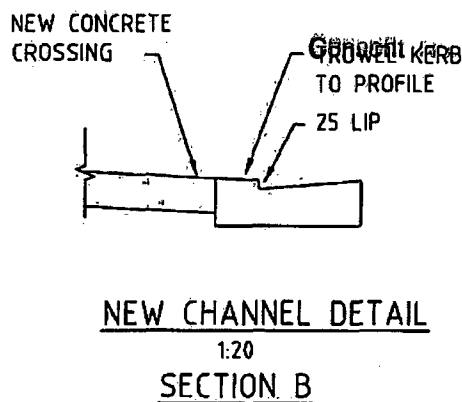
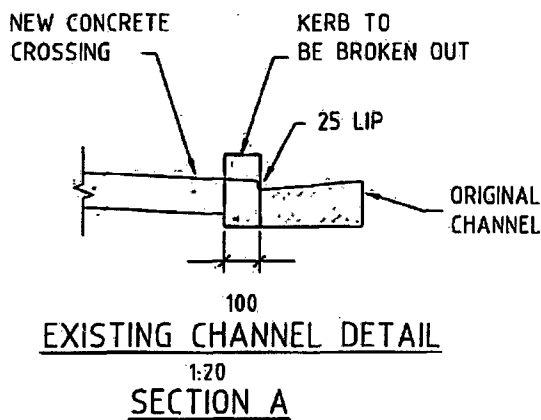
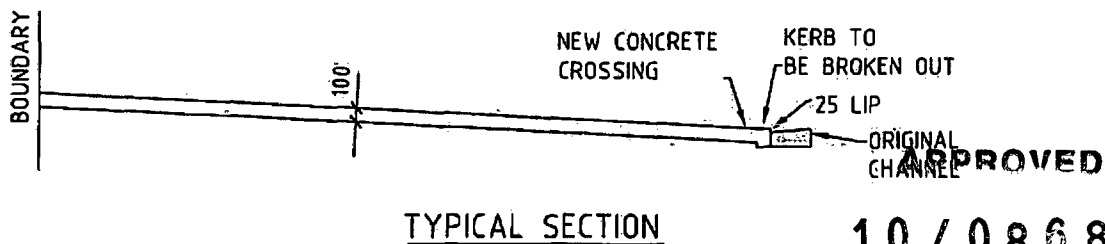
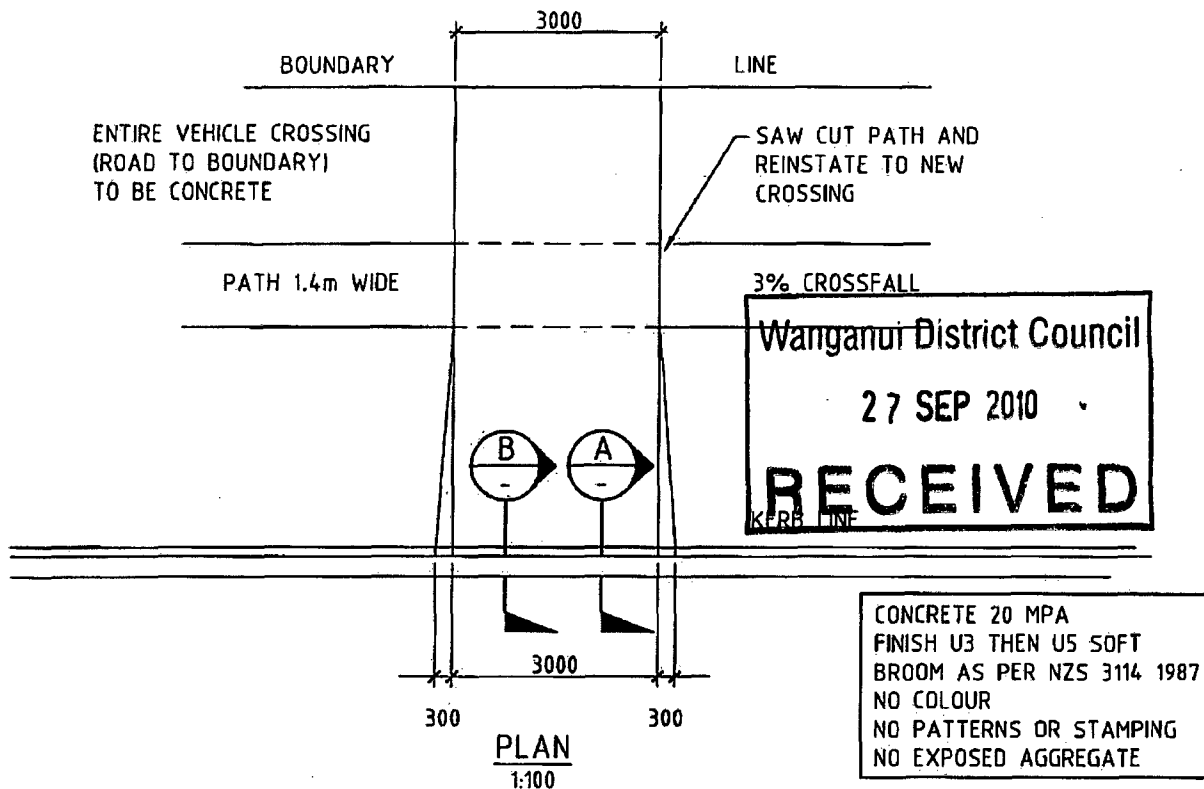


ORIGINAL SIZE A4 DO NOT SCALE - IF IN DOUBT, ASK

TAB/DWG : TAB-DWG

SERVER: WANGANUI (NZWANIS01)



NOTE

THIS DRAWING SHOWS AN ACCEPTABLE SOLUTION MEETING COUNCIL'S STANDARDS.
THE CROSSING WIDTH IS THE MINIMUM ALLOWABLE BUT MAY BE INCREASED UP TO 3.5m AT COUNCIL'S DISCRETION.
CROSSING WIDTHS GREATER THAN 3.5m REQUIRE RESOURCE CONSENT APPROVAL.
TO BE READ IN CONJUNCTION WITH DRAWING RD-WDC-009

DRAWN BY MWH

SCALES : AS NOTED		
	UNIT	DATE
DESIGNED		
DRAWN	LGS	11/05
CHECKED		
APPROVED		

WANGANUI DISTRICT COUNCIL
WANGANUI SUBDIVISIONAL STANDARD - DETAILS
VEHICLE CROSSINGS
URBAN RESIDENTIAL - CONCRETE FOOTPATH



Status Stamp	CONSTRUCTION	
Date Stamp	23/07/09	
Sheet No.	RD-WDC-001	Rev.
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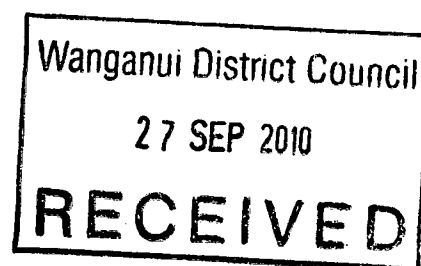
Lot 28 Lithgow Drive, Wanganui

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INDEX



CODE	WORK SECTION TITLE
A01	PRELIMINARIES AND GENERAL
A03	INSULATION CALCULATIONS TO NZS 4218
C01	SITE CLEARANCE, EXCAVATION AND FILLING
E01	CONCRETE WORK
F01	BLOCKWORK
H01	CARPENTRY
H03	JOINERY
H11	STRUCTURAL STEEL
H14	METALWORK
N01	ROOFING
R01	PLASTERBOARD LININGS
R03	GLAZING
V01	PAINTING
301	ALUMINIUM WINDOWS AND DOORS
501	DRAINAGE
502	PLUMBING
602	ELECTRICAL

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A01 PRELIMINARIES AND GENERAL

A01:01 GENERAL

0101 PARTIES TO THE WORK are:

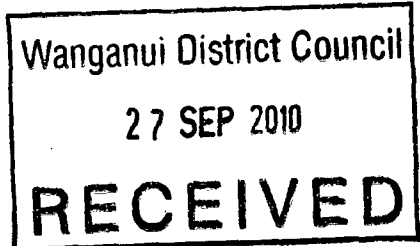
Employer:

Designer :

Engineer:

Quantity Surveyor: -

Territorial Authority: -



0121 SITE LOCATION and legal description are:

0071 THE SITE of the works is shown on the drawings and will be pointed out to Tenderers on request. Tenderers are advised to visit the site and check the slope of the ground, subsoil conditions, any site features etc., as no extras will be paid for foundation work, site drainage or levelling not detailed or specified and which should have been apparent from proper inspection.

0141 SITE LIMITATIONS: Confine access and work to the area of the site indicated on the drawings.

0151 SCOPE: Carry out the contract in accordance with the full intent and meaning of the contract documents taken collectively or separately and including any work which is to be reasonably inferred from those documents all to the satisfaction of the Architect.

A01:02 DOCUMENTATION

0201 FORM OF CONTRACT: The form of contract will be the current A7 General Conditions of Contract plus Addenda and Appendices, Special Conditions of Contract and any amendments or supplementary conditions as noted in Addenda or Appendices of the General Conditions or these Preliminaries. A copy of the General Conditions of Contract is available for inspection at the offices of the architect.

0221 NZ BUILDING CODE: Throughout this specification references are made to BIA Approved Documents which are made up of the appropriate Building Code clause with the addition of Acceptable Solutions that are a means of compliance.

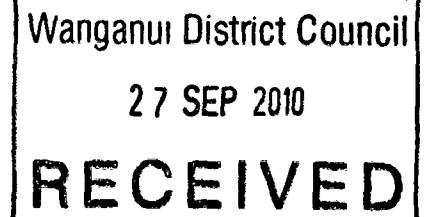
The following is a list of Approved Documents referred to in this specification. There may be other Approved Documents that need to be complied with but which are not a required part of this specification.

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B1/AS1	Structure - general
B1/AS2	Structure - timber barriers
B1/AS3	Structure - small chimneys
B1/AS4	Structure - foundations
C1/AS1	Outbreak of fire
D1/AS1	Access routes
E1/AS1	Surface water
E2/AS1	External moisture
E3/AS1	Internal moisture
F2/AS1	Hazardous materials
F4/AS1	Safety from falling
F5/AS1	Construction and demolition hazards
G1/AS1	Personal hygiene
G4/AS1	Ventilation
G8/VM1	Artificial light
G9/VM1	Electricity
G10/AS1	Piped services
G11/AS1	Gas as an energy source
G12/AS1	Water supplies
G13/AS1	Foul water - sanitary plumbing
G13/AS2	Foul water - drainage



0225

STANDARDS: Throughout this specification, references are made to Standards produced by the Standards Association of New Zealand and other Associations as well as various Acts and Regulations. The latest edition at the date of tender - including Provisional standards - applies unless stated otherwise. It is the responsibility of Contractor and of Subcontractors to be informed of the material in those publications which are referred to in this specification.

NZ Standards which may be referred to throughout this specification are listed below. This is not necessarily a complete list.

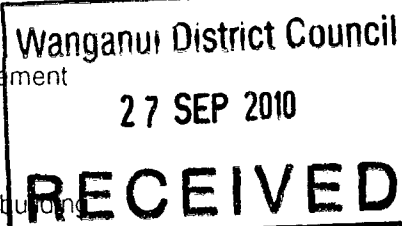
NZS 366	Clay building bricks
1158	Doors
2033	Installation of polyethylene pipe systems
2295	Building papers, (breather type)
3101	Design of concrete structures - Pt 1.
3102	Concrete masonry units
3103	Sands for mortars and internal and external renderings
3104	Concrete production, high grade and special grade
3108	Concrete production, ordinary grade
3109	Concrete construction
3111	Methods of test for water and aggregate for concrete
3112	Methods of test for concrete, parts 1 to 4
3114	Concrete surface finishes
3117	Pigments for portland cement and portland cement products
3121	Water and aggregate for concrete
3122	Portland cement
3124	Concrete construction for minor works
3302	Ceramic pipes fittings and joints
3402	Steel bars for the reinforcement of concrete
3403	Hot dipped galvanised corrugated steel sheet for building purposes

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- 3421 Steel wire for concrete reinforcement
- 3422 Welded fabric of drawn steel wire for concrete reinforcement
- 3441 Hot dipped zinc - coated steel coil and cut lengths
- 3501 Copper tubes for water gas and sanitation
- 3504 Aluminium windows
- 3602 Specifying timber and wood-based products for use in buildings
- 3603 Timber Design
- 3604 Light timber frame buildings not requiring specific design
- 3606 Manufacture of glue-laminated timber
- 3608 Resin bonded wood chipboard
- 3610 Profiles of moulding and joinery
- 3614 Manufacture of construction plywood
- 3615 Strength properties and design methods for construction plywood
- 3616 Finger jointed timber
- 3617 Profiles of weatherboards, fascia boards and flooring
- 3619 Timber windows
- 3631 NZ national timber grading rules
- 3640 Minimum requirements of NZ Timber Preservation Council
- 4203 General structural design and loadings for buildings
- 4206 Concrete interlocking roofing tiles
- 4210 Masonry construction materials and workmanship
- 4211 Performance of windows
- 4214 Methods of determining the total thermal resistance of parts of buildings
- 4217 Pressed metal tile roofs
- 4218P Minimum thermal insulation for residential buildings
- 4221 Fibrous plaster sheets
- 4223 Glazing in buildings.
- 4229 Concrete masonry buildings not requiring specific design
- 4230 Design of masonry structures
- 4234 Cellulose cement products - corrugated sheets for roofing and cladding
- 4251 Solid plastering
- 4303 Ventilation for acceptable air quality
- 4452 Construction of underground pipe sewers and drains
- 4602 Low pressure copper thermal storage electric heaters
- 5258 Gas distribution
- 5261 Installation of gas burning appliances and equipment
- 5841 Reduction of slip hazards : Part 1
- 6401 PVC - insulated cables for electric power and lighting
- 7641 Unplasticized pvc waste and ventilating pipe, fittings and accessories 32, 40 and 50mm
- 7643 Installation of unplasticized pvc systems
- 7646 Polythylene pipe and fittings for gas reticulation
- 7649 Unplasticized pvc underground drain pipes and fittings
- 7703 Painting of buildings



A01:3 OBLIGATIONS

- 0301 COMPLY with the NZ Building Code and all statutory obligations and regulations of Territorial Authorities and Regulatory Bodies with regard to the execution of the contract.
- 0311 BUILDING CONSENTS/NOTICES: Uplift the building consent and confirm with the Territorial Authority the notices to be given and the inspection requirements needed to ensure compliance with the NZ Building Code.

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- 0321 CODE COMPLIANCE CERTIFICATE: Apply for and obtain for the Principal the Code Compliance Certificate for this building work from the Territorial Authority as prescribed under the Building Act 1991, Section 43 (3).
- 0331 COMPLIANCE SCHEDULE: Obtain from the Principal the list of systems and features that were agreed as completing the Compliance Schedule when application was made for Building Consent. Supply to the Principal the inspection, maintenance and reporting procedure information of each system or feature of the building needed to complete the schedule for issue by the Territorial Authority.
- 0341 INSURANCES: Refer to the conditions of contract and take out all insurance cover called for, stating in the tender those amounts.
- 0351 SAFETY: Comply with all regulations applying to the safety, health and welfare of workers.
Fence off, light or otherwise separate any source of danger on the site to people outside of work hours.
- 0361 NUISANCE: Take all reasonable precautions to prevent damage and nuisance from water, fire, smoke, vehicles, dust, rubbish, noise and any other causes resulting from the construction works. Comply with the requirements of the Territorial Authority and relevant Acts and Standards.

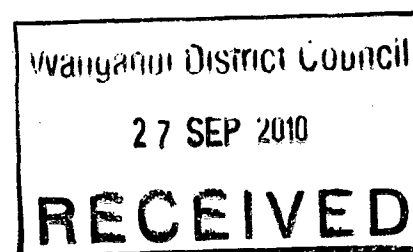
A01:04 MANAGEMENT

- 0411 PROGRAMME: Provide within 2 weeks of tender acceptance an approved programme chart for the contract including the work of nominated sub-contractors and other work concurrent with the contract.
- 0421 SITE MEETINGS: Allow for holding site meetings when required by the architect. The main-contractor's representative and site foreman are to attend such meetings and inform subcontractors when their presence is required.
Meetings will normally be held (weekly/fortnightly/monthly)
- 0431 ATTEND upon all subcontractors and other trades and render them reasonable assistance, including use of standing scaffolding, connection points for water, power and lighting, provision of extra fixing drawings and the clearing away of rubbish from a predetermined point.

A01:05 TEMPORARY WORKS/SERVICES

- 0511 PROVIDE, erect and maintain all necessary scaffolding, sheds, toilet, water, power, hoardings and access to the site. Allow for all necessary cartage, craneage, plant hire, storage or the like. Arrange for all temporary works and services necessary for the completion of the works, including that for nominated subcontractors. Pay all fees in connection therewith and remove on completion of the contract.
- 0521 SITE TELEPHONE: Provide a site telephone for the duration of the contract.

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0541 PROTECT all parts of the work liable to damage and all adjoining property, and all existing site features to be retained, until completion of the contract. Take all precautions necessary to protect the works from damage by unauthorised entry or inclement weather. Keep the site and works clean and tidy.

A01:06 MATERIALS/WORKMANSHIP GENERALLY

0611 MATERIALS are to be new unless otherwise stated, the best quality of their respective kinds, and complying with relevant BIA Approved Documents, NZ Standards and Regulations.

0621 WORKMANSHIP: Conform to good trade practice and the relevant Codes of Practice in current use in NZ. All work to be level, plumb, and true to line and face. Employ only experienced workers familiar with the materials and techniques specified.

0631 SUPPLY all labour, materials, services, temporary works and equipment and plant required for the proper execution and completion of the contract works.

A01:08 COMPLETION

0811 GUARANTEES, stating the period and any special obligations, may be called for in any work section of this specification. The general terms of such guarantees are covered by the General Conditions of Contract but in no case shall the terms or conditions accepted negate the minimum remedies available under common law as if no guarantee had been offered or accepted.

0821 CLEAR AWAY all trade debris from the site and leave the building clean and ready for occupancy, with all services operating and mechanical parts in good working order. Remove all temporary markings, coverings and protective wrappings. Clean all glass inside and out.

END OF SECTION

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0101 SCOPE: This section deals with the clearance/excavation/filling as shown on:
Architectural and structural drawings.

0102 REFER TO PRELIMINARIES, section A01 for items affecting this section.

0121 DOCUMENTS referred to in this section are:

NZS 3604 Light timber frame buildings not requiring specific design

Documents listed above and cited in the clauses which follow are deemed to form part of this specification.

However this specification takes precedence in the event of it being of a higher standard than the cited documents.

0131 SITE VISIT: Visit the site and make all necessary investigations as to conditions.

0141 ANTIQUITIES: All fossils, antiquities and other objects of interest or value which may be found on the site are the property of the employer.

C01:05 CLEARANCE

0501 PREPARATION: Comply with NZS 3604 - Clause 3.4, Site preparation. Remove all turf, vegetation, trees, topsoil, stumps and rubbish from the area to be built on.

0511 TOPSOIL: Stockpile excavated topsoil on site where directed by the architect. Keep separate from other excavated materials. Spread and level where directed before completion of contract.

C01:06 EXCAVATION

0601 GENERAL EXCAVATION: Trim ground to required profiles, batters, falls and levels. Remove all loose material. Protect all cut faces from collapse. Keep all excavations free from water. General excavation is assumed to be in material other than rock.

0611 ROCK EXCAVATION: Tenderers must state their monetary rate/cubic metre for excavation in rock.

0621 EXCAVATION FOR FOOTINGS: Footing excavations are to be taken down to depths shown. Trenches must be plumb and straight, bottoms level and solid, stepped as required and kept clean and free of water.

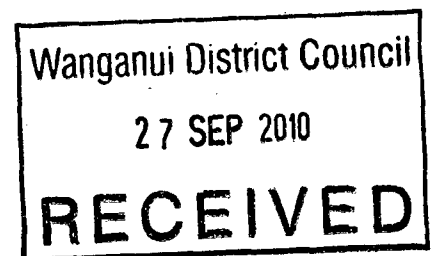
0631 INADEQUATE BEARING: If, due to any cause, bearing becomes inadequate then excavate further, backfill and compact to approval with material as follows:

Below slabs on grade:	Hardfill
Below footings:	10MPa concrete
Service trenches:	Hardfill

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- 0641 EXCESS EXCAVATION: If, for any reason, excavation exceeds the required depths, backfill and compact to correct level with material as shown in the table above at no cost to employer.
- C01:07 FILLING
- 0701 GRANULAR BASE FOR SLABS: To conform with Appendix E5, Granular Base, of NZS 3604. Consolidate with a vibrating roller. Blind the surface with coarse sand and roll ready to receive a polythene sheet vapour barrier.
- 0731 GENERAL BACKFILLING: Use excavated material, compacted in 150mm layers. The last 200mm to be clean top soil lightly compacted and neatly finished off.
- C01:08 COMPLETION
- 0801 SURPLUS MATERIAL: Remove and dispose off the site any surplus excavated material including that excavated for drains.

END OF SECTION



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E01 CONCRETE WORK

E01:01 GENERAL

- 0101 SCOPE: This section deals with the formwork, reinforcing, mixes and the placing of concrete in buildings and in landscaping.
- 0102 REFER TO PRELIMINARIES: Section A01 for items affecting this section.
- 0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

- B1/AS1 Structure - general
2.0 Concrete
- B1/AS3 Structure - small chimneys
- B1/AS4 Structure - foundations
1.0 Foundations for small buildings
- E2/AS1 External moisture
4.0 Floors
5.0 Basements.

0121 DOCUMENTS referred to in this section are:

- NZS 3104 Concrete production - high grade and special grade
- NZS 3108 Concrete production - ordinary grade
- NZS 3109 Concrete construction
- NZS 3114 Concrete surface finishes
- NZS 3124 Concrete construction for minor works
- NZS 3402 Steel bars for the reinforcement of concrete
- NZS 3422 Welded fabric of drawn steel wire for concrete reinforcement
- NZS 3604 Light timber frame buildings not requiring specific design

Documents listed above and cited in the clauses which follow are deemed to form part of this specification.

However this specification takes precedence in the event of it being of a higher standard than the cited documents.

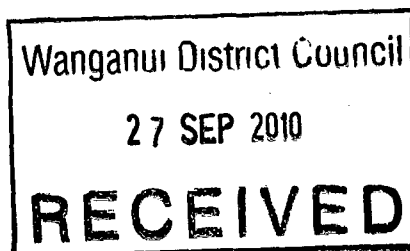
E01:02 MATERIALS

- 0201 GENERAL: All materials for concrete work to comply with NZS 3109.
- 0211 FORMWORK:
- | | |
|---------------|---|
| Framing | No 2 Framing radiata pine |
| Boards | No 2 Framing radiata pine |
| Rigid Sheets: | Construction plywood CP-D grade Hardboard |
- 0221 REINFORCEMENT: Grade 300 deformed bars, to NZS 3402.
668 and 665 welded reinforcing mesh, to NZS 3422.
- 0231 VAPOUR BARRIER: 0.25mm minimum polythene to NZS 3604 Appendix E8.

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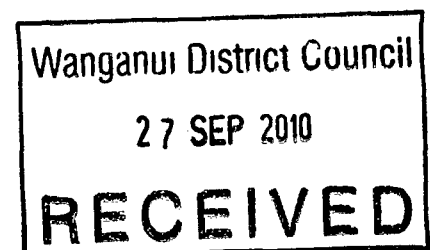
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- 0241 READY-MIX CONCRETE: High grade 20 MPa, maximum aggregate size 19mm to NZS 3104.
- 0251 SITE-MIX CONCRETE: Ordinary grade 20 MPa with separate batching of sand and coarse aggregate all to NZS 3108.
- 0261 SITE WORKS CONCRETE: 1:8 - cement:all-in aggregate with minimum water for workability, all materials and batching to NZS 3108.
- E01:05 WORKMANSHIP
- 0501 GENERALLY: Workmanship and construction to comply with NZS 3109 and NZS 3604.
- 0511 INSPECTION: Place no concrete until all excavations, boxing and reinforcing have been inspected and passed by both the architect and Terretorial Authority inspector.
- 0521 FORMWORK: To be securely fixed and braced, have sufficient strength to support all loads and with joints and linings tight enough to prevent loss of water. Hose out to clean thoroughly and keep wet before and after concrete is placed.
- 0531 VAPOUR BARRIER: Apply polythene with 150 mm laps, tape sealed to laps and penetrations.
- 0541 REINFORCEMENT: To comply with NZS 3109. Bends to be made cold, without fracture. All reinforcing to be accurately placed and well secured against displacement. Do not weld reinforcement.
- 0551 FLOOR SLABS: Construct in accordance with NZS 3604 Appendix E. Lay to true and straight surfaces, screeded, floated and steel (manual or power) trowelled to a Class U3 NZS 3114 finish. Tolerance on flatness to be a maximum 3 mm gradual deviation over a 3 metre straight-edge.
- 0561 SAW CUTS: Cut slabs where shown on drawings and as required to control shrinkage cracking. Cutting to be carried out as soon as possible, without causing tear-out of aggregate and before shrinkage cracking has occurred. This will generally be within 72 hours of pouring. Where saw cuts are to be made, cut out 100mm of every second wire of the mesh for a length of 50mm each side of the saw cut position.
- 0571 EXPOSED CONCRETE: Provide formwork with board/smooth plywood/hardboard linings where the finish is exposed. Surface finish to be F4/F5/F6 for surface tolerance, colour variation, physical irregularities and surface dressing as required by NZS 3114. Discuss with and obtain approval from the Architect of the type of joint to be used.
- 0581 CASTING IN: Allow to build in all grounds, holding down bolts, pipes, sleeves etc as required by the various trades and as shown on the drawings, prior to pouring the concrete.

