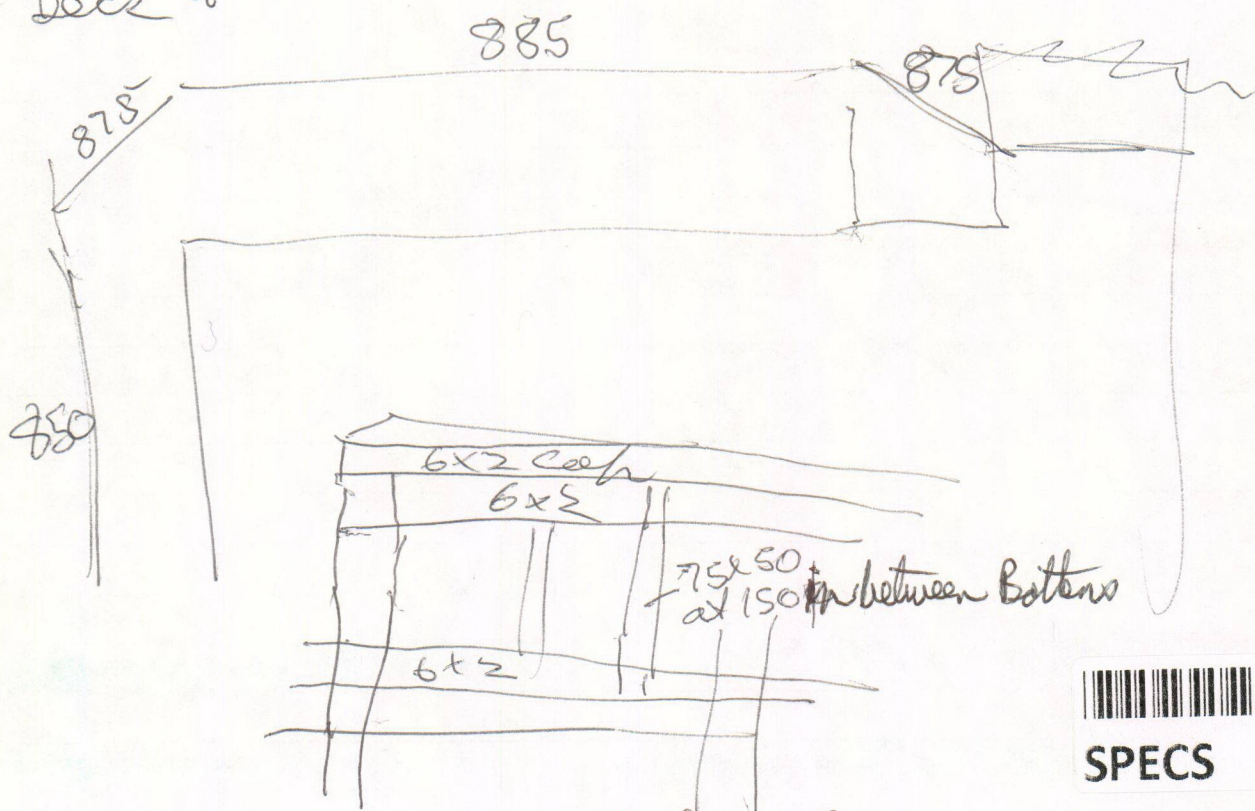


Front Deck stairs Handrail 850 High
of Deck 8



SPECS

Honkers & Whitehead -

- 3) Bathroom Toilet only Light/Fan/Heater/Vent
ensuite also Fan Light -
- 4) HWC Handie Dux non vented cylinder
- 2) gully Traps above ground - 3 -
- 1) Hand Rails Comp Deck -

BC3038
W.D. & I Rose
C/O Honkers

Talked to Front Cam 'Honkers'.
discussed non compliance -
8:34 am 8/6/95

2/may 94

Receipt 17114

K.B.
may 16 signed

VN
31, may - 1

FIELD INSPECTIONS

307-0458

DATE:	DAY: Wed 7 June
-------	-----------------

TIME	TYPE	BC NO.	LOCATION	BUILDER ETC	STAFF
0800	Final	2361	Lang, 5A Merito Place		Telf?
0830	Floor	3731	Manawake Rd. Kendals Rd. steel Snodgrass.		John
0900	Foot.	3909	Harris - Rurima Rise	C/Heine	Ross
0930					
1000					
1030	Footng	3566	13A Serenters Ave. Sunny		Ross
1100	Final.	3038	47 Appenzell Drive, Rose.		Ross
1130	Final.	NEW one.	Sykes, Taneatua Road.		Ross
1300	Final	new file	Zinsli, Magee Rd first hse R/H S down Magee Rd.		Ross
1330	P/Line	3739	Ross, Washer Avenue.		Ross
1400	Footng	3921	Western Drains Rd 5/hour.	(taller in force give to owner)	Ross
	D/TEST	3916	Civerco, Gateway Drive		Bruce
1430	Footng	3870	Maclean Rd. Peter goes CARPENT.		Ross
1500					
1530	Final.	new file	Schick, 5 Pioneer Place	canceled	Ross.
1600					

COMMENTS:

~~no file?~~ can find.
merry knew

shall be provided with at least one *gully trap* which shall:

- a) Be positioned so that the top of the gully dish is no less than 50 mm below the overflow level of the lowest *sanitary fixture* served by the drainage system, and
- b) Be located within the legal boundary of the land on which the *building* is erected.

3.2 Construction

3.2.1 *Gully trap* construction shall prevent the ingress of *surface water*, and of foreign bodies likely to cause a blockage (see Figure 2), and shall have:

- a) The top of the gully dish shall be no less than:
 - i) 25 mm above paved surfaces, or
 - ii) 100 mm above unpaved surfaces, and
- b) A grating,
- c) A minimum pipe *diameter* of 80 mm,
- d) A *water seal* depth of at least 65 mm,
- e) At least one *waste pipe* discharging to the *water trap* so as to avoid *water seal* evaporation,
- f) *Waste pipes* which discharge over a *gully trap*, arranged to permit easy cleaning of the *gully trap* (see Figure 2),
- g) *Waste pipe* outlets located at least 20 mm above *water seal* level, and at least 20 mm below top of the grating,
- h) Top of *water seal* no more than 600 mm below the top of the gully dish, and

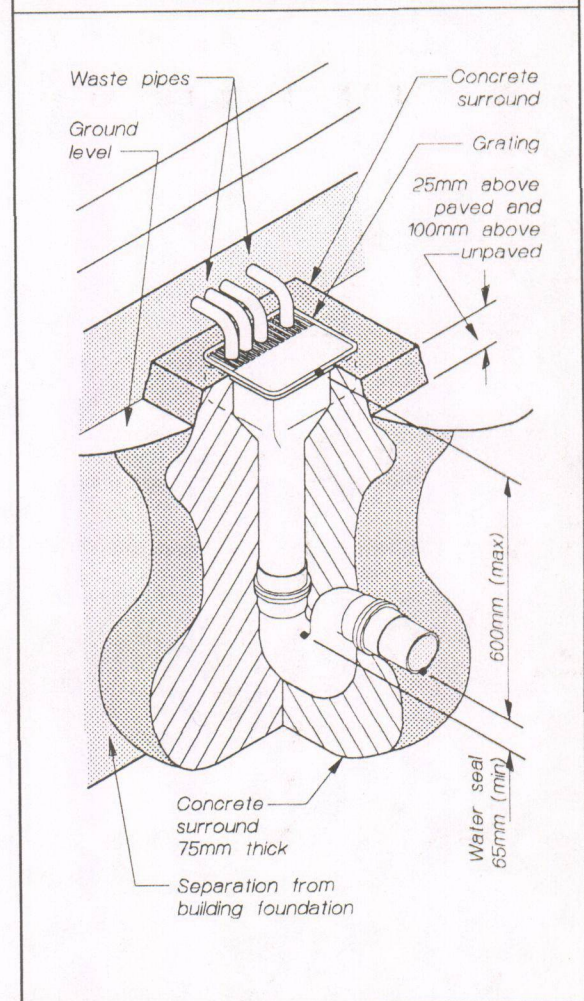
Comment:

To permit the gully trap to be easily cleaned by hand.

