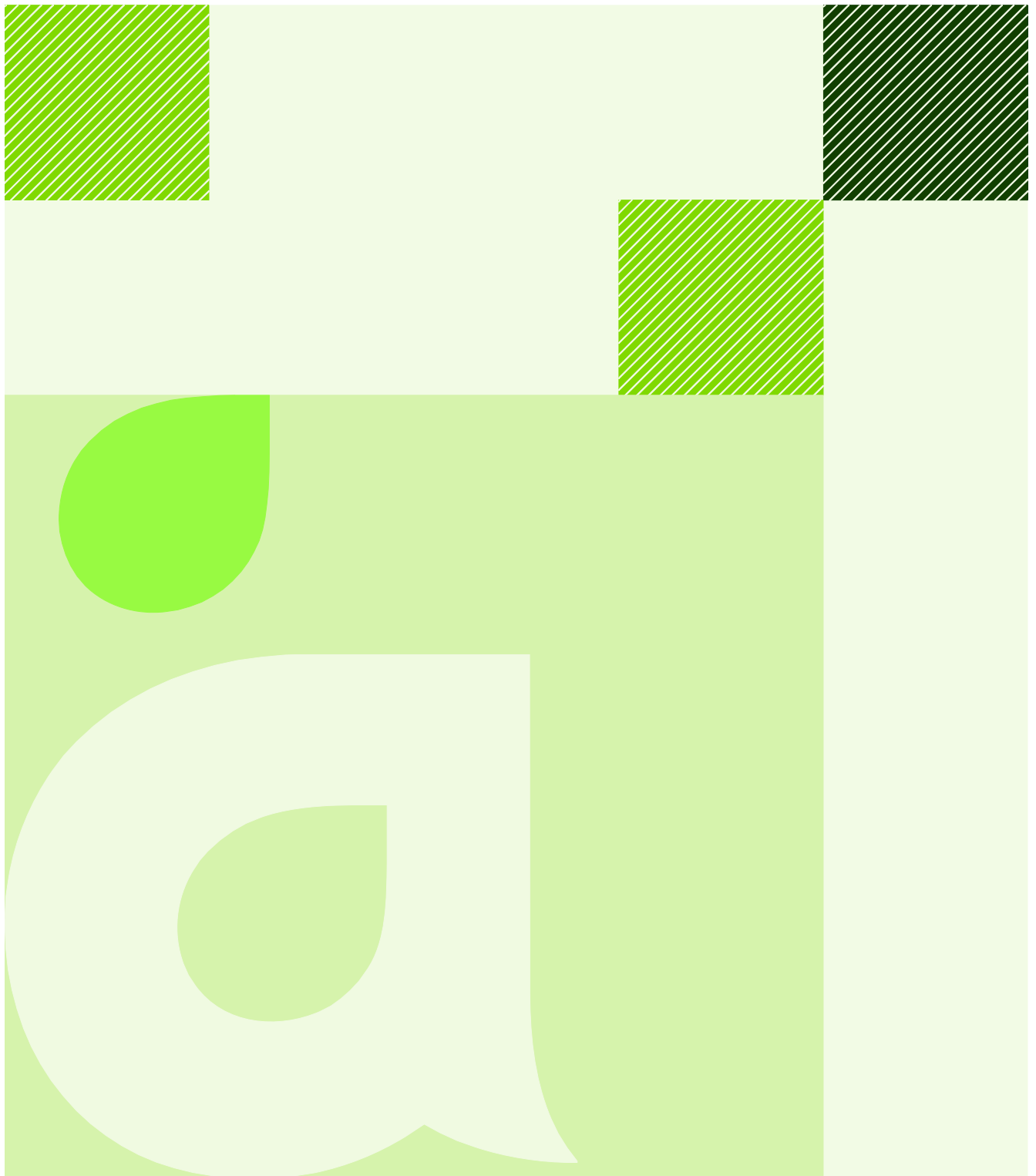




Project: Lookout Point Fire Brigade
Detailed Seismic Assessment

Reference: 233791

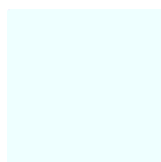
Prepared for: New Zealand Fire Service

Revision: 0

15 March 2013



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Author Signature		Approver Signature	
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Lookout Point Fire Brigade

Date | 15 March 2013

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2	Building Description	2
3	Assessment Methodology	3
4	Assessment Results	4
5	Seismic Improvement Requirements	6
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Appendices

Appendix A

Building Plan

Appendix B

Site Photographs

Appendix C

Concept Structural Improvement Sketches

Appendix D

Cost Estimate Summary



1 Introduction

New Zealand Fire Service (NZFS) has engaged Aurecon to undertake a Detailed Seismic Assessment of the **Lookout Point Fire Brigade Building** located at 184 Mornington Road, Kenmure, Dunedin.

This assessment has been commissioned as part of a New Zealand Fire Service nationwide Earthquake Strengthening Project for selected Fire Brigade Buildings.

The assessment was undertaken to determine the building's %NBS (New Building Standard) seismic lateral capacity when considered as an Importance Level (IL) 4 Building (Emergency Service Facility). The NZFS has set criteria that Fire Brigade buildings should achieve a minimum of 67% NBS IL4.

This report summarises the findings of this seismic assessment and what structural improvements should be considered to increase the buildings %NBS seismic capacity to satisfy NZFS minimum criteria. Where structural improvements have been determined to be necessary cost estimates for the installation of these improvements have been provided. This report does not address other Building Code requirements such as Fire Safety and Accessibility.

2 Building Description

Aurecon staff have reviewed available design documentation and visited the building to confirm its structural system. In principle the Lookout Point Fire Station consists of three wings; a two storey reinforced concrete frame structure South Wing; a two storey brick structure over a reinforced concrete basement West Wing; and a two storey brick structure East Wing.

The following table summarises the key features of the building from a structural perspective.

Date of Design/Construction	Original design drawings are dated 1951. Minor alterations were made in 2000.
Gross Floor Area	750 m ² (includes basement level, ground floor and first floor)
Foundation System	Reinforced pad footings under columns. Reinforced concrete strip footings around the building perimeter and under internal walls. Reinforced concrete basement walls.
Wall/cladding system	Double skin unreinforced masonry brick walls
Roof System	The roof structure of the main station building is reinforced concrete slab on reinforced concrete beams. The roof structure of the residential buildings is a concrete tiled roof on timber battens on timber purlins. Timber ceiling joists with fibrous plaster ceiling.
Lateral Load Resisting System – Longitudinal direction	Reinforced concrete moment resisting frames provide lateral support to the South Wing. Double skin unreinforced brick walls with reinforced concrete bond beams provide lateral support to West Wing down to the ground floor concrete slab. Reinforced concrete basement walls provide lateral support down to foundations. Double skin unreinforced brick walls with reinforced concrete bond beams provide lateral support to the East Wing down to foundation level.
Lateral Load Resisting System – Transverse Direction	Reinforced concrete moment resisting frames provide lateral support to the South Wing. Double skin unreinforced brick walls with reinforced concrete bond beams provide lateral support to the West Wing down to the ground floor concrete slab. Reinforced concrete basement walls provide lateral support down to foundations. Double skin unreinforced brick walls with reinforced concrete bond beams provide lateral support to the East Wing down to foundation level.

