



# **Christchurch City Council**

BE 0893 EQ2 Cuthberts Green Softball Complex Pages Road, Wainoni



COMBINED QUALITATIVE AND QUANTITATIVE REPORT

## FINAL

- **4**
- 05 February 2013





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Sinclair Knight Merz 142 Sherborne Street Saint Albans PO Box 21011, Edgeware Christchurch, New Zealand Tel: +64 3 940 4900 Fax: +64 3 940 4901 Web: www.skmconsulting.com

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	Signature	Date	Name	Title
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## 1. Executive summary

A Detailed Engineering Evaluation (DEE) was carried out for various structures at the Cuthberts Green Softball Facility in Wainoni (BU 0893-003 EQ2). This report contains the results of both the qualitative and the quantitative reports which were done as one report on the assumption that at least the Groundsmans Shed was an earthquake prone building and hence a quantitative report would have been recommended.

### 1.1. Key Damage Observed

The key damage observed during our inspections are summarised below:

- 5 of the 6 light towers are out of plumb.
- The modesty walls in the softball complex had collapsed and have subsequently been removed.
- The ground bearing floor slab in the softball complex had settled and cracked.
- Various other areas of minor structural damage such as concrete and block cracks.

### 1.2. Critical Structural Weaknesses

There were no critical structural weaknesses discovered that have not been accounted for in our quantitative assessment.

### 1.3. Indicative Building Strength

As described in the Engineering Advisory Group's "Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings" (from July 2011) we have assessed the percentage of new building standard seismic resistance using the quantitative method. Our assessment included consideration of geotechnical conditions, existing earthquake damage to the buildings and structural engineering calculations to assess both strength and ductility/resilience.

The assessments were based on the following:

- Detailed on-site investigation to assess the extent of existing earthquake damage including limited intrusive investigation.
- Qualitative assessment of critical structural weaknesses (CSWs) based on review of available structural drawings.
- Geotechnical investigation of the ground conditions on the site. The results of this investigation are summarised in this report and contained in the Geotechnical Assessment Report dated 8 December 2011.
- Assessment of the strength of the existing structures taking account of the current condition.



Any building that is found to have a seismic capacity less than 34% of the new building standard is required by the CCC Earthquake Prone Building policy (2010) to be strengthened up to a target strength of at least 67%NBS.

Based on the information available, and using the Quantitative Assessment Procedure, the original capacity and the post earthquake capacity have been calculated as below in Table 1.

Description	Grade	Risk	%NBS Pre EQ	%NBS Post EQ	Structural performance
Softball complex (modesty walls in damaged condition)	E	High	26	<10%	Unacceptable. Improvement required.
Groundsmans shed	Е	High	19	19	Unacceptable. Improvement required.
Canopy	D	Moderate	23	23	Unacceptable. Improvement required.
Softball complex (modesty wall demolished)	С	Moderate	39	39	Acceptable legally. Improvement recommended.
Grandstand	С	Moderate	52	52	Acceptable legally. Improvement recommended.
Light towers	A+	Low	>100	>100	Acceptable. Improvement may be desirable.
Dugouts	A+	Low	>100	>100	Acceptable. Improvement may be desirable.

### Table 1: DEE results summary

As noted above the Softball Complex, Canopy and the Groundsmans shed have been assessed as potentially earthquake prone. The remaining buildings have been found to not be potentially earthquake prone.

Please note that structural strengthening is required by law for buildings that are confirmed to have a seismic capacity of less than 33% NBS.



### 1.4. Recommendations

It is recommended that:

- a) The current placard statuses posted on the buildings of green remain as is, however refer to the recommendations below.
- b) Due to the %NBS calculated, CCC may wish to vacate the earthquake prone buildings even though we are not aware of any legal obligation to do so.
- c) We consider that barriers around the building are not necessary unless the buildings are vacated in which case barriers will be required to prevent access to the grandstand offices since access to these is under the Softball complex.
- d) An options study is carried out providing solutions to strengthen the potentially earthquake prone buildings (Softball complex, Groundsmans Shed, and Canopy) to a target of 67% and 100% of New Building Standard



## 2. Introduction

Sinclair Knight Merz was engaged by Christchurch City Council to carry out a Quantitative Assessment of the seismic performance of buildings located at the Cuthberts Green Softball facility on Pages Road. The structures that this report covers are listed below:

- Softball complex
- Grandstand
- Groundsmans shed
- Light towers
- Dugouts
- Canopy between the Softball Complex and Cowles Stadium

The scope of this quantitative analysis includes the following:

- Analysis of the seismic load carrying capacity of the building compared to current seismic loading requirements or New Buildings Standard (NBS). It should be noted that this analysis considers the building in its damaged state where appropriate.
- Identification of any critical structural weaknesses which may exist in the building and include these in the assessed %NBS of the structure.
- Preparation of a summary report outlining the areas of concern in the building.

The recommendations from the Engineering Advisory  $\text{Group}^1$  were followed to assess the likely performance of the structures in a seismic event relative to the New Building Standard (NBS). 100% NBS is equivalent to the strength of a building that fully complies with current codes. This includes a recent increase of the Christchurch seismic hazard factor from 0.22 to  $0.3^2$ .

Construction drawings were made available, and these have been considered in our evaluation of the buildings. The buildings' description below is based on a review of the drawings and our visual inspections.

At the time of writing the buildings were thought to have an equivalent placard status of green.

<sup>2</sup> <u>http://www.dbh.govt.nz/seismicity-info</u>

<sup>&</sup>lt;sup>1</sup> EAG 2011, Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury - Draft, p 10

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## 3. Compliance

This section contains a brief summary of the requirements of the various statutes and authorities that control activities in relation to buildings in Christchurch at present.

### 3.1. Canterbury Earthquake Recovery Authority (CERA)

CERA was established on 28 March 2011 to take control of the recovery of Christchurch using powers established by the Canterbury Earthquake Recovery Act enacted on 18 April 2011. This act gives the Chief Executive Officer of CERA wide powers in relation to building safety, demolition and repair. Two relevant sections are:

### Section 38 – Works

This section outlines a process in which the chief executive can give notice that a building is to be demolished and if the owner does not carry out the demolition, the chief executive can commission the demolition and recover the costs from the owner or by placing a charge on the owners' land.

### Section 51 – Requiring Structural Survey

This section enables the chief executive to require a building owner, insurer or mortgagee carry out a full structural survey before the building is re-occupied.

We understand that CERA will require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building Act). It is anticipated that CERA will adopt the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011. This document sets out a methodology for both qualitative and quantitative assessments.

The qualitative assessment is a desk-top and site inspection assessment. It is based on a thorough visual inspection of the building coupled with a review of available documentation such as drawings and specifications. The quantitative assessment involves analytical calculation of the buildings strength and may require non-destructive or destructive material testing, geotechnical testing and intrusive investigation.

It is anticipated that factors determining the extent of evaluation and strengthening level required will include:

- The importance level and occupancy of the building
- The placard status and amount of damage
- The age and structural type of the building



- Consideration of any critical structural weaknesses
- The extent of any earthquake damage

### 3.2. Building Act

Several sections of the Building Act are relevant when considering structural requirements:

### 3.2.1. Section 112 – Alterations

This section requires that an existing building complies with the relevant sections of the Building Code to at least the extent that it did prior to any alteration. This effectively means that a building cannot be weakened as a result of an alteration (including partial demolition).

### 3.2.2. Section 115 – Change of Use

This section requires that the territorial authority (in this case Christchurch City Council (CCC)) be satisfied that the building with a new use complies with the relevant sections of the Building Code 'as near as is reasonably practicable'. Regarding seismic capacity 'as near as reasonably practicable' has previously been interpreted by CCC as achieving a minimum of 67%NBS however where practical achieving 100%NBS is desirable. The New Zealand Society for Earthquake Engineering (NZSEE) recommend a minimum of 67%NBS.

### 3.2.3. Section 121 – Dangerous Buildings

The definition of dangerous building in the Act was extended by the Canterbury Earthquake (Building Act) Order 2010, and it now defines a building as dangerous if:

- in the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
- in the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
- there is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or
- there is a risk that that other property could collapse or otherwise cause injury or death; or
- a territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

### 3.2.4. Section 122 – Earthquake Prone Buildings

This section defines a building as earthquake prone if its ultimate capacity would be exceeded in a 'moderate earthquake' and it would be likely to collapse causing injury or death, or damage to other property. A moderate earthquake is defined by the building regulations as one that would generate ground shaking 33% of the shaking used to design an equivalent new building.



### 3.2.5. Section 124 – Powers of Territorial Authorities

This section gives the territorial authority the power to require strengthening work within specified timeframes or to close and prevent occupancy to any building defined as dangerous or earthquake prone.

### 3.2.6. Section 131 – Earthquake Prone Building Policy

This section requires the territorial authority to adopt a specific policy for earthquake prone, dangerous and insanitary buildings.

### 3.3. Christchurch City Council Policy

Christchurch City Council adopted their Earthquake Prone, Dangerous and Insanitary Building Policy in 2006. This policy was amended immediately following the Darfield Earthquake of the 4<sup>th</sup> September 2010.

