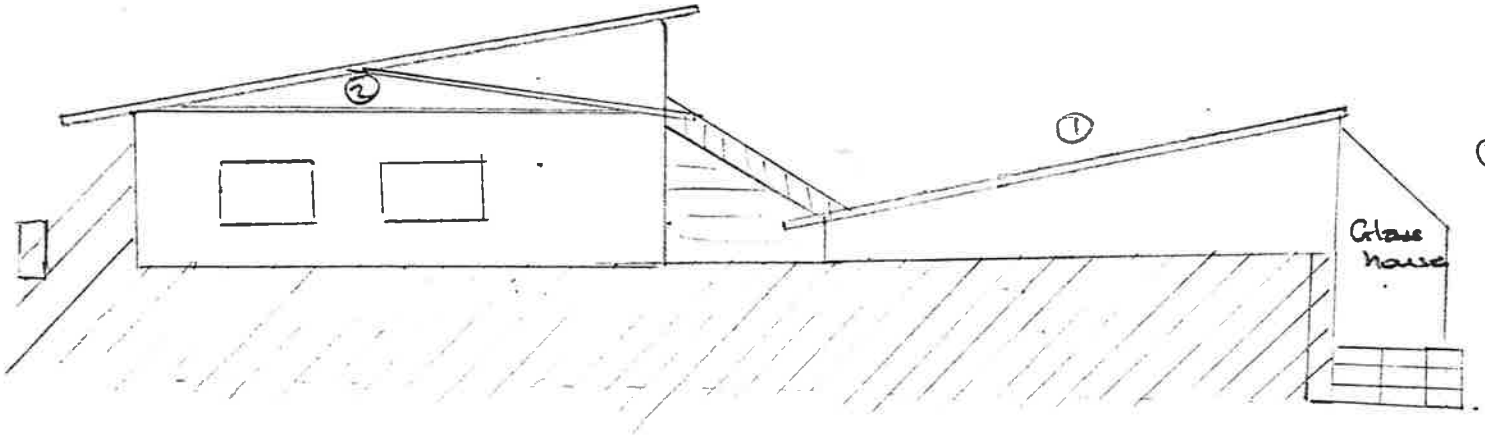


West & East Elevation

Alterations

① Reversed slope of roof on lower level. (Same structural design as upper level)

② Roof over patio area (only on east elevation)

BC 0196/04

Brian Gubb
11 Waingaro Rd
Ngaruawhia

South Elevation

Tyre retaining wall and
Bermed earth will be planted
with ferns - shrubs.

GRANT LOWTHER
Consulting Civil Engineer Hills Road R D 1 Raglan NZ Ph / fax + 64 7 825 8729

21 May 2004 ref: 04476

Waikato District Council
Private Bag 544
NGARUAWAHIA

Dear Sir,

Re: new dwelling at 11 Waingaro Road Ngaruawahia for Brian Gubb.

I confirm that I have been engaged to oversee the design and supervise construction of :-

On-site grey water treatment and land application system and composting toilet for the proposed 4 bedroom dwelling.

After completion a producer statement will be issued covering the specified work.

Yours faithfully,

GRANT LOWTHER

Source of clay/earth and test results

All C is sourced from on site excavation

NZS 4298:1988 (page 12)
RAMMED EARTH: Damp or moist soil, with or without stabilizer, that is tamped in placed between *temporary moveable formwork.* Also known as pise. (italics added)

Note: Building by ramming earth into tyre casings is unique in that the formwork (tyres) are not removed. They remain as a permanent part of the structure.

FLEXURAL TENSILE STRENGTH TEST:

A tyre compacted with clay was elevated on two 4" x 4"s and a 4 wheel drive vehicle was parked on top of it. The clay compacted tyre didn't bend at all under the weight. (refer to attached photos) I do not know the weight of the 4 wheel drive, suffice it to say that it is much heavier than this test requires.
PASSED

SHRINKAGE:

Shrinkage tests performed as outlined in appendix F
Sample 1: 3 hairline cracks <0.05%
Sample 2: 2 hairline cracks <0.05%
PASSED

MOISTURE DROP TEST:

A handful of clay dropped from shoulder height shatters when it falls on a flat hard surface.
PASSED

WHOLE BLOCK DROP TEST:

Tyres compacted with clay (weighing > 150kgs) were dropped from a 1m height, landing on their flat and on their edge. There was no damage to the clay when it landed on its flat, and a small section of the clay broke lose from the centre of the tyre when dropped on its edge.
PASSED

WET/DRY APPRAISAL:

The weather edge of the compacted clay is a tyre casing. If the tyres were to get repeated wetting and drying it would have no effect on the clay inside the tyres.
ACCESSED PASS

DURABILITY EROSION TEST PRESSURE SPRAY METHOD:

The weather edge of the compacted clay is a tyre casing. You could use a water blaster with 100's kPa pressure and it would have no impact on the tyre casing. I did not do this test as one can surely assume that the depth of erosion would be 0mm/hr. Erodibility Index =1
ACCESSED PASS

DURABILITY EROSION TEST GEELONG METHOD:

(As above) The weather edge of the compacted clay is a tyre casing.
Erodibility Index =1
ACCESSED PASS

FOUNDATION EXCAVATION AND BACKFILLING

John DALE
Consulting Engineer

SD 21 Rev 3/04

1 GENERAL

This section of the Specification covers all excavation required for the construction of footings, walls and ground slabs to the dimensions shown on the Drawings, together with backfilling where required.

Bulk excavation, filling, clearing and other work related to site development, underground services, roads, paths, landscaping etc are not covered by this section and are specified elsewhere.

2 RELATED DOCUMENTS

Work shall comply with the relevant requirements of the following standard specifications together with the further provisions herein:

NZS	4202	Method of Measurement of Building Works
NZS	4204P	Code of Practice for Foundations for Buildings not requiring Specific Design
NZS	4205P	Code of Practice for Design of Foundations for Buildings

3 EXCAVATION

3.1 General

Strip all topsoil, organic materials, fill, soft materials and debris over the site and stockpile or dispose of as agreed. Report soft spots to the Engineer.

3.2 Dimensions

The Contractor shall excavate to the total building dimensions shown on the Drawings together with any additional allowance for working space for form work prescribed in Clause 3.4.1, NZS 4202. The total building dimensions shall include provision for 40mm minimum thickness of site concrete under all foundations except ground slabs and for any requirement for drainage course, hardfill or other details shown on the Drawings.

Where excavation of unsuitable soils is required, excavation of such soils shall be carried out to 1 metre beyond the building perimeter.

3.3 Unsuitable Foundations

Any unsuitable or doubtful foundation conditions shall be brought to the attention of the Engineer who will make any decisions and give any instructions required to remedy the condition. Any unsuitable foundation conditions arising from disturbance of the soil by the Contractor, or failure by the Contractor to maintain adequate drainage and any over excavation shall be good by the Contractor at his own cost.

3.4 Shoring

The Contractor shall provide a detailed scheme of his proposed shoring and underpinning to safeguard adjacent buildings and services. Unless otherwise agreed, all temporary shoring and timbering shall be removed during backfilling.

4 DISPOSAL OF SPOIL

Any excavated material required for backfill or site works shall be stockpiled as directed by the Engineer. All surplus spoil shall be removed from the site and disposed of at the total cost of the Contractor.

5 EXISTING UTILITIES

The attention of the Contractor is drawn to the provisions of the General Conditions of Contract regarding underground and overhead utilities. Where the Drawings show any such utilities to be affected by proximity to the foundations or other portions of the structure, the Contractor shall carry out such protective measures as are shown.

At all pile locations near buried utilities, the cables or pipes shall be exposed by hand excavation prior to driving or boring for piles. Any potential conflicts shall be advised to the Engineer.

6 DEWATERING

The Contractor shall provide adequate and continuous drainage from the foundation excavations. All seepage and surface water shall be discharged by means of temporary sumps, drains or pumps as required. Where a settlement pond is provided discharge from the foundation excavations shall be to that pond. Where no such provision is made or the pond so provided is not conveniently located the Contractor shall construct a settlement area to the approval of the Engineer designed to minimise the discharge of settleable solids to the receiving system.

Any foundation materials softened as a result of the Contractor's failure to provide adequate drainage shall be removed and replaced with approved compacted hardfill at the cost of the Contractor.

7 BACKFILLING

7.1 Imported fill

Backfill under floors and foundation beams or footings where required as a result of over-excavation by the contractor or excavation of unsuitable foundations as instructed by the Engineer shall be carried out with approved granular fill. Such backfill shall be consolidated in 150 mm layers to not less than 92% of the maximum dry density of the soil as determined by NZS 4402, Test 4.1.3. Suitable material includes pit sand with a silt or clay content not exceeding 10% passing a 0.075 sieve. Sand backfill is to be compacted to achieve an average of at least 6 blows per 100 mm using a Scala penetrometer, with no location less than 4 blows per 100 mm.

7.2 Fill with local material

Where the Engineer determines that backfilling with excavated material is necessary to preclude differential settlement, such material shall be selected to the approval of the Engineer and consolidated to provide an average undrained shear strength (by hand vane) of 120 kPa in any group of 10 tests with no

single test less than 100 kPa. Backfilling with excavated material shall not be carried out without the written instruction of the Engineer.

7.3 Hardfill

Where shown on the drawings, hardfill shall be basecourse material to Transit NZ specification M4, 100 mm thick unless shown otherwise.

7.4 Drainage & Filter material

Protect membranes on walls with fibre cement sheets before backfilling. Backfill behind retaining walls shall be at least 300 mm wide and consist of free draining hardfill. Filter material to drains shall be well graded stone to Transit NZ specification F2.

8 BLINDING

Lay blinding concrete, where shown on the drawings, as soon as possible after excavation has reached final depth and been approved. In other areas, blind surface of the hardfill with 25 mm sand blinding.

