

Sheet Index			
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203	WALL BRACING PLAN	<input type="checkbox"/>	
204	ROOF FRAMING PLAN	<input type="checkbox"/>	
205	SECTION A	<input type="checkbox"/>	
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303	ARCHITECTURAL DETAILS	<input type="checkbox"/>	
304	ENGINEERING	<input type="checkbox"/>	
305	ENGINEERING	<input type="checkbox"/>	
306	GENERAL DETAILS	<input type="checkbox"/>	
307	GENERAL DETAILS	<input type="checkbox"/>	
308	GENERAL DETAILS	<input type="checkbox"/>	
309	ROOF NAILING SCHEDULE	<input type="checkbox"/>	
310	BRACING DETAILS	<input type="checkbox"/>	
311	BRACING DETAILS	<input type="checkbox"/>	
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313	WET AREA DETAILS	<input type="checkbox"/>	

THIS SET OF DRAWINGS SHALL BE READ IN CONJUNCTION WITH ATTACHED

1) ENGINEERING CALCULATIONS AND DRAWINGS.
2) MANUFACTURER'S LITERATURE.
3) SPECIFICATIONS.

IT IS AN OFFENCE UNDER THE BUILDING ACT 2004 TO CARRY OUT ANY WORK NOT IN ACCORDANCE WITH THE BUILDING CONSENT. REFER THE RESOLUTION OF MATTERS CONCERNING COMPLIANCE TO THE OWNER. WHERE BUILDING CONSENT APPROVAL IS AFFECTED REFER ANY CHANGES TO THE TERRITORIAL AUTHORITY.

THERE ARE NO PRODUCT / SPECIFICATION SUBSTITUTIONS ALLOWED FOR THIS PROJECT WITHOUT PRIOR WRITTEN CONSENT FROM THE AUTHOR OF THESE DOCUMENTS AND THE OWNER / PROJECT CLIENT

GENERAL NOTES:

1. CONTRACTOR TO VERIFY JOINERY SIZES WITH OWNER. ALL EXTERNAL DOOR AND WINDOW SIZES SHOWN ARE ROUGH OPENING SIZES.

2. ALL MATERIAL FINISHES AND COLOURS TO OWNER'S SPECIFICATION UNLESS OTHERWISE STATED.

3. ALL CONSTRUCTION TO COMPLY WITH THE CODE OF PRACTICE NZS 3604 2011 AND LOCAL TERRITORIAL AUTHORITY BYLAWS.

4. ALL NEW / REPLACEMENT CISTERNS SHALL BE APPROVED DUAL FLUSH MODELS AS PER T. A. BYLAWS.

5. ALL INTERNAL DOOR SIZES SHOWN ARE FOR THE ACTUAL DOOR AND ARE NOT THE TRIM SIZE.

6. ALL DIMENSIONS & UNDERGROUND SERVICES TO BE CHECKED ON SITE BY CONTRACTOR BEFORE COMMENCEMENT OF ANY WORK.

7. CONTRACTOR TO ENSURE ALL GROUND LEVELS & HEIGHT RESTRICTIONS ARE CORRECT AND COMPLY WITH TERRITORIAL AUTHORITY BYLAWS THROUGHOUT CONSTRUCTION.

8. DO NOT SCALE FROM DRAWINGS & WORK FROM DIMENSIONS SHOWN.

NOT FOR CONSTRUCTION

LEGAL DESCRIPTION

LOT 333, DP 582536

SITE AREA 654M²

SITE COVERAGE CALCULATION

HOUSE

218.19M²

COVERAGE

33.36%

IMPERMEABLE AREA CALCULATION

ROOF

255.58M²

NON ROOF

118.17M²

TOTAL

373.75M²

COVERAGE

57.14%

CUT / FILL VOLUME CALCULATION

28M³ CUT

53M³ FILL

HOUSE

BRUSHED CONC

DECK

CUT

FILL

FINISHED FLOOR LEVEL (F.F.L.)

CONCRETE - TOP OF FINISHED SLAB

TIMBER FLOOR - TOP OF FLOORING

FINISHED GROUND LEVEL (F.G.L.)

MEANS THE LEVEL AFTER ALL BACKFILLING, LANDSCAPING AND SURFACE PAVING HAS BEEN COMPLETED

CLEARED GROUND LEVEL (C.G.L.)

MEANS THE LEVEL AFTER THE SITE EXCAVATION HAS BEEN COMPLETED BUT BEFORE BUILDING FOUNDATIONS HAVE BEEN EXCAVATED AND THE AREA OF THE SITE TO BE COVERED BY THE BUILDING IS FREE OF ALL DELETERIOUS MATERIAL

SET OUT

SITE SETOUT IS RECOMMENDED BY A SURVEYOR TO ENSURE THE POSITION OF BUILDING, CONFIRM SITE DATUM, FLOOR LEVELS, GROUND CONTOURS AND FENCES ARE SHOWN CORRECTLY. WHERE A SURVEY PLAN HAS NOT BEEN PROVIDED OR UNDERTAKEN PRIOR TO CONSTRUCTION, THEN IT BECOMES THE CLIENTS RESPONSIBILITY AND MAY INCUR FURTHER COSTS. DISCREPANCIES MAY AFFECT TOWN PLANNING RULES AND REQUIRE RESOURCE CONSENT.

CUT & FILL EXCAVATION NOTES

OUR MEASUREMENTS AND VOLUMES ARE NOT TO BE USED IN ANY WAY FOR QUANTITY SURVEY, OR COSTING PURPOSES, AS THE ACCURACY OF THE SURVEY & TOPOGRAPHICAL INFORMATION CONTAIN A MARGIN OF ERROR THAT INFLUENCES SUCH MEASUREMENTS & VOLUMES. EARTHWORKS VOLUMES ARE AFFECTED BY:

CUT VOLUMES

- 'BULKING' DUE TO EXCAVATED MATERIAL TAKING UP MORE SPACE ON A TRUCK.

- WHETHER ALLOWANCE HAS BEEN MADE FOR EXCAVATION OF SERVICE TRENCHES, REMOVAL OF VEGETATION, FOOTINGS, PADS AND PILE HOLES, DRIVEWAYS AND FOOTPATHS.

- ACTUAL DEPTHS OF TOPSOIL & STAINED CLAY THAT MAY GET REMOVED.

- REMOVAL OF MATERIAL FOUND TO BE 'UNSUITABLE' FOR FILL.

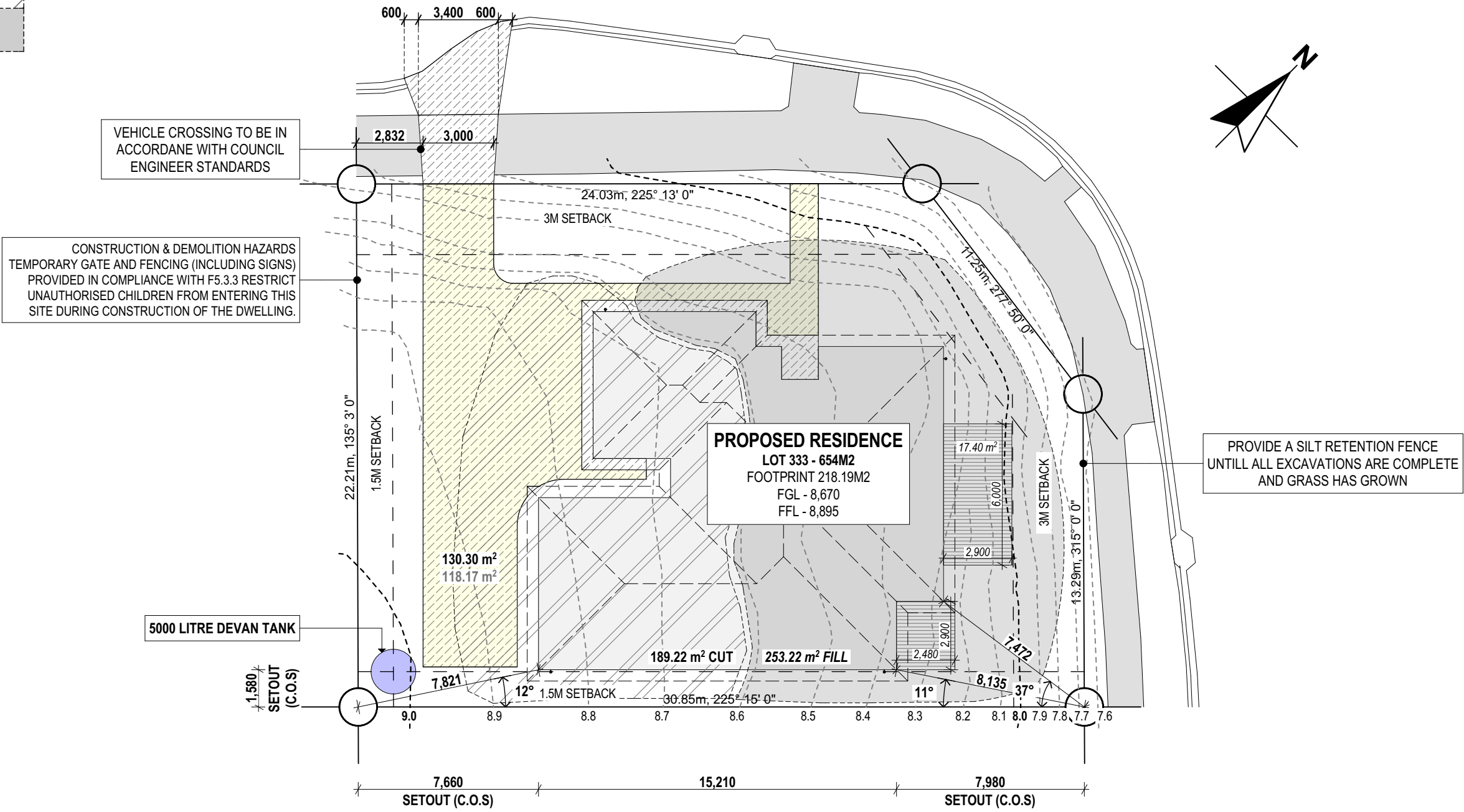
FILL VOLUMES REQUIRED

THESE CAN BE AFFECTED BY:

THE AMOUNT OF 'UNDERCUT' MADE DURING EXCAVATION.

- THE SLOPE OF THE BATTER AS RECOMMENDED IN THE GEOTEC REPORT.

- THE SUITABILITY OF THE CUT MATERIAL FOR COMPACTION PURPOSES.



NOT FOR CONSTRUCTION

PROVIDE SILT RUN OFF PROTECTION
TAKE APPROPRIATE MEASURES TO PREVENT OR MINIMISE SEDIMENT GENERATION AND SILT RUN OFF. COMPLY WITH TERRITORIAL AND OTHER AUTHORITIES REQUIREMENTS RELATING TO CARRYING OUT EARTHWORKS. PUMP WATER FROM TRENCHES AND OTHER AREAS OF SITE USING METHODS TO PREVENT SEDIMENT ENTERING ANY DRAIN OR WATERCOURSE. FILTER DIRTY WATER BEFORE DISCHARGING INTO ANY DRAINAGE SYSTEM

- PLUMBING AND DRAINAGE:**
1. ALL SANITARY PLUMBING AND DRAINAGE WORK MUST COMPLY WITH NZ BUILDING CODE ACCEPTABLE SOLUTION AS/NZS 3500 PART 2.2
 2. ALL STORMWATER DRAINAGE WORK MUST COMPLY WITH NZ BUILDING CODE ACCEPTABLE SOLUTION E1/AS1
 3. SANITARY PLUMBING MUST BE RUN IN PVC, AND WATER RETICULATION IN POLYBUTYLENE.
 4. COLD WATER SUPPLY PIPE TO HAVE A NON-RETURN VALVE FITTED BEFORE THE FIRST OUTLET.
 5. ALL EXISTING SERVICES MUST BE LOCATED AND PEGGED BEFORE COMMENCING WORK.

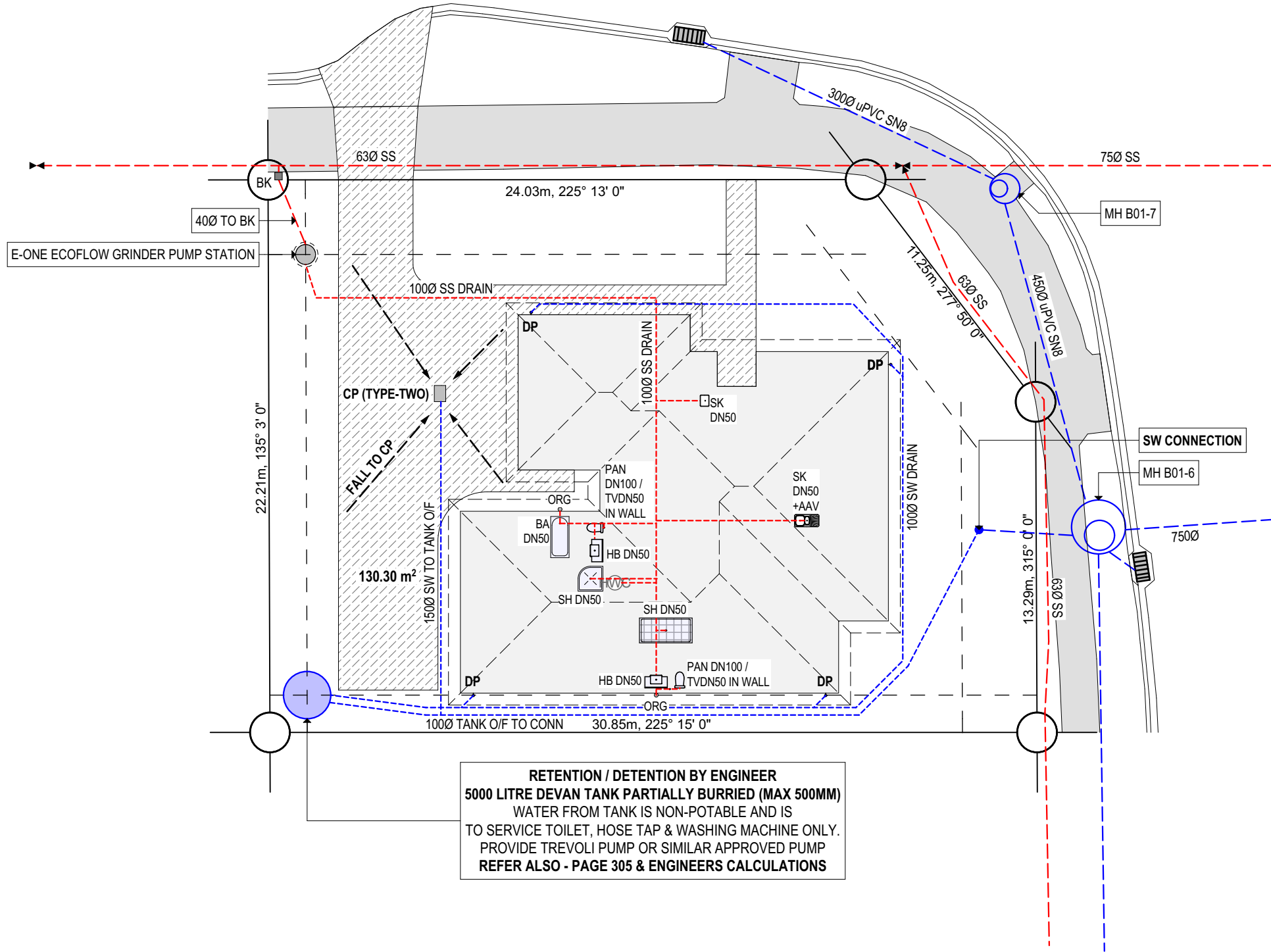
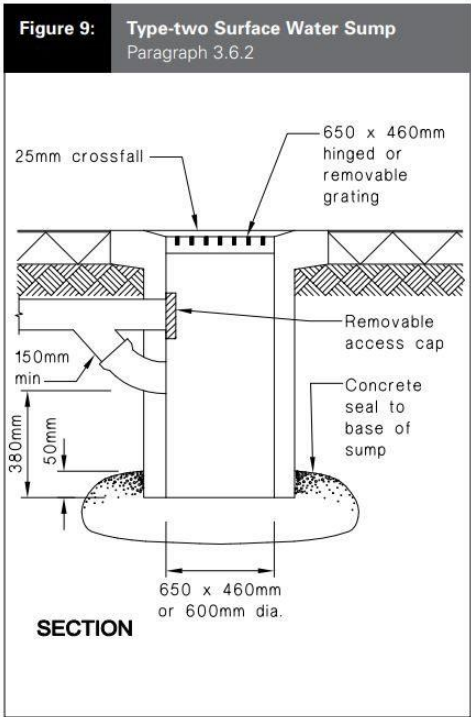
MINIMUM GRADIENT RATIO OF SANITARY DISCHARGE PIPES AND DRAINS:
1. AS/NZS 3500 PART 2 DISCHARGE PIPES AND DRAINS.
DRAIN GRADIENTS TABLE 3.2
DISCHARGE PIPES TABLE 6.1
DISCHARGE GRADIENTS TABLE 7.1
TABLES ARE PROVIDED AT BACK OF DRAWINGS

DN65 - 2.50% DN80 - 1.65% DN100 - 1.65%
DN125 - 1.25% DN150 - 1.65% DN225 - 0.65%

MINIMUM GRADIENT RATIO OF STORMWATER DRAINS:
NZBC E1/AS1
DN100, MAX MODIFIED CATCHMENT AREA: 200M - 1:120
DN150, MAX. MODIFIED CATCHMENT AREA: 400M2 - 1:200

PLUMBING NOTE
ALL FIXTURE PIPES INTO MIN DN65 (DN100 PREFERRED) BRANCHES UNDER SLAB. PLUMBER TO CONFIRM UNDERSLAB WASTE PIPE LOCATIONS WITH SITE MANAGER BEFORE THE SLAB IS POURED
REFER ALSO - FOUNDATION PLAN

STORMWATER TANK DESIGN BY GRAYSON DESIGN & DEVELOPMENTS LTD (KEVIN BURROWS)
REFER KEVIN BURROWS ENGINEERS DESIGN & CALCULATIONS



PLUMBING LEGEND	
---	SS DRAIN
---	SW DRAIN
AJ	ACCESS JUNCTION
IP	INSPECTION POINT
FWG	FLOOR WASTE GULLY
GT	GULLY TRAP
TV	TERMINAL VENT
AAV	AIR ADMITTANCE VALVE
CP	CESSPIT
DP	DOWN PIPE
ORG	OVERFLOW RELIEF GULLY
BA	BATH
DW	DISHWASHER
SH	SHOWER
SK	SINK
TU	LAUNDRY TUB
PAN	TOILET
HB	HAND BASIN
HWC	HOT WATER CYLINDER
ST	STACK



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Job Title
PROPOSED DWELLING
At
63 KITEMAUNGA AVE, THE LANDING WHANGAREI
For
HOME CONCEPTS


Drawing Title
DRAINAGE PLAN
THIS DOCUMENT REMAINS THE PROPERTY OF MAKING PLANS LTD / ALL DIMENSIONS TO BE VERIFIED ON SITE

SCALE @ A3.	1:200	WIND ZONE	HIGH
SHEET NUMBER	103	EXPOSURE ZONE	C
		EQ ZONE	1
		ZONE	GRZ
		Checked	MAKING PLANS
		Drawn	DRAWN BY NAME
OF: 31	Plot Date	1/05/2024	


NOT FOR CONSTRUCTION


Job # 23020

 **FINISHED FLOOR LEVEL (F.F.L.)**
CONCRETE - TOP OF FINISHED SLAB
TIMBER FLOOR - TOP OF FLOORING


 **FINISHED GROUND LEVEL (F.G.L.)**
MEANS THE LEVEL AFTER ALL BACKFILLING,
LANDSCAPING AND SURFACE PAVING HAS BEEN
COMPLETED


CLEARED GROUND LEVEL (C.G.L.)
MEANS THE LEVEL AFTER THE SITE EXCAVATION
HAS BEEN COMPLETED BUT BEFORE BUILDING
FOUNDATIONS HAVE BEEN EXCAVATED AND THE
AREA OF THE SITE TO BE COVERED BY THE
BUILDING IS FREE OF ALL DELETERIOUS MATERIAL

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S DOMESTIC SMOKE ALARMS.

SMOKE ALARMS SHALL COMPLY WITH APPROVED DOCUMENT F7 WARNING SYSTEMS. SMOKE ALARMS MAY BE BATTERY POWERED, HAVE A HUSH FACILITY HAVING A MIN. 60 SECOND DURATION, HAVE A TEST FACILITY AND BE APPROVED BY A RECOGNIZED AUTHORITY

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SMOKE ALARMS SHALL COMPLY WITH APPROVED DOCUMENT F7 WARNING SYSTEMS. SMOKE ALARMS MAY BE BATTERY POWERED, HAVE A HUSH FACILITY HAVING A MIN. 60 SECOND DURATION, HAVE A TEST FACILITY AND BE APPROVED BY A RECOGNIZED AUTHORITY

GLAZING SCREENS

ALL GLASS SCREENS ARE TO BE CODE COMPLIANT TO ALL RELEVANT SAFETY GLASS STANDARDS AND ARE TO BE INSTALLED TO COMPLY WITH NZBC E3

GLAZING SCREENS

ALL GLASS SCREENS ARE TO BE CODE COMPLIANT TO ALL RELEVANT SAFETY GLASS STANDARDS AND ARE TO BE INSTALLED TO COMPLY WITH NZBC E3

**WET AREAS WATERPROOFING
SYSTEM OPTIONS**

PROVIDE AN IMPERVIOUS AND EASILY CLEANABLE SURFACE TO ALL WALL AREAS LIKELY TO BE SPLASHED AND TO ALL BATHROOM, TOILET, LAUNDRY, KITCHEN AND MAIN ENTRANCE FLOORS.
USE ELEPHANT AQUABOARD ON BATHROOM, TOILET, LAUNDRY AND KITCHEN WALLS AND BATHROOM AND LAUNDRY CEILINGS.

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TILING / WET AREAS SPECIFICATIONS
INSTALL ALL WET AREA LININGS, MEMBRANES AND
TILING WORK IN ACCORDANCE WITH THE FOLLOWING
SPECIFICATIONS, STANDARDS AND MANUFACTURERS
LITERATURE:

TILING / WET AREAS SPECIFICATIONS
INSTALL ALL WET AREA LININGS, MEMBRANES AND
TILING WORK IN ACCORDANCE WITH THE FOLLOWING
SPECIFICATIONS, STANDARDS AND MANUFACTURERS
LITERATURE:

NZBC E3/AS1 - INTERNAL MOISTURE
 SPECIFICATION SECTIONS 6221A
 ELEPHANT AQUABOARD WET AREA SYSTEMS AND
 DETAILS
 TECHNOKOLLA RASOGUM LITERATURE
 FLOORING INSTALLATION MANUAL
 AS3740 WATERPROOFING OF WET AREAS WITHIN
 RESIDENTIAL BUILDINGS
 AS4992.2 CERAMIC TILE GROUTS AND ADHESIVES
 AS3958.1 CERAMIC TILES - GUIDE TO THE
 INSTALLATION OF CERAMIC TILES

WALLS

- FIX TILES WITH APPROVED AND COMPATIBLE TILE ADHESIVE OVER TECHNOKOLLA RASOGUM WPM OVER ELEPHANT AQUABOARD SHEETS. FOR APPLICATIONS OF TILES

6MM OR LESS - STUDS @ 600CRS & NOGS @ 600CRS.

6MM OR MORE - STUDS @ 400CRS & NOGS @ 600CRS

- APPROVED PAINT SYSTEM, E.G. 1 COAT ALKYD SEALER AND 2 COATS WATER BASED ENAMEL

WALLS

- FIX TILES WITH APPROVED AND COMPATIBLE TILE ADHESIVE OVER TECHNOKOLLA RASOGUM WPM OVER ELEPHANT AQUABOARD SHEETS. FOR APPLICATIONS OF TILES

6MM OR LESS - STUDS @ 600CRS & NOGS @ 600CRS.