The 2010 amendment includes the following:

- A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
- A strengthening target level of 67% of a new building for buildings that are Earthquake Prone. Council recognises that it may not be practicable for some repairs to meet that target. The council will work closely with building owners to achieve sensible, safe outcomes;
- A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
- Repair works for buildings damaged by earthquakes will be required to comply with the above.

The council has stated their willingness to consider retrofit proposals on a case by case basis, considering the economic impact of such a retrofit.

We anticipate that any building with a capacity of less than 33%NBS (including consideration of critical structural weaknesses) will need to be strengthened to a target of 67%NBS of new building standard as recommended by the Policy.

If strengthening works are undertaken, a building consent will be required. A requirement of the consent will require upgrade of the building to comply 'as near as is reasonably practicable' with:

- The accessibility requirements of the Building Code.
- The fire requirements of the Building Code. This is likely to require a fire report to be submitted with the building consent application.



## 3.4. Building Code

The building code outlines performance standards for buildings and the Building Act requires that all new buildings comply with this code. Compliance Documents published by The Department of Building and Housing can be used to demonstrate compliance with the Building Code.

After the February Earthquake, on 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

- a) Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)
- b) Serviceability Return Period Factor increased from 0.25 to 0.33 (80% increase in the serviceability design loads when combined with the Hazard Factor increase)

The increase in the above factors has resulted in a reduction in the level of compliance of an existing building relative to a new building despite the capacity of the existing building not changing.



## 4. Earthquake Resistance Standards

For this assessment, the building's earthquake resistance is compared with the current New Zealand Building Code requirements for a new building constructed on the site. This is expressed as a percentage of new building standard (%NBS). The new building standard load requirements have been determined in accordance with the current earthquake loading standard (NZS 1170.5:2004 Structural design actions - Earthquake actions - New Zealand).

The likely capacity of this building has been derived in accordance with the New Zealand Society for Earthquake Engineering (NZSEE) guidelines 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006. These guidelines provide an Initial Evaluation Procedure that assesses a buildings capacity based on a comparison of loading codes from when the building was designed and currently. It is a quick high-level procedure that can be used when undertaking a Qualitative analysis of a building. The guidelines also provide guidance on calculating a modified Ultimate Limit State capacity of the building which is much more accurate and can be used when undertaking a Quantitative analysis.

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure 1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance		Improvement of Structural Performa			
					_►	Legal Requirement	NZSEE Recommendation		
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)		The Building Act sets no required level of structural improvement (unless change in use)	100%NBS desirable. Improvement should achieve at least 67%NBS		
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		decide. Improvement is not limited to 34%NBS.	Not recommended. Acceptable only in exceptional circumstances		
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement		Unacceptable	Unacceptable		

### Figure 1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Figure 2 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk of exceedance in 50 years (i.e. 0.2% in the next year). It is noted that the current seismic risk in Christchurch results in a 6% risk of exceedance in the next year.



### Table 2: %NBS compared to relative risk of failure

Percentage of New Building Standard (%NBS)	Relative Risk (Approximate)
>100	<1 time
80-100	1-2 times
67-80	2-5 times
33-67	5-10 times
20-33	10-25 times
<20	>25 times



## 5. Building Details

### 5.1. Structure descriptions

### 5.1.1. Softball complex

The Softball Complex was designed in 1988 and is a two storey high structure with approximate plan dimensions of 28 x 14 m. It has reinforced block walls up to the first floor and steel portal frames forming the load resisting structure of the second storey. There are also changing block 'wings' of the building that are only one level which have block walls with steel portals to support the roof. The foundations of the building are constructed of strip footings below the block walls with 'floating' slabs between the walls which are not connected to the foundations. The first floor is in-situ reinforced concrete and the portals have lightweight steel cladding. The seismic load resisting structure incorporated steel portal frames above level 1 and reinforced concrete shear walls below level 1. The concrete block shear walls carry the lateral loads into the shallow strip foundations where the loads are resisted by friction.

### 5.1.2. Grandstand

The Grandstand was designed in 2009 and is a two storey building with approximate dimensions of 18 x 11 m. It consists of grandstand seating with a viewing deck above and various rooms below. The Grandstand is constructed from precast concrete shear wall panels and bleachers on top of a concrete floor with 1200 deep concrete 'posthole' foundations. The balcony floor is made of 75 mm precast floor units under 75 mm concrete topping.

### 5.1.3. Groundsmans Shed

No plans were available for the Groundsmans Shed and so all calculations were done on the basis of site visits and a reinforcing bar detection survey. The shed is constructed from lightly reinforced concrete block walls with a timber truss roof and profiled steel cladding and it has approximate plan dimensions of  $9 \ge 6$  m. The foundations for the shed are assumed to consist of the block walls extending below ground onto strip foundations with the slab 'floating' between walls. The block walls of the building act as shear walls to carry seismic loads down to shallow strip footings. The roof has not been detailed to act as a diaphragm.

### 5.1.4. Light towers

There are six light towers surrounding the softball pitch but structural information was available for only four of the towers. The two most recent towers were designed in 2003 and are made of steel octagonal sections of varying thicknesses and sizes with a total height of 25.7 m above ground. Two of the older light towers were retrofitted with new foundations in 2003 with a new reinforced concrete pile for each tower which extends six metres below ground. It has been assumed that the



retrofitted towers are similar to the new ones and the new towers have similar foundations to the retrofitted towers. The light towers are cantilevered steel columns on piled foundations.

### 5.1.5. Dugouts

There are two dugouts adjacent to the softball pitch which each have plan dimensions of  $11.5 ext{ x}$  3.8m. They were designed in 2003 and are made of steel portal frames with fibre cement board, Perspex and wire mesh to different parts of the walls and a profiled steel and Durolite roof. The foundations for the dugouts are made of a reinforced concrete slab with edge thickening.

### 5.1.6. Canopy between the Softball Complex and Cowles Stadium

No information was available for the canopy but an intrusive site visit found that it is constructed from steel portal frames in the transverse direction with support from Cowles Stadium entrance walls in the longitudinal direction. The walls are open and the roof is made of a membrane on plywood on timber framing with fibre cement board soffit cladding. It has approximate plan dimensions of  $5.3 \times 24$  m. The connection detail between the Canopy and Cowles Stadium consists of the canopy end beam nailed to the side of a 70x85 timber which is then coach screwed from the underside to a 260x150 beam spanning above the entrance of Cowles Stadium.

### 5.2. Structural Damage

Below is an explanation of the damage noted to each structure. The damage described is from our inspections dated 21/10/2011, 2/11/2011 and a specific inspection of the Grandstand viewing deck on 01/02/2012.

### 5.2.1. Softball complex

The quantitative analysis has been preceded by a Level 2 Rapid Assessment undertaken by others dated 23/02/11. The rapid assessment found that a cantilever modesty wall in the south eastern end of the building had failed. In addition the rapid assessment noted other damage including cracking to some exterior block walls and differential settlement to some floors. Minor cracking to block walls is typical for this type and age of building.

### Ground floor slab

The floor slab survey contained in Appendix 3 – Survey Results indicated significant settlement with around 100mm maximum variation in level at ground floor level. While this is not a residential property the guidance document titled "Guidance on house repairs and reconstruction following the Canterbury Earthquake" recommends that a house with Type C foundations (slab on grade) should have foundations completely rebuilt if the maximum variation in level exceeds 100mm; as noted above the maximum variation in level is approximately 100mm. The above levels would lead to the conclusion that the slab is significantly out of level and should be substantially



replaced. We note that the slab is a floating slab on grade and the surrounding structures are not reliant on the slab for stability and so this repair could be undertaken relatively simply.

### **Superstructure Levels**

The superstructure has been surveyed by taking levels of a consistent blockwork course which is assumed to have been level prior to the earthquake induced settlements evident on site having occurred. The survey results are contained in Appendix 3 – Survey Results.

The maximum differential between adjacent levels on the block wall course is 60mm over approximately 9.0m a slope of 1:150 or 0.67%. While this is not a residential property the guidance document titled "Guidance on house repairs and reconstruction following the Canterbury Earthquake" recommends that a house with Type C foundations (slab on grade) should have foundations completely rebuilt if the slope between two points greater than 2m apart is greater than 0.50%; as noted above the slope between points 3 and 4 is approximately 0.67%. These levels would lead to the conclusion that the building has settled and relevelling or demolition is required.

In addition the level 1 floor slab was surveyed, however these levels have been ignored since the block course survey should provide a more accurate indication of the superstructure settlement.

### Superstructure Damage

Further investigation will be required for any blocks that are not to be demolished and have cracking greater than 1.0mm wide. This investigation will require removing the block faces off a select number of blocks so the concrete infill can be inspected for cracking and reinforcing samples taken if deemed necessary by the engineer.

The ground bearing concrete slab between the Grandstand and the Softball complex has sever cracking where the two structures have moved separately.

The two areas of concern which caused the building to be given a yellow placard have been addressed as follows:

- The minor block work cracking and differential settlement is not considered to have a significant impact on the load carrying capacity of the structure.
- In discussion with Christchurch City Council the cantilevered modesty walls at each end of the building have been demolished.

The above information should allow the existing placard to be removed in discussion with CERA.