9 INSPECTION

The Contractor shall notify the Engineer at least 48 hours before casting of blinding concrete or fixing of reinforcement, to allow the Engineer to inspect the foundations.

CONCRETE CONSTRUCTION

John DALE
Consulting Engineer

SD 31_Rev 3/04

1 GENERAL

This section of the Specification covers the handling and placing of structural concrete in this contract. Work shall comply with NZS 3124 and cited clauses from NZS 3109 Concrete Construction and NZS 3114 Concrete Surface Finishes together with the provisions herein.

2 MATERIALS

2.1 Concrete

Unless shown otherwise on the Drawings, all structural concrete shall be ready-mixed with a minimum 28 day compressive cylinder strength of 25 MPa, while blinding concrete shall be 10 MPa. However in coastal areas within 500 m of the high tide line, higher strength concrete may be required and the contractor shall confirm this with the engineer. Delivery dockets for all deliveries, showing date, strength and grade, shall be retained for inspection by the Engineer.

2.2 Reinforcement

All mild steel round and deformed bar (denoted R and D respectively on the Drawings) shall be grade 300E, and all high yield steel (denoted H, HD or Y, and HR or YR on the Drawings) shall be grade 500E deformed or plain bars respectively complying with AS/NZS 4671:2001.

2.2 Moisture Membrane

Slabs within buildings shall have a dpc of 0.25 mm polythene or similar proprietary membrane laid in accordance with the manufacturer's recommendations. Side lapped joints of 150 mm and end laps of 300 mm shall be used, with all laps and edges sealed with 50 mm wide pressure sensitive tape.

3 WORKMANSHIP

3.1 Concrete Placement

The Contractor shall advise the Engineer when he intends to commence placing concrete. No concrete shall be placed until the Engineer is satisfied that the requirements of this Specification and the Drawings relating to formwork, reinforcement and construction joints have been complied with entirely. No concrete shall be placed in the absence of the Engineer without his prior approval.

Concrete may be placed by pumping provided that a concrete mix, designed and approved for pumping is used and that approved equipment is employed.

Concrete not placed and vibrated in forms after 90 minutes have lapsed from the stated time that water was added at the plant may be rejected by the Engineer. Concrete not placed in its final position in the forms within 30 minutes after discharge from the mixer or agitator truck, or before initial set has occurred shall not be used. For concrete mixes containing accelerating admixtures the time of 30 minutes shall be reduced to 15 minutes.

3.2 Concrete Compaction

All concrete shall be thoroughly compacted during and immediately after depositing, by means of approved power driven immersion vibrators of a size suitable for the section being poured, in accordance with Clause 7.5 of NZS 3109.

3.3 Reinforcement Placement

The surface of the steel reinforcement shall comply with the requirements of NZS 3109 Clause 3.3 at the time of concreting. Cover to all reinforcement shall comply with NZS 3101. After placement the reinforcement shall be inspected and approved by the Engineer or his representative before any concrete is placed. At least 24 hours notice shall be provided for inspection and approval. The removal of all formwork preventing proper inspection shall be allowed for. Concrete placed before inspection and approval shall be liable to rejection and removal.

3.4 Surface Finishes

Unless noted otherwise on the Drawings, concrete surface finishes shall be:

Buried formed surfaces	F1
Exposed formed surfaces	F4
Unformed surfaces	U3

in accordance with NZS 3114.

3.5 Construction Joints

Joints shall be Type B in accordance with Clause 5.6 of NZS 3109. Where construction joint locations are not indicated, the Contractor shall submit his proposals to and obtain approval from the Engineer before proceeding with the construction of the section in question.

For all slabs provision shall be made for shrinkage control joints within the pour to be formed by either saw cutting or another approved method. Saw cuts, if used, shall be carried out not more than 24 hours after the concrete is poured. The cuts shall be 10 mm wide unless shown otherwise, and to a depth of one third of the slab thickness and true to line for the full length of each cut. The maximum spacing between sawn control joints or control joints and construction joints shall be 5m for slabs on the ground.

Control joints shall be filled with Exposeal or equivalent sealant in accordance with the manufacturer's recommendations, as close to the end of the contract as possible.

3.6 Curing

Concrete shall be moist cured for 7 days, or have an approved curing membrane applied.

STRUCTURAL STEELWORK

John DALE Consulting Engineer

SD 41_Rev 3/04

1 GENERAL

This section of the Specification covers the requirements for supply, fabrication and erection of structural steelwork in this contract.

1.1 Related Documents

Work shall comply with the relevant requirements of the following documents:

NZS 3404 Steel structures standard
AS/NZS 1554 Structural steel welding

1.2 Dimensions

Where new work is being placed onto or connecting with existing work, the contractor shall check and verify all dimensions and levels on site before commencing fabrication. Any discrepancy found shall be reported to the Engineer and amendments agreed.

1.3 Co-operation

The steel fabricator shall cooperate with all other trades and shall supply the main contractor with accurate details and templates for the fixing of all holding down bolts etc.

1.4 Alternatives

If any specified sections or materials are not available, substitute sections shall be agreed in writing with the Engineer before any work commences. Alternative connections and details may be used, subject to the approval of the Engineer, but at no cost or delay to the contract.

1.5 Inspections

The Engineer shall have access at all reasonable times to all places where the work is being carried out, and shall be provided with all needed facilities for inspection. The Contractor must be satisfied that the work complies with the Contract Documents before calling for an inspection. Generally 24 hours notice shall be given for calls for inspection, but 48 hours for weld non-destructive tests.

2 MATERIALS

2.1 General

Steel and fasteners shall comply with section 2 of NZS 3404. Unless noted otherwise, materials shall be of the following grades:

rolled sections over 125 deep	grade 300 to AS 3679.1
plate & bar, sections less than 125	grade 250 to AS 3678 or AS 3679.1
hollow sections (not circular)	grade 350 to AS 1163
pipe & circular hollow sections	grade B to API 5L
welded beams	grade 300 to AS 3679.2

2.2 Certification

The Contractor shall obtain, on request, copies of the mill test report certificates or certificates of compliance, and supply them to the Engineer.

3 WELDING

All welding and welding procedures shall comply with NZS 3404 which modifies AS/NZS 1554. Unless noted otherwise, all welds are category SP, with E41XX electrodes for materials 300 MPa or less and E48XX for grade 350 material.

The extent of NDT shall be 100% visual, 10% MP or LP, and 10% radiography to SP butt welds. The Contractor is responsible for arranging and paying for the testing by a Telarc registered agency, who shall report simultaneously to the Contractor and the Engineer. Defective welds shall be repaired in a manner agreed with the Engineer.

Unless noted otherwise, fillet welds shall be 5 mm leg all round and butt welds full strength.

4 BOLTING

Fabrication and assembly shall comply with NZS 3404. All bolts cast into concrete or between galvanised members or exposed to weather shall be galvanised. Unless noted otherwise, bolts shall be class 8.8/S, except for bolts to purlins which shall be class 4.6/S by default. Bolt heads and nuts shall be provided with flat or tapered washers to NZS 4320 or AS 1252 as appropriate.

5 FABRICATION & ERECTION

Work shall comply with NZS 3404. Cut surfaces shall be dressed to a smooth finish free from defects and distortions. Edges shall be lightly rounded. All hollow sections shall be capped with 3 mm plate and seal welded all round, unless noted otherwise. Joints shall be made only where and by the method shown on the Drawings, unless agreed in writing by the Engineer.

Members to be hot-dip galvanised shall be fully fabricated before galvanising. The silicon content of steel to be galvanised shall be advised to the galvaniser so that the galvanising process can be modified.

It is the Contractor's responsibility to ensure that after erection and application of dead loads, all members are level, plumb and straight. The Contractor is responsible for providing sufficient temporary bracing and temporary support for members during erection.

6 PURLINS & GIRTS

Cold rolled steel members shall comply with AS/NZS 4600. Steel purlins and girts shall be galvanised in accordance with AS/NZS 4791 and manufactured from grade 450 coil by an approved manufacturer. All holes shall be pre-punched. Braces, sag rods, washers and double nuts are to be supplied to achieve a complete system in accordance with the manufacturer's recommendations. These ancillary items shall have similar coatings to those specified for the members being joined or braced.

STRUCTURAL TIMBERWORK

John DALE
Consulting Engineer

SD 51_Rev 03/04

1 GENERAL

This section of the Specification covers the requirements for supply, fabrication and erection of specifically designed structural timberwork in this contract. Light timber framing to NZS 3604 is specified elsewhere.

1.2 Related Documents

Work shall comply with the relevant requirements of the following documents and the other documents referenced therein:

NZS 3603	Timber structures standard
NZS 3604	Light timber frame buildings

2 MATERIALS

2.1 Sawn timber

Unless noted otherwise, all sawn timber shall be verified No 1 grade *Pinus radiata* treated to H1 retention and marked as such. The design relies on, and the timber shall have, a modulus of elasticity of at least 8 GPa. Timber in contact with concrete, within 600mm of the ground or exposed to the weather shall be H3 treated. Timber in ground contact shall be H5 treated.

All timber finally exposed shall be dressed, other timbers shall be gauged. Finishing timber shall be hand sanded before coating.

2.2 Poles and half rounds

Poles shall be peeled not shaved and treated to H5 retention. They shall comply with NZS 3605.

2.3 Metal plate connectors

Unless shown otherwise on the drawings, or stainless steel is required by the NZ Building Code, nail plates, straps, braces, joist hangers and the like shall be manufactured from grade 350 Z 275 steel coil.

Structural brackets shall be manufactured from grade 250 plate and galvanised in accordance with AS/NZS 4680:1999.

Circular toothed-plate connectors shall be "Bulldog" brand available from Stapleton Roofing Ltd., P O Box 18-028, Auckland.