- i) *Adequate* support from bedding and backfilling with:

- i) where the *gully trap* is likely to be subjected to damage: concrete no less than 75 mm thick and which is separated from the *building foundation* (see Figure 2), or
- ii) in other areas: compacted selected fill complying with Paragraph 8.2.4.

Figure 2: Details of gully traps
Paragraph 3.2.1



ACCEPTABLE SOLUTION F4/AS1**1.0 BARRIERS IN BUILDINGS****1.1 Barrier heights**Amd 2
Aug '94

1.1.1 Acceptable minimum barrier heights are given in Table 1.

Comment:

A handrail can be constructed as an integral part of a barrier. Refer NZBC D1 "Access Routes".

Table 1: Minimum barrier heights
Paragraph 1.1.1

Building type	Location	Barrier height (mm) (Note 1)
Detached dwellings and within household units of multi-unit dwellings	External deck or external balcony	1000
	Stairs, landings, ramps or edges of internal floors	900
All other buildings, and common areas of multi-unit dwellings	Stairs or ramps	900
	All locations other than stairs	1000

NOTE:

- Heights are measured vertically from floor level on floors, landings and ramps, and from pitch line or stair nosings on stairways.
- A landing is a platform with the sole function of providing access. A platform used as a space for people to congregate is described as a deck or balcony.

Amd 2
Aug '94**1.2 Barrier construction****1.2.1 Buildings frequented by young children**Amd 2
Aug '94

Barriers located in any part of a *building* likely to be frequented by children under the age of 6 years shall have:

Amds 1
and 2

- No openings which will permit the passage of a sphere greater than given by Table 2.
- No components between the heights of 150 mm and 760 mm above floor (or stair nosing) level which can provide a toehold, and

Amd 2
Aug '94

Table 2: Acceptable opening sizes for barriers (Note 1)
Paragraph 1.2.1(a)

Age group	Examples of application (Note 2)	Maximum sphere dia. (mm)
Children under 4	Housing, Early Childhood Centres, shopping malls, health care facilities	100
Children 4 and under 6	Cinemas, motels, halls churches, bridges with pedestrian access	130

NOTE:

- Opening size restrictions are chosen on the basis of child head and chest dimensional statistics.
- Because the barrier opening size is determined by the age and likely presence of children, and not by the classified use of the building, it is reasonable to expect different parts of a building to have different requirements. For example, in a public hall children may be expected in a public gallery, but not in a gallery reserved for lighting equipment or musicians. In shopping malls children are expected in public areas, but not in areas for the preparation of food or the unloading and reception of stock.

Amd 2
Aug '94

- c) The triangular opening formed by the riser, tread and bottom rail at the open side of a stairway shall be of such a size that a 150 mm diameter sphere cannot pass through it.

Comment:

Where barriers are provided for protection at a change of level in any building classified as Housing they will need to be constructed to restrict young children. Commercial buildings containing shops or health care facilities are also likely to need barriers that will restrict young children as are some Communal Residential and Communal Non-residential buildings such as motels and museums.

Amd 1
Sept '93

1.2.2 Low risk areas

In areas used exclusively for emergency or maintenance purposes in buildings, and in other buildings not frequented by children, barriers may have openings with maximum dimensions of either:

- 300 mm horizontally (between vertical balusters), or
- 460 mm vertically (between longitudinal rails).

1.2.3 These dimensional limitations apply also to any openable window or panel in a barrier.

1.2.4 Balconies with fixed seating

Where a balcony or mezzanine floor accommodates fixed seating, a front barrier as shown in Figure 1 may be used as an alternative to Paragraph 1.2.1 and shall have:

- A minimum height of 700 mm above floor level,
- A horizontal projection extending at least 700 mm forward of the barrier at the top rail level, and
- No opening through which a 100 mm diameter sphere can pass.

Comment:

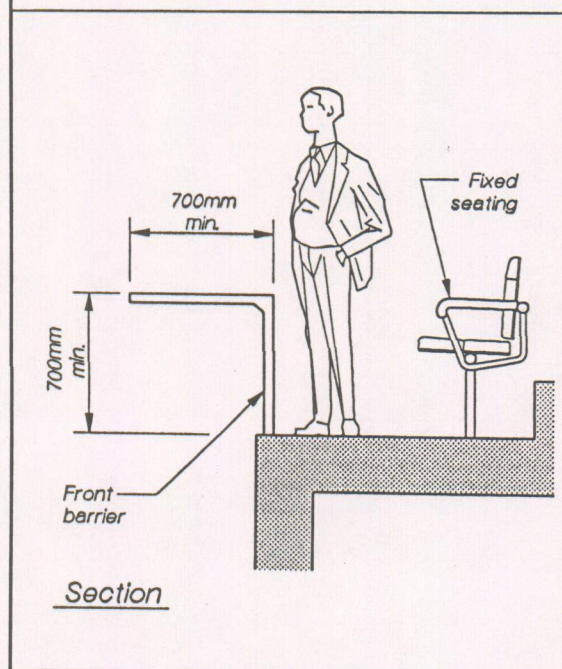
This solution is expected to be used mainly in places such as assembly halls, theatres and cinemas.

2.0 CONSTRUCTION SITE BARRIERS

2.0.1 Construction site barriers shall have, in addition to a top rail, one or more intermediate rails or a suitable toeboard as described in Paragraph 2.0.3. Maximum rail spacing shall be 500 mm.

Amd 1
Sept '93

Figure 1: Barriers to balconies
Paragraph 1.2.4



2.0.2 Scaffolding cross-bracing between standards within a single lift may be used as a top rail provided:

- The braces cross at a height of between 1000 mm and 1100 mm above the platform, and
- The platform is decked to within 200 mm of a vertical plane through the cross-bracing.

2.0.3 The mid-height rail is not necessary where the top rail is at the minimum height if a toeboard extending more than 225 mm above the platform is provided.

2.0.4 Each barrier rail shall be fixed as nearly as possible on a line vertically above the outer edge of the platform. In no case shall a rail be more than 200 mm beyond the platform edge.

3.0 SWIMMING POOL BARRIERS

3.1 Fencing

3.1.1 Fencing for swimming pools shall comply with the requirements of the Schedule to the Fencing of Swimming Pools Act 1987.

ACCEPTABLE SOLUTION F4/AS1

1.0 BARRIERS IN BUILDINGS

1.1 Barrier heights

Amd 2
Aug '94

1.1.1 Acceptable minimum barrier heights are given in Table 1.

Comment:

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- A landing is a platform with the sole function of providing access. A platform used as a space for people to congregate is described as a deck or balcony.

Amd 2
Aug '94

1.2 Barrier construction

1.2.1 Buildings frequented by young children

Amd 2
Aug '94

Barriers located in any part of a *building* likely to be frequented by children under the age of 6 years shall have:

Amds 1
and 2

- No openings which will permit the passage of a sphere greater than given by Table 2.
- No components between the heights of 150 mm and 760 mm above floor (or stair nosing) level which can provide a toehold, and

Amd 2
Aug '94

Table 2: Acceptable opening sizes for barriers (Note 1)
Paragraph 1.2.1(a)

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NOTE:

- Opening size restrictions are chosen on the basis of child head and chest dimensional statistics.
- Because the barrier opening size is determined by the age and likely presence of children, and not by the classified use of the building, it is reasonable to expect different parts of a building to have different requirements. For example, in a public hall children may be expected in a public gallery, but not in a gallery reserved for lighting equipment or musicians. In shopping malls children are expected in public areas, but not in areas for the preparation of food or the unloading and reception of stock.