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E01:08 COMPLETION

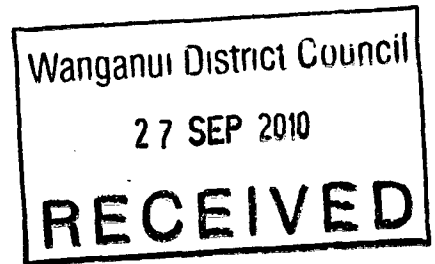
0801 CLEAN OUT saw cuts after a period of not less than six weeks, and fill with cement grout where the floor will be covered with carpet or vinyl. Where the slab is exposed fill joints with gun-grade sealant over a back-up of PEF rod in accordance with manufacturers recommendations.

0811 CURING OF CONCRETE: Protect fresh concrete from premature drying and extremes of temperature. Use suitable methods to limit evaporative drying and keep damp for not less than seven days. Ensure curing of slabs commences as soon as possible after final finishing, by the use of continuous water sprays, ponding, or the application of a curing membrane. Make sure any membrane used will not affect subsequent applied finishes.

0821 STRIKE FORMWORK without damaging or overloading structure. Do not remove formwork before the following minimum periods:

Sides of beams, walls and columns	12 hours
Slabs in beam and slab construction (leave props under slab spans over 2m)	4 days
Props from under slab spans over 2m	10 days
Beams, soffits and slab spans over 5m	18 days

END OF SECTION



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F01 CONCRETE MASONRY

F01:01 GENERAL

0101 SCOPE: This section deals with the:
a) supply and laying of concrete blocks
b) supply and placing of reinforcing steel
c) grouting of walls

0102 REFER TO PRELIMINARIES, section A01, for items affecting this section.

0115 NZ BUILDING CODE: The Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

B1/AS1 Structure - general
3.0 Masonry
B1/AS4 Structure - foundations
1.0 Foundations for small buildings
E2/AS1 External moisture
2.0 Walls

0121 DOCUMENTS referred to in this section are:

NZS 3102 Concrete masonry units
NZS 3402 Steel bars for the reinforcement of concrete.
NZS 4210 Masonry construction materials and workmanship.
NZS 4229 Concrete masonry buildings not requiring specific design.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However, this specification takes precedence in the event of it being a higher standard than the cited documents.

0131 BLOCKLAYER QUALIFICATIONS: All work in this section to be carried out by competent experienced tradesmen.

0141 INSPECTION: Allow for inspection of the work at critical stages such as set out, reinforcing, and prior to and during grouting, to recognised good trade practice as set out in NZS 4210.

0151 QUALITY RECORDS: Keep accurate records relating to strength and quality of materials used in the construction, and make available to the architect or Territorial Authority inspectors when requested.

F01:02 MATERIALS

0201 GROUT: To conform to NZS 4210

Minimum properties for this work are: -

Design strength at 28 days: 20 MPA

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Maximum aggregate size: TO SUIT

Spread Value: 450 - 530 mm

- 0231 BLOCKS: To conform with NZS 3102.
- 0251 REINFORCEMENT: To conform with NZS 3402.
- 0271 MORTAR: Conform to the requirements of NZS 4210 to provide a compressive strength of not less than 12.5 MPa for structural walls and work below ground, or 8.5 MPa for all other masonry.
- F01:05 WORKMANSHIP**
- 0501 GENERALLY: Comply with NZS 4210 and NZS 4229.
- 0511 STORE BLOCKS: Clear of the ground, under cover and well ventilated until placed in the work.
- 0521 CHECK BASE: Check that the base concrete on which blockwork is to be built is true to line and level. If more than 20mm thickness of mortar bed will be needed to correct inaccuracies obtain direction from the architect. Ensure that all laitance, loose aggregate, or anything that would prevent bond is removed prior to block laying.
- 0531 STARTER POSITIONS: Before commencing block laying check location of starter reinforcement by measure or by a dry trial lay up of the first course. Do not attempt to correct misplacement by cranking bars. Where misplacement exceeds the location tolerance obtain direction from the architect.
- 0541 TOLERANCES: Construct within the tolerances set out in NZS 4210 Clauses 2.6.5 and 2.7.1.4. Lay blocks with jointing of consistent thickness throughout.
- 0551 MOISTURE CONTENT: Ensure that blocks are air-dry prior to laying.
- 0561 PROTECTION: Protect fair faced block walls to keep them clear of all mortar droppings, grout splashes, or stains of any kind as the work proceeds.
- 0571 LAYING: Use good trade practice to ensure consistent fully filled and tooled joints. Where walls are reinforced prevent mortar droppings from entering cells to be grouted, or clean out by adequate means prior to grouting. Unless Low Lift grouting is used, provide clean out holes at base of wall. Ensure reinforcement is accurately placed and tied. Lay in regular running bond with all necessary special units and sill blocks. Cut blocks if necessary true and square without chipping.
- 0581 CONTROL JOINTS: Locate at major changes of wall height or thickness, at openings, and at not more than 8 metre centres, or as shown on the drawings. Where reinforcement passes through a control joint, provide for breaking bond using methods detailed on Fig. 2.10.1 of NZS 4210, unless specifically detailed otherwise on the drawings.
- 0591 BRACING: Provide adequate temporary lateral bracing where necessary to ensure stability until final supporting construction is in place.

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F01:06 GROUTING

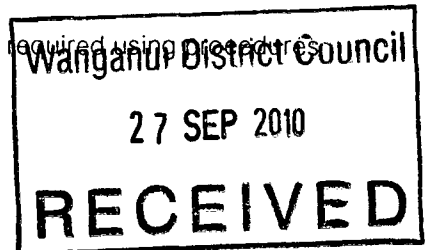
0601 INSPECTION: Inspect walls prior to grouting. Ensure that cells are clean and reinforcement is correctly placed. Where high lift grouting is used, seal the clean out holes and brace to prevent blow outs.

0611 CONTENT OF GROUTING: Unless specifically noted otherwise on the drawings walls containing reinforcement may be intermittently filled, requiring grouting of cells containing reinforcement only. The contractor may use solid filling to all cells if this better suits his grouting method.

0621 GROUTING PROCEDURE: Grout fill the block walls where required using procedures set out in NZS 4210.

The methods acceptable on this job are:

- (a) high lift grouting with expansive admixture.
- (b) high lift grouting with reduced compaction.
- (c) low lift grouting.



0631 CONSTRUCTION JOINTS: Form and treat construction joints between grout pours and between block walls and hardened concrete work so that bonding occurs. Comply with NZS 4210 Section 2.16 to ensure this happens.

F01:07 ANCILLARY WORK

0701 BUILD IN COMPONENTS: Mortar in place as the work proceeds, components such as sills, copings, lintels, and steps.

0711 BUILD IN FIXINGS: Build in all necessary plugs, bolts, ties, metal flashings, dowels, fastenings and fixings required by this and other work sections. Co-operate with others to meet this requirement.

F01:08 COMPLETION

0801 PROGRESSIVE CLEANING: Clean off mortar splashes and grout spills if and as they occur making good any damage at the same time.

0811 FINAL CLEANING: At completion, clean down all block work and remove waste material from adjoining surfaces and floors.

END OF SECTION

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H01 CARPENTRY

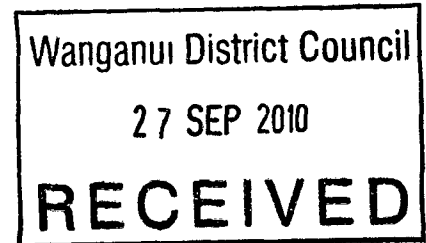
H01:01 GENERAL

0101 SCOPE: This section deals with the supply and erection of timber framing and flooring, timber and timber product exterior sheathing and internal lining.

0102 REFER TO PRELIMINARIES, Section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

B1/AS1	Structure - general 4.0 Timber
B1/AS2	Structure - timber barriers
E2/AS1	External moisture 2.0 Walls 4.0 Floors 6.0 Construction moisture
F4/AS1	Safety from falling 2.0 Construction site barriers
F5/AS1	Construction and demolition hazards 1.0 work-site barriers



0121 DOCUMENTS: Referred to in this section are:

NZS 2295	Building papers (breather type).
NZS 3109	Concrete construction.
NZS 3602	Specifying timber and wood-based products for use in building.
NZS 3603	Timber design
NZS 3604	Light timber frame buildings not requiring specific design.
NZS 3606	Manufacture of glue-laminated timber.
NZS 3608	Resin bonded, wood chipboard
NZS 3614	Manufacture of construction plywood.
NZS 3616	Finger jointed timber.
NZS 3617	Profiles of weatherboards fascia boards and flooring.
NZS 3631	NZ National timber grading rules
NZS 3602 : 2003	Minimum requirements of TIMBER TREATMENT
NZS 4214	Methods of determining the total thermal resistance of parts of buildings.
NZS 4218P	Minimum thermal insulation for residential buildings.
PS60-73US	Department of Commerce - hardboard siding.
NZS 4234	Cellulose cement products - corrugated sheets for roofing and cladding.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However this specification takes precedence in the event of it being of a higher standard than the cited documents.

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H01:02 MATERIALS

- 0221 TIMBER PILES: Timber treated to NZMP 3640 H5 Group A and all to NZS 3604 for footing and type.
- 0231 FRAMING: Grading to NZS 3602 : 2003
- 0241 LAMINATED TIMBER: Radiata pine laminations to NZS 3606, H1 treated internally and H3 externally to NZMP 3640, standard finish and weather resistant sealed.
- 0251 TIMBER WEATHERBOARDS: SEE PLAN
- 0281 FASCIA & BARGEBOARDS: SEE PLAN
- 0291 STRIP FLOORING: Dressing grade to NZS 3631. H1 treated to NZMP 3640 and profiles to NZS 3617.
- 0321 BUILDING PAPER: Light weight breather type flame proof kraft paper laminates to NZS 2295.
- Brand: NZFG
- 0331 ALUMINIUM FOIL: Aluminium sheet, kraft paper fibre reinforced laminates to NZS 4222 and fitted to NZS 4218.
- Brand: NZFG
- 0341 DAMP PROOF COURSE: Heavy kraft strip laminates saturated and coated with bitumen.
- 0351 PARTICLE BOARD: Flooring grade high density resin bonded to NZS 3608.
- Brand: PINEX
- 0361 PLYWOOD: Construction plywood to NZS 3614 for bracing. Interior plywood to NZS 3612 for interior finish.
- 0371 FIBRE CEMENT SHEET: Cellulose cement fully compressed auto-claved sheets to NZS 4234.
- Brand: HARDIES
- 0381 MELAMINE FACED SHEET: Melamine sheet factory laminated to tempered fibreboard to BS 1142 Pt 2.
- Brand: FORMICA
- 0391 NAILS: Steel and galvanised steel of pattern to suit location and to Appendix A, NZS 3604.
- 0401 BOLTS & SCREWS: Steel and galvanised steel to suit location and to NZS 3604.

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0411 NAIL PLATES: Toothed or nailed steel plates to manufacturer's design for particular location shown on the drawings.

Brand: LUMBERLOK

0431 CONCRETE: For piles and footings ordinary grade 17.5 MPa to NZS 3109 and NZS 3604.

H01:05 WORKMANSHIP

0501 GENERALLY: Comply with NZS 3604 except as varied in this specification. Workmanship to be in accordance with the best trade practice and to current syllabi for NZ Trade Certificates in carpentry, joinery and timber machining.

0511 INSPECTIONS: Allow for and ensure that inspections required for NZ Building Code compliance are carried out at the required times.

0521 ATTENDANCE: Allow for attending on all trades as is normal trade practice. Provide and fix all blocks, nogs, openings and other items as required for them.

0551 TIMBER PILES: Auger bore holes at selected sites and seat timber piles to NZS 3604.

0561 SUB-FLOOR FRAMING: Frame up off foundation walls and piles, all fabricated, fastened and braced to Sections 2.5, 4.8 and 4.9, NZS 3604.

0571 FLOORS: Framed and fastened to sections 5.1 and 5.3 NZS 3604.

0581 WALL FRAMING: Frame to required loading and bracing complete with lintels, sills and nogs all fabricated and fastened to NZS 3604: 2003

0591 ROOF FRAMING: Frame to required loading and bracing complete with valley boards, and purlins. All fabricated and fastened to NZS 3604: 2003

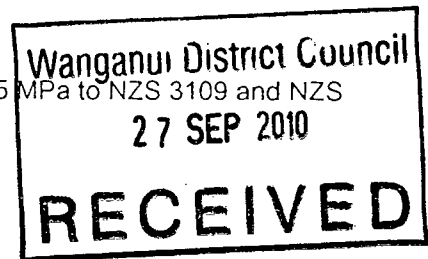
0601 PAPERS AND INSULATIONS: Lay aluminium foil insulating sheet, fix breather type building paper and fit insulation as detailed and to manufacturer's recommendations.

0611 TIMBER STRIP FLOORING: Lay and fasten to Section 5.2, NZS 3604. Secret nails and sand off with one coarse and one fine paper, hand scraping into corners.

0621 PARTICLE BOARD FLOORING: Lay and fasten to manufacturer's recommendations and Section 5.2, NZS 3604. Punch nails and sand off with one coarse and one fine paper, hand scraping into corners.

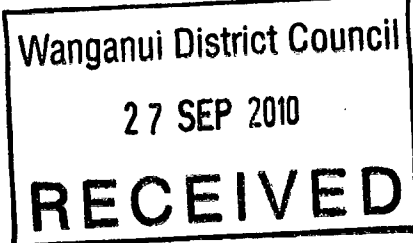
0631 TIMBER WEATHERBOARDS: Fix to framing, true to line and face and to Sections 8.1 and 8.2, NZS 3604.

0651 FIBRE CEMENT SHEET: Fix to timber framing to detail and to manufacturer's recommendations with pvc jointers.



0661 MOISTURE CONTENT at time of fixing or installing:

Framing Timbers 18-20%
Exterior Trim 12-14%
Weatherboards 12% max
Flooring 10% max



0671 SCHEDULE OF TIMBER FRAMING AND FINISHES: Refer to appendix at end of this section.

0681 PRIME OR SEAL: faces, edges and end grain before fixing of all weatherboards and exterior trim to finish and workmanship specified in Section V01 - Painting.

0691 MELAMINE FACED SHEET: Fix to timber framing with jointing as detailed and to manufacturer's recommendations.

H01:08 COMPLETION

0801 LEAVE all this work in proper condition for the work of following trades. Take away from the site all trade rubbish.

0671 SCHEDULE OF TIMBER FRAMING AND FINISHES

<u>Member</u>	<u>Size</u>	<u>Centres</u>	<u>Species & Grade</u>	<u>Treatment</u>
---------------	-------------	----------------	----------------------------	------------------

Sub-floor framing:

Timber piles	125 x 125	See dwgs.		H5 Group A
Bearers	To NZS3604	To NZS3604	MSG 8	H3.2
Floor joists	150 x 40 150 x 50 200 x 50 200 x 50	450 450	MSG 8 MSG 8	H3.2 (EXPOSED) H1.2 (NOT EXPOSED)

Flooring:

Particle Board	20mm	High Density
Strip Flooring	ex. 150 x 25	Matai Dressing A Heart.

Wall Framing: (REFER TO PLAN)

Bottom Plate	100 x 50		MSG 8	H1.2
Studs	100 x 50	600	MSG 8	H1.2
Noggings	100 x 50	600	MSG 8	H1.2
Top Plate	100 x 50		MSG 8	H1.2
LINTELS	(SEE PLAN)		MSG 8	H1.2

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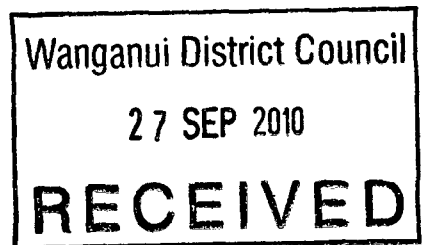
Roof Framing:

Ceiling Battens	75 75x 40	450	MSG 8	H1.2
Rafters			MSG 8	H1.2
Laminated Beams			MSG 8	H1.2

Cladding & Trim:

Weatherboards	ex.	REFER	DRAWINGS	H3.2
Fascias	ex.		"	H3.2
Barges	ex.		"	H3.2

END OF SECTION



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H03 JOINERY

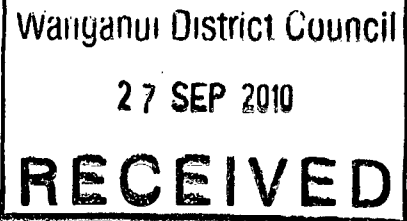
H03:01 GENERAL

0101 SCOPE: This section deals with timber joinery in general including doors, door frames, windows, interior glazing, stairs, fittings, mouldings and trim.

0102 REFER TO PRELIMINARIES, section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the NZ Building Code.

- D1/AS1 Access routes
 - 1.0 General criteria
 - 3.0 Ramps
 - 4.0 Stairways
 - 6.0 Handrails
 - 7.0 Doors and openings
- E2/AS1 External moisture
 - 3.0 External joinery



0121 DOCUMENTS referred to in this section are:

- NZS 1158 Doors
- NZS 3604 Light timber frame buildings not requiring specific design.
- NZS 3608 Resin bonded, wood chipboard
- NZS 3610 Profiles of mouldings and joinery
- NZS 3616 Finger jointed timber
- NZS 3619 Timber windows
- NZS 3631 NZ national timber grading rules
- NZS 4211 Performance of windows
- NZS 4303 Ventilation for acceptable air quality
- NZS 5841 Reduction of slip hazards Pt. 1.
- Joinery Manufacturers Federation: Technical Manual

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However, this specification takes precedence in the event of it being of a higher standard than the cited documents.

H03:02 MATERIALS

0201 EXTERIOR FRAMES: Heads, jambs and sills to NZS 3610 and NZS 3619 profiles or as detailed.

0211 INTERIOR FRAMES: Heads and jambs 20 mm sections with 10 mm planted stops as detailed/rebated for wall linings.

0221 INTERIOR FRAMES SOLID: Heads and jambs solid rebated to NZS 3610 or as detailed.

0231 WINDOW FACINGS/SCRIBERS: To NZS 3610 or as detailed.

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- 0241 ARCHITRAVES: To NZS 3610 or as detailed.
- 0251 SKIRTINGS: To NZS 3610 or as detailed.
- 0261 PARTICLE BOARD: Medium density fibreboard resin bonded to NZS 3608

Thickness: TO SUIT

- 0291 EXTERIOR DOORS: Solid timber framed, panelled and or bead glazed to NZS 1158.
- 0311 SOLID DOORS: To NZS 1158 with clashing strips two sides.
- 0341 HOLLOW CORE DOORS, PAINT: To NZS 1158 with clashing strips two sides.
- 0371 DOOR HINGES to be butt hinges, zinc plated fixed pin for exterior use. Bright steel, chrome plate or florentine bronze loose pin for interior use and to suit adjoining finish. Size and gauge to carry door size and weight - 1 1/2 pair per door.
- 0381 CUPBOARD FURNITURE HINGES: To be spring loaded chrome plate finish with opening range from 100° to 170° to suit location.

Brand: SELECTED

- 0401 SLIDING DOOR GEAR: To suit door size and weight and as detailed.

- 0421 DRAWER SLIDES: Heavy duty extruded aluminium with nylon rollers/ball bearings.

Brand: SELECTED

H03:05 WORKMANSHIP

- 0501 GENERALLY: Workmanship to be in accordance with the best trade practice, and to current syllabi for the NZ Trade Certificates in carpentry, joinery and timber machining.
- 0511 EXTERNAL JOINERY FRAMES: Construct to requirements of NZS 4211 wedge and rigidly fix in place without distortion, plumb and true to line and face, complete with tray and cap flashings and all doors and sashes operating freely. Fit hardware.
- 0521 INTERNAL JOINERY FRAMES: To be wedged and rigidly fixed in place without distortion, plumb and true to line and face. Hang doors on hinges, sliding and bi-fold gear to manufacturer's instructions to operate freely. Fit hardware.
- 0531 KITCHEN FITTINGS: Check site dimensions. Construct fittings in a joinery shop with visible internal carcass of melamine faced boards and external carcass, doors and drawer fronts of melamine or wood veneer faced boards. All joints stop housed and glued. All exposed edges clashed to match. Hang doors on furniture hinges with all stiles meeting. Fit drawers on slides. Construct and fit bench tops and/or supply and fit specialist material sink bench. All as detailed. Scribe fit on site square, plumb, level and true to line and face.

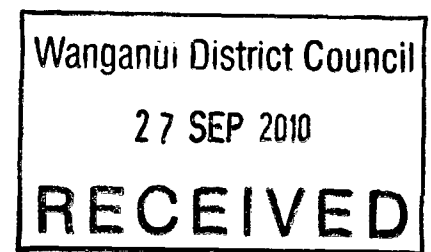
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- 0541 TIMBER STAIRS: To comply with D1/AS1, 4.0 and to be closed type unless detailed otherwise with ex 250 x 50 mm strings and ex 40 mm treads housed into 20 mm risers. House and wedge treads and risers 15 mm into strings all glued, wedged and blocked. Nosing 25 mm.
- 0551 VANITY UNIT: Construct in a joinery shop with visible carcass of melamine faced board, doors melamine faced both sides, drawer fronts and interiors melamine faced. All exposed edges clashed to match. Hang doors in furniture hinges. Fit drawers on slides. All as detailed.
- 0561 WARDROBES: Fit out with 300 mm wide melamine faced board shelf on 25 mm scotia bead along back and ends. All exposed edges clashed to match. Fit selected coatrail.
- 0571 LINEN CUPBOARD: Fit out with 5 full depth melamine faced board shelves on 25 mm scotia beads along back and ends. All exposed edges clashed to match. Heights to be finalised by Architect on site.
- 0581 HOT WATER CUPBOARD: Fit out with 2 full depth 20 x 70 mm timber slat shelves on 25 mm scotia bead along ends. Height over hot water cylinder to be finalised by architect on site.
- 0600 TRIM: Scribe and fit facings to exterior joinery, architraves to interior joinery, skirtings to all walls and timber bead cornices as detailed and shown.

END OF SECTION



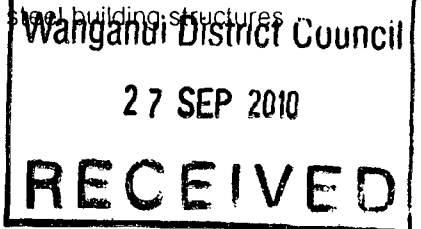
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H11 STRUCTURAL STEEL

This section deals with the fabrication and erection of structural steel building structures of a general nature.



H11:A GENERAL

A001 SCOPE: Supply and install steel beams as indicated on drawings.

A002 REFER to DIVISION A, PRELIMINARIES, for items affecting this section.

A005 NZ BUILDING CODE: Refer to the following NZ Building Code clauses and Approved Document paragraphs for the criteria and/or methods that must be used in this section to establish compliance with the Code.

B1/VM1 Structure - general
2.0 Loadings
5.0 Steel
F5 Construction and demolition hazards.