A plan drawing of the building is included in Appendix A.

A selection of photos of the building is included in Appendix B.

3 Assessment Methodology

The Assessment of the building involved performing the following tasks:

- Reviewing available design documentation
- Inspecting the building to undertake site measurements and confirm the building's components and structural systems
- Undertaking a desktop geotechnical assessment to determine the site subsoil classification
- Performing derivation of loads and analysis using the provisions of relevant structural design codes and technical society publications.

The following table summarises the principal parameters used for the derivation of earthquake loads and the analysis of the building.

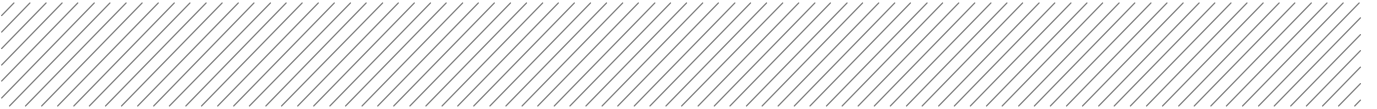
Parameter	Value
Design Working Life (remaining)	50 years
Importance Level	4
Return Period Factor (R)	1.8
Site Subsoil Classification	C
Period (seconds)	0.4 seconds (longitudinal direction) 0.4 seconds (transverse direction)
Hazard Factor (Z)	0.13
Near Fault Factor (N)	1.0
Structural Ductility Factor	1.0 (unreinforced masonry) 1.25 (reinforced concrete moment resisting frames)

4 Assessment Results

The following table summarises the %NBS capacity for the various lateral load resisting elements based on the analysis.

Element	% NBS Capacity	Commentary
South Wing		
Floor diaphragm	>100%	
Reinforced concrete moment resisting frames	73%	Governed by column flexural capacity
Brick infill walls	24%	Out-of plane capacity
Foundations	>100%	Sliding capacity
West Wing		
Brick walls in plane	22%	
Brick walls out of plane	35%	
RC basement walls	>100%	
Foundations	>100%	Sliding capacity
East Wing		
Brick walls in plane	27%	
Brick walls out of plane	35%	
Foundations	>100%	Sliding capacity
Miscellaneous Items:		
Brick parapet walls at roof levels	29%	Flexural capacity
Brick chimneys	29%	Flexural capacity

The governing element of the building's lateral load resisting system is therefore the in-plane capacity of the West Wing brick walls with a score of 22% NBS. This does not meet the minimum NZFS minimum criteria of 67% when considered as an Importance Level 4 Building



Other components of the building that do not meet the NZFS minimum criteria of 67% NBS IL4 are the out-of-plane capacity of the brick in-fill walls and the out-of-plane capacity of the roof parapets and brick chimneys.

To achieve the minimum 67% NBS IL4 lateral seismic capacity as stipulated by the NZFS structural improvements will be required. The following section of the report looks at methods of increasing the %NBS lateral capacity of the building.

We note that we have separated the station into three parts (South Wing, West Wing and East Wings) for ease of reference. However, all three parts are connected and the station should generally be considered as one building. As a result the lowest %NBS rating for any one element is the governing score for the overall site.

The available existing drawings have no details for the South Wing reinforced concrete beams at first floor and roof levels. Our analysis has assumed that all the beams have a minimum tension steel content ratio of 0.5% to the beam cross sectional area, at the column faces. It is also assumed that the detailing of these beams provides a full development length of the tension steel at the column face locations. If the tension steel content is less than assumed then this could potentially reduce the %NBS score for the moment resisting frames. We recommend that further intrusive investigations be undertaken to confirm these assumptions.

The South Wing has a reinforced concrete winder staircase at the northern end. The available drawings have limited information with regards to the structural detail of these stairs. The staircase has not been assessed as a lateral resisting element of the building due to the stairs being of a winder type. However, as the stairs are tied into the structure, in a seismic event they will likely attract some load. In this event it is possible that some tearing failure or connection failure could occur. The stairs appear to bear on reinforced concrete walls which should provide support against collapse. It was noted on site that one of the concrete stair stringers has previously been saw cut right through at approximately 1400mm from the top stair landing. We recommend that further intrusive investigations are undertaken to confirm if any remedial strengthening works had been installed to secure the saw cut stair stringer.

On the design drawings for the alteration works in 2000, there is a note with reference to “providing a provisional price for remedial brick wall ties”. As this note is for provisional pricing only, and there is no other evidence to suggest that any remedial brick ties have been installed, our analysis of the brick walls is based on the assumption that no brick wall ties are present. However, if brick wall ties are present, the %NBS out-of-plane capacity of the brick walls will not have been improved without additional structural support. We recommend that further intrusive investigations are undertaken to confirm the presence of any brick wall ties as part of the out- of- plane wall strengthening.

5 Seismic Improvement Requirements

Based on the findings of the assessment the following methods have been identified to increase the %NBS lateral capacity of the building to achieve the NZFS minimum %NBS criteria of 67% IL4:

South Wing

- Provide new timber stud walls to one face of all brick in-fill walls. Provide Helifix DryTies securing the brick wall skins to new timber studs.
- Provide steel angle members fixed to the inside face of the roof parapets. Provide steel angle diagonal struts back to the roof slab.

East & West Wings

Two strengthening options have been provided for these Wings.

Option 1:

- Provide new 1200mm x 200mm thick reinforced concrete walls to each external wall from foundation level up to roof level. Provide new 6000mm x 1200mm x 1500mm foundation beams under the East Wing shear walls. Provide dowel connections into the existing basement walls at the new shear wall locations for West Wing.
- Provide new 380PFC steel beams to the perimeters of the first floor and roof levels. Tie in to the existing reinforced concrete bond beams with post fixed anchors.
- Provide new 7.5mm plywood diaphragms to first floor and roof levels.
- Provide new timber stud walls to one face of all brick in-fill walls. Provide Helifix DryTies through the brick wall skins to fix to the timber studs.
- Remove existing brick chimneys

Option 2:

- Demolish both the East and West Wing parts of the station building down to basement/foundation levels retaining the South Wing.
- Re-build lightweight timber structures to replace the East Wing and West Wing demolished floor area. The new construction to be structurally separated from the South Wing.

This has been based on undertaking an initial concept design. Concept sketches for these improvements based on undertaking an initial concept design are included in Appendix C.

Two initial cost estimates for the structural improvement works have been developed by cost consultant Rider Levitt Bucknall.

The cost estimate, which incorporates strengthening Option 1 for the East and West Wings, including an allowance for miscellaneous architectural and building services works is \$546,000 (exclusive of GST). A summary breakdown of this cost is provided in Appendix D.

The cost estimate, which incorporates strengthening Option 2 for the East and West Wings, including an allowance for miscellaneous architectural and building services works is \$887,000 (exclusive of GST). A summary breakdown of this cost is provided in Appendix D.

Consideration could also be given to total demolition of the Fire Station building and building a modern facility. A concept design for a new station could be developed and costed for comparative purposes.

6 Conclusions and Recommendations

The assessment has indicated the building achieves a %NBS capacity of **22 %NBS** when considered as an Importance Level 4 Building.

This does not meet the New Zealand Fire Service minimum of 67%NBS IL4.

