



**RILEY  
CONSULTANTS LTD**  
Engineers and Geologists

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Rodney District Council  
c/- Mr Tyl Von Randow  
Te Aute Ridge  
Bethells Beach  
R D 1  
HENDERSON

April 17, 1998

Our Ref: 98136-C

Dear Sir

## **KAUKAPAKAPA COMMUNITY HALL**

The following report has been prepared at the request of Mr Tyl Von Randow on behalf of Rodney District Council. This report summarises our engineering design input for the above proposed development in support of a building consent application to Rodney District Council.

It is proposed to resite the existing community hall and provide ancillary services such as car parking and effluent disposal. Our engineering input has included a geotechnical review, earthworks and underfill drainage design, foundation design, car park pavement design and a feasibility study of effluent disposal options.

### **Geotechnical Review**

The site is located on the southern side of Kaipara Coast Highway, adjacent to Kaukapakapa Primary School. The land is nearly level. It has been proposed to raise the floor of the building above flood level whilst minimizing subfloor crawl space to achieve compliance with the Fire Code by forming a raft of compacted cleanfill beneath the building platform.

A geotechnical report has been prepared by Engineering Geology Ltd (ref 3745 dated 28 January 1998). Subsurface data indicates that the site is underlain by stiff alluvial soils which typically decrease in strength below 1m depth. The report concluded that with the formation of the raft and careful foundation design, it should be feasible to construct the hall on shallow piles. Subsoils are relatively consistent so that differential foundation settlements are likely to be small.

PRINCIPAL: P.B. Riley, B.E., M.Sc. (Rock Mechanics), D.I.C., M.I.P.E.N.Z.

ASSOCIATES: N.R. Fitch, B.E., M.E., N.Z.C.E., M.I.P.E.N.Z. D.R. Tate, B.E., M.I.P.E.N.Z. B.A. Black, B.E. (Hons), N.Z.C.E., M.I.P.E.N.Z. P.B. Lilley, B.E. Civil

Geotechnical & Geological Engineering, Dams & Hydraulic Structures, Hydro Projects, Coastal Engineering.



From our review we would concur with this assessment. Whilst founding conditions are not ideal, the soil profile encountered is likely to be fairly typical to that of the surrounding area. Provided the cleanfill is incorporated into the development, the foundations can consist of relatively standard shallow augered and concrete encased piles and strip footings. From a geotechnical viewpoint the proposed cleanfill raft will have the affect of raising the foundations clear of the lower strength underlying soils.

Subgrade conditions for the proposed carpark at the subject site are also likely to be fairly typical of that of the surrounding area. High groundwater levels (together with the level topography of the site limiting drainage options) are likely to have some long term adverse impact on the subgrade increasing maintenance requirements.

## Earthworks

Imported earthfill will be required to form the raft to support the hall foundations. Earthfill is also recommended to raise the carpark pavement clear of the surrounding low lying ground.

The imported earthfill will have to be clean (ie free of building rubble etc, topsoil and other organic matter) and compacted to an engineered standard. The fill should be compacted to a low air void ratio (5%) to minimise the risk of softening due to a seasonal increase in water content from a rise in groundwater level. A standard earthworks specification is appended.

The material could either be sourced from other earthwork operations in the district or alternatively the 'Redvale fine fill' supplied, transported and placed by Redvale Lime Co Ltd. The suitability of the fill should be reviewed by Riley Consultants Ltd at its source.

Earthwork operations should be undertaken in dry weather conditions, in summer. The hall raft should be formed immediately prior to the scheduled transporting of the hall structure.

Underfill drainage will be required particularly beneath the hall raft to limit the groundwater rise within the founding fill material. Drainage options are restricted by the flat nature of the site and limited falls to the outlet table drains.

The underfill drainage layout beneath the raft is detailed on drawing 98136-1 attached. Due to the proximity of the drainage to the foundations it is most important that our design intentions are strictly followed.

## Foundations

As previously outlined the geotechnical investigation found that the site comprised relatively weak soils, and accordingly our approach has been to build a raft of 0.6m of compacted filling on which to found the building. This solution will also provide benefits to the site in having the floor of the building raise above flood level, with the additional benefit if minimizing the subfloor crawl space to achieve compliance with the Fire Code.

In designing the bearer and foundation system, the Building Code requirement of 5kPa live load has been used, together with the adoption of foundation pressures which should not realise undue settlement of the building by overload of the weaker materials below the engineered filling. We have been informed that the existing bearers (75 x 100mm @ 1.72m centres) are in good condition and will be retained. Calculations indicate that the existing bearers can only accommodate approximately 2kPa live load. We would therefore recommend that they be stiffened. The stiffened member will also allow greater load transfer to adjacent piles, minimizing the risk of differential settlement.