Amd 2
Aug '94

- c) The triangular opening formed by the riser, tread and bottom rail at the open side of a stairway shall be of such a size that a 150 mm diameter sphere cannot pass through it.

Comment:

Where barriers are provided for protection at a change of level in any building classified as Housing they will need to be constructed to restrict young children. Commercial buildings containing shops or health care facilities are also likely to need barriers that will restrict young children as are some Communal Residential and Communal Non-residential buildings such as motels and museums.

Amd 1
Sept '93

1.2.2 Low risk areas

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- A minimum height of 700 mm above floor level,
- A horizontal projection extending at least 700 mm forward of the barrier at the top rail level, and
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Comment:

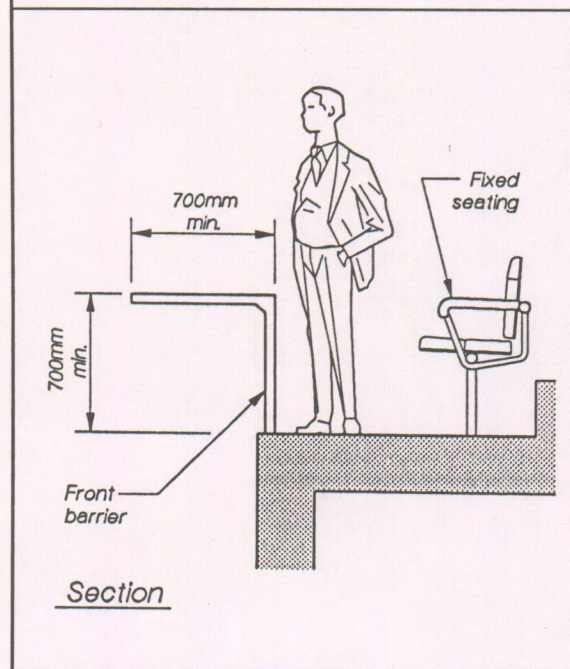
This solution is expected to be used mainly in places such as assembly halls, theatres and cinemas.

2.0 CONSTRUCTION SITE BARRIERS

2.0.1 Construction site barriers shall have, in addition to a top rail, one or more intermediate rails or a suitable toeboard as described in Paragraph 2.0.3. Maximum rail spacing shall be 500 mm.

Amd 1
Sept '93

Figure 1: Barriers to balconies
Paragraph 1.2.4



2.0.2 Scaffolding cross-bracing between standards within a single lift may be used as a top rail provided:

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3.0 SWIMMING POOL BARRIERS

3.1 Fencing

3.1.1 Fencing for swimming pools shall comply with the requirements of the Schedule to the Fencing of Swimming Pools Act 1987.

Hazards of Ventilating into Roof Spaces

Recently the Authority's technical staff have received enquiries relating to building code clause G4 Ventilation. In particular, the queries have concerned subclause G4.3.3(b) which requires steam from laundering, utensil washing, bathing and showering to be removed from the spaces in which they are generated.

"Is it adequate to exhaust vents from bathrooms into roof spaces of houses and rely on the natural ventilation in the roof space to get rid of the moisture [ie, deliver moisture outside]?"

This raises the question "Does the typical roof space of a house of light timber construction have enough air movement to cope with the moisture?"

It appears not. A recent BRANZ house condition survey has found mould growing in roof spaces where bathrooms were vented into those roof spaces. Further, BRANZ has studied ventilation in over 400 existing houses. Problems revealed when venting into roof spaces are:

1. Effect on health

Mildew was found on the members immediately above the vent. This is not acceptable under clause E3 Internal Moisture.

2. Effect on insulation

Insulation may not comply with code clauses H1 Energy Efficiency, B2 Durability and E3 Internal Moisture because:

- moisture in fibreglass insulation reduces its R value,
- moisture in paper insulation causes deterioration,
- moisture-laden insulation acts like a wet sponge holding moisture against the timbers thereby affecting durability.

3. Effect on structure

High moisture content in timbers encourages rot and reduces the strength of building materials (non-compliance with clause B1 Structure).

4. Transfer of moisture

High moisture content in roof spaces can lead to moisture passing into other spaces throughout the building (non-compliance with clause E3 Internal Moisture).

CONCLUSION: It could be possible to vent into a roof space if the ventilation in that roof space is sufficient to prevent damage from mould or the accumulation of contaminants on linings and other building elements. To satisfy the territorial authority that such venting complies with the code the owner will have to demonstrate that the ventilation in the roof space is adequate. Whether vents in the eaves or on the ridge, or a combination of both, could cope with a large volume of steam, as would be generated by a family having successive showers for instance, is questionable.

Rangerooms

The code and the acceptable solutions do not specifically prevent the venting of rangerooms into the roof spaces in domestic situations. However, in the event of a stove-top fire the flames could be drawn up by the rangeroom fan into the roof space and feed on fat deposits there. ■

Missing Profiles in E2/AS1

Earlier this month we discovered a flaw in the Acceptable Solution E2/AS1 amendment to Table 1: Roof pitch. In the looseleaf version of the amendments three profiles are missing. Standards New Zealand will be issuing a corrigendum in the form of a replacement page in the near future. On behalf of SNZ we apologise for any inconvenience this may have caused.

The complete table below shows the missing profiles.

Table 1: Roof pitch
Paragraph 1.1.1

Material	Pitch (no less than) (note 1)
Corrugated and low profile metal sheet with profile height less than 20 mm:	
Long run steel or aluminium	8° (10°)
End lapped steel or aluminium	10° (12°)
Metal decking and trough sections	
i) Trapezoidal symmetrical profiles with rib heights between 20 mm and 35 mm.	4° (10°)
ii) Trapezoidal asymmetrical profiles with rib heights between 20 mm and 35 mm.	3° (10°)
iii) Trapezoidal symmetrical and asymmetrical profiles with rib heights between 36 mm and 60 mm.	3° (10°)
iv) Concealed trough section profiles with rib heights: less than 30 mm	8° (10°)
30 mm or greater	3° (10°)
Flat metal sheet fully supported	3° (10°)
Metal tile:	
Long run	10°
Lapped	12°
Thin stone slate	20°
Timber shingle	14°
Fibre cement:	
Corrugated	7°
Slates	17.5°
Shingles	20°
Shakes	25°
Membrane (e.g. butyl rubber)	1.5°
Bitumen strip slate	17.5°
Concrete tile	12.5°

NOTE:

1. Figures in brackets apply to roof subject to snow loading.

FIRST SCHEDULE—continued

Clause B1—STRUCTURE

Provisions	Limits on application
OBJECTIVE	
B1.1 The objective of this provision is to:	
(a) Safeguard people from injury caused by structural failure, (b) Safeguard people from loss of <i>amenity</i> caused by structural behaviour, and (c) Protect <i>other property</i> from physical damage caused by structural failure.	
FUNCTIONAL REQUIREMENT	
B1.2 <i>Buildings, building elements and sitework</i> shall withstand the combination of loads that they are likely to experience during <i>construction or alteration</i> and throughout their lives.	
PERFORMANCE	
B1.3.1 <i>Buildings, building elements and sitework</i> shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during <i>construction or alteration</i> and throughout their lives.	
B1.3.2 <i>Buildings, building elements and sitework</i> shall have a low probability of causing loss of <i>amenity</i> through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during <i>construction or alteration</i> when the <i>building</i> is in use.	
B1.3.3 Account shall be taken of all physical conditions likely to affect the stability of <i>buildings, building elements and sitework</i> , including:	
(a) Self-weight, (b) Imposed gravity loads arising from use, (c) Temperature,	

FIRST SCHEDULE—continued

Provisions	Limits on application
(d) Earth pressure, (e) Water and other liquids, (f) Earthquake, (g) Snow, (h) Wind, (i) <i>Fire</i>, (j) Impact, (k) Explosion, (l) Reversing or fluctuating effects, (m) Differential movement, (n) Vegetation, (o) Adverse effects due to insufficient separation from other <i>buildings</i>, (p) Influence of equipment, services, non-structural elements and contents, (q) Time dependent effects including creep and shrinkage, and (r) Removal of support.	
B1.3.4 Due allowance shall be made for:	
(a) The consequences of failure, (b) The intended use of the <i>building</i>, (c) Effects of uncertainties resulting from <i>construction</i> activities, or the sequence in which <i>construction</i> activities occur, (d) Variation in the properties of materials and the characteristics of the site, and (e) Accuracy limitations inherent in the methods used to predict the stability of <i>buildings</i>.	
B1.3.5 The demolition of <i>buildings</i> shall be carried out in a way that avoids the likelihood of premature collapse.	
B1.3.6 <i>Sitework</i> , where necessary, shall be carried out to:	

FIRST SCHEDULE—continued

Clause B2—DURABILITY

Provisions

Limits on application

OBJECTIVE

B2.1 The objective of this provision is to ensure that a *building* will throughout its life continue to satisfy the other objectives of this code.