Structural improvements have been suggested to increase the buildings %NBS lateral capacity to meet the New Zealand Fire Service minimum %NBS requirements.

The costs for these structural improvements, based on initial concept designs for strengthening option 1, are **\$546,000** (exclusive of GST).

The costs for these structural improvements, based on initial concept designs for strengthening option 2, are **\$887,000** (exclusive of GST).

Consideration could also be given to total demolition of the Fire Station building and building a modern facility. A concept design for a new station could be developed and costed for comparative purposes.

Detailed design and a building consent application are required to be completed prior to the installation of the suggested structural improvements.

We recommend further invasive investigations be undertaken to confirm the following items:

- Steel reinforcement content of the first floor and roof beams in the South Wing. We would recommend using ferro-scanning combined with some localised concrete break outs.
- Determine the extent of remedial works that had been installed for the cut stair stringer in the South Wing. We would recommend removing wall linings to expose the back face of the stair stringer.
- Brick wall tie installation to the brick skin walls. We would recommend localised breakout of the brick walls to confirm type and spacings.

7 Explanatory Statement

Exclusive Use

- This report has been prepared by Aurecon at the request of the New Zealand Fire Service ("Client") exclusively for the use and reliance of the Client for the purpose of the Contract NP1589 Detailed Engineering Evaluations of New Zealand Fire Service Stations ("Project") only and may not be used by the Client for any other purpose or by a third party for any purpose without the prior consent of Aurecon. It is not possible to make a proper assessment of this report without a clear understanding of the terms of engagement under which the report has been prepared, including the scope of the instructions and directions given to and the assumptions made by Aurecon or sub-consultants. The report is scoped in accordance with instructions given by or on behalf of Client. The report will not address issues which would need to be considered for another party if that party's particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. Aurecon therefore does not assume responsibility for the use of, or reliance on, the report by any third party and the use of, or reliance on, the report by any third party is at the risk of that party.

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Limits on investigations

- This report contains a detailed assessment of the main building at each Fire Station site. No ancillary/secondary buildings have been assessed. Where extensions have been added to the main station building these have not necessarily been assessed.
- The station inspection discussed in this report was limited to a visual examination of the station assets only where safe and ready access existed at the time, and we have not undertaken any intrusive inspections or testing to verify conclusions related to the station construction, foundations, structural condition, seismic performance, and strengthening costs. This report is necessarily limited in that respect and does not address any matter that is not discoverable from such an inspection or the existing asset drawings, including any damage or defect in inaccessible places and/or latent defects. Aurecon is not able to give any warranty or guarantee that all possible damage, defects, conditions or qualities have been identified.
- This report does not address building defects. Where site inspections were undertaken, they were restricted to visual inspections with intent to determine existing building main structural elements only.

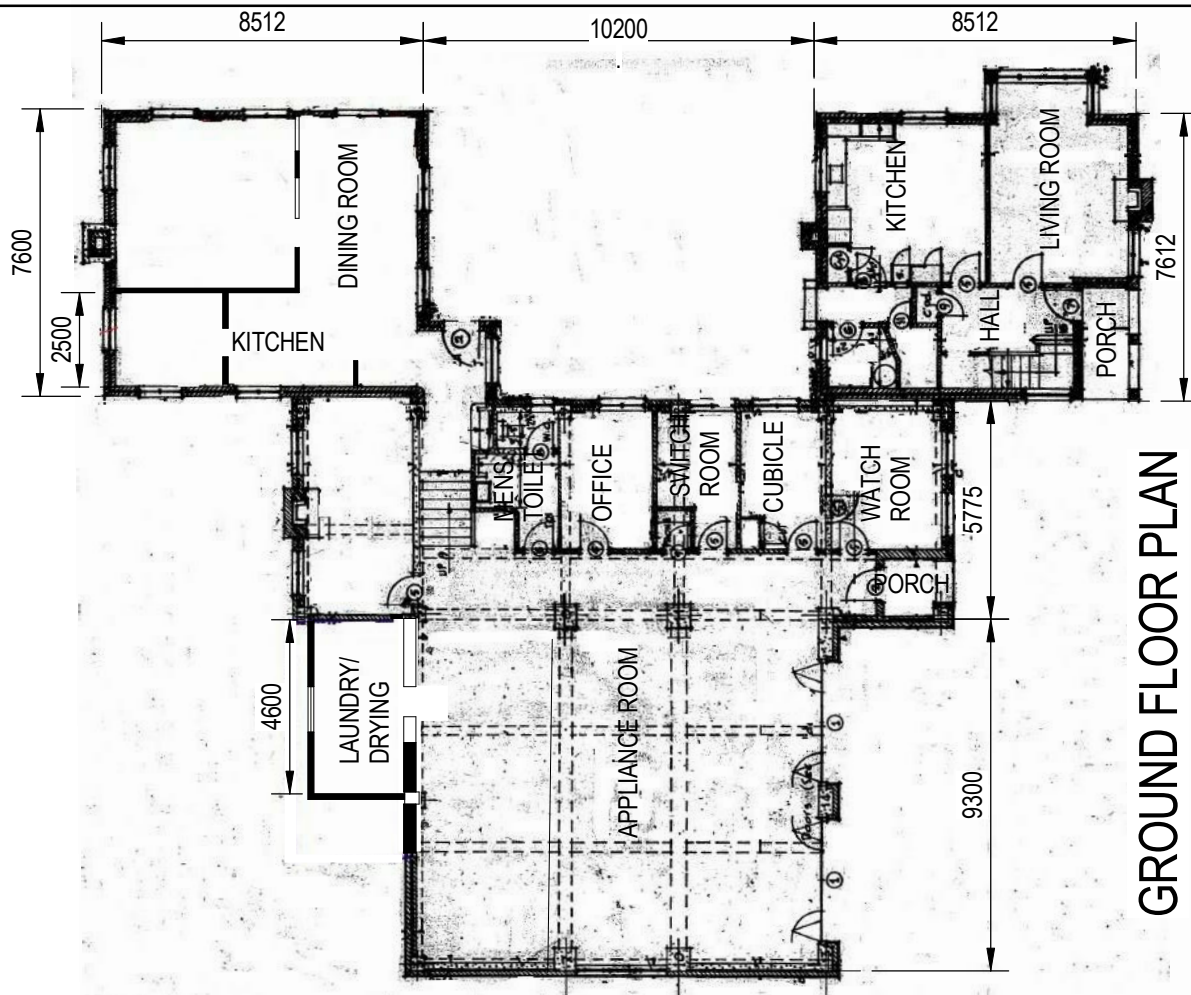
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- Seismic analyses conducted for this report are based on visual inspections, a desktop geotechnical assessment of sub-soil classes and review of existing asset records. No liquefaction assessment has been undertaken for any site. The assessed capacity of parts of the structure assessed may therefore be subject to further refinement if further investigations are conducted. This report details those assumptions made and areas in which the assessment conclusions may be tested further. Some station buildings may require further investigations in due course to confirm certain geotechnical or structural parameters where the assessment result is sensitive to such parameters. Additional costs will result where such investigation is required.
 - This report does not attempt to accurately assess the seismic performance of soft-board proprietary diaphragms. There is little technical data to assess non-compliant materials such as soft-board ceilings and walls.
 - This report provides concept strengthening drawings for stations. These are not detailed design solutions, and are subject to further investigation, design and cost estimating before being suitable as a construction solution. The drawings provided are schematic and focus on highlighting main structural components and suitable strengthening options to pursue.
 - Cost estimates provided with this report are initial estimates only and are subject to detailed design work and possible future investigations. All cost estimates in this report are exclusive of GST. The cost estimates specifically exclude ancillary costs such as consenting, operational impacts and other factors, and include a nominal allowance for other ancillary costs associated with earthquake strengthening works. The report conclusions are not suitable to be used directly for the purposes of making a structural assessment or for whole life project costing. Since Aurecon has no control over the cost of labour, materials, equipment or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, any indication of costs is made on the basis of Aurecon's experience and qualifications and represents its judgment as an experienced and qualified professional consultant, familiar with the relevant industry, but Aurecon cannot and does not guarantee that actual repair/construction costs will not vary from cost indications given.
 - It is recommended that the cost estimates in this report have an additional project contingency of 20% added to them. This contingency is proposed based on experience with similar projects where increases in costs may occur. There is always a level of uncertainty with regard to geotechnical and other factors from a visual only inspection for which such a contingency is appropriate. In some regional areas a higher project contingency may be more appropriate e.g. Christchurch due to local economic conditions; this is something the NZFS may wish to consider in its budget setting process.
 - It is assumed that stations will be grouped into contract packages for future strengthening works; some of the stations with little strengthening costs associated may be not possible to deliver for the identified sum if completed individually, as contract set up and mobilisation costs can be relatively high. This is likely to be the case for stations estimates under \$10-20k.