The foundation design details are appended on the attached sketch drawings and summarized below:

- The internal bearers can span between 125 x 125 senton poles concrete encased in 450mm deep 350mmØ augered holes at 1.5m centres throughout, except that the line of piles under the point loads from columns supporting the main roof require augered holes of 450mmØ.
- The stiffening of the existing internal bearers can be achieved by spiking an additional 75 x 100mm continuous timber member to the underside of the existing bearers.
- Perimeter loads are taken by a low level reinforced masonry foundation wall and shallow strip footing.

The following details should also be noted:

- Piles should also be positioned beneath point loads.
- Joints of the existing and new bearers should be offset from each other and stiffened with nail plates at mid span and over pile supports. Joins between new bearer timbers should be positioned over the piles.
- A representative from RCL should be on site to examine the existing building before it is laid on its new foundations.

Calculations, sketches and Producer Statement - Design are appended.

## **Carparking**

As previously outlined imported earthfill is recommended to raise the carpark pavement clear of the surrounding low lying ground to reduce the effects of groundwater on the subgrade and pavement.

Typically we would recommend that 300mm - 700mm (600mm average) depth of compacted earthfill be placed over the stripped natural ground and graded to the road. The pavement design should consist of 200mm of GAP 40 basecourse and a two coat chip seal to RDC standards. Typical carparking construction details including underfill and surface drainage control are shown on drawing 98136-2 attached.

## **Effluent Disposal**

We have undertaken a feasibility study of the proposal for the community hall to connect into the neighbouring school's effluent treatment and disposal system.

Our study concluded that it is considered feasible for the hall to connect into the schools system. The nature of the hall and school are typically compatible for combined treatment and disposal. Additional flows from the hall must not compromise the performance of the existing schools system, its resource consent conditions or its design roll.

Our design philosophy would be to store the hall effluent production, partially releasing on weekdays with higher volumes released on weekends.

It will be necessary to apply to the Auckland Regional Council for a variation to the schools current resource consent.

## **Conclusions and Recommendations**

The proposed development is considered suitable for the conditions at the site provided the following recommendations are followed:

- A 600mm thick compacted earthfill raft should be formed to support the hall foundations. Earthworks and underfill drainage details are appended to this report.
- Hall foundations will consist of relatively standard shallow internal augered and concrete encased piles with a perimeter strip footing. Foundation details are appended.

- The carpark area should also be raised with the placement of compacted earthfill. Construction details are appended.
- A feasibility study has concluded that the hall could connect into the neighboring school's effluent treatment and disposal system. It will be necessary to apply to the ARC for a variation to the school's current resource consent.

## Limitation

This report has been prepared solely for the benefit of Rodney District Council as our client with respect to the brief. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties sole risk.

Recommendations and opinions in this report are based on data from limited test positions. The nature and continuity of subsoil conditions away from the test position are inferred and it must be appreciate that actual conditions could vary considerably from the assumed model.

During excavation and construction the site should be examined by an Engineer or Engineering Geologist competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based upon this report.

Riley Consultants Ltd would be pleased to provide this service to Rodney District Council and believe that the project would benefit from such continuity. In an event it is essential Riley Consultants Ltd are contacted if there is any variation in subsoil conditions from those described in the report as it may affect the design parameters recommended in the report.

Yours faithfully

**RILEY CONSULTANTS LTD**

Prepared by:



B Black  
Associate, Registered Engineer

Reviewed by:

