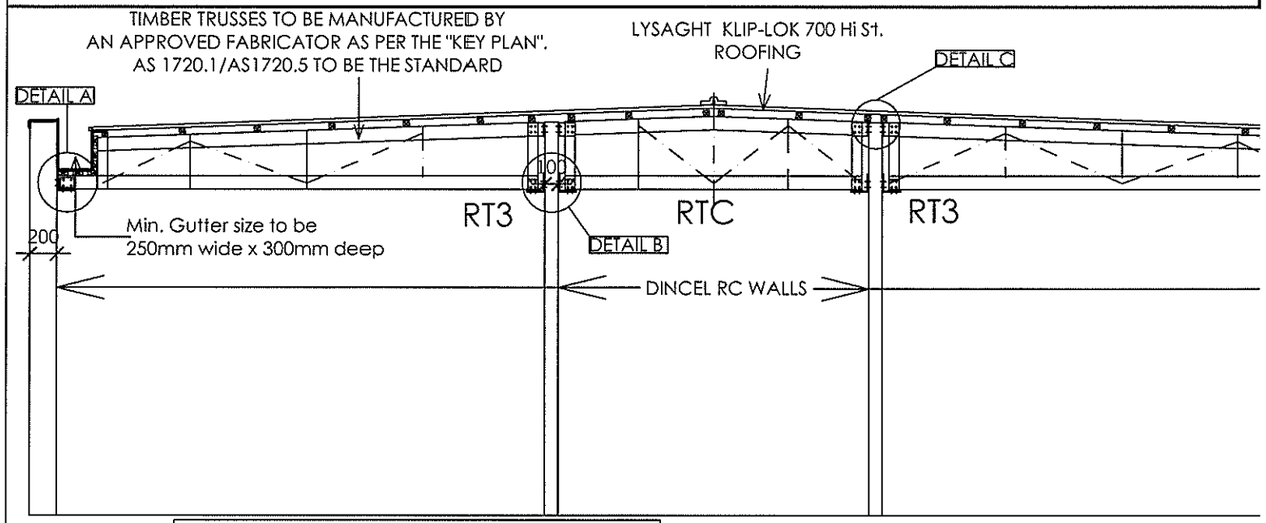
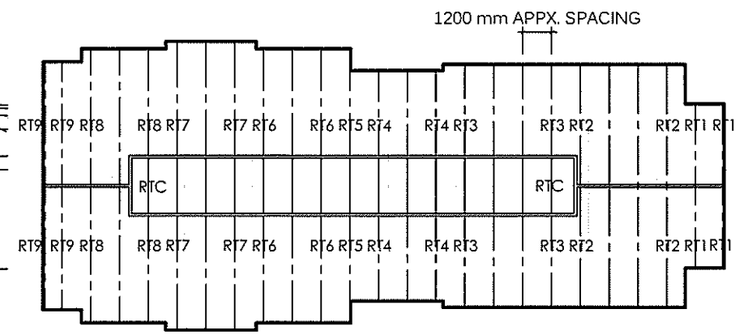
TIMBER ROOF TRUSS FRAMING / BRACING PLAN