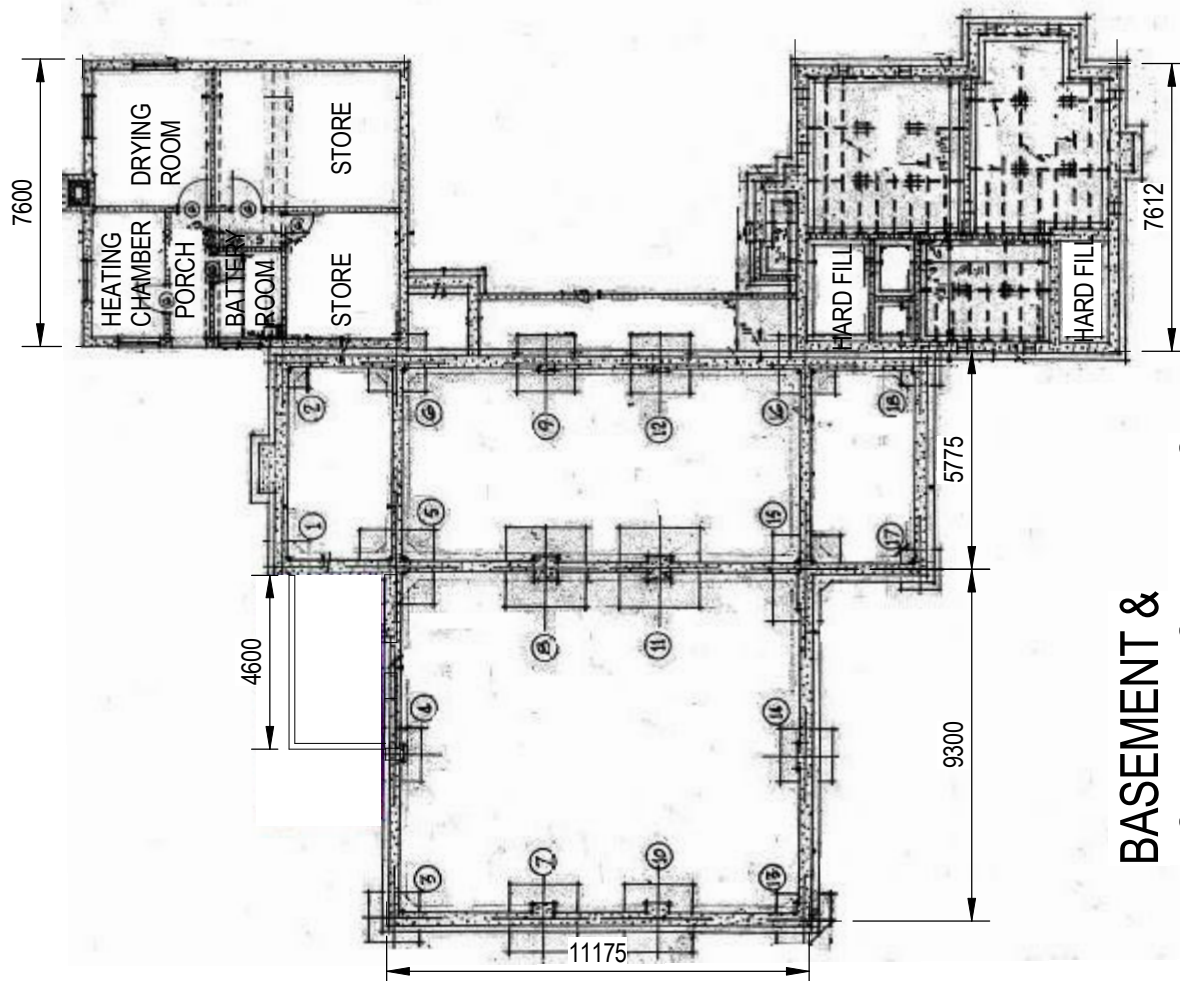
Appendix A

Building Plan

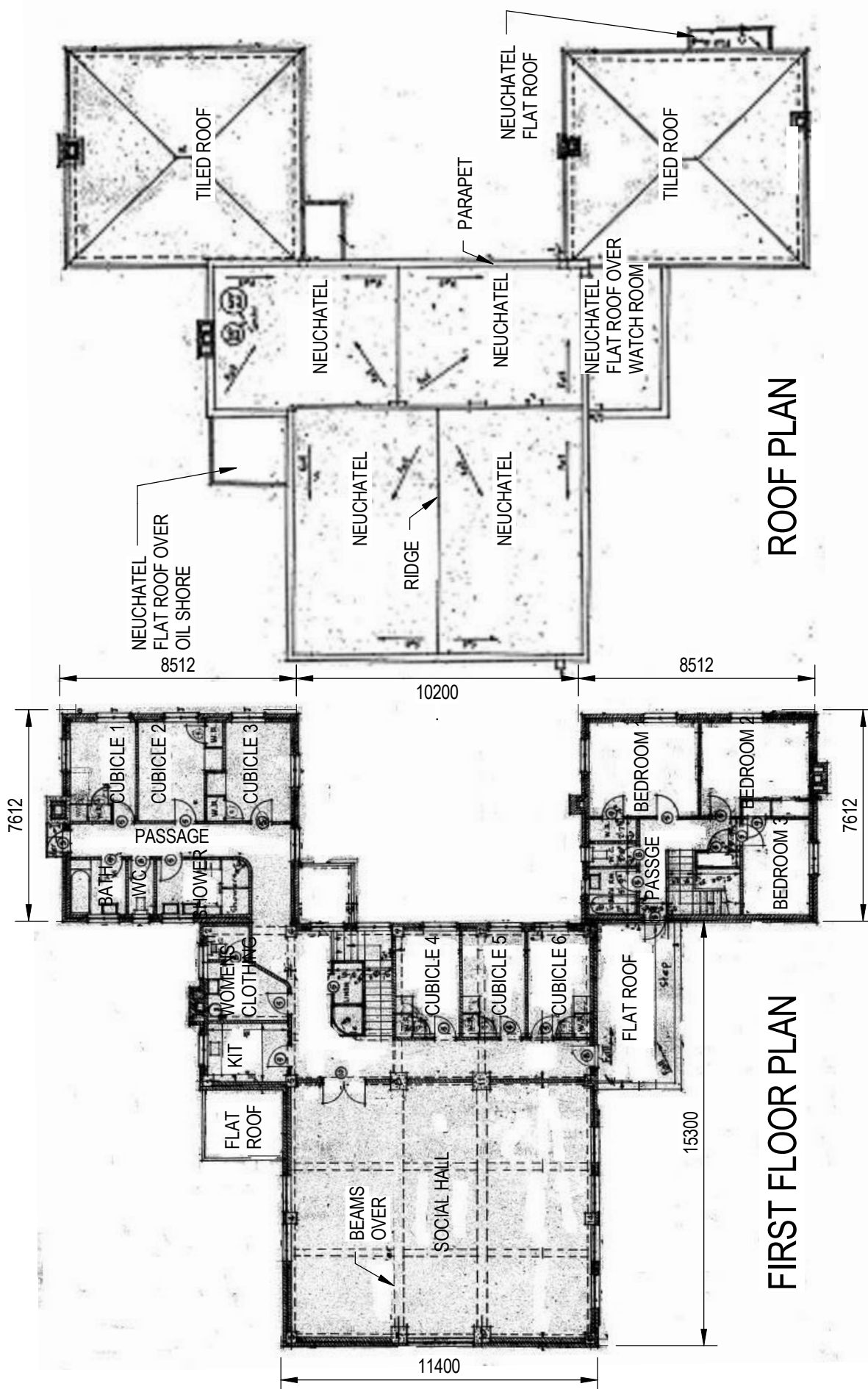
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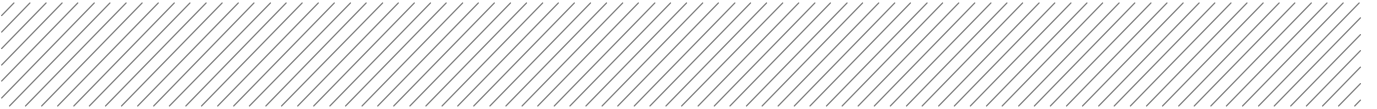


GROUND FLOOR PLAN



BASEMENT &
FOUNDATION PLANS





Appendix B

Site Photographs

East Elevation of South Wing.



South Elevation of South Wing. West Wing visible on the left.



West Elevation of South Wing and West Wing.



North Elevation of South Wing. East Wing and West Wing are visible on the left and right hand sides respectively.



North Elevation of East Wing



North Elevation of West Wing



Ground floor of South Wing - Appliance Bay. Looking up at the first floor beams and slab soffit.



First floor of South Wing - Gym (above the Appliance Bay).

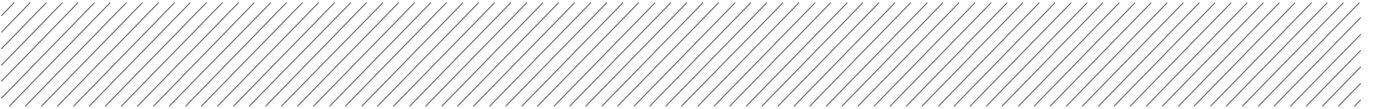


Saw cut through reinforced concrete stair stringer in the South Wing leading up to the first floor.



Dining area in ground floor of West Wing.