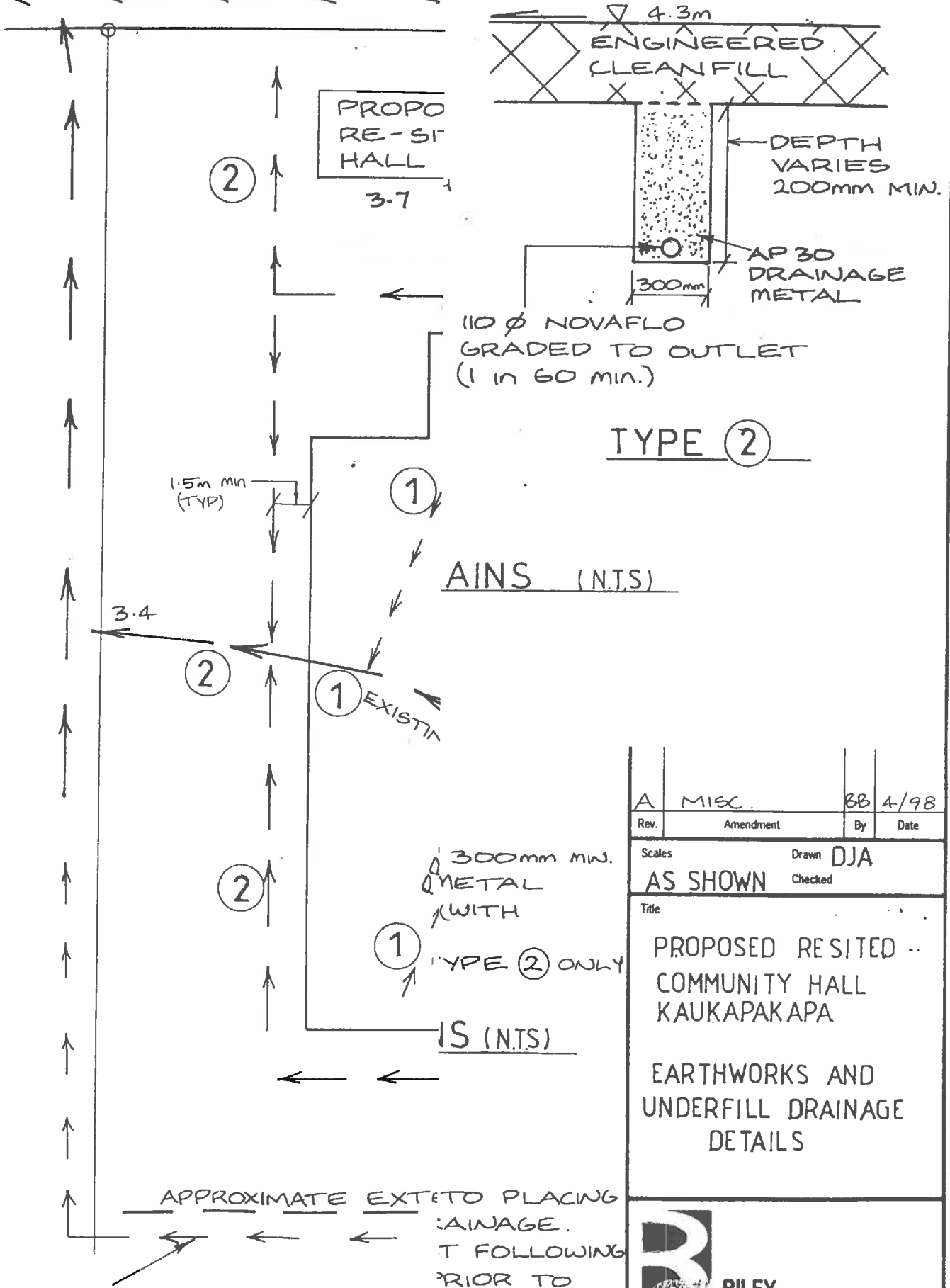


N. R. Fitch  
Associate, Registered Engineer

BB/SB:Report/98136-C/April 17, 1998

KAIPARA COAST

1000  
WATER



Rev.	A	MISC.	BB	4/98
		Amendment	By	Date

Scales AS SHOWN  
Drawn DJA  
Checked

Title  
PROPOSED RESITED COMMUNITY HALL  
KAUKAPAKAPA

EARTHWORKS AND UNDERFILL DRAINAGE DETAILS



RILEY CONSULTANTS LTD  
Engineers and Geologists

Date  
MAR 1998

Drawing No  
98136-1A

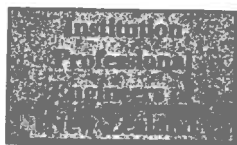
FORM SURFACE CUT-OFF DRAIN & GRADE TO EXISTING OPEN CHANNEL

SITE IN EARTHWORKS



Graphic Scale (m)

ROUND LEVEL



P.I.M. No.....

Building Regulation Clause(s).....

## PRODUCER STATEMENT - PS1 - DESIGN

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

ISSUED BY: C. SLIGO FOR RILEY CONSULTANTS LTD  
(Suitably qualified Design Professional)

TO: RODNEY DISTRICT COUNCIL  
(Owner)

TO BE SUPPLIED TO: RODNEY DISTRICT COUNCIL  
(Territorial Authority)

IN RESPECT OF: FOUNDATIONS FOR RELOCATED HALL  
(Description of Building Work)

AT: KAUKAPAKAPA  
KAIPARA COAST HIGHWAY  
(Address)

..... DP ..... SO .....  
RILEY CONSULTANTS has been engaged by RODNEY D.C.  
(Design Firm) (Owner/Developer/Contractor)

to provide FOUNDATION DESIGN services in respect of the  
(Extent of Engagement)

requirements of Clause(s) B1, VMI of the Building Regulations 1992 for

☐ All

☒ Part only as specified

of the building work. The design has been prepared in accordance with B1, VMI  
(verification method(s)/acceptable solution(s))

(respectively) of the approved documents issued by the Building Industry Authority and the work is described on

TSL VAN RANDOW drawings titled KAUKAPA HALL RELOCATION  
(Design Firm)

and numbered 91/179/4, 5, 6 and the specification and other documents according to which the building is proposed to be constructed.