A011 DOCUMENTS which relate to this section are :

NZS 3404	Steel structures standard Pt 1 and Pt 2.
NZS 4701	Metal arc welding of steel structures
NZS 4711	Qualification tests for metal-arc welders
NZS/AS 1111	ISO metric hexagon commercial bolts and screws
NZS/AS 1112	ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts
NZS/AS 1252	High strength steel bolts with associated nuts and washers for structural engineering
AS 1897	Electroplated coatings on threaded components (metric coarse series)
AS 2204	Zinc rich organic priming paint
SAA MAI.8	Manual on steel structures - fabrication
SAA MAI.9	Manual on steel structures - erection
AWRA	Flame cutting of steels (Australian Welding)
BS 729	Hot dip galvanised coatings on iron & steel articles
SIS 05 59 00	Pictorial surface preparation standards for painting steel surfaces (Swedish)

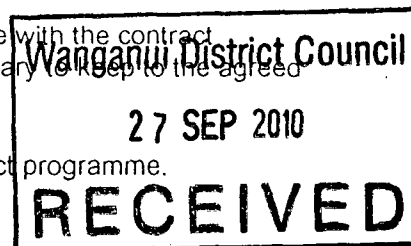
HERA 17 - Vol 2 Hera design guides - Fabrication and erection of structural steel

Documents listed above and cited in the following clauses are part of this specification and are the latest edition, including amendments at the time of tender. However this specification takes precedence when it is of a higher standard than the cited document.

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- A051 REFER to architectural, electrical and services drawings to ensure all details and all fixings they require are provided for in the structural steel work.
- A061 VERIFY DIMENSIONS against site measurements prior to fabrication.
- A101 CONTRACT PROGRAMME: Progress this work in accordance with the contract programme. Work overtime, without additional cost, as necessary to keep to the agreed times.
- A151 STATE in the tender the relationship of this work to the contract programme.



QUALITY ASSURANCE

- A201 GENERAL: Maintain Quality Assurance programmes for both fabrication and erection as necessary to assure that all work is performed in accordance with this specification and the qualifying requirements of the contract documents.
- A251 INSPECTION: Adequately inspect all stages of fabrication and construction of the structure to NZS 3404 Pt 1.
-
- A301 MATERIAL: Supply mill test certificates relating to mill sections, bolts and nuts or welding consumables. High strength steel to be marked accordingly by the supplier before delivery.
- A351 WELDING: Non-destructive test welding with method, extent and standards of acceptance to Clause 7, NZS 4701.
-
- A401 FASTENERS: Bolts, nuts and washers to comply with and to be installed to the requirements of NZS 3404.
- A501 TOLERANCES: Comply with the tolerances laid down for holding down bolts, columns, beams and other members in Hera 17 Vol 2 and NZS 3404.

MATERIALS

- H11:H SECTIONS AND SHEET
- H051 STRUCTURAL STEEL: Comply with Australian, British and Japanese Standards for steel as required by NZS 3404 Pt 1. Test and stress relieve for brittle fracture when required by NZS 3404 Pt 2.

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H11:X ACCESSORIES

- X051 ELECTRODES: To comply with, and selected for grade of steel being welded as required by, NZS 4701.
- X101 WIRE: Welding wire as recommended by manufacturer for materials to be joined and the welding position.
- X151 FLUX: Welding flux must be dry and used from sealed containers.
- X201 STEEL STUDS: Material for arc stud welding to comply with NZS 4701.
- X251 BOLTS, NUTS AND WASHERS: Grade 4.6 screws and bolts to comply with NZS/AS 1111. Grade 4.6 nuts to comply with NZS/AS 1112. Grade 8.8 bolts, nuts and washers (high strength structural quality only) to comply with NZS/AS 1252. Hot dip galvanise to BS 729 bolts, nuts and washers forming a permanent part of a structure subject to a protective coating. Alternatively electrogalvanise to AS 1897.

H11:Y COATINGS

- Y051 PRIMER: Zinc-rich organic priming paint to AS 2204.

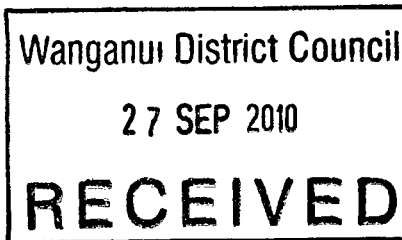
WORKMANSHIP

H11:1 GENERAL

- 1051 GENERALLY: Carry out all of the construction of a structure to NZS 3404 Parts 1 and 2.
- 1151 DEFECTS: Discard material showing visual defects that affect its structural integrity.
- 1201 SURFACE FINISH: Grind off all burns and sharp arrises. Rust grade not to exceed "C" as in SIS 05.59.00.
- 1251 IDENTIFY STEEL at all stages to NZS 3404.

H11:2 FABRICATION

- 2051 TOLERANCES: Structural components to comply, for straightness, length, full contact splices and struts not prepared for full contact with NZS 3404.
- 2151 CUTTING: Hand out only where machine cutting not possible. All cutting to comply with NZS 3404 and Clause 5.2 Hera 17, Vol 2.
- 2351 WELDING: Employ NZS 4711 qualified welders only on the construction. Comply with NZS 3404 and NZS 4701.
- 2371 WELD FAILURE: Comply with NZS 4701 for detailed guidance on welding inspection and quality control.



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2551 **HOLING:** Comply with NZS 3404 for sizes, alignment, finishing, punching and flame cutting of holes.

2751 **BOLTING:** High strength bolting to comply with NZS 3404.

2771 **NOTATION** of bolting categories

Bolting Category	Bolt Standard	Bolt Grade	Tension Method	Tensioned Joint type
4.6/S	NZS/AS 1111	4.6	snug tight	
8.8/S	NZS/AS 1252	8.8	snug tight	
8.8/TB	NZS/AS 1252	8.8	full tension	Bearing
8.8/TF	NZS/AS 1252	8.8	full tension	Friction

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In bearing type connections where the thread position relative to the shear plane is to be controlled.

N - threads included in shear plane

X - threads excluded from shear plane

2791 **THREADS EXCLUDED FROM SHEAR PLANE:** Select length of bolts such that the threaded portion does not occur within the shear plane between joined parts.

H11:4 **ERECTION**

4051 **GENERAL:** Do not start erection until holding down bolts and anchorages have been cast-in-place long enough to achieve sufficient strength.

4151 **TOLERANCES:** Comply with NZS 3404 for level and alignment of beams and alignment and plumbing of struts.

4171 **BASE PLATES:** Enlargement or cutting of holes is not permitted without approval of the engineer. Bending or displacement of holding down bolts is also not permitted.

4191 **COLUMNS:** Plumb columns using sawn steel packs and wedges not larger than necessary for the purpose. Report to engineer when column base is to be raised by more than 25mm. Fill space beneath base plate with cement-sand grout, containing an approved non-shrink additive, having a minimum compressive strength of 30MPa at 28 days, or by the use of a dry pack of 1:2 cement : sand mortar hammered in tight to ensure complete filling of space.

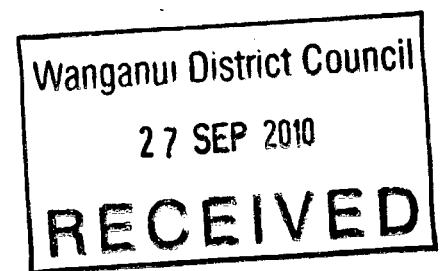
4301 **SAFETY DURING ERECTION:** Comply with Approved Document F5, NZS 3404 and Labour Department regulations during the erection of a structure.

H11:5 **SURFACE TREATMENTS**

5051 **GENERALLY:** All steelwork unless specifically noted otherwise is to be coated with the specified priming paint, including patch priming on site after erection. Decorative and other finishing paint coatings are covered under sections V51 and V52.

- 5101 STEELWORK TO BE GALVANISED: Clean sections thoroughly and apply zinc coating by the hot-dip process to the requirements of BS 729 to give a coating weight of not less than 600 grammes per square metre.
- 5301 UNPAINTED SURFACES: Do not paint -
Faying face of HSFG bolted joints.
Areas to be site welded keeping 75 mm clear all round.
Surfaces to be embedded in concrete.
Where steel is only partly encased then extend priming 30 mm maximum into the concrete encasement area.
- 5401 PATCH PRIMING: Clean areas of damaged priming and areas left clear for site jointing to a standard comparable with shop cleaning specified. Wash off chemical deposits from welding fumes. Apply priming coats to same standard as shop primers, ensuring thorough coating of bolts, nuts and connection areas.
Allow for and reprime if the primer fails, or more than 4 weeks elapse, before the final coating system is applied.
- 5451 COATING SYSTEMS: Apply all coatings strictly in accordance with the manufacturer's recommendations.
- 5501 CONDITIONS FOR APPLYING COATINGS: Apply coatings to steel immediately after cleaning and before condensation or light rusting can occur. Steel must be dry and atmospheric conditions warm and dry, with air temperature greater than 12 degrees C and relative humidity less than 85%.

END OF SECTION



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N01 ROOFING

N01:01 GENERAL

0101 SCOPE: This section deals with the supply and fixing of the roof coverings shown on the drawings, along with all necessary accessories to make a watertight roof.

Refer to section 502 for flashings gutters and rainwater pipes.

0102 REFER TO PRELIMINARIES, section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

E2/AS1 External moisture
1.0 Roofs

0210 DOCUMENTS referred to in this section are:

NZS 2995 Building papers, (breather type)
NZS 3403 Hot dipped galvanised corrugated steel sheet for building purposes.
NZS 3441 Hot dipped zinc-coated steel coil and cut lengths.
NZS 3602 Specifying timber and wood-base products for use in building.
NZS 3604 Light timber frame buildings not requiring specific design.
NZS 3640 Minimum requirements of the NZ Timber Preservation Council.
NZS 4206 Concrete interlocking roofing tiles.
NZS 4217 Pressed metal tile roofs.
NZS 4234 Cellulose cement products - corrugated sheets for roofing and cladding.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However this specification takes precedence in the event of it being of a higher standard than the cited documents.

0131 WIND AND EARTHQUAKE LOADINGS: Use fixings and methods that will be capable of sustaining the loads appropriate to the area as set out in NZS 3604.

0141 ROOFER QUALIFICATION: Carry out all roofing work with experienced competent roofers familiar with the materials and techniques specified.

0151 GUARANTEE: Provide written warranties for work in this section for coating 10 years, for material 25 years and for workmanship 2 years. Make out in name of Employer, date from Practical Completion and give to contractor within 30 days of that date.

0161 CO-ORDINATE with main contractor to ensure preparatory work is complete and other work programmed in the order required for access and completion of the roof. Co-operate with the Plumber with regard to penetrations, flashings and water collection system. Check that all preparatory work is satisfactory for the proper and waterproof application of the roof covering. Arrange for main contractor to bring up to the required standard before commencing work.

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N01:02 MATERIALS

0211 BUILDING PAPER: Breather type flame retardant kraft paper laminates to NZS 2295.

Brand: NZFG

0221 WIRE NETTING: Galvanised hexagon 900 mm wide, 50 mm mesh, 1 mm diameter steel wire.

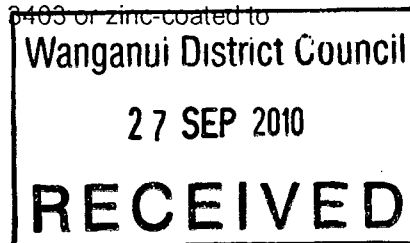
0251 PROFILED METAL ROOFING: Steel sheet galvanised to NZS 3403 or zinc-coated to NZS 3441.

Brand:

Profile: CUSTOMRUN Thickness: 0.55 MM

Coating: COLORSTEEL G2 Colour:

Accessories, cappings, flashings and fixings to match and to manufacturer's recommended practice.



N01:05 WORKMANSHIP

0501 STACK ROOFING and accessories on clean level areas of the site and protect from damage and from weather until ready to fix in place.

0511 SET OUT the planned layout before fixing commences to ensure true lines, correct relationship to module, grid and roof features.

0521 BUILDING PAPER: Lay and fix to NZS 3604, manufacturer's recommendations and relative to requirements of the roofing.

0541 CUT PROFILED METAL ROOFING with recommended tools, fold ends and seal cut edges all to manufacturer's instructions.

0551 LAY PROFILED METAL ROOFING and fix complete with all matching accessories, flashed to all roof features and penetrations and all to manufacturer's instructions.

0561 FIX THE BATTENS to roofing manufacturer's requirements and with all joints fully supported and staggered.

0611 Trim for and install 'Velux' 1140 x 1180 openable roof windows where shown complete with rod control and venetian blinds. Flash to recommended details.

N01:08 COMPLETION

0801 LEAVE this work complete with all necessary flashings, undercloaks, valleys, ridges and hips all properly installed as the work proceeded so that the finished roof is completely weathertight.

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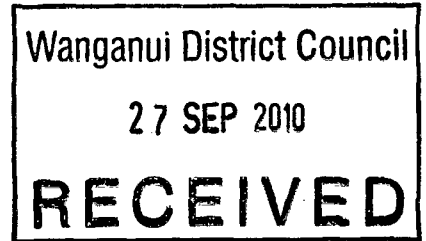
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0811

REMOVE all trade rubbish and unused materials from the roof and surrounds regularly during the work as well as at completion. Sweep down the completed roof and clean out all spouting and rainwater pipes.

END OF SECTION



R01 PLASTERBOARD LININGS

R01:01 GENERAL

0101 SCOPE: This section deals with the supply, fixing and stopping of plasterboard sheets and accessories to walls and ceilings as shown on the drawings.

0102 REFER TO PRELIMINARIES, Section A01 for items affecting this section.

0121 DOCUMENTS referred to in this section are:

NZS 3604 Light timber frame buildings not requiring specific design.
ISO 6308 Gypsum plasterboard

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However this specification takes precedence in the event of it being of a higher standard than the cited documents.

R01:02 MATERIALS

0201 EXTERNAL ANGLE: Slim type 0.5 mm galvanised steel.

0211 CASING BEAD: Slim type 0.5 galvanised steel/pvc.

0221 CORNICE: Square stop finish.

0231 STANDARD SHEET: Plasterboard 9.5 and 12.5 mm thick, tapered edge, to ISO 6308.

0241 BRACING SHEET: High density plasterboard 9.5 mm thick, tapered edge, to ISO 6308.

0261 NAILS: Galvanised clouts 30 mm and 40 mm x 2.5 mm

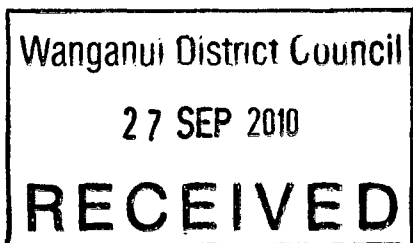
0271 JOINTING: Compound and tape to board manufacturer's recommendation.

0281 ADHESIVE: Multi-purpose water based wallboard adhesive.

R01:05 WORKMANSHIP

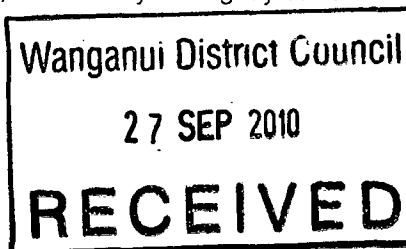
0501 SUB-STRATE: To NZS 3604 and standard required by manufacturer's recommendations. Starting work implies acceptance by the sub- contractor.

0511 PROTECT all joinery, fittings and finishes already in place from water staining or damage. Make good immediately any damage that occurs as directed by Architect.



- 0521 LINE CEILINGS with 9.5 mm thick sheets and fasten with adhesive/nail system to manufacturer's recommendation.
- 0531 LINE WALLS that are up to 2400 mm high by the horizontal method and walls above 2400 mm high by the vertical method with 9.5 mm thick sheets and fasten with adhesive/nail system to manufacturer's recommendations.
- 0551 BRACING PANELS/SYSTEMS: Form using high density sheet fixed with clout-washers and clouts to manufacturers details. For panels strap sub-strate and for systems diagonal brace to appendices K.4 and K.2 NZS 3604.
- 0561 EXTERNAL ANGLES: Fix full length to all external corners with clouts at 100 mm each side staggered.
- 0581 JOINTS: Fill recess with bedding compound, centre the tape, apply second coat of bedding compound followed by a coat of finishing compound, allow to dry and lightly sand off, all to manufacturer's recommendations.
- 0591 STOPPING: Fill nail holes and flush up external angles with two successive coats of bedding compound followed by a coat of finishing compound, allow to dry and lightly sand off, all to manufacturer's recommendations.

END OF SECTION



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R03 GLAZING

R03:01 GENERAL

0101 SCOPE: This section deals with the glazing of external joinery on site, internal glazing and the supply of glass fittings.

0102 REFER TO PRELIMINARIES, section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

B1/AS1 Structure - general
7.0 Glazing
F2/AS1 Hazardous materials
1.0 Glazing.

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0121 DOCUMENTS referred to in this section are:

NZS 4223 Glazing in buildings, parts 1 & 2.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However this specification takes precedence in the event of it being of a higher standard than the cited documents.

R03:02 MATERIALS

0201 GLASS, CLEAR SHEET: Selected glazing quality to NZS 4223 up to 4mm. thick.

0211 GLASS, FLOAT: Clear glass float processed to give flat parallel surfaces, 5mm thick and over.

0221 GLASS, ROUGH CAST: Translucent rolled glass to give rough pattern on one surface.

0261 GLASS, TOUGHENED: Heating/coating processed glass. Work on the glass must be done before processing.

0281 GLASS, SOLAR CONTROL: Float glass, body-tinted or coated, single glazing to manufacturers recommendation.

0301 PUTTY, TIMBER FRAME: Standard Linseed oil and fillers compound.

0311 SPRIGS: Standard triangular metal pieces to retain glass.

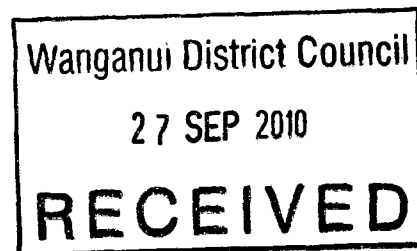
0321 TAPE: Treated cotton tape with self adhesive coating on one side.

R03:05 WORKMANSHIP

0501 GENERALLY: Glaze directly into joinery fittings from the truck and carry out the whole of this work to NZS 4223.

- 0511 TOUGHENED GLASS: Use in all doors and sidelights and in windows with sills below 750 mm.
- 0601 MIRRORS: Silvered 4 mm float glass to NZS 4223 plastic back sprayed. Arris and edge the glass, drill holes in each corner and screw fix to wall with c/p screws and c/p cups on neoprene washers.
- R03:08 COMPLETION
- 0801 INDICATE the glass in place with an inert whitening or glued white paper stripes.
- 0811 PRIME all exposed putty within 21 days of completion of glazing.
- 0821 CLEAN off indicators at completion of the building. Clean all glass inside and out to a shining finish.

END OF SECTION



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V01: PAINTING

V01:01 GENERAL

0101 SCOPE: This section deals with normal thin film coating and sealing work on prepared surfaces.

0102 REFER TO PRELIMINARIES, Section A01 for items affecting this section.

0121 DOCUMENTS: Referred to in this section are:

NZS 7703 The painting of buildings.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification.

However this specification takes precedence in the event of it being of a higher standard than the cited documents.

0141 ALL WORK must be carried out by competent experienced tradesmen.

V01:02 MATERIALS

0201 PAINT TYPES: To NZS 7703 for exterior/interior
solvent-borne and water-borne paints
undercoats
wood and metal primers
sealers
stains and clear coatings

0211 GAP FILLERS of linseed oil, putty, plastic wood, wood filler or plastic filler to suit and to match the surface being prepared.

V01:05 WORKMANSHIP

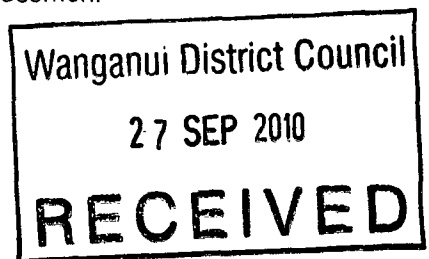
0501 INSPECT all surfaces to be painted and report to the Contractor any that will not, after preparation as laid down in NZS 7703, allow workmanship to the best trade practice.

0511 COVER UP all adjoining surfaces and areas liable to damage by this work.

0521 REMOVE ALL HARDWARE liable to damage by this work and replace on completion.

0531 WHERE NECESSARY to prime or seal surfaces before or while building-in, arrange with the trade concerned to inform when this work is required.

0541 CARRY OUT this work within the temperature and humidity limits, and with timber dry and in the equilibrium moisture content range, all as required by NZS 7703.



0551 PREPARE ALL SURFACES to be coated by making good all damage and defects. Use as gap filler linseed oil, putty, plastic wood, wood filler or plaster filler as appropriate and to manufacturer's direction.

0561 APPLY PAINT by brush and/or roller to suit location of the coating and to Clause 6.7 NZS 7703. Do not spray on site without permission from the Architect.

0571 REFER TO manufacturer's manuals for and follow their preparation, sequence and application recommendations as they apply to each system. Correct defective work immediately with any recoating following the systems recommendation.

All coats in any system must be supplied by the same manufacturer.

0581 SCUFF BETWEEN ALL COATS to remove any dust pick-up, protruding fibres and coarse particles.

0591 ALL FINISHED PAINT SURFACES to show, uniformity of gloss and colour, the correct thickness of each coat, freedom from painting defects such as tackiness and conspicuous brush marks, cleanliness and absence of disfigurement.

0601 PAINTING SYSTEMS, EXTERIOR: To manufacturer's recommendation and Section 5 NZS 7703.

Substrate	Brand	Name	Finish
Galvanised Steel	DULUX	SUPER ENAMEL	HIGH GLOSS

0621 PAINTING SYSTEMS, INTERIOR: To manufacturer's recommendations and to section 5 NZS 7703.

Substrate	Brand	Name	Finish
Plasterboard	DULUX	WASH & WEAR	LOW SHEEN
Doors and Trim	DULUX	SUPER ENAMEL	HIGH GLOSS
Timber	DULUX	SUPER ENAMEL	HIGH GLOSS
Cupboards	DULUX	SUPER ENAMEL	HIGH GLOSS

V01:08 COMPLETION

0801 CLEAN ALL adjoining surfaces, glass and fittings of any paint contamination.

0811 REPLACE ALL hardware without damage to it or the adjoining surface.

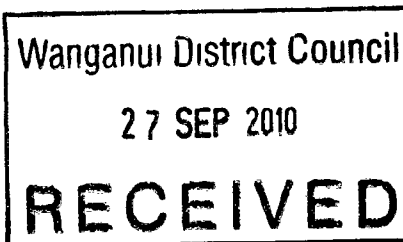
0821 TAKE AWAY from the site all painting materials, equipment and rubbish leaving the surrounding area clean, tidy and undamaged.

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END OF SECTION

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301 ALUMINIUM WINDOWS & DOORS

301:01 GENERAL

0101 SCOPE: This section deals with the manufacture, supply, glazing and installation of aluminium windows and doors.

0111 REFER TO PRELIMINARIES: Section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

E2/AS1 External moisture
3.0 Exterior joinery

0121 THE DOCUMENTS referred to in this section are :

NZS 3503 Anodic oxide coatings on aluminium external applications
NZS 3504 Aluminium windows
NZS 4211 Performance of windows
NZS 4223 Glazing in buildings, parts 1 and 2
BS 6496 Specification for powder organic coatings for application and stoving to aluminium alloy extrusions, sheet and preformed sections for external architectural purposes and for the finish on aluminium alloy components coated with powder organic coatings.

Architectural Aluminium Association: -

Aluminium Window Handbook, and Specification for the powder organic coatings on architectural aluminium products.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However, this specification takes precedence in the event of it being of a higher standard than the cited documents.

0141 SUBMIT samples on request of full size sections with the selected finish and hardware through all profiles offered. Provide evidence at time of tender from a TELARC registered laboratory that windows offered comply with the requirements of NZS 1900 ch. 10 and the required site and building Design Wind Pressure and Air Leakage level to NZS 4211.

0151 GUARANTEE: Provide a written guarantee covering the work in this section for a period of two years from date of Practical Completion.

301:02 MATERIALS

0201 ALUMINIUM WINDOWS AND DOORS: To comply with NZS 3504 and to have security beading.

Brand: SELECTED

Type: REFER DRAWINGS

Colour/Finish: SILVER ANODISED

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OR CONTRACTOR to nominate brand and type for the architect's approval prior to acceptance of the tender. The architect reserves the right to reject any brand and request nomination of alternatives.