FUNCTIONAL REQUIREMENT

B2.2 *Building* materials, components and *construction* methods shall be sufficiently durable to ensure that the *building*, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the *building*.

PERFORMANCE

B2.3 From the time a *code compliance certificate* is issued, *building elements* shall with only normal maintenance continue to satisfy the performances of this code for the lesser of; the *specified intended life* of the *building*, if any, or:

- (a) For the structure, including *building elements* such as floors and walls which provide structural stability: the life of the *building* being not less than 50 years.
- (b) For services to which access is difficult, and for hidden fixings of the external envelope and attached structures of a *building*: the life of the *building* being not less than 50 years.
- (c) For other fixings of the *building* envelope and attached structures, the *building* envelope, lining supports and other *building elements* having moderate ease of access but which are difficult to replace: 15 years.

continued

Limits on application

performance G3.3.6 shall apply to *residential or Industrial buildings* intended uses include the storage of perishable food, the treatment of humans or animals, the slaughter of animals and the reception of dead bodies.

FIRST SCHEDULE—continued

Clause G4—VENTILATION

Provisions

Limits on application

OBJECTIVE

G4.1 The objective of this provision is to safeguard people from illness or loss of amenity due to lack of fresh air.

FUNCTIONAL REQUIREMENT

G4.2 Spaces within *buildings* shall be provided with *adequate* ventilation consistent with their maximum occupancy.

PERFORMANCE

G4.3.1 Spaces within *buildings* shall have means of ventilation with *outdoor air* that will provide an *adequate* number of air changes to maintain air purity.

G4.3.2 Mechanical air-handling systems shall be constructed and maintained in a manner that prevents harmful bacteria, pathogens and allergens from multiplying within them.

G4.3.3 *Buildings* shall have a means of collecting or otherwise removing the following products from the spaces in which they are generated:

- (a) Cooking fumes and odours,
- (b) Steam from laundering, utensil washing, bathing and showering,
- (c) Odours from sanitary and waste storage spaces,
- (d) Gaseous by-products and excessive moisture from commercial or industrial processes,
- (e) Poisonous fumes and gases,
- (f) Flammable fumes and gases,
- (g) Airborne particles,
- (h) Bacteria, viruses or other pathogens, or
- (i) Products of combustion.

NZBC Clause B1 STRUCTURE

This Clause is extracted from the New Zealand Building Code contained in the First Schedule of the Building Regulations 1992.

Provisions	Limits on application
OBJECTIVE B1.1 The objective of this provision is to: (a) Safeguard people from injury caused by structural failure, (b) Safeguard people from loss of <i>amenity</i> caused by structural behaviour, and (c) Protect <i>other property</i> from physical damage caused by structural failure. FUNCTIONAL REQUIREMENT B1.2 <i>Buildings, building elements and sitework</i> shall withstand the combination of loads that they are likely to experience during <i>construction</i> or <i>alteration</i> and throughout their lives. PERFORMANCE B1.3.1 <i>Buildings, building elements and sitework</i> shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during <i>construction</i> or <i>alteration</i> and throughout their lives. B1.3.2 <i>Buildings, building elements and sitework</i> shall have a low probability of causing loss of <i>amenity</i> through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during <i>construction</i> or <i>alteration</i> when the <i>building</i> is in use. B1.3.3 Account shall be taken of all physical conditions likely to affect the stability of <i>buildings, building elements and sitework</i>, including: (a) Self-weight, (b) Imposed gravity loads arising from use,	

NZBC Clause B2 DURABILITY

This Clause is extracted from the New Zealand Building Code contained in the First Schedule of the Building Regulations 1992.

Provisions**Limits on application****OBJECTIVE**

B2.1 The objective of this provision is to ensure that a *building* will throughout its life continue to satisfy the other objectives of this code.

FUNCTIONAL REQUIREMENT

B2.2 *Building* materials, components and construction methods shall be sufficiently durable to ensure that the *building*, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the *building*.

PERFORMANCE

B2.3 From the time a *code compliance certificate* is issued, *building elements* shall with only normal maintenance continue to satisfy the performances of this code for the lesser of; the *specified intended life* of the *building*, if any, or:

- (a) For the structure, including *building elements* such as floors and walls which provide structural stability: the life of the *building* being not less than 50 years.
- (b) For services to which access is difficult, and for hidden fixings of the external envelope and attached structures of a *building*: the life of the *building* being not less than 50 years.
- (c) For other fixings of the *building* envelope and attached structures, the *building* envelope, lining supports and other *building elements* having moderate ease of access but which are difficult to replace: 15 years.
- (d) For linings, renewable protective coatings, fittings and other *building elements* to which there is ready access: 5 years.

Clause G4 VENTILATION

This Clause is extracted from the New Zealand Building Code contained in the First Schedule of the Building Regulations 1992.

Provisions

Limits on application

OBJECTIVE

G4.1 The objective of this provision is to safeguard people from illness or loss of *amenity* due to lack of fresh air.

FUNCTIONAL REQUIREMENT

G4.2 Spaces within *buildings* shall be provided with *adequate* ventilation consistent with their maximum occupancy.

PERFORMANCE

G4.3.1 Spaces within *buildings* shall have means of ventilation with *outdoor air* that will provide an *adequate* number of air changes to maintain air purity.

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G4.3.3 *Buildings* shall have a means of collecting or otherwise removing, the following products from the spaces in which they are generated:

- (a) Cooking fumes and odours,
- (b) Steam from laundering, utensil washing, bathing and showering,
- (c) Odours from sanitary and waste storage spaces,
- (d) Gaseous by-products and excessive moisture from commercial or industrial processes,
- (e) Poisonous fumes and gases,
- (f) Flammable fumes and gases,
- (g) Airborne particles,

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Provisions

(h) Bacteria, viruses or other pathogens, or

(i) Products of combustion.

G4.3.4 Contaminated air shall be disposed of in a way which avoids creating a nuisance or hazard to people and *other property*.

G4.3.5 The quantities of air supplied for ventilation shall meet the additional demands of any fixed *combustion appliances*.