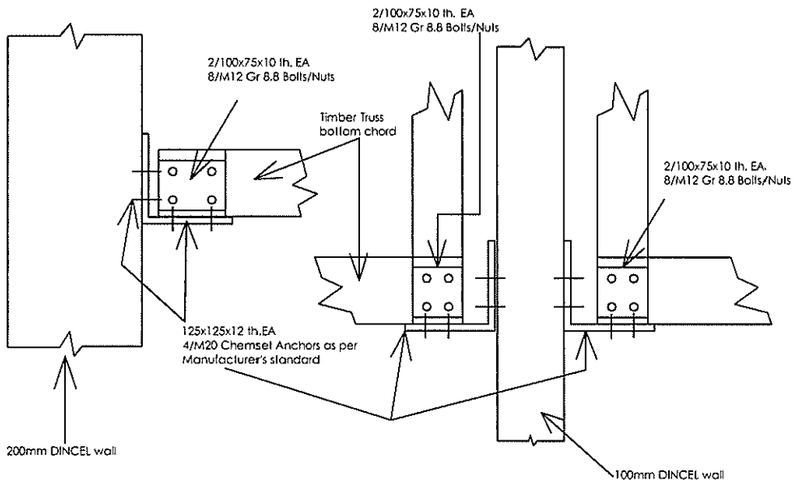
A TYPICAL TRUSS SECTION 1:25



TRUSS FRAMING "KEY PLAN" NTS

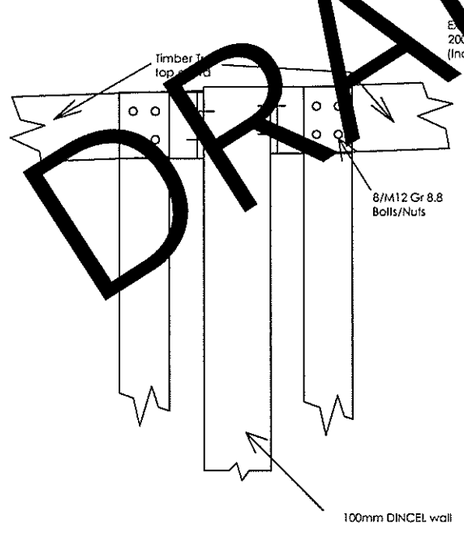
NOTES:

- RT1, RT2 etc. Represents different truss configurations.
- RTC represents trusses in centre section of roof.
- RT3,RTC&RT3 represents a typical trusses configuration in a roof section.
- All trusses to be timber and manufactured as per AS1720.1/1720.5.
- Refer to plans supplied by truss manufacturer for complete information.
- Roof sheeting to be Lysaght - KLIP-LOK 700 hi-St including gutters, flashing and accessories.
- Wall hanger/brackets to be steel and fabricated as per Engineer's & DINCEL (where applicable) specifications.

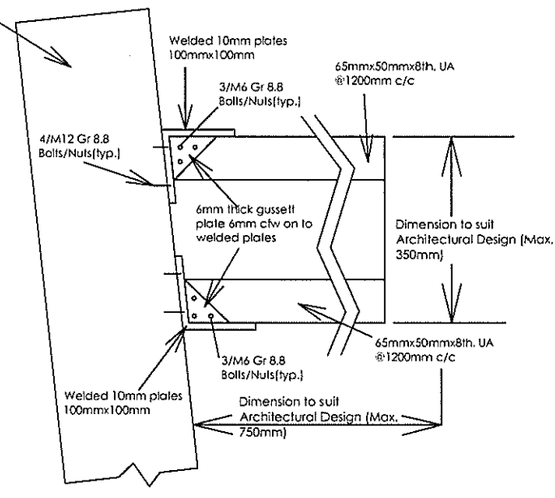


DETAIL A NTS

DETAIL B NTS



DETAIL C NTS



CANOPY/EXT. WALL
FIXING DETAIL (TYP.) NTS

Scale: As Shown

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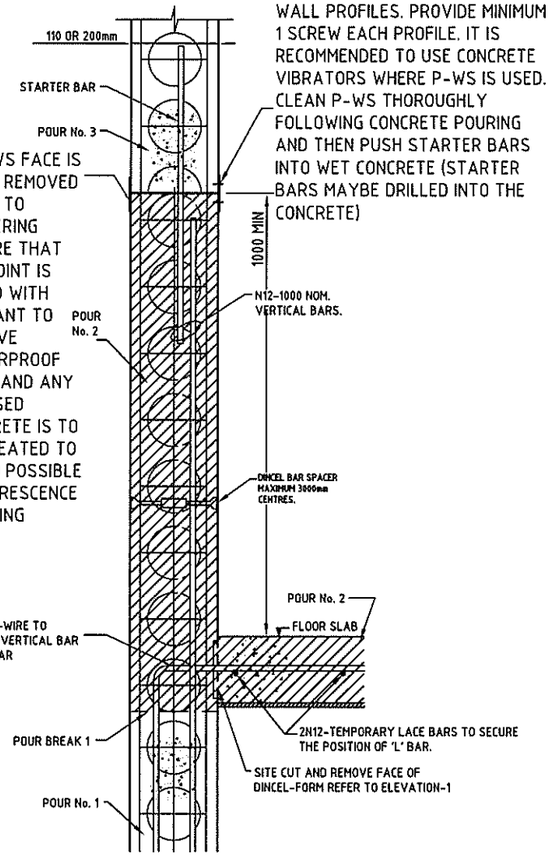
SHEET NO: **9/12**