2.4 Bolts, nuts, washers, nails and screws

Unless noted otherwise, or required by the durability provisions of the NZBC to be stainless steel, bolts, nuts and coach screws shall be galvanised M12 class 4.6. Washers and nails shall be galvanised, or stainless steel if required by the NZBC for durability.

2.5 Moisture barrier

Damp proof course shall be Duroid dpc 1840 g/m2 or equivalent

2.6 LVL

Laminated Veneer Lumber (LVL) shall be Hyspan, HY90 or Hybeam products manufactured by Carter Holt Harvey.

3 WORKMANSHIP

3.1 Nailing

All nails shall be fully driven. Nails in dressed timber shall be punched and filled.

3.2 Bolts and screws

Bolts, nuts and coach screws shall be installed with the edge distances, and be provided with galvanised washers in accordance with NZS 3603, namely

M12 bolts	35x35x3 or 40 diam x 3 mm
M16 & M20	50x50x4 or 55 diam x 4 mm
M24	65x65x5

3.3 Damp proof course

All timber in contact with masonry or concrete shall be separated from it by Malthoid or similar approved dpc. The dpc shall overlap the timber by 6 mm.

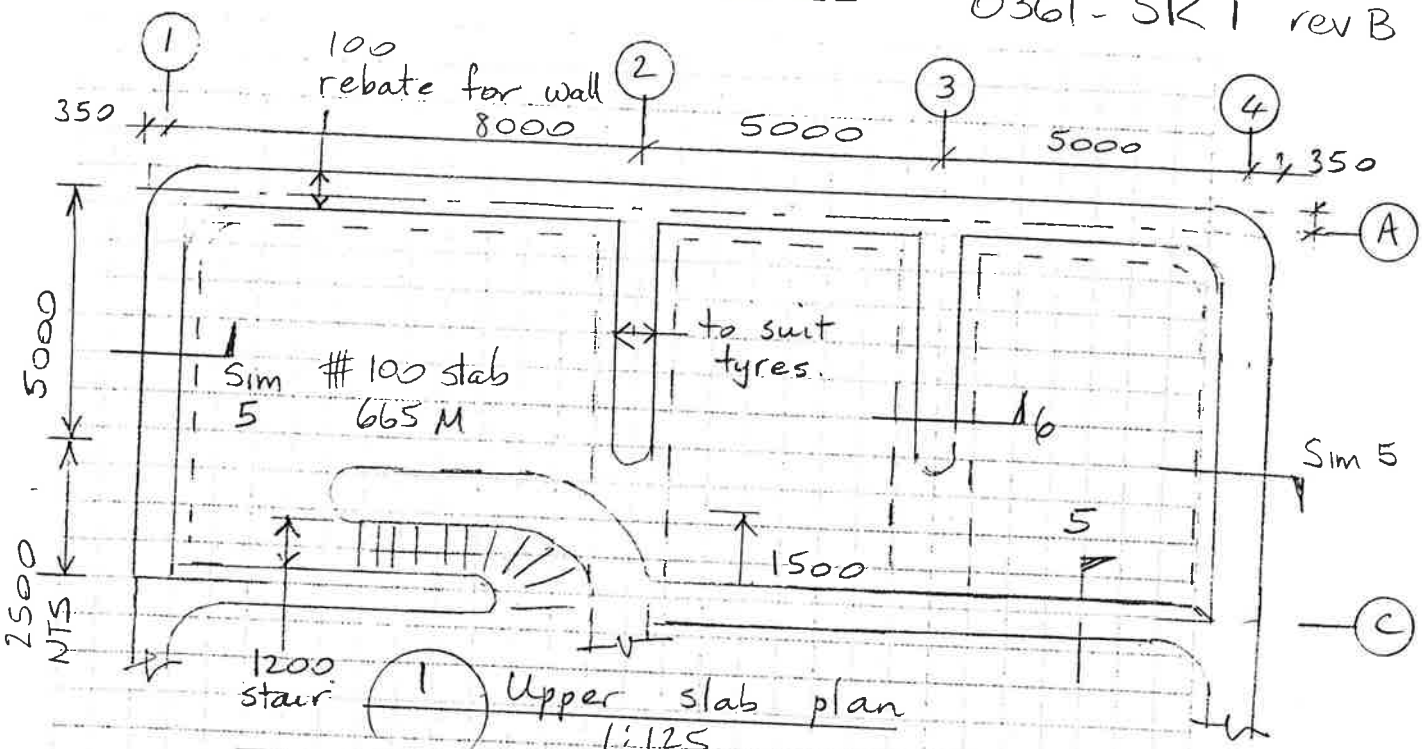
3.4 Treatment of cut ends

Ends and surfaces of H3 or more heavily treated timber cut after treatment shall be liberally brushed with "Ensele" or similar copper napthenate solution.

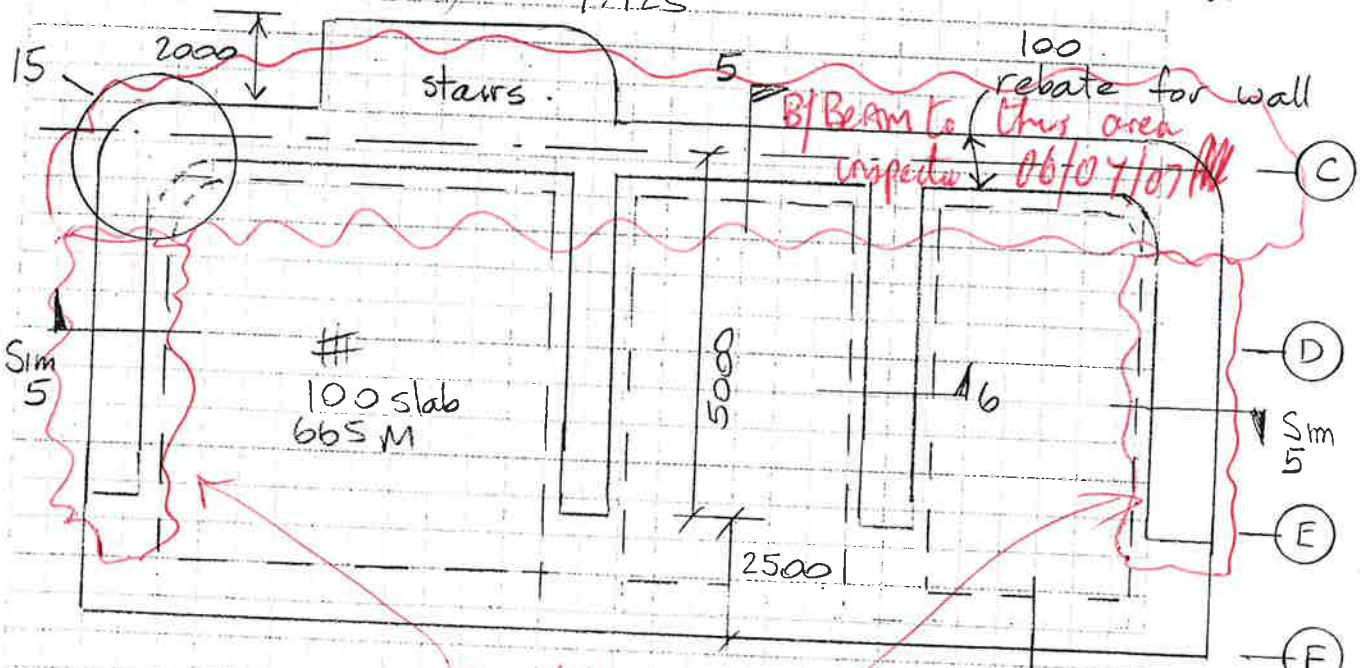
B Gubb

John DALE

0361 - SK 1 rev B



1 Upper slab plan
1:125



2 Lower slab plan
1:125

Finished floor levels min 225 above exterior ground level

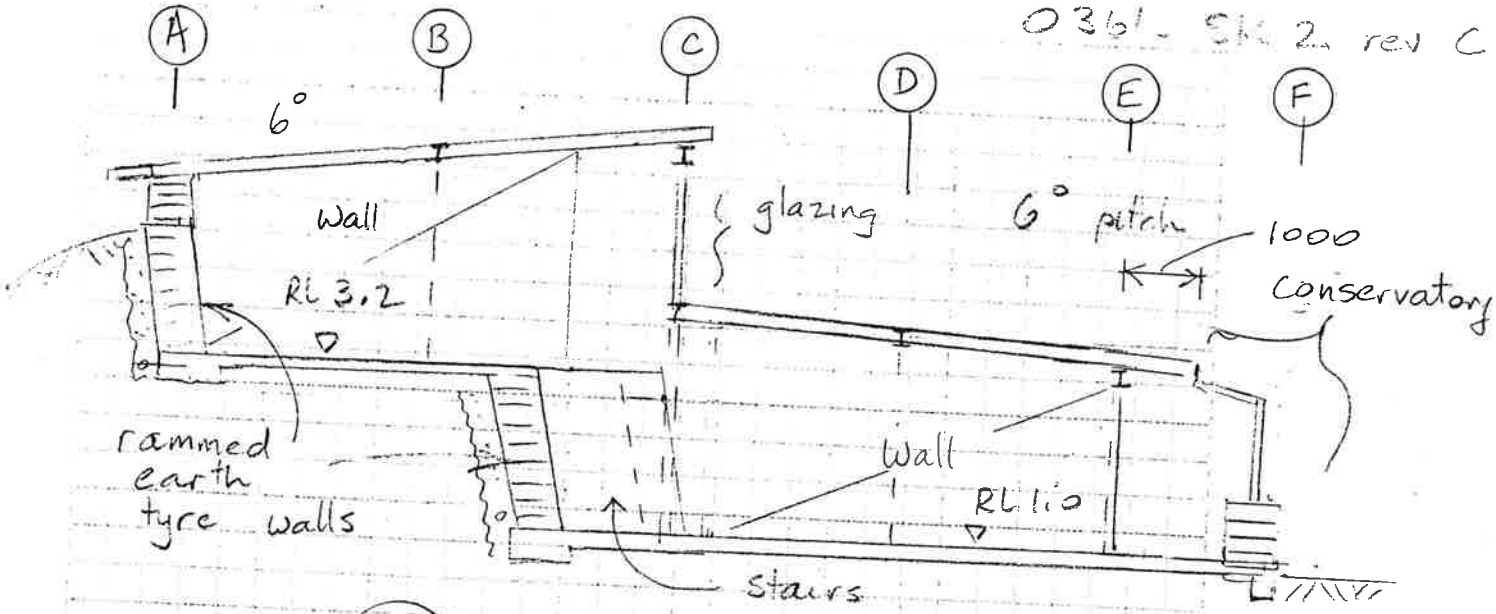
Refer (architectural / owner's) plans for wall set out

2 Guibb
11 Waingaro Rd

John DALE

7.5.04

0361 - SK 2 rev C



3 Cross-section 1:100

Roof construction follows NZS 3604 for high wind zone.