Limits on application

50 Strand East, P.O. Box 37, Whakatane.
Telephone 07 307 1444.

Principal:
Barry Cutfield - BE, MIPENZ



Our file : 12394

Date : APRIL 1994

STRUCTURAL DESIGN CALCULATIONS

for :

PROPOSED RESIDENCE NO ROSE
APPENZELL DRIVE, WHAKATANE

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Appendix: COMPUTER PRINTOUTS

Proposed Residence
W. Rose
Apperzell Drive, Whakatane

12394

9.1.1994

C.D.M. Page 1

1.0 Loadings

Roof

Colorsteel trusses @ 15°
 no access
 or

$$G = 400 \text{ Pa}$$

$$Q_B = 250 \text{ Pa}$$

$$= 1.0 \text{ kN/m}^2$$

Ext wall

LTF

$$G = 300 \text{ Pa}$$

20 Series Masonry partially grouted $G = 3600 \text{ Pa}$
 " " solid grouted $G = 4000 \text{ Pa}$

Floor

incl partitions and ceiling

$$G = 600 \text{ Pa}$$

$$Q_B = 1500 \text{ Pa}$$

$$\text{or}$$

$$= 1.80 \text{ kN/m}^2$$

Deck

$$G = 400 \text{ Pa}$$

$$Q_B = 2000 \text{ Pa}$$

$$\text{or}$$

$$= 1.80 \text{ kN/m}^2$$

Back fill

Sand or Gravel

$$\delta = 18 \text{ kN/m}^3$$

$$\phi = 35^\circ$$

$$k_a = 0.27$$

Surcharge

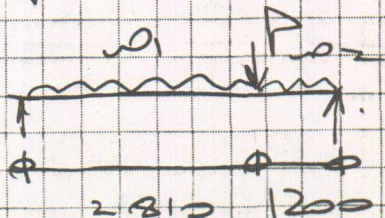
slab + partitions + floor

$$S = 4.100 \text{ Pa}$$

2.0 First Floor

2.01 Floor Beam over Garage

$$\text{Span} = 4.01 \text{ m}$$



Refer computer printouts
 for results

$$(G + Q)$$

$$w_1 = 4.30 \times (0.60 + 1.50)$$

$$= 2.58(G) + 6.45(Q) = 9.03 \text{ kN/m}$$

Floor

$$w_2 = 2.15 \times (0.60 + 1.50) + \frac{4.80^2}{2 \times 4.20} \times (0.40 + 0.25)$$

Floor
Roof

$$= 2.39(6) + 3.91(2) = 6.30 \text{ kN}$$

$$P = \left(\frac{4.30^2}{2 \times 7.70} \times 4.30 + 3.65 \times 2.05 \right) \times (0.40 + 0.25)$$

$$+ 3.30 \times 7.40 \times (0.25) + 0.60 \times 2.15 \times (0.40 + 2.0)$$

Int wall
Deck

$$= 13.58(6) + 9.26(2) = 22.84 \text{ kN}$$

Check 200 UB 29.80

- deflection

$$A(h_2/6 + \frac{1}{5} \Delta) = 3.98 + 3.61 = 7.59 \text{ mm}$$

$h_2 = 2.0$
 $\Delta = 0.70$

$$\frac{\text{span}}{400} = 10.03 \text{ mm} \quad \therefore \text{OK}$$

- bending $(1.20 + 1.60)$

$$M_t = 1.20 \times 15.47 + 1.60 \times 17.64 = 46.79 \text{ kNm}$$

Section capacity

Section is compact

$$\phi M_n = 0.90 \times 250 \times 313 = 70.43 \text{ kNm}$$

Critical flange can be assumed fully restrained by joists

Provide 200 UB 29.80

- post support

$$(6+2) P = 9.20(6) + 15.25(2) + 2.01 \times (2.50 + 6.45) - 14.39(6) + 22.21(2) = 42.60 \text{ kN}$$

2.01
Reaction

OK for $89 \times 89 \times 4.90 \text{ SH} \leq \text{post}$

footing

$$(1.26 + 1.62) P^* = 64.40 \text{ kN}$$

incl footing DL

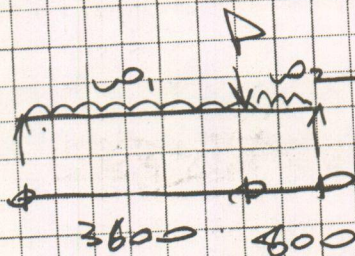
$$A_{req} = \frac{64.40}{300 \text{ kPa}} \times 1.80 (\text{PS}) = 0.39 \text{ m}^2$$

Provide a minimum of 650 x 650 x 200 deep
slab thicker

2.2 Multiple Joist over Garage

Span $\rightarrow$ 4.20 m.

(6+2)

Refer computer
printouts for
results

$$w_1 = 0.58 \times (0.40 + 2.0) + 0.23 \times (0.60 + 1.50) + \frac{2.00^2}{2 \times 1.40} \times (0.40 + 0.25)$$

Deck
Floor
Roof

$$= 0.94(6) + 1.87(2) = 2.80 \text{ kN}$$

Deck

$$w_2 = 0.58 \times (0.40 + 2.0) + 0.23 \times (0.60 + 1.50)$$

Floor

$$= 0.37(6) + 1.51(2) = 1.88 \text{ kN}$$

$$P = (2.50 \times 3.80 + 1.0 \times 0.60) \times (0.40 + 0.25)$$

Roof
Deck

$$+ 2.50 \times 2.40 \times 0.30$$

$$= 5.84(6) + 2.58(2) = 8.42 \text{ kN}$$

-deflection

Check $3/300 \times 50 \text{ mm}$ $h_2 = 200$
 $\Delta_s = 0.70$

$$D(h_2 G + \Delta_s Q) = 7.31 + 3.15 = 10.46$$

$$\text{Span } 1400 = 10.5 \text{ mm}$$

- bending $(1.26 + 1.60)$

$$M^* = 1.26 \times 4.02 + 1.60 \times 1.85 = 12.40 \text{ kNm}$$

$$\phi M_n = 0.80 \times 0.80 \times 1.20 \times 17.70 \times 1.813.29 = 24.65 \text{ kNm}$$

Provide a minimum of 3/300x50mm

2.03 Deck Beams

Span = 4.0m

$$C_{t+d} = \frac{1.80^2}{2 \times 1.20} \times (0.40 + 2.0) = 0.54(6) + 2.70(6) = 3.24 \text{ kNm}$$

- deflection

check 300x100

$$\delta_{(26+43)} = \frac{5}{384} \times \frac{(2 \times 0.54 \times 10^3 + 2.70 \times 10^3) \times 4.0^4}{8 \times 10^4 \times 169.95 \times 10^{-6}} = 2.26 \text{ mm}$$

Span = 10mm

- bending $(1.26 + 1.60) M_u = 4.97 \text{ kNm}$

$$M^* = \frac{span^2}{8} = 9.94 \text{ kNm}$$

$$\phi M_n = 0.80 \times 0.80 \times 1.0 \times 17.70 \times 1208.26 = 13.69 \text{ kNm}$$

OK in bend

Provide a minimum of 300x100 deck beams

- Footing

$$C_{t+d} = \frac{4.80^2}{2 \times 1.0} \times (0.54 + 2.70) + 1.50 = 3.6(6) + 7.78(6) = 10.24 \text{ kNm}$$

check 350x350

$$P_u = \frac{16.12}{0.352} = 45.79 \text{ kPa}$$

Provide 350x350x300 deep

3.0 R.H.M. Masonry Basement3.01 lintel over Garage Door

$$\text{Span} = 2.75 \text{ m}$$

(G & D)

$$w = \frac{2.8^2}{2 \times 2.2} \times \frac{1.60}{1.30} \times (0.40 + 0.25) \quad \text{Roof}$$

$$+ \frac{1.60}{1.30} \times 2.40 \times (0.75) \quad \text{Ext Wall}$$

$$+ \frac{1.60^2}{2 \times 1.30} \times (0.60 + 1.50) \quad \text{Floor}$$

$$+ 0.50 \times (0.40 + 2.0) \quad \text{Deck}$$

$$+ 0.40 \times (4.0) \quad \text{Lintel DL}$$

$$= 4.15 (G) + 3.03 (D) = 7.18 \text{ kN/m}$$

$$(1.46 + 1.70) w_u = 10.96 \text{ kN/m}$$

- flexure

Try a 390x190 R.H.M. lintel 75bc

$$M_u = \frac{w_u \text{span}^2}{8} = 10.36 \text{ kNm} \quad \text{Grade R}$$

$$\begin{aligned} b &= 190 \\ d &= 307 \\ f_y &= 430 \text{ MPa} \\ f_{cd} &= 8 \text{ MPa} \\ \phi &= 0.85 \end{aligned}$$

$$A_{s \text{ req}} = 139.74 \text{ mm}^2$$

$$A_{s \text{ prov}} = 201.06 \text{ mm}^2$$

- shear

$$V_u = (2.75 - 0.307) \times 10.96 = 11.71 \text{ kN}$$

$$\frac{V_u}{\phi b_w d} = \frac{11.71 \times 10^3}{0.80 \times 190 \times 307} = 0.25 \text{ MPa}$$