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0211 REVEALS

Type: TIMBER

Colour/Finish: PAINT

Timber Species: SELECTED

0231 ANODISED FINISH: To NZS 3503 with a minimum thickness of 12.5 microns. Colour to match approved sample.

0271 SHEET GLASS: To be OQ and in thickness to suit sash and light size.

0301 SEALANT: To manufacturer's recommendation.

301:05 WORKMANSHIP

0501 GENERALLY: Workmanship to be in accordance with best trade practice and properties to requirements of NZS 4211.

0511 AVOID DISTORTION of components during transit, handling and storage. Prevent pre-finished surfaces from rubbing together. Prevent contact with mud, plaster and cement. Do not deliver to site any components which cannot be immediately unloaded into suitable conditions of storage.

0521 CORROSION PROTECTION: Before fixing, apply suitable barriers of bituminous coatings, slips or underlays between dissimilar metals in contact or aluminium in contact with concrete.

0531 FLASHINGS: Install flashings to heads, jambs and sills of frames as supplied and recommended by the window manufacturer, and as detailed on the drawings. Head flashings finished to match windows.

0541 FIX FRAMES: Rigidly fix in place without distortion to manufacturer's and Aluminium Window Handbook recommendations plumb, true to line and face, weathertight and with all openings operating freely.

0551 SEAL FRAMES to adjoining structure where necessary as recommended by manufacturer to make weathertight.

0561 RETAIN PROTECTIVE COVERINGS and coatings in place during fixing wherever possible. Provide additional protection as necessary to prevent marking of surfaces which will be visible in completed work. Keep paper and cardboard wrappings on aluminium components dry. Remove protection on completion unless designed to remain in place.

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301:08 COMPLETION

0801 ON COMPLETION, remove temporary protection and thoroughly clean down both sides of all aluminium and glass, using method recommended by the manufacturer. Protect glass from damage by crossing clearly visible tape between jamb liners and clear of the glass.

END OF SECTION

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501 DRAINAGE

501.01: GENERAL

0101 SCOPE: This section describes the supply and laying of foulwater, stormwater and field drains.

0102 REFER TO PRELIMINARIES, section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

B1/AS1 Structure - general

6.0 Drains

E1/AS1 Surface water

3.0 Drainage system materials and construction.

G13/AS2 Foul Water - drainage.

0121 DOCUMENTS which relate to this section are :

NZS 3108 Concrete production, ordinary grade

NZS 3301 Clayware field drain pipes

NZS 3302 Ceramic pipes, fittings and joints

NZS 4452 Construction of underground pipe sewers and drains.

NZS 7643 Installation of unplasticised pvc pipe systems.

NZS 7649 Unplasticised pvc underground drain pipes and fittings.

NZS/AS2033 Installation of polyethelene pipe systems.

BS 416 Cast iron spigot and socket soil waste and ventilating pipes (sand cast and spun) and fittings

Plumbers, Gasfitters and Drainlayers Act 1976.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However, this specification takes precedence in the event of it being of a higher standard than the cited documents.

0131 COMPLY with the NZ Building Code, and the utility network operator's requirements, give notices for inspections and carry out tests as required.

0141 SUPPLY 1:100 scale drainage plan showing drains and fittings as laid to Utility network operator at completion.

0151 ALL WORK: To be carried out by or under the direct supervision of a person registered under the Plumbers, Gasfitter and Drainlayers Act.

501.02 MATERIALS

0201 FILL: Scoria or crushed rock of General all-passing 40 grading.

0211 CONCRETE: 17.5 MPa and 20 MPa ordinary grade to NZS 3108.

0221 REINFORCEMENT: To NZS 3402P Grade 275 deformed bars.

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- 0231 CAST IRON PIPES: To BS 416.
- 0241 CLAYWARE PIPES for field drains to NZS 3301.
- 0251 CERAMIC PIPES, bends, junctions fittings and joints to NZS 3302.
- 0261 UPVC PIPES, bends, junctions, fittings and joints to NZS 7649.
- 0271 PVC PIPING for field drains perforated and coiled.
- 0281 CESSPIT GRATINGS: Cast iron frame 615 mm square with lift-up grating 535 x 440 mm overall.
- 0291 INSPECTION COVERS: Cast iron frame with 600 x 450 screw-down cover.

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501:05 WORKMANSHIP

- 0501 GENERALLY: Carry out the whole of this work to NZS 4452 and NZS 7643 as modified by B1/AS1.
- 0511 EXCAVATE for drains to a firm even bottom with correct gradients in straight runs.
- 0521 FOULWATER DRAINS: Lay from high point of the system, in straight runs to correct gradients to connect to utility network operator sewer to their requirements. Fit all inspection fittings on a concrete base. All work to pipe manufacturer's recommendations.
- 0531 GULLY TRAPS: Set on concrete brought up to protect top of fitting from damage and trowel off. All to fitting manufacturer's recommendations.
- 0541 STORMWATER DRAINS: Confirm location of all downpipes and the finished ground levels. Set bends under downpipes in concrete brought up to protect top of fitting from damage. Trowel off and fit CI grating. Lay drains from high point, in straight runs to correct gradients to discharge into utility network operator stormwater system to their requirements.
- 0551 SUB-SOIL DRAINS: Lay firmly in granular bed in straight runs to correct gradients and discharging into a cesspit. Carry granular bed up and over the pipes without disturbing them to a total depth of 300 mm. Cover with 0.3 mm plastic sheet. All to manufacturer's recommendations.
- 0561 CESSPITS: To G13/AS2 standard of 150 mm thick 20 MPa concrete 455 mm square and 1000 mm deep complete with 225 mm dia ceramic half-syphon pipe and cast iron frame with lift out grating.
- 0571 INSPECTION CHAMBERS: To G13/AS2 standard of 150 mm or 100 mm reinforced thick walls on 150 mm thick base all 20 MPa concrete with ceramic channels to form a cascade and with 75 mm fall across chamber. Bench from channels at 45° and plaster all the interior with 1:2 cement:sand mortar, trowelled smooth. Fit cast iron cover and frame. Stormwater chambers do not need ceramic channels.

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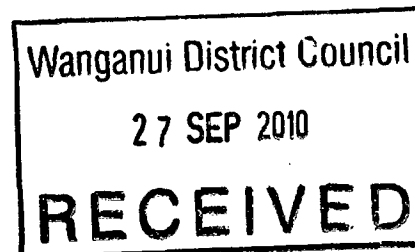
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502 PLUMBING

502:01 GENERAL

- 0101 SCOPE: This section describes the supply and fitting of roof stormwater collection, flashings, waste disposal, water supply and plumbing fittings.
- 0102 REFER TO PRELIMINARIES, Section A01 for items affecting this section.
- 0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods to establish compliance with the Code.

- G1/AS1 Personal hygiene
2.0 Fixture construction and installation
3.0 Location of sanitary fixtures
- G12/AS1 Water supplies
- G13/AS1 Foul water - sanitary plumbing.



0121 DOCUMENTS referred to in this section are:

- NZS 3441 Hot-dipped zinc-coated steel coil and cut lengths.
- NZS 3501 Copper tubes for water, gas and sanitation
- NZS 4602 Low pressure copper thermal storage electric heaters.
- NZS 7641 Unplasticized pvc waste and ventilating pipe, fittings and accessories 32, 40 and 50mm.
- CSA B137-8 Polybutylene (PB) piping for hot and cold water distribution systems.
- AS 1804 Soft lead sheet and strip
- Plumbers, Gasfitters and Drainlayers Act, 1976.

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However, this specification takes precedence in the event of it being of a higher standard than the cited documents.

- 0131 COMPLY with the NZ Building Code and utility network operator's requirements for inspections and carry out tests as required.
- 0151 ALL WORK covering waste disposal, water supply and plumbing fittings to be carried out by or under the direct supervision of a person registered under the Plumbers, Gasfitters and Drainlayers Act.

502:02 MATERIALS

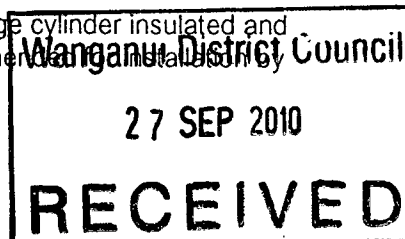
- 0211 SPOUTING, STANDARD:
NZS 3441 and Colorsteel to match roof.
- 0251 DOWNPIPES, NZS 3441 and formed into round tube seam jointed complete with stand-off brackets, galvanised screw fixed and Colorsteel to match gutter.
- 0271 FLASHINGS: 0.60 mm sheet steel galvanised to NZS 3441, 1.8mm (20kg/m2) copperised pure lead to AS 1804, 0.50 mm copper sheet and 0.70 mm aluminium sheet to suit location of the flashing.

- 0311 WASTE PIPES, PLASTIC: Upvc pipe to NZS 7641 complete with fittings brand-matched to manufacturer's specification.
- 0321 WATER MAIN: High density alkathene 25 mm i.d pipe to minimum 170 psi complete with "o"-ring compression type fittings.
- 0331 WATER PIPE, COPPER: Copper tube to NZS 3501.
- 0341 WATER PIPE, PB: Polybutylene tubing to CSA B137-8 complete with fittings and accessories brand-matched.

Brand: SELECTED

- 0351 GATE VALVES: de-zincified brass b.s.p screwed ends.

- 0461 HW CYLINDER, MAINS PRESSURE Copper thermal storage cylinder insulated and complete with pressure reducing valve and fittings recommended by manufacturer.



- 502:05 WORKMANSHIP

- 0501 GENERALLY carry out the whole of this work and tests to acceptable solutions E1/AS1, G12/AS1 and G13/AS1.

- 0511 AVOID electrolytic action by eliminating actual contact or continuity of water between dissimilar metals.

- 0541 SPOUTINGS, STEEL: Screwfix brackets, set in spouting to falls to outlets, joints solder run/silicone sealed and pop-riveted to manufacturer's recommendations.

- 0551 DOWNPIPES, STEEL: Screwfix stand off brackets, set plumb and clear of the wall, with joints solder run and discharge into stormwater bends.

- 0571 FLASHINGS: Scribe fit, fold, lap, seam, run solder or braze as required by the metal to flash roof penetrations, roofing and exterior joinery to prevent weather penetration.

- 0601 EXCAVATE for water main to a firm even bottom in straight runs. Allow to backfill.

- 0611 WATER MAIN: Lay a minimum of 450 mm below ground level from utility network operator supply through a gate valve and toby box to the building all to manufacturer's specification and all brand-matched.

- 0621 WATER SUPPLY - COPPER: Size piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Run pipes in straight runs, firmly fixed, to falls with easy bends and jointed by brazing or with cross fittings all to acceptable solution G12/AS1. Conceal all piping, lag all hot water piping and pressure test before wall linings are fixed.

- 0631 WATER SUPPLY - PB: Size piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Run pipes complete with all fittings and jointed to manufacturer's specification and to acceptable solution G12/AS1. Conceal all piping and pressure test before wall linings are fixed.

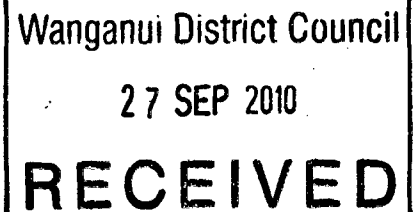
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- 0641 HW CYLINDERS: Install where shown complete with all the necessary fittings to manufacturer's recommendations.
- 0651 EXPOSED PIPES: Chrome plate on copper or white PB/PVC including back nuts. At wall penetrations provide and fit c/p or white pvc collars.
- 0701* SANITARY FIXTURES SCHEDULE: Fit and install plumb, true to line and rigid, all to manufacturer's recommendations.
- 0711 TRAPS AND WASTE PIPES: Connect waste outlets to traps and run waste pipes and back vents concealed, all sized and fixed to acceptable solution G13/AS1. Discharge wastes into drainage system stack soil pipe or gully trap as shown.
- 0711* PLUMBER HARDWARE: Allow for the supply of selected shower fittings, taps, towel rails, toilet roll holders, soap dishes and other similar type fittings.
- Allow to fit and fix same.
- 502:08 COMPLETION
- 0801 GENERALLY: Leave all rainwater services in proper working order and all flashing work keeping building weathertight. Pressure test all water supply services and fittings and check all waste disposal services to ensure no leakage and leave all in proper working order.
- 0811 CLEAN UP: Remove labels and clean all fittings. Take away from the site all rubbish and trade waste.

END OF SECTION



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602 ELECTRICAL WORK

602:01 GENERAL

0101 SCOPE: This section deals with the wiring for power and lighting complete with all componentry and electrical fittings and connected back to the electrical authorities supply.

0102 REFER TO PRELIMINARIES, Section A01 for items affecting this section.

0115 NZ BUILDING CODE: Follow the Approved Documents with regard to the criteria and/or methods that must be used in this section to establish compliance with the Code.

G8/VM1 and AS1 Artificial light
G9/VM1 Electricity

0121 DOCUMENTS referred to in this section are:

Electrical Wiring Regulations 1976 and amendments
Handbook to the Electrical Wiring Regulations 1976
NZ ECP 2 Electrical installations in damp situations
NZ ECP 3 Electrical safety of apparatus and materials
NZ ECP 5 Electrical installations - cold cathode discharge lighting
NZ ECP 28 Selection and installation of cables
NZ ECP 33 Electrical installations of mineral insulated cables and equipment
NZS 6401PVC - insulated cables for electric power and lighting

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However, this specification takes precedence in the event of it being of a higher standard than the cited documents.

0141 COMPLY with electrical wiring regulations and the utility network operator's requirements. Give notices for inspections and carry out tests as required.

0151 ALL WORK must be carried out by or under the direct supervision of a person registered under the Electricians Act.

602:02 MATERIALS

0201 MAINS UNDERGROUND: Tough plastic sheathed neutral screened cable to NZS 6401.

0211 CABLES: Tough plastic sheathed copper conductors to NZS 6401.

Lighting Circuits	1.0 mm - domestic 1.5 mm - commercial
Power Circuits	2.5 mm

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Risk score

Table 2 'Building envelope risk matrix' sets out the risk matrix that shall be used to define the risk score. A risk score is calculated for each elevation of the building.

Claddings are then selected from Table 3 'Suitable wall cladding' according to the risk scores, or the highest risk score may be used for all walls.

Table 2 from E2/AS1: Building envelope risk matrix

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	Risk severity				
Risk factor	low score	medium score	high score	very high score	subtotals for each risk factor
Wind zone (per NZS 3604)	0	0	1	2	0
Number of storeys	0	1	2	4	0
Roof/wall intersection design	0	1	3	5	0
Eaves width	0	1	APPROVED		2
Envelope complexity	0	1	10 / 0868		0
Deck design	0	2	Consent No.		0
Total risk score:					2

(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right-hand column. Finally, add up the figures in the right-hand column to get the total risk score.)

- NORTH ELEVATION & WEST ELEVATION
- BEVEL-BACK TIMBER WEATHERBOARD DIRECT FIX
 - 70 SERIES BRICK VENEER, 40mm. CAVITY
- SOUTH ELEVATION
- BEVEL-BACK TIMBER WEATHERBOARD DIRECT FIX
- EAST ELEVATION
- BEVEL-BACK TIMBER WEATHERBOARD DIRECT FIX
 - 70 SERIES BRICK VENEER, 40mm. CAVITY

Specification L1

September 2008

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BRICKS

Bricklaying Specification

You can have the best quality bricks available, but if your bricklayer does not lay them in a "tradesman like manner", the quality of the brick is lost. Make sure your bricklayer follows this basic specification in order that you obtain a job and home, that you can be proud of.

Building Code Requirements

1. The brick cavity must be between 40-75mm wide - keep cavity clean.
2. Use 5 screw fixed brick ties per square metre, 200mm around perimeter of openings; 600mm horizontal, 350mm vertical, or accepted alternatives.
3. All mortar joints (vertical & horizontal) should be of a consistent thickness, between 9-12mm; exceptions to rule - minimum joint 7mm, maximum 20mm.
4. Install weepholes every third perpend at the base of the wall and across all openings. Provide vent holes at the top of the wall.
5. Provide a polythene flashing across the top of all window and door openings. Extend the flashing 200mm each side.

Monier Recommendations

1. Ensure all the bricks used on the job are from the same Batch Number.
2. Bricks must be thoroughly blended from at least three pallets to ensure an even spread of colour. Check the colour and the general size of all bricks before commencing work. The width may affect the cavity size.
3. If you are likely to run out of bricks, stop laying immediately this is realised, and wait until sufficient bricks arrive - then blend them thoroughly.
4. Bricks must be laid level and plumb. Protect brickwork from staining and damage by other trades, especially near taps.
5. Bricks may be laid in "metric bond", but the aesthetic appearance of the wall is enhanced by laying bricks in a half bond pattern by cutting the corner bricks to 190mm for 70mm bricks.
6. It is not desirable nor should it be necessary to lay bricks less than 50mm long, if the layout has been well planned. There are exceptions.
7. Bricks must be kept dry (not saturated) at all times during construction. Keep plastic on top of pallets. Cover bricks around site. Cover the top of unfinished walls or work. Divert downpipes away from brickwork. This action will eliminate most problems relating to efflorescence (salts) on bricks.
8. Mix mortar by volume to ensure an even colour on the job. The mortar makes up approx. 17% of the surface area. Do not allow newly laid veneer to get wet as this can also change the colour of the mortar.
9. All mortar joints must be tooled to provide a smooth sealed joint. Do not rake joints more than 6mm, then tool the joint smooth.
10. Window sills should overhang 30-50mm. Minimum slope 15. All sills to be sloped at the same angle. All sizes of bricks on the sill and sizes of joints to be uniform in width and thickness.
11. Thoroughly clean the brickwork as the job progresses. Do not use Spirits of Salts to clean buff coloured bricks as this could draw out any vanadium salts, which can make them difficult to remove.

Important Notes:

If this specification is not being followed, raise the matter with your bricklayer at the earliest possible moment. It often becomes too late if the job has progressed too far or once the job is finished.

Additional requirements for two storey brick veneer - check prior to starting.

Once the bricklayer lays a brick he accepts responsibility for the brick and how it is laid. If the bricks are not what you expected you must contact the supplier prior to laying any bricks.

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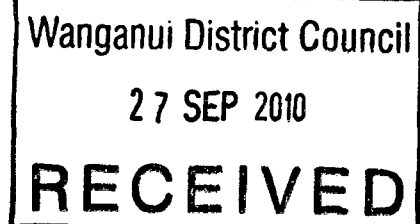
Suggested Veneer Tolerances NZS 4210:1989

ITEM	TOLERANCE
Deviation from the position shown on plan for a building more than one storey in height	15mm
Deviation from vertical within a storey	10mm per 3m of height
Deviation from vertical in total height of building.	20mm
Relative displacement between load-bearing walls in adjacent storeys intended to be in vertical alignment.	5mm
Deviation from line in plan	
(a) In any length up to 10m	5mm
(b) In any length over 10m	10mm
Deviation of bed joint from horizontal	
(a) In any length up to 10m	mm
(b) In any length over 10m	10mm total
Average thickness of bed joint, cross joint, or perpend.	+/- 3mm on thickness specified
Maximum protrusion of mortar into cavity	5mm

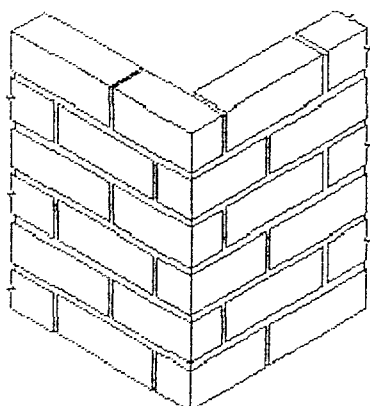
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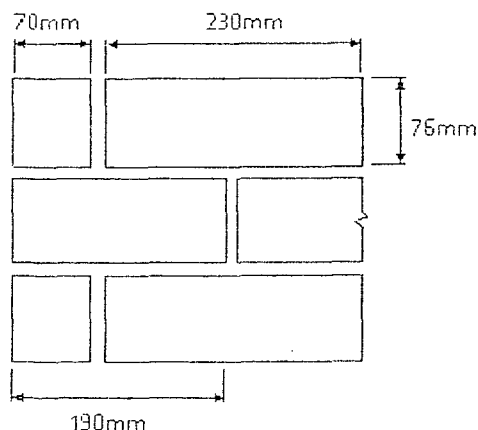
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Half Bonding of 70mm Clay Brick Veneer



Note: Cut Bricks Shaded

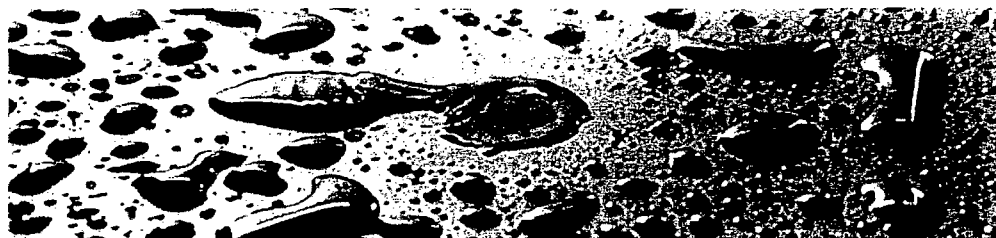


All corner bricks are cut to 190mm

You are here: [Home](#) > [Products & Services](#) > [Solutions for Businesses](#) > [Bitumen](#) > [Products](#) > [Shell Flintkote](#)



Shell Flintkote



Shell Flintkote is a family of high performance waterproofing products that provide protection for entire buildings – right from the basement to the roof.

Overview

Shell Flintkote
Colourflex

Shell Flintkote Decoralt

Shell Flintkote
Hydroguard

Shell Flintkote Ultra

From conception over 50 years ago as a cost effective and reliable waterproof coating, the Shell Flintkote product range has expanded to create an integrated portfolio of products that work together, offering a seamless barrier to keep water out.

Benefits

- easy to apply;
- water based;
- high resistance to weathering;
- non-hazardous;
- ready mixed; and
- strong elastomeric properties.



Application

Shell Flintkote products are ideal for use in:

- waterproofing wet areas including bathrooms, kitchens, toilets;
- waterproofing metal roofs;
- waterproofing blockwork and concrete structures;
- Flintkote Mastic Flooring;
- waterproofing flat concrete roofs;
- waterproofing mastic asphalt roofs;
- treatment of water tanks;
- protection of steelworks; and
- waterproofing of ironworks.

Please contact your local [Shell sales contact](#) for availability in your country.

- [Safety Data Sheets](#) - opens in new window
- [Events](#)
- [Contact Us](#)

Shell Flintkote product range

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Superflex Bathroom & Balcony Premixed - 1 Part

Single Component Undertile Waterproofing Membrane

BRANZ Appraised

Low VOC content – meets Green Building Council of
Australia Green Star IEQ-13 requirements

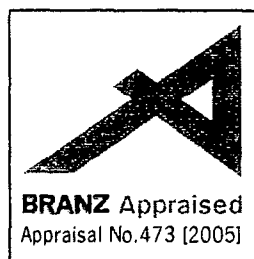
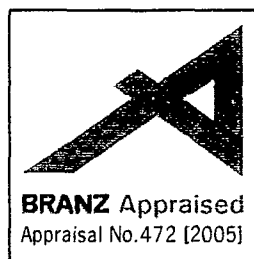
Fast drying one part acrylic membrane

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Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane



Copies available on request.

PRODUCT DESCRIPTION

Ardex WPM 001 (Superflex Bathroom & Balcony Premixed 1 Part) is a tough, ready to use waterproofing membrane specifically designed for use under tiles. Ardex WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. Ardex WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

Ardex WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. Ardex WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying Ardex WPM 001 can be tiled over in 48 hours in non critical areas*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 4858: 2004 Wet Area Membranes
- Advanced acrylic: Will not re-emulsify once cured
- Designed for tiling - Fully compatible with Ardex tile adhesive systems
- Water based, safe to use, low odour & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes.
(Ref: CSIRO Report 3779)

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

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APPLICATION RANGE

Performance Levels
Commercial and residential

Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

Surfaces

Walls & floors

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat of Ardex WPM 300 (HydrEpoxy 300) at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of Ardex WPM 300 as above.
Renders and screeds	Cured for min. 7 days or sealed when set with one coat of Ardex WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of Ardex WPM 300 as above.
Fibre cement	Suitable for wet area grade fibre cement.
Plasterboard	Wet area grade only.
Plywood	Structural plywood (PAA branded), marine grade or other wet area grade only.
Particleboard	Wet area grade, internal use only (special preparation is required – contact Ardex).
Permanent Immersion	In conditions of permanent immersion, it is recommended that Ardex WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.
Contact Ardex for use over existing membranes, covering materials, and any other substrates not listed.	

SPECIFICATION CLAUSE

ARDEX WPM 001 (Superflex Premixed)

The waterproofing membrane shall be Ardex WPM 001: a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

PACKAGING

Single component: 20kg (approx 15 litres) or 6.5kg (approx 5 litres).