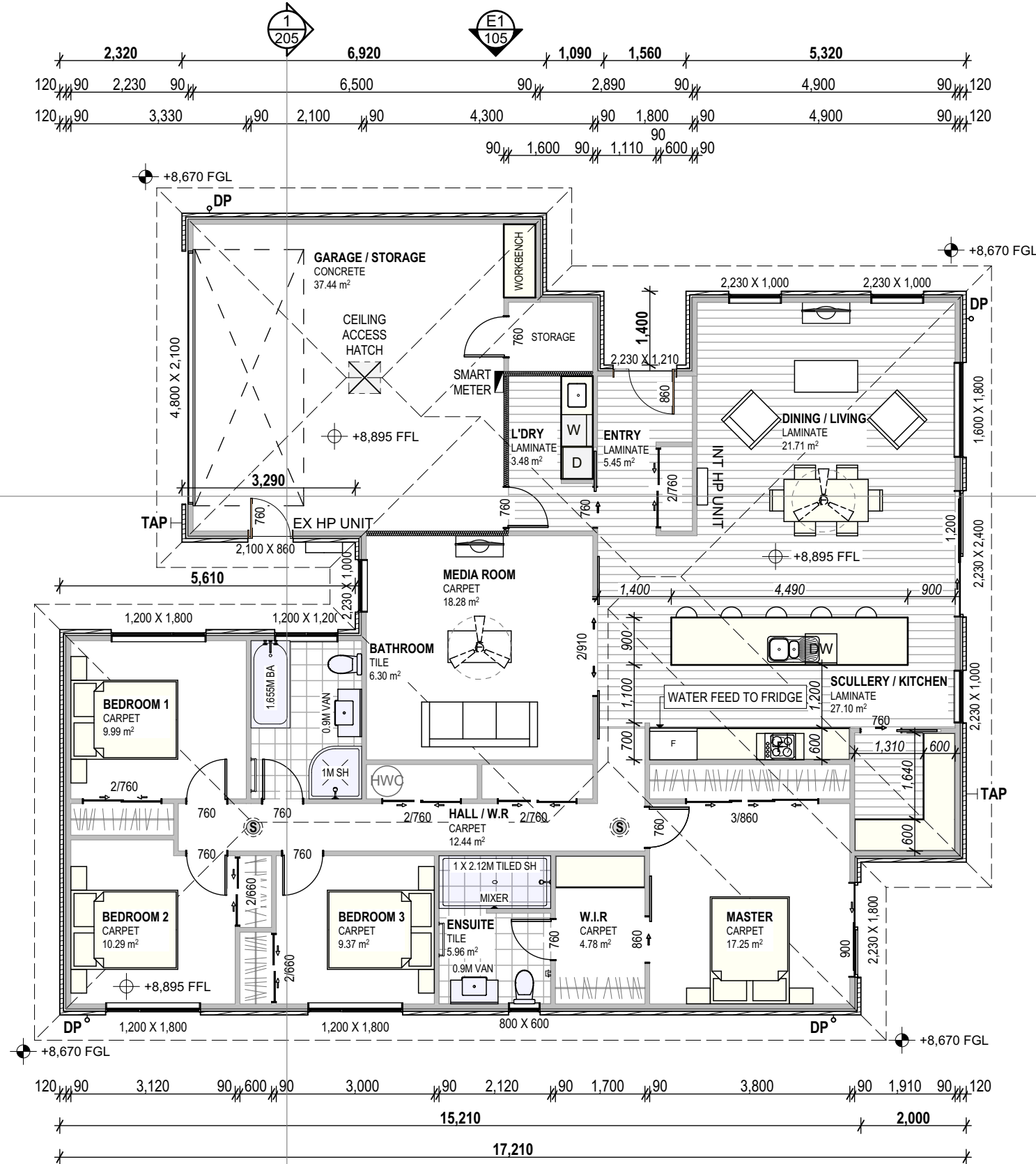
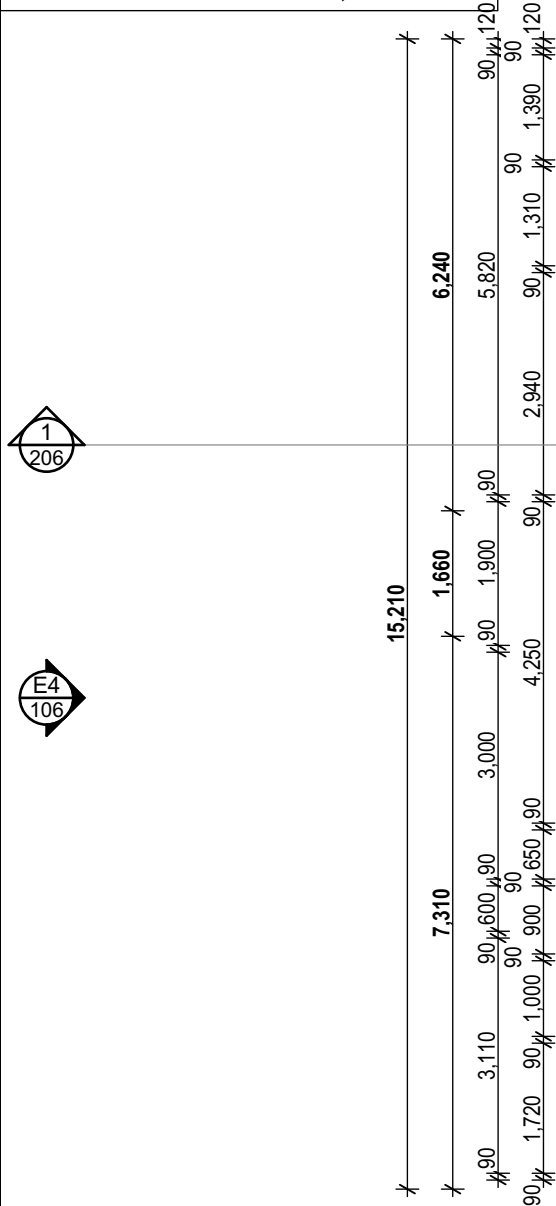
6MM OR MORE - STUDS @ 400CRS & NOGS @ 600CRS



- APPROVED PAINT SYSTEM, E.G. 1 COAT ALKYD SEALER AND 2 COATS WATER BASED ENAMEL



FLOORING
• TILING OVER CONCRETE FLOOR
 FIX TILES WITH APPROVED AND COMPATIBLE TILE
 ADHESIVE OVER TECHNOKOLLA RASOGUM
 WATERPROOFING SYSTEM. ENSURE CONCRETE HAS
 HAD ADEQUATE CURING TIME



FLOORING
• TILING OVER CONCRETE FLOOR
 FIX TILES WITH APPROVED AND COMPATIBLE TILE
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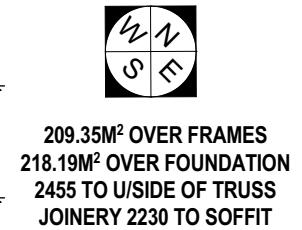
(F) VENT ALL FANS THROUGH SOFFIT
MANROSE EXTRACTOR FAN - REFER LITERATURE FOR MORE DETAILED INFORMATION
MECHANICAL EXTRACT FANS (INCLUDING ASSOCIATED DUCTING) MUST HAVE A FLOWRATE NOT LESS THAN:
A) 25L/S FOR SHOWERS AND BATHS, AND
B) 50L/S FOR COOKTOPS.
IN ACCORDANCE WITH G4/AS1 CLAUSE 1.2.5
LAUNDRY FAN TO HAVE A FLOWRATE NOT LESS THAN 40L/S IN ACCORDANCE WITH TABLE B1, AS1668.2



WALL LEGEND	
	PROPOSED WALL
	PROPOSED WALL WITH THERMAL BREAK

WALL LEGEND	
	PROPOSED WALL
	PROPOSED WALL WITH THERMAL BREAK

WALL LEGEND	
	PROPOSED WALL
	PROPOSED WALL WITH THERMAL BREAK



209.35M² OVER FRAMES
218.19M² OVER FOUNDATION
2455 TO U/SIDE OF TRUSS
JOINERY 2230 TO SOFFIT

NOT FOR CONSTRUCTION



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PROPOSED DWELLING
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Drawing Title

GROUND FLOOR PLAN

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SCALE @ A3.	WIND ZONE	HIGH	Job # 23020
1:100	EXPOSURE ZONE	C	
	EQ ZONE	1	
	SHEET NUMBER	ZONE	
104	Checked	MAKING PLANS	OF: 31 Plot Date 1/05/2024
	Drawn	DRAWN BY NAME	

SCALE @ A3.	WIND ZONE	HIGH	Job # 23020
1:100	EXPOSURE ZONE	C	
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	Drawn	DRAWN BY NAME	

ALUMINIUM JOINERY NOTES:
JOINERY MANUFACTURER TO CHECK AND VERIFY THE FOLLOWING PRIOR TO COMMENCING MANUFACTURE OF JOINERY UNITS.
ALL DIMENSIONS SHOWN ARE ROUGH OPENINGS.
ANY STRUCTURAL SUPPORTS WHERE REQUIRED.
REFER TO ENGINEERS DESIGNS WHERE REQUIRED.

1. ALL JOINERY FAIRVIEW RESIDENTIAL / EVOLUTION SUITE GENERALLY AS REQUIRED FOR OPENING SIZES - UNLESS REQUESTED OTHER BY OWNER
2. ALL FRAMES DOUBLE GLAZED.
3. CONFIRM PANELS / GLAZING FOR FRONT DOOR WITH OWNER.
4. CONFIRM OPAQUE GLAZING WITH OWNER.
5. ALL SAFETY GLAZING SHALL BE SUPPLIED & INSTALLED TO THE REQUIREMENTS OF NZBC B1/AS1 & NZS 4223.3.

GLAZING TO COMPLY WITH THE FOLLOWING STANDARDS

NZS 3504: SPECIFICATION FOR ALUMINIUM WINDOWS
NZS 4223: CODE OF PRACTISE FOR GLAZING IN BUILDINGS
NZS 4211: SPECIFICATION FOR THE PERFORMANCE OF WINDOWS

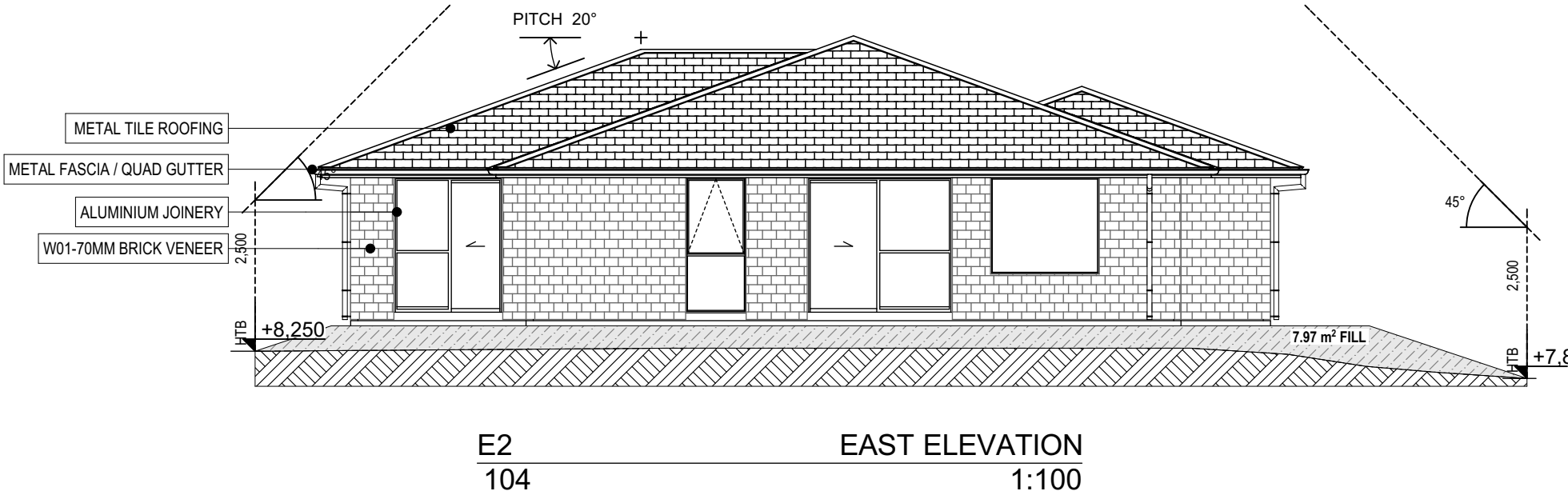
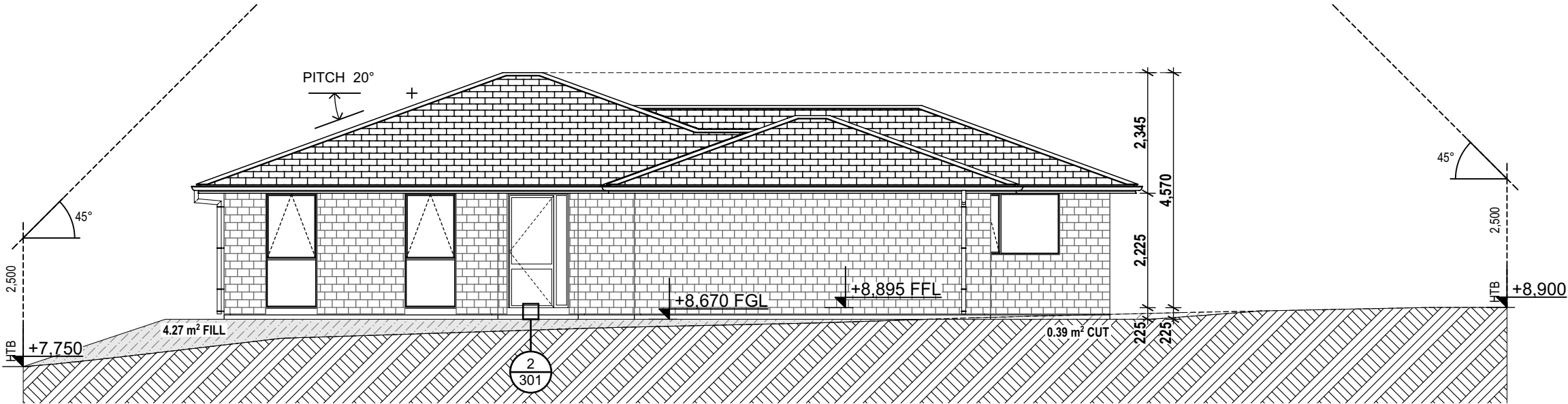
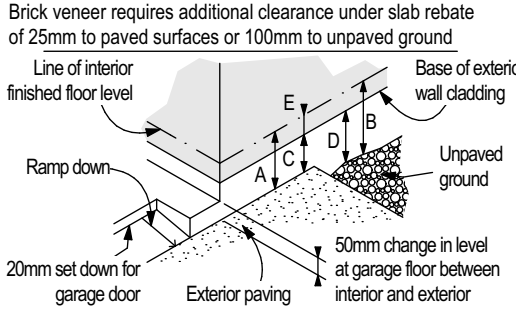
CLEAR FLOAT GLASS, TOUGHENED AS REQUIRED FOR PANE SIZE.
OPAQUE GLASS - ACID TECH OR LAMINATED WITH OBSCURE INTER LAYER.
ALL FIXINGS AND FLASHINGS TO MANUFACTURERS DETAILS AND SPECIFICATIONS.
INSTALL WITH THERMAKRAFT WINDOW WORM AND ALUBAND FLASHING TAPE SYSTEM TO WRAP MANUFACTURERS SPECIFICATIONS AND DETAILS.
FINISHES TO ALL SILL TRAYS AND FLASHINGS TO MATCH JOINERY FRAMES.
ALL HINGES FOR EXTERIOR JOINERY TO BE MARINE GRADE 316 STAINLESS STEEL.
ALL HARDWARE TO OWNERS SPECIFICATION

REFER FLOOR PLANS / ELEVATIONS FOR HANGING ORIENTATIONS.
ALL INTERIOR DOORS TO BE SEMI GLOSS PAINT FINISH.
ALL INTERIOR DOOR HEIGHTS AS SHOWN AND HOLLOW CORE UNLESS SPECIFIED OTHER.
SOLID SLASH ALL EDGES.

BUILDING ENVELOPE RISK MATRIX		
ALL WALLS		
Risk Factor	Risk Severity	Risk Score
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Low risk	0
Roof/wall intersection design	Low risk	0
Eaves width	Medium risk	1
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		3

LEVELS AND CLADDING CLEARENCES TO COMPLY WITH E2/AS1 fig.65 / table 18							
Min. clearance	Masonry Veneer		Other claddings				
	A	B	A	B	C	D	E
CONCRETE SLAB	100	150	150	225	100	175	50
TIMBER FLOOR	refer note		100 175 50				

NOTE: refer to NZS3604 for Req.



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ARCHITECTURAL : DESIGN

47 Forge Road, Silverdale
PO Box 88 Waiwera
Telephone: 09 426 7835
email: admin@makingplans.co.nz

Job Title
PROPOSED DWELLING
At
63 KITEMAUNGA AVE, THE
LANDING
WHANGAREI
For
HOME CONCEPTS

Drawing Title
ELEVATIONS
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SCALE @ A3.	WIND ZONE	HIGH
1:100	EXPOSURE ZONE	C
SHEET NUMBER	EQ ZONE	1
105	ZONE	GRZ
OF: 31	Checked	MAKING PLANS
Plot Date	Drawn	DRAWN BY NAME
1/05/2024		

Job # 23020

ALUMINIUM JOINERY NOTES:
JOINERY MANUFACTURER TO CHECK AND VERIFY THE FOLLOWING PRIOR TO COMMENCING MANUFACTURE OF JOINERY UNITS.
ALL DIMENSIONS SHOWN ARE ROUGH OPENINGS.
ANY STRUCTURAL SUPPORTS WHERE REQUIRED.
REFER TO ENGINEERS DESIGNS WHERE REQUIRED.

1. ALL JOINERY FAIRVIEW RESIDENTIAL / EVOLUTION SUITE GENERALLY AS REQUIRED FOR OPENING SIZES - UNLESS REQUESTED OTHER BY OWNER
2. ALL FRAMES DOUBLE GLAZED.
3. CONFIRM PANELS / GLAZING FOR FRONT DOOR WITH OWNER.
4. CONFIRM OPAQUE GLAZING WITH OWNER.
5. ALL SAFETY GLAZING SHALL BE SUPPLIED & INSTALLED TO THE REQUIREMENTS OF NZBC B1/AS1 & NZS 4223.3.

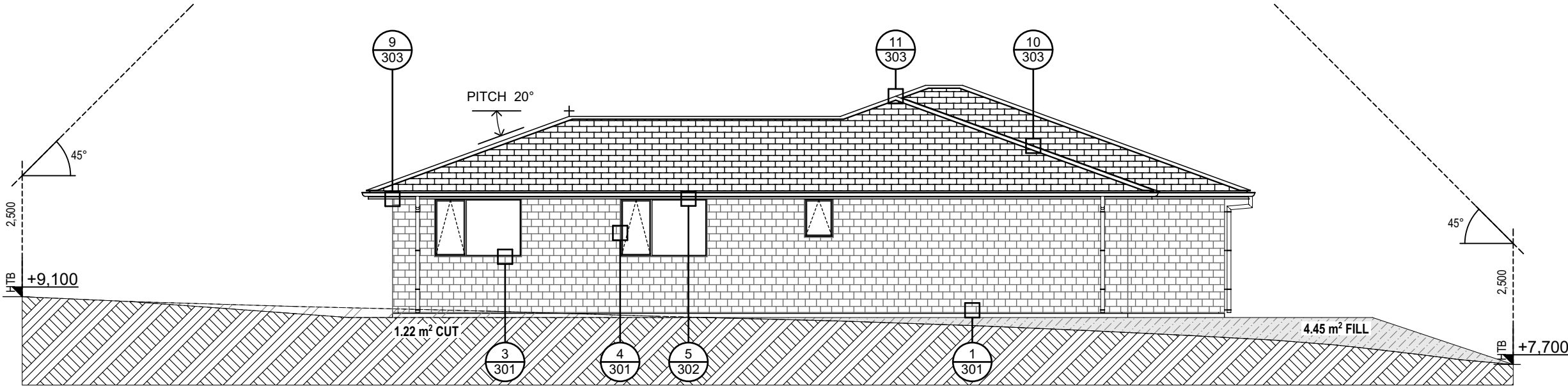
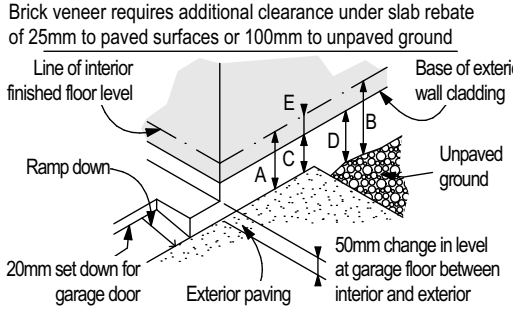
GLAZING TO COMPLY WITH THE FOLLOWING STANDARDS
NZS 3504: SPECIFICATION FOR ALUMINIUM WINDOWS
NZS 4223: CODE OF PRACTISE FOR GLAZING IN BUILDINGS
NZS 4211: SPECIFICATION FOR THE PERFORMANCE OF WINDOWS
CLEAR FLOAT GLASS, TOUGHENED AS REQUIRED FOR PANE SIZE.
OPAQUE GLASS - ACID TECH OR LAMINATED WITH OBSCURE INTER LAYER.
ALL FIXINGS AND FLASHINGS TO MANUFACTURERS DETAILS AND SPECIFICATIONS.
INSTALL WITH THERMAKRAFT WINDOW WORM AND ALUBAND FLASHING TAPE SYSTEM TO WRAP MANUFACTURERS SPECIFICATIONS AND DETAILS.
FINISHES TO ALL SILL TRAYS AND FLASHINGS TO MATCH JOINERY FRAMES.
ALL HINGES FOR EXTERIOR JOINERY TO BE MARINE GRADE 316 STAINLESS STEEL.
ALL HARDWARE TO OWNERS SPECIFICATION

REFER FLOOR PLANS / ELEVATIONS FOR HANGING ORIENTATIONS.
ALL INTERIOR DOORS TO BE SEMI GLOSS PAINT FINISH.
ALL INTERIOR DOOR HEIGHTS AS SHOWN AND HOLLOW CORE UNLESS SPECIFIED OTHER.
SOLID SLASH ALL EDGES.

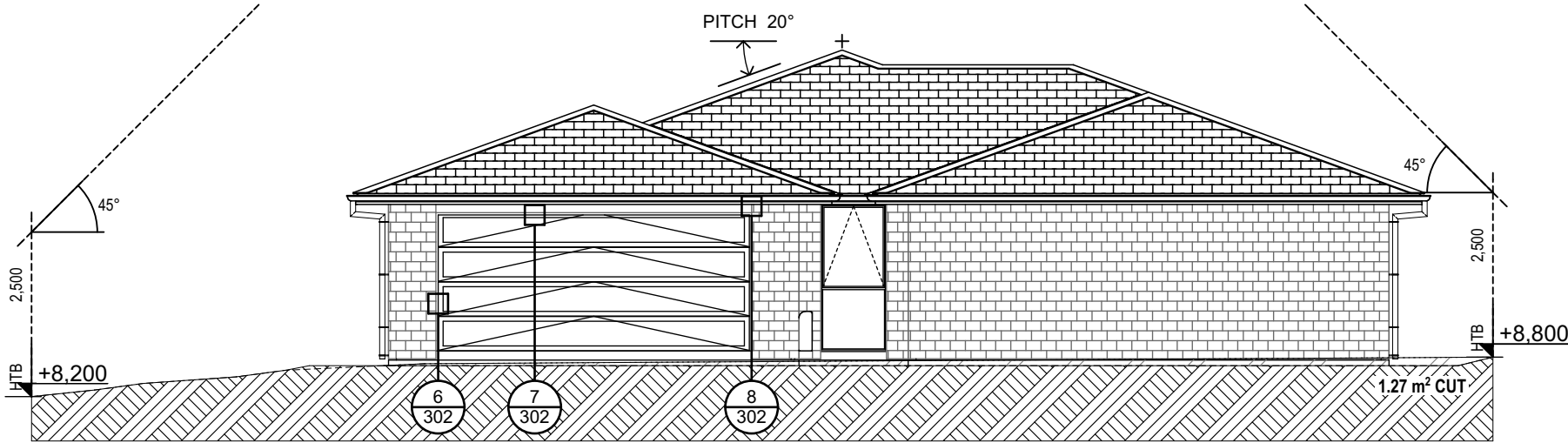
BUILDING ENVELOPE RISK MATRIX		
ALL WALLS		
Risk Factor	Risk Severity	Risk Score
Wind zone (per NZS 3604)	High risk	1
Number of storeys	Low risk	0
Roof/wall intersection design	Low risk	0
Eaves width	Medium risk	1
Envelope complexity	Medium risk	1
Deck design	Low risk	0
Total Risk Score:		3

LEVELS AND CLADDING CLEARENCES TO COMPLY WITH E2/AS1 fig.65 / table 18							
Min. clearance	Masonry Veneer		Other claddings				
	A	B	A	B	C	D	E
CONCRETE SLAB	100	150	150	225	100	175	50
TIMBER FLOOR	refer note				100	175	50

NOTE: refer
to NZS3604
for Req.