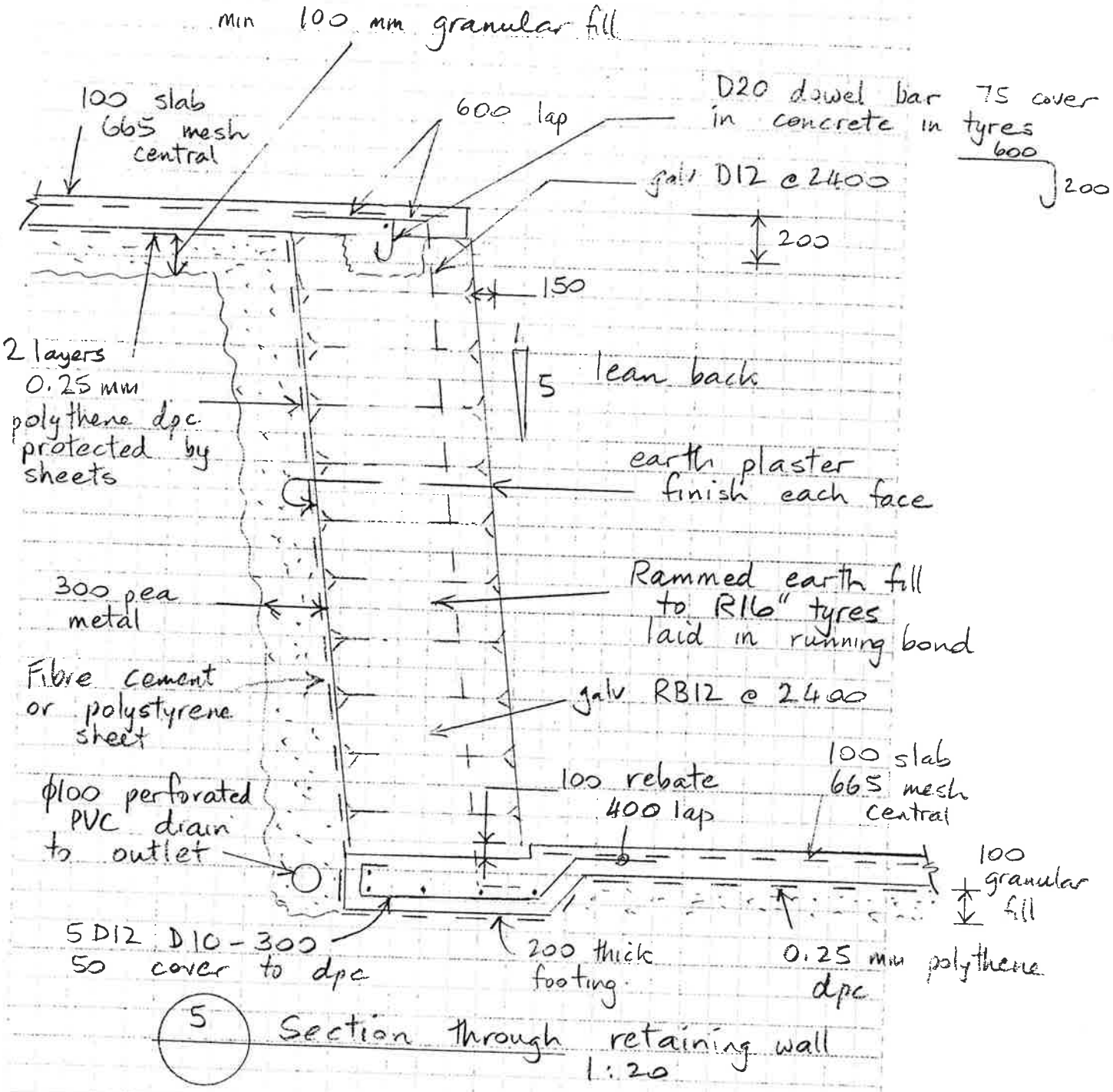
Refer specification notes and specification

B Gubb
11 Waingaro Rd
Narrawahia

John DALE

7.5.04

0361 – SK 3 rev C



5 Section through retaining wall
1:20

Maximum 2.2m
between floor levels

20 MPa concrete

Perimeter footing similar

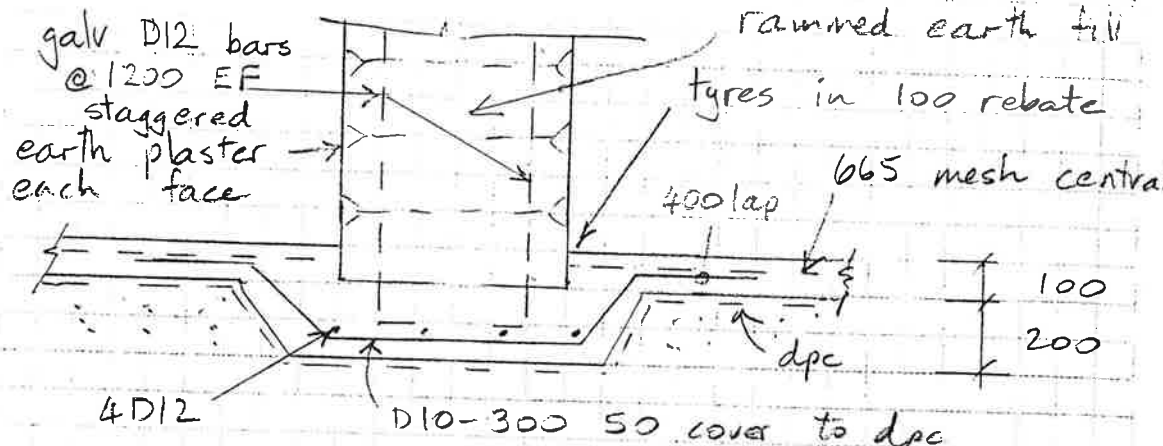
This Detail Inspected 08-12-04 - Approved
Engineer Inspected 07-02-04.