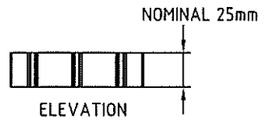
DINCEL WALL CONSTRUCTION DETAILS - TYPICAL 1

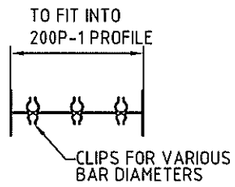


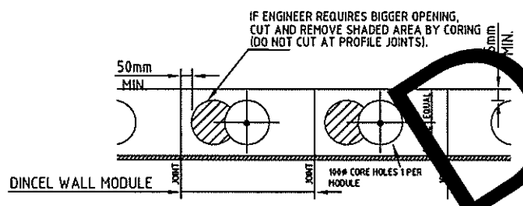
WALL EXTENDED TO WINDOW SILL-LEVEL

FACADE WALL CONSTRUCTION WITHOUT SCAFFOLDING

- THE WALL IS NOT REINFORCED FOR SHEAR WALL PURPOSES
- 110mm DINCEL ABOVE THE FLOOR DECK TO BE SECURED IF THE DINCEL FORMWORK IS USED TO ELIMINATE SCAFFOLDING

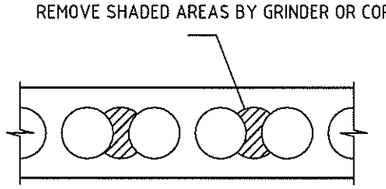




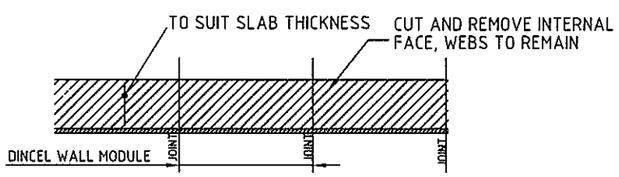


ELEVATION - 1 FOR 200 DINCEL

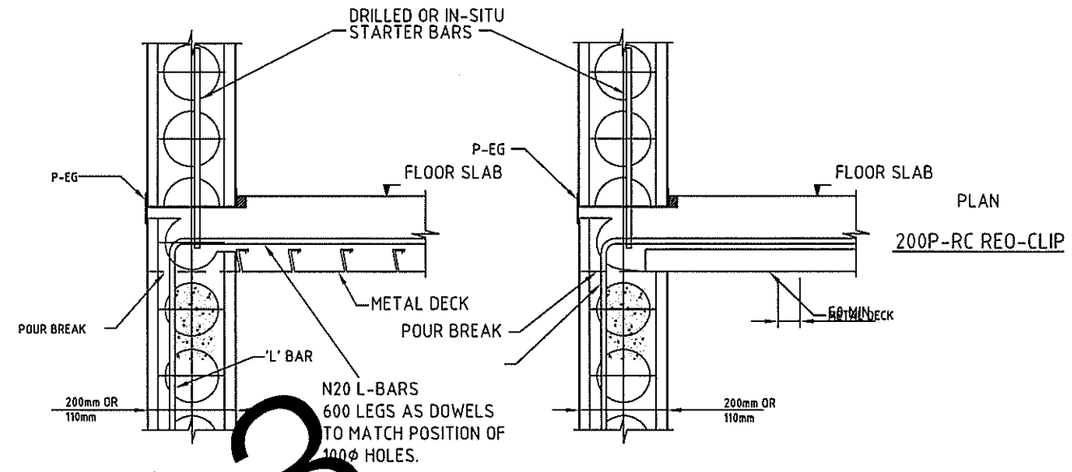
WHERE REQUIRED IT IS RECOMMENDED TO INCREASE OPENING SIZE AS SHOWN. CUT AND REMOVE SHADED AREAS BY GRINDER OR CORING