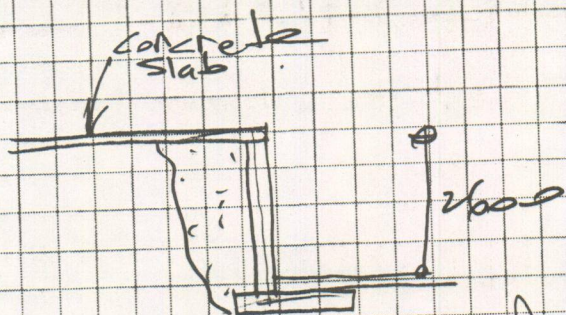
$$0.24 \text{ MPa} = V_c$$

R6 links - 200 JS OK by inspection

Provide a minimum of 390x190 R.H.M. lintel
with 1/16 at 75 top and bottom cover
with 26 links - 200 c/s

3.02 Retaining Walls

3.02.01 Retains $H = 2.60m$ $S = 4100Pa$



Consider unit length
of propped cantilever
wall.
Assume 1st floor
concrete slab provides
the necessary restraint
at the top of the wall.

Refer computer printouts for
results

(a)

$$M_a = -6.65 \text{ kNm}$$

$$D \text{ at } P_s = 19.38 - 4.38 = 15.00 \text{ kN}$$

Wall design

$$M_u = 1.7 \times 6.65 = 11.31 \text{ kNm} \quad V_u = 1.7 \times 15 = 25.5 \text{ kN}$$

- Flexure

$$A_{s \text{ req}} = 249.36 \text{ mm}^2$$

$$A_{s \text{ H16}} - 600 \text{ c/s} = 335.10 \text{ mm}^2$$

$$\text{So code } d = 132 \text{ mm}$$

$$b = 1000$$

$$\text{Flex } \phi = 0.85$$

$$f_c = 430 \text{ MPa}$$

$$\text{Grade B steel } f_y = 430 \text{ MPa}$$

$$\text{at } h = 1.47 \quad M_u = 1.7 \times 3.07 = 5.22 \text{ kNm}$$

$$A_{s \text{ req}} = 158.75 \text{ mm}^2$$

$$A_{s \text{ H12}} - 600 \text{ c/s} = 188.50 \text{ mm}^2$$

- Shear

$$\frac{V_u}{\phi b d} = \frac{25.5 \times 10^3}{0.8 \times 1000 \times 132} = 0.24 \text{ MPa}$$

OK $r_m = 0.24 \text{ MPa}$
Conservative as shear d from supports
is the force to be resisted

~~Provide a 20 Series masonry wall with
H16 starters - boots at 500mm to
earth face extend to H=1200mm and
1x H12 vertical bars - boots at 500mm
and 12 bars - boots Max.~~

- Footing design

(a)

$$M_a = -6.65 \text{ kNm}$$

Try a 850 wide x 200 deep x 100 heel.

axial loads (6)

$$\text{Wall } e_y = 0.19 \text{ m } \rightarrow = 2.60 \times (4.0) = 10.40 \text{ kN}$$

Backfill on heel

$$e_y = 0.05 \text{ m } \rightarrow = 2.60 \times 0.10 \times 18$$

$$+ 0.10 \times 4.10 = 5.09 \text{ kN}$$

$$\text{Footing } e_y = 0.45 \text{ m } \rightarrow = 0.85 \times 0.20 \times (24) = 4.08 \text{ kN}$$

- soil bearing

$$p_{\text{ave}} = 42.53 \text{ kPa} < 100 \text{ kPa} \text{ OK}$$

- overturning

$$M_{\text{stab}} = 12.62 \text{ kNm } FS > 1.50 \text{ OK}$$

~~Provide a minimum of 850 wide x 200 deep
x 100 heel footing~~

3.02.02 Retains $H = 1.60m$ $S = 2000Pa$

Consider 5 unit length of a cantilevered wall.
 Compute moments for results.

$$P_{at} P_s = 7.11 kN/m$$

$$M_o = -4.02 kNm$$

2.7.2a
 - grill design
 - flexure

$$M_u = 1.70 \times 4.02 = 6.83 kNm$$

$$b = 1000$$

$$d = 134 mm$$

$$f_c = 420 MPa$$

$$f_{yk} = 8 MPa$$

$$\phi = 0.85$$

$$A_{s req} = 144.39 mm^2$$

$$A_{s H012-600 S} = 188.50 mm^2$$

$$M_u = 1.70 \times 1.08 = 1.84 kNm$$

$$e/h = 0.60$$

OK for D12-600 S central

- shear OK by inspection

Provide 20 Series Masonry wall with
 #D12 starters - 600 S at soffit to earth
 like extend to $H = 600$ above start
 and lap D12 vert - 600 S central
 #12 bond to S - 600 S max

- footing requirements

(a)

$$M_o = -4.02 kNm$$

Consider a 700 wide x 200 deep x 1000 heel
 concrete footing

axial loads (a)

$$W_{all ey} < 0.195 m$$

$$w = 1.60 \times (4.0)$$

$$+ 0.80 \times (3.60)$$

$$= 9.28 kNm$$

Backfill on heel

$$w = 0.10 \times 60 \times (3) = 2.88 kNm$$

$$e_y = 0.05$$

Feetings $\rightarrow$ $\phi = 0.2 \times 0.7 \times 24 = 3.36 \text{ kN/m}$
 $e_y = 0.35$

- soil bearing

Pat $\phi = 43.2 \text{ kN/m}^2 < 100 \text{ kN/m}^2$

- overturn

$M_{stab} = 7.73 \text{ kN/m}$ $FS > 1.50 : \text{OK}$

Provide 750 wide x 200 deep x 100 heel footing

3.02.03 Retains $H = 9.0 \text{ m}$ $S = 2000 \text{ Pa}$

Consider unit length of foot

(a) $M_0 = -0.81 \text{ kN/m}$

Provide 20 Series masonry wall with
 12 vertical bars - 600 CS central with
 12 bond bars - 600 CS

- footing requirements

(c) Try a 450 wide x 200 deep x 50 heel footing

Wall $e_y = 0.145 \text{ m}$ $\phi = 1.0 \times (4.0 + 1.4 \times (3.6)) = 9.04 \text{ kN/m}$

Backfill on heel $\phi = 0.9 \times 0.25 \times (1.8) = 0.81 \text{ kN/m}$
 $e_y = 0.25$