B Gubb
11 Waingaro Rd

John DALE

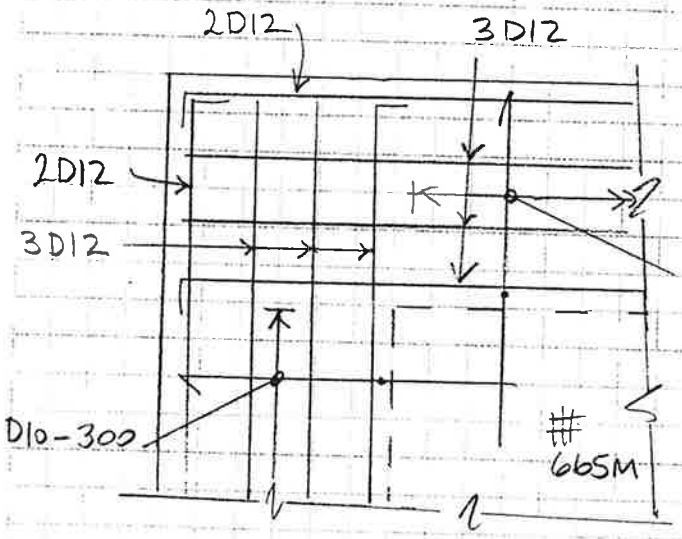
7.5.04

0361 - SK4 rev C

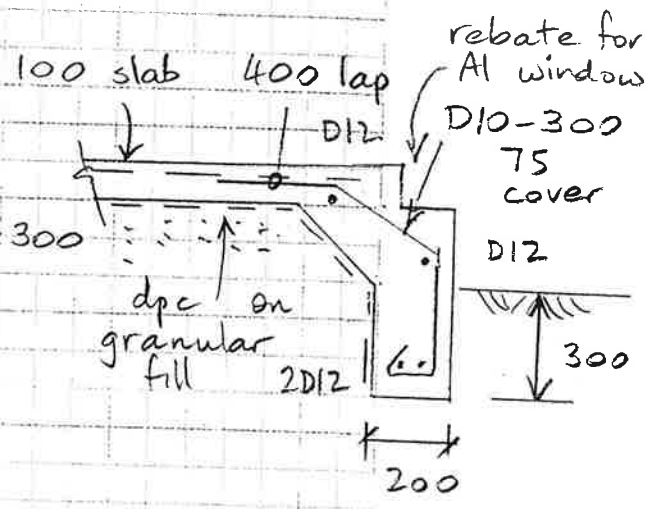


6 Internal wall footing 1:20

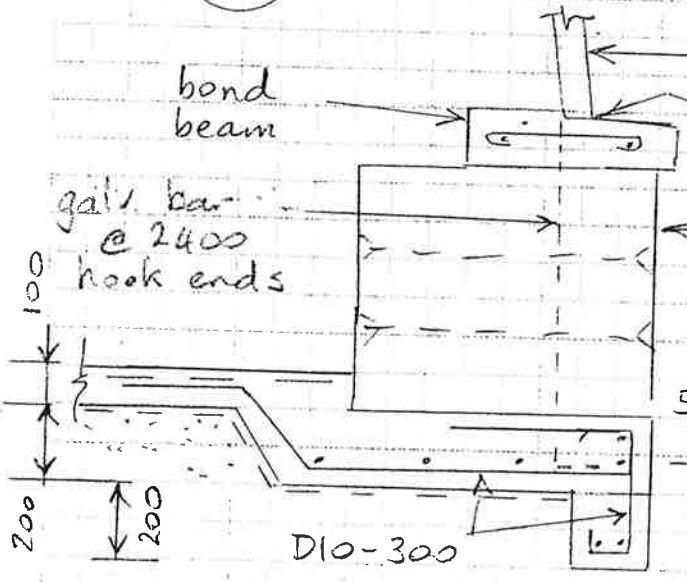
20 MPa concrete



7 Square Footing corner 1:20



8 Grid F footing 1:20 no tyres



9 Grid F tyres

B Gubb
11 Waingaro Rd
Ngaruawahia

John
DALE

7.5.04

0361 - SK5 rev C

A B C
1000 3750 3750 300 NTS

4 3 2 1

portal frame
portal frame

23 21 20 41 45

strybrace

24

5000 5000 8000 1000 1000

line of earth under wall

Upper roof plan
1:100

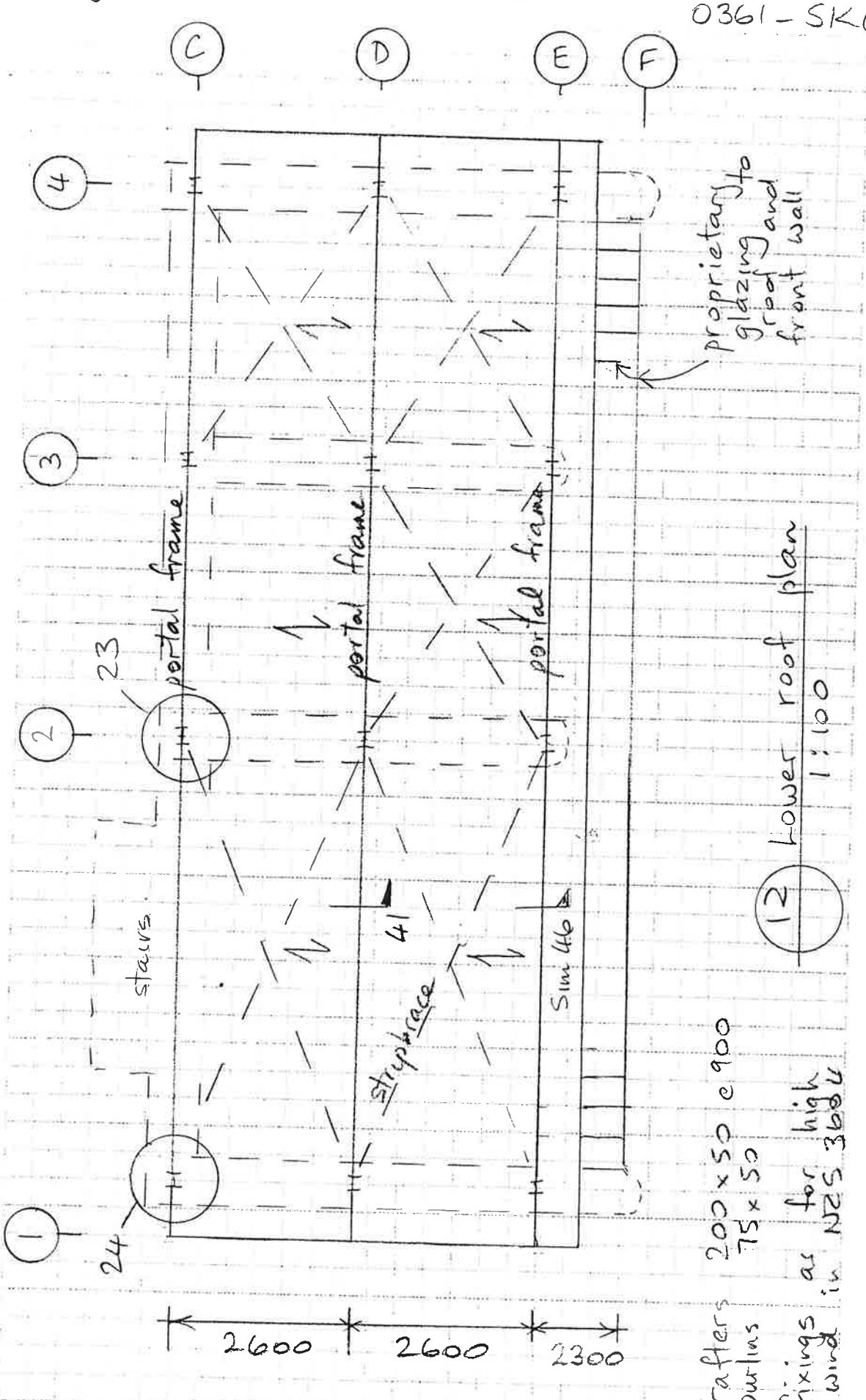
rafters 200x50 @ 900
purlins 75x50
fixings as for high wind
in NZS 3604