As an independent design professional covered by a current policy of Professional Indemnity Insurance to a minimum value of \$200,000, I BELIEVE ON REASONABLE GROUNDS that subject to:

(i) the site verification of the following design assumptions EXAMINATION OF EXCAVATIONS BY GEOTECHNICAL ENGINEER

and (ii) all proprietary products meeting the performance specification requirements, the drawings, specifications, and other documents according to which the building is proposed to be constructed comply with the relevant provisions of the building code.

C. Sligo  
(Signature suitably qualified Design Professional)

NZCE M. IPENZ  
(Professional Qualifications)

P.O. Box 100 253 N.S.M.C.  
(Address)

Date 4.5.98

ERB/AERB Reg No. 4587

Member ACENZ ☐

IPENZ ☒ NZIA



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FAX No. 489-7873

Job No: 98136 Page: 1 of 3 Pages

Project: Karikarika Hall.

Calc: ~~CAS~~ Date: 18.3.98

Check: ~~JS~~ Date: 4/5/98

Description

## FOUNDATION DESIGN.

### LOADS

Roof + ceiling

DL

0.5 (KPa)

UL

0.25

Floor

0.3

(Hall)

5.00

(Atrium)

3.00

N2S4203

5.2, 5.6

### MAIN HALL AND STAGE

$$DL + UL = 5.3 \text{ KPa (working)}$$

$$\text{Beaver spacing} = 8.59/5 = 1.72 \text{ c/c}$$

$$\text{Load} = 5.3 \times 1.72 = 9.1 \text{ KN/m}$$

Design pressure 150 KPa bearing for piles (crowd loads)

$C_u = 75 \text{ KPa}$

$$350 \phi \text{ pile } P = 150 \times \pi/4 \times 0.35^2 = 14.4 \text{ KN}$$

$$\text{Spacing} = 14.4/9.1 = 1.58 \text{ c/c}$$

← 350  $\phi$  piles @ 1500 c/c

$$\text{Beaver } M = 9.1 \times 1.5^2/8 = 2.57 \text{ KNm}$$

$$\text{Existing beaver} = 100 \times 75 \text{ (on Act)}$$

$$\text{Capacity } M = 0.75 \text{ KNm } (K_1 = 1.4 \text{ for crowd loads})$$

$$\text{Additional } 100 \times 75 = 2.5 \text{ KNm total moment capacity}$$

Continuity with restrict deflection, so **OK**

← Fix additional 100  $\times$  75 to existing beaver





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Job No: 98136 Page: 2 of 3 Pages

Project: Karaka Karaka Hall

Calc: CAS

Date:

Check: ~~SS~~

Date: 4/5/98

Description

Piles carrying roof and beam loads

$$\text{Roof (DL only)} = 0.5 \times (9/2 + 4.4/2) = 3.3 \text{ KN/m}$$

$$\text{beam wt} = 0.3$$

$$3.6 \text{ KN/m}$$

$$\text{Roof Load} = 3.6 \times 4 = 14.4$$

$$\text{Floor Load} = \left[ \left( 3.3 \times \frac{3}{2} \right) + \left( 5.3 \times \frac{7}{2} \right) \right] \times 1.25 = 9.7 \text{ KN}$$

$$\text{Pile load} = 14.4 + 9.7 = 24.6 \text{ KN}$$

$$\leftarrow 450\phi \text{ pile } P = 150 \times \frac{\pi}{4} \times 0.45^2 = 24 \text{ KN (working capacity)}$$