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TABLE 1

	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry Film	Wet Film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m ²	7.5m ²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m ²	15m ²	20kg(15L) unit

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5-15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

DRYING TIMES**Recoat time**

1-2 hours at (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. Ardex WPM 001 is totally dry in 48 hours at 23°C/50% RH, but can take up to 72 hours at 10°C/50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. Ardex WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with Ardex WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of Ardex WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the Ardex WPM 001.

For substrates or situations other than those listed contact Ardex.

SAFETY DATA

Ardex WPM 001 is non-hazardous and non dangerous. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE MATERIAL SAFETY DATA SHEET.

QUALITY PRODUCT

Ardex WPM 001 is manufactured and tested to Ardex procedures which are maintained in accordance with Quality System Standard ISO 9001.

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Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane

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USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with Ardex instructions and in applications for which they are intended.

APPLICATION

Apply Ardex WPM 001 by brush or roller. A medium nap (12-15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while Ardex WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

Critical Areas:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).

5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

Fig.1 - Shower Recess - Critical Areas

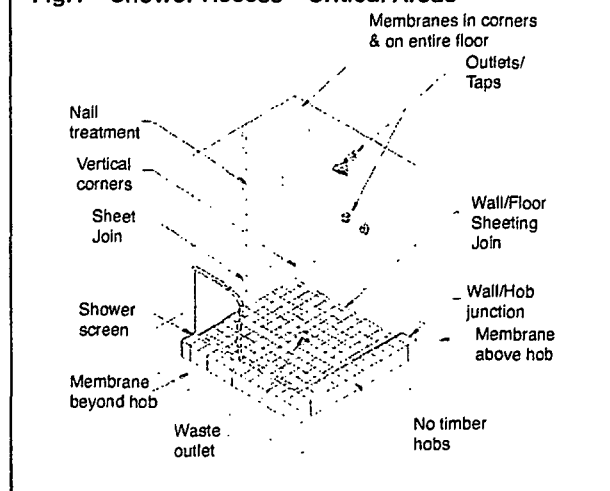
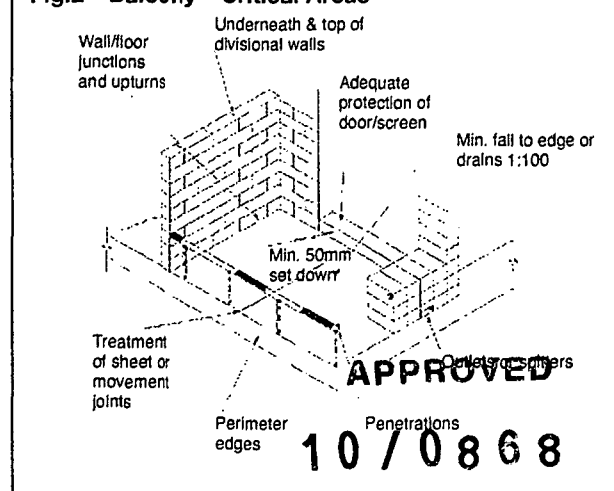


Fig.2 - Balcony - Critical Areas



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RECEIVED**BALCONIES AND DECKS**

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES**Surface preparation**

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2mtr (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.

- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of Ardex WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the Ardex WPM 001 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION**Crack preparation****Cracks <2mm:**

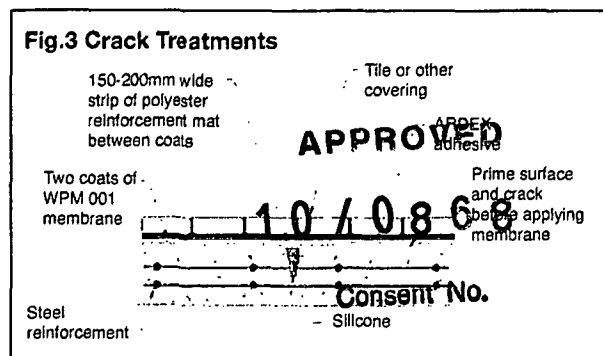
Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with Ardex WPM 265 and allow to dry before applying two coats of Ardex WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

Cracks 2-6mm:

(Refer Fig. 3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of Ardex WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of Ardex "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

Contact your local Ardex representative.





NEW ZEALAND INSTITUTE OF
ARCHITECTS
INCORPORATED



Building Code Clause(s)

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side)

Wanganui District Council

27 SEP 2010

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ISSUED BY: MEC Engineering Consultants Limited ... IPENZ CPEng ID number: 236042
(Design Firm)

TO: David Li
(Owner/Developer)

TO BE SUPPLIED TO: Auckland City Council
(Building Consent Authority)

IN RESPECT OF: New house – New House-structural design for wall bracing, sub-floor bracing, beams and Foundation
(Description of Building Work)

AT: Lot 28, Lithgow Drive Wanganui
(Address)

LOT 28 DP SO

We have been engaged by the owner/developer referred to above to provide **structural design for for wall bracing, sub-floor bracing, beams and Foundation** services in respect of the requirements of
(Extent of Engagement)

Clause(s) **B1, VM1,4/AS1** of the Building Code for

☐ All Or ☒ Part only (Structural design for Foundation, Beams, and posts), of the proposed building work

The design carried out by us has been prepared in accordance with:

☒ Compliance Documents issued by Department of Building & Housing ... **B1, VM1,4/AS1**
(verification method(s)/acceptable solutions(s))

or

☐ Alternative solution as per the attached schedule.....

The proposed building work covered by this producer statement is described on the drawings titled: **General specification, Foundation plan, Footing details and Beam/wall bracing plan** and numbered... **S01 to S04 (job no. Rey 082)** together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions: **The subsoil and surrounding area is assumed to be firm natural stable ground capable of 300 kPa ultimate bearing pressure and complying with NZS3604:1999.**
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of Building Code.

I, Melvin Man am ☒ CPEng
(Name of Design Professional)

☐ Reg Arch

I am a member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: **BE (civil)**

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*

The Design Firm is a member of ACENZ ☐ YES ☒ NO

SIGNED BY... Melvin Man ON BEHALF OF MEC Engineering Consultants Limited ...

Date... 04 March 2008 (signature)
(Design Firm)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damage payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application a Building Consent.

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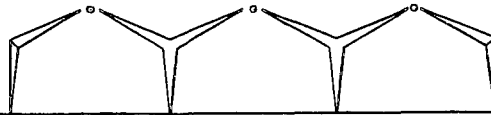
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Consent No.

MEC ENGINEERING CONSULTANTS LTD.

Consulting Civil & Structural Engineers

P O Box 301 131
Albany
Auckland New Zealand



Tel: 09 476 8184
Fax: 09 476 8186
Mobile: 0275 483806

**New House at
Lot28, Lithgow Drive
Wanganui**

March 2008

Wanganui District Council

27 SEP 2010

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Content:

Calculation

Page 1 to 11 Wall bracing design
Page 12 to 16 Beams and posts design
Page 17 to 27 Foundation design
Page 28 to 32 Sub floor bracing design

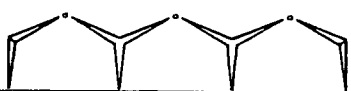
Drawings

S 01 General specification
S 02 Foundation Plan
S 03 Footing details
S 04 Beam / Wall Bracing Plan

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MEC ENGINEERING CONSULTANTS LTD Consulting Civil & Structural Engineers  Tel: 09 4768184 Fax: 09 4768186 P O Box 301 131 Albany Auckland	Job: <u>Lot 28, Lithgow Drive</u>	Page: <u>1</u>
	Wanganui District Council Subject: <u>General Design Notes</u>	
	Date: <u>March 08</u>	By: <u>MM</u>
	27 SEP 2010 Key 082	

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DESIGN NOTES:

General notes:

1. These notes shall be read in conjunction with the design where applicable
2. All dimensions, locations of existing services e.g. sewer, stormwater, power, phone, gas, etc and existing ground levels shall be confirmed on site prior to construction by owner or owner's agent.
3. It has been assumed for the purpose of the design that this site is stable and has "good ground" to NZS 3604:1999. Compliance with Section 3 of NZS 3604:1999 should be verified on site by Chartered Professional Geotechnical Engineer after excavation and prior to commencement of construction where applicable. This design does not include any assessment of site conditions regarding ground stability and/or soil strength.
4. All the recommendations of the geotechnical investigation report for the project must be implemented where applicable.
5. If retaining walls are involved in this project, ensure that any footings behind the wall are taken down deep enough so as to not surcharge the wall, i.e. footings shall be founded below a 45 degree line to horizontal originating from the retained face of the wall at the base of the retained height.
6. Block/concrete retaining wall shall be waterproofed on the earth face to architectural details by architects or architectural designer. The water proofing shall be protected from damage also to architectural details by others.
7. The contractor is required to maintain the stability of any excavations and the structure during construction. The contractor must take all necessary precautions including temporary support/waterproofing of exposed cut earth faces/bracing/method of construction etc, to ensure that the stability of this site and the structure and/or adjacent site and structures. Is maintained.

Material:

1. Material and proprietary items are to be covered by manufacturers' producer statements where relevant. Material and workmanship are to comply to New Zealand Building Codes, relevant NZ Standards and manufactures specifications.
2. All timber beams, lintels, bearers, etc, must be "dry" at installation (moisture content less than 16%) if otherwise they should be propped until dry.
3. All timber members specified by these calculations are to be MSG8 Radiata Pine unless noted otherwise. Glulam and flitch beam members to be design and specified by manufacturer.
4. Timber members located in positions subject to decay is to be tanalised to the appropriate NZTPA hazard class and comply to NZS 3602:2002 - Timber and Wood-based Products for Used in Building.
5. Any structural members specified as consisting of multiple members, e.g. 2/100x50 studs, 2/300x50 beams etc, are to be well nailed together to act as one member, e.g. pairs of 90mm x 4mm nails at 300mm centres.
6. All structural steel welds are to be 6mm fillet welds or full strength butt welds unless specified otherwise. All welding is to be carried out by certified welder. All bolts to be grade 4.6/s unless noted otherwise.
7. All structural steel, bolt and fixings must comply with durability requirements of NZS3604:1999 unless otherwise specified. e.g. All steelwork exposed to the weather, including nuts, bolts, washers, brackets, nail plates etc, is to be hot dip galvanised and also coated with approved anti-corrosion paint where applicable or use stainless steel to suit site environment conditions.
8. Reinforcing show as
 R = round grade 300
 D = deformed grade 300
 HD = deformed grade 500
9. Concrete must satisfy the durability requirements of NZS 3604:1999 section 4.8 and its crushing strength at 28 days is to be minimum of (unless noted otherwise)
 20 or 25 MPa for footing, slab and pile below ground to steel to suit site environment conditions.
 17.5 MPa for grout to blockwork

Structural Design:

1. The preparation of this design has been based on information shown on the drawings provided to us particularly with regard to existing structures, ground levels etc, and we have not independently verified this information and are not endorsing that information as to it's accuracy.
2. Building alterations and extensions: This design assumes that the existing building structure and foundations are structurally sound and that they were constructed as described in the drawings. This design does not cover investigation of the existing structure and verifying its adequacy. The Contractor should check all supports below new load points during construction if there are any doubts the design engineer shall be informed.
3. Any parts of this structure which are not covered by specific design included with these calculations must comply to NZ Building Codes or specific design as detailed by other professionals. Any exception to this should be referred back to this design office.
4. Beams are to be securely connected to and laterally restrained by the members they are supporting.
5. For wall bracing and subfloor bracing types and details refer to NZS 3604:1999 and Winstone Gibboard wall bracing brochure.

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2

Structural calculations

Loads(kPa)

	Basic	U.L.S.	Glulam k2=1.5, y1=0.7	S.L.S. Solid k2=2, y1=0.7	Steel y1=0.7
✓ Light roof/ceiling					
D.L.	0.4	0.48	0.60	0.80	0.40
L.L.	<u>0.25</u>	<u>0.4</u>	<u>0.18</u>	<u>0.18</u>	<u>0.18</u>
	0.65	0.88	0.78	0.98	0.58
X Heavy roof/ceiling					
D.L.	1	1.2	1.50	2.00	1.00
L.L.	<u>0.25</u>	<u>0.4</u>	<u>0.18</u>	<u>0.18</u>	<u>0.18</u>
	1.25	1.6	1.68	2.18	1.18
✓ Deck(light)					
D.L.	0.5	0.6	0.75	1.00	0.50
L.L.	<u>2</u>	<u>3.2</u>	<u>1.80</u>	<u>2.20</u>	<u>1.40</u>
	2.5	3.8	2.55	3.20	1.90
X Deck(heavy)					
D.L.	1	1.2	1.50	2.00	1.00
L.L.	<u>2</u>	<u>3.2</u>	<u>1.80</u>	<u>2.20</u>	<u>1.40</u>
	3	4.4	3.30	4.20	2.40
✓ Floor/ceiling					
D.L.	0.5	0.6	0.75	1.00	0.50
L.L.	<u>1.5</u>	<u>2.4</u>	<u>1.35</u>	<u>1.65</u>	<u>1.05</u>
	2	3	2.10	2.65	1.55
✓ Wall					
D.L.	0.3	0.36	0.45	0.60	0.30
✓ 70 series Brick veneer					
D.L.	1.4	1.68	2.10	2.80	1.40
X 20 series masonry wall					
D.L.	4.56	5.472	6.84	9.12	4.56

Foundation:

The subsoil and surrounding area is assumed to be firm natural stable ground capable of 300 kPa ultimate bearing pressure and complying with NZS3604:1999.

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Hand-drawn floor plan of a house. The plan includes the following rooms and features:

- Deck**: FL 100.95
- Lounge**
- Dining**
- Kitchen**
- Family**
- Foyer**
- Porch**
- Study**: 8'11/16" x 12'5"
- Garage**: 45'10" x 2.0"
- Laundry**: 8'11/16" x 12'5"
- Corridor**: 45'10" x 3.4"
- BDRM 1**: Includes a Walk-in Wardrobe (W.I.R.B.)
- BDRM 2**
- BDRM 3**
- BDRM 4**
- Bath**
- Ensuite**: Includes a Walk-in Wardrobe (W.I.R.B.)
- Store**
- Corridor**
- Closets**: C.B.D., W.I.R.B., W.I.R.

Dimensions for rooms and garage:

- Study: 8'11/16" x 12'5"
- Garage: 45'10" x 2.0"
- Corridor: 45'10" x 3.4"
- Laundry: 8'11/16" x 12'5"

Other labels and notes:

- Part 1** (bottom right)
- Part 2** (top right)
- APPROVED** (bottom left)
- Consent No. 10/0868** (bottom left)
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- Part 1** (bottom center)

part (1)

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		Ground Floor	Date	03-Mar-08

Part 1 Wall Bracing calculation Sheet A

Name _____			
Street and Number Lot 28, Lithgow Drive			
Lot and DP Number _____			
City/Town/District <u>Surburbs</u>			
Location of Story: <u>Ground Floor</u>			
Building height to apex	<u>4.5</u> m average	Roof weight	Light
Roof height above eaves	<u>1.5</u> m average	first floor clading weight	N/A
Stud height	<u>2.7</u> m	ground floor clading weight	Heavy
Average roof pitch	<u>22.5</u> degree	Room in roof space	No
Ground Floor			
Building length BL=	<u>10.2</u> m	Gross Building	Ground Floor
Building width BW=	<u>6.4</u> m	Plan Area, GPA=	<u>65</u> m ²
Note: When the average roof pitch is over 25 degrees, use the eaves length and width to determine BL and BW.			
Note: For heavy roof use roof plan at eaves level to determined GPA.			

Wind Zone box 2			
Region:	Terrain:	Exposure:	Topography:
R1 0 _____	Inland 0 _____	Sheltered 0 _____	Gentle 0 _____
R2 1 _____	Coastal 1 _____	Exposed 1 _____	Moderate 1 _____
			Extreme 3 _____
Total points _____			
Wind Zone:	Low(0) _____	Very high (3) _____	
	<u>Medium</u> Medium(1) _____	Specific Design (4) _____	
	High(2) _____		

Earthquake Zone box 3
From Figure EQ1 select Earthquake Zone: <u>A</u>

BUs required Wind box 4
From table W1A/W1B
Ground Floor
W across= <u>37</u> BUs/m
W along= <u>44</u> BUs/m
Total wind load,
W ACROSS
W acrossxBL= <u>377</u> Bus
W ALONG
W alongxBW= <u>282</u> BUs

BUs required Earthquake box 5
From table EQ 1
Ground Floor
E = <u>5.2</u> BUs/m ²
Note: For a room in the roof space use E+1
Total earthquake load,
EQ ALONG and EQ ACROSS:
E x GPA BUs= <u>338</u> BUs

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ACROSS

ACROSS

Wall or Bracin Line		Bracing Elements Provided		stud height H	Wind		Earthquake	
1	2	3	4		5W	6W	5EQ	6EQ
Bracing Elements	Minimum BUs Required	Bracing type	Length Element (m) L		Rating BU/m	BUs Achieved (BU/mxL) W	Rating BU/m	BUs Achieved (BU/mxL) EQ
G		GS1a	1	1.8	65	117	55	99
H		GS1a	2	1.8	65	234	55	198
I		GS1a	1	3	75	225	65	195
Total Achieved					W	512	EQ	437

From Sheet A	Total Required	
Wreq/EQreq=	1.11657	*

W	377
---	-----

EQ	338
----	-----

ALONG

Wall or Bracin Line		Bracing Elements Provided		Wind		Earthquake	
1	2	3	4	5W	6W	5EQ	6EQ
Bracing Elements	Minimum BUs Required	Bracing Type	Length Element (m) L	Rating BU/m W	BUs Achieved (BU/mxL) W	Rating BU/m EQ	BUs Achieved (BU/mxL) EQ
M		GS1a	1 2	65	130	55	110
N		GS1a	1 2.4	75	180	65	156
O		SP1	1 1.2	100	120	100	120
Total Achieved				W	382.22	EQ	343

From Sheet A	Total Required
Wreq/EQreq=	0.83314 *

W	282
---	-----

EQ	338
----	-----

*If W_{rep}/EQ_{rep} is 1 or less complete EQ column only
If W_{rep}/EQ_{rep} is 1.5 or more complete W column only
Otherwise complete both W and EQ.

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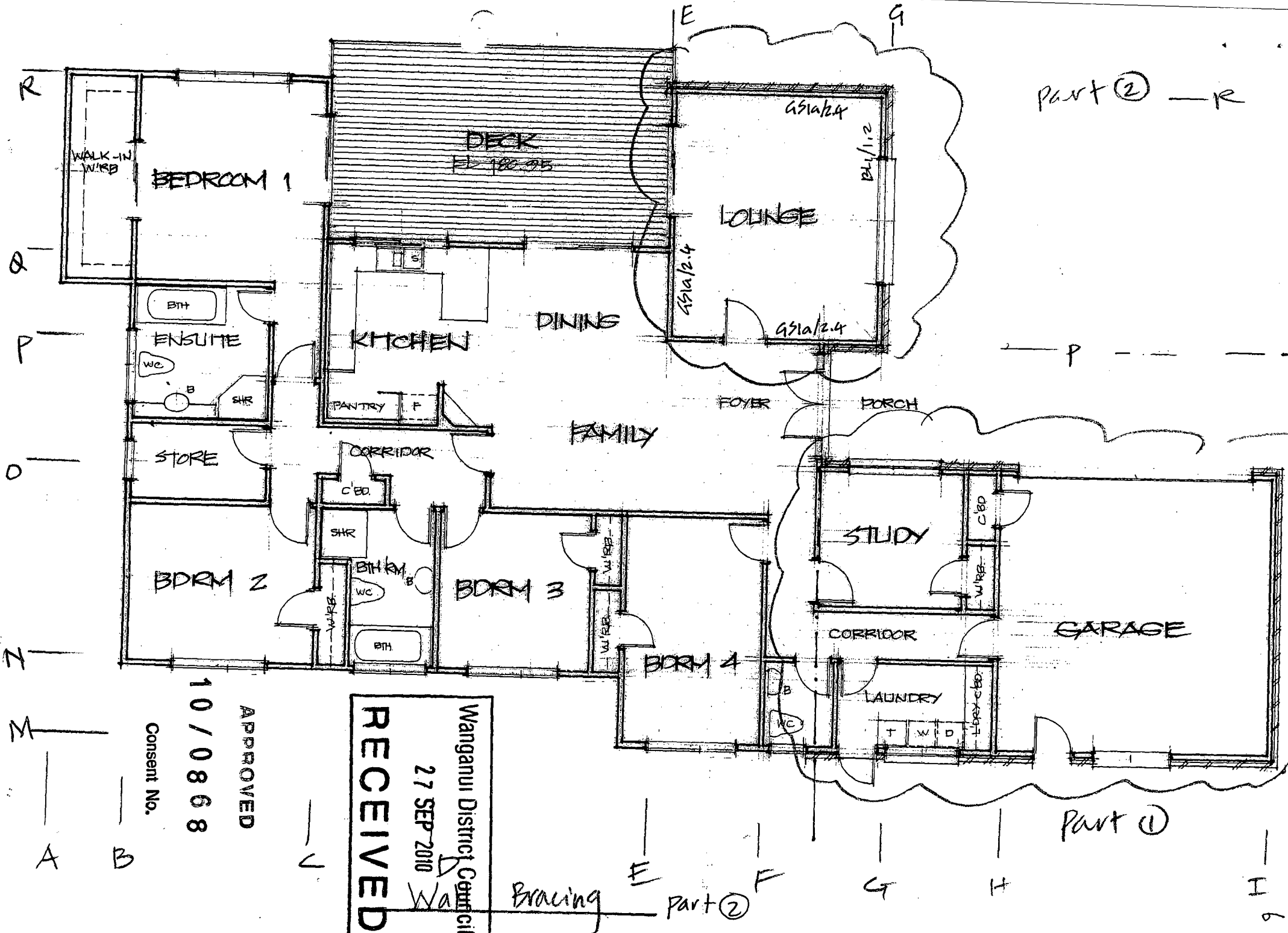
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Part 2 Wall Bracing calculation Sheet A

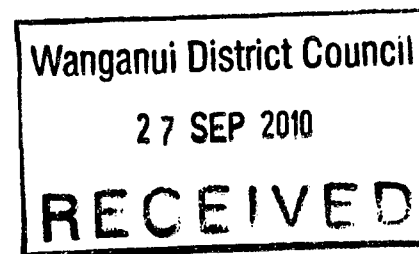
Name _____				
Street and Number Lot 28, Lithgow Drive				
Lot and DP Number _____				
City/Town/District Surburbs				
Location of Story: Ground Floor				
Building height to apex	4.5	m	average	Roof weight
Roof height above eaves	1.5	m	average	first floor clading weight
Stud height	2.7	m		ground floor clading weight
Average roof pitch	22.5	degree		Room in roof space
Ground Floor				
Building length BL=	5.5	m		Gross Building
Building width BW=	5	m		Plan Area, GPA=
				Ground Floor
				27 m ²
Note: When the average roof pitch is over 25 degrees, use the eaves length and width to determine BL and BW.				
Note: For heavy roof use roof plan at eaves level to determined GPA.				