### 5.2.2. Grandstand

Damage noted during an inspection of the building includes hairline cracks to the underside of the bleacher units, 0.6 mm wide cracking to cantilever part of the stairs and 'puckering' of the



fibreglass topping of the viewing platform which appears to be at the joins of the precast floor units. One section of the 'puckering' was lifted and the concrete beneath inspected revealing 0.3mm cracks. The separation joint with the Softball Complex has been damaged and rainwater is now leaking into the walkway beneath. Some of the waterproofing seals on the structure has visible cracking and in some cases spalled plasterwork beneath.

The survey contained in Appendix 3 – Survey Results indicated a differential settlement of 35mm to the ground floor slab and 52mm to the viewing deck area. The settlement relative to the original building level has not been ascertained due to the survey using a different datum level when compared with the original construction drawings. The maximum slope of the viewing deck area is approximately 52mm over 10m or 0.52%. While this is not a residential property the guidance document titled "Guidance on house repairs and reconstruction following the Canterbury Earthquake" recommends that a house with Type C foundations (slab on grade) should have foundations completely rebuilt if the slope between two points greater than 2m apart is greater than 0.50%; as noted above the slope is approximately 0.52%. These levels would lead to the conclusion that the building has settled and relevelling or demolition is required.

### 5.2.3. Groundsmans Shed

Damage to the Groundsmans Shed consisted of hairline cracking to some of the blockwalls as well as substantial cracking to ground floor slab.

The building was not surveyed, however there was no evidence of settlement nor of any structural distress caused by settlement.

### 5.2.4. Dugouts

No damage or settlement issues were noted to the dugouts during the site inspection.

### 5.2.5. Canopy between the Softball Complex and Cowles Stadium

No damage to the canopy structure was discovered, an intrusive investigation was undertaken where the canopy connects to Cowles Stadium since this location will transfer all longitudinal loads from the canopy into Cowles Stadium and then into the foundations. The intrusive investigation showed that there was no damage in this connection.

### 5.2.6. Lighting Towers

No damage was noted to the light towers during the site inspection, however it was recommended that a verticality survey and a review of the bolt tensioning be carried out due to the critical nature of these elements of the structure. No intrusive investigations were undertaken to inspect the foundations although based on the detailed engineering calculations for these structures it is reasonable to assume that limited or no damage has occurred to the light tower structures.



The tension in the holding down bolts was reviewed against the methods of tensioning contained in NZS3404: Part 1:1997. It was discovered that 98% of the nuts had sufficient tension, 2% of the bolts were tensioned and all bolts held tension and so did not require replacement.

The verticality survey of the light towers which is attached at Appendix 3 – Survey Results has shown that the 5 of the 6 light towers were not vertical and exceeded the recommended column plumb tolerance. The recommended column plumb tolerance is 25mm for any point up to 60m in height and lights 1, 2, 3, 5 and 6 exceed this tolerance in one or both measured orthogonal directions and hence these light towers will need to be re-plumbed. The towers should be levelled by lifting them off the foundations, providing the necessary level of shims and then replacing the towers, tensioning the bolts using the methods contained in NZS3404 and the baseplates drypacked.



## 6. Foundation and Ground Conditions

Descriptions of ground conditions are based on boreholes and CPT's.

### 6.1. Ground

Investigation findings show that the materials are predominantly loose to dense medium to coarse sand. The sequence of materials typically comprised of an "upper" medium dense sand layer with occasional thin beds of silt. The thin beds of silt were identified at approximately 4.0 - 4.5m, 5.0 - 5.5m and 6.0 - 6.5m. A deeper 750mm thick silty layer was identified approximately 14.0 to 16.0m below ground level. Underlying this silt layer a "lower" dense medium sand layer was encountered.

Refer to the borehole logs presented in the Geotechnical report for more detailed interpretation.

The paleo-topography generally indicates that the underlying soil profile is near flat to gently sloping. Refer to Drawings ZP01185-001, 002 and 003 for the inferred geological long section and the estimated extent of the sand and silty layers. We have assumed a flat site at RL15m for the long sections as no detailed survey/level was undertaken.

### 6.2. Groundwater

Groundwater levels were measured at the completion of drilling and also undertaken the day after drilling in the open hole (no piezometer). These results are presented on the borehole logs in the Geotechnical report.

The groundwater table is estimated to be 2m below existing ground level based on measurements in the boreholes.

### 6.2.1. Bearing Capacity

Bearing capacity of the shallow foundations of Cuthberts Green Softball Pavilion and Grandstand were calculated in accordance with 'New Zealand Building Code Structure Clause B1/VM4, Foundations'.

This calculation assumed foundations of Cuthberts Green Softball Pavilion to be 600mm high, 270mm wide strip footing as per drawing D3479 and foundations of the Grandstand to be 1200mm deep, 600mm diameter circular concrete foundation as the worst case as per drawing S1.01. Design parameters were assumed based on borehole logs and CPT output and they are show in Table 4. The ground was pre-drilled to the depth of 1.2-1.8m so that the cone resistance value (q<sub>c</sub>) was assumed to be the value at 1.2m bgl (below ground level).



### Table 3 Design Parameters

Unit Weight, γ (kN/m <sup>3</sup> )	18
Friction Angle, $\Phi$ (°)	35

### Table 4 Bearing Capacity of Softball Pavilion and Grandstand

	Softball Pavilion	Grandstand
Ultimate Bearing Capacity (kPa)	650	1700
Allowable Bearing Capacity (kPa)	215	550

### 6.3. Seismic Assessment

Seismic loading for geotechnical foundation assessment has been determined from NZS 1170.5:2004 Structural Design Actions Part 5: Earthquake Actions – New Zealand, with the following inputs:

- Site subsoil class: D (deep soil)
- Zone factor 0.3
- Structure design working life 50 years (this is the maximum design working life)
- Structural importance level 2
- Serviceability-level earthquake annual probability of exceedance (SLS) 1/25
- Ultimate limit state earthquake annual probability of exceedance (ULS) 1/500
- Maximum considered earthquake annual probability of exceedance (MCE) 1/2500

The Ultimate Limit State (ULS) and the Serviceability-level earthquake is Serviceability Limit State (SLS). The resulting design seismic loadings are peak ground acceleration (PGA) for:

- NZS1170 1/25 year return period (SLS) 0.084g
- NZS 1170 1/500 year return period (ULS) 0.336g
- NZS 1170 1/2500 year return period (MCE) 0.605g

### 6.4. Liquefaction

The susceptibility of a site to soil liquefaction is a function of particle size distribution, groundwater level and soil density. Liquefaction assessment has been carried for the soil profile of CPT02, CPT10 and CPT14 using the simplified procedure presented in the 1996 and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils. Data was analysed using CPT results from the investigation. Results of the liquefaction analysis are presented in the appendix to



the Geotechnical report. By this method, the analyses indicate that there is a risk of liquefaction within the silty sand units under ULS acceleration. In this loading case, the liquefaction occurs only in the fully saturated, loose material of the upper sand layer from approximately 4m to 15m depth.

Due to the soils showing a high liquefaction potential under ULS accelerations, the soils are expected to be prone to liquefaction induced settlement under ULS loading and the bearing capacity of shallow foundations may be compromised. It is likely that this will manifest as some irregular settlement or tilting.

### 6.5. Possible Remedial Works

Results from the investigations (CPT02, CPT10 & CPT14) show zones of loose and medium dense sands in the upper 15m.

The existing pavilion structure and the grandstand both satisfy the static bearing capacity in accordance with 'New Zealand Building Code Structure Clause B1/VM4, Foundations'. However, under ULS earthquake loading we would anticipate liquefaction and associated settlement and ground deformation resulting in a loss of serviceability. The existing foundation would not be considered appropriate for the given ground conditions and applicable earthquake design criteria. Detailed design of the foundations has not been undertaken as part of this investigation, although it is concluded that remedial treatment is required to improve the seismic performance of the existing foundations. Examples and explanation of possible ground treatments options are as follows:

**Vibro-compaction technique** – This technique is used to densify granular soils using a deep vibrator. It involves vibrating a hollow steel probe into the soils to the required depth. Aggregate is then introduced down the probe to the base of the hole and is vibro-compacted whilst the probe is slowly withdrawn.

**Vibro Replacement installed as a stone column** – Similar in character to the vibro-compaction using top feed vibrators which are forced into the ground. The aggregates are then allowed to take the place of the displaced soil which exerts a pressure on the surrounding soil, hence helping to improve the soil's load-bearing capacity and liquefaction resistance.

**Compaction grouting** (Pressure / permeation grouting) involves injecting a grout material into the pore or void space of loose granular materials and is often referred to simply as *grouting*. The grout is usually a cementitious mix that is assumed to strengthen a formation. The risk in this technique is controlling the distribution of the injected materials and validating that sufficient material has been successfully placed in the required zones to achieve the desired result.

**Deep Soil Mixing (DSM)** is a soil improvement technology used to treat soils in situ to improve strength and stiffness thereby improving bearing capacity and reducing compressibility. The process involves mixing a grout or binder with the soil in reciprocating augers to create cemented column of improved soil.



**Displacement Piles** can be used to also improve the mass strength / stiffness of an extensive area of loose compressible or potentially liquefiable soils. The technique simply involves driving displacement piles at intervals across the required treatment to a pre-determined depth. The installation of the piles can densify loose sand deposits within the immediate influence zone of the pile and transfer structural loads to deeper more competent soils. Displacement piles can be driven pre-cast concrete or timber poles.