B Gubb
11 Waingaro Rd
garuawahia

John DALE

7.5.04

0361 - SK6 rev C

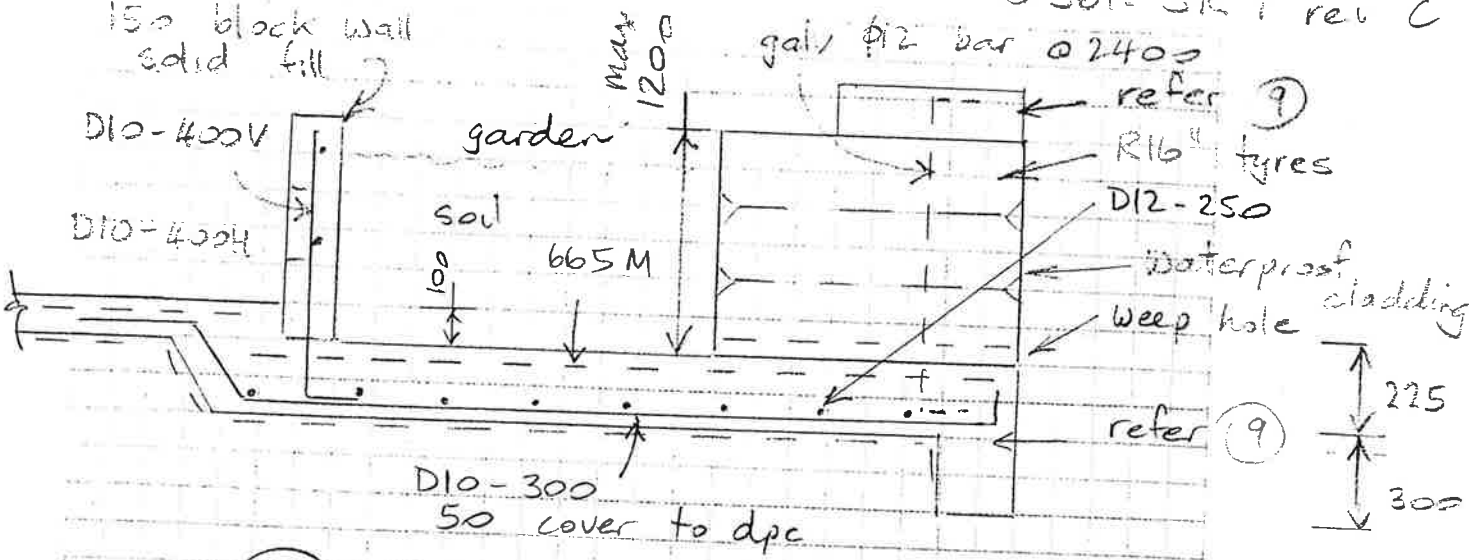


B Gubb
11 Waingaro Rd

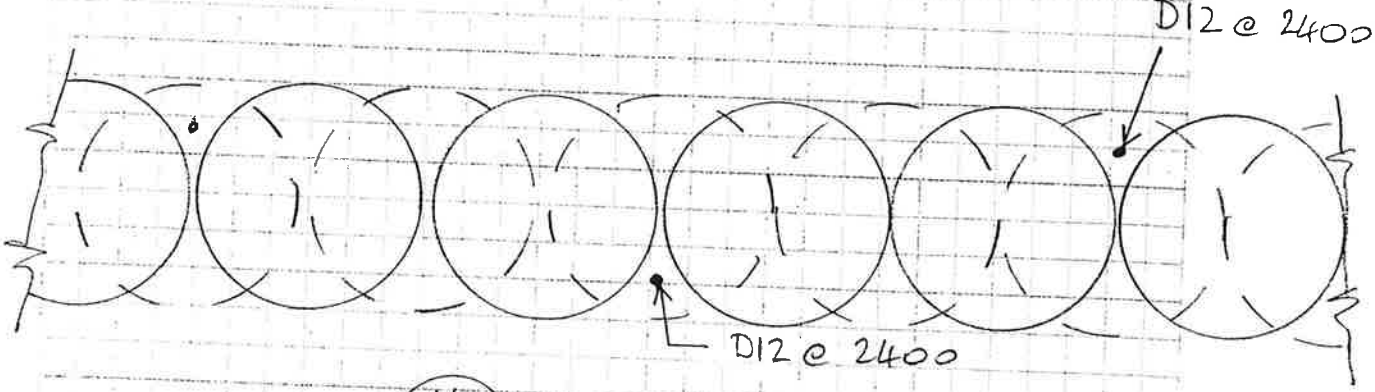
John DALE

7.5.04

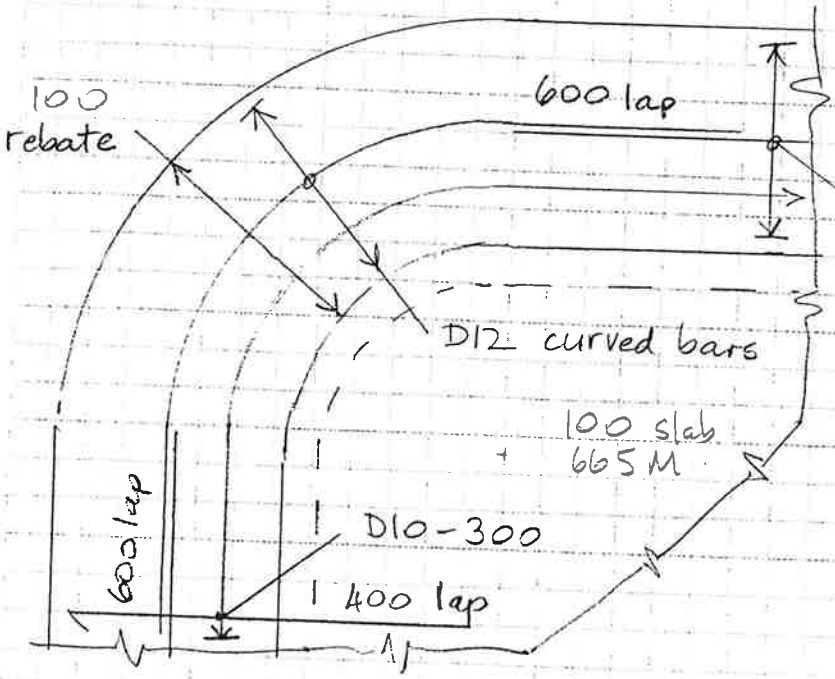
0361. SK7 rev C



13 Grid F with garden
1:20



14 Tyre wall horiz section
1:20



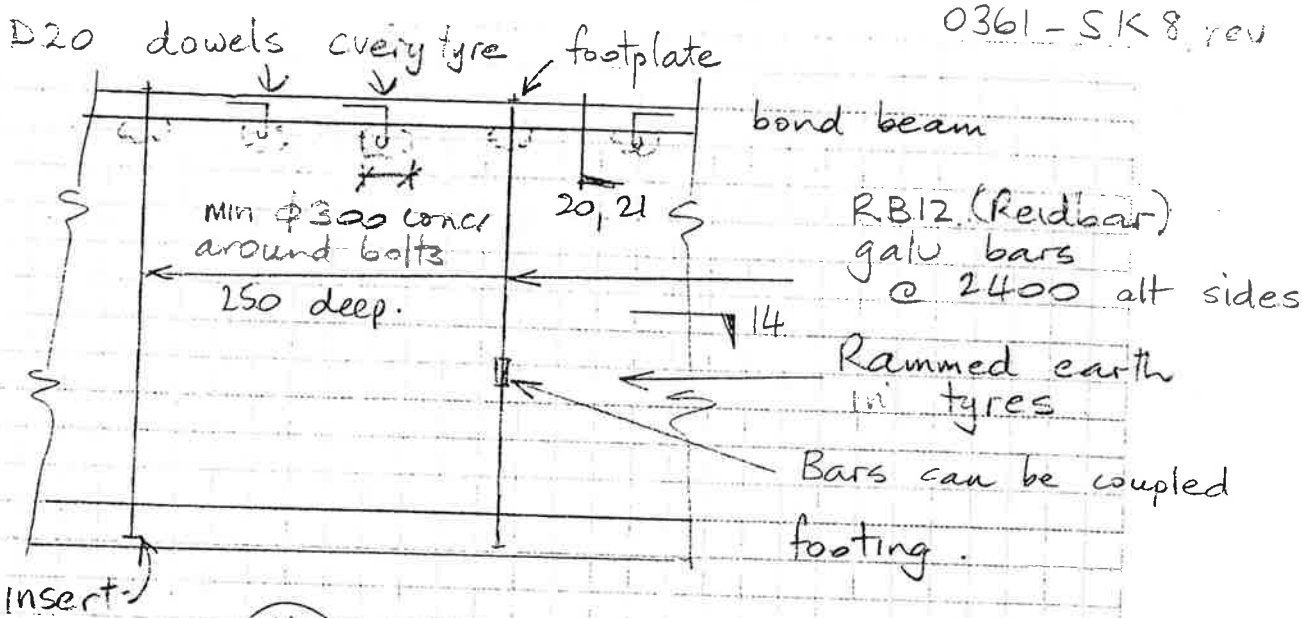
15 Curved Corner footing
1:20

B Gubb
11 Waingaro Rd

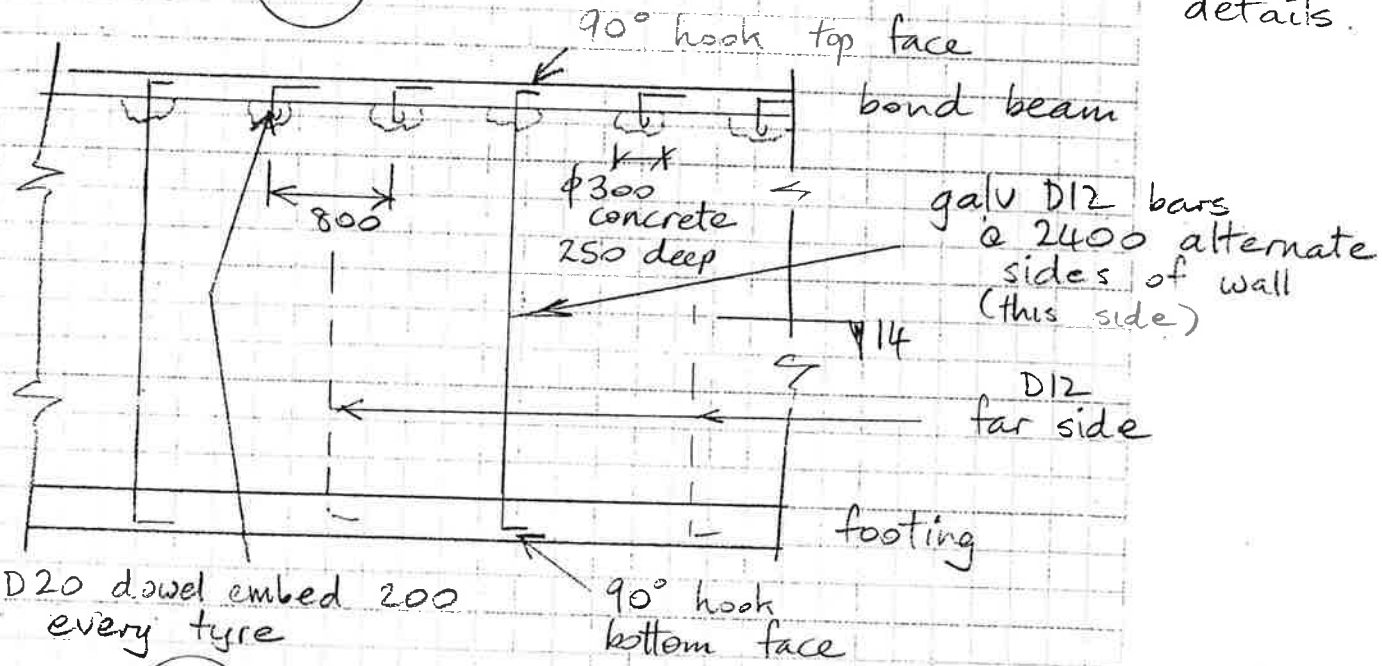
John DALE

7.5.04

0361 - SK8 rev C



16 Wall elevation - Option 1 - as on details.



17 Wall elevation - Option 2

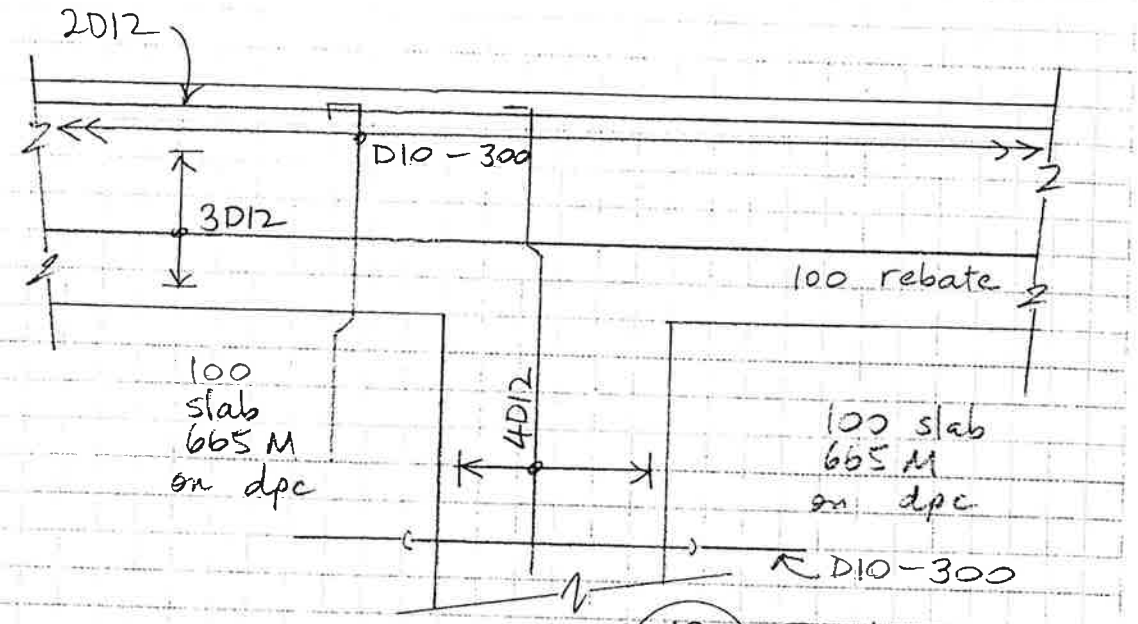
Option 3 - use ungalvanised bars in duct tube grouted with cement grout giving 50 mm cover to the bars
Bars could lap 500 mm