Acceptable

EXTERNAL WALLS

$$\text{Roof Load} = 3.6 \text{ KN/m}$$

$$\text{Wall } 0.4 \text{ kPa} \times 3 \text{m} \times \text{stud} = 1.2$$

$$\text{Floor } 3/2 \times 5.3 \text{ kPa} = 7.9$$

$$\text{OW } \frac{(4.4 \times 0.6)}{2.6} + \frac{(24 \times 0.2 \times 0.3)}{1.5} = 4.1$$

$$\leftarrow 16.8 \text{ KN/m}$$

$$P = 16.8 / 0.3 = 56 \text{ kPa}$$

OK

$\leftarrow$  200 x 300 wide strip footing 2M16 with R6 @ 600



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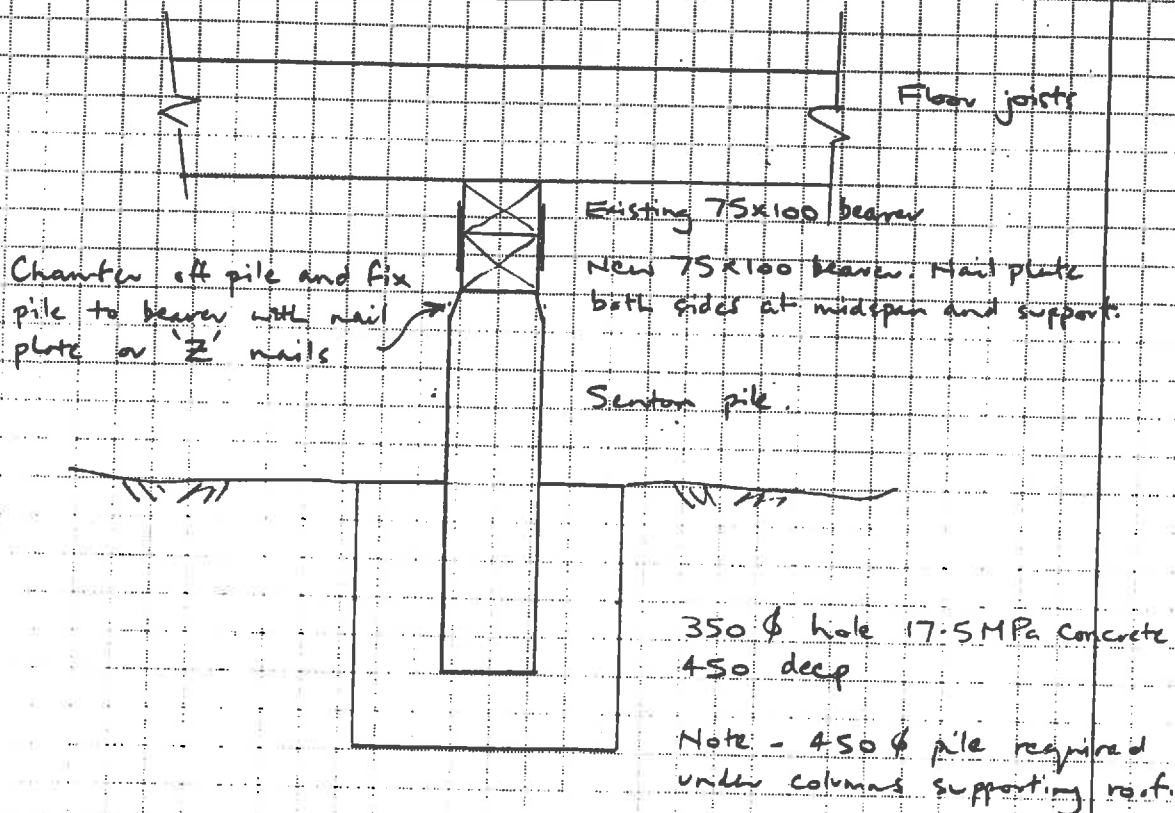
2 FRED THOMAS DRIVE  
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Job No:	98136	Page:	3	of	3	Pages
Project:	Kaukapakepa Hall					
Calc:	CASS	Date:				
Check:	RS	Date:	4/5/98			