A Stiffened Raft is another treatment option that could be considered. This process would involve the mass excavation and replacement of loose / soft near surface soils to a pre-determined depth with an engineered / compacted fill material that may or may not be reinforced with geo-fabrics or grids. The stiffened raft provides a competent formation to above ground structures and mitigates the consequences of any liquefaction of materials at depth.

**Structural Solutions** for improving the seismic performance of the existing foundations would involve the installation / construction of underpinning piles. Underpinning piles may take the form of conventional screw piles installed in small groups immediately adjacent and structurally connected to existing shallow foundations. The piles would need to be installed to found in competent materials that are not prone to liquefaction and would need to be grouped to provide adequate lateral and shear resistance in the event that earthquake induced liquefaction occurs in the overlying loose soils.

Given the area of treatment would encompass the whole of the building footprint it is unlikely that any of the above treatment options could be implemented without first removing the existing flooring.

A detailed assessment of the options would be required to determine which offers the most effective solution. Criteria to be used in the evaluation would be:-

- Cost
- Construction Programme / Duration
- Effectiveness degree to which liquefaction effects can be mitigated
- Site Constraints suitability of treatment process given existing site constraints.
- Environmental Impacts degree to which noise, vibration, silt / water discharges from the site could impact on the environment and neighbouring properties.

On the balance of the above factors and given our current understanding of the site constraints we would currently predict that the Deep Soil Mixing or Displacement Piling solutions would be favoured.



## 7. Seismic Loading

The following criteria has been used to determine the seismic loading in accordance with NZS 1170.5:

#### Factor Value (Groundsmans Discussion Value (other Shed) structures) $C_h(T)$ 3.00 3.00 As above Site Subsoil class D, with period less than 0.4 seconds Ζ 0.3 0.3 Altered Seismic Zone factor for Canterbury following the Canterbury Earthquakes R 1.0 1.0 Importance Level 2, 50 year design life and Annual Probability of exceedance for ULS 1/500 N(T,D)1.0 1.0 No near fault considerations required 0.9 1.0 Ultimate Limit state structural $S_p$ performance factor using ZNS 1170.5 figures. 1.0 Ductility 1.00 for Groundsmans 1.14 kμ shed and 1.25 for other structures, assumed period less than 0.4sec 0.73 0.9 $C_d(T_1)$

### Table 5: Seismic Design Parameters



## 8. Assumptions

The following assumptions have been made in the detailed engineering evaluation:

- Structural Steelwork material grade = 300MPa (Softball Complex, Dugouts and Light Towers)
- Concrete material grade = 30MPa (Grandstand), 30MPa (Softball Complex, Groundsmans Shed, Light Towers, Dugouts)
- Reinforcing Steelwork grade = 300MPa (Grandstand D bars), 500MPa (Grandstand H bars), 485MPa (Grandstand Mesh), 300MPa (Softball Complex, Groundsmans shed), 500MPa (Light Towers, Dugouts)
- Blockwork strength = 12MPa (Groundsmans Shed and Softball Complex)
- The building was built according to the drawings and according to good practice at the time. We have reviewed the building and from our visual inspection the structure appears to be built in accordance with the drawings.



## 9. Investigation scope and limitations

This report covers DEEs only of the structures listed above in the Introduction. The DEE process is outlined in guidance notes from the Engineering Advisory Group<sup>3</sup> and aims to be a 'review of the building design, construction, and how the building has performed in recent earthquakes to understand its potential performance in future earthquakes and to determine what repair or strengthening is required to bring it to a satisfactory level of compliance or to simply improve its future performance.'

These DEEs were based on either drawings of the structure or a site inspection as detailed in section 2 and 3. The detailed engineering analysis is a post construction evaluation. Since it is not a full design and construction monitoring, it has the following limitations:

- It is not likely to pick up on any concealed construction errors (if they exist)
- Other possible issues that could affect the performance of the building such as corrosion and modifications to the structure will not be identified unless they are visible and have been specifically mentioned in this report.
- The detailed engineering evaluation deals only with the structural aspects of the structure. Other aspects such as building services and building fabric are not covered.

### 9.1. Available Information

The DEEs were based on the following information:

- Softball complex original drawings dated 1987-1988 by the Christchurch City Council City Works and Planning Department
- Grandstand original consent drawings dated 2009 by Alan Reay Consultants
- Groundsmans shed no drawings were available for this building. Our DEE was based on site measurements and a rebar survey
- Light towers drawings date 2003 by CSP Pacific and City Solutions
- Dugouts 2003 drawings by City Solutions
- Canopy between the Softball Complex and Cowles Stadium no drawings were available for this structure. Our DEE was based on site measurements and an intrusive investigation into the ceiling of the structure.

<sup>&</sup>lt;sup>3</sup> See EAG 2011, Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury - Draft, p 10



## 9.2. The Detailed Engineering Evaluation process

The DEE is a procedure written by the Department of Building and Housing's Engineering Advisory Group and grades buildings according to their likely performance in a seismic event. The procedure is not yet recognised by the NZ Building Code but is widely used and recognised by the Christchurch City Council as the preferred method for preliminary seismic investigations of buildings<sup>4</sup>.

The procedure of the DEE is as follows:

- 1) Qualitative assessment procedure
  - a. Determine the building's status following any rapid assessment that have been done
  - b. Review any existing documentation that is available. This will give the engineer an understanding of how the building is expected to behave. If no documentation is available, site measurements may be required
  - c. Review the foundations and any geotechnical information available. This will include determining the zoning of the land and the likely soil behaviour, a site investigation may be required
  - d. Investigate possible Critical Structural Weaknesses (CSW) or collapse hazards
  - e. Assess the original and post earthquake strength of the building
- 2) Quantitative procedure
  - a. Carry out a geotechnical investigation if required by the qualitative assessment
  - b. Analyse the building according to current building codes and standards

The DEE assessment ranks buildings according to how well they are likely to perform relative to a new building designed to current earthquake standards, as shown in Table 6. The building rank is indicated by the percent of the required New Building Standard (%NBS) strength that the building is considered to have. Earthquake prone buildings are defined as having less than 33 %NBS strength which correlates to an increased risk of approximately 20 times that of 100% NBS<sup>5</sup>. Buildings that are identified to be earthquake prone are required by law to be strengthened within 30 years of the owner being notified that the building is potentially earthquake prone<sup>6</sup>.

<sup>&</sup>lt;sup>4</sup> <u>http://resources.ccc.govt.nz/files/EarthquakeProneDangerousAndInsanitaryBuildingsPolicy2010.pdf</u>

 <sup>&</sup>lt;sup>5</sup> NZSEE 2006, Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, p 2 2

<sup>&</sup>lt;sup>6</sup> http://resources.ccc.govt.nz/files/EarthquakeProneDangerousAndInsanitaryBuildingsPolicy2010.pdf



Table 6: DEE Risk classifications

Description	Grade	Risk	%NBS	Structural performance
Low risk building	A+	Low	> 100	Acceptable. Improvement may
				be desirable.
	А		100 to 80	
	D			
	В		80 to 67	
Moderate risk building	С	Moderate	67 to 33	Acceptable legally.
Woderate fisk building	C	Moderate	071035	1 0 5
				Improvement recommended.
High risk building	D	High	33 to 20	Unacceptable. Improvement
				required.
	Е		< 20	

The DEE method rates buildings based on the plans (if available) and other information known about the building and some more subjective parameters associated with how the building is detailed and so it is possible that %NBS derived from different engineers may differ.

This assessment describes only the likely seismic Ultimate Limit State (ULS) performance of the building. The ULS is the level of earthquake that can be resisted by the building without catastrophic failure. The DEE does also consider Serviceability Limit State (SLS) performance of the building and or the level of earthquake that would start to cause damage to the building but this result is secondary to the ULS performance.

The NZ Building Code describes that the relevant codes for NBS are primarily:

- AS/NZS 1170.0,1,5 Structural Design Actions
- NZS 3101:2006 Concrete Structures Standard
- NZS 3404:1997 Steel Structures Standard
- NZS 2606:1993 Timber Structures Standard
- NZS 4230:1990 Design of Reinforced Concrete Masonry Structures



## 10. Discussion

The information below confirms the outcome of our detailed engineering evaluation as well as discusses any critical structural weaknesses which have been identified.

### 10.1. Geotechnical results

The bearing capacity of the soil under non-seismic cases appears to be adequate, however under earthquake loading there is a high liquefaction potential. Liquefied soils are likely to result in further settlement and possible structural damage. It is recommended that a detailed design assessment of the possible ground remediation or foundation strengthening solutions is undertaken.

### 10.2. Critical Structural weaknesses

### 10.2.1. Softball complex

The only critical structural weakness in the softball complex is the stairs. The stairs of this building are detailed in such a way that they are considered a critical structural weakness, however since the structure is a single level shear wall structure it is not anticipated that sway will be large enough to cause the stairs to collapse and in addition there is an alternative means of escape down the bleachers of the grandstand. Removing this critical structural weakness would cost only a small amount by the addition of two new structural steel columns under the landing. It is anticipated that detailed design should confirm these new columns are able to rest on the existing floor slab.