E Gubb

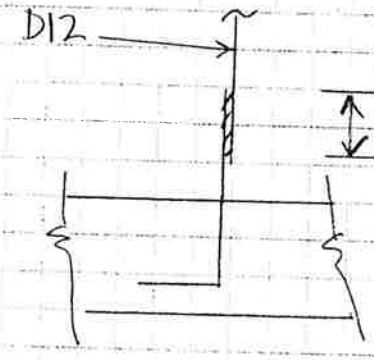
John DALE

7.5.04

0361-SK9 rev C



18 Footing Tee junction 1:20



19 Welded bar splice option 2

either Cold galv paint weld area

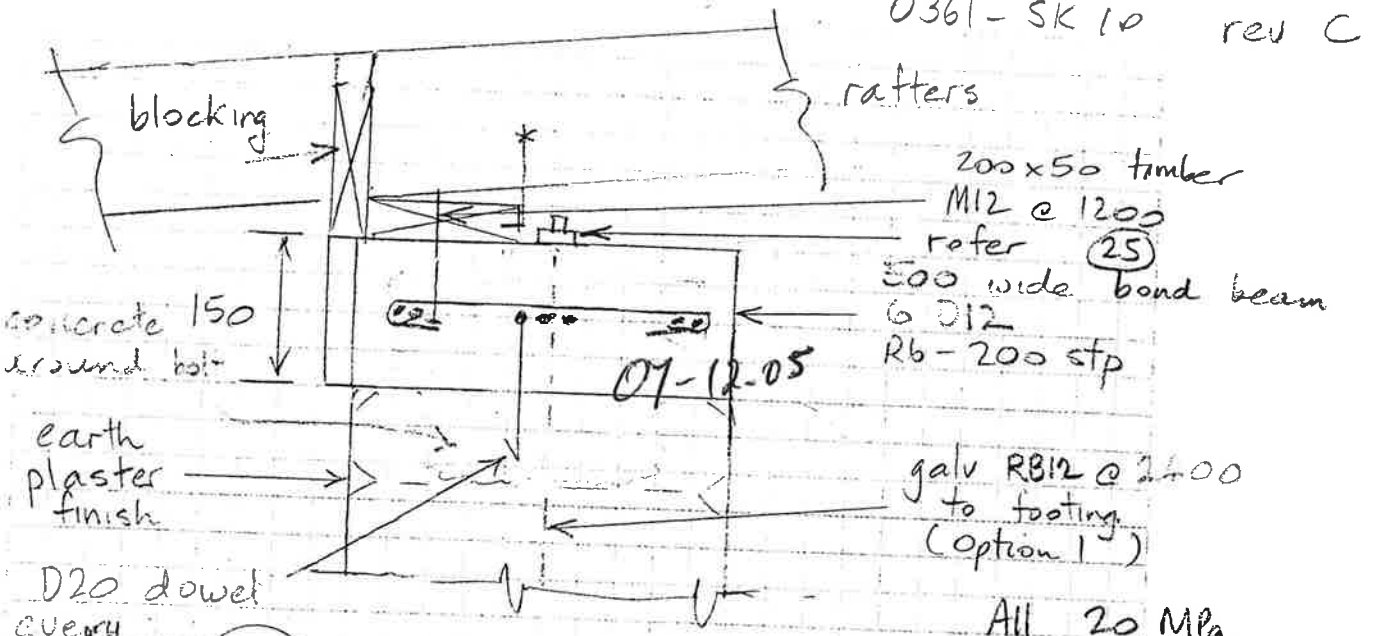
or Wrap weld and bars 50 above & below with 3 layers of Densotape

B Gubb
11 Waungaro Rd
Ngaruawahia

John DALE

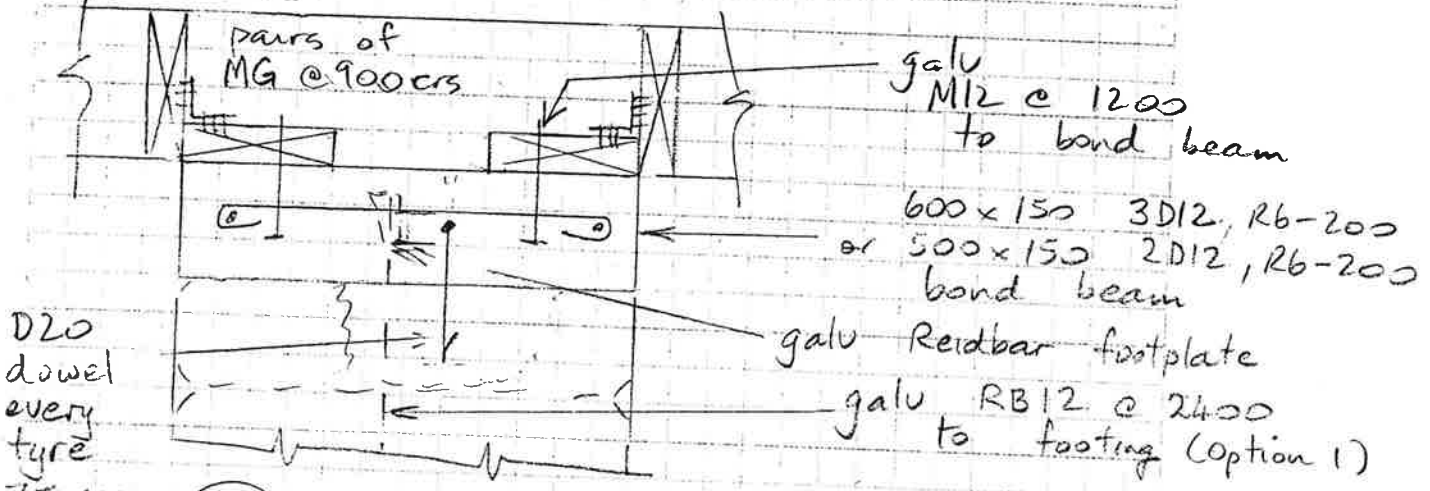
7.5.04

0361 - SK 10 rev C

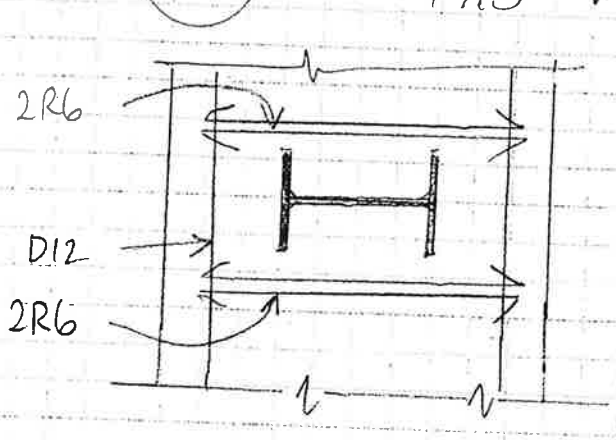


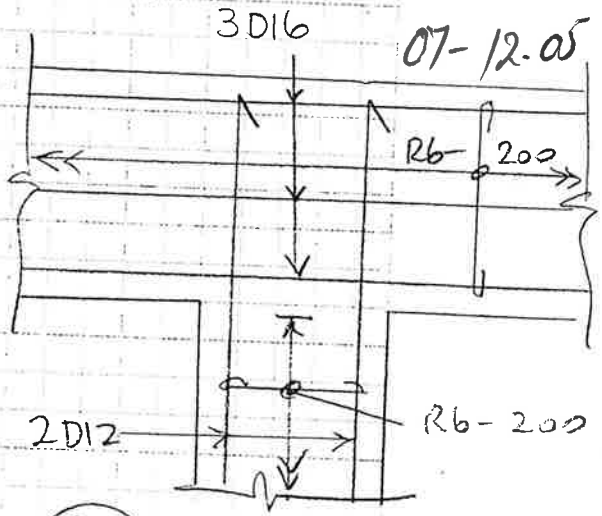
(20) Bond beam grid A
1:10

All 20 MPa concrete



(21) Bond beam grids 1-4
1:10





(22) Column/bord beam
1:10

(23) Bond beam Tee joint
1:20

B Gubb

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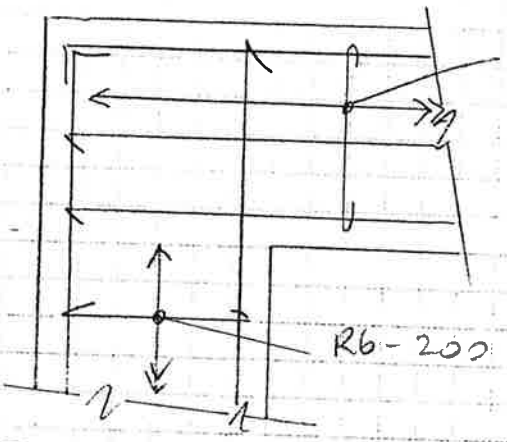
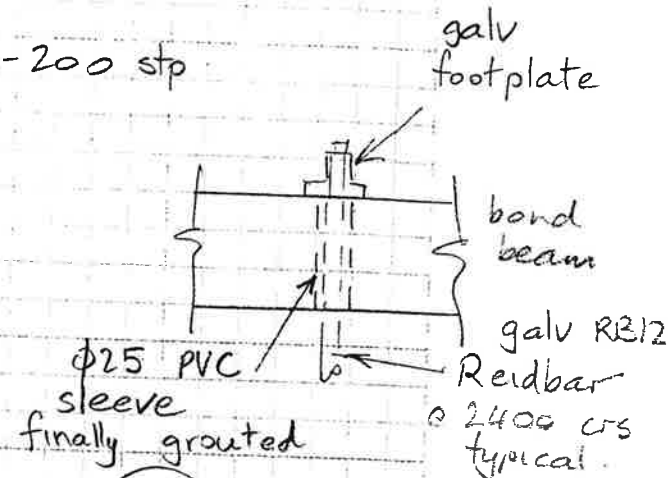
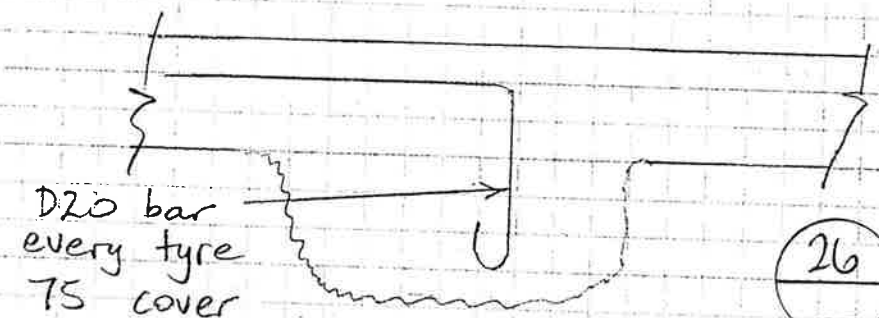
0361-SK11 rev C