E3
104
SOUTH ELEVATION
1:100



E4
104
WEST ELEVATION
1:100

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Drawing Title
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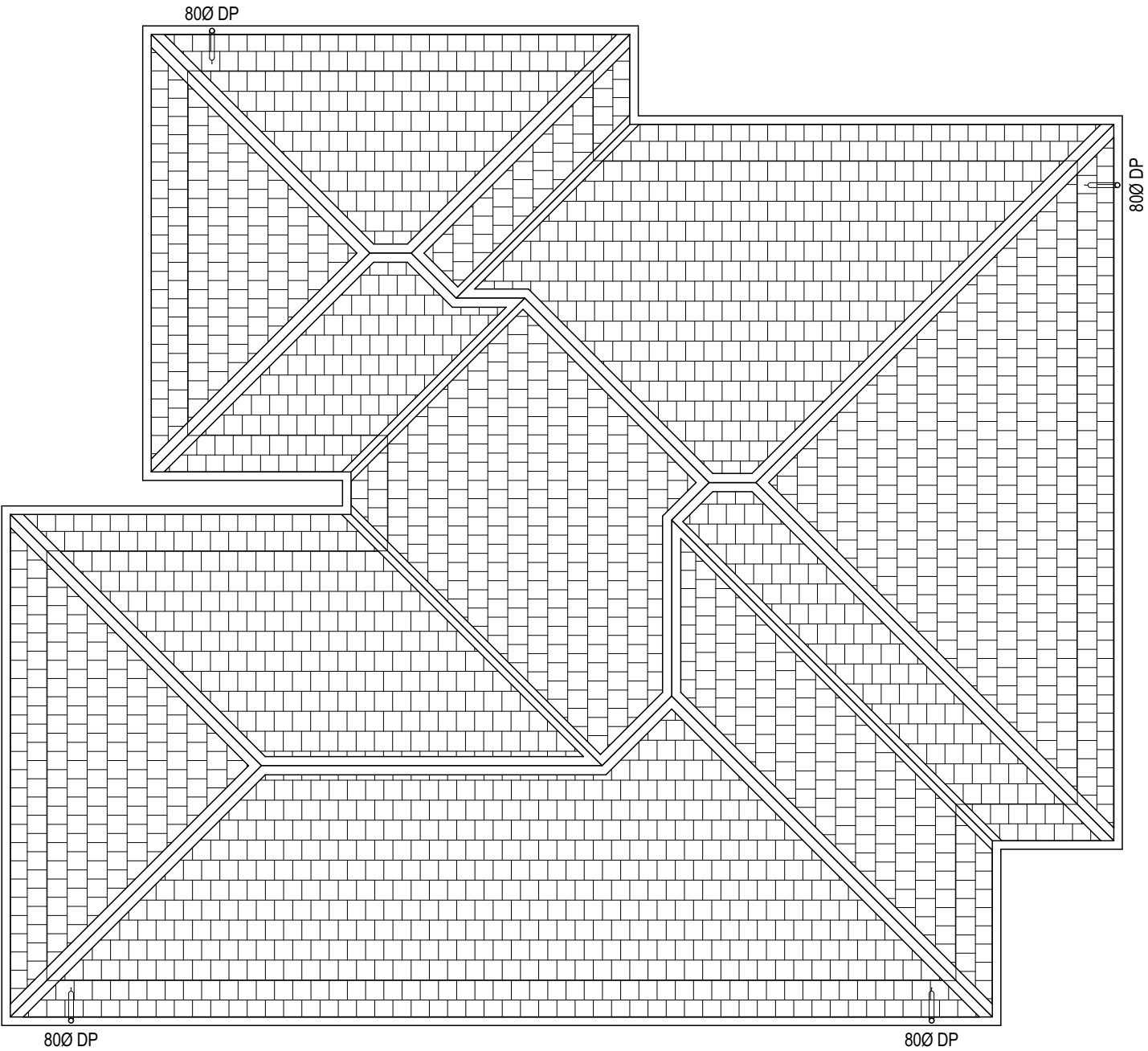
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SCALE @ A3.	WIND ZONE	HIGH
1:100	EXPOSURE ZONE	C
SHEET NUMBER	EQ ZONE	1
106	ZONE	GRZ
OF: 31	Checked	MAKING PLANS
Plot Date	Drawn	DRAWN BY NAME
		1/05/2024

Job # 23020

DOWNPIPE CALCULATIONS:
 PROPOSED ROOF PITCH = 20°
 0° - 25° = 1 80Ø DP/85M²
 25° - 35° = 1 80Ø DP/70M²
 35° - 45° = 1 80Ø DP/60M²
 PROPOSED ROOF AREA = 255.58M²
 REQUIRED # OF DP = 4
 SUPPLIED # OF DP = 4
 COMPLIES

METAL TILE ROOFING
 AREA: 255.58
 20° PITCH



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DURABILITY OF ALL FIXINGS

FIXINGS ARE TO COMPLY WITH NZBC B2 DURABILITY AND
NZS 3604:2011 SECTION 4 - DURABILITY.

ALL ZONES

1. NAIL PLATES IN CLOSED AND ROOF SPACES TO BE CONTINUOUSLY COATED GALV. STEEL.
2. WIRE DOGS & BOLTS IN CLOSED AND ROOF SPACES TO BE HOT-DIPPED GALV. STEEL.
3.ALL OTHER STRUCTURAL FIXINGS IN COLSED ENVIRONMENTS TO BE MILD STEEL (UNCOATED NON- GALV. STEEL).

ZONE D

ALL FIXINGS ARE TO BE TYPE 304 OR 316 STAINLESS STEEL IN EXPOSED AND SHELTERED ENVIRONMENT.

ZONES B AND C

1. ALL FIXINGS WITHIN 600MM OF THE GROUND SHELTERED AND EXPOSED ARE TO BE TYPE 304 OR 316 STAINLESS STEEL.
2. ALL SHELTERED FIXINGS MORE THAN 600MM FROM THE GROUND ARE TO BE HOT-DIP GALV. STEEL.
3. ALL EXPOSED FIXINGS ARE TO BE TYPE 304 OR 316 STAINLESS STEEL.

FS1 - RIB RAFT FLOOR SLAB

90MM (MIN) THICK 25MPA SLAB WITH HURRICANE SE62res MESH, 40MM MIN TOP COVER, ON 1100SQ X 220MM THICK POLYSTYRENE PODS, OVER THERMAKRAFT 250 MICRON DPM. (LAP AND SEAL JOINTS 150MM) OVER MIN 25MM SAND BLINDING OVER COMPACTED HARDFILL.

SLAB TO BE CONSTRUCTED IN ACCORDNACE WITH SPECIFIC ENGINEERING DESIGN

F1 - RAFT FLOOR EDGE BEAM - 300 / INTERNAL RIB - 100
F2 - INTERNAL RIB - 200
F3 - CONTROL JOINT - 200
F4 - LEVEL ENTRY SHOWER

FOUNDATIONS BY ENGINEER

PLEASE REFER ENGINEERS
PLANS & CALCULATIONS

90MM RIB RAFT SLAB 218.19M2

REFER SLAB NOTE - ALL RIBS @
1200CRS UNLESS DIMENSIONED

PLUMBING NOTE

ALL FIXTURE PIPES INTO MIN DN65
(DN100 PREFERRED) BRANCHES
UNDER SLAB. PLUMBER TO CONFIRM
UNDERSLAB WASTE PIPE LOCATIONS
WITH SITE MANAGER BEFORE THE
SLAB IS POURED

PLUMBING LEGEND	
	SS DRAIN
	SW DRAIN
AJ	ACCESS JUNCTION
IP	INSPECTION POINT
FWG	FLOOR WASTE GULLY
GT	GULLY TRAP
TV	TERMINAL VENT
AAV	AIR ADMITTANCE VALVE
CP	CESSPIT
DP	DOWN PIPE
ORG	OVERFLOW RELIEF GULLY
BA	BATH
DW	DISHWASHER
SH	SHOWER
SK	SINK
TU	LAUNDRY TUB
PAN	TOILET
HB	HAND BASIN
HWC	HOT WATER CYLINDER
ST	STACK

This review is limited to the structural design only
as outlined in the calculations and other documentation.
We have not reviewed any drawing dimensions. For any
discrepancies, please contact the undersigned.

Signed

Kevin Burrows (CPEng: 1897#)

GRAYSON DESIGN & DEVELOPMENTS LTD

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Drawing Title

FOUNDATION PLAN

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SCALE @ A3.

1:100

SHEET NUMBER

201

WIND ZONE

EXPOSURE ZONE

EQ ZONE

ZONE

Checked

Drawn

HIGH

C

1

GRZ

MAKING PLANS

DRAWN BY NAME

OF: 31 Plot Date

1/05/2024

Job # 23020

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WALL FRAMING - HIGH WIND ZONE

ADAPTED FROM NZS 3604:2011 TABLE 8.2 & 8.3

LOAD BEARING SINGLE STOREY WALLS:

2400 MAX HEIGHT - USE 90 X 45 SG8 STUDS @ 600CRS, NOGS @ 800CRS.

NON LOAD BEARING INTERNAL WALLS

2400 MAX HEIGHT - USE 90 X 45 SG8 H1.2 STUDS @ 600CRS, NOGS @ 800CRS.

TILED INTERNAL WALLS

90 X 45 H1.2 SG8 STUDS @ 400CRS & NOGS @ 600CRS.

BUILT UP MEMBERS ARE TO BE NAILED TO COMPLY WITH NZS 3604:2011, CLAUSE 2.4.4.7

LINTELS / BEAMS

ALL LINTEL AND BEAM DIMENSIONS SHOWN ARE OPEN SPANS ONLY. ALLOW EXTRA LENGTH FOR TRIMMING STUD REQUIREMENTS. REFER NZS 3604:2011 - CLAUSE 8.5 / TABLE 8.5 FOR TRIMMING STUDS

LINTEL FIXING

FIXING REQUIREMENTS SHOWN ON PLAN. REFER DETAILS.

TOP PLATE FIXING

TYPE B OR BOWMAC STUD-LOK FIXING - ALL REQUIRED WALLS

REFER MITEK ON SITE GUIDE 2018 FOR LINTEL FIXING AND TOP PLATE FIXING DETAILS

WALL FRAMING NOTE

SOME WALL FRAMING & NOGS MAY NEED TO BE ADDED OR ALTERED ON SITE, CONFIRM WITH PROJECT MANAGER.

NOTE

ALL BOLTS SHALL HAVE 50SQ X 3MM WASHERS TO TIMBER FACES

WESTMORELAND HOMES LTD TO CONFIRM ALL JOINERY OPENING POSITIONS WITH PRECUT DESIGN PRIOR TO FABRICATIONS

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LICENSED BUILDING PRACTITIONER

www.dhb.govt.nz

BUILDING CONFIDENCE

MAKING PLANS LTD

ARCHITECTURAL : DESIGN

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WALL FRAMING / LINTEL PLAN

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SCALE @ A3.

1:100

SHEET NUMBER

202

OF: 31

Plot Date

1/05/2024

WIND ZONE

EXPOSURE ZONE

EQ ZONE

ZONE

Checked

Drawn

MAKING PLANS

DRAWN BY NAME

1

GRZ

1/05/2024

Job # 23020

ALL WALL BRACES TO STUD WALLS ARE TO BE GIB 10MM BRACES INSTALLED IN ACCORDANCE WITH THE GIB EZYBRACE MANUAL 2016. REFER LITERATURE PROVIDED



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	Drawing Title
--	---------------

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203

OF: 31 Plot Date

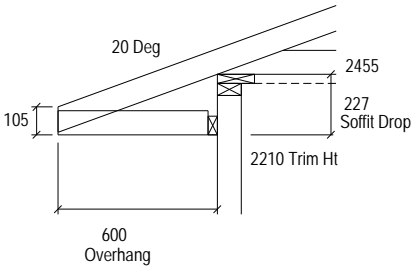
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EXPOSURE ZONE	C
EQ ZONE	1
ZONE	GRZ
Checked	MAKING PLANS
Drawn	DRAWN BY NAME

Job # 23020

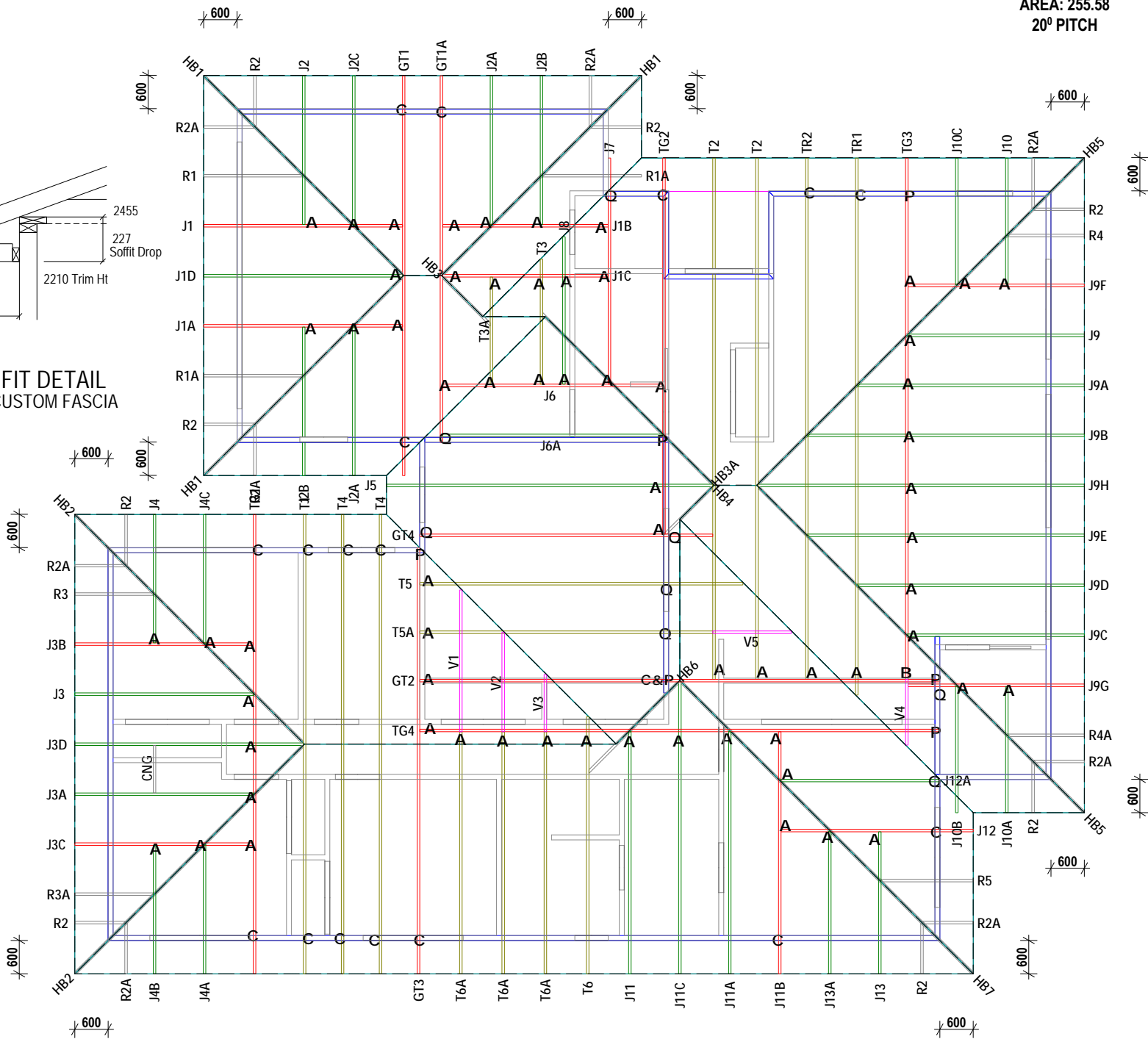
METAL TILE BATTENS
50 X 40 SG8 H3.2 BATTENS WITH CRS TO SUIT TILES
TYPE S (0.8KN) 2/90 X 3.15 GUN NAILS (UP TO VERY HIGH)
TYPE T (2.4KN) 1/10G SELF-DRILLING SCREW, 80MM LONG (EXTRA HIGH)

PURLIN REQUIREMENTS
70 X 45 SG8 H1.2 PURLINS @ MAX 900C
TYPE T (2.4KN)
1/10G SELF-DRILLING SCREW, 80MM LONG (UP TO VERY HIGH)
TYPE U (5.5KN)
1/14G SELF-DRILLING TYPE 17 SCREW, 100MM LONG (EXTRA HIGH)

ROOF BRACING - LIGHT HIP/GABLE ROOF
1 ROOF PLANE DIAGONAL BRACE PER 50M² (RPDB)
1 BRACE = 1 PAIR OF LUMBERLOCK STRIP BRACES
FIXED TO MANUFACTURERS SPECS OR 1 HIP / VALLEY RAFTER



SOFFIT DETAIL
150 CUSTOM FASCIA



METAL TILE ROOFING
AREA: 255.58
20° PITCH

CARTERS

32 Commerce St
Whangarei
Ph (09) 430 7714
Fax (09) 430 7720

JOB No 407240C1
Client: Westmoreland Homes
Job Name: Home Concepts
Address: 63 Kitemaunga Ave
Whangarei

Pitch: 20
Roof Material: Metal Tiles
Soffit Overhang: 600
Wind Area: High
Ceiling: Gib
B/chord restraints: 600crs
Drawn by: Steve Tacon
Date : 22/03/24

Trusses And Rrafters At 900 Centres
Unless Stated Otherwise.
This layout is to be read in conjunction
with the Architectural plans.

PAGE 1 of 2

FIXINGS Truss Fixing read in conjunction
with truss hardware site pack
supplied with trusses for fixing

A=47x90 JH
B=47x120 JH
C=CT200
D=47x190 JH
E=95x165 JH
S=Strut brace
G=SH-140 Split Hanger
H=SH-180 Split Hanger
K=SH-220 Split Hanger
L=6kn Strap
M=Multigrip
N=Nail On Plate
J=CPC 80
T=CPC 40 Short {Pair}
Q=9kn Pack
P=16kn
X=24kn uplift

All other truss fixings not indicated as
above must have two wire dogs

NOTE

Please contact your local CARTERS
Manufacturing Branch for any queries
regarding this layout or if any on site remedial
work is required.

No modifications to Roof Trusses or Wall Frames
are to be undertaken without first obtaining
written authority from CARTERS Manufacturing.



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Drawing Title

ROOF FRAMING PLAN

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SCALE @ A3.

1:100

SHEET NUMBER

204

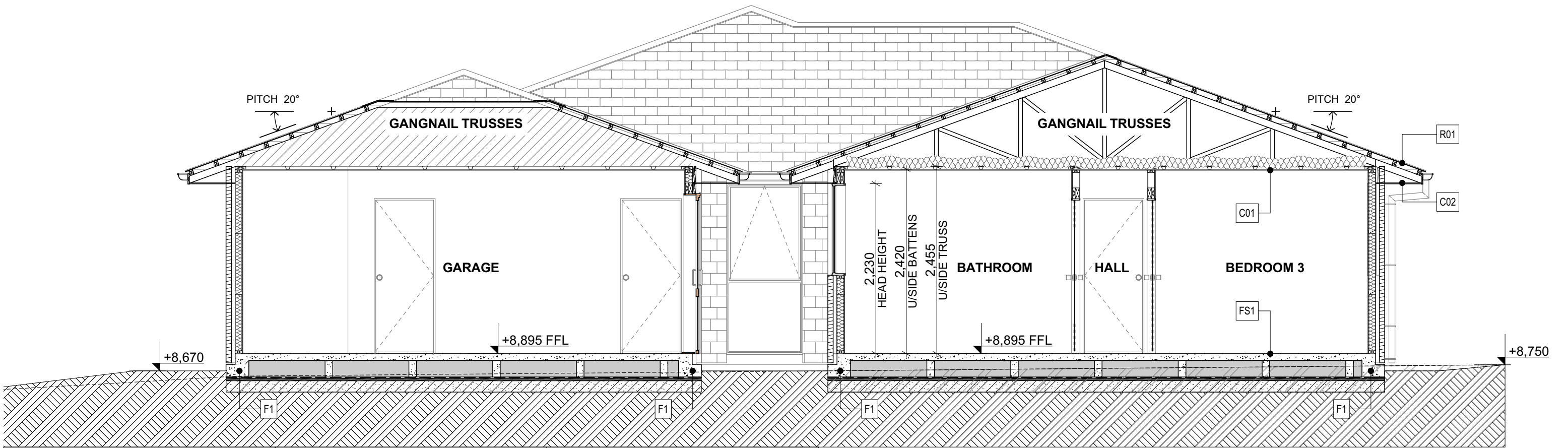
WIND ZONE HIGH
EXPOSURE ZONE C
EQ ZONE 1
ZONE GRZ
Checked MAKING PLANS
Drawn DRAWN BY NAME

OF: 31 Plot Date

1/05/2024

Job # 23020

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TIMBER TREATMENT LEVELS:
TREATMENT LEVELS TO COMPLY WITH NZBC CLAUSE B2/AS1 DURABILITY, NZS3602. TIMBER AND WOOD BASED PRODUCTS FOR USE IN BUILDING AND NZS3640 CHEMICAL PRESERVATION OF ROUND AND SAWN TIMBER. THIS TABLE IS A SUMMARY OF THE MINIMUM TREATMENT LEVEL REQUIREMENTS ONLY. HIGHER LEVELS MAY BE USED IN ANY SITUATION.

ALL WALL FRAMING AND ASSOCIATED MEMBERS - H1.2
ROOF FRAMING, TRUSSES AND CEILING JOISTS
ENCLOSED FRAMING WITHIN SKILLION / FLAT ROOFS
SUBFLOOR FRAMING / INTERIOR FLOOR FRAMING
PARAPET FRAMING
FRAMING FOR ENCLOSED DECKS, BALCONIES AND BALUSTRADES - NOT CANTILEVERED
ENCLOSED POST AND BEAM OR WALL TRIMMING STUDS AND LINTELS UNDER ENCLOSED DECKS.

CLADDING CAVITY BATTENS - H3.1
EXPOSED DECKING / FRAMING AND EXTERNAL POST, BEAM AND BALUSTRADE - H3.2
FRAMING FOR ENCLOSED DECKS, BALCONIES AND ASSOCIATED MEMBERS - CANTILEVERED

PILES AND POSTS IN GROUND - H5

FLASHING AND WRAP SYSTEMS
ALL FLASHINGS, FLASHING TAPES, WRAPS, UNDERLAYS AND ASSOCIATED ACCESSORIES ARE TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND AS PER DETAILS PROVIDED. NO SUBSTITUTIONS ARE PERMITTED WITHOUT PRIOR APPROVAL. IF SUBSTITUTIONS ARE MADE WITHOUT APPROVAL IT IS AT THE INSTALLERS RISK AND RESPONSIBILITY. INSTALLER ON SITE IS TO CHECK COMPATIBILITY OF ALL PRODUCTS.

FLOORS
FS1
90MM RIBRAFT SLAB. REFER FOUNDATION PLAN.