### 10.2.2. Grandstand

The Grandstand is not thought to have any critical structural weaknesses. The stairs of this structure are detailed such that they might be classified as a critical structural weakness, however since the structure is a single level shear wall structure it is not anticipated that sway will be large enough to cause the stairs to collapse and in addition there is an alternative means of escape down the bleachers.

### 10.2.3. Groundsmans shed

The Groundsmans Shed is not thought to have any critical structural weaknesses.

### 10.2.4. Light towers

The Light Towers are not thought to have any critical structural weaknesses.

### 10.2.5. Dugouts

The Dugouts are not thought to have any critical structural weaknesses.



### 10.2.6. Canopy

A portion of the canopy is being supported by Cowles Stadium. This connection will initially transfer all longitudinal loads from the canopy into Cowles Stadium and then into the foundations. From intrusive investigations it was found the lateral loads from the canopy transfers loads to Cowles Stadium by horizontal nail connections. The capacity of this connection has been accounted for in our design and as such can be ignored.

### 10.3. Detailed Engineering Results

The equivalent static force method was used to analyse the seismic capacity of the structures. The results of the analysis are reported below. The results below are calculated for the structures in the damaged state. The results have been broken down into their seismic resisting elements.

### 10.3.1. Softball complex

The steel portal frame on the first floor was found to have insufficient strength due to the lack of bracing in the longitudinal direction – having an existing capacity of 60%NBS.

It was also noted that the lack of bracing will produce large deflections in moderate seismic events and if future strengthening is undertaken this will need to be addressed.

Some of the block walls at ground floor level were found to have inadequate reinforcing – having an existing capacity 56%NBS.

A section of the first floor slab cantilevers to the south west toward the grandstand and was found to have insufficient strength – having an existing capacity of 39%NBS (this is due to vertical earthquake accelerations).

The failed cantilever modesty wall is assumed to have a capacity less than 10%NBS. As noted in section 3 this wall and the matching wall at the opposite end of the building have been demolished to remove the immediate safety risk. The capacity of the modesty walls in their undamaged state has been assessed at 26%.

Appendix 3 – Survey Results contains the results of limited surveys which were undertaken. These generally show that the some areas of the ground bearing floor slab are out of level and should be replaced with new code-compliant floor slabs. In addition the survey shows that the walls have settled, these settlements should be corrected and the foundations improved to limit future liquefaction settlement.



### Table 7: DEE assessment summary for the Softball Complex

Seismic Resisting Element	Seismic Rating (%NBS)		
Modesty walls in damaged condition	<10		
Modesty Wall prior to Earthquake Damage	26		
First floor slab cantilevers to the south west	39		
Concrete Block Walls	56		
Steel Portal Frames (ULS)	60		

### 10.3.2. Grandstand

Our analysis found that the structural connection between the grandstand bleachers and the foundations were inadequate – having existing capacity of 52%NBS. The connection should be strengthened by adding additional bars drilled and grouted through the bleachers into the foundation. Our analysis found that the structural connection between the precast wall panels and the foundations were less than current requirements – having existing capacity of 80%NBS. The connection could be strengthened by adding additional bars drilled and grouted at an angle near to vertical through wall panels into the foundations.

Appendix 3 – Survey Results contains the results of limited surveys which were undertaken. The survey shows that the walls have settled, these settlements should be corrected and the foundations improved to limit future liquefaction settlement. Detailed design will be required for the foundation upgrade.

Seismic Resisting Element	Seismic Rating (%NBS)
Bleacher to Foundation Connection	52
Precast Wall connection to Foundation	80

### Table 8: DEE assessment summary for the Grandstand

### 10.3.3. Groundsmans shed

The block walls were shown to have insufficient strength – having existing capacity of 43%NBS.

The roof diaphragm was shown to have insufficient strength – having existing capacity 19%NBS.



The shed was not surveyed since there was no visible reason to believe that any settlement had occurred. The foundations of the building may need to be strengthened in order to limit future settlements. Detailed design will be required for the foundation upgrade.

### Table 9: DEE assessment summary for the Groundsmans Shed

Seismic Resisting Element	Seismic Rating (%NBS)
Roof diaphragm	19
Block walls	43

### 10.3.4. Light towers

The light towers were found to have a capacity in excess of 100% and so no strengthening is proposed.

### Table 10: DEE assessment summary for the Light Towers

Seismic Resisting Element	Seismic Rating (%NBS)		
Entire structure	>100%		

### 10.3.5. Dugouts

The Dugouts were found to have a capacity in excess of 100% and so no strengthening is proposed. There was no visual evidence of settlement and so no survey was undertaken. Due to the value of the Dugouts foundation strengthening to prevent future liquefaction settlement is not proposed.

### Table 11: DEE assessment summary for the Dugouts

Seismic Resisting Element	Seismic Rating (%NBS)		
Entire structure	>100%		

### 10.3.6. Canopy

The connection between the canopy and Cowles Stadium is inadequate based on intrusive investigations.

There was no visible settlement and so a survey has not been undertaken. The foundations of the building may need to be strengthened in order to limit future settlements. Detailed design will be required for the foundation upgrade and this is currently excluded from the strengthening concept.



### Table 12: DEE assessment summary for Canopy

Seismic Resisting Element	Seismic Rating (%NBS)	
Earthquake loads in longitudinal direction, governed by withdraw of the nail connections	23	
Concrete Block Wall at Cowles Stadium	54	
Earthquake loads in transverse direction	100	

### 10.3.7. Assessment Summary

Table 13 below summarises the earthquake prone status of each building on the site.

### Table 13: DEE assessment summary

Building	Date of drawings	%NBS estimate	Earthquake prone	Earthquake risk	Rating
Softball complex (modesty walls in damaged condition)	1988	<10	Yes	Yes	E
Softball complex (modesty walls prior to the earthquakes)	1988	26	Yes	Yes	E
Groundsmans shed	Not available	19	Yes	Yes	Е
Canopy	Not available	23	Yes	Yes	D
Softball complex (modesty walls demolished)	1988	39	No	Yes	С
Grandstand	2009	52	No	Yes	С
Light towers	2003	>100	No	No	A+
Dugouts	2003	>100	No	No	A+

As above the Groundsmans Shed, Canopy and the Softball Complex are Earthquake Prone buildings. Based on the above we recommend that the Softball Complex be vacated immediately pending strengthening. Christchurch City Council may wish to vacate the Groundsmans shed until



it is strengthened or stabilised on the basis of the limiting building capacity summarised above in Table 13 but it is understood that there is no legal requirement to do so at this point.

Note that the proposed strengthening designs are conceptual designs only and full detailed design will be required prior to confirming the details and the associated costs.

If it is determined that the structures should be repaired there are a number of issues which will need to be investigated and associated documents prepared in order to submit a building consent application. Listed below are the likely items the council may require to be explored:

- A detailed assessment of the foundation remediation works will be required so that the costs of the work can be included in the cost estimate.
- A fire report will be required and all necessary upgrades to egress routes, emergency lighting and specified systems will need to be undertaken.
- An emergency lighting design will be required to meet the provisions noted in the fire report.
- A disabled access summary will be required including provision for disabled facilities.
- The site amenities (toilets and the like) will need to be reviewed to ensure that there are sufficient facilities for the expected number of people on site.
- Landscaping will need to be considered although we do not anticipate that any modifications
  will be required since you will not be adjusting the footprint area of buildings on site and will
  likely only be required for the new build option.



## 11. Conclusion

We have inspected the Softball Complex, Grandstand, Groundsmans Shed, Light Towers, Dugouts and Canopy structures on the Cuthberts Green site and commented on levels of damage. In addition we have undertaken a detailed engineering evaluation of the structures to consider the structures seismic capacities compared with New Building Standard. The outcome of this analysis is shown in Table 16 below:

Description	Grade	Risk	%NBS Pre EQ	%NBS Post EQ	Structural performance
Softball complex (modesty walls in damaged condition)	Е	High	26	<10%	Unacceptable. Improvement required.
Groundsmans shed	Е	High	19	19	Unacceptable. Improvement required.
Canopy	D	High	23	23	Unacceptable. Improvement required.
Softball complex (modesty wall demolished)	С	Moderate	39	39	Acceptable legally. Improvement recommended.
Grandstand	С	Moderate	52	52	Acceptable legally. Improvement recommended.
Light towers	A+	Low	>100	>100	Acceptable. Improvement may be desirable.
Dugouts	A+	Low	>100	>100	Acceptable. Improvement may be desirable.

### Table 14: DEE Summary Table



The above table excludes the portal frame serviceability capacity; we recommend that the serviceability capacity is not considered in a decision on whether to vacate the building. As shown above the Groundsmans Shed, canopy and the Softball Complex are classified as Earthquake Prone Buildings and these building are required to be strengthened to a target of at least 67% of NBS.

We make the following additional recommendations:

- A detailed design of foundation remediation solutions and associated costs obtained from a specialist contractor in order to weigh up the merits of repair options compared with demolish and rebuild options.
- The current placard status of the building of green, remain as is.
- We consider that barriers around the building are not necessary unless the Softball Complex is evacuated in which case barriers should be placed to prevent access between the Grandstand and the Softball Complex at ground level as well as onto the Softball Complex balcony at level 1.
- An options study is carried out providing solutions to strengthen the potentially earthquake prone buildings (Softball complex, Groundsmans Shed, and Canopy) to a target of 34% and 67% of New Building Standard.
- If the earthquake prone buildings are vacated then access to the adjacent Grandstand offices should also be cordoned due to the risk level associated with the access to the offices.