Footing $e_y = 0.225$ $\phi = 0.45 \times 0.2 \times 24 = 2.16 \text{ kN/m}$

Provide a minimum of 450 wide x 200 deep x 50 heel footing

- soil bearing $\phi = 38.45 \text{ kN/m}^2$

- overturn $M_{stab} = 3.12 \text{ kN/m}$

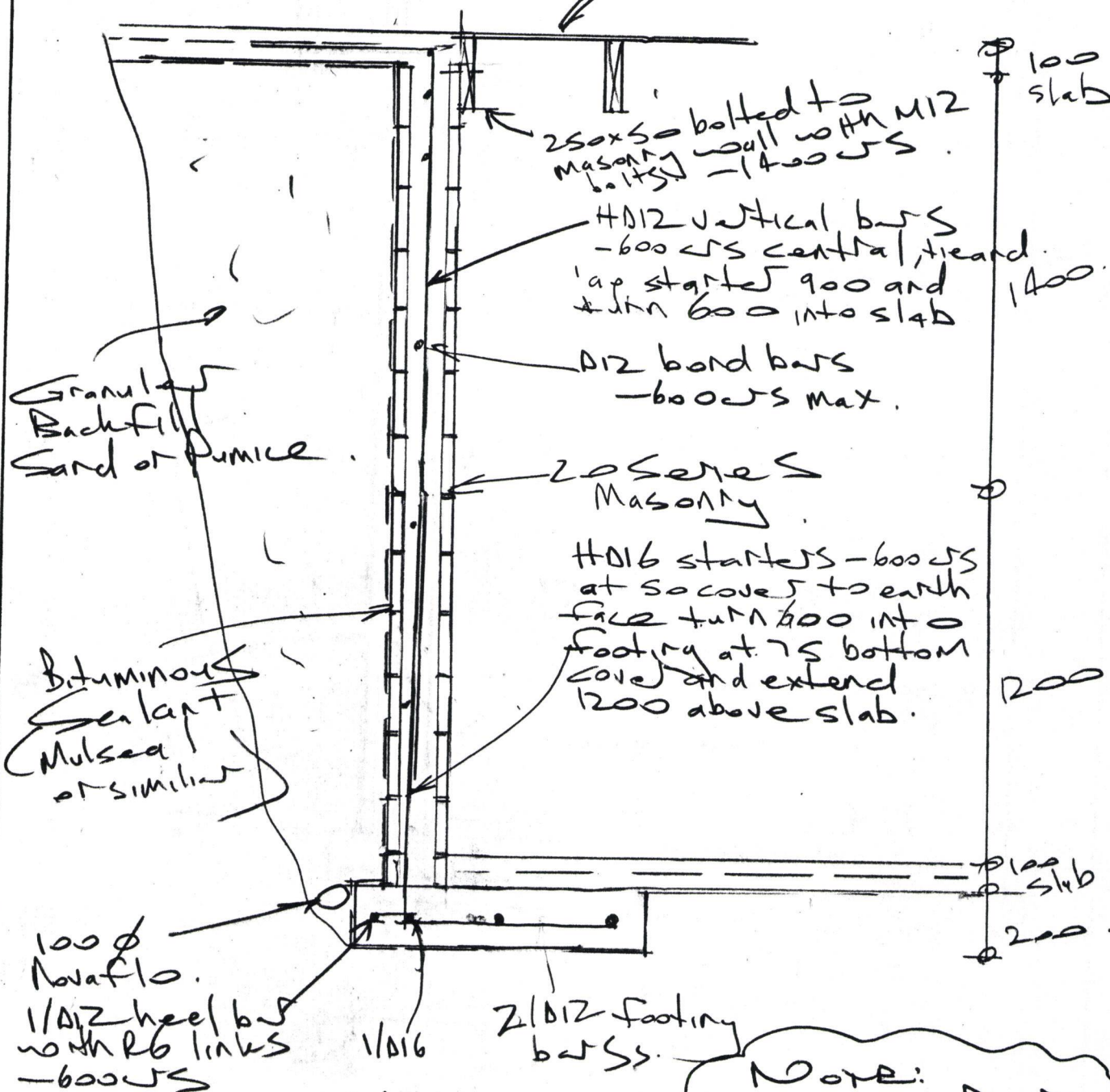
CONSTRUCTION NOTES

1. Concrete construction shall be in accordance with NZS 3109. Minimum concrete compressive strength at 28 days shall be 20 MPa for retaining wall footings and 17.5 MPa elsewhere.
2. Reinforced hollow concrete masonry construction shall be in accordance with NZS 4210 for Grade B construction. The Design Engineer shall be notified at least two working days in advance of any grouting.
3. Reinforced hollow concrete masonry retaining walls shall be grouted solid below the level of retained fill.
4. Retaining walls shall not be backfilled until concrete has attained its specified strength. unless adequate temporary bracing has been installed.
5. Structural steel shall be Grade 250 (AS 1204) or equivalent. Fabrication and erection of structural steelwork shall meet the requirements of NZS 3404:1992 and shall be in accordance with best trade practice.
6. Prior to painting, structural steelwork shall be solvent cleaned to SSPC SP1 specification, and power tool cleaned to SSPC SP3. Protective coatings shall comprise zinc chromate shop primer (40 micron dft).
7. Structural timber shall be No.1 Framing Grade Pinus Radiata, or Standard Building Grade Douglas Fir, unless specified otherwise.
8. Light timber framed construction shall be in accordance with NZS 3604:1990 unless specified otherwise on the plans.
9. Check all dimensions on site.
10. Proprietary systems, and products, shall be installed strictly in accordance with the manufacturers' recommendations.
11. Foundation design assumes that the site requirements of NZS 3604:1990 are met, and that the foundation subsoils have a safe allowable bearing pressure of 100 kPa.

SKETCH DETAILS: PROPOSED HOUSE
W.O. ROSA, APPENZELL DRIVE
W. HAKARANGA

REF 12394
DATE APRIL 1994
DRAWN CAM.