WALLS
W01
70MM BRICK VENEER ON 50MM VENTED CAVITY OVER BUILDING PAPER ON H1.2 SG8 STUDS. 10MM ELEPHANT BOARD STOPPED TO LEVEL 4. WALL BATTS.

ROOFS
R01
COLORTILE ROOFING ON 50 X 40 H3.2 BATTENS @ CRS TO SUIT TILES ON THERMAKRAFT ROOFING UNDERLAY ON 90MM H1.2 GANGNAIL TRUSSES AT 900CRS

CEILINGS
C01
10MM ELEPHANT BOARD FIXED TO UNDERSIDE OF GIB RONDO METAL BATTEN SYSTEMS @ 600CCRS MAX. STOPPED TO LEVEL 4. CEILING BATTS OVER BATTENS.

C02
5MM HARDIESOFFIT LINING TO UNDERSIDE 70 X 45 H1.2 SG8 SOFFIT BATTENS @ 600CCRS MAX

INSULATION REQUIREMENTS FOR NON-SOLID TIMBER WALL CONSTRUCTION
NZBC H1 2008 - CALCULATION METHOD.
R-VALUES SHOWN ARE PRODUCT R VALUES FOR CONSTRUCTION PURPOSES

1.0 ROOF.
1.1 COLORTILE ROOFING WITH UNDERLAY ON 90MM TRUSSES, R5.2 ECOINSULATION - R5.51
1.2 (500MM PERIMETER) COLORTILE ROOFING WITH UNDERLAY ON 90MM TRUSSES, R3.6 ECOINSULATION - R3.91

2.0 EXTERNAL WALLS.
2.1 70MM BRICK ON CAVITY, BUILDING PAPER, 90MM TIMBER, R2.3 ECOINSULATION - R2.06
3.1 RIBRAFT - R1.6

4.0 GLAZING.
4.1 ALUMINIUM JOINERY.
DOUBLE GLAZING TO ALL JOINERY - R0.46

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Drawing Title
SECTION A

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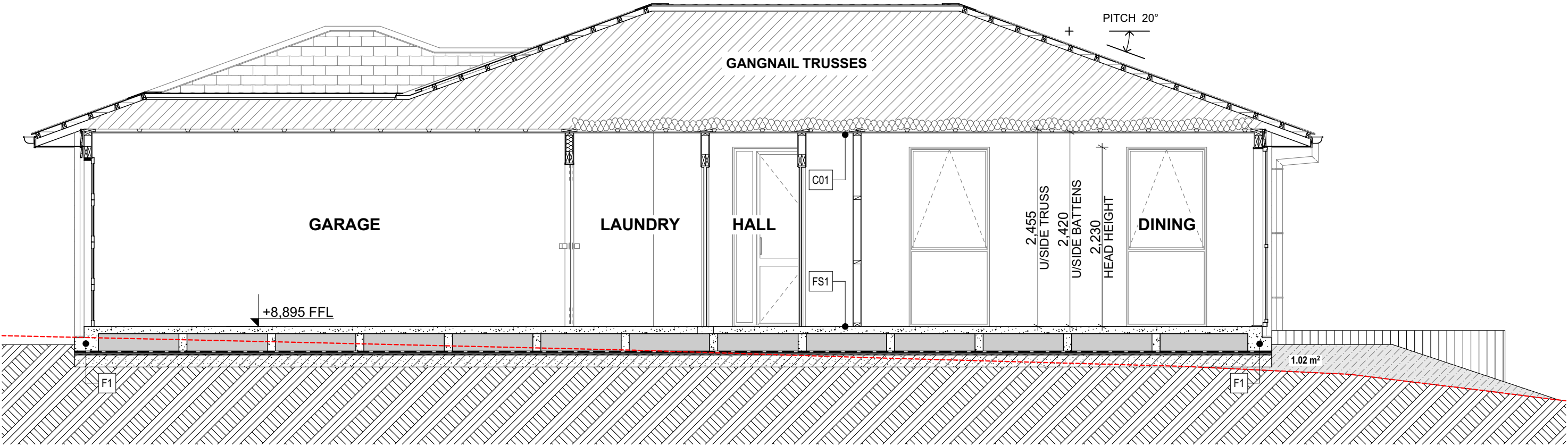
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SHEET NUMBER
205

OF: 31 Plot Date 1/05/2024

WIND ZONE	HIGH
EXPOSURE ZONE	C
EQ ZONE	1
ZONE	GRZ
Checked	MAKING PLANS
Drawn	DRAWN BY NAME

Job # 23020



TIMBER TREATMENT LEVELS:

TREATMENT LEVELS TO COMPLY WITH NZBC CLAUSE B2/AS1 DURABILITY, NZS3602. TIMBER AND WOOD BASED PRODUCTS FOR USE IN BUILDING AND NZS3640 CHEMICAL PRESERVATION OF ROUND AND SAWN TIMBER. THIS TABLE IS A SUMMARY OF THE MINIMUM TREATMENT LEVEL REQUIREMENTS ONLY. HIGHER LEVELS MAY BE USED IN ANY SITUATION.

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ROOF FRAMING, TRUSSES AND CEILING JOISTS
ENCLOSED FRAMING WITHIN SKILLION / FLAT ROOFS
SUBFLOOR FRAMING / INTERIOR FLOOR FRAMING
PARAPET FRAMING

FRAMING FOR ENCLOSED DECKS, BALCONIES AND BALUSTRADES - NOT CANTILEVERED
ENCLOSED POST AND BEAM OR WALL TRIMMING
STUDS AND LINTELS UNDER ENCLOSED DECKS.

CLADDING CAVITY BATTENS - H3.1

EXPOSED DECKING / FRAMING AND EXTERNAL POST, BEAM AND BALUSTRADE
FRAMING FOR ENCLOSED DECKS, BALCONIES AND ASSOCIATED MEMBERS - CANTILEVERED

PILES AND POSTS IN GROUND - H5

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FLOORS

FS1
90MM RIBRAFT SLAB. REFER FOUNDATION PLAN.

WALLS

W01
70MM BRICK VENEER ON 50MM VENTED CAVITY OVER BUILDING PAPER ON H1.2 SG8 STUDS. 10MM ELEPHANT BOARD STOPPED TO LEVEL 4. WALL BATTS.

ROOFS

R01
COLORTILE ROOFING ON 50 X 40 H3.2 BATTENS @ CRS TO SUIT TILES ON THERMAKRAFT ROOFING UNDERLAY ON 90MM H1.2 GANGNAIL TRUSSES AT 900CRS

CEILINGS

C01
10MM ELEPHANT BOARD FIXED TO UNDERSIDE OF GIB RONDO METAL BATTEN SYSTEMS @ 600CCRS MAX. STOPPED TO LEVEL 4. CEILING BATTS OVER BATTENS.

C02
5MM HARDIESOFFIT LINING TO UNDERSIDE 70 X 45 H1.2 SG8 SOFFIT BATTENS @ 600CRS MAX

INSULATION REQUIREMENTS FOR NON-SOLID TIMBER

WALL CONSTRUCTION

NZBC H1 2008 - CALCULATION METHOD.
R-VALUES SHOWN ARE PRODUCT R VALUES FOR CONSTRUCTION PURPOSES

1.0 ROOF.

1.1 COLORTILE ROOFING WITH UNDERLAY ON 90MM TRUSSES, R5.2 ECOINSULATION - R5.51
1.2 (500MM PERIMETER) COLORTILE ROOFING WITH UNDERLAY ON 90MM TRUSSES, R3.6 ECOINSULATION - R3.91

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3.1 RIBRAFT - R1.6

4.0 GLAZING.

4.1 ALUMINIUM JOINERY.
DOUBLE GLAZING TO ALL JOINERY - R0.46

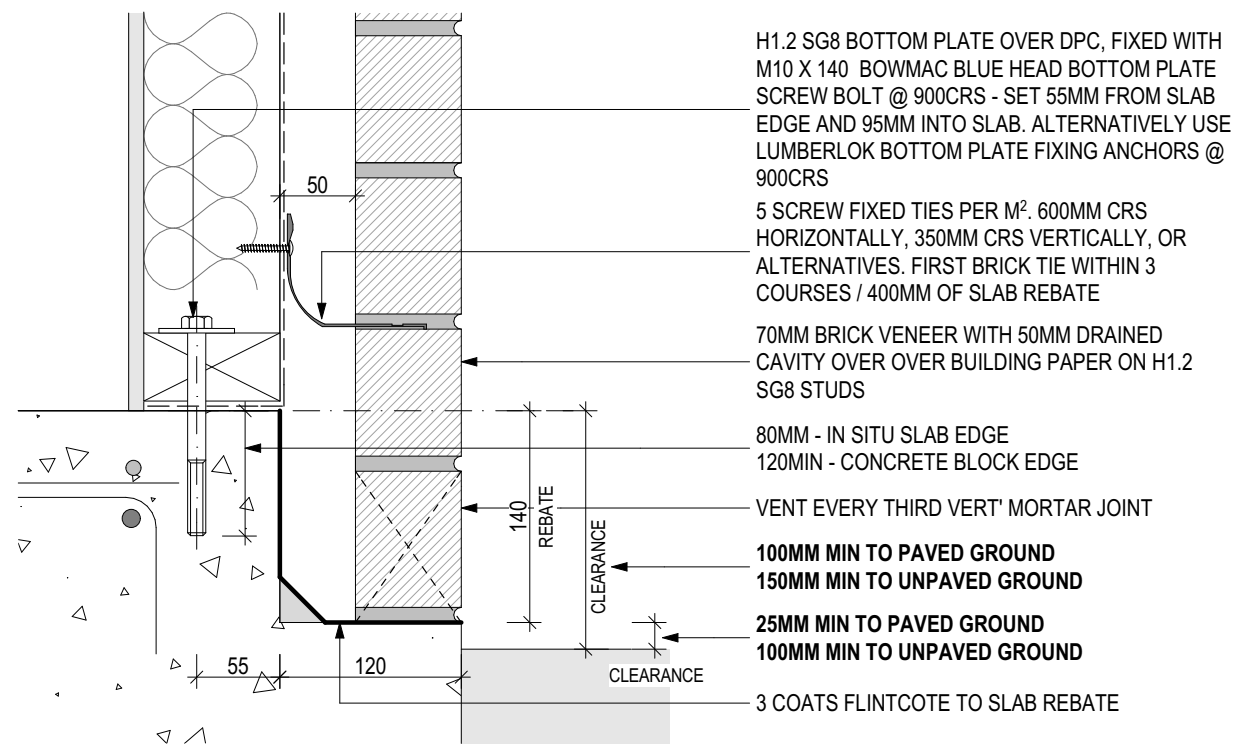


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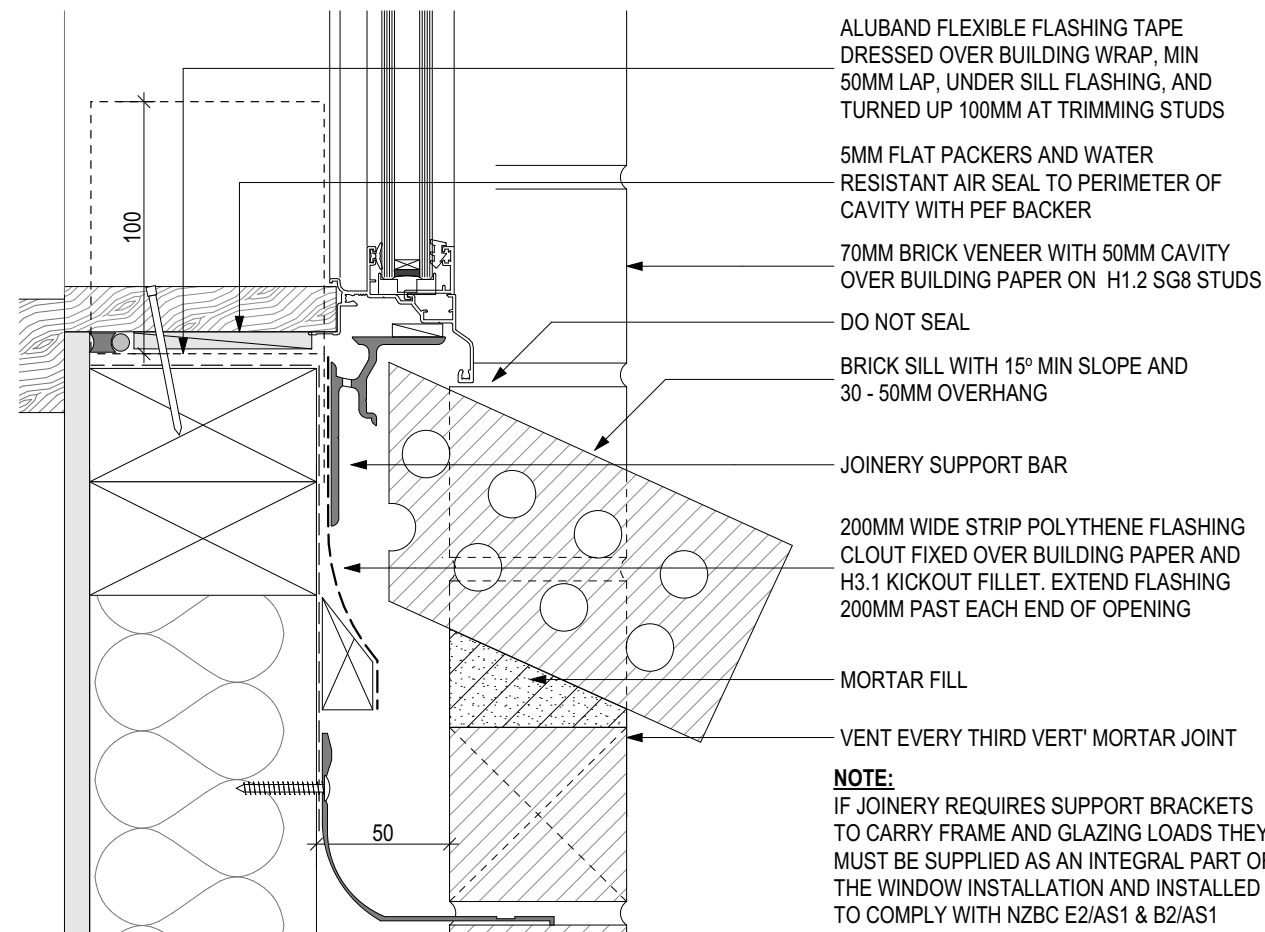
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Drawing Title
SECTION B
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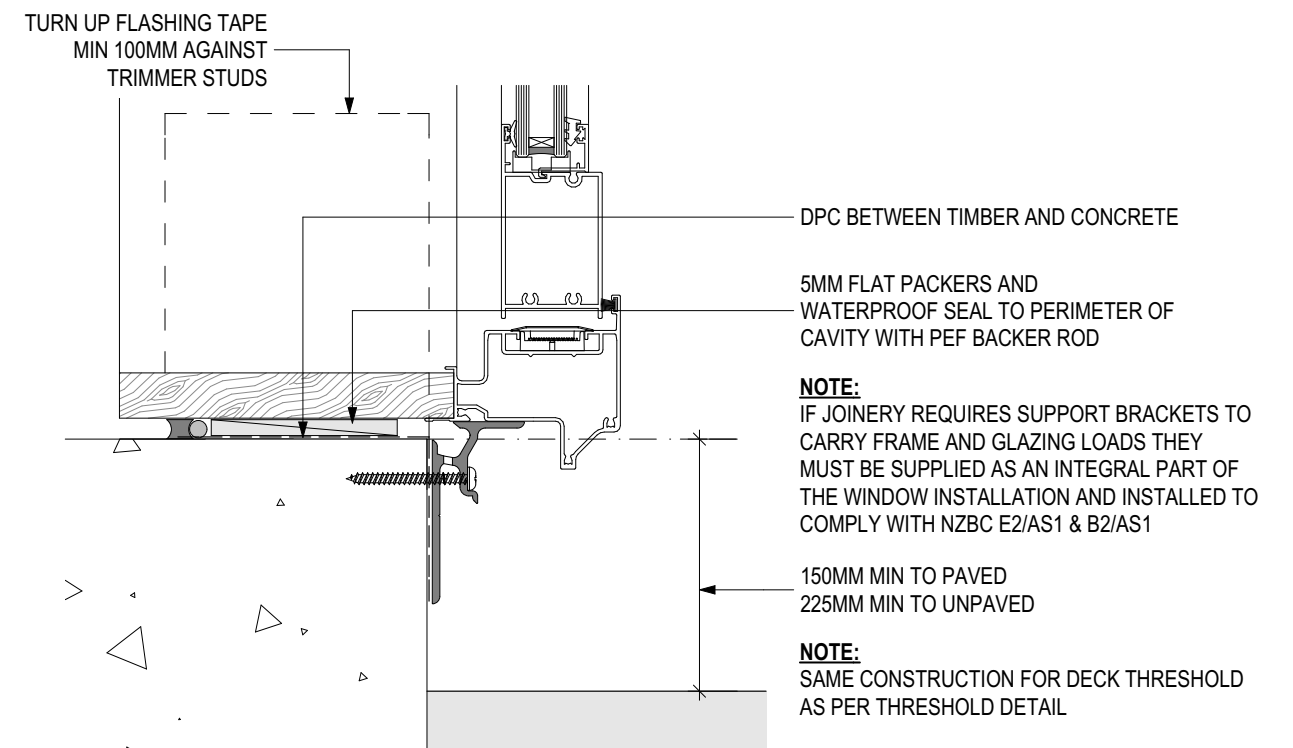
SCALE @ A3.	WIND ZONE	HIGH	Job # 23020
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SHEET NUMBER	EQ ZONE	1	
206	ZONE	GRZ	
OF: 31	Checked	MAKING PLANS	
Plot Date	Drawn	DRAWN BY NAME	
		1/05/2024	