## 12. Limitation Statement

This report has been prepared on behalf of, and for the exclusive use of, SKM's client, and is subject to, and issued in accordance with, the provisions of the contract between SKM and the Client. It is not possible to make a proper assessment of this report without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to, and the assumptions made by, SKM. The report may 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. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this report by any third party.

Without limiting any of the above, in the event of any liability, SKM's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited in as set out in the terms of the engagement with the Client.

It is not within SKM's scope or responsibility to identify the presence of asbestos, nor the responsibility of SKM to identify possible sources of asbestos. Therefore for any property predating 1989, the presence of asbestos materials should be considered when costing remedial measures or possible demolition.

Should there be any further significant earthquake event, of a magnitude 5 or greater, it will be necessary to conduct a follow-up investigation, as the observations, conclusions and recommendations of this report may no longer apply Earthquake of a lower magnitude may also cause damage, and SKM should be advised immediately if further damage is visible or suspected.



# Figure 2 – Complex – Typical Damage of Figure 3 – Complex – Typical wall cracking. Modesty Walls. Figure 4 – Complex – Typical cracking and Figure 5 – Complex – Floor slab cracking and settlement of slab adjacent Grandstand. bulging.

## 13. Appendix 1 – Damage Photos

#### SINCLAIR KNIGHT MERZ









#### SINCLAIR KNIGHT MERZ





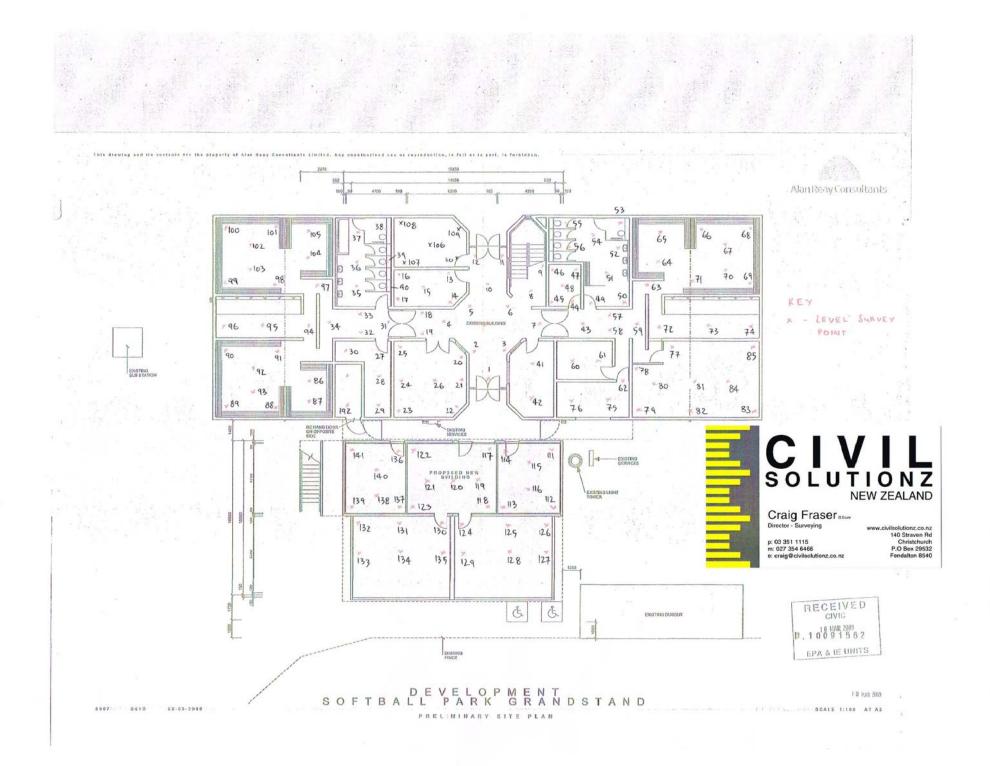
 Figure 14 – Light Towers – Typical Base detail, some require relevelling.