P-WS, P-G OR P-EG - PLAN DETAIL



ELEVATION - 1 FOR 110 DINCEL

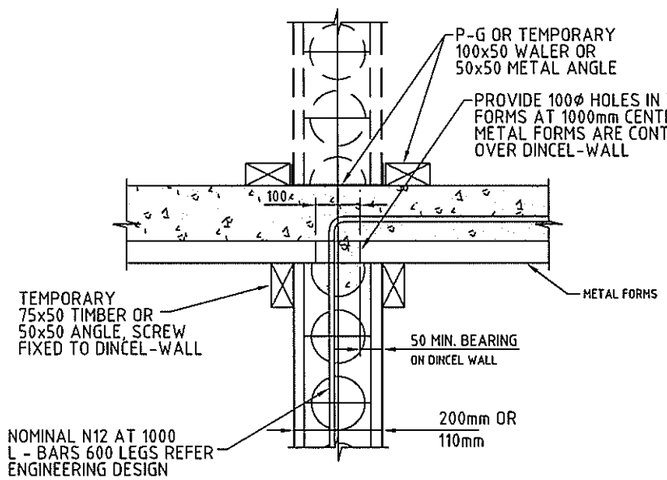


ALTERNATIVE DETAIL-1

ALTERNATIVE DETAIL-2

EXTERNAL WALL

DETAILS FOR METAL FORM



INTERNAL WALL

DETAILS FOR METAL FORM

Scale: Not to Scale

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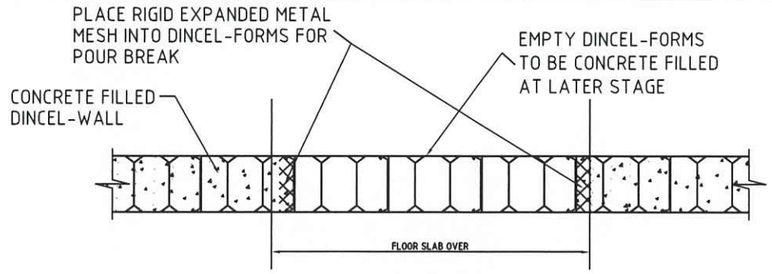
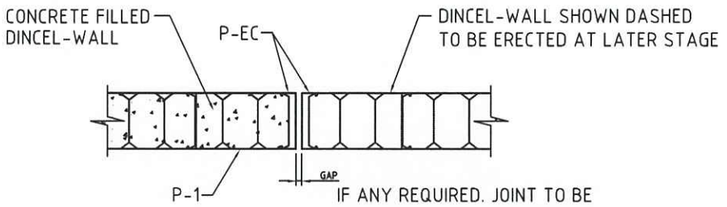
SHEET NO: 10/12

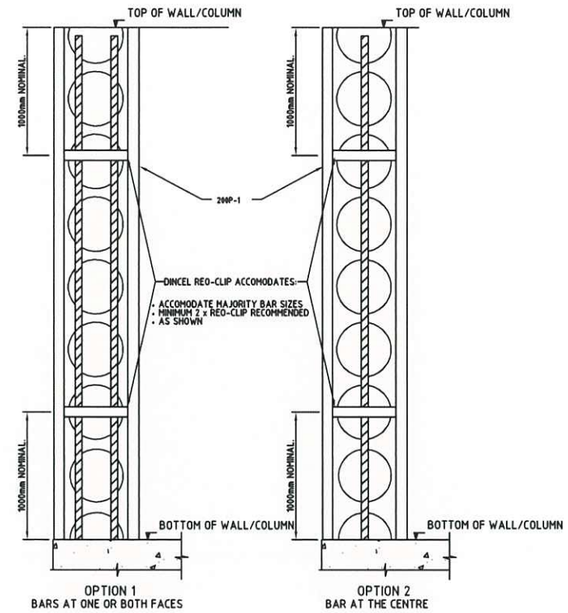
DINCEL WALL CONSTRUCTION DETAILS - TYPICAL 2