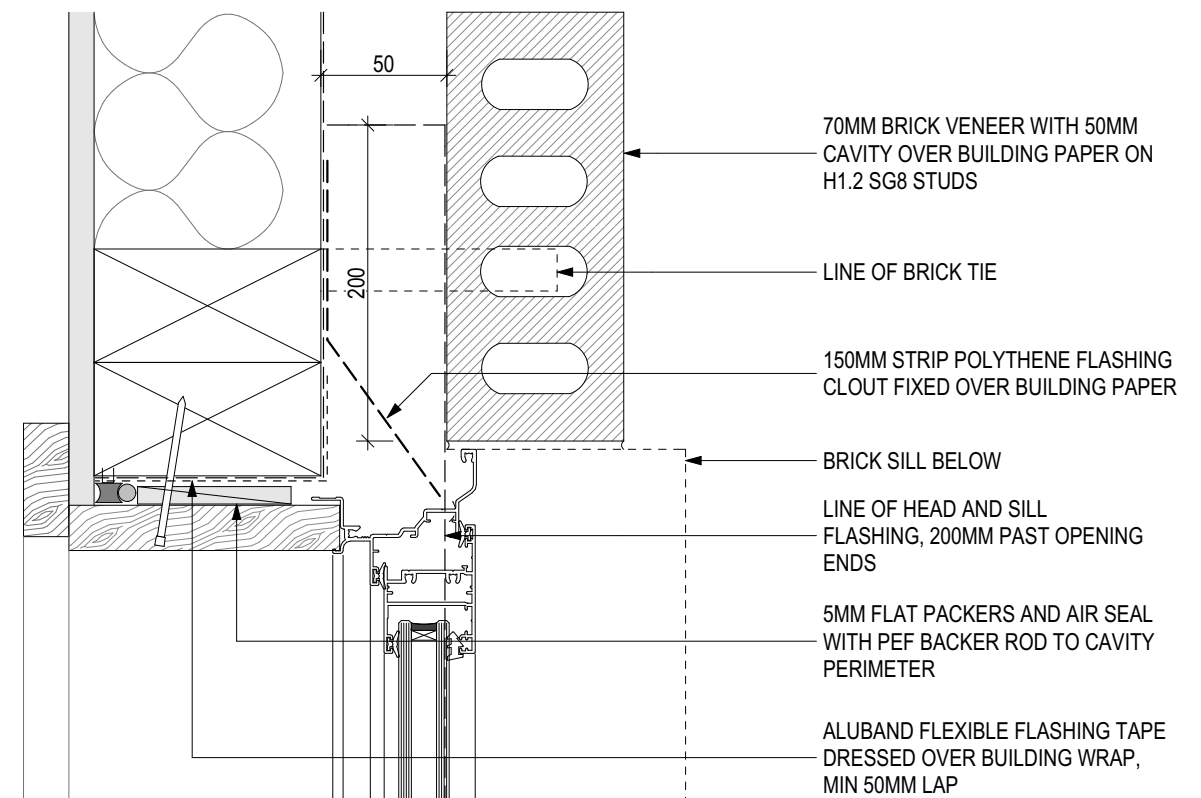
1 WALL BASE 1:3
106



3 WINDOW SILL 1:3
106

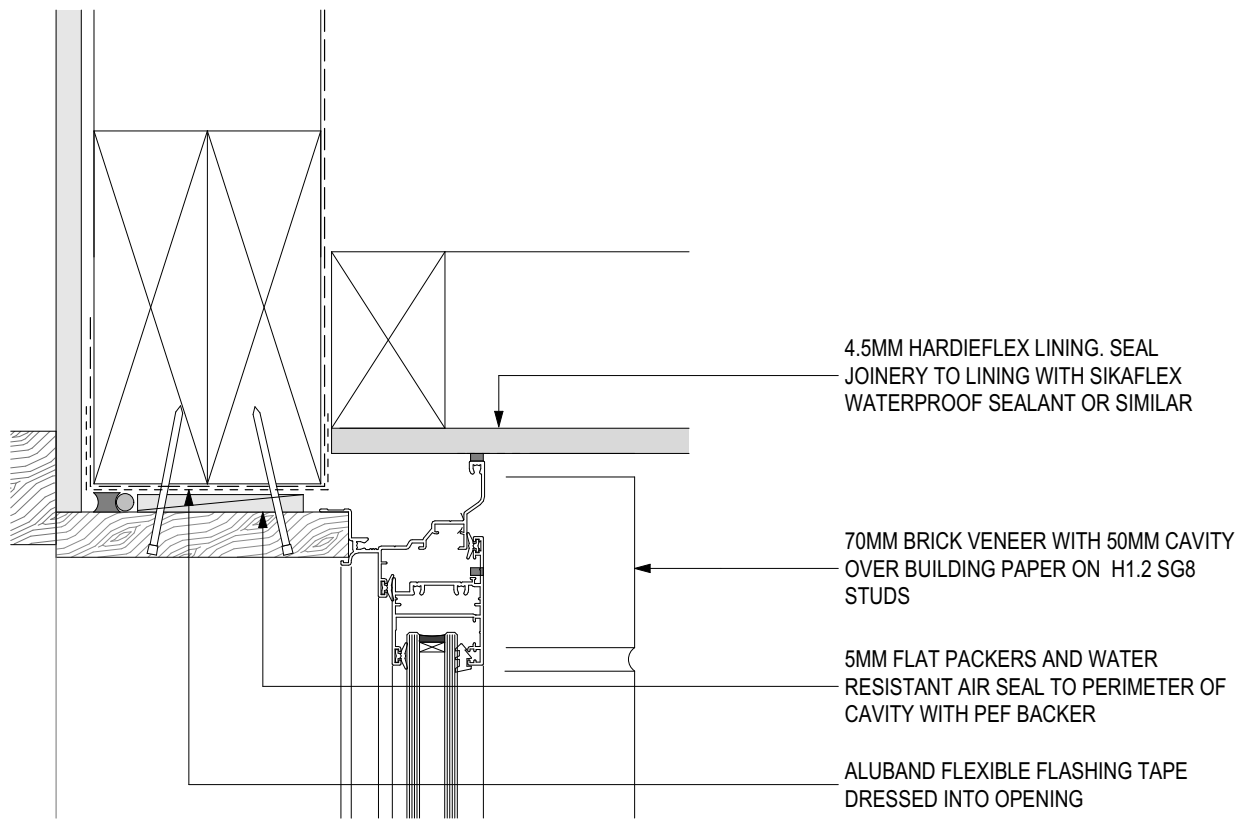


2 DOOR SILL - OPEN IN 1:3
105



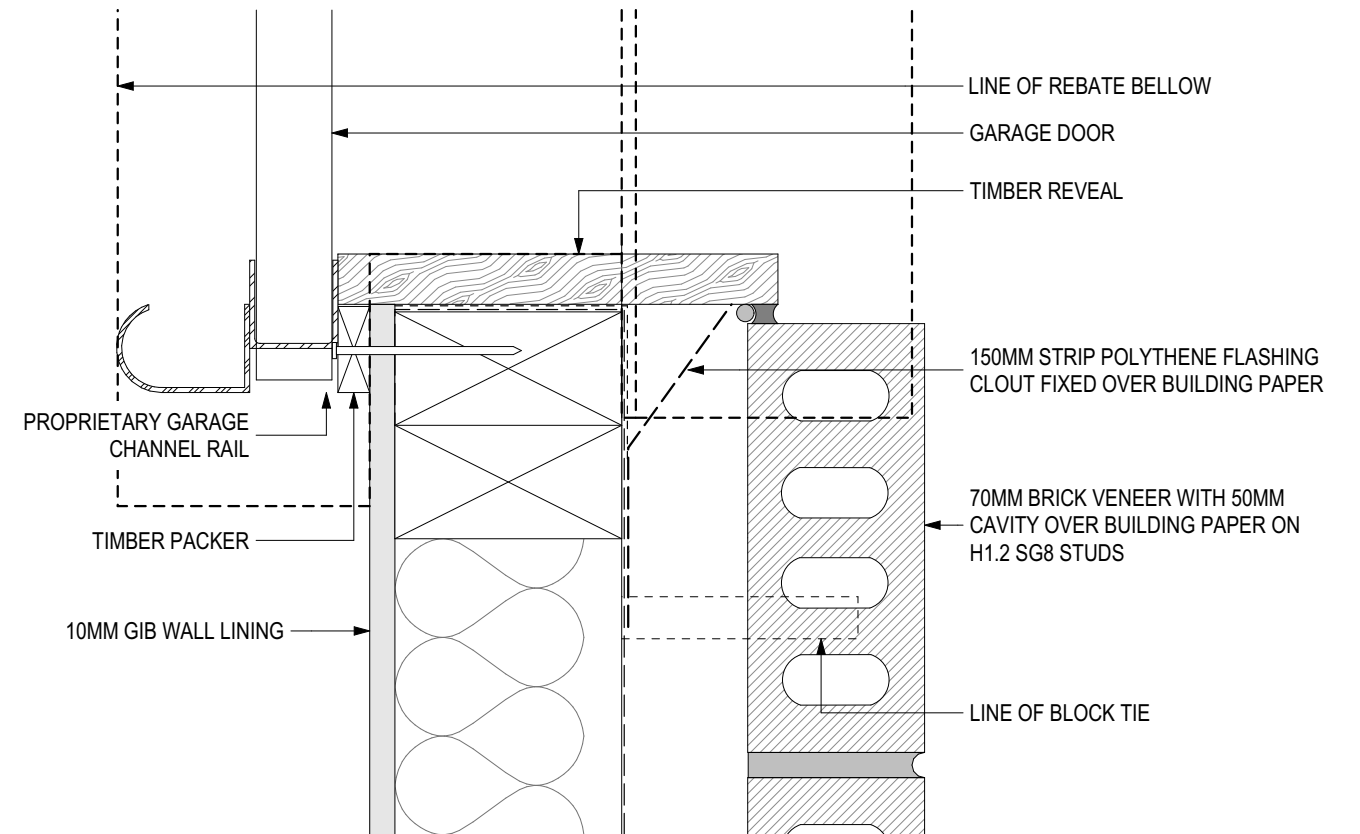
4 WINDOW JAMB 1:3
106

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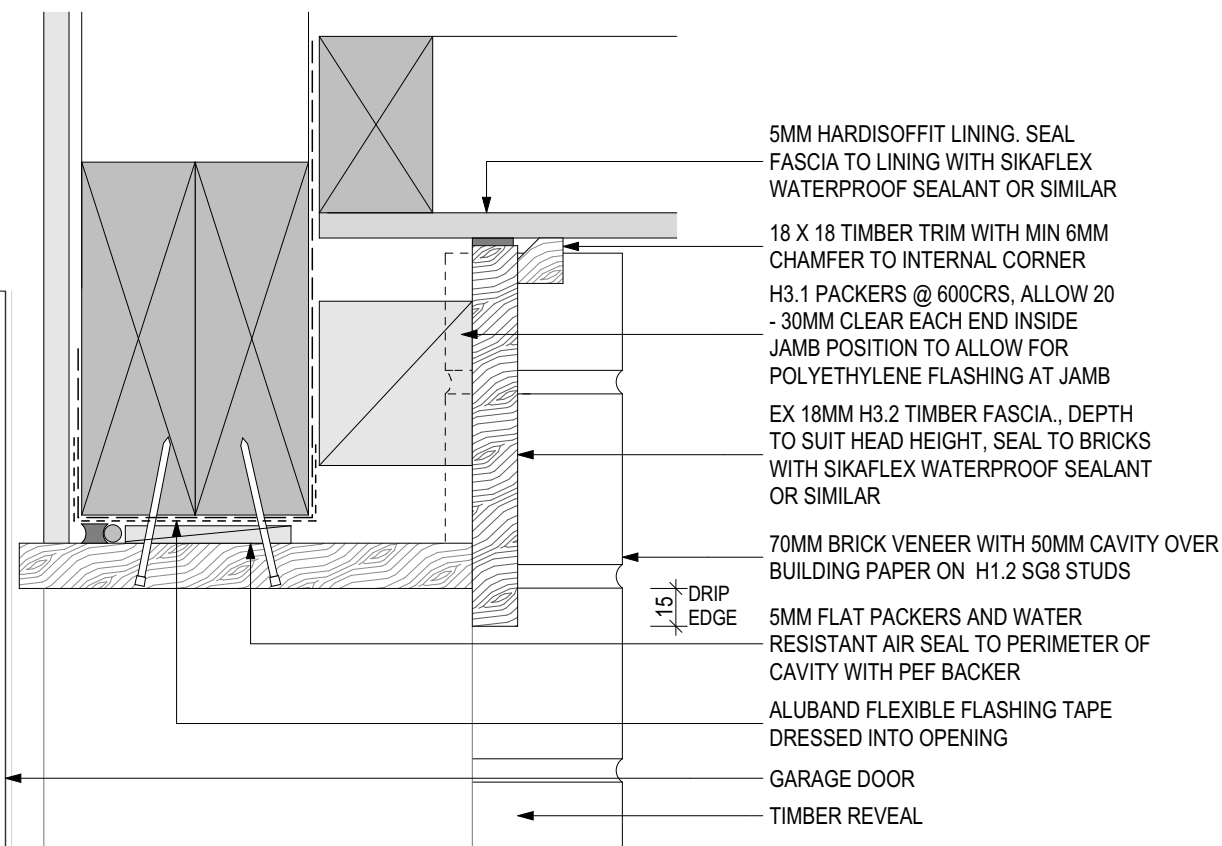
5 WINDOW HEAD TO SOFFIT

1:3



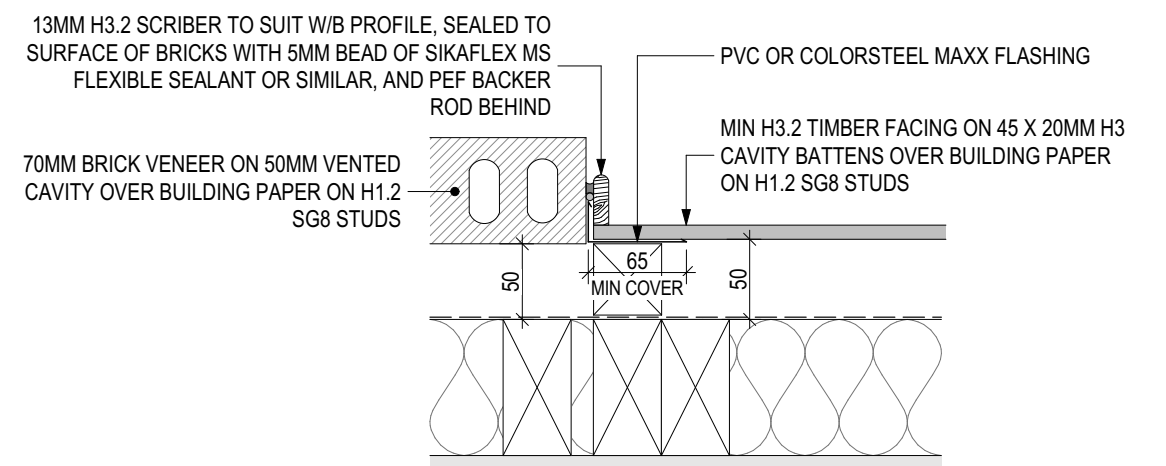
6 GARAGE DOOR JAMB

1:3



7 GARAGE DOOR HEAD - TIMBER FACING

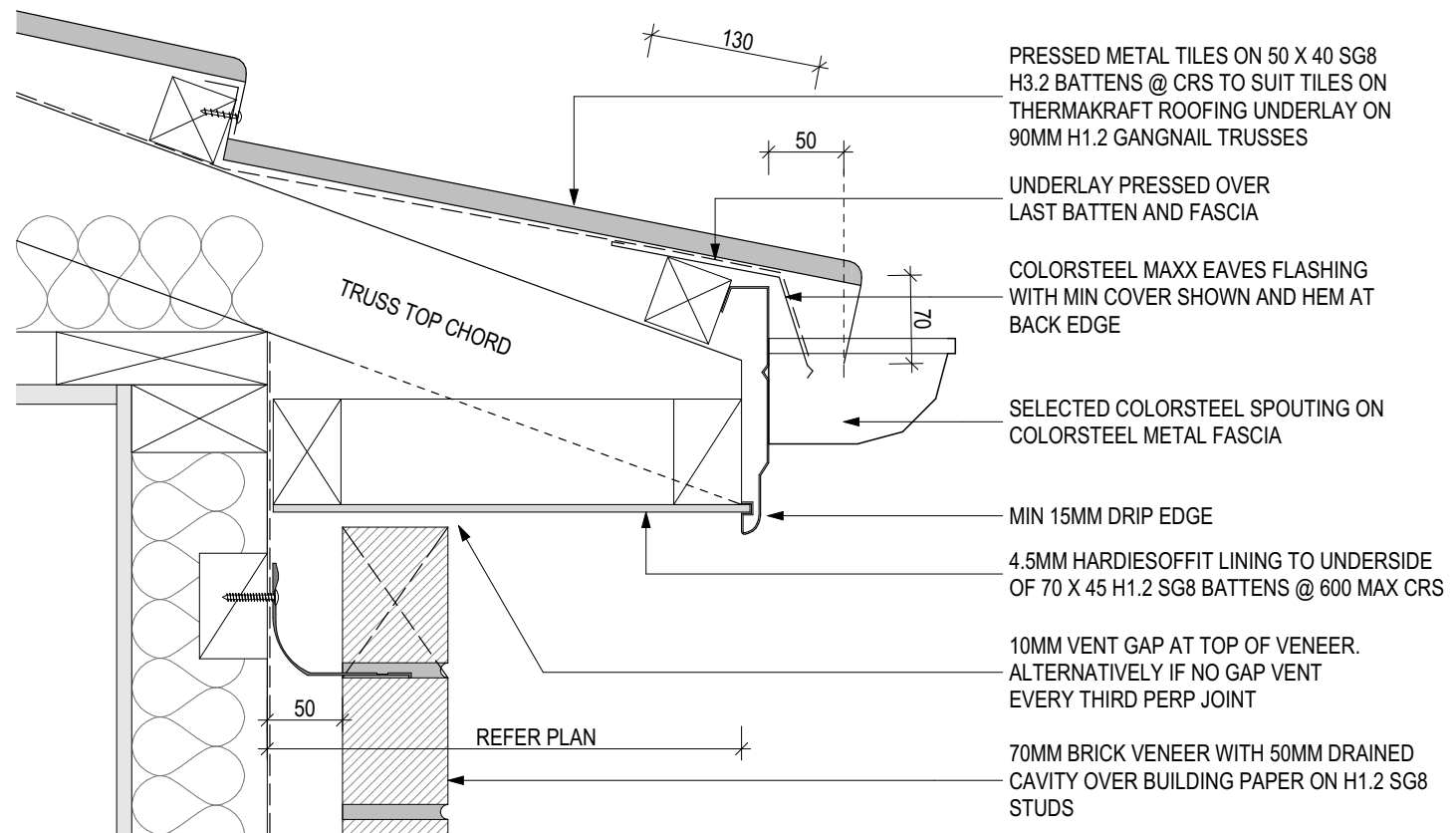
1:3



8 BUTT JOIN - BRICK TO TIMBER FACING

1:5

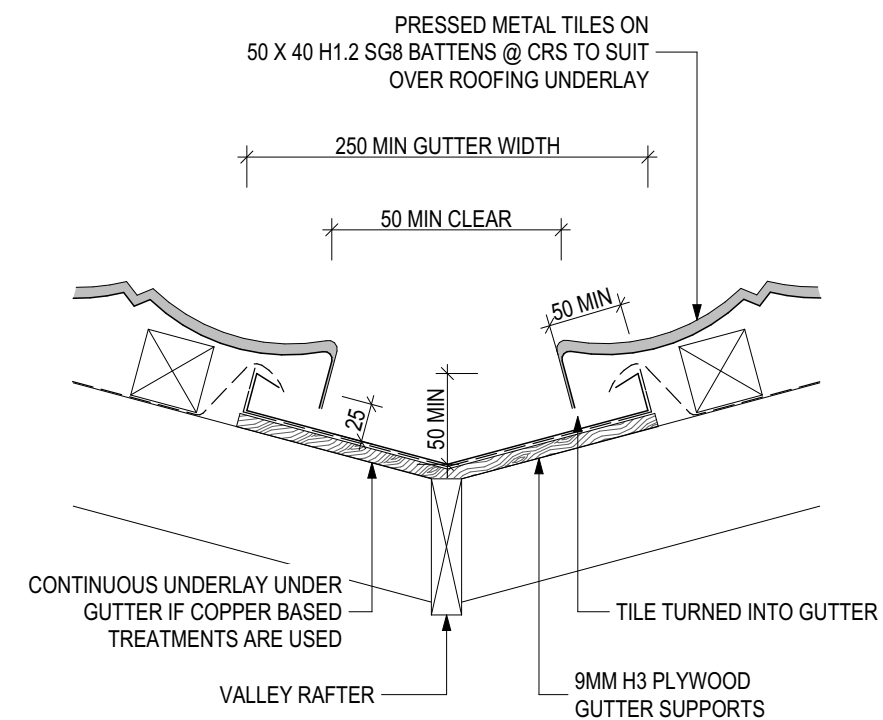
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106

EAVE / SOFFIT - BRICK

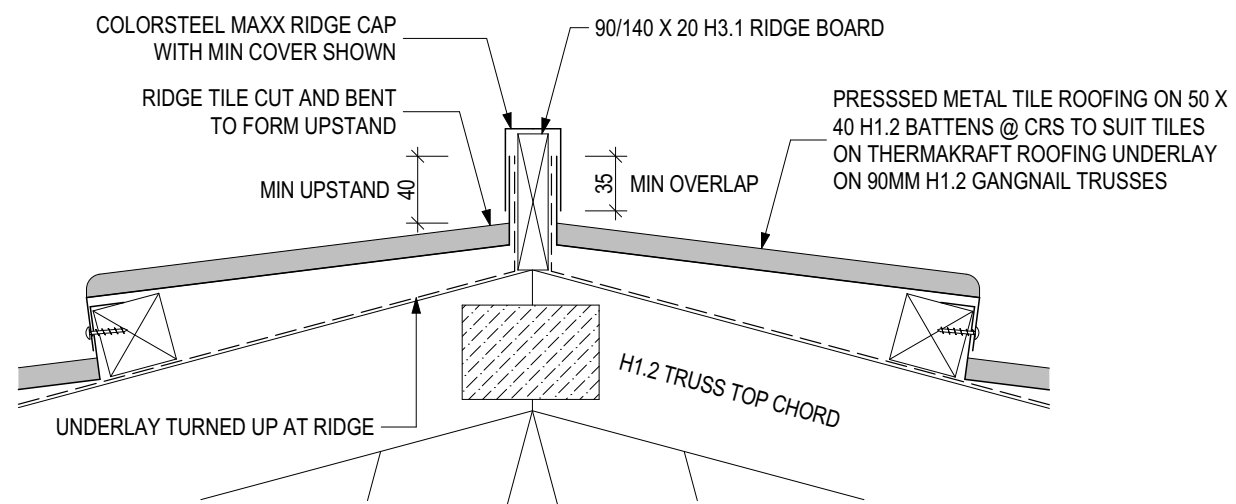
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10
106

VALLEY

1:5

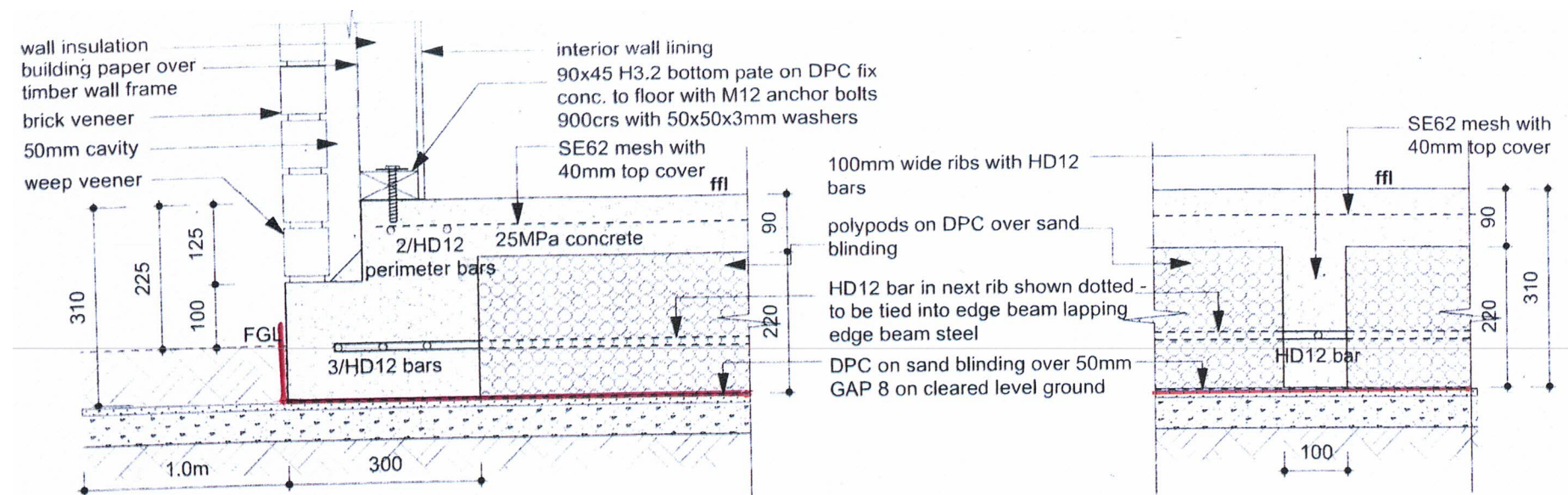


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106

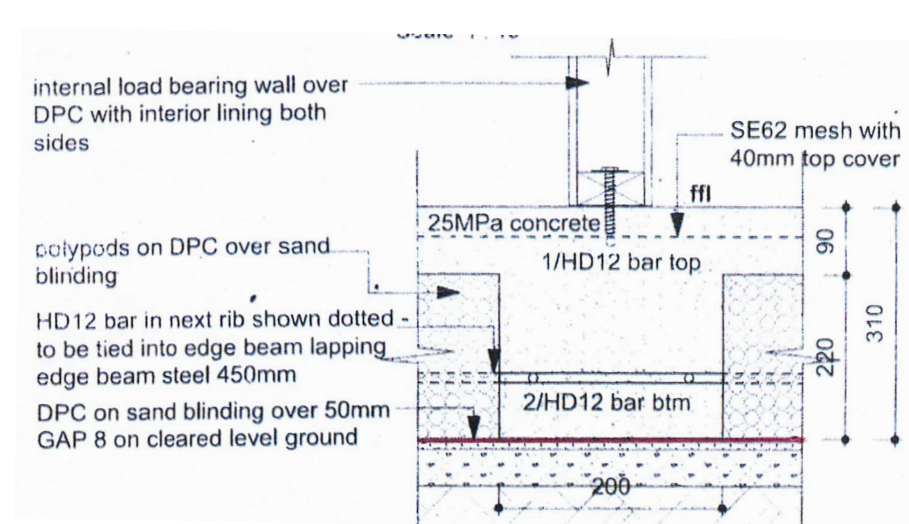
RIDGE

1:5

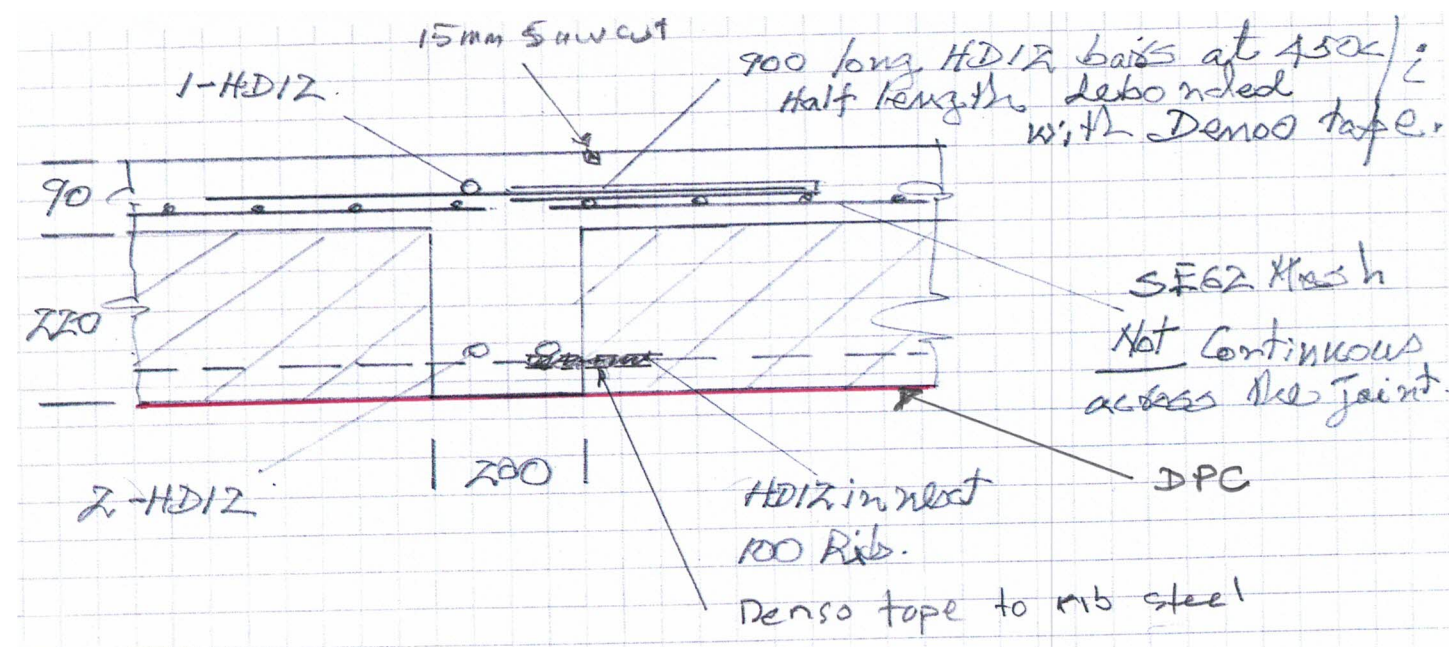
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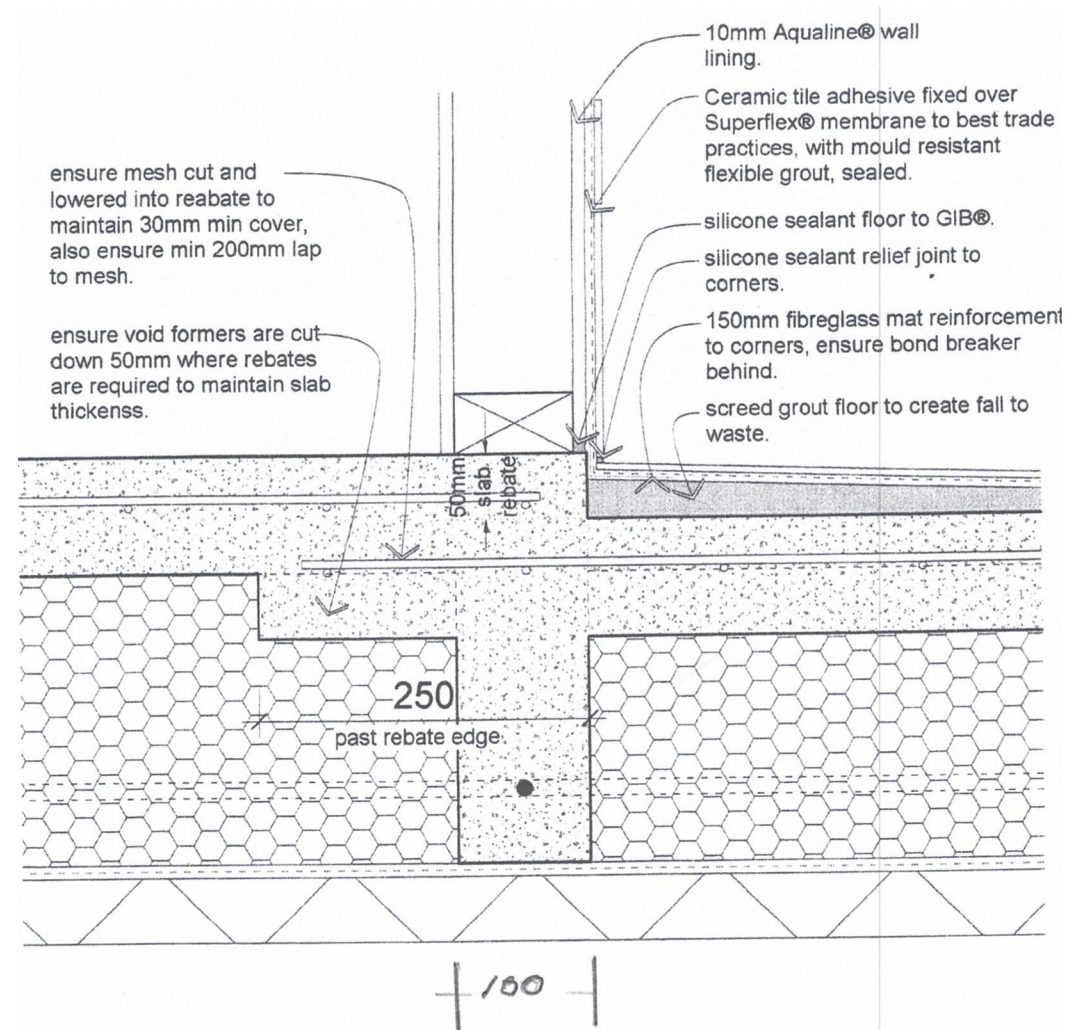
F1 201 RAFT FLOOR EDGE BEAM - 300 / INTERNAL RIB - 100 1:10



F2 201 INTERNAL RIB - 200 1:10



F3 201 CONTROL JOINT - 200 1:10



F4 201 LEVEL ENTRY SHOWER 1:10

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This review is limited to the structural design only as outlined in the calculations and other documentation. We have not reviewed any drawing dimensions. For any discrepancies, please contact the undersigned.