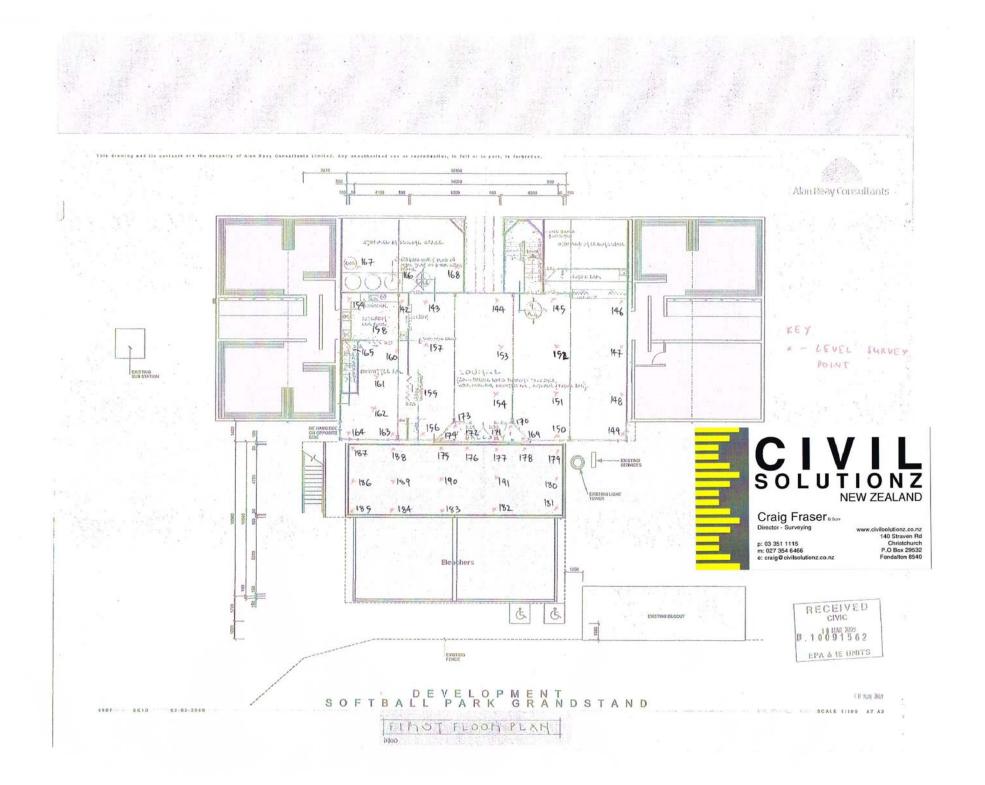
#### SINCLAIR KNIGHT MERZ



# 14. Appendix 2 – Survey Results

SINCLAIR KNIGHT MERZ





# FLOOR SLAB LEVELS

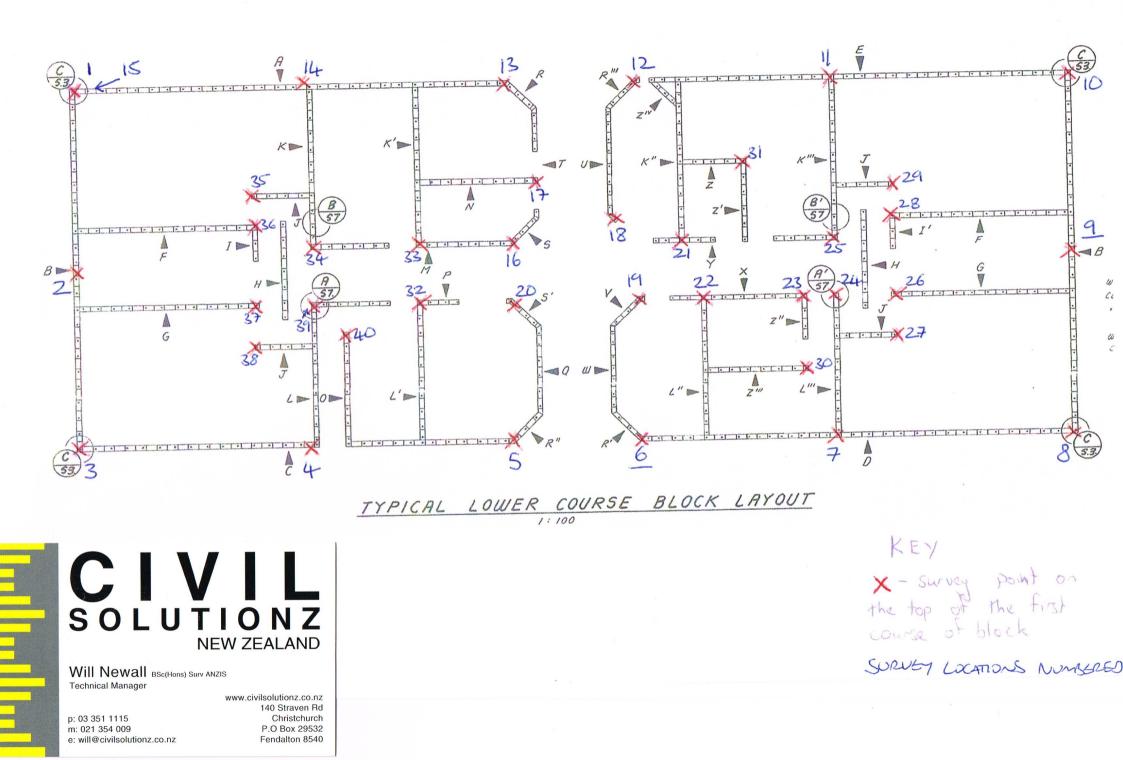
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8.393       5       20         8.385       6       12         8.384       7       11         8.393       8       20         8.4       9       27         8.395       10       22         8.395       10       22         8.395       10       22         8.395       12       23         8.396       12       23         8.383       13       10         8.374       14       1         8.375       5       -         8.387       17       14         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)				
8.385       6       12         8.384       7       11         8.393       8       20         8.393       8       20         8.393       8       20         8.395       10       22         8.398       11       25         8.398       11       25         8.398       11       25         8.398       11       25         8.398       11       25         8.398       11       25         8.391       15       5         8.391       16       17         8.386       18       13         8.386       18       13         8.386       18       13         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)<				
8.384       7       11         8.393       8       20         8.393       8       20         8.393       8       20         8.395       10       22         8.398       11       25         8.398       11       25         8.398       12       23         8.383       13       10         8.374       14       1         8.378       15       5         8.39       16       17         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       23       23       lino         8.394       26       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.397       30       24       sarpet(about 8mm)         8.397 <td></td> <td></td> <td></td> <td></td>				
8.393       8       20         8.4       9       27         8.395       10       22         8.396       12       23         8.396       12       23         8.387       14       1         8.378       15       5         8.391       16       17         8.393       16       17         8.386       18       13         8.387       20       14       carpet(about 8mm)         8.386       19       13				
8.4       9       27         8.395       10       22         8.398       11       25         8.398       12       23         8.383       13       10         8.374       14       1         8.375       15       5         8.39       16       17         8.387       17       14         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.396       23       23       1ino         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       27       24       26         8.397       29       24       26         8.397       30       24       24         8.397       30       24         8				
8.395       10       22         8.396       11       25         8.396       12       23         8.383       13       10         8.374       14       1         8.378       15       5         8.39       16       17         8.387       17       14         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.394       23       23       lino         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       27       24       24         8.402       28       29       29         8.397       30       24       24         8.397       30       24       24         8.397       33				
8.398       11       25         8.396       12       23         8.383       13       10         8.374       14       1         8.374       14       1         8.374       14       1         8.378       15       5         8.39       16       17         8.387       17       14         8.386       18       13         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       23       10no       100         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.402       28       29       24         8.402       28       29       24         8.397       30       24       24         8.397       33       24       24         8.397				
8.396       12       23         8.383       13       10         8.374       14       1         8.378       15       5         8.39       16       17         8.387       17       14         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.394       23       23       lino         8.395       23       23       lino         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       29       24       sassign 31         8.397       29       24       sassign 33         8.397       30       24       sassign 33         8.397       33       24       sassign 33         8.391       35       18       sassign 33 <td></td> <td></td> <td></td> <td></td>				
8.383       13       10         8.374       14       1         8.374       14       1         8.378       15       5         8.39       16       17         8.387       17       14         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       23       23       lino         8.394       24       26       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29          8.401       26       28       carpet(about 8mm)         8.397       30       24          8.402       27           8.397       33       24          8	-			
8.374       14       1         8.378       15       5         8.387       17       14         8.387       17       14         8.387       17       14         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       23       lino       lino         8.394       26       carpet(about 8mm)       lino         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29       lino         8.397       27       24       lino         8.397       30       24       lino         8.397       30       24       lino         8.397       30       24       lino         8.397       33       24       lino         8.397       33       18				
8.378       15       5         8.39       16       17         8.387       17       14         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.396       23       23       lino         8.397       24       26       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29          8.402       28       29          8.397       30       24          8.397       31       22          8.397       33       24          8.397       33       24          8.398       34       25				
8.39       16       17         8.387       17       14         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.394       24       26       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29       14         8.397       27       24       14         8.397       29       24       26         8.397       30       24       14         8.397       30       24       14         8.397       33       24       14         8.398       34       25       15         8.391       35       18       16         8.393       36       17       16         8.403       37 <td></td> <td></td> <td></td> <td>  </td>				
8.387       17       14         8.386       18       13         8.386       19       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.396       23       23       lino         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29       24         8.402       28       29       24         8.397       27       24       24         8.397       30       24       24         8.397       30       24       24         8.397       30       24       24         8.397       31       22       27         8.398       34       25       25         8.391       35       18       25         8.393       36       17       24         8.403				
8.386       18       13         8.386       19       13         8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.396       23       23       lino         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)         8.397       27       24       carpet(about 8mm)         8.397       29       24       carpet(about 8mm)         8.397       30       24       carpet(about 8mm)         8.397       30       24       sassistical accorpet(about 8mm)         8.397       30       24       sassistical accorpet(about 8mm)         8.398       34       25       sassistical accorpet	-			
8.386         19         13           8.387         20         14         carpet(about 8mm)           8.391         21         18         carpet(about 8mm)           8.393         22         20         carpet(about 8mm)           8.393         22         20         carpet(about 8mm)           8.396         23         23         lino           8.396         23         23         lino           8.397         25         24         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.402         28         29            8.402         28         29            8.397         29         24            8.397         30         24            8.397         30         24            8.397         33         24            8.397         33         24            8.398         34         25            8.391         35         18            8.393	-			
8.387       20       14       carpet(about 8mm)         8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.396       23       23       lino         8.396       23       23       lino         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29       .         8.402       28       29       .         8.397       29       24       .         8.397       30       24       .         8.397       30       24       .         8.397       30       24       .         8.397       31       22       .         8.4       32       27       .         8.397       33       24       .         8.391       35       18       .         8.393       36       17       .         8.403       37       30       .         8.413       38       40 <t< td=""><td></td><td></td><td></td><td></td></t<>				
8.391       21       18       carpet(about 8mm)         8.393       22       20       carpet(about 8mm)         8.396       23       23       lino         8.399       24       26       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.402       28       29       .         8.397       29       24       .         8.397       30       24       .         8.397       30       24       .         8.397       30       24       .         8.397       30       24       .         8.397       30       24       .         8.397       33       24       .         8.391       35       18       .         8.393       36       17       .         8.403       37       30       .         8.413       38       40       .         8.395       39       22       .         8.382       40       9				
8.393         22         20         carpet(about 8mm)           8.396         23         23         lino           8.399         24         26         carpet(about 8mm)           8.397         25         24         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.397         27         24            8.402         28         29            8.397         29         24            8.397         30         24            8.397         30         24            8.395         31         22            8.4         32         27            8.397         33         24            8.398         34         25            8.391         35         18            8.393         36         17            8.403         37         30            8.413         38         40            8.382         40				
8.396         23         23         lino           8.399         24         26         carpet(about 8mm)           8.397         25         24         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.397         27         24            8.402         28         29            8.397         29         24            8.397         30         24            8.397         30         24            8.397         30         24            8.395         31         22            8.4         32         27            8.397         33         24            8.398         34         25            8.391         35         18            8.393         36         17            8.403         37         30            8.413         38         40            8.382         40         9	-			
8.399       24       26       carpet(about 8mm)         8.397       25       24       carpet(about 8mm)         8.401       26       28       carpet(about 8mm)         8.397       27       24          8.402       28       29          8.397       29       24          8.397       29       24          8.397       30       24          8.397       30       24          8.397       30       24          8.397       33       24          8.397       33       24          8.398       34       25          8.391       35       18          8.393       36       17          8.403       37       30          8.413       38       40          8.382       40       9          8.382       40       9          8.382       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8				
8.397         25         24         carpet(about 8mm)           8.401         26         28         carpet(about 8mm)           8.397         27         24            8.402         28         29            8.397         29         24            8.397         29         24            8.397         30         24            8.397         30         24            8.397         30         24            8.395         31         22            8.4         32         27            8.397         33         24            8.398         34         25            8.391         35         18            8.393         36         17            8.403         37         30            8.413         38         40            8.395         39         22            8.382         40         9            8.382         41         12         Carpet (about6mm) </td <td></td> <td></td> <td></td> <td></td>				
8.401       26       28       carpet(about 8mm)         8.397       27       24         8.402       28       29         8.397       29       24         8.397       30       24         8.397       30       24         8.397       30       24         8.397       30       24         8.395       31       22         8.4       32       27         8.397       33       24         8.398       34       25         8.391       35       18         8.393       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.382       40       9         8.382       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.374       43       1       43         8.379       44       6       43         8.382       45	-			
8.397       27       24         8.402       28       29         8.397       29       24         8.397       30       24         8.397       30       24         8.395       31       22         8.4       32       27         8.397       33       24         8.397       33       24         8.398       34       25         8.391       35       18         8.393       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.382       40       9         8.382       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.374       43       1       1         8.379       44       6          8.382       45       9				
8.402       28       29         8.397       29       24         8.397       30       24         8.395       31       22         8.4       32       27         8.397       33       24         8.397       33       24         8.397       33       24         8.397       33       24         8.398       34       25         8.391       35       18         8.393       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.374       43       1       1         8.379       44       6          8.382       45       9				carpet(about 8mm)
8.397       29       24         8.397       30       24         8.395       31       22         8.4       32       27         8.397       33       24         8.397       33       24         8.398       34       25         8.391       35       18         8.393       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.374       43       1          8.379       44       6          8.382       45       9				
8.397         30         24           8.395         31         22           8.4         32         27           8.397         33         24           8.398         34         25           8.391         35         18           8.392         36         17           8.403         37         30           8.413         38         40           8.395         39         22           8.382         40         9           8.385         41         12         carpet (about6mm)           8.382         42         9         carpet (about6mm)           8.374         43         1         46           8.382         45         9	8.402			
8.395         31         22           8.4         32         27           8.397         33         24           8.398         34         25           8.391         35         18           8.39         36         17           8.403         37         30           8.413         38         40           8.395         39         22           8.382         40         9           8.382         41         12           8.374         43         1           8.379         44         6           8.382         45         9	8.397	29	24	
8.4       32       27         8.397       33       24         8.398       34       25         8.391       35       18         8.391       35       18         8.391       35       18         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         carpet (about6mm)       8.382         8.374       43       1         8.379       44       6         8.382       45       9	8.397	30	24	
8.397       33       24         8.398       34       25         8.391       35       18         8.39       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.374       43       1         8.379       44       6         8.382       45       9	8.395	31	22	
8.398       34       25         8.391       35       18         8.39       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.374       43       1         8.379       44       6         8.382       45       9	8.4	32	27	
8.391       35       18         8.39       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.374       43       1         8.379       44       6         8.382       45       9	8.397	33	24	
8.39       36       17         8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.374       43       1         8.379       44       6         8.382       45       9	8.398	34	25	
8.403       37       30         8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.382       43       1         8.382       42       9         8.374       43       1         8.379       44       6         8.382       45       9	8.391	35	18	
8.413       38       40         8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.382       42       9         8.374       43       1         8.379       44       6         8.382       45       9	8.39	36	17	
8.395       39       22         8.382       40       9         8.385       41       12         8.382       42       9         8.374       43         8.379       44         6       9	8.403	37	30	
8.382       40       9         8.385       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.374       43       1       1         8.379       44       6       1         8.382       45       9       1	8.413	38	40	
8.385       41       12       carpet (about6mm)         8.382       42       9       carpet (about6mm)         8.374       43       1          8.379       44       6          8.382       45       9	8.395	39	22	
8.382         42         9         carpet (about6mm)           8.374         43         1	8.382	40	9	
8.382         42         9         carpet (about6mm)           8.374         43         1	8.385	41	12	carpet (about6mm)
8.374       43       1         8.379       44       6         8.382       45       9				
8.379     44     6       8.382     45     9		43		
8.382 45 9				
8.396 46 23	8.396	46	23	