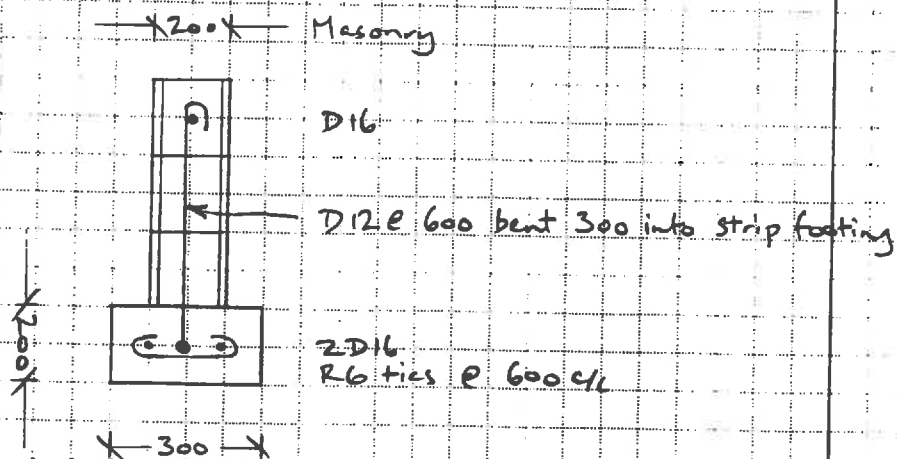
Description

## SKETCH DETAILS

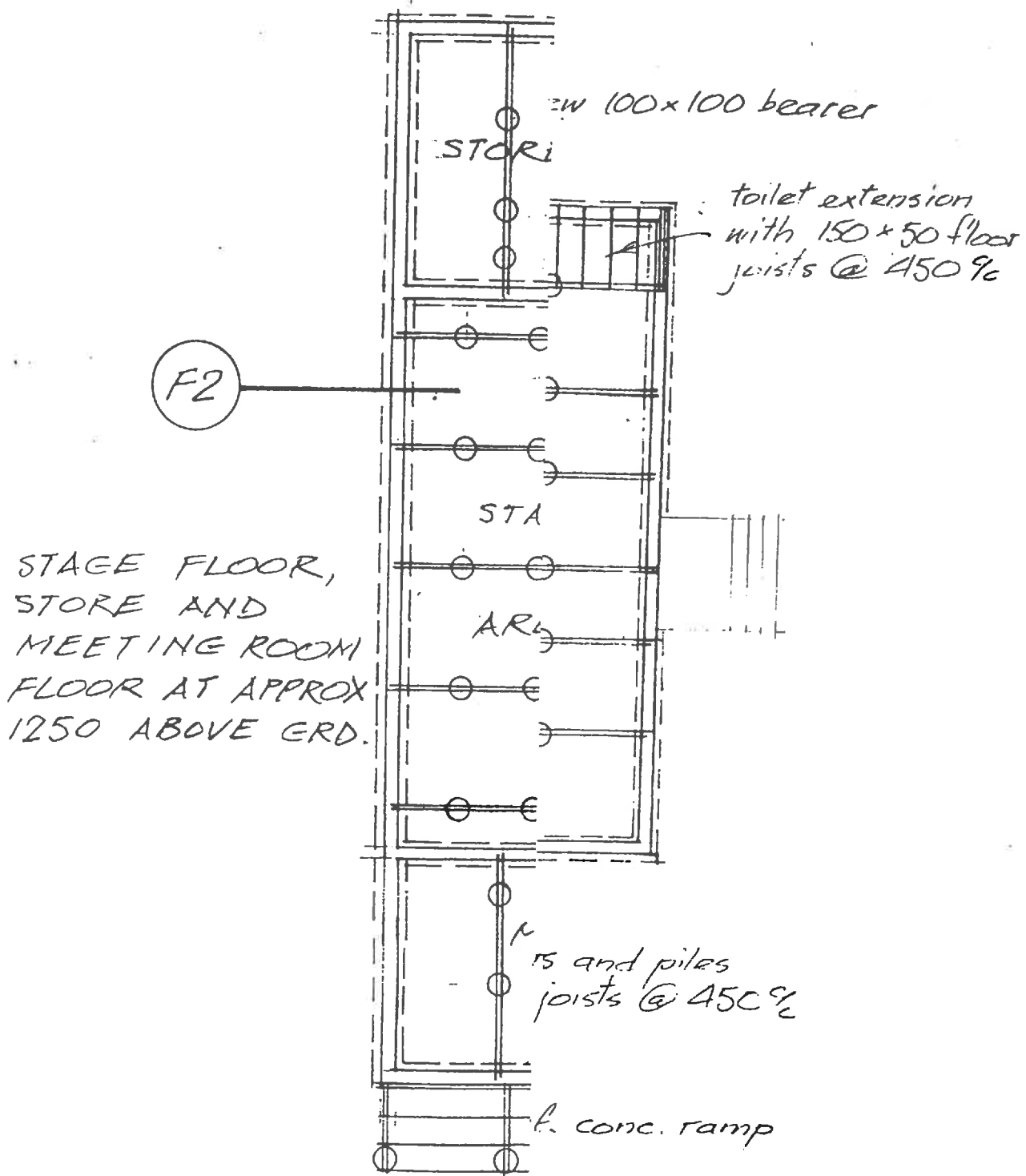
### BEAMER / POLE CONNECTION



### PERIMETER WALL



ck fdn. wall



STAGE FLOOR,  
STORE AND  
MEETING ROOM  
FLOOR AT APPROX  
1250 ABOVE GRD.

lower this

97/179/4

15/3/98

KAUKAPAKAPCT

TYL VON RANDOW  
ARCHITECT

B. ARCH  
ANZIA

# KAUKAPAKAPA COMMUNITY HALL

RCL Ref: 98136-D

## SPECIFICATION

### BULK EARTHWORKS

#### SECTION 20

##### **20.0 SCOPE**

This section of the Specification covers the clearing of site, stripping of topsoil, removal and replacement of unsuitables, cut to waste, controlled compacted fill, and any other incidental work in accordance with this Specification.