Signed

Kevin Burrows

Kevin Burrows (CPEng: 1897#)

GRAYSON DESIGN & DEVELOPMENTS LTD

Westmoreland HOMES



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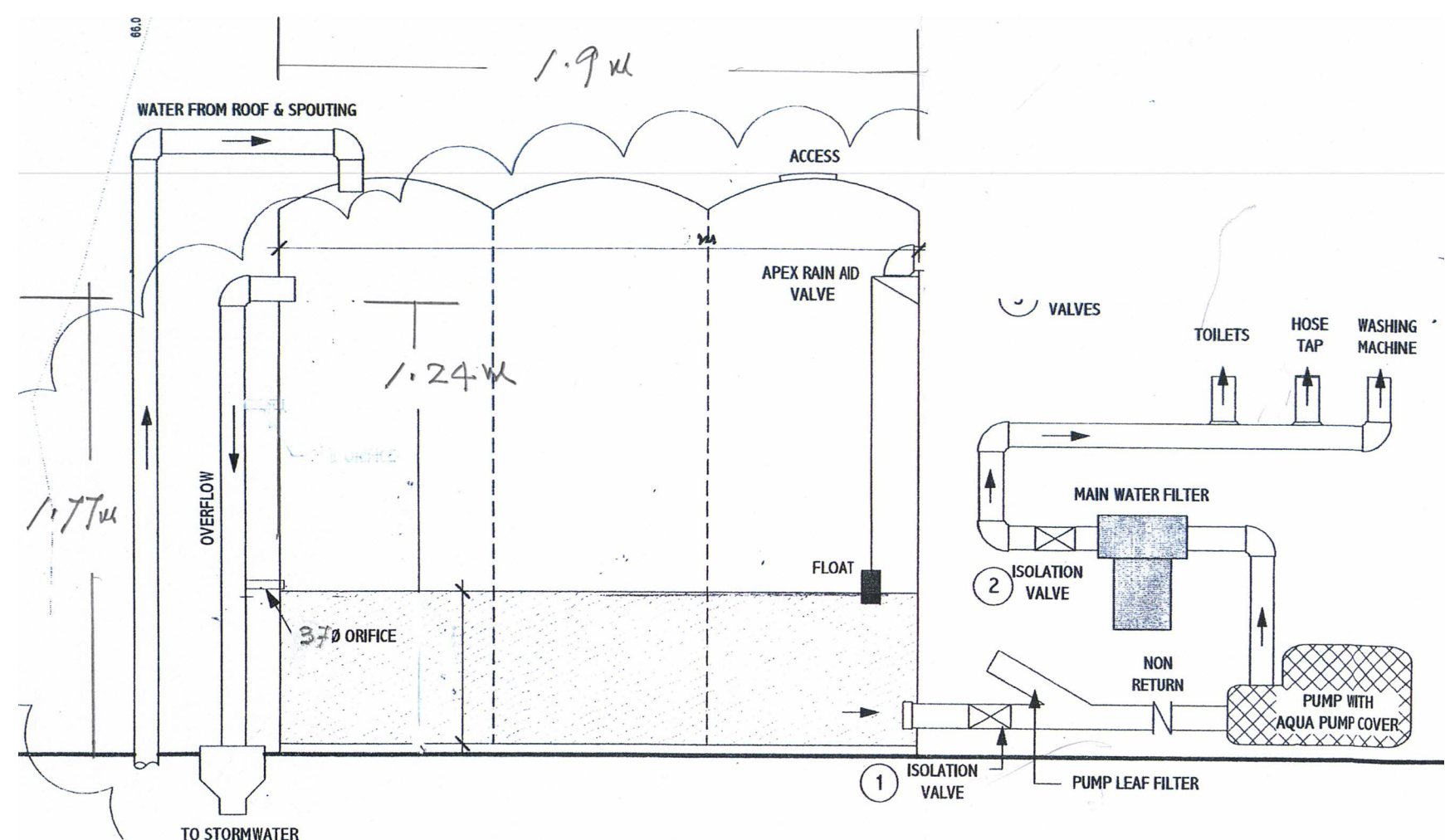
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Job # 23020

5000 LITRE DEVAN TANK
WATER FROM TANK IS NON-POTABLE AND IS TO SERVICE
TOILET, HOSE TAP & WASHING MACHINE ONLY. PROVIDE
TREVOLI PUMP OR SIMILAR APPROVED PUMP
REFER ALSO - ENGINEERS CALCULATIONS



RECYCLED RAINWATER SCHEMATIC
NOT TO SCALE

5000 Litre Devan Water Tank

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as outlined in the calculations and other documentation.
We have not reviewed any drawing dimensions. For any
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Signed

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Figure 68: General pipe penetration
Paragraph 9.1.9.3, Figure 126

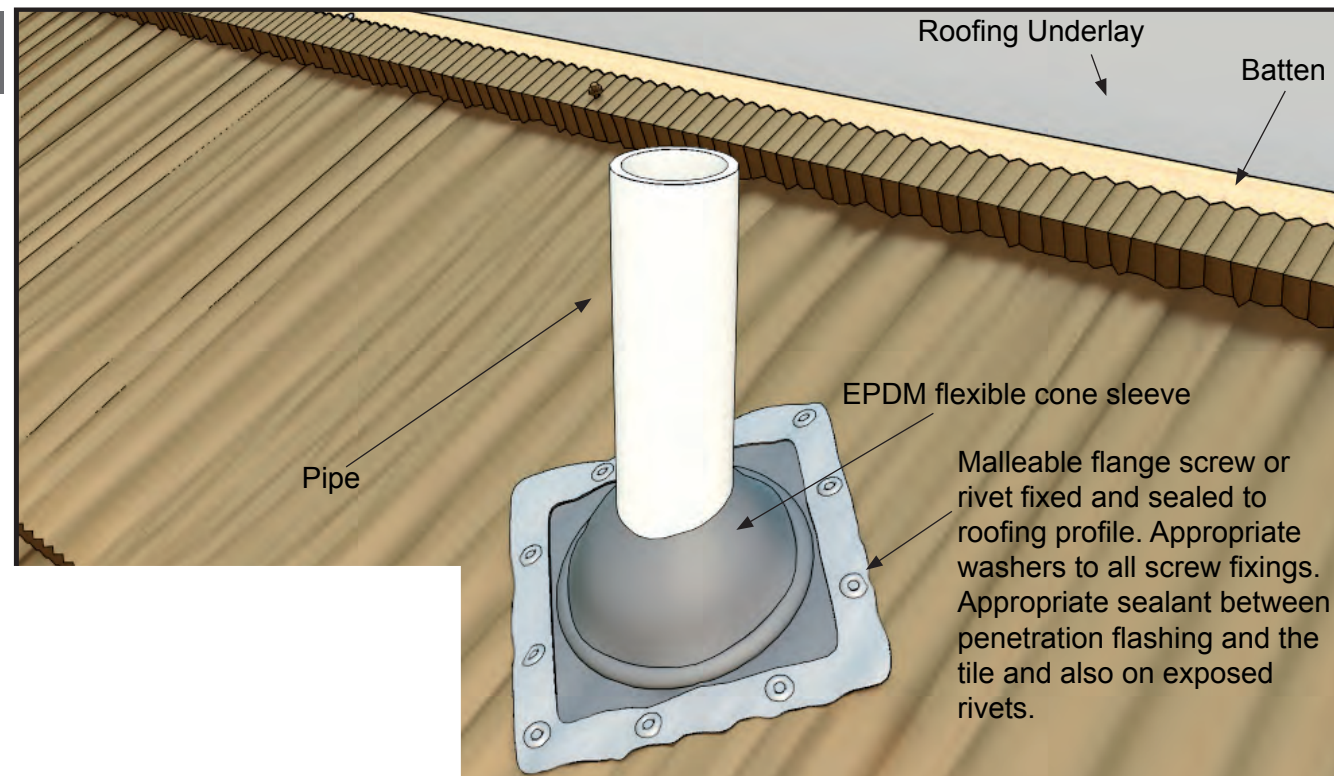
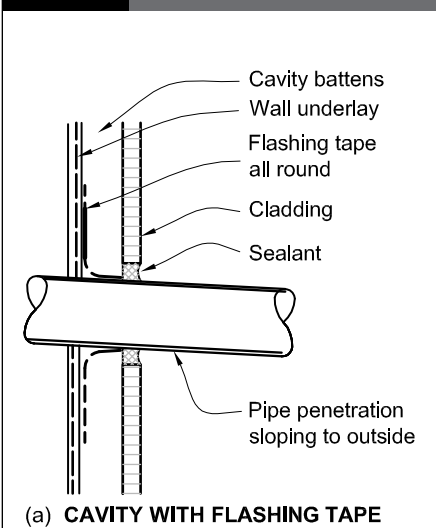


Figure 8: Mains Pressure Storage Water Heater System (unvented)
Paragraphs 6.1.2 and 6.2.1 b)

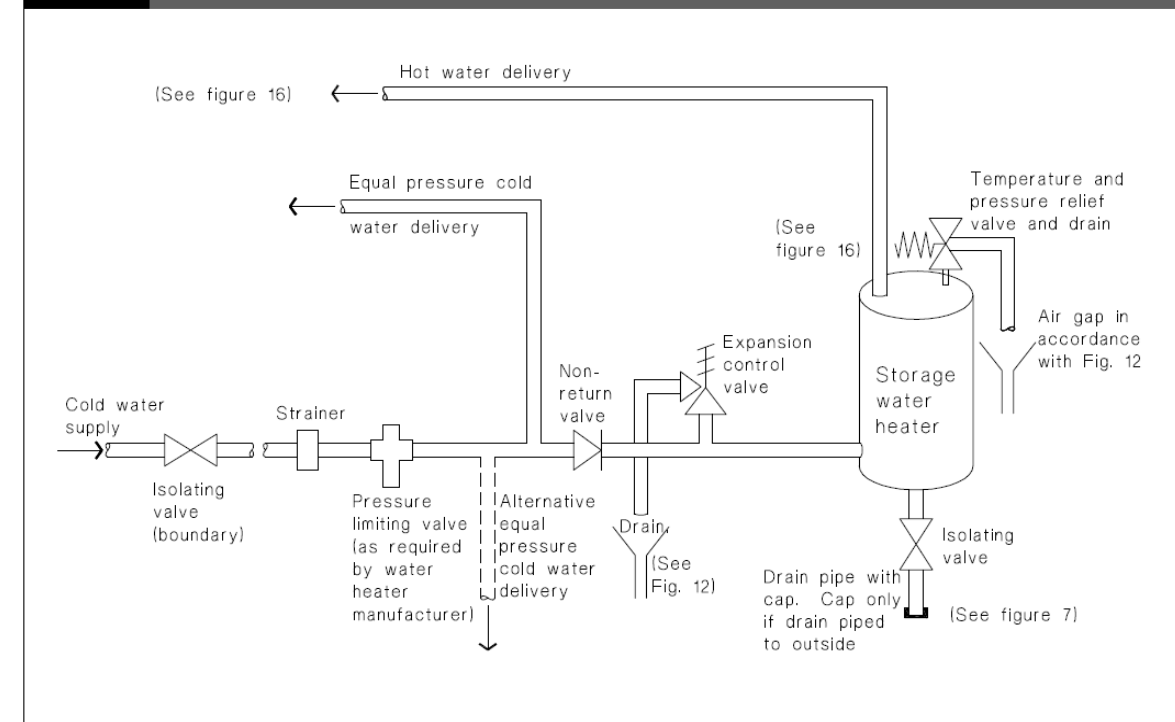


Figure 12: Relief Valve Drains – Freezing Protection
Paragraphs 6.7.1, 6.7.4 and 6.7.5

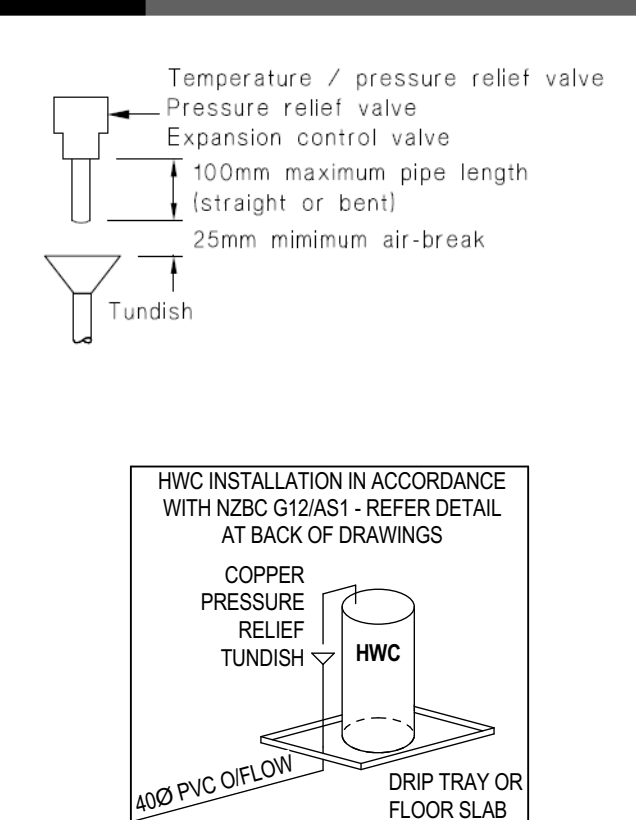


Figure 13: Relief Valve Drains – Combined
Paragraphs 6.7.1, 6.7.2 f) and 6.7.3

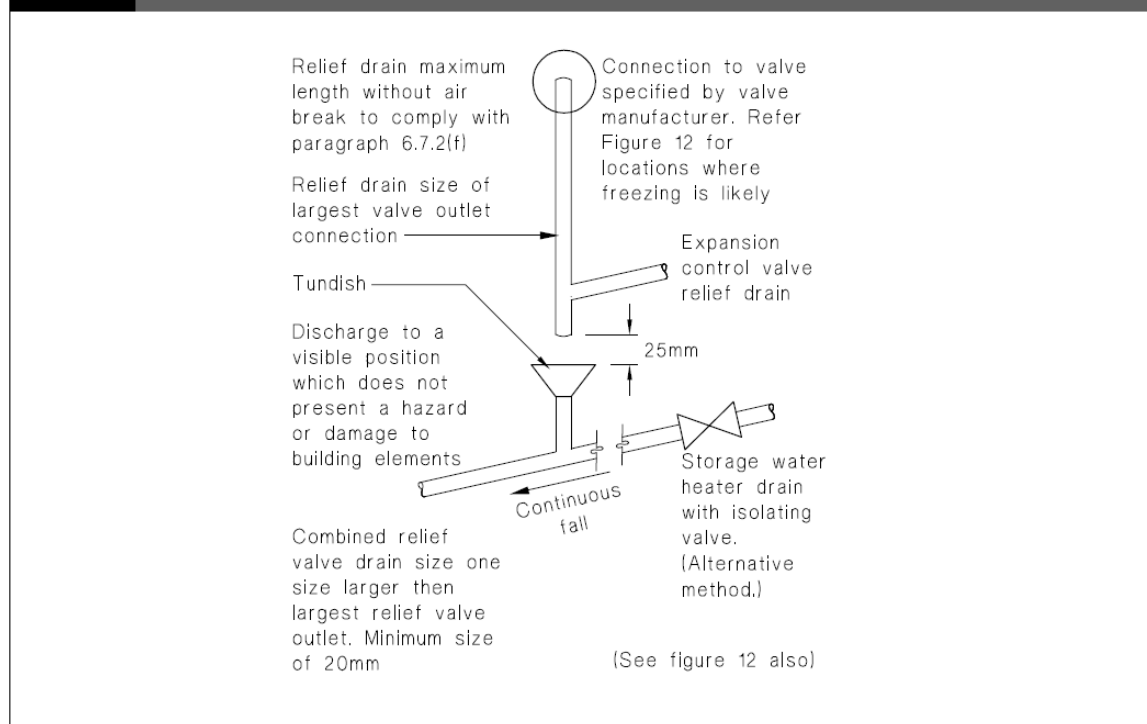
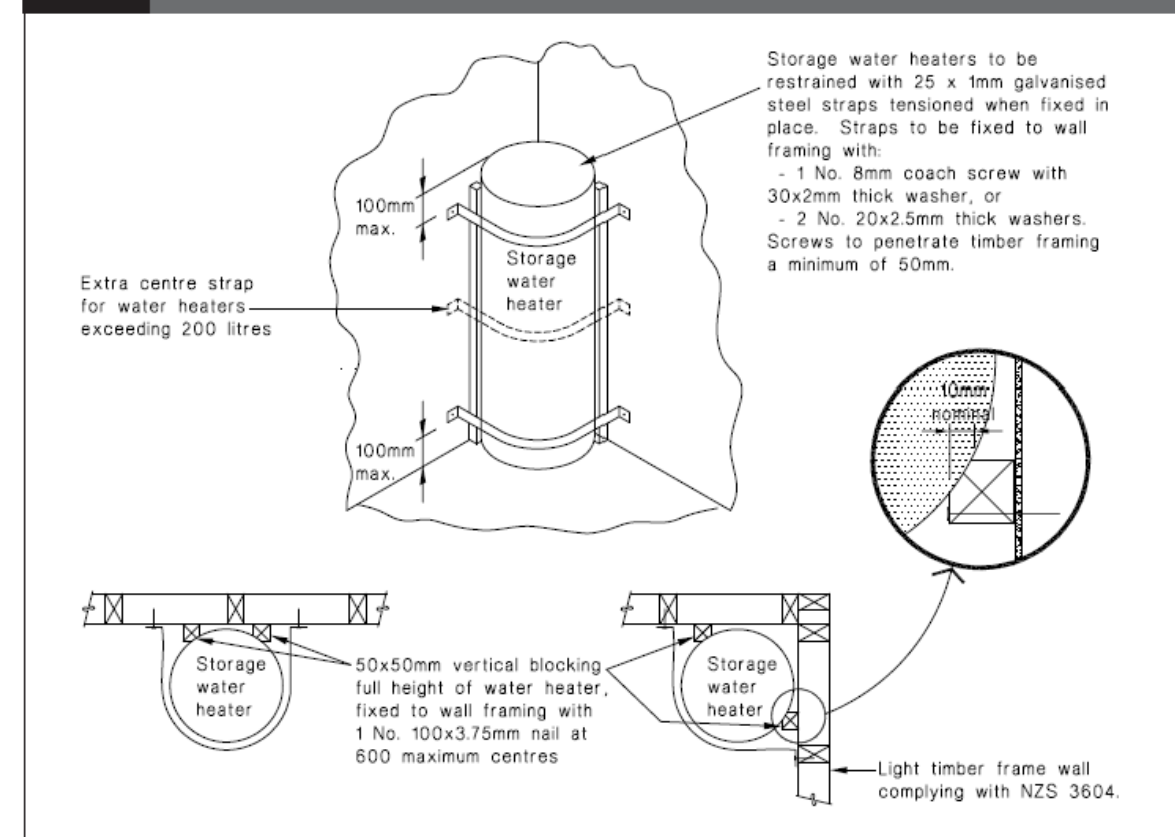