Appendix C

Concept Structural Improvement Sketches

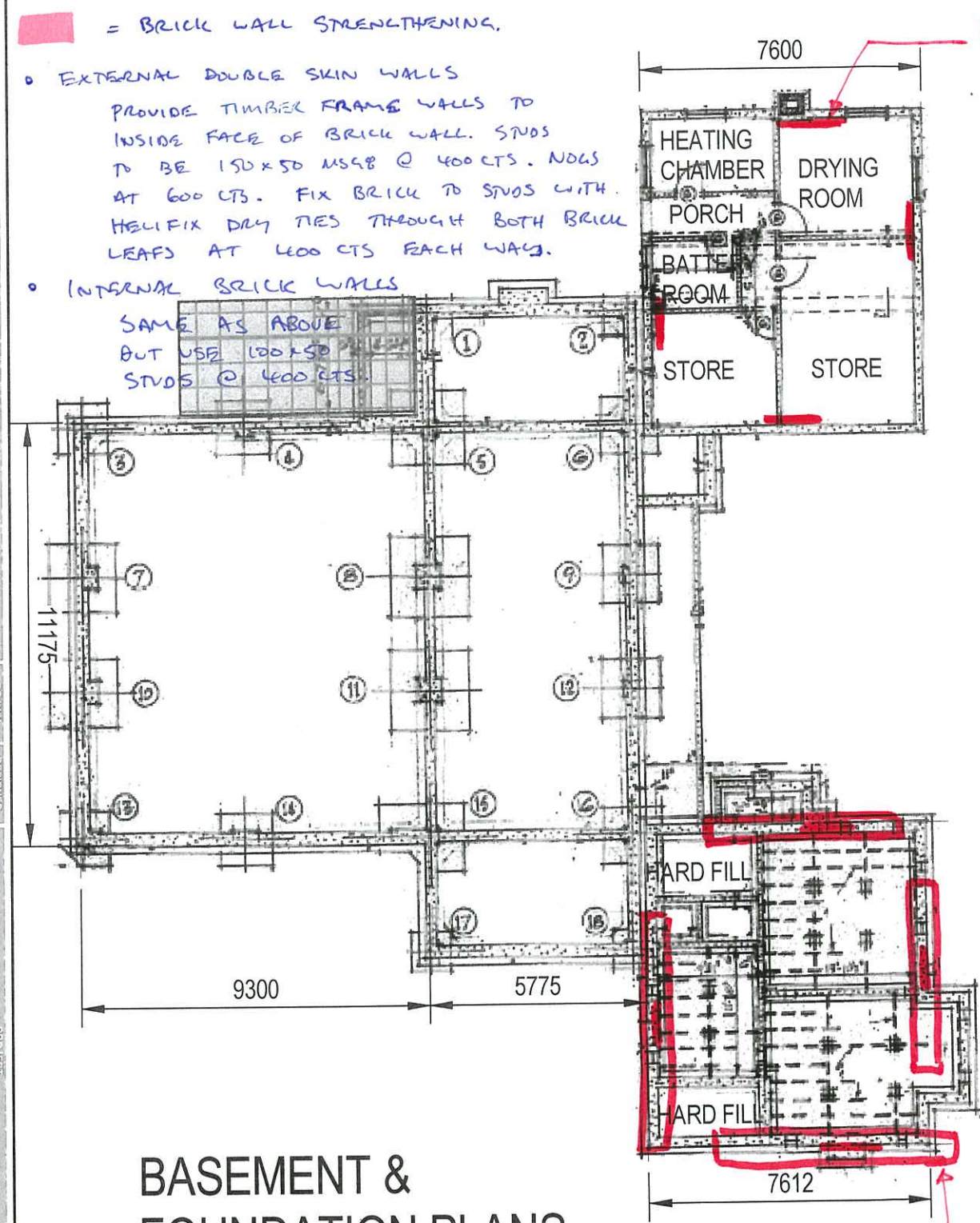
LOOKOUT POINT STRENGTHENING CONCEPT. #1

14/2/13

SKS-001

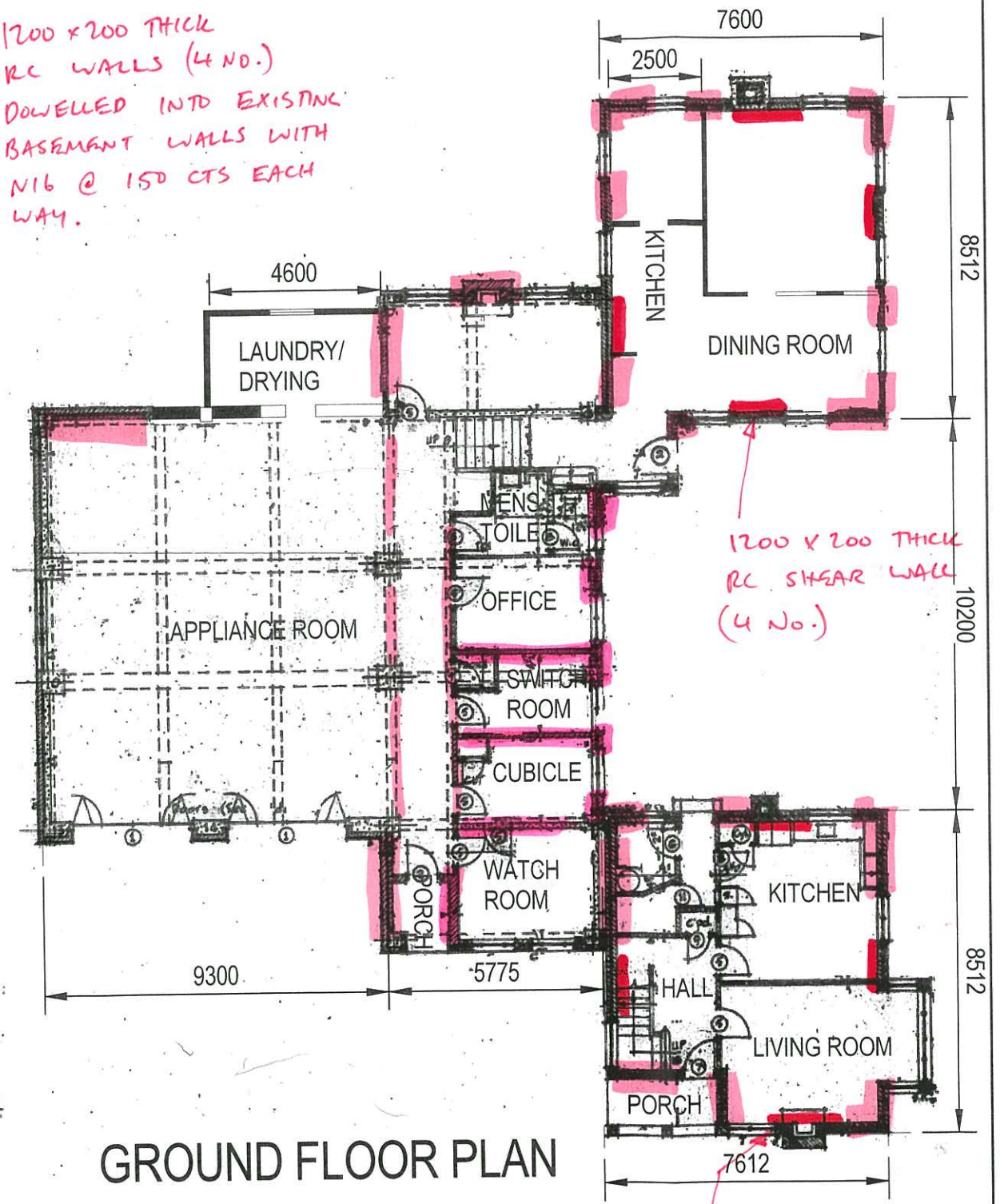
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- = BRICK WALL STRENGTHENING.**
- EXTERNAL DOUBLE SKIN WALLS
PROVIDE TIMBER FRAME WALLS TO INSIDE FACE OF BRICK WALL. STUDS TO BE 150x50 MSG @ 400 CTS. NOGS AT 600 CTS. FIX BRICK TO STUDS WITH HELIFIX DRY TIES THROUGH BOTH BRICK LEAFS AT 400 CTS EACH WAY.
 - INTERNAL BRICK WALLS
SAME AS ABOVE BUT USE 100x50 STUDS @ 400 CTS.

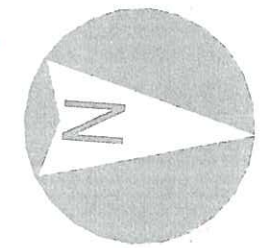
1200 x 200 THICK RC WALLS (4 NO.)
DOWELLED INTO EXISTING BASEMENT WALLS WITH N16 @ 150 CTS EACH WAY.



1200 x 200 THICK RC SHEAR WALL (4 No.)

6000 x 1200 x 1500 (D) FOUNDATION BEAMS (4 NO.)
1200 x 200 THICK RC WALLS OVER.

1200 x 200 THICK RC SHEAR WALL (4 No.)



CLIENT: NEW ZEALAND FIRE SERVICE STATION INSPECTIONS
PROJECT: LOOKOUT POINT FIRE BRIGADE
REGION 5
DRAWN: R BURKOS
CHECKED: [blank]
APPROVED: [blank]
DATE: [blank]
PROJECT NO: 233791
SCALE: 1:20
DRAWING NO: RS-01
SIZE: A4