##### **20.1 CLEARING**

The Contractor shall remove all vegetation from the site of earthworks, and shall clear all obstructions, etc, from the site of works. The Contractor shall direct his operations to avoid clearing vegetation beyond the designated site of works. No trees or bush shall be cleared without approval from the Engineer.

##### **20.2 GENERAL REQUIREMENTS FOR EARTHWORKS**

###### **20.2.1 Surface Drainage Control**

All earthworks shall be carried out in the dry. Both cut and fill areas shall be sloped adequately during construction so that they do not pond water and temporary drains shall be provided as necessary to ensure the effective removal of stormwater from the areas of operation into the site drainage system.

###### **20.2.2 Earthworks Tolerances**

All cut and fill work shall be carried out to the lines and levels and grades shown on the drawings or otherwise established by the Engineer. Cut and fill batters shall be of neat appearance to the eye and free of abrupt irregularities.

Profiles prior to trimming shall be correct within the following tolerances provided that no areas which might pond water will be permitted.

Road Subgrades	-0 + 50mm
Cut and Fill Batters	-0 + 100mm

### **20.2.3 Preservation and Maintenance**

The Contractor shall preserve and maintain all earthworks throughout the contract in accordance with the relevant standard as specified and shall make good at no extra cost to the Principal any earthworks which have deteriorated below the minimum standards for whatever reason.

### **20.2.4 Overexcavation**

The Contractor shall direct his operations to avoid excavating beyond the designated profiles. Any overexcavation beyond these profiles carried out without the written instruction of the Engineer shall be made good to the directions of the Engineer with compacted fill meeting the requirements of this Specification at the Contractors own expense.

## **2.3 REMOVAL OF TOPSOIL**

Earthwork areas shall be stripped to remove all turf and organic topsoil to depths designated by the Engineer ahead of or during the stripping operations.

Stripping shall also cover picking up any old topsoil stockpiles and any buried topsoil detected during the course of the works. The depth shall be sufficient to remove all material considered unsuitable as fill or unsuitable to remain beneath fill but will not necessarily extend to the full depth of organic stained soil. Topsoil material shall be stockpiled for later use in the designated area or spread beyond the area of the bulk earthworks as directed by the Engineer.

## **20.4 BULK EXCAVATION**

All excavation shall be carried out to the lines and levels shown on the drawings or as otherwise established by the Engineer. It is intended that all excavated spoil except that considered unsuitable be used for filling. Suitable fill material shall be stockpiled in the designated area or as directed by the Engineer. Prior to trimming the formation to final grades, the profile shall be within a tolerance of -0 + 150 mm for subgrades. On completion of the bulk excavation inspection and testing of the subgrade shall be performed by the Engineer to determine the condition of the subgrade.

## **20.5 UNSUITABLE MATERIAL**

The term unsuitable material shall apply to weak deposits and organic material which because of their inherent nature cannot be satisfactorily reconditioned and are not suitable for use as controlled compacted fill. Unsuitable material shall be removed within the limits specified by the Engineer, using whatever equipment is required and disposed of.

## **20.6 USE OF MATERIALS**

All material other than topsoil and those classed as unsuitable by the Engineer shall be used in permanent fills. The Contractor shall direct his operations to avoid contamination of this material.

## **20.7 WATER IN EXCAVATION**

The Contractor shall keep the excavation free of water at all times and shall provide and use in the work all necessary pumps, and every appliance and means necessary for the purpose to the satisfaction of the Engineer. Sumps formed for the purposes of dewatering shall be kept clear of the foundations. When finished with, they shall be backfilled and compacted in layers with suitable fill to the approval of the Engineer.

## **20.8 INSPECTION PRIOR TO FILLING**

Before fill is placed in any area, the Engineer shall be notified so that he may inspect the stripping and/or removal of unsuitable materials to see that this prior work meets with the specified requirements. No filling shall be undertaken until inspections have been made and the Engineer has approved the commencement to fill.

## **20.9 SUBEXCAVATION**

Where the foundation material in areas to be filled has an in-situ shear undrained strength of less than 80 kPa, it shall be excavated, blended with other materials and used as fill.