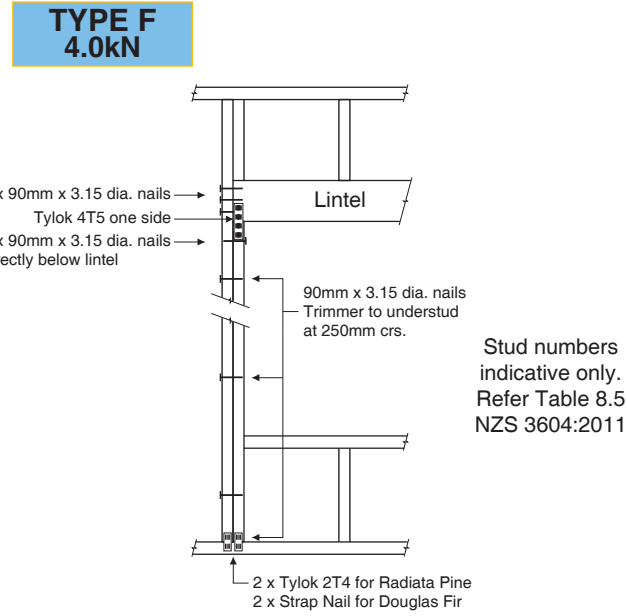
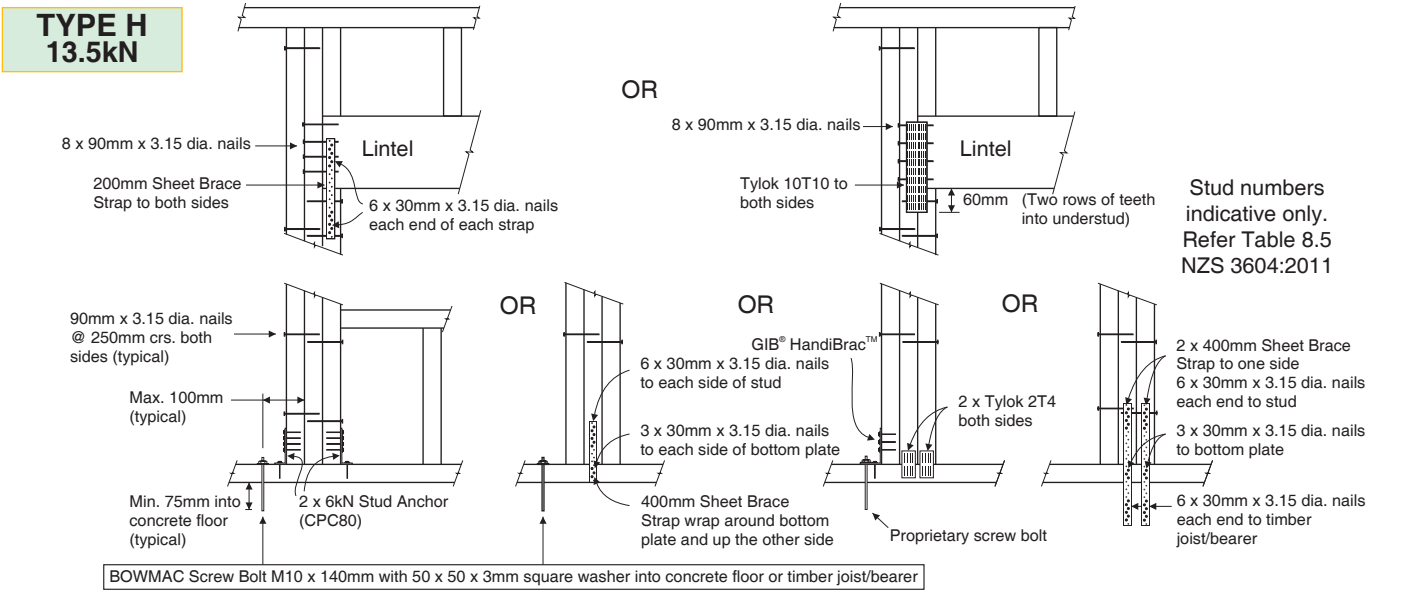
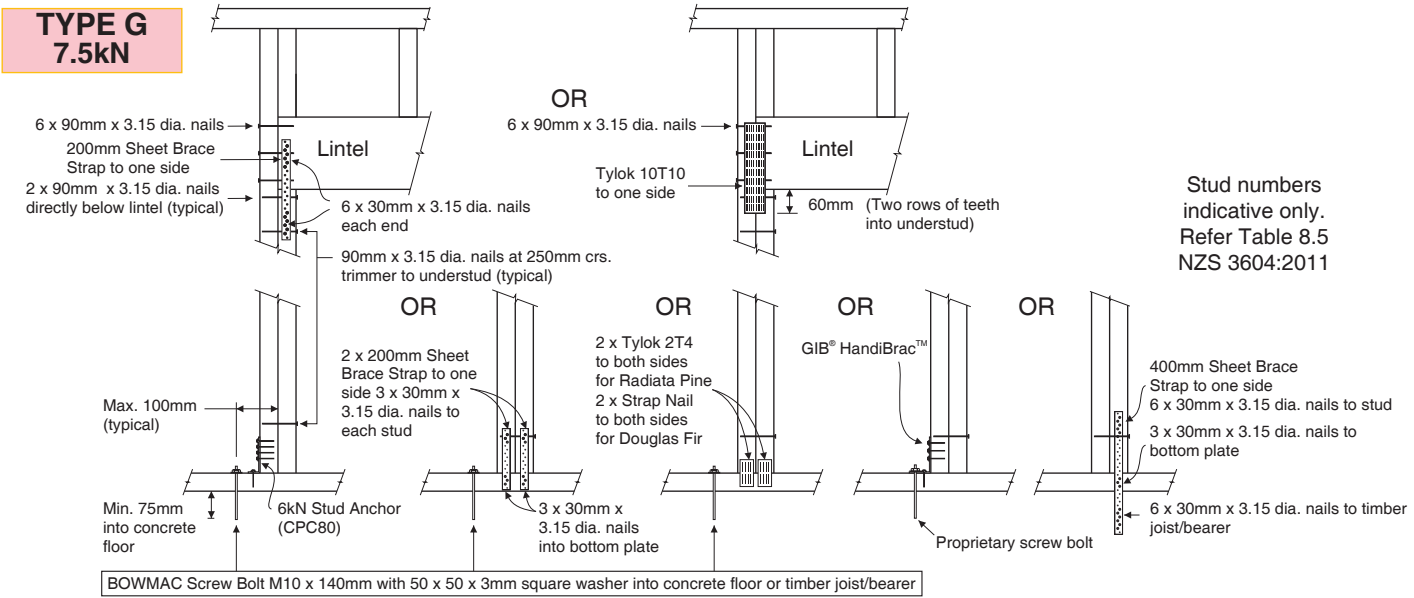
Figure 14: Seismic Restraint of Storage Water Heaters 90 – 360 litres
Paragraph 6.11.4



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Table 8.19 – Nailing schedule for hand-driven and power-driven nails (see 8.8.6)

Joint	Hand-driven nails		Power-driven nails	
	Length (mm) x diameter (mm) and type	Number/ Location	Length (mm) x diameter (mm) and type	Number/ Location
Bottom plate to floor framing at: (a) External walls and internal wall bracing elements (b) Internal walls (may be nailed to floor decking) (c) Trimmer not exceeding 4.2 m long	100 x 3.75	2 at 600 mm centres	90 x 3.15	3 at 600 mm centres
	100 x 3.75	1 at 600 mm centres	90 x 3.15	1 at 600 mm centres
	100 x 3.75	4 (end nailed)	90 x 3.15	6 (end nailed)
Dwang to stud	75 x 3.15 or 100 x 3.75	2 (skewed) 2 (end nailed)	75 x 3.06 90 x 3.15	2 (skewed) 2 (end nailed)
Fishplate to straightened stud	60 x 2.8	4 each side of cut	60 x 2.8	4 (each side of cut)
Half joint in top plate	75 x 3.15	3	75 x 3.06	4
Lintel to trimming stud	75 x 3.15 or 100 x 3.75	4 (skewed) 2 (end nailed)	90 x 3.15	3 (end nailed)
Ribbon board to stud	100 x 3.75	2	90 x 3.15	3
Sill or header trimmer to trimming stud for: (a) Trimmer not exceeding 2.4 m long (b) Trimmer not exceeding 3.0 m long (c) Trimmers not exceeding 3.6 m long	100 x 3.75	2 (end nailed)	90 x 3.15	3 (end nailed)
	100 x 3.75	3 (end nailed)	90 x 3.15	5 (end nailed)
	100 x 3.75	4 (end nailed)	90 x 3.15	6 (end nailed)
Solid plaster batten to stud	60 x 2.8 (galv.)	500 mm centres	60 x 2.8 (galv.)	500 mm centres
Stud to plate	75 x 3.15 or 100 x 3.75	4 (skewed) 2 (end nailed)	75 x 3.06 90 x 3.15	4 (skewed) 3 (end nailed)
Top plate 140 mm x 35 mm to 90 mm x 45 mm and top plate to lintel	100 x 3.75	2 at 500 mm centres	90 x 3.15	3 at 500 mm centres
Trimming studs at openings, blocking and studs at wall intersections	100 x 3.75	600 mm centres	90 x 3.15	600 mm centres
Trimming stud to doubled stud immediately under lintel	100 x 3.75	2	90 x 3.15	2
Waling to stud	60 x 2.8	2	60 x 2.8	2
NOTE – (1) Nail lengths and diameters are the minimum required. (2) Refer to 4.4 for required protective coatings for metal fasteners. (3) For studs up to 2.7 in length, 2 / 90 x 3.15 power-driven nails (end nailed) are sufficient.				



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TABLE 3.2

MINIMUM GRADES OF DRAINS

Nominal size DN	Minimum grade, %
65	2.50
80	1.65
100	1.65
125	1.25
150	1.00
225	0.65
300	0.40

NOTE: Appendix B provides a table for conversion of grades as a percentage to grades as a ratio.

TABLE 3.3

MINIMUM FIXTURE UNIT LOADINGS FOR REDUCED GRADE DRAINS

Reduced grade %	Nominal size of drain, DN			
	80	100	125	150
1.45	9	10	—	—
1.25	10	18	—	—
1.10	×	×	27	—
1.00	×	×	38	—
0.85	×	×	×	75
0.65	×	×	×	160

Grade %	Nominal size of pipe, DN							
	40	50	65	80	100	125	150	225
5.00	6	15	51	65	376	953	1 959	7 098
3.35	5	10	29	39	248	686	1 445	5 583
2.50	4	8	21	27	182	509	1 148	4 513
2.00	×	×	×	20	142	410	953	3 739
1.65	×	×	×	16	115	342	813	3 258
1.25	×	×	×	×	×	254	627	2 656
1.00	×	×	×	×	×	×	509	2 272

TABLE 6.1

FIXTURE UNIT RATINGS

Fixture	Fixture abbreviations	Min. size of trap outlet and fixture discharge pipe DN		Fixture unit rating
		NZ (only)		
Autopsy table	AT	50	32	3
Bain-marie	BM	40		1
Basin	B	40		1
Bath (with or without shower) (Note 1)	Bth.	40		4
Bath (foot)	Bath (foot)	40		3
Bath (baby)	Bath (baby)	40		3
Bath (shower)	Bath (shr)	40		4
Bedpan sterilizer	BPS	50		4
Bedpan washer	BPW	80		6 (F. valve) 4 (Cist.)
Bedpan washer	BPW	100		6 (F. valve) 4 (Cist.)
Bedpan washer/sterilizer	BPWS	80	25	6 (F. valve) 4 (Cist.)
Bedpan washer/sterilizer	BPWS	100		6 (F. valve) 4 (Cist.)
Bidet, bidette	Bid	40	32	1
Circular wash fountain	CWF	50	25	4
Clothes-washing machine—domestic	CWM	40		5
commercial		50		See Table 6.2
Dental unit	DU	40		1
Dishwashing machine—domestic	DWM	40		3
commercial		50		See Table 6.2
Drinking fountain	DF	40		1
Floor waste gully—without fixture	FW	50		0
with fixture				as per fixture rating
Glass-washing machine	GWM	40		40
Potato peeler	PP	50	3	
Sanitary napkin disposal unit	SNDU	40	3	
Shower—single	Shr	40	2	
multiple		50	2 per shower head	
Sink—single, or double (with or without disposal unit)	S	50	3	
tea	TS	50	1	
bar, domestic	BS(D)	40	1	
bar, commercial	BS(C)	50	3	

TABLE 6.1 (continued)


Fixture	Fixture abbreviations	Min. size of trap outlet and fixture discharge pipe DN		Fixture unit rating
		NZ (only)		
Sink cleaner	CS	50	40	1
Sink laboratory	LS	50		1
Sink (pot or utility)	PS	50		5
Slop hopper	SH	100		6 (F. valve) 4 (Cist.)
Trough— ablution	Tr.(A)	40		3
laundry (single or double)	Tr.(L)	40		5
Urinal— wall-hung (including waterless), stall, or each 600 mm length of slab	Ur.	40 50	32	1 1
Water closet pan	WC	80		6 (F. valve) 4 (Cist.)
Water closet pan	WC	100		6 (F. valve) 4 (Cist.)
Bathroom group in a single room (basin, bath, shower, water closet)				6
Combination pan room sink and flushing bowl	PRS	80		6 (F. valve) 4 (Cist.)
Combination pan room sink	PRS	100		6 (F. valve) 4 (Cist.)

TABLE 3.1


MAXIMUM FIXTURE UNIT LOADING FOR VENTED DRAINS

Grade, %	Nominal size of drain, DN						
	65 (Note 1)	80	100	125	150	225	300
5.00	60	215	515	1 450	2 920	11 900	26 900
3.35	36	140	345	1 040	2 200	9 490	21 800
2.50	25	100	255	815	1 790	8 060	18 700
2.00	×	76	205	665	1 510	7 090	16 600
1.65	×	61	165	560	1 310	6 370	15 000
1.45	×	(50)	(140)	485	1 160	5 810	13 900
1.25	×	(42)	(120)	425	1 040	5 360	12 900
0	×	×	×	(380)	935	4 970	12 100
	×	×	×	(340)	855	4 500	11 400
0.85	×	×	×	×	(725)	3 850	10 300
0.65	×	×	×	×	(595)	3 250	9 090
0.50	×	×	×	×	×	×	7 720
0.40	×	×	×	×	×	×	6 780

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Table 10.18 – Nailing schedule for hand-driven and power-driven nails (see 10.5.1)

Joint	Hand-driven nails		Power-driven nails	
	Length (mm) x diameter (mm) and type	Number/ Location	Length (mm) x diameter (mm) and type	Number/ Location
Roof framing				
Rafter or jack rafter to ridge board or top plate (except skillion roofs) (see 10.2.1.3.7)	See table 10.1	See table 10.1	See table 10.1	See table 10.1
Truss to top plate of external wall	See tables 10.14 and 10.15	See tables 10.14 and 10.15	See tables 10.14 and 10.15	See tables 10.14 and 10.15
Truss to top plate of internal wall	100 x 3.75	2	90 x 3.15	2
Ceiling batten to parallel top plate of internal wall bracing element	75 x 3.15	2 at 400 mm centres	90 x 3.15	2 at 400 mm centres
Collar tie or cleat to rafter	75 x 3.15	4	75 x 3.06	4
Flitches to ridge board and roof members for each side on both joints	60 x 2.8	3	60 x 2.8	3
Hip rafter to top plate	See table 10.1	See table 10.1	See table 10.1	See table 10.1
Underpurlin strut to underpurlin or top plate or strutting beam	100 x 3.75 together with fixing types as set out in table 10.5	2	90 x 3.15 together with fixing types as set out in table 10.5	3
Strutting beam to top plate	See table 10.7	See table 10.7	See table 10.7	See table 10.7
Roof braces at each connection to a framing member:				
(a) 90 mm x 19 mm brace	75 x 3.15	3	75 x 3.15	3
(b) 70 mm x 45 mm brace runner	100 x 3.75	2	90 x 3.15	3
(c) 90 mm x 45 mm brace	100 x 3.75	3	90 x 3.15	5
(d) Steel strip brace				
(i) At ends	60 x 3.15	3	–	–
(ii) Other cases	60 x 3.15	2	–	–
(iii) To ends of braces	–	–	–	–
NOTE –				
(1) Nail lengths and diameters are the minimum required.				
(2) Refer to 4.4 for required protective coatings for metal fasteners.				
(3) Proprietary fixings with the required fixing capacity indicated in the tables may be used.				

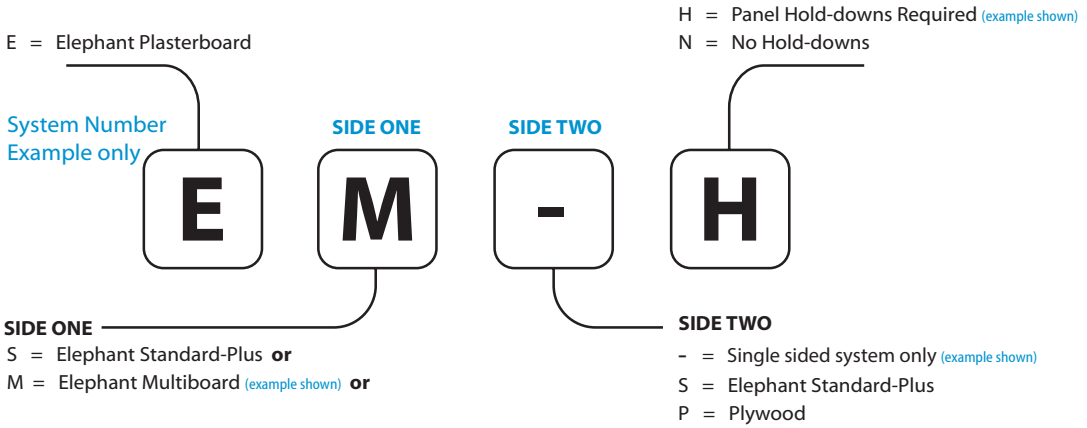
Table 10.18 – Nailing schedule for hand-driven and power-driven nails (continued) (see 10.5.1)

Joint	Hand-driven nails		Power-driven nails	
	Length (mm) x diameter (mm) and type	Number/ Location	Length (mm) x diameter (mm) and type	Number/ Location
Roof framing (continued)				
Blocking between rafters, joists or truss chords, 90 mm x 45 mm	100 x 3.75	2 (end nailed)	90 x 3.15	2 (end nailed)
Outrigger to gable top plate (as for equivalent purlins)	See table 10.10 and table 10.11	See table 10.10 and table 10.11	See table 10.10 and table 10.11	See table 10.10 and table 10.11
Outrigger to rafter	100 x 3.75 or 75 x 3.15	2 (end nailed) 4 (skewed)	90 x 3.15	3 (end nailed)
Flying rafter to outrigger	100 x 3.75	2	90 x 3.15	3
Outrigger blocking to top plate	100 x 3.75	4 (skewed)	90 x 3.15	4 (skewed)
Purlin or batten directly to rafter or top chord	See table 10.10 and table 10.11	See table 10.10 and table 10.11	See table 10.10 and table 10.11	See table 10.10 and table 10.11
Roof sarking				
Board sarking to rafters or top chords:				
(a) Boards not exceeding 75 mm wide	2½ x finished thickness	1	–	–
(b) Boards exceeding 75 mm wide		2	–	–
Sheet material for sheet sarking to:				
(a) Rafters or top chords at sheet edges	30 x 2.5 FH	150 mm centres	–	–
(b) Intermediate supports		300 mm centres	–	–
Purlins or battens through sarking to rafter or top chord	See table 10.15	See table 10.15	See table 10.15	See table 10.15
NOTE –				
(1) Nail lengths and diameters are the minimum required.				
(2) Refer to 4.4 for required protective coatings for metal fasteners.				
(3) Proprietary fixings with the required fixing capacity indicated in the tables may be used.				

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Quickbrace™ Design Solutions

Quickbrace™ Numbering System



QuickBrace™ Systems & Performance Table

System Number	Lining Requirement	Min. Length (m)	BU/m		Panel Hold-downs	Bracing Corner Pattern
			Wind	Earth-quake		
Plasterboard on One Side						
ES-N	Elephant Standard-Plus on One Side	0.4	65	60	No	Condensed
		1.2	70	65		
		1.8	80	65		
ES-H	Elephant Standard-Plus on One Side	0.4	80	75	Yes	
		0.8	100	85		
		1.8	115	85		
EM-H	Elephant Multiboard on One Side	0.4	95	100		
		0.8	120	110		
		1.2	140	115		
Plasterboard on Both Sides						
ESSN	Elephant Standard-Plus on Both Sides	0.4	80	75	No	
		0.8	90	80		
		1.2	95	85		
ESSH	Elephant Standard-Plus on Both Sides	0.4	95	110	Yes	
		0.8	140	130		
		1.2	150	140		
EMSH	Elephant Multiboard on One Side Elephant Standard-Plus on the Other	0.4	110	115		
		0.8	140	135		
		1.2	150	145		
Plasterboard One Side, Plywood the Other						
ESPH	Elephant Standard-Plus on One Side Plywood on the Other	0.4	100	115	Yes	
		0.8	140	140		
		1.2	150	150		
EMPH	Elephant Multiboard on One Side Plywood on the Other	0.4	120	135		
		0.8	140	145		
		1.2	150	150		

* Timber Floors - It is required by NZS 3604:2011 to limit BU ratings to 120 BU/m for timber floors. For a higher floor frame uplift, a specifically engineered design will be required.

Note- The QuickBrace™ Numbering System and the sub components thereof are protected by copyright.



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Wall & Ceiling Construction Details

Wall Framing

Framing is to comply to NZS 3604:2011 and must be a minimum of 70 x 45mm for internal walls and 90 x 35mm for external walls. Nogs or dwangs are not a requirement in order to achieve the bracing ratings published in this document.

Fastening Bracing Elements to Floors

Quick-Brace™ System Number	Bottom Plate Fixing Requirements			Additional Requirements
	Concrete Floors		Timber Floors	Concrete or Timber
	External Walls	Internal Walls	External or Internal Walls	External or Internal
ES-N	Fix as per NZS 3604:2011	Fix as per NZS 3604:2011. Alternatively see Note 1 below	Pairs of 100 x 3.75mm hand driven flat head nails or three 90 x 3.15mm power driven nails at 600mm centres all in accordance to NZS 3604:2011	None
ESSN	Not applicable			
ESSH	Not applicable	Fix as per NZS 3604:2011		Panel End Hold downs at each end of the bracing element.
EMSH				
ES-H				
EM-H				
ESPH				
EMPH				

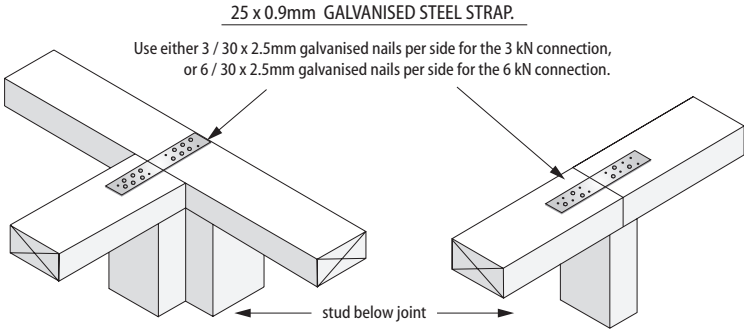
Note 1:

Min 75 x 3.8mm shot-fired fasteners with 16mm discs at 150mm & 300mm from end studs and thereafter at 600mm centres. Ensure a minimum penetration of 30mm into the concrete foundation.

Top Plate Connections

Top plate connections detailed on the right meet the requirements of NZS 3604:2011 clause 8.7.3 Joints in Plates. The joints must be over a stud or solid blocking.

A 6kN connection is required if any bracing element in the wall exceeds 100 bracing units. Otherwise a 3kN connection is adequate.



Panel End Hold down Details - Bracing Anchor Brackets

Either Pryda® Bracing Anchor or any other proprietary panel end hold down bracket with a minimum performance of 15kN.

Concrete Floors		Timber Floors	
M12 galvanised anchor bolt or proprietary equivalent with minimum characteristic strength of 15kN . Set no less than 75mm into the concrete.		M12 x 150mm galvanised coach screw or proprietary equivalent with minimum characteristic strength of 12kN.	
External	Internal	External	Internal
Locate the bracket flush with the inside face of the framing in order to maximise concrete edge distance.	Locate the bracket centrally on the bottom plate.	Locate the bracing anchor bracket so that the coach screw is centred over the timber below.	Full depth solid blocking centrally positioned beneath the coach screw.

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SHEET NUMBER
310

OF: 31 Plot Date 1/05/2024

WIND ZONE
EXPOSURE ZONE
EQ ZONE
ZONE

HIGH
C
1
GRZ

Checked MAKING PLANS
Drawn DRAWN BY NAME

Job # 23020

Panel End Hold down Details - Bracing Strap & Bolt Detail

N.B. Bottom plate anchor placements have been reduced to 80mm from the end of the bracing element. This is to be consistent with the bolt location when using bracing anchor brackets and represents industry best practise. This does not affect previous designs or installations.