Wind Zone				box 2
Region:	Terrain:	Exposure:	Topography:	
R1 0	Inland 0	Sheltered 0	Gentle 0	
R2 1	Coastal 1	Exposed 1	Moderate 1	
			Extreme 3	
Total points				
Wind Zone:	Low(0)		Very high (3)	
	Medium Medium(1)		Specific Design (4)	
	High(2)			

Earthquake Zone	box 3
From Figure EQ1 select Earthquake Zone:	A

BUs required Wind		box 4
Ground Floor		
W across=	37	BU/s/m
W along=	44	BU/s/m
Total wind load,		
W ACROSS		
W acrossxBL=	204	Bus
W ALONG		
W alongxBW=	220	BU/s

BUs required Earthquake		box 5
Ground Floor		
E =	5.2	BU/s/m ²
Note: For a room in the roof space use E+1		
Total earthquake load,		
EQ ALONG and EQ ACROSS:		
E x GPA BU/s=	140	BU/s



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		Ground Floor	Date	03-Mar-08

ACROSS

Wall or Bracing Line		Bracing Elements Provided	
1	2	3	4
Bracing Elements	Minimum BUs Required	Bracing type	Length Element (m) L
P		GS1a	1 2.4
R		GS1a	1 2.4

stud
height
H

Wind	
5W	6W
Rating BU/m	BUs Achieved (BU/mxL) W
75	180
75	180

Earthquake	
5EQ	6EQ
Rating BU/m	BUs Achieved (BU/mxL) EQ
65	156
65	156

Total Achieved	
----------------	--

W	320
---	-----

EQ	277
----	-----

From Sheet A	Total Required
Wreq/EQreq=	1.44943 *

W	204
---	-----

EQ	140
----	-----

ALONG

Wall or Bracing Line		Bracing Elements Provided	
1	2	3	4
Bracing Elements	Minimum BUs Required	Bracing Type	Length Element (m) L
E		GS1a	1 2.4
G		BL1	1 1.2

Total Achieved	
----------------	--

Wind	
5W	6W
Rating BU/m	BUs Achieved (BU/mxL) W
75	180
125	150

Earthquake	
5EQ	6EQ
Rating BU/m	BUs Achieved (BU/mxL) EQ
65	156
55	
115	138

From Sheet A	Total Required
Wreq/EQreq=	1.56695 *

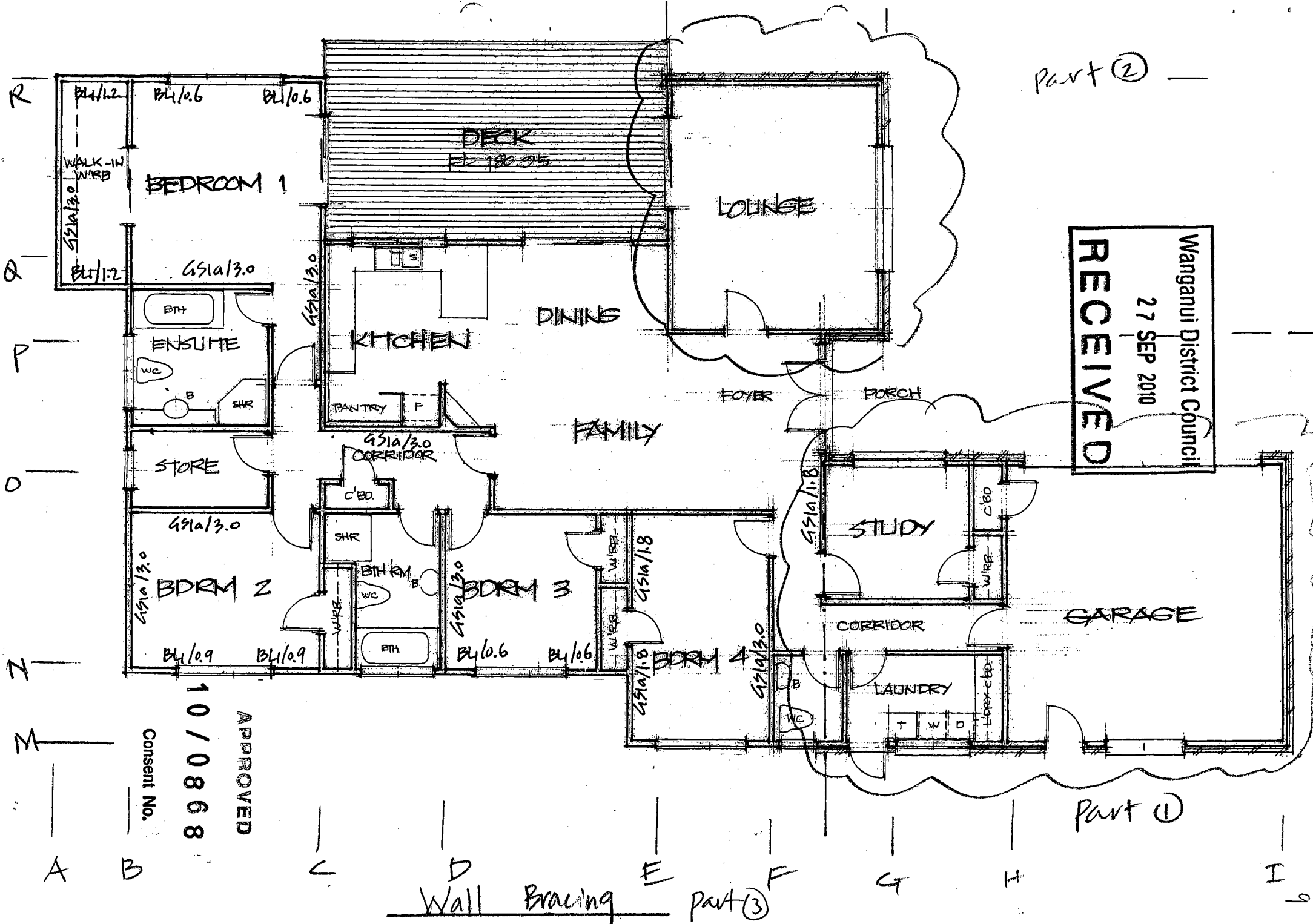
W	220
---	-----

EQ	140
----	-----

*If Wreq/EQreq is 1 or less complete EQ column only
If Wreq/EQreq is 1.5 or more complete W column only
Otherwise complete both W and EQ.

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Part ②

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Part ①

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Wall Bracing
part ③

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	Site	Lot 28, Lithgow Drive Wanganui		
		Ground Floor	Date	03-Mar-08

Part 3

Wall Bracing calculation Sheet A

Name _____			
Street and Number Lot 28, Lithgow Drive			
Lot and DP Number _____			
City/Town/District <u>Surburbs</u>			
Location of Story: <u>Ground Floor</u>			
Building height to apex	<u>5.5</u> m average	Roof weight	Light
Roof height above eaves	<u>2</u> m average	first floor clading weight	N/A
Stud height	<u>2.7</u> m	ground floor clading weight	Heavy
Average roof pitch	<u>22.5</u> degree	Room in roof space	No
Ground Floor			
Building length BL=	<u>17.2</u> m	Gross Building	Ground Floor
Building width BW=	<u>13</u> m	Plan Area, GPA=	<u>160</u> m ²
Note: When the average roof pitch is over 25 degrees, use the eaves length and width to determine BL and BW.			
Note: For heavy roof use roof plan at eaves level to determine GPA.			

Wind Zone

box 2

Region:	Terrain:	Exposure:	Topography:
R1 0 _____	Inland 0 _____	Sheltered 0 _____	Gentle 0 _____
R2 1 _____	Coastal 1 _____	Exposed 1 _____	Moderate 1 _____
			Extreme 3 _____
Total points	_____		
Wind Zone:	Low(0)	Very high (3)	
	<u>Medium</u> Medium(1)	Specific Design (4)	
	High(2)		

Earthquake Zone

box 3

From Figure EQ1 select Earthquake Zone:	A
---	----------

BUs required Wind

box 4

Ground Floor	
W across=	<u>37</u> BUs/m
W along=	<u>44</u> BUs/m
Total wind load,	
W ACROSS	
W acrossxBL=	<u>636</u> Bus
W ALONG	
W alongxBW=	<u>572</u> BUs

BUs required Earthquake

box 5

Ground Floor	
E =	<u>6.7</u> BUs/m ²
Note: For a room in the roof space use E+1	
Total earthquake load,	
EQ ALONG and EQ ACROSS:	
E x GPA BUs=	<u>1072</u> BUs

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		Ground Floor	Date	03-Mar-08

ACROSS

Wall or Bracing Line		Bracing Elements Provided	
1	2	3	4
Bracing Elements	Minimum BUs Required	Bracing type	Length Element (m) L
A		GS1a	1 3
B		GS1a	1 3
C		GS1a	1 3
D		GS1a	1 3
E		GS1a	2 1.8
F		GS1a	1 3
G		GS1a	1 1.8

Wind	
5W	6W
Rating BU/m	BUs Achieved (BU/mxL) W
W	W
75	225
75	225
75	225
75	225
65	234
75	225
65	117

Earthquake	
5EQ	6EQ
Rating BU/m	BUs Achieved (BU/mxL) EQ
EQ	EQ
65	195
65	195
65	195
65	195
55	198
65	195
55	99

Total Achieved	
----------------	--

W	1312
---	------

EQ	1131
----	------

From Sheet A	Total Required
Wreq/EQreq=	0.59366 *

W	636
---	-----

EQ	1072
----	------

ALONG

Wall or Bracing Line		Bracing Elements Provided	
1	2	3	4
Bracing Elements	Minimum BUs Required	Bracing Type	Length Element (m) L
N		BL1	2 0.9
		BL1	2 0.6
O		GS1a	2 3
Q		GS1a	1 3
		BL1	1 1.2
R		BL1	1 1.2
		BL1	2 0.6

Wind	
5W	6W
Rating BU/m	BUs Achieved (BU/mxL) W
W	W
125	225
125	150
75	450
75	225
125	150
125	150
125	150
W	1333.33

Earthquake	
5EQ	6EQ
Rating BU/m	BUs Achieved (BU/mxL) EQ
EQ	EQ
115	207
115	138
65	390
65	195
115	138
115	138
115	138
EQ	1195

Total Achieved	
----------------	--

W	572
---	-----

EQ	1072
----	------

From Sheet A	Total Required
Wreq/EQreq=	0.53358 *

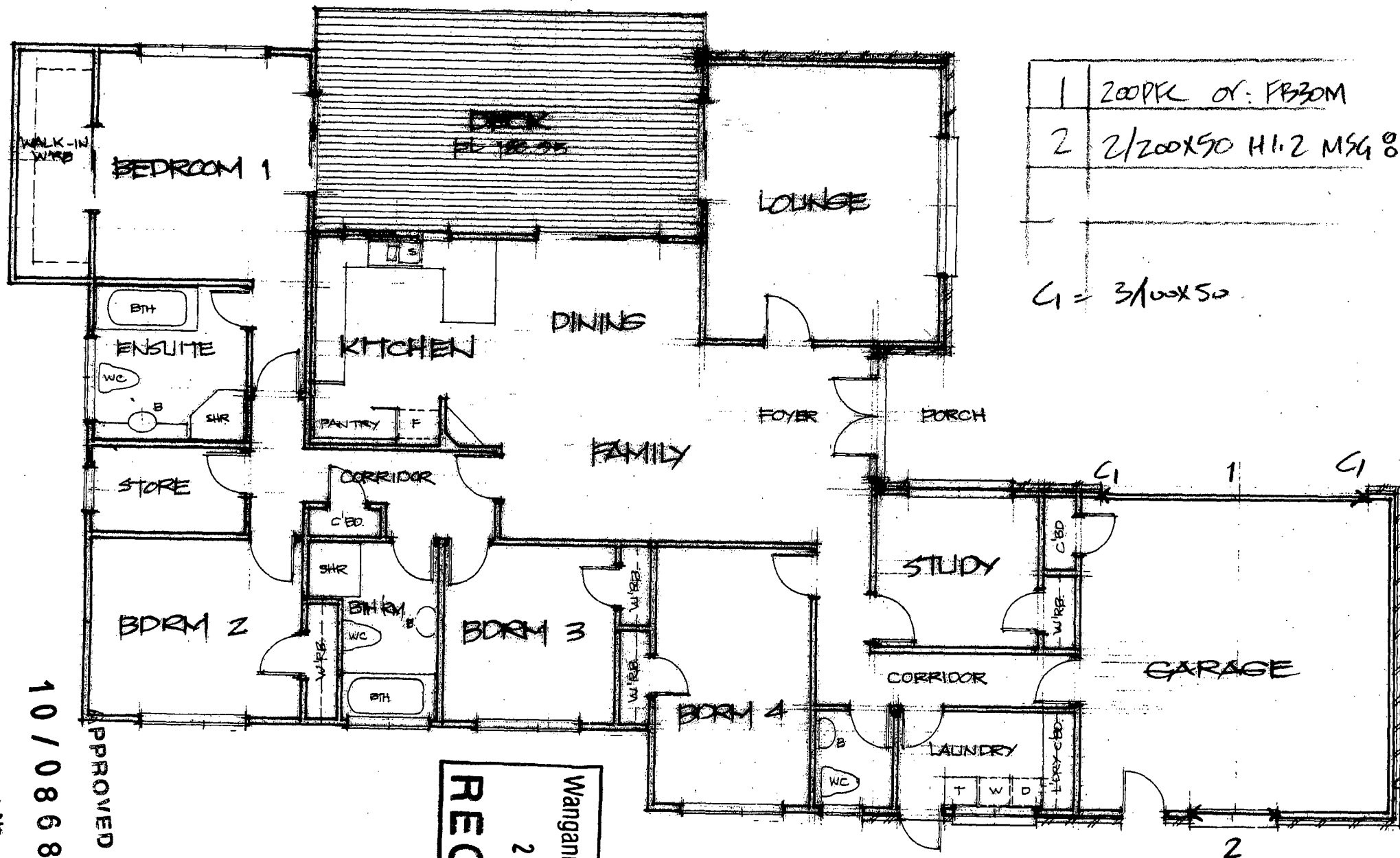
*If Wreq/EQrep is 1 or less complete EQ column only
If Wreq/EQrep is 1.5 or more complete W column only
Otherwise complete both W and EQ.

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1	200PKL OF: FB30M
2	2/200X50 H1.2 MSG 8

C1 = 3100x50

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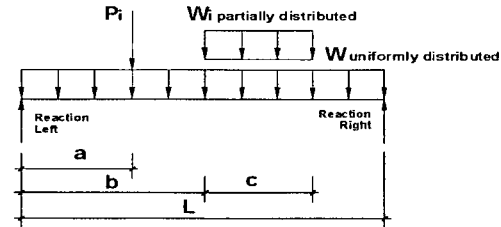
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Beam No. 1
 Beam Span = 5.2 m
 Allowable def = Span / 400
 Select Steel Grade PFC250MPa
 Select section 200PFC
 $I_{req} = 11.53 \times 10^6 \text{ mm}^4$
 $I_{prov} = 19.1 \times 10^6 \text{ mm}^4$
 Supporting roof only No
 Segment length = 0.6 m



Design Results for		200PFC	PFC250MPa		
ULS Design		Actions	Strengths	Ratio	Statu
Bending	Section	15.36	59.67	3.88	PASS!
	Member		59.02	3.84	PASS!
Shear	1.2G+1.5Q	10.15	207.36	20.43	PASS!

Deflection - SLS	Defl. Δ (mm)	
Long-term Deflection	6.17	= L/843
Short-term Deflection	7.01	= L/742
Deflection due to G	5.05	= L/1031
Deflection due to Q	2.80	= L/1855

Reactions	Left	Right
G	5.00	3.96
Q	2.76	2.11
1.2G+1.5Q	10.15	7.93
1.4G	7.01	5.55

Design Actions - ULS		
Comb.	M (kNm)	V (kN)
1.2G+1.5Q	15.36	10.15
1.4G	10.53	7.01
G	7.52	5.00
Q	4.23	2.76

Check Floor Vibration	
With 1kN Point Load at mid-span	
Def, Δ =	0.767 mm
Floor Vibration OK!	

Design Loadings

Point Load P_i

Item	a	load area	G	Q	PL _G	PL _Q
	m	m ²	kPa	kPa	kN	kN
P ₁ from girder truss	2.60	6.50	0.40	0.25	2.60	1.63
P ₂ from						
P ₃ from						
P ₄ from						
P ₅ from						
P ₆ from						

Ultimate Limit State- Load comb.

G	1.2	1.4
Q	1.5	-

Serviceability Limit State

Long-term, Ψ _L =	0.4
Long-term, Ψ _S =	0.7

Uniformly Distributed Load.

Item	b	c	load width	G	Q	w _G	w _Q
	m	m	m	kPa	kPa	kN/m	kN/m
W Uniformly Distributed Load over whole span							
roof	zero	5.2					
floor	zero	5.2					
wall	zero	5.2					
deck	zero	5.2					
Selfweight	zero	5.2				0.22	
Sum						0.22	
W_i Partially Distributed Load, W _i							
W1		2.60	for W1 see table below			1.40	0.88
W2	2.60	2.60	for W2 see table below			0.60	0.38
W3							
W4							

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W1	load width (m)	G kPa	Q kPa	G kN/m	Q kN/m	W2	load width (m)	G kPa	Q kPa	G kN/m	Q kN/m
roof	3.5	0.4	0.25	1.4	0.875	roof	1.5	0.4	0.25	0.6	0.375
floor						floor					
wall						wall					
deck						deck					
other						other					
sum				1.4	0.875	sum				0.6	0.375

Dependable strength

$$\begin{aligned}
 \phi M_{sx} &= \phi f_y Z_{sx} = 59.67 \text{ kNm} & \phi &= 0.9 \\
 \phi M_{sx} &= \phi \alpha_m \alpha_s M_{sx} = 59.02 \text{ kNm} & k_t &= 1 \\
 \phi V_s &= 207.4 \text{ kN} & L_o &= 0.6 & k_r &= 1 & \alpha_m &= 1.00 & \alpha_s &= 0.99
 \end{aligned}$$

Summary: Beam 1 = USE 200PFC (PFC250MPa)
 Max Span = 5.2 m

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FL TCH BEAM



Selection Charts

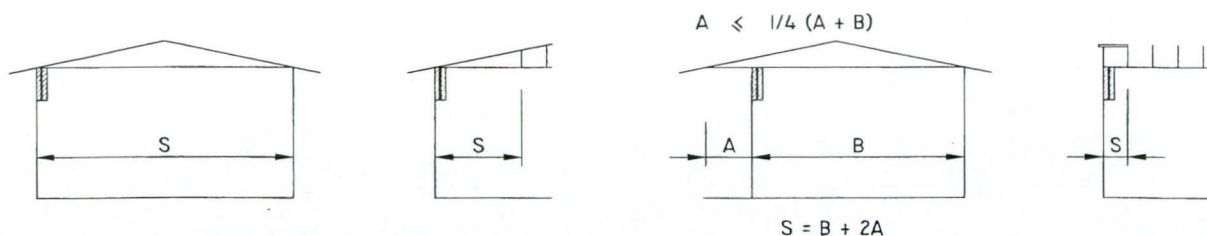
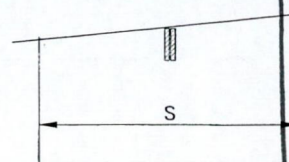
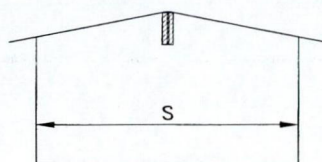


TABLE 1: MSG8, VSG8, MSG6 or Unverified No. 1 Framing
LINTELS SUPPORTING ROOF AND CEILING ONLY

	LINTEL SIZE	MAXIMUM LINTEL SPAN (m)												
		SUPPORTED ROOF SPAN 'S' (m)												
		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
LIGHT ROOF	FB15L	3.44	3.21	3.03	2.89	2.75	2.60	2.47	2.36	2.26	2.17	2.10	2.03	1.96
	FB20M	4.93	4.68	4.48	4.32	4.15	4.00	3.87	3.73	3.58	3.44	3.32	3.21	3.11
	FB25L	5.17	4.91	4.70	4.53	4.26	4.02	3.82	3.65	3.50	3.37	3.25	3.14	3.04
	FB25M	5.90	5.59	5.36	5.16	5.00	4.86	4.74	4.63	4.53	4.37	4.22	4.08	3.95
	FB30M	6.81	6.46	6.19	5.96	5.78	5.61	5.47	5.35	5.23	5.13	5.04	4.95	4.79
HEAVY ROOF	FB15L	2.92	2.72	2.57	2.45	2.30	2.17	2.06	1.97	1.89	1.82	1.75	1.69	1.64
	FB20M	4.21	3.99	3.82	3.68	3.52	3.39	3.26	3.12	2.99	2.87	2.77	2.68	2.59
	FB25L	4.41	4.19	4.01	3.79	3.56	3.36	3.19	3.05	2.92	2.81	2.71	2.62	2.54
	FB25M	5.03	4.77	4.57	4.41	4.27	4.15	4.04	3.95	3.80	3.65	3.52	3.40	3.30
	FB30M	5.81	5.51	5.28	5.09	4.93	4.79	4.67	4.56	4.47	4.38	4.27	4.13	4.00



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TABLE 2: MSG8, VSG8, MSG6 or Unverified No. 1 Framing
FLITCH BEAM RIDGE BEAM SUPPORTING ROOF AND SARKING OR CEILING
(RAFTERS @ 1200mm CRS MAX)

	LINTEL SIZE	MAXIMUM LINTEL SPAN (m)										
		SUPPORTED ROOF SPAN 'S' (m)										
		5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
LIGHT ROOF	FB15L	3.03	2.89	2.75	2.60	2.47	2.36	2.26	2.17	2.10	2.03	1.96
	FB20M	4.55	4.34	4.15	4.00	3.87	3.73	3.58	3.44	3.32	3.21	3.11
	FB25L	4.85	4.54	4.26	4.02	3.82	3.65	3.50	3.37	3.25	3.14	3.04
	FB25M	5.78	5.50	5.27	5.07	4.90	4.74	4.55	4.37	4.22	4.08	3.95
	FB30M	6.85	6.60	6.39	6.15	5.94	5.75	5.52	5.30	5.12	4.95	4.79
HEAVY ROOF	FB15L	2.57	2.45	2.30	2.17	2.06	1.97	1.89	1.82	1.75	1.69	1.64
	FB20M	3.86	3.68	3.52	3.39	3.26	3.12	2.99	2.87	2.77	2.68	2.59
	FB25L	4.08	3.79	3.56	3.36	3.19	3.05	2.92	2.81	2.71	2.62	2.54
	FB25M	4.90	4.66	4.47	4.30	4.15	3.96	3.80	3.65	3.52	3.40	3.30
	FB30M	5.84	5.63	5.42	5.21	5.03	4.81	4.61	4.43	4.27	4.13	4.00

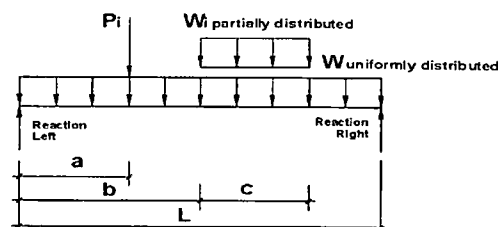
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P O Box 301 131 Albany		Wanganui	
Tel: 09 476 8184 Fax: 09 476 8186		mm	Date 03-Mar-08

Beam No. 2
 Span, L = 1.80 m
 Allowable def = Span / 400
 Moisture condition = Dry
 Timber grade = MSG8
 Beam Size = 2/200 x 50
 $I_{red} = 33.1 \times 10^6 \text{ mm}^4$
 $I_{prv} = 51.4 \times 10^6 \text{ mm}^4$

Supporting roof only No
 Dist of restraint = 0.9 m



Design Results for 2/200 x 50 MSG8

ULS DESIGN	Actions	Strengths	Ratio	Statu
Bending	1.2G+1.5Q	2.89	5.53	1.91 OK!
	1.4G	1.92	4.14	2.16 OK!
Shear	1.2G+1.5Q	3.65	24.93	6.83 OK!
	1.4G	2.44	18.70	7.65 OK!

Deflection - SLS	Defl. Δ (mm)	
Long-term Deflection	2.76	= L/652
Short-term Deflection	2.96	= L/607
Deflection due to G	1.11	= L/1618
Deflection due to Q	0.67	= L/2679

Reactions	Left	Right
G	1.74	1.74
Q	1.04	1.04
1.2G+1.5Q	3.65	3.65
1.4G	2.44	2.44

Design Actions - ULS

Comb.	M (kNm)	V (kN)
1.2G+1.5Q	2.89	3.65
1.4G	1.92	2.44
G	1.37	1.74
Q	0.83	1.04

Check Floor Vibration

With 1kN Point Load at mid-span

Def, Δ = 0.353 mm

Floor Vibration OK!

Design Loads

Point Load, Pi

Item	a	Load area	G	Q	PL _G	PL _Q
	m	m ²	kPa	kPa	kN	kN
P ₁ from girder/truss	0.90	6.50	0.40	0.25	2.60	1.63
P ₂ from						
P ₃ from						
P ₄ from						
P ₅ from						
P ₆ from						

Ultimate Limit State- Load comb.