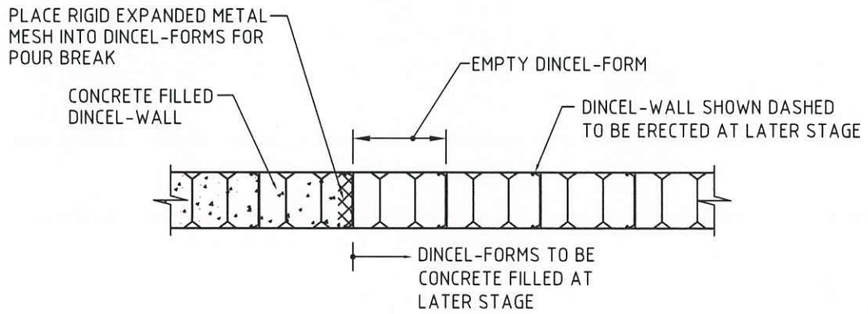
DINCEL-WALL AT FLOOR SLAB POUR-STRIP



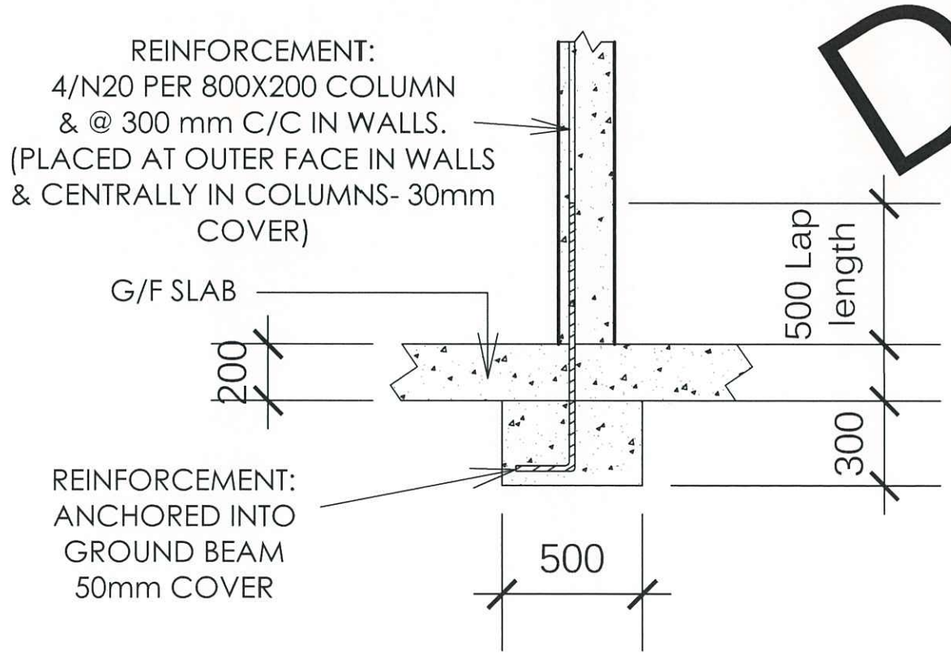
HOW TO STOP & START CONCRETING AT DINCEL-WALL



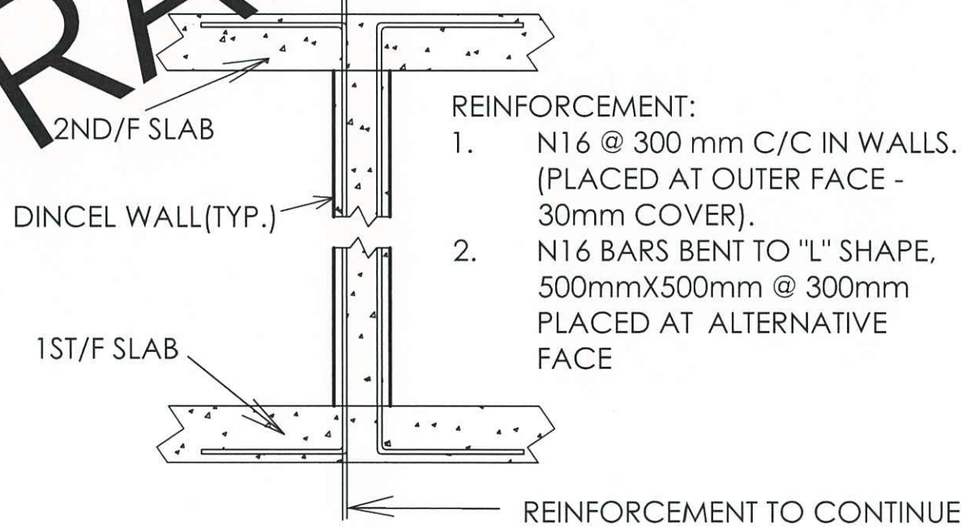
REINFORCEMENT BAR POSITIONING DETAILS



HOW TO STOP & START CONCRETING AT DINCEL-WALL



STARTER BARS INTO DINCEL COLUMS/WALLS AT



REINFORCEMENT:
1. N16 @ 300 mm C/C IN WALLS. (PLACED AT OUTER FACE - 30mm COVER).
2. N16 BARS BENT TO "L" SHAPE, 500mmX500mm @ 300mm PLACED AT ALTERNATIVE FACE