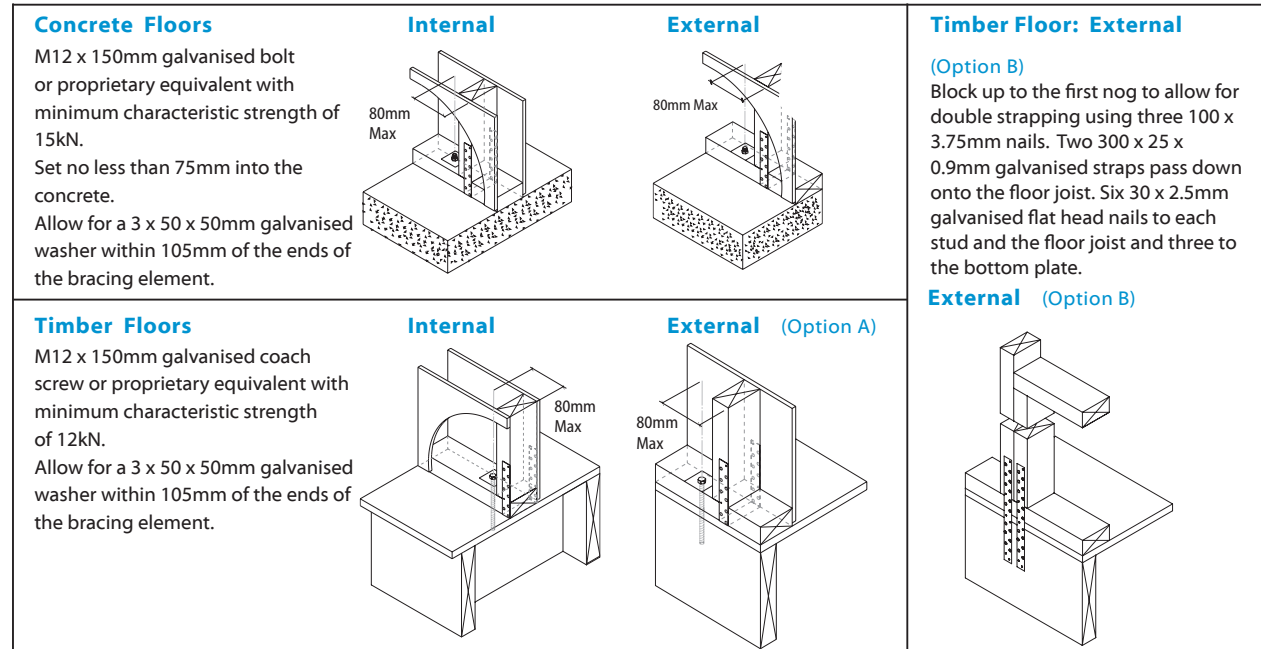
Bracing Strap:

400 x 25 x 0.9mm galvanised strap passing under the bottom plate. Six 30 x 2.5mm galvanised flat head nails to each side of the stud and three 30 x 2.5mm galvanised flat head nails to each side of the bottom plate.

The bracing strap should be checked into the framing in order to make the substrate flush when receiving the plasterboard lining.

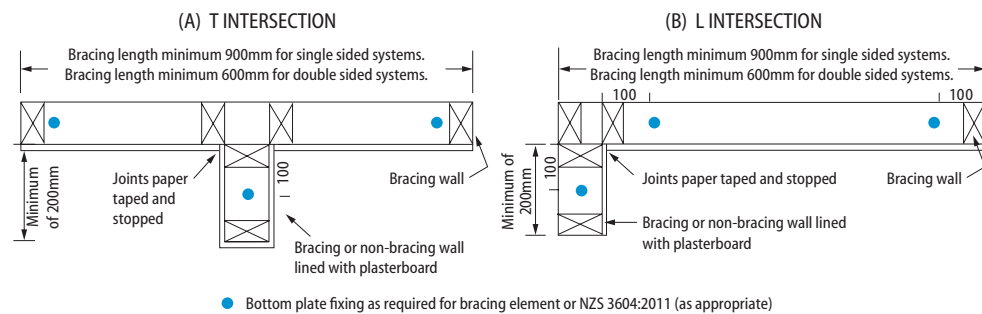
Position it in such a way that the important corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown below will ensure the important corner fastenings won't penetrate the bracing strap.

Extra thickness and/or corrosion protection may be required on exposed and unexposed sites as per requirements of NZS 3604:2011

**Intersecting Walls**

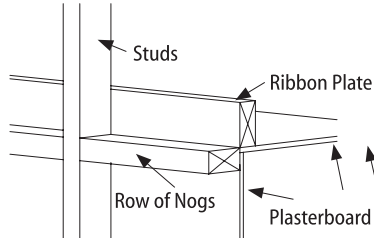
Provided the minimum wall lengths are complied with and walls are constructed as described in this manual, bracing elements may be interrupted by intersecting walls as detailed below. Fasteners layout at the corners and around the perimeter of the bracing elements are as per The Fastener Layout figures on page 22. Joints between sheets shall be paper taped and stopped in accordance with the Elephant Plasterboard Installation Guide. Panel end hold-downs must also comply except that the location of bottom plate anchors is modified for L and T intersections as defined below.

The minimum bracing element length is 900mm for single sided bracing systems (ES-N, ES-H and EM-H) and 600mm for double sided bracing systems, (ESSN, ESSH, ESPH, EMSH and EMPH.)

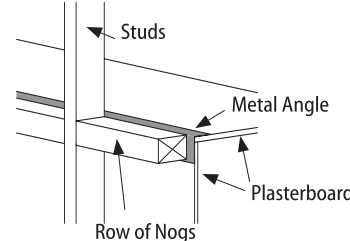
**Parapets, Gable End Walls or Dropped or Suspended Ceilings**

Sheeting material used in bracing elements must connect to both the top and bottom plates. Where the top plate is not accessible, fixing to a row of nogs is not an acceptable solution. Detail below are two possible solutions.

A continuous length of timber or ribbon plate, with the same minimum size as the bottom plate, fixed across the face of the studs just above the row of nogs and at the ceiling line.



A metal angle of minimum of 50 x 50 x 0.55mm fixed to the row of nogs at the ceiling line. Use minimum 30 x 2.5mm FH galv nails at 300mm centres.

**Wall Bracing Construction Details****Fastening the Plasterboard Linings**

Elephant Plasterboard designated as a bracing element must be constructed with specified fasteners and fastener patterns. Specialised panel end hold downs may also be required as they are essential for obtaining the bracing unit ratings. The corner detail for plasterboard bracing elements require specific increased fastening. See figures below.

Fasteners:

Timber battens & Timber perimeters: 32mm x 6g High thread Drywall screws

Steel battens and Steel perimeter: 25mm x 6g self tapping screws

Fastener Brands Allowable

Fortress®, Grabber® or Senco®. (Other fastener brands need to demonstrate equal or better performance).

Fastener Layout

Refer Condensed Bracing Corner Pattern on the right. Place all fasteners 12mm from paper bound sheet edges and 18mm from sheet ends or cut edges. Fastening the middle of the bracing element is as per the recommended screw and glue methods. Refer to Elephant Plasterboard Installation Guide.

Minimum Sheet Size

Sheets less than 300mm wide are allowable provided that the joints form over solid framing or the sheet is back blocked. All joints must be paper taped and stopped.

Butt Joints

All butt joints should be either fitted over nogs or studs and fastened at 200mm centres or back-blocked. All joints must be paper taped and stopped. Refer to Elephant Plasterboard Installation Guide.

Horizontal Fixing

QuickBrace™ systems may be fixed horizontally. The specialised corner and perimeter bracing pattern need only to be placed over the length and width of the bracing element. Fastening in the field of the bracing element is as per the recommended glue and screw method.

Note- Care should be taken during the installation of the plasterboard, as often the studs that require the special mechanical fixing pattern are in the field of the sheet. It is important to insure that the adhesives are not placed on or near the studs that require these special perimeter fasteners as this can be a cause of screw popping.

Alternative Corner Fastener Layout

If the installer has used the 50, 50, 50, 75, 75, 150 corner screw pattern then this can easily be remedied by simply placing an extra screw between the first 150mm (where possible). Refer to the Alternative Condensed Bracing Corner Pattern on the right.

Wet Areas

Do not place bracing elements in areas such as behind showers and baths. Placing bracing elements in water splash areas is acceptable provided that these areas are maintained impervious for the life of the building. Bracing elements require a 50 year durability.

Allowable Substitutions

Elephant Aquaboard can be substituted for the Elephant Standard-Plus in QuickBrace™ systems ES-N, ESSN, ES-H, ESSH, ESPH and EMSH. Elephant Aquaboard can be substituted for the Elephant Multiboard in QuickBrace™ systems EM-H, EMSH and EMPH provided that the element is 600mm or longer and the perimeter screw pattern is reduced to 100mm centres. Ensure that all other relevant bracing system requirements including the important corner patterns are met.

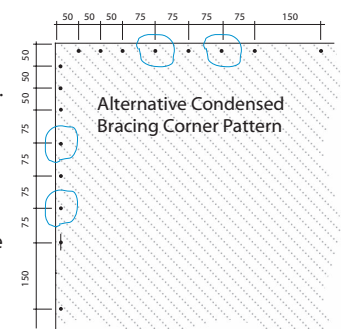
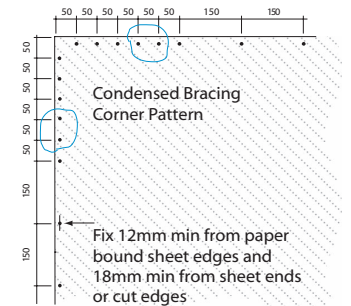
Openings in Bracing Elements

Large openings can only be placed in the middle 1/3 of the bracing element. Neither the opening height nor length can be more than 1/3 of the bracing element height. Fix the wall linings around the opening trimmers at 150mm centres. Smaller openings of 90 x 90mm or less are allowable but cannot be placed closer than 90mm from the edge of the bracing element.

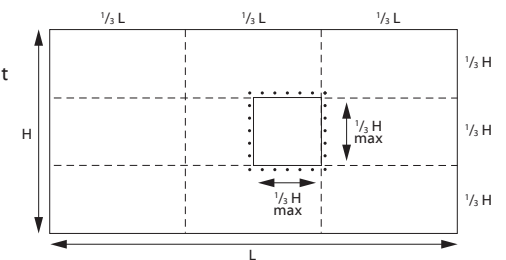
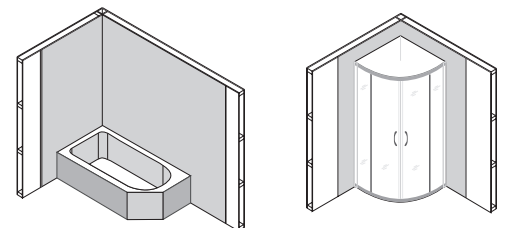
Plywood

For systems ESPH and EMPH plywood is required. This can be Grade D-D 7mm construction plywood at a minimum. The plywood must be manufactured as per Australian/New Zealand Standard AS/NZS 2269:2004. The nailing pattern is at 150mm centres around the perimeter of the bracing element or each plywood sheet, whichever is the lesser width, using 50 x 2.8mm Flat head galvanised or stainless steel nails.

Sheet edges must be supported by framing or blocking. The corner pattern fastening is conventional and there is no need for the specialised corner patterns as is required on the plasterboard side of the brace.



Shaded area must not have Plasterboard Bracing Systems



PLASTERBOARD ON ONE SIDE

System Number	Lining Requirement	Min Length (m)	BU/m		Panel Hold-downs	<div><div><div>505050505050150150</div><div>505050505050150150</div></div><div>Condensed Bracing Corner Pattern</div><div>Fix 12mm min from paper bound sheet edges and 18mm min from sheet ends or cut edges</div></div>	
			Wind	Earth-quake			
ES-N	Elephant Standard-Plus on one side	0.4	65	60	No		
		1.2	70	65			
		1.8	80	65			
ES-H	Elephant Standard-Plus on one side	0.4	80	75	Yes		
		0.8	100	85			
		1.8	115	85			
EM-H	Elephant Multiboard on one side	0.4	95	100			
		0.8	120	110			
		1.2	140	115			

FRAMING

Framing heights and dimensions to comply with NZS 3604:2011 and must be a minimum of 70 x 45mm for internal walls and 90 x 35mm for external walls. Nogs and Dwangs are not a requirement in order to achieve the bracing ratings in this document. Refer to relevant sections and clauses of NZBC B1: Structure; AS1 Clause 3 Timber -NZS 3604 NZBC B2: Durability; AS1 Clause 3.2 Timber -NZS 3602

FASTENING BRACING ELEMENTS TO FLOOR

Timber Floor:
Fastening within the bracing element must be done in accordance with NZS 3604:2011. i.e. Either pairs of 100 x 3.75mm hand driven nails or three 90 x 3.15mm power driven nails at 600mm centres. For **ES-H** and **EM-H**: Use the panel hold downs at each end of the bracing element.

Concrete Floors:
External or Internal walls: Within the bracing element fix the bottom plate as per NZS 3604:2011. For **ES-N**: On Internal Walls alternatively use 75 x 3.8mm shot-fired fasteners with 16mm discs at 150mm & 300mm from end studs and thereafter at 600mm centres. Ensure a minimum penetration of 30mm into the concrete foundation. For **ES-H** and **EM-H**: Use the panel hold downs at each end of the bracing element.

WALL LINING (As per Specified System Above)

One layer of Plasterboard lining type as per specified system above to ONE side of frame. The Plasterboard sheets can be fixed vertically or horizontally. Use full height or full length sheets when fixing vertically or horizontally where possible. All sheet end butt joints must be fixed over solid timber framing and fastened at 200mm centres. Alternatively the sheet end butt joints may be back blocked. Sheets shall be touch fitted.

FIXING OF PLASTERBOARD LININGS

Fastening: (Corners and Perimeters of the bracing element)
32mm x 6g High thread Drywall screws (Fortress® or Grabber® or Senco®)

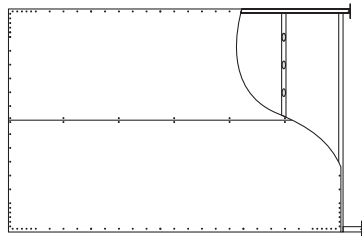
Fastening Centres: (Corners and Perimeters of the bracing element)
Corner Pattern: Refer to the bracing corner pattern above. (See Page 22 for alternative allowable corner pattern.)
Perimeter Pattern: Place fasteners at 150mm centres around perimeter of bracing element. Place all fasteners 12mm from paper bound sheet edges and 18mm from sheet ends or cut edges.

Fasteners and Fastening Centres in the Field of the bracing element
For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For Horizontally fixed sheets place fasteners at the sheet edge that crosses the studs. Place daubs of Drywall adhesives at 300mm centres to intermediate studs. Take extra care to ensure that screws or clouts are not placed closer than 200mm from any daubs of adhesive.

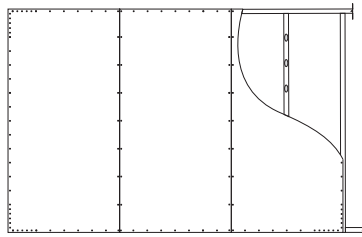
JOINTING

All fasteners stopped and all sheet joints reinforced with paper jointing tape. All in accordance with the Elephant Plasterboard Installation Guide.

Horizontal Fixing



Vertical Fixing



DESIGN DETAIL

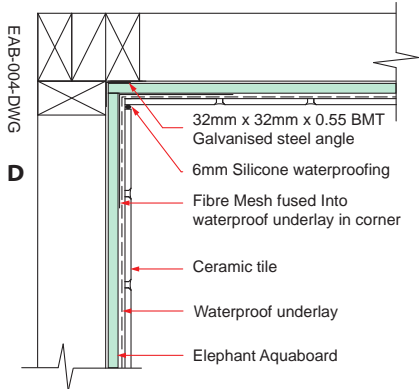
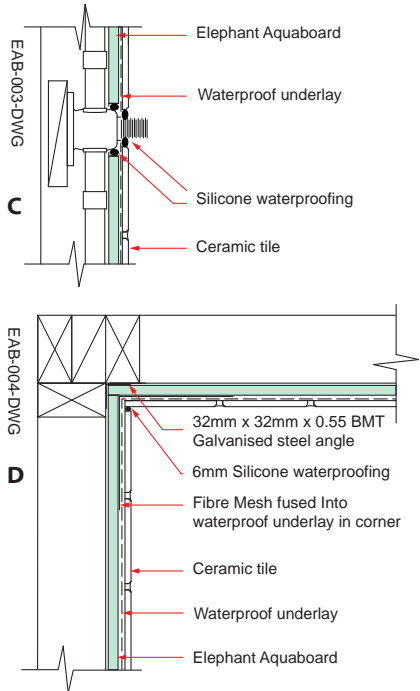
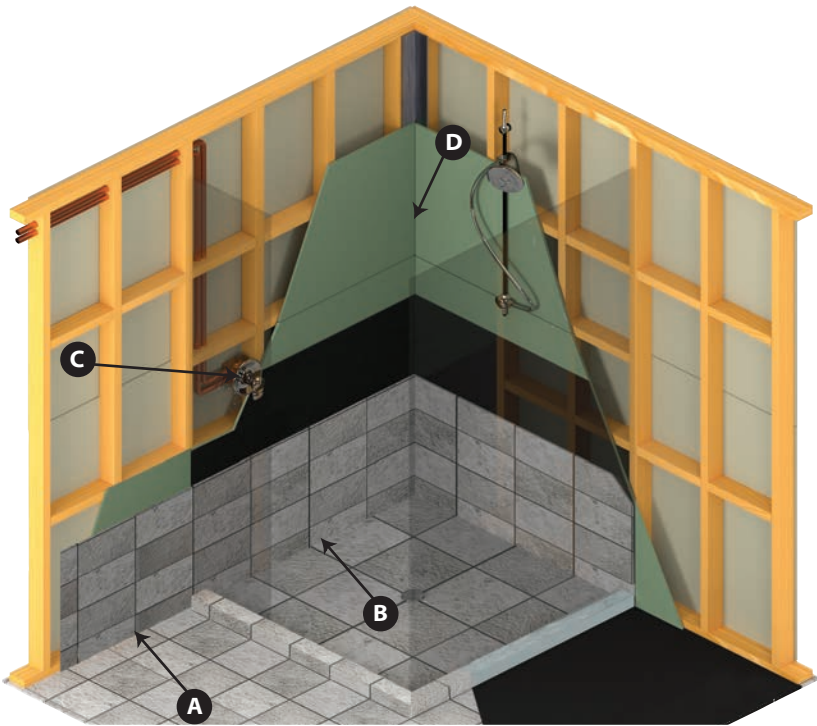
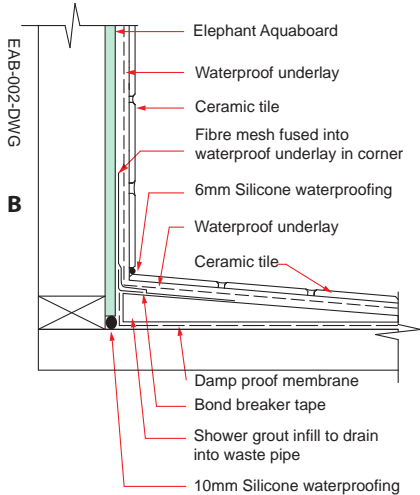
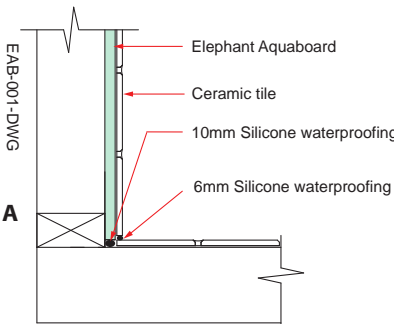
Showers - Tiled Walls and Tiled Base

Galvanised steel corner angle

A galvanised metal angle of minimum dimension 32mm x 32mm x .55mm BMT shall be installed in the corner of the shower before any plasterboard is installed, this ensures that any sudden movement in the shower will maintain the structural stability of the timber framing behind the shower and possible stop the tiles from cracking or displacement.

Fibre mesh and waterproof underlay

- A waterproof membrane must be applied to the tiled areas, refer to manufacturers recommendations and installation on waterproof membranes.
- All corners of the tiled area in the shower need embed reinforcing mats in the waterproofing membrane, refer to the manufacturers specifications and installation procedures.

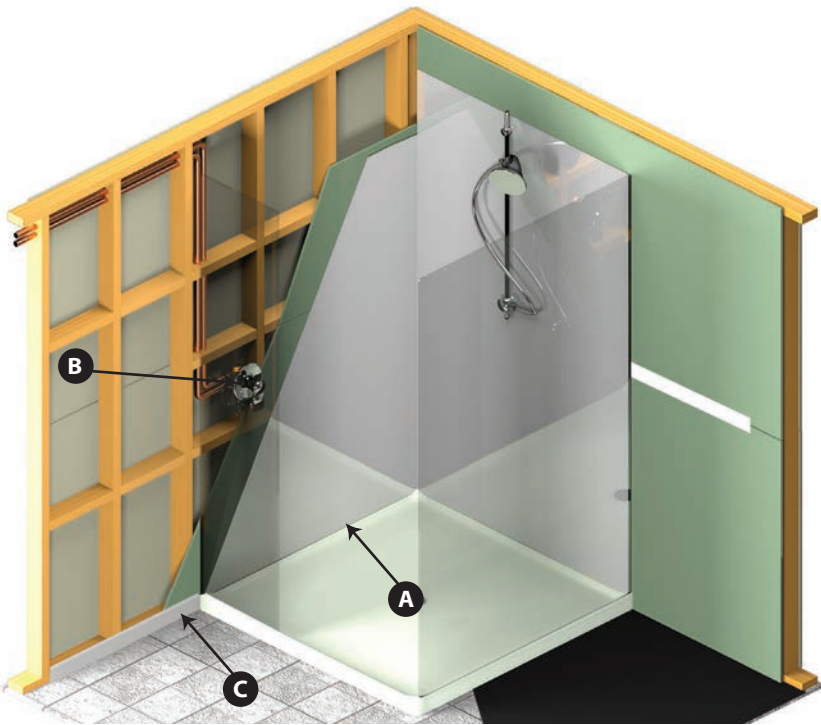
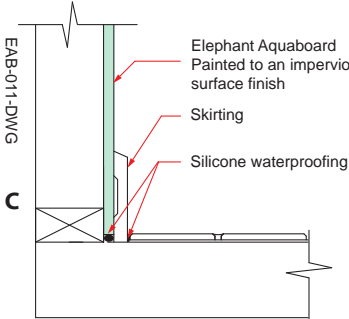
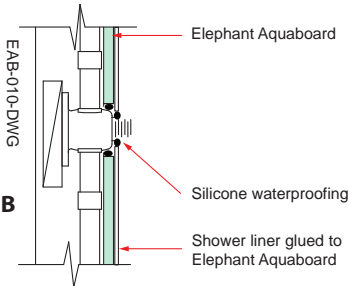
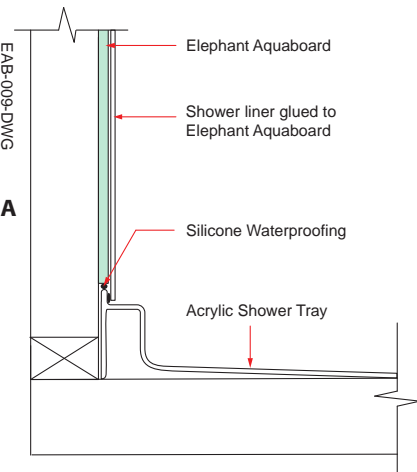


NOT FOR CONSTRUCTION

DESIGN DETAIL

Showers - Acrylic Liners & Base

- After fixing and stopping the Aquaboard to the shower enclosure area, it is not recommended that the Aquaboard be painted before gluing the acrylic liner to the wall surface, as the glue needs to bed into the surface of the paper before the acrylic liner is attached to the wall.
- Acrylic type showers are supplied by manufacturers and special consideration must be given before installation and fixing the shower liners. Ensure you read and follow all requirements and instructions.
- Ensure a bead of waterproof sealant is used between the top of the liner and the Aquaboard.



DESIGN DETAIL

Tiled Bath Upstand and Typical Vanity

Galvanised steel corner angle

It is highly recommended that a 32mm x 32mm x .55mm BMT galvanised equal angle plate is installed in the corner of the tiled upstand before any plasterboard is installed, this ensures that any sudden movement in the shower will maintain the structural stability of the timber framing behind the shower and possible stop the tiles from cracking or displacement.

Fibre mesh and waterproof underlay

- A waterproof membrane must be applied to the tiled areas, refer to manufacturers recommendations and installation on waterproof membranes.
- All corners of the tiled area in the upstand need embed reinforcing mats in the waterproofing membrane, refer to the manufacturers specifications and installation procedures.