G	1.2	1.4
Q	1.5	-

Serviceability Limit State

Creep factor, k_s =	2.0
Long term factor, Ψ_L =	0.4
Short term factor, Ψ_s =	0.7

Uniformly Distributed Load,

Item	b	c	load width	G	Q	w _G	w _Q
	m	m	m	kPa	kPa	kN/m	kN/m
Uniformly Distributed Load over whole span							
roof	zero	1.8	1	0.4	0.25	0.40	0.25
floor	zero	1.8					
wall	zero	1.8					
deck	zero	1.8					
Selfweight	zero	1.8				0.09	
Sum						0.49	0.25
Partially Distributed Load, W_i							
W1			for W1 see table below				
W2			for W2 see table below				
W3							
W4							

W1	load width (m)	G kPa	Q kPa	G kN/m	Q kN/m	W2	load width (m)	G kPa	Q kPa	G kN/m	Q kN/m
roof						roof					
floor						floor					
wall						wall					
deck						deck					
other						other					
sum						sum					

SUMMARY: Beam 2 = Use 2/200 x 50 MSG8 Grade Radiata Pine
 Max Span = 1.8 m

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Timber post supporting beam 1

2.2 m high both end assumed pinned

Height (m) - 2.2 m both end assumed pinned

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RECEIVED**Load on post**

LOAD	Load area (m2)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
ROOF						
FLOOR						
WALL						
beam						
beam 1	1	5	2.76	5	2.76	10.14
TOTALS				5	2.76	10.14

Ultimate limit strength

Characteristic stress, f_c =	20.7	MPa	dry condition
Strength reduction factor, ϕ =	0.8		
Duration of load factor, K_1 =	0.6		
Bearing area factor, K_3 =	1		
Parallel support factor, K_4 =	1.2		
Grid system factor, K_5 =	1		
Stability factor, K_8 =	0.52	$S=L/d=$	23.404 about x-x
Shear in beams, f_s =	3.8	MPa $S= L/d=$	8.511 about y - y
Compression perpendicular, f_p =	8.9	MPa	
Effective post cross section area, A_e =	11280	mm ²	area reduced by M12 bolts consider
f_b =	17.7	MPa	in this calculation
Maximum end reaction, N^* =	10.14	kN	less than ϕN_c 58.77
eccentricity, e =	10	mm	area reduced by M12 bolts c
bending moment due to eccentricity, e, M^* =	0.10	kNm	
nominal bending moment capacity, ϕM_n =	2.12	kNm	

Post selection

No. of post elements =	3	
Element depth =	94	mm
Element width =	47	mm

3 | 94 x 47

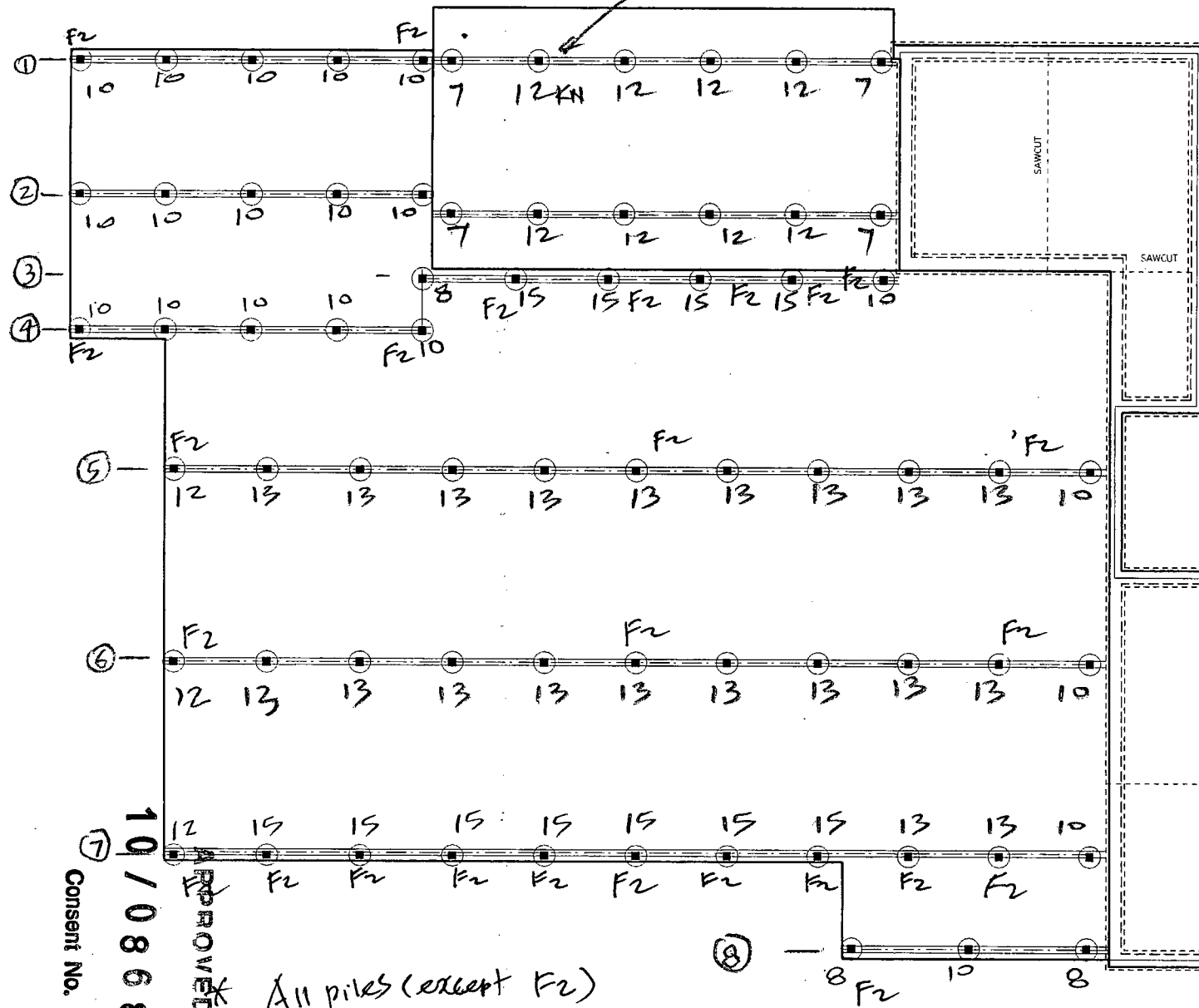
Combined bending and compression

$$M^*/\phi M_n + N^*/\phi N_c = 0.220 \text{ less than } 1 \text{ OK}$$

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pile loads (KN) (1.29+1.50)



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100mm thick R.C. slab with 665 mesh on 0.2mm polythene on 25mm sand blinding on 150mm fully compacted hardfill on firm natural stable clay

Garage Rebate

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All piles (except F2) are F1.

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	Footing	

Date 04-Mar-08

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RECEIVED**Load on concrete pile F1****Soil assumed complying with NZS 3604:1999**

Footing Dia=	350	mm	
Load on pile, R =	13.00	kN	1.2G+1.5Q
Ultimate end bearing capacity =	300	kPa	
Ultimate side adhesion =	0	kPa	
Assumed top soil thickness =	0.3	m	
Resistance from end bearing =	14.42	kN	
strength reduction factor ϕ =	0.5		
Minimum embedment =	0.60	m	
Resistance from Skin friction =	0.00	kN	
strength reduction factor ϕ =	0.50		
Total resistance=	14.42	>	13.00

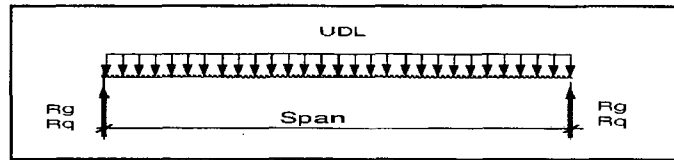
Therefore R.C. pile 350 dia. into firm natural ground**Load on concrete pile F2****Soil assumed complying with NZS 3604:1999**

Footing Dia=	350	mm	
Load on pile, R =	15.00	kN	1.2G+1.5Q
Ultimate end bearing capacity =	300	kPa	
Ultimate side adhesion =	16	kPa	
Assumed top soil thickness =	0.6	m	
Resistance from end bearing =	14.42	kN	
strength reduction factor ϕ =	0.5		
Minimum embedment =	0.90	m	
Resistance from Skin friction =	2.64	kN	
strength reduction factor ϕ =	0.50		
Total resistance=	17.06	>	15.00

Therefore R.C. pile 350 dia. into firm natural ground**APPROVED****10 / 0868****Consent No.**

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House Bearer 1 beam span= 1.35 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof	3	0.4	0.25	1.2	0.75	2.57
floor	1.1	0.5	1.5	0.55	1.65	3.14
wall	2.4	0.3		0.72		1
slab						
self weight	1	0.05		0.05		0.06
total				2.52		

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Eib (kPa)=	
No. 1 radiata	14	8.9	3.8	5360	MSG 8 dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.7	2	1	1.14	1
Strength reduction factor, $\phi = 0.8$					

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	1.56	kNm less than	$\phi M_n = 2.90$	kNm	OK
V*max =	4.63	kN less than	$\phi V_n = 21.89$	kN	OK
Nb*max =	4.63	kN less than	$\phi N_{nb} = 44.04$	kN	OK
Beam end reactions					
	G= 1.70	kN			
	Q= 1.62	kN			
	R(G+Q)kN = 3.32	kN	R(1.2G+1.5Q)kN = 4.47		

Serviceability		short term factor $\psi_s = 0.7$	long term factor $\psi_l = 0.4$
Deflection		G= 0.87 mm	
		Q= 0.83 mm	
Max.deflection(mm)(K2G+K2 ψ_l Q)			I= 23.39
$\Delta y(mm)_{long term} =$		2.40	Z= 0.32
Max.deflection(mm)(K2G+ ψ_s Q)			Minimum moment of inertia(span/250), I= 10.04
$\Delta y(mm)_{short term} =$		2.32 mm less than	deflection(mm) over span 1/ 582.36
		4.5	OK 1/300

So beam size 2 150 x 50
OK

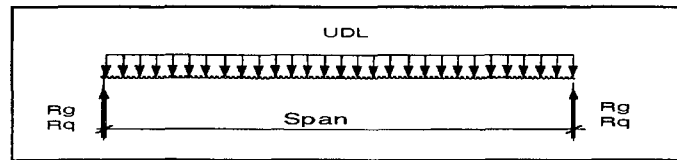
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House Bearer 2 beam span= 1.35 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof						
floor	2.1	0.5	1.5	1.05	3.15	5.99
wall						
slab						
self weight	1	0.05		0.05		0.06
total				1.1	3.15	6.05

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Characteristic stresses for timber(Mpa)

	bending f_b	compre parallel f_p	shear in beams f_s	modulus of elasticity E_{lb} (kPa)=	
No. 1 radiata	14	8.9	3.8	5360	MSG 8 dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.8	2	1	1.14	1
Strength reduction factor, ϕ =			0.8		

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M^*_{max} =	1.45	kNm less than	ϕM_n = 3.32	kNm	OK
V^*_{max} =	4.29	kN less than	ϕV_n = 25.02	kN	OK
$N^*_{b,max}$ =	4.29	kN less than	ϕN_{nb} = 50.33	kN	OK
Beam end reactions					
	$G = 0.74$	kN			
	$Q = 2.13$	kN			
	$R(G+Q)kN = 2.87$		kN	$R(1.2G+1.5Q)kN = 4.08$	

Serviceability		short term factor ψ_s =	0.7	long term factor ψ_l =	0.4
Deflection		G=	0.38	mm	
		Q=	1.09	mm	
Max.deflection(mm)(K2G+K2 ψ_l Q)				$I = 23.39$	
$\Delta y(mm)$ long term =		1.63		$Z = 0.32$	
Max.deflection(mm)(K2G+ ψ_s Q)				Minimum moment of inertia(span/250), $I = 6.58$	
$\Delta y(mm)$ short term =		1.52 mm less than	4.5	OK	1/300
				deflection(mm) over span 1/ 888.41	

So beam size 2 150 x 50

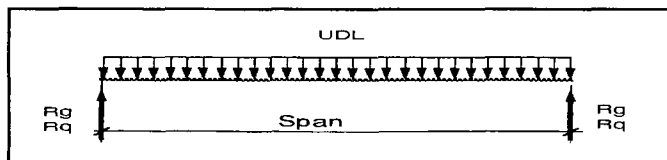
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House Bearer 3 beam span= 1.5 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof	5	0.4	0.25	2	1.25	4.28
floor	1.5	0.5	1.5	0.75	2.25	4.28
wall	2.4	0.3		0.72		1
slab						
self weight	1	0.05		0.05		0.06
total				3.52	3.5	9.47

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Eib (kPa)=	MSG 8
No. 1 radiata	14	8.9	3.8	5360	dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.7	2	1	1.14	1
Strength reduction factor, $\phi =$			0.8		K8
					1

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	2.76	kNm less than	$\phi Mn = 2.90$	kNm	OK
V*max =	7.37	kN less than	$\phi Vn = 21.89$	kN	OK
Nb*max =	7.37	kN less than	$\phi Nnb = 44.04$	kN	OK
Beam end reactions					
	G= 2.64	kN			
	Q= 2.63	kN			
	R(G+Q)kN = 5.27	kN		R(1.2G+1.5Q)kN = 7.11	

Serviceability		short term factor $\psi_s =$	0.7	long term factor $\psi_l =$	0.4
Deflection		G=	1.85 mm		
		Q=	1.84 mm		
Max.deflection(mm)(K2G+K2 ψ_l Q)				I= 23.39	
Δy (mm)long term =		5.17	Minimum moment of inertia(span/250), I= 19.45	Z= 0.32	
Max.deflection(mm)(K2G+ ψ_s Q)			deflection(mm) over span 1/ 300.62		
Δy (mm)short term =		4.99 mm less than	5	OK	1/300

So beam size 2 150 x 50

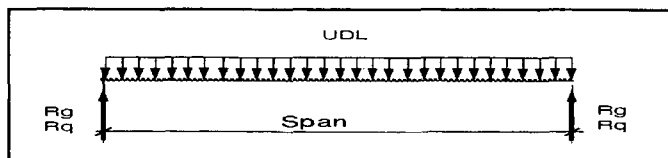
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House Bearer 4 beam span= 1.35 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof						
floor	2.2	0.5	1.5	1.1	3.3	6.27
wall						
slab						
self weight	1	0.05		0.05		0.06
total				1.15	3.3	6.33

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Eib (kPa)=	
No. 1 radiata	14	8.9	3.8	5360	MSG 8 dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.8	2	1	1.14	1
Strength reduction factor, ϕ =			0.8		

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	1.52	kNm less than	ϕM_n = 3.32	kNm	OK
V*max =	4.50	kN less than	ϕV_n = 25.02	kN	OK
Nb*max =	4.50	kN less than	ϕN_{nb} = 50.33	kN	OK
Beam end reactions					
	G= 0.78	kN			
	Q= 2.23	kN			
	R(G+Q)kN = 3.00	kN	R(1.2G+1.5Q)kN = 4.27		

Serviceability		short term factor ψ_s =	0.7	long term factor ψ_l =	0.4
Deflection		G=	0.40 mm		
		Q=	1.14 mm		
Max.deflection(mm)(K2G+K2 ψ_l Q)				I= 23.39	
				Z= 0.32	
Δy (mm)long term =		1.70	Minimum moment of inertia(span/250), I= 6.89		
Max.deflection(mm)(K2G+ ψ_s Q)			deflection(mm) over span 1/ 848.90		
Δy (mm)short term =		1.59 mm less than	4.5	OK	1/300

So beam size 2 150 x 50
OK

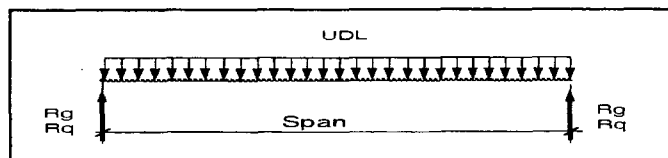
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House Bearer 5 beam span= 1.5 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof	3	0.5	1.5	1.5	4.5	8.55
floor						
wall						
slab						
self weight	1	0.05		0.05		0.06
total				1.55		8.61

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Eib (kPa)=	MSG 8
No. 1 radiata	14	8.9	3.8	5360	dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.8	2	1	1.14	1
Strength reduction factor, $\phi =$			0.8		

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	2.55	kNm less than	$\phi M_n = 3.32$	kNm	OK
V*max =	6.80	kN less than	$\phi V_n = 25.02$	kN	OK
Nb*max =	6.80	kN less than	$\phi N_{nb} = 50.33$	kN	OK
Beam end reactions					
	G= 1.16	kN			
	Q= 3.38	kN			
	R(G+Q)kN = 4.54	kN	R(1.2G+1.5Q)kN = 6.46		

Serviceability	short term factor $\psi_s =$	0.7	long term factor $\psi_l =$	0.4
Deflection	G=	0.81 mm		
	Q=	2.37 mm		
Max.deflection(mm)(K2G+K2 ψ_l Q)			I= 23.39	
			Z= 0.32	
Δy (mm)long term =	3.52	Minimum moment of inertia(span/250), I= 12.81		
Max.deflection(mm)(K2G+ ψ_s Q)		deflection(mm) over span 1/ 456.46		
Δy (mm)short term =	3.29 mm less than	5	OK	1/300

So beam size 2 150 x 50
OK

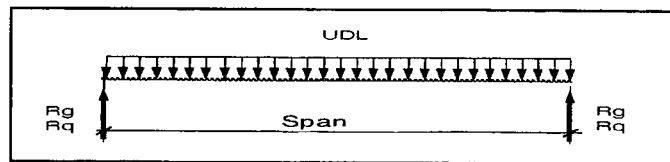
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Consent No.

MEC Engineering Consultants Ltd. Consulting Structural & Civil Engineers P O Box 301 131 Albany Tel: 09 476 8184 Fax: 09 476 8186	Job No.	Rey 082	Page:
	Site	Lot 28, Lithgow Drive Wanganui	Date 03-Mar-08

House Bearer 6 beam span= 1.5 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof	3	0.5	1.5	1.5	4.5	8.55
floor						
wall						
slab						
self weight	1	0.05		0.05		0.05
total				1.55	4.5	8.61

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Etb (kPa)=	
No. 1 radiata	14	8.9	3.8	5360	MSG 8 dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.8	2	1	1.14	1
Strength reduction factor, $\phi =$			0.8		

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	2.55	kNm less than	$\phi M_n = 3.32$	kNm	OK
V*max =	6.80	kN less than	$\phi V_n = 25.02$	kN	OK
Nb*max =	6.80	kN less than	$\phi N_{nb} = 50.33$	kN	OK
Beam end reactions					
	G= 1.16	kN			
	Q= 3.38	kN			
	R(G+Q)kN = 4.54	kN	R(1.2G+1.5Q)kN = 6.46		

Serviceability	short term factor $\psi_s =$	0.7	long term factor $\psi_l =$	0.4
Deflection	G=	0.81 mm		
	Q=	2.37 mm		
Max.deflection(mm)(K2G+K2 ψ_l Q)			I= 23.39	
			Z= 0.32	
Δy (mm)long term =	3.52	Minimum moment of inertia(span/250), I= 12.81		
Max.deflection(mm)(K2G+ ψ_s Q)		deflection(mm) over span 1/ 456.46		
Δy (mm)short term =	3.29 mm less than	5	OK	1/300

So beam size 2 150

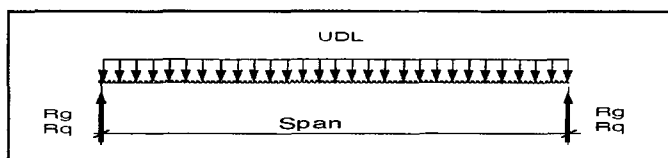
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OK

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Consent No.

MEC Engineering Consultants Ltd. Consulting Structural & Civil Engineers P O Box 301 131 Albany Tel: 09 476 8184 Fax: 09 476 8186	Job No.	Rey 082	Page:
	Site	Lot 28, Lithgow Drive Wanganui	Date 03-Mar-08

House Bearer 7 beam span= 1.5 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof	5	0.4	0.25	2	1.25	4.28
floor	1.5	0.5	1.5	0.75	2.25	4.28
wall	2.4	0.3		0.72		1
slab						
self weight	1	0.05		0.05		
total				3.52	3.5	9.47

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Eib (kPa)=	
No. 1 radiata	14	8.9	3.8	5360	MSG 8 dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.8	2	1	1.14	1
Strength reduction factor, $\phi =$			0.8		

beam size:

No.	depth	width
2	150	50

 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	2.76	kNm less than	$\phi M_n = 3.32$	kNm	OK
V*max =	7.37	kN less than	$\phi V_n = 25.02$	kN	OK
Nb*max =	7.37	kN less than	$\phi N_{nb} = 50.33$	kN	OK
Beam end reactions					
	G= 2.64	kN			
	Q= 2.63	kN			
	R(G+Q)kN = 5.27	kN	R(1.2G+1.5Q)kN = 7.11		

Serviceability		short term factor $\psi_s =$	0.7	long term factor $\psi_l =$	0.4
Deflection		G=	1.85 mm		
		Q=	1.84 mm		
Max.deflection(mm)(K2G+K2 ψ_l Q)				I= 23.39	
$\Delta y(mm)$ long term =		5.17		Z= 0.32	
Max.deflection(mm)(K2G+ ψ_s Q)				Minimum moment of inertia(span/250), I= 13.45	
$\Delta y(mm)$ short term =		4.99 mm less than	5	deflection(mm) over span 1/ 300.62	
				OK 1/300	

So beam size 2 150 x 50
OK

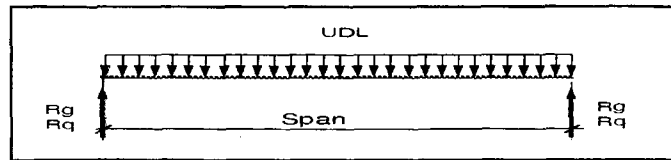
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Consent No.

MEC Engineering Consultants Ltd. Consulting Structural & Civil Engineers P O Box 301 131 Albany Tel: 09 476 8184 Fax: 09 476 8186	Job No.	Rey 082	Page:
	Site	Lot 28, Lithgow Drive Wanganui	Date 03-Mar-08

House Bearer 8 beam span= 1.9 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof	1.5	0.4	0.25	0.6	0.375	1.28
floor	0.8	0.5	1.5	0.4	1.2	2.28
wall	2.4	0.3		0.72		1
slab						
self weight	1	0.05		0.05		0.06
total				1.77		4.49

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Characteristic stresses for timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity Eib (kPa)=	MSG 8
No. 1 radiata	14	8.9	3.8	5360	dry timber
Modification factors					
	K1	K2	K3	K4	K5
	0.7	2	1	1.14	1
Strength reduction factor, $\phi =$			0.8		

beam size: No. depth width No. 1 radiata

2	150	50
---	-----	----

Ultimate limit state(1.2G+1.5Q)

M*max =	2.10	kNm less than	$\phi M_n = 2.90$	kNm	OK
V*max =	4.41	kN less than	$\phi V_n = 21.89$	kN	OK
Nb*max =	4.41	kN less than	$\phi N_{nb} = 44.04$	kN	OK
Beam end reactions					
	G= 1.68	kN			
	Q= 1.50	kN			
	R(G+Q)kN = 3.18	kN	R(1.2G+1.5Q)kN = 4.26		

Serviceability		short term factor $\psi_s =$	0.7	long term factor $\psi_l =$	0.4
Deflection		G=	2.40	mm	
		Q=	2.13	mm	
Max.deflection(mm)(K2G+K2 ψ_l Q)					l= 23.39
Δy (mm)long term =		6.50	Minimum moment of inertia(span/250), l=	19.34	
Max.deflection(mm)(K2G+ ψ_s Q)				deflection(mm) over span 1/	302.38
Δy (mm)short term =		6.28 mm less than	6.333333	OK	1/300

So beam size 2 150 x 50
OK

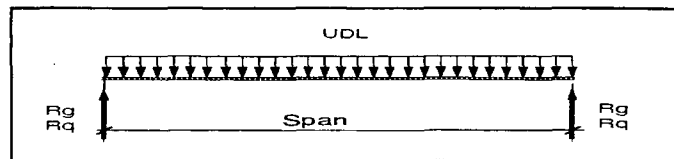
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Consent No.