Floor diaphragm constructed
in accordance with NZS
3604:1990



NOTE:
TEMPORARY PROP
WALL UNTIL
FIRST FLOOR CONCRETE
SLAB HAS CURED

Section A: RETAINS H=2.60m max
1:20

Project

Proposed Residence

no Rose

Appenzell Drive, Whakatane

File

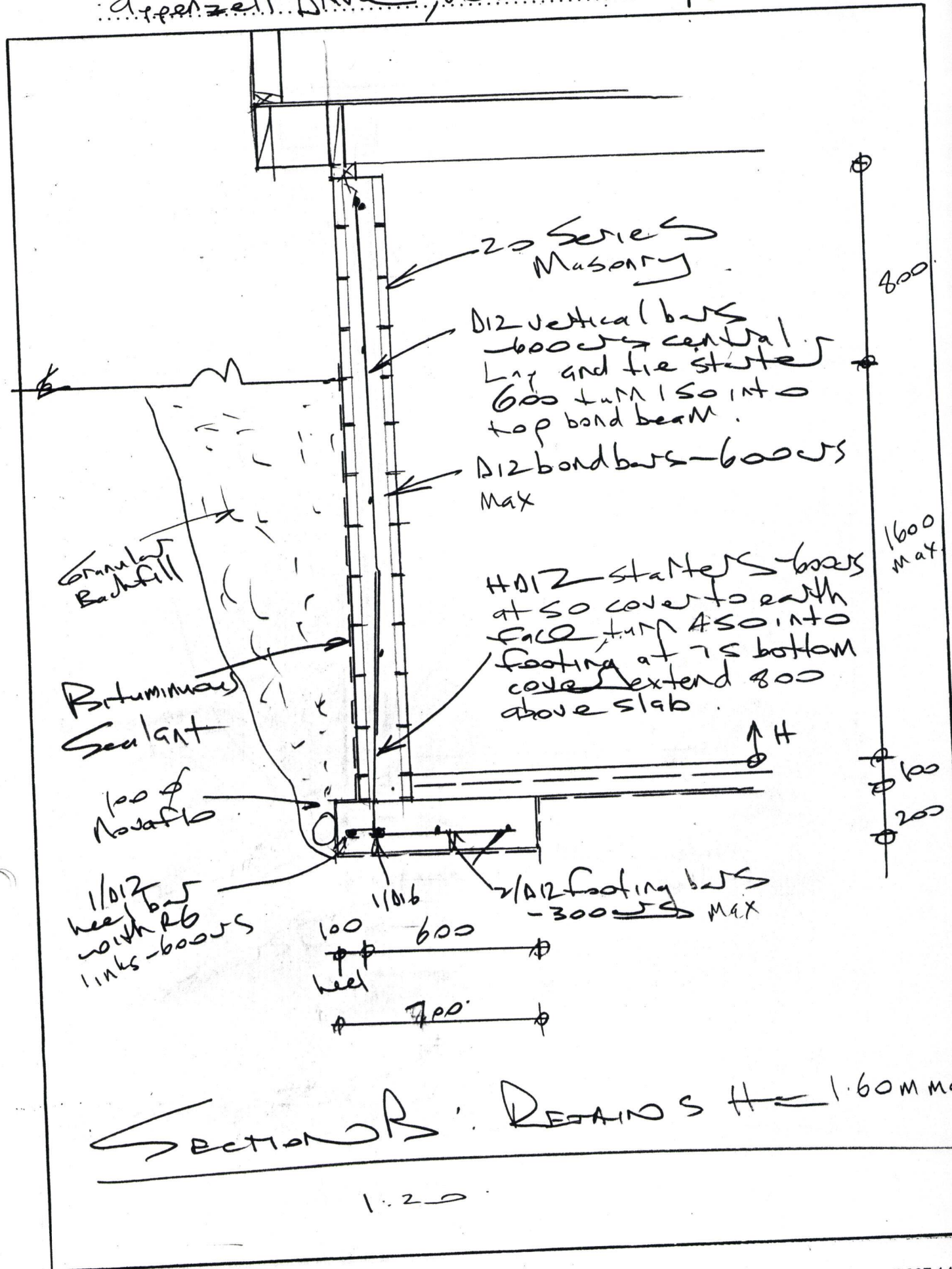
12394

Date

April 1994

By

EDM Page 2



Project

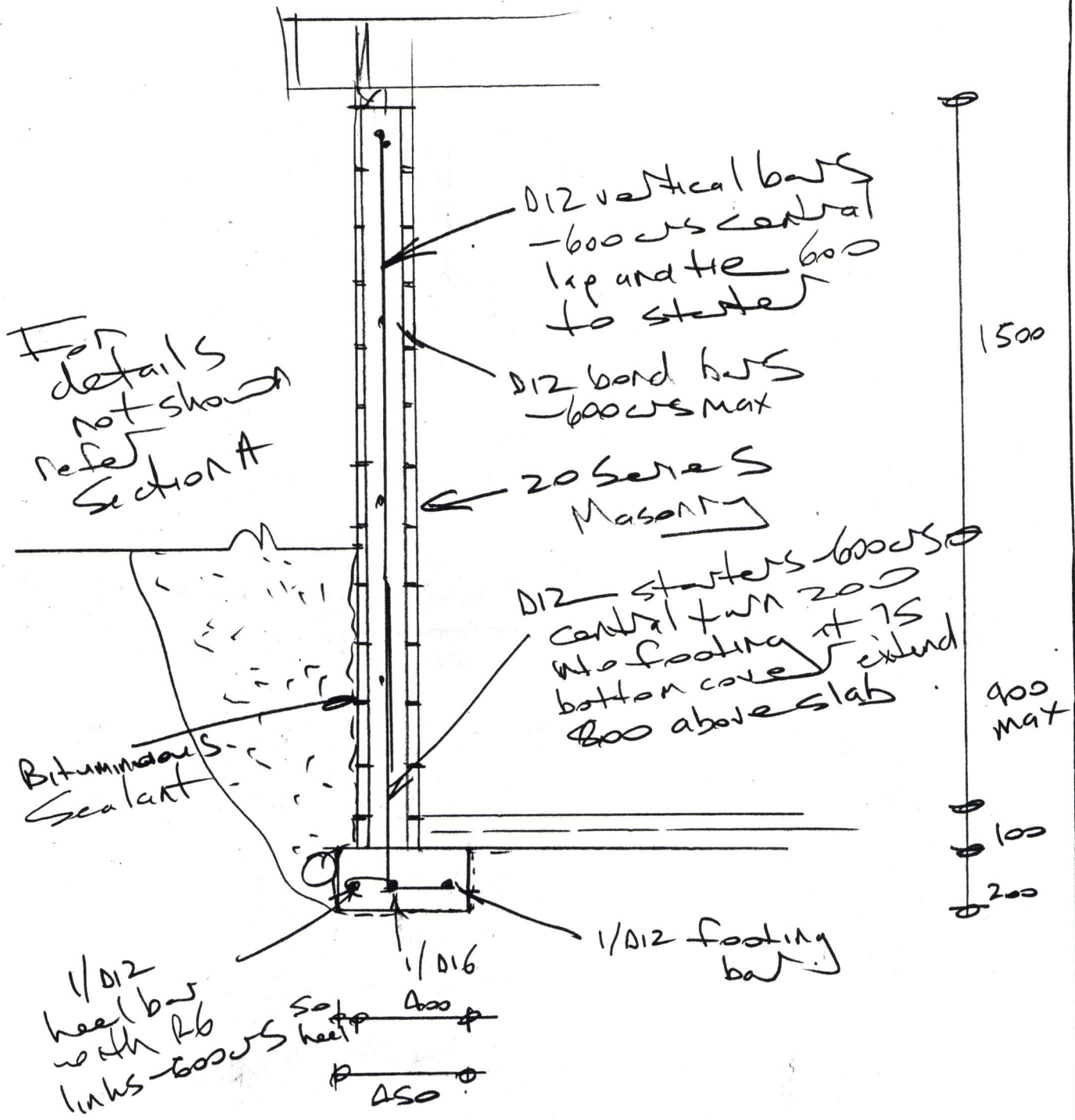
Proposed Residence

File 12394

Date April 1994

no. 2000
Appenzell Drive, Whakatane

By C.M. Page 3



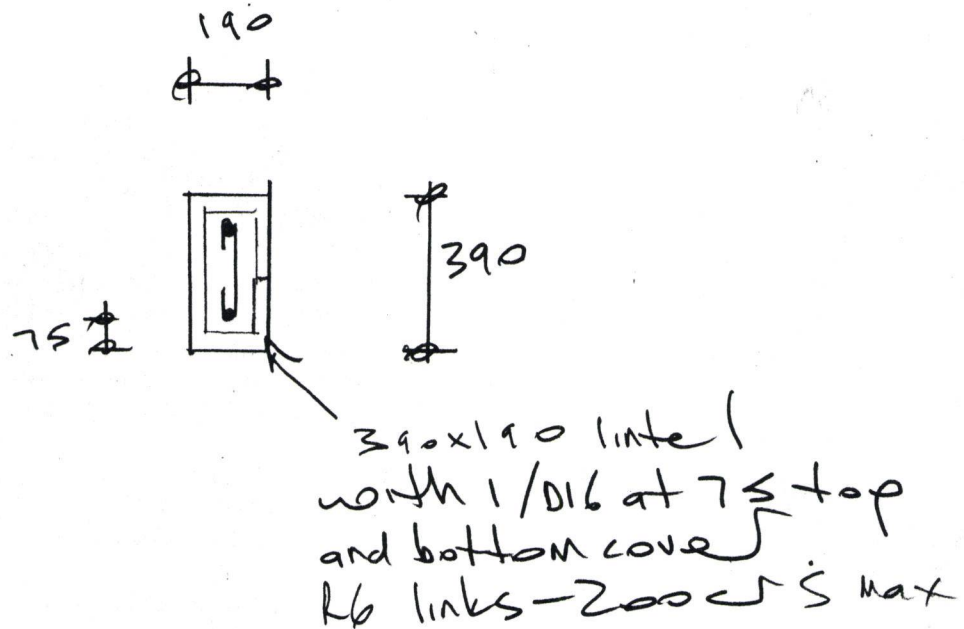
Section C

RETAINING H=900mm max

1:20

Project

File 12314
Date April 1994
By CDM Page 4



SECTION D: R.H.M LINTEL

1:20