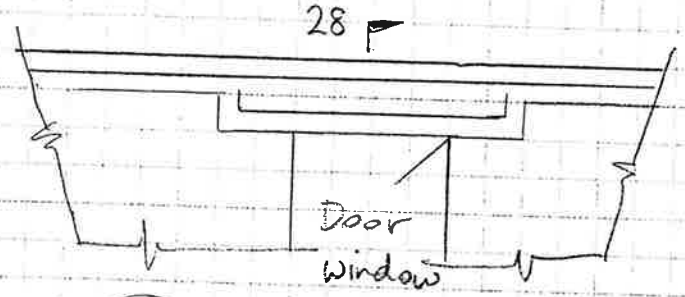
24 Bond beam corner 1:20



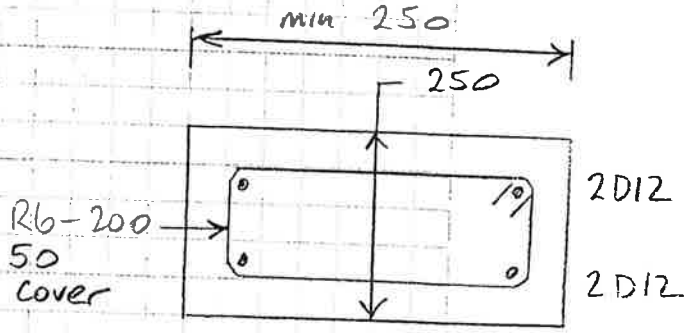
25 Bar termination 1:10 Option 1



26 Dowel bars



27 Door or window



Concrete lintel 1:10 (span up to 2 m)

P Gubb.

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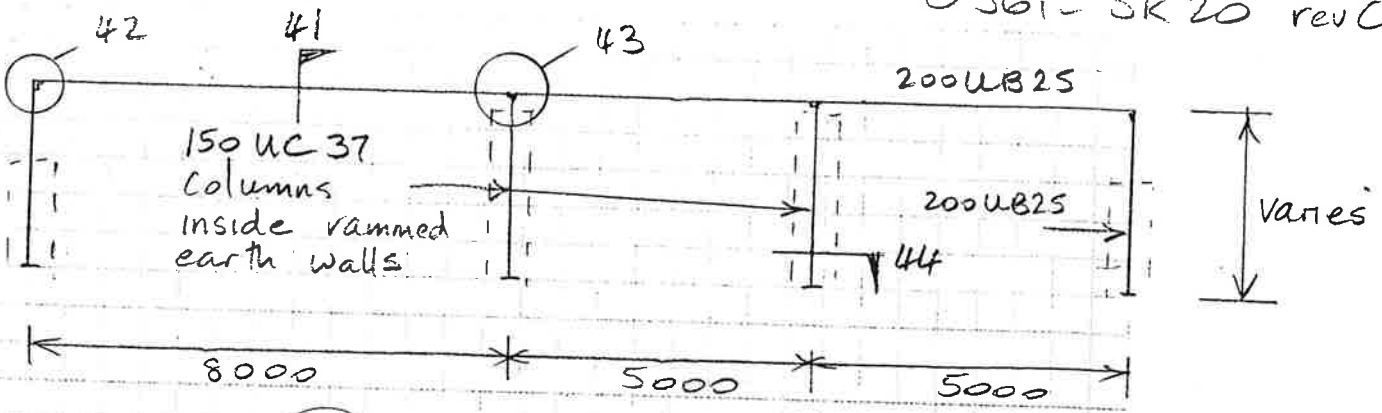
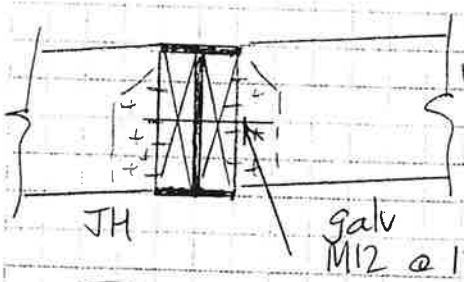
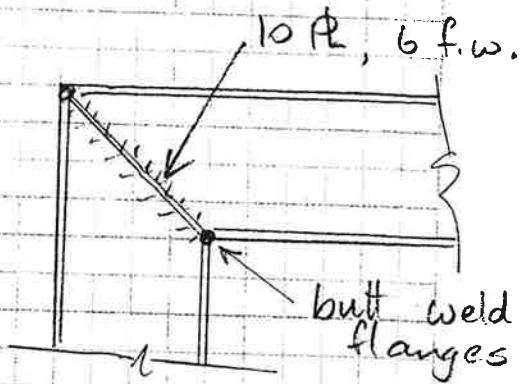


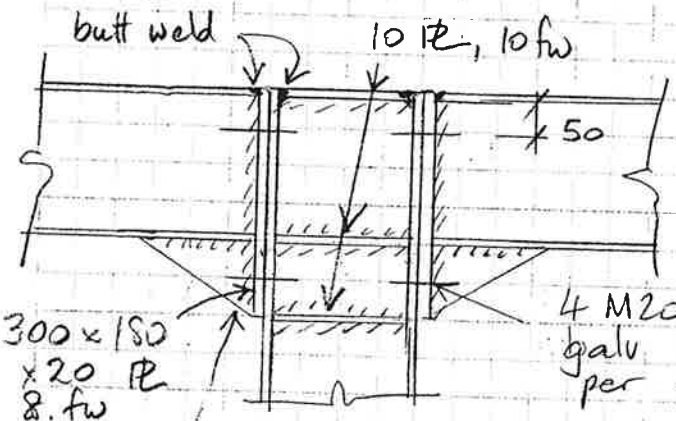
40 Elevation of typ. portal
1:125



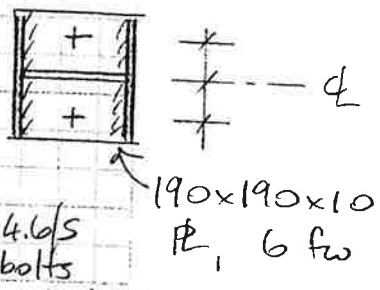
41
1:10



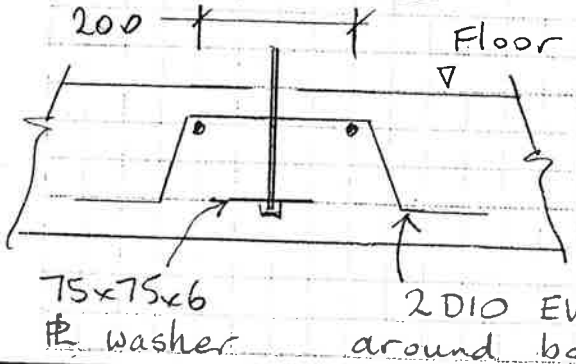
42 Portal knee
1:10



43 Beam/col joint
1:10



44 Baseplate
1:10



45 Holding down bolt detail

B Gubb

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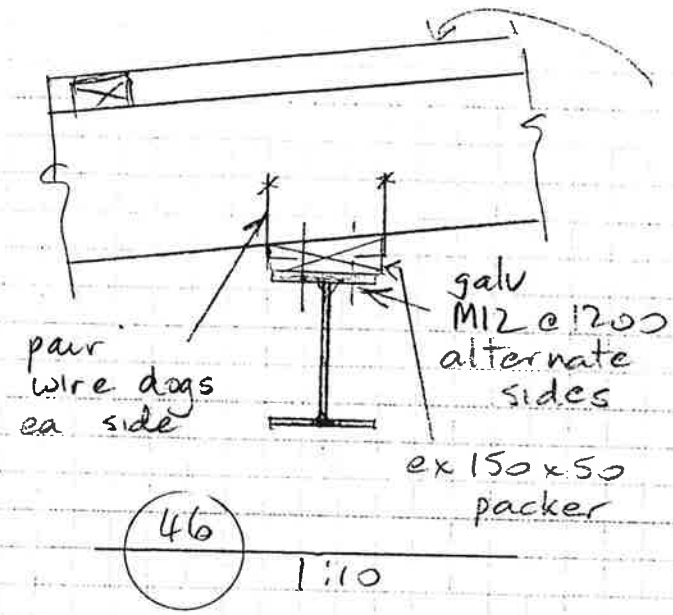
7.5.04

0361 - SK 21 rev C



46
1:10

roofing on building paper on netting

Ceiling battens, insulation and ceiling not shown - follow NZS 3604