14/2/13

7.5mm PLYWOOD CRILING

PROJECT No. 233791
SCALE 1:200
SIZE A4

LOOKOUT POINT STRENGTHENING CONCEPT # 2

14/2/13

SKS-003

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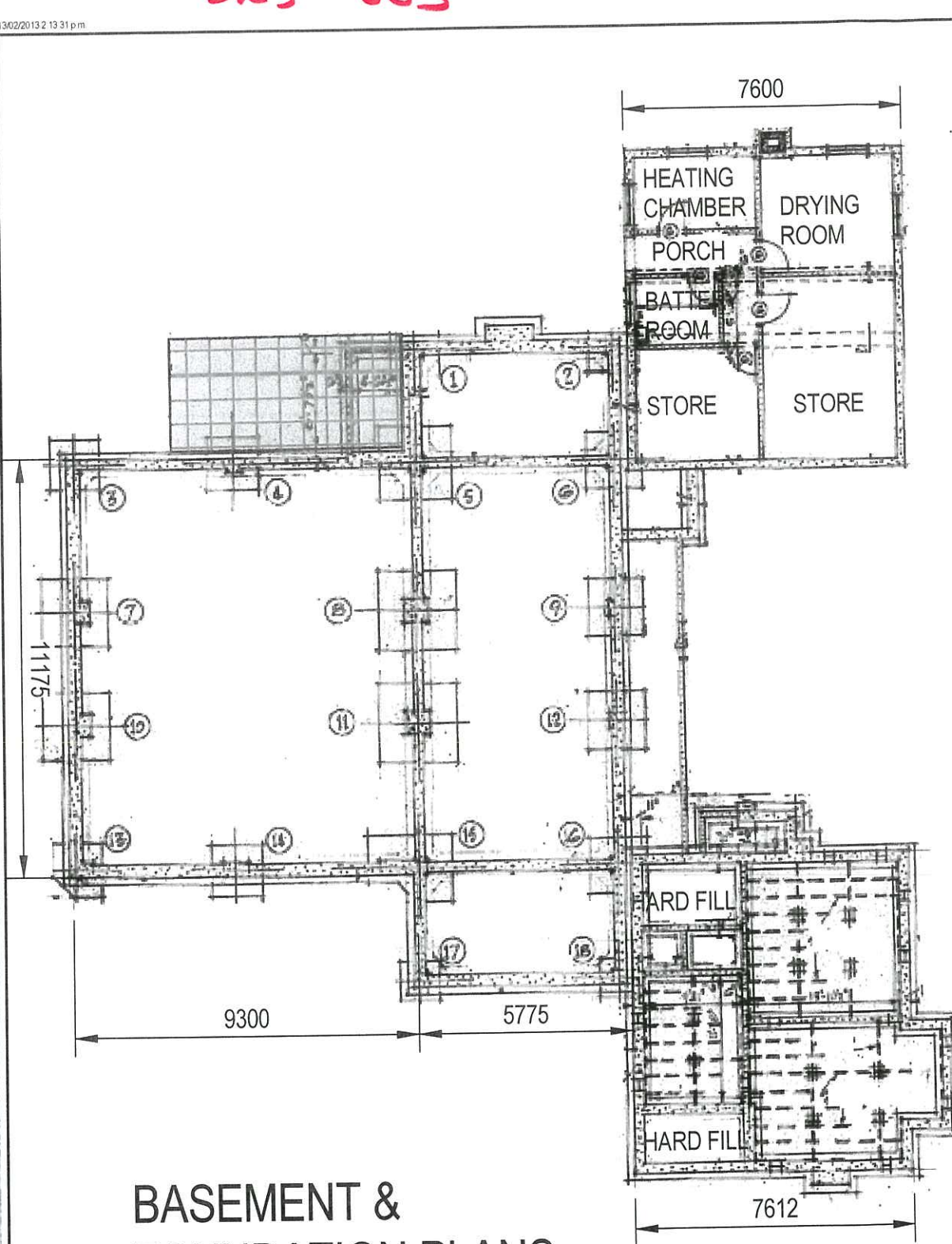
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DESIGNED
R BURROS
CHECKED
DATE

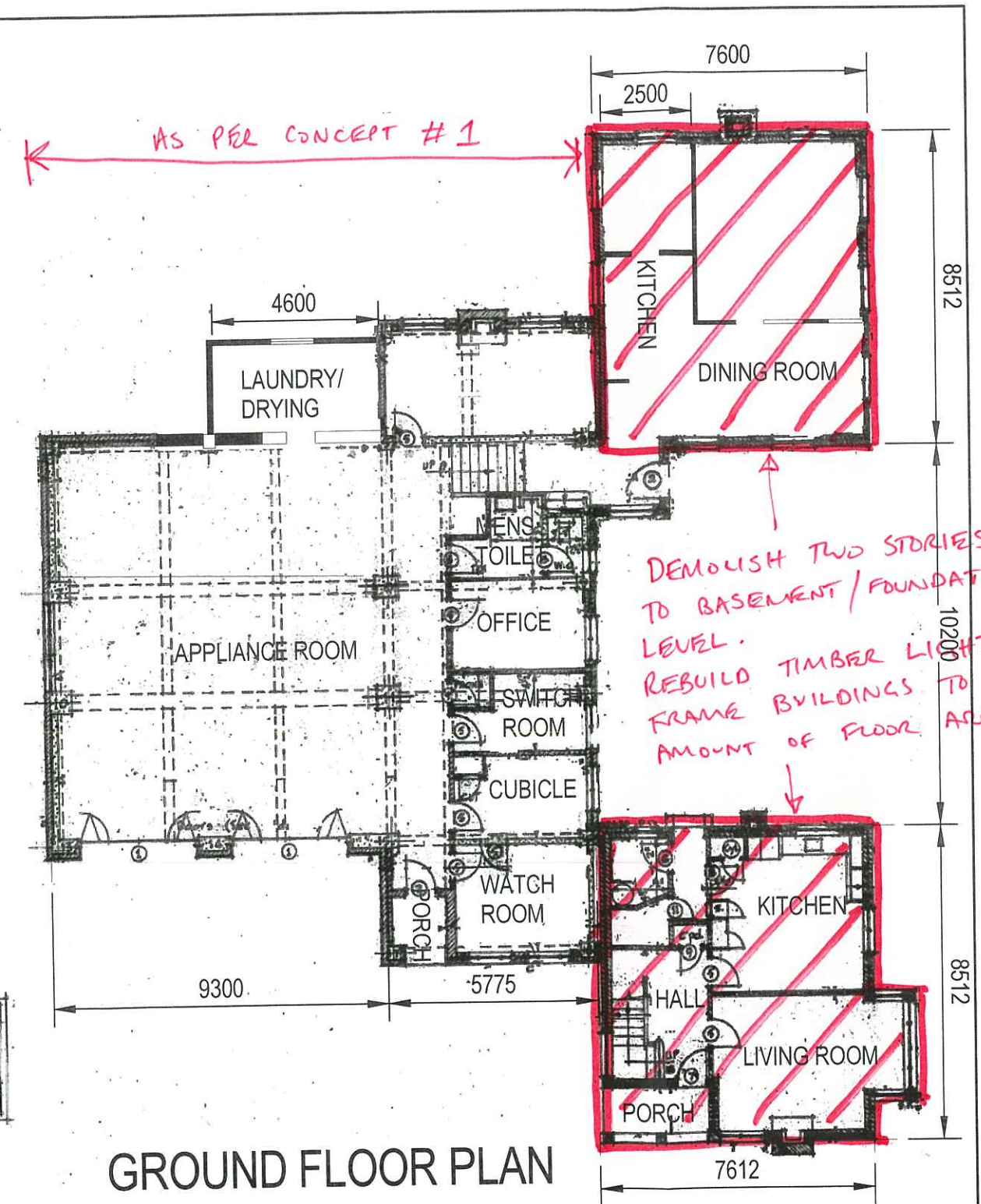
PROJECT
NEW ZEALAND FIRE SERVICE STATION INSPECTIONS

REGION 5
LOOKOUT POINT FIRE BRIGADE
PLAN

REGION 5
PROJECT NO.
233791
SCALE
1:200
DRAWING NO.
RS-01



BASEMENT & FOUNDATION PLANS

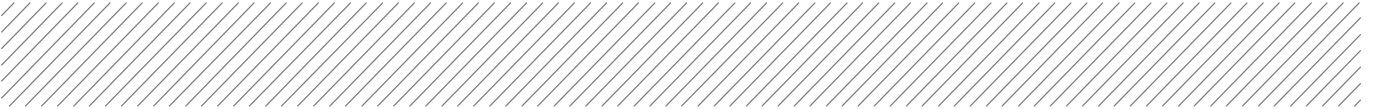


GROUND FLOOR PLAN

AS PER CONCEPT # 1

DEMOLISH TWO STORIES DOWN TO BASEMENT / FOUNDATION LEVEL. REBUILD TIMBER LIGHTWEIGHT FRAME BUILDINGS TO REPLACE AMOUNT OF FLOOR AREA LOST