MEC Engineering Consultants Ltd. Consulting Structural & Civil Engineers P O Box 301 131 Albany Tel: 09 476 8184 Fax: 09 476 8186	Job No.	Rey 082	Page:
	Site	Lot 28, Lithgow Drive Wanganui	Date Mar-08

Deck bearer beam span= 1.4 m



Loading on beam

LOAD	Load width (m)	Dead (G) kPa	Live (Q) kPa	G kN/m	Q kN/m	1.2 G + 1.5 Q kN/m
roof						
floor						
wall						
deck	2.1	0.4	2	0.84	4.2	7.308
self weight	1	0.05		0.05		0.06
total				0.89		7.37

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Characteristic stresses for visually graded timber(Mpa)

	bending fb	compre parallel fp	shear in beams fs	modulus of elasticity E _{lb} (kPa)=	
No. 1 radiata	11.7	8.9	3.8	4355	Green timber
Modification factors					
	K1	K2	K3	K4	K5
	0.8	3	1	1.14	1
Strength reduction factor, ϕ =			0.8		

beam size: No. depth width
2 150 50 No. 1 radiata

Ultimate limit state(1.2G+1.5Q)

M*max =	1.91	kNm less than	ϕM_n = 2.77	kNm	OK
V*max =	5.45	kN less than	ϕV_n = 25.02	kN	OK
Nb*max =	5.4516	kN less than	ϕN_{nb} = 50.33	kN	OK
Beam end reactions					
	G= 0.62	kN			
	Q= 2.94	kN			
	R(G+Q)kN = 3.56		kN	R(1.2G+1.5Q)kN = 5.16	

Serviceability		short term factor ψ_s =	0.7	long term factor ψ_l =	0.4
Deflection		G=	0.44	mm	
		Q=	2.06	mm	
Max.deflection(mm)(K2G+K2 ψ_l Q)				I= 23.39	
Δy (mm)long term =		3.79	Minimum moment of inertia(span/250), I= 9.68	Z= 0.32	
Max.deflection(mm)(K2G+ ψ_s Q)			deflection(mm) over span 1/ 369.78		
Δy (mm)short term =		2.75 mm less than	5.6	OK	

So beam size 2 150 x 50
OK

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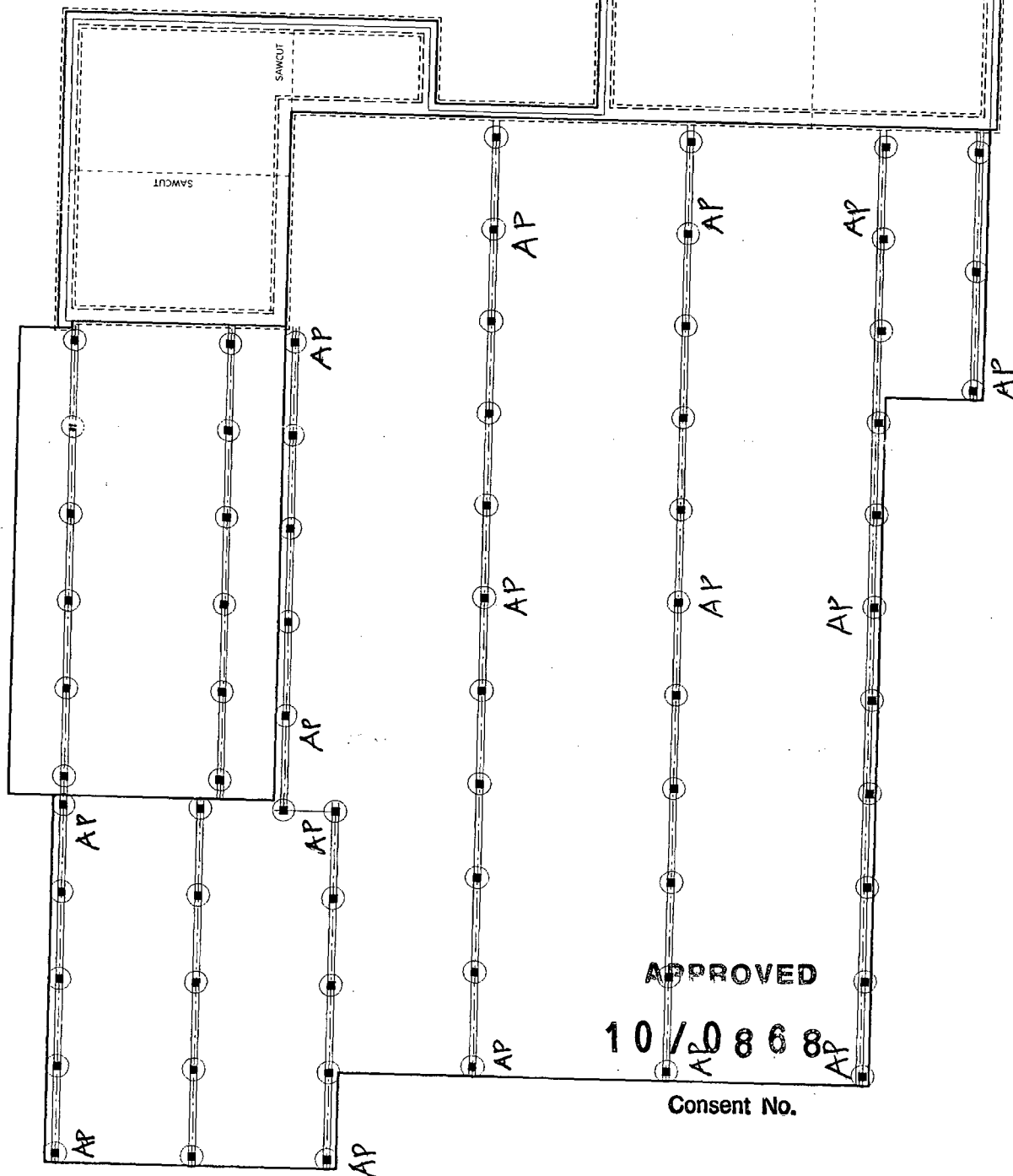
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Consent No.

Wanganui District Council
27 SEP 2010
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Garage Rebuild

100mm thick R.C. slab with 665 mesh on
0.25mm polythene on 25mm sand blinding
on 150mm fully compacted hardfill on firm
natural stable clay



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Consent No.

House Subfloor Bracing

MEC Engineering Consultants Ltd. Consulting Structural & Civil Engineers P O Box 301 131 Albany Tel: 09 476 8184 Fax: 09 476 8186	Job No.	Rey 082	Page:	
	Site	Lot 28, Lithgow Drive Wanganui	Date	03-Mar-08

Part 3 *Sub Floor* Wall Bracing calculation Sheet A

Name _____				
Street and Number Lot 28, Lithgow Drive				
Lot and DP Number _____				
City/Town/District Surburbs				
Location of Story: Sub Floor				
Building height to apex	5.5	m average	Roof weight	Light
Roof height above eaves	2	m average	first floor clading weight	N/A
Stud height	2.7	m	ground floor clading weight	Heavy
Average roof pitch	22.5	degree	Room in roof space	No
Ground Floor				
Building length BL=	17.2	m	Gross Building Plan Area,	Ground Floor
Building width BW=	13	m	GPA=	160 m ²
Note: When the average roof pitch is over 25 degrees, use the eaves length and width to determine BL and BW.				
Note: For heavy roof use roof plan at eaves level to determined GPA.				

Wind Zone

box 2

Region:	Terrain:	Exposure:	Topography:
R1 0	Inland 0	Sheltered 0	Gentle 0
R2 1	Coastal 1	Exposed 1	Moderate 1
			Extreme 3
Total points			
Wind Zone:	Low(0)	Very high (3)	
	Medium Medium(1)	Specific Design (4)	
	High(2)		

Earthquake Zone

box 3

From Figure EQ1 select Earthquake Zone:	A
---	---

BUs required Wind

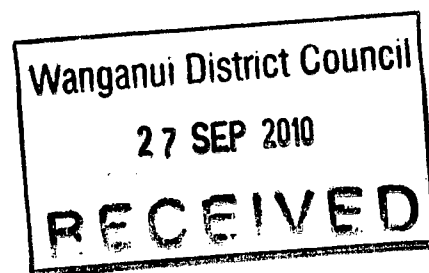
box 4

Ground Floor	
W across=	83 BUs/m
W along=	91 BUs/m
Total wind load,	
W ACROSS	
W acrossxBL=	1428 Bus
W ALONG	
W alongxBW=	1183 BUs

BUs required Earthquake

box 5

Ground Floor	
E =	9.4 BUs/m ²
Note: For a room in the roof space use E+1	
Total earthquake load,	
EQ ALONG and EQ ACROSS:	
E x GPA BUs=	1504 BUs



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Consent No.

MEC Engineering Consultants Ltd. Consulting Structural & Civil Engineers P O Box 301 131 Albany Tel: 09 476 8184 Fax: 09 476 8186	Job No.	Rey 082	Page:	
	Site	Lot 28, Lithgow Drive Wanganui		
		Ground Floor	Date	03-Mar-08

ACROSS

Wall or Bracing Line		Bracing Elements Provided		stud height H	Wind		Earthquake	
1	2	3	4		5W	6W	5EQ	6EQ
Bracing Elements	Minimum BUs Required	Bracing type	Length Element (m) L		Rating BU/m W	BUs Achieved (BU/mxL) W	Rating BU/m EQ	BUs Achieved (BU/mxL) EQ
Diagonal braces or Anchor piles			15		160	2400	120	1800

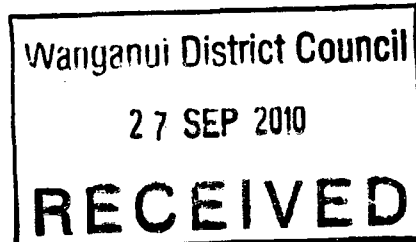
Total Achieved				W	2133	EQ	1600
From Sheet A Total Required				W	1428	EQ	1504
Wreq/EQreq= 0.9492 *							

ALONG

Wall or Bracing Line		Bracing Elements Provided		stud height H	Wind		Earthquake	
1	2	3	4		5W	6W	5EQ	6EQ
Bracing Elements	Minimum BUs Required	Bracing Type	Length Element (m) L		Rating BU/m W	BUs Achieved (BU/mxL) W	Rating BU/m EQ	BUs Achieved (BU/mxL) EQ
Diagonal braces or Anchor piles			15		160	2400	120	1800

Total Achieved				W	2133.33	EQ	1600
From Sheet A Total Required				W	1183	EQ	1504
Wreq/EQreq= 0.78657 *							

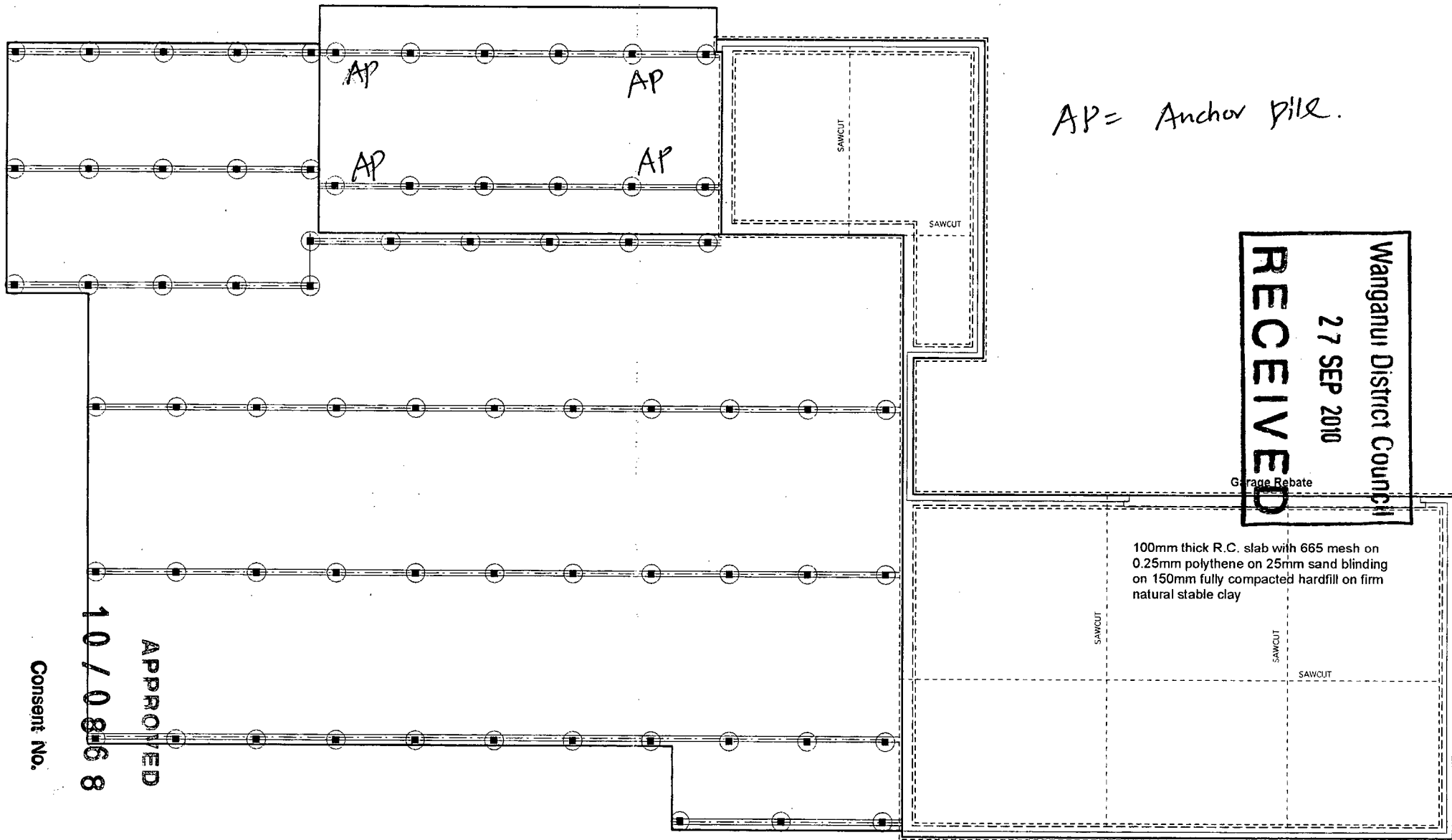
*If Wreq/EQreq is 1 or less complete EQ column only
If Wreq/EQreq is 1.5 or more complete W column only
Otherwise complete both W and EQ.



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AP = Anchor pile.

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Garage Rebate

100mm thick R.C. slab with 665 mesh on
0.25mm polythene on 25mm sand blinding
on 150mm fully compacted hardfill on firm
natural stable clay

SAWCUT

SAWCUT

SAWCUT

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Consent No.

Deck Sub-floor Bracing

MEC Engineering Consultants Ltd.	Job No.	Rey 082	Page:	
Consulting Structural & Civil Engineers	Site	Lot 28, Lithgow Drive		
P O Box 301 131 Albany		Wanganui		
Tel: 09 476 8184 Fax: 09 476 8186		Timber deck subfloor	Date	03-Mar-08

Earthquake loading calculation based on NZS1170.5:2004

Site subsoil class	A	shallow soil
Period	T=	0.3 second
spectral shape factor	$C_h(T)=$	2.36
Hazard factor	Z=	0.25 Wanganui
Return period factor(ultimate limit state)	$R_u=$	1 annual probability of exceedance of 1/500
Return period factor(serviceability)	$R_s=$	0.25 annual probability of exceedance of 1/25
near-fault factor	$N(T,D)=$	1
Elastic site hazards spectrum, C(T) for horizontal loading		
	$C(T)=C_h(T)ZR_uN(T,D)=$	0.59 ultimate limit state
	$C(T)=C_h(T)ZR_sN(T,D)=$	0.15 serviceability
Structural ductility factor		
ultimate limit state	$\mu=$	1
serviceability	$\mu=$	1
Structural performance factor		
ultimate limit state	$S_p=$	1
serviceability limit state	$S_p=$	0.7

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Horizontal design action coefficient

$k_{\mu}=(\mu-1)T_1/0.7+1=$	$k_{\mu}=$	1 for $T_1 < 0.7s$	ultimate limit state
	$k_{\mu}=$	1 for $T_1 > 0.7s$	serviceability
Ultimate limit state			
$C_d(T_1)=C(T_1)S_p/K_s=$	0.59	$>(Z/20+0.02)R_u=$	0.033
Serviceability limit state			
$C_d(T_1)=C(T_1)S_p/K_s=$	0.1033	but not less than $0.03R_u=$	0.03

Seismic weight

LOAD	Load area (m ²)	Dead (G) KPa	Live (Q) KPa	G KN	Q KN	G+ ϕ_u Q KN
ROOF				0.00	0	0
FLOOR				0.00	0	0
masonry wall				0.0	0	0
deck	31	0.4	2	12.4	62	37.2
OTHER				0.00	0	0.00
TOTALS				12.4	62	37.20

Seismic weight, $W = (G + \phi_u Q) = 37.20$ kN

FORCE ULTIMATE $V(u) = 21.948$ kN $\times 20 \text{ kN/m} = 439 \text{ kN}$
 FORCE SERVICEABILITY $V(s) = 3.8409$ kN

4 Anchor piles provide

4 x 120 kN = 480 kN > 439 kN

APPROVED OK

10/0868

Consent No.

Allen Penman

3 Walpole Street, Cambridge Ph (07) 827-9272 Fax (07) 827-9203

PRODUCER STATEMENT

8:01am 9 NOV 2010

Ver 3.5.3.8 PAGE 1

Job Ref: LOT-28

TRUSS DESIGN CRITERIA

Customer name : LOT-28

Site address : LOT 28 LITHGOW DR
WANGANUI

DESIGN CRITERIA

Roofing - Metal Tile
Ceiling - Gib Board (13mm)
Top chord battens - 380 mm
Bottom chord restraints - 600 mm
Standard truss spacing - 900 mm
Standard roof pitch - 23.00 deg

Design wind speed - 44 m/s (ultimate)

Internal pressure coefficient up - 0.3

The truss designs for this job have been determined using computer software provided by the Technical Division within Pryda Truss Systems. These designs are in accordance with sound and widely accepted engineering principles and comply with the following New Zealand Standards:-

AS/NZS1170.1:2002 Loading Code Part 1: Dead and live loads and
AS/NZS1170.2:2002 Loading Code Part 2: Wind loads
NZ3603 : 1993 Timber Design
AS1649 : 1974 Determination of Basic Working Loads for
Metal Fasteners for Timber

All trusses shall be manufactured in accordance with the fabrication specifications provided by Pryda, and installed, connected and braced in accordance with the recommendations given in - :

AS4440:2004 "Installation of nailplated timber roof trusses"
and any other supplementary details that may be provided.

Name : _____

Position: _____

Signed : _____

Date : _____

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Consent No.



TRUSS REACTIONS REPORT

Job Ref: LOT-28

Client Details
LOT-28Site Address
LOT 28 LITHGOW DR
WANGANUI

O/N : Date Reqd:

Truss Mark	Support at Joint	(1.35G) (kN)	Max.Reaction (1.2G+1.5Q2) (kN)	Uplift (0.9G+WuUpl) (kN)	Uplift fixing	Special bearing requirement
S1	1	1.8	3.4	-4.9	2/MG	
S1	7	1.8	3.4	-4.9	2/MG	
S8	1	1.3	2.7	-3.3	2/Z NAILS	
S8	6	1.3	2.5	-3.3	2/Z NAILS	
SG2	1	3.2	5.8	-6.1	2/MG	
SG2	9	6.4	12.4	-14.9	2/WS6	
TGG1	1	3.1	5.9	-5.7	2/MG	
TGG1	8	6.8	14.0	-15.0	2/WS6	
TS1	1	1.1	2.5	-2.5	2/Z NAILS	
TS1	6	1.2	2.4	-3.0	2/Z NAILS	
TG	1	3.8	9.7	-8.2	1/WS6 (wr)	
TG1	7	3.1	7.1	-6.6	2/MG	
TS2	1	1.3	2.7	-3.4	2/Z NAILS	
TS2	6	1.3	2.5	-3.3	2/Z NAILS	
TG2	1	4.3	9.3	-10.3	1/WS6 (wr)	
TG2	7	4.2	10.6	-9.9	1/WS6 (wr)	
S10	1	0.6	2.0	-1.7	2/Z NAILS	
S10	4	0.8	2.0	-2.1	2/Z NAILS	
SG1	1	3.3	6.2	-7.6	1/WS6	
SG1	5	4.3	8.2	-10.2	1/WS6 (wr)	
S2	1	3.1	5.3	-5.6	2/MG	
S2	5	3.1	5.3	-5.6	2/MG	
S3	1	1.2	2.4	-3.4	2/Z NAILS	
S3	5	1.2	2.4	-3.4	2/Z NAILS	
SG4	1	5.2	10.4	-12.9	2/WS6	
SG4	5	4.2	8.3	-10.4	1/WS6 (wr)	
S7	1	0.6	1.9	-1.5	2/Z NAILS	
S7	5	0.6	1.9	-1.5	2/Z NAILS	
S6	1	1.8	3.1	-4.6	2/MG	
S6	5	1.8	3.1	-4.6	2/MG	
SG	1	2.3	4.3	-5.9	2/MG	
SG3	5	4.6	8.5	-12.0	2/WS6	
S9	1	0.5	1.9	-1.4	2/Z NAILS	
S9	4	0.7	1.9	-1.9	2/Z NAILS	
S4	1	1.6	2.8	-4.2	2/MG	
S4	5	1.5	2.7	-3.5	2/Z NAILS	
S5	1	0.7	2.0	-1.8	2/Z NAILS	
S5	5	0.6	1.9	-1.3	2/Z NAILS	
SG5	1	4.3	9.7	-8.9	1/WS6 (wr)	
SG5	5	2.4	5.2	-4.8	2/MG	
SG6	1	2.8	5.4	-7.0	2/MG	
SG6	5	1.6	3.1	-3.9	2/MG	
MTG1	1	1.1	2.4	-2.7	2/Z NAILS	
MTG1	4	1.3	3.8	-3.2	2/Z NAILS	
H1	1	0.8	2.1	-1.6	2/Z NAILS	
H1	4	1.1	2.4	-3.1	2/Z NAILS	
H7	1	0.0	1.4	-0.2	2/Z NAILS	
H7	2	0.0	1.4	-0.1	2/Z NAILS	
H7	3	0.0	1.5	-0.1	2/Z NAILS	



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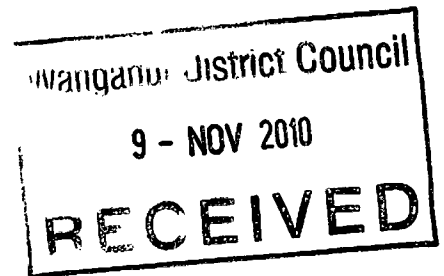
Consent No.

TRUSS REACTIONS REPORT

Client Details
LOT-28Site Address
LOT 28 LITHGOW DR
WANGANUI

O/N : Date Reqd:

Truss Mark	Support at Joint	(1.35G) (kN)	Max.Reaction (1.2G+1.5Q2) (kN)	Uplift (0.9G+WuUpl) (kN)	Uplift fixing	Special bearing requirement
H5	1	0.7	2.1	-1.4	2/Z NAILS	
H5	4	0.9	2.3	-2.8	2/Z NAILS	
H4	1	0.0	1.4	-0.2	2/Z NAILS	
H4	2	0.0	1.4	-0.1	2/Z NAILS	
H4	3	0.0	1.5	-0.1	2/Z NAILS	
H6	1	0.6	2.0	-1.2	2/Z NAILS	
H6	3	0.6	2.1	-1.9	2/Z NAILS	
M2	1	0.5	1.8	-1.6	2/Z NAILS	
M2	4	0.3	1.7	-1.1	2/Z NAILS	
H3	1	0.0	1.4	-0.2	2/Z NAILS	
H3	2	0.0	1.4	-0.1	2/Z NAILS	
H3	3	0.0	1.5	-0.1	2/Z NAILS	
H2	1	0.5	2.0	-1.0	2/Z NAILS	
H2	3	0.6	2.0	-1.7	2/Z NAILS	
M1	1	0.3	1.6	-0.7	2/Z NAILS	
M1	4	0.3	1.7	-0.9	2/Z NAILS	
H8	1	0.0	1.4	-0.1	2/Z NAILS	
H8	2	0.0	1.4	0.0	2/Z NAILS	
H8	3	0.0	1.5	0.0	2/Z NAILS	
S8a	1	1.3	2.7	-3.3	2/Z NAILS	
S8a	6	1.5	2.7	-3.9	2/MG	



Note 1 :

All supports for bearing have been checked for 90mm JD4 and are satisfactory unless the bearing width and/or joint group have been changed, or there is a reference to Note 2.

Fixing Summary :

All trusses not listed require a minimum of 2 Skew Nails

Z NAILS / 152 : Each side of truss
 MG / 28 : 10 nails per fixing
 WS6 / 1 : 4 nails per leg
 WS6(wr) / 6 : Wrap around plate; 5 nails per leg
 WS6 / 8 : 4 nails per leg

Legend :

2/Z NAILS Double Z-nails
 2/MG Double Multigrip
 1/WS6 Single Wind Strap 600mm long
 1/WS6(wr) Single Wind Strap 600mm long wrapped
 2/WS6 Double Wind Strap 600mm long

APPROVED

10 / 0868

Consent No.