## **20.10 UNDERFILL DRAINAGE**

The underfill drainage system shall be installed as and where shown on the drawings or otherwise established by the Engineer prior to the commencement of filling operations. The subsoil drains and collector pipe shall be uniformly graded to ensure they do not hold water and evenly jointed to ensure unimpeded flow.

### **20.11 a) IMPORTED FILL**

Compacted hardfill shall consist of a suitable clean GAP65 metal. Imported hardfill shall be placed in the base of the subexcavated area prior to the placement of cut to compacted fill. Hardfill shall be compacted in even layers not exceeding 200mm loose depth with a minimum of six overlapping passes of a Sakai - SW70 vibrating roller or approved equivalent.

### **b) EARTHFILL**

Imported earthfill material shall be clean, ie free of debris and organic matter and shall be suitable to meet the requirements fo 20.12. The engineer shall approve the material at source prior to delivery to site.

## **20.12 COMPACTED EARTHFILL**

### **20.12.1 Conditioning and Spreading**

Fill shall be conditioned to an appropriate average water content prior to compaction. Conditioning may require the addition of water to excessively dry material, drying of excessively wet material, and/or thorough blending of materials of varying water content.

Fill material shall be broken into fragments of less than 100 mm, be spread uniformly in horizontal layers of less than 200 mm thickness.

New fill shall not be spread over surfaces which have deteriorated from the specified standard, and where necessary, the old surface shall be scarified and wetted or dried before placing new fill. Where fill material is spread against sloping surfaces the sloping surface shall be excavated or "benched" such that the vertical height of the "bench" is at least twice the thickness of the compacted fill layer to ensure proper keying of the fill.

## 20.12.2 Compaction

Specialised rollers of protruding foot type, shall be used for compaction of fill and equipment used in transportation and spreading will not be accepted. Compaction plant shall cover the entire area of each layer of fill and give each layer a uniform degree of compactive effort. Each layer shall receive at least four passes of the plant even if strength requirements are met with less than four passes. Surfaces of filled areas shall be sealed with appropriate plant when rain is impending. The Contractor shall interrupt his operations as necessary to permit the Engineer to carry out with safety, control tests on the fill.

The combined operations of spreading and compacting shall be undertaken using very systematic and properly managed procedures to the satisfaction of the Engineer, to ensure that each loose layer received the minimum four passes of the plant before further loose material is spread.

Notwithstanding the strength requirements specified for compacted fill, the Contractor shall undertake all fill work and trafficking over fill so that deflections of the fill surface under the passage of fully laden earthmoving plant are visibly small or non-existent and entirely of a fully recoverable elastic nature. Rutting of compacted fill caused by the passage of plant will not be permitted.

## 20.12.3 Fill Standards

All bulk fill shall be compacted to achieve the nominated minimum undrained shear strength and maximum tolerated voids as defined air voids as defined and stated herein.

Undrained Shear Strength kPa		Air Voids %	
Absolute Min.	10	Absolute Max.	10
Average Test	Consecutive Average	Average Test	Consecutive Average
100 kPa	Not less than 150 kPa	7%	5%



#### **20.12.4 Control Testing**

Testing to confirm that fill standards have been met will be undertaken by the Engineer but the Contractor is encouraged to conduct his own tests: the Engineer cannot provide an advisory service.

#### **20.13 SUBGRADE PREPARATION**

On completion of bulk earthwork operations the subgrade shall be trimmed and shaped to the levels and grades shown on the plans allowing for the thickness of basecourse aggregate.

#### **20.14 SUBGRADE**

The subgrade should be proof rolled to identify any soft areas. Any soft areas identified should be excavated to a minimum depth of 0.5m and backfilled with an approved compacted aggregate such as GAP65 or clean ROP (Run-of-Pit).

#### **20.15 SITE SHAPING**

Minor recontouring, shaping and trimming of the ground surface of the site outside the area of bulk earthworks shall be undertaken as directed by the Engineer. Work shall be confined to within the existing topsoil layers. The Contractor shall direct his operations to ensure that areas do not pond water and that a minimum depth of topsoil of 100mm is maintained over the site. After shaping the ground shall be sown with an appropriate seed mixture.

#### **20.16 TOPSOILING**

On completion of all other works, stockpiled topsoil shall be spread and compacted to a depth of 150mm over all cuts and fill batters as directed by the Engineer. After topsoiling, the batters shall be sown with a seed mixture containing equal parts by weight of perennial rye grass and white clover. The mixture shall be sown at a rate of 1 kg to 60 sq m area.