Appendix D

Cost Estimate Summary

ITEM DETAILS

R LOOKOUT POINT FIRE STATION

R1 Strengthening Works - Concept 1

Rates current at February 2013

Item	Description	Unit	Qty	Rate	\$
SP	SITE PREPARATION				
1	Demolish and remove floor coverings	m2	131	10.0	1,310
2	Demolish and remove wall linings at areas affected by shear walls	m2	180	20.0	3,600
3	Form openings in existing floor for shear wall	Item			3,600
4	Remove brick chimneys	Item			5,000
	Element SP total				13,510
SB	SUBSTRUCTURE				
1	1200 x 1500 deep reinforced concrete foundation beam incl propping	m3	44	1,700.0	74,800
	Element SB total				74,800
SW	STRUCTURAL WALLS				
1	1200 x 200 thick reinforced concrete wall	m2	50	750.0	37,500
2	380PFC to concrete bond beam	t	3.55	8,500.0	30,175
3	65x6EA to parapet & 50x5EA diagonal struts	m	30	150.0	4,500
4	OPTION 1	Note			
5	150 x 50 MSG8 timber frame, Helifix dry ties, gib lining, trim & paint fin	m2	345	255.0	87,975
6	100 x 50 MSG8 timber frame, Helifix dry ties, gib lining, trim & paint	m2	155	195.0	30,225
	Element SW total				190,375
UF	UPPER FLOORS				
1	7.5 thick plywood diaphragm flooring	m2	131	80.0	10,480
	Element UF total				10,480
RF	ROOF				
1	7.5 thick plywood ceiling diaphragm	m2	131	100.0	13,100
	Element RF total				13,100
EW	EXTERIOR WALLS AND EXTERIOR FINISH				
1	Make good exterior walls where chimney removal has taken place	Item			5,000
	Element EW total				5,000
SC	STAIRS AND BALUSTRADES				
Carried forward					307,265

ITEM DETAILS

R LOOKOUT POINT FIRE STATION

R1 Strengthening Works - Concept 1

Rates current at February 2013

Item	Description	Unit	Qty	Rate	\$
	Brought forward				307,265
1	Allowance to form opening, inspect and make good on completion	Item			1,000
	Element SC total				1,000
PN	INTERIOR WALLS				
1	Allowance to remove and replace timber framed walls affected by works	Item			5,000
	Element PN total				5,000
FF	FLOOR FINISHES				
1	Make good floor coverings	m2	262	60.0	15,720
	Element FF total				15,720
WF	WALL FINISHES				
1	Gib lining incl trim and paint finish	m2	180	80.0	14,400
2	Extra value for Gib Aqualine	Item			1,500
	Element WF total				15,900
CF	CEILING FINISHES				
1	Allowance to make good ceiling	Item			7,000
	Element CF total				7,000
FT	FITTINGS AND FIXTURES				
1	Allowance to remove, store and reinstate fittings and fixtures	Item			10,000
	Element FT total				10,000
PB	SANITARY PLUMBING				
1	Allowance to alter sanitary pipework/fittings required to undertake works	Item			30,000
	Element PB total				30,000
HV	HEATING AND VENTILATION SERVICES				
1	Allowance to remove, store and reinstate heating and ventilation units	Item			5,000
	Element HV total				5,000
Carried forward					396,885

ITEM DETAILS

R LOOKOUT POINT FIRE STATION

R1 Strengthening Works - Concept 1

Rates current at February 2013

Item	Description	Unit	Qty	Rate	\$
	Brought forward				396,885
EL	ELECTRICAL SERVICES				
1	Remove, store & reinstate electrical fittings as required to undertake work	Item			10,000
	Element EL total				10,000
PG	PRELIMINARIES				
1	Preliminary & General (10%)	Item			41,000
	Element PG total				41,000
MG	MARGINS				
1	Contractor's Margin (6%)	Item			27,000
	Element MG total				27,000
CN	CONTINGENCIES				
1	Contract Contingency (15%)	Item			71,000
2	Rounding	Item			115
	Element CN total				71,115
Total					546,000

ITEM DETAILS

R LOOKOUT POINT FIRE STATION

R2 Demolish and Rebuild - Concept 2

Rates current at February 2013

Item	Description	Unit	Qty	Rate	\$
SP	SITE PREPARATION				
1	Demolish & remove Blocks B&C to basement & grd floor levels	m2	265	150.0	39,750
2	Salvage heat pump units and store for reinstatement	Item			500
	Element SP total				40,250
SW	STRUCTURAL WALLS				
1	65x6EA to parapet & 50x5EA diagonal struts	m	30	150.0	4,500
2	CONCEPT 2	Note			
3	150 x 50 MSG8 timber frame, Helifix dry ties, gib lining, trim & paint fin	m2	160	255.0	40,800
4	100 x 50 MSG8 timber frame, Helifix dry ties, gib lining, trim & paint	m2	152	195.0	29,640
	Element SW total				74,940
FF	FLOOR FINISHES				
1	Make good floor coverings	Item			5,000
	Element FF total				5,000
WF	WALL FINISHES				
1	Gib lining incl trim and paint finish	m2	180	80.0	14,400
	Element WF total				14,400
CF	CEILING FINISHES				
1	Allowance to make good ceiling	Item			2,500
	Element CF total				2,500
FT	FITTINGS AND FIXTURES				
1	Allowance to remove, store and reinstate fittings and fixtures	Item			5,000
	Element FT total				5,000
PB	SANITARY PLUMBING				
1	Allowance to alter sanitary pipework as required to undertake works	Item			2,500
	Element PB total				2,500
Carried forward					144,590

ITEM DETAILS

R LOOKOUT POINT FIRE STATION

R2 Demolish and Rebuild - Concept 2

Rates current at February 2013

Item	Description	Unit	Qty	Rate	\$
	Brought forward				144,590
HV	HEATING AND VENTILATION SERVICES				
1	Allowance to remove, store and reinstate heating and ventilation units	Item			2,500
	Element HV total				2,500
EL	ELECTRICAL SERVICES				
1	Remove, store & reinstate electrical fittings as required to undertake work	Item			5,000
	Element EL total				5,000
SU	SUNDRIES				
1	Construct light weight timber framed building on existing concrete slab	m2	265	2,000.0	530,000
	Element SU total				530,000
PG	PRELIMINARIES				
1	Preliminary & General (10%)	Item			68,200
2	Interface services with existing structure	Item			5,000
3	Protection to existing structure	Item			5,000
	Element PG total				78,200
MG	MARGINS				
1	Contractor's Margin (6%)	Item			45,600
	Element MG total				45,600
CN	CONTINGENCIES				
1	Contract Contingency (10%)	Item			80,600
2	Rounding	Item			510
	Element CN total				81,110
Total					887,000



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