REINFORCEMENT AT WALLS/COLUMNS/ SLABS TYPICAL DETAIL 2 NTS

Scale: Not to Scale

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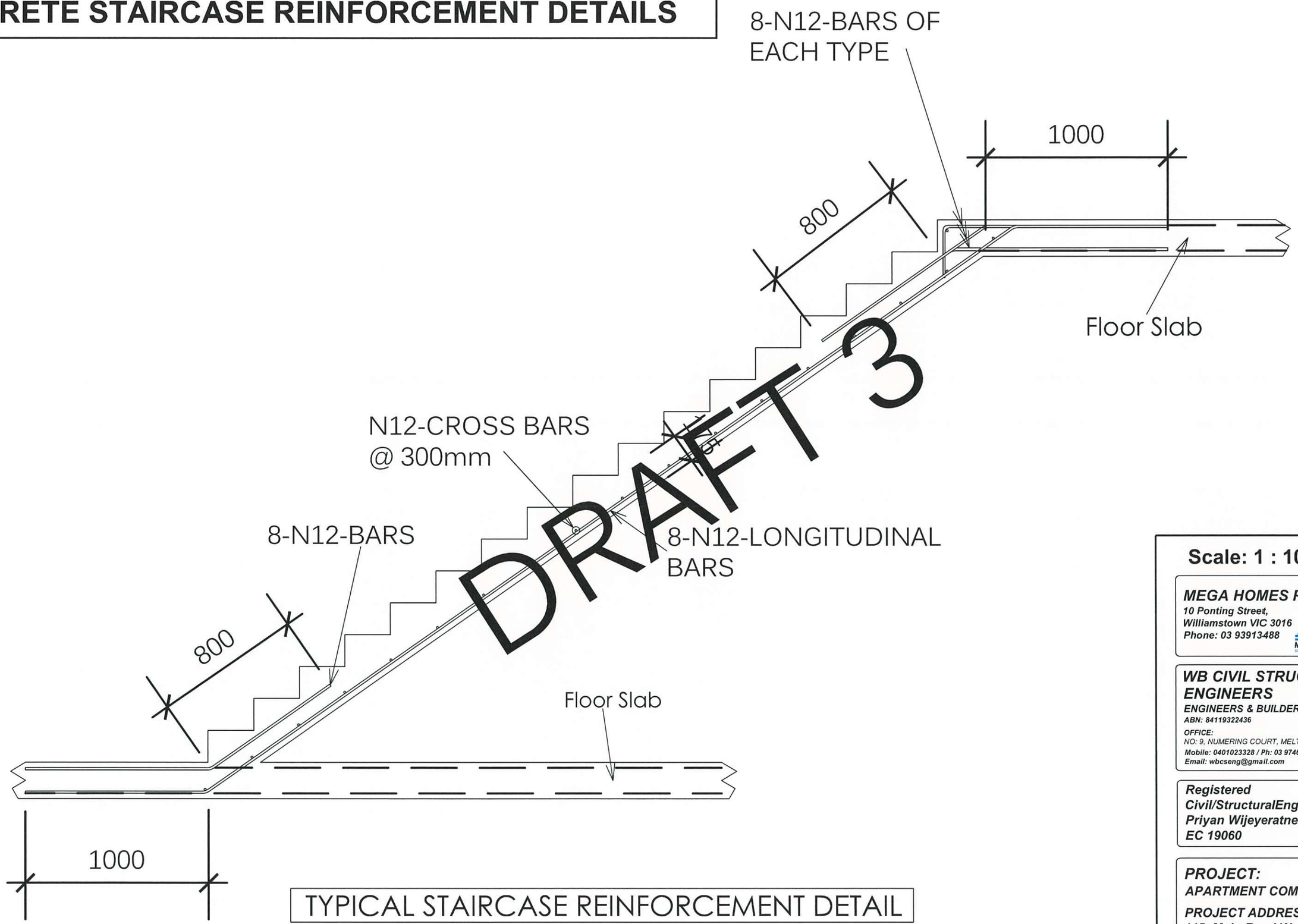
PROJECT:
APARTMENT COMPLEX

PROJECT ADDRESS:
115, Main Road West,
St Albans

SHEET NO: **11/12**

CONCRETE STAIRCASE REINFORCEMENT DETAILS



TYPICAL STAIRCASE REINFORCEMENT DETAIL

Scale 1 : 20

Scale: 1 : 100

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