8.395	47	22	
8.391	48	18	
8.382	49	9	
8.379	50	6	
8.388	51	15	
8.398	52	25	
8.427	53	54	
8.424	54	51	
8.427	55	54	
8.398	56	25	
8.382	57	9	
8.374	58	1	
8.377	59	4	
8.374	60	1	
8.372	61	-1	
8.369	62	-4	conc
8.394	63	21	
8.418	64	45	
8.418	65	53	
8.420	66	64	
8.437	67	58	
8.424	68	51	
8.424	69	25	
8.416	70	43	
8.4	71	27	
8.378	72 73	5	
8.384		11	
8.379	74	6	line
8.375	75	2	lino
8.37	76	-3 5	lino
8.378	77		carpet (about 4mm)
8.383	78	10	carpet (about 4mm)
8.383	79	10	carpet (about 4mm)
8.386	80	13	carpet (about 4mm)
8.385	81	12	carpet (about 4mm)
8.375	82	2	carpet (about 4mm)
8.378	83	5	carpet (about 4mm)
8.392	84	19	carpet (about 4mm)
8.389	85	16	carpet (about 4mm)
8.415	86	42	
8.424	87	51	
8.445	88	72	
8.469	89	96	
8.449	90	76	
8.43	91	57	
8.454	92	81	
8.463	93	90	
8.416	94	43	
8.433	95	60	
8.448	96	75	
8.419	97	46	

8.445       99       72         8.468       100       95         8.461       101       88         8.463       102       90         8.453       103       80         8.441       104       68         8.452       105       79         8.431       106       58         8.396       107       23         8.432       109       59         8.432       109       59         8.432       109       59         8.432       109       59         8.432       109       59         8.432       109       59         8.432       109       59         8.432       109       59         8.433       110       34         8.384       111       13       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.387       115       17       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)	8.438	98	65	
8.468         100         95           8.463         102         90           8.453         103         80           8.453         105         79           8.431         106         58           8.431         106         58           8.431         106         58           8.432         109         59           8.447         110         34           8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         119         9         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.383         121         10         carpet (4mm?)     <				
8.461         101         88           8.463         102         90           8.453         103         80           8.441         104         68           8.452         105         79           8.431         106         58           8.396         107         23           8.422         108         56           8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.381         116         14         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         119         9         carpet (4mm?)           8.383         120         10         carpet (4mm?)           8.382         129         carpet (4mm?)         8.383           8.382         129         carpet (4mm?)         8.384           8.382         121         10 <td></td> <td></td> <td></td> <td></td>				
8.463         102         90           8.453         103         80           8.441         104         68           8.452         105         79           8.431         106         58           8.396         107         23           8.429         108         56           8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         120         10         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.384         124<				
8.453         103         80           8.441         104         68           8.452         105         79           8.431         106         58           8.396         107         23           8.429         108         56           8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         121         10         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.382         122         9         carpet (4mm?)				
8.441         104         68           8.452         105         79           8.431         106         58           8.396         107         23           8.429         108         56           8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.383         121         10         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.384         126         11         concrete           8.391         127         18				
8.452       105       79         8.431       106       58         8.396       107       23         8.429       108       56         8.432       109       59         8.407       110       34         8.386       111       13       carpet (4mm?)         8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       120       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       124       11       concrete         8.384       124       11       concrete </td <td></td> <td></td> <td></td> <td></td>				
8.431       106       58         8.396       107       23         8.429       108       56         8.432       109       59         8.407       110       34         8.386       111       13       carpet (4mm?)         8.386       111       13       carpet (4mm?)         8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       120       10       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       11         8.384       126       11       13<				
8.396       107       23         8.429       108       56         8.432       109       59         8.407       110       34         8.386       111       13       carpet (4mm?)         8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       117       4       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       14         8.387       129				
8.429         108         56           8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.393         112         20         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.387         117         4         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         120         10         carpet (4mm?)           8.383         121         10         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.384         124         11         concrete           8.379         125         6         1           8.381         127         18         1      <				
8.432         109         59           8.407         110         34           8.386         111         13         carpet (4mm?)           8.393         112         20         carpet (4mm?)           8.384         113         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.384         114         11         carpet (4mm?)           8.39         115         17         carpet (4mm?)           8.397         116         14         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         119         9         carpet (4mm?)           8.382         120         10         carpet (4mm?)           8.382         122         9         carpet (4mm?)           8.384         124         <				
8.407       110       34         8.386       111       13       carpet (4mm?)         8.393       112       20       carpet (4mm?)         8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.382       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       6         8.384       126       11       6         8.387       129       14       8				
8.386       111       13       carpet (4mm?)         8.393       112       20       carpet (4mm?)         8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.39       115       17       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       11         8.384       126       11       13         8.387       128       14       14         8.387       128       14       14         8.387       130       18 <t< td=""><td></td><td></td><td></td><td></td></t<>				
8.393       112       20       carpet (4mm?)         8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.39       115       17       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       117       4       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       6         8.384       126       11       14         8.387       128       14       14         8.387       128       14       14         8.387       129       14       14         8.388       131       15       15				cornet (4mm2)
8.384       113       11       carpet (4mm?)         8.384       114       11       carpet (4mm?)         8.39       115       17       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       117       4       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       122       9       carpet (4mm?)         8.384       122       9       carpet (4mm?)         8.384       123       15       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6          8.384       126       11          8.387       128       14          8.387       128       14          8.388       131       15          8.394       132       21				
8.384       114       11       carpet (4mm?)         8.39       115       17       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       116       14       carpet (4mm?)         8.387       117       4       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       11         8.384       126       11       11         8.391       127       18       14         8.387       129       14       14         8.387       129       14       14         8.381       131       15       15         8.394       132       21       14         8.398       133       25       14				
8.39         115         17         carpet (4mm?)           8.387         116         14         carpet (4mm?)           8.377         117         4         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.381         118         8         carpet (4mm?)           8.382         119         9         carpet (4mm?)           8.383         120         10         carpet (4mm?)           8.383         121         10         carpet (4mm?)           8.383         122         9         carpet (4mm?)           8.384         122         9         carpet (4mm?)           8.384         124         11         concrete           8.379         125         6         6           8.384         126         11         6           8.387         128         14         6           8.387         128         14         6           8.387         129         14         6           8.381         131         15         6           8.394         132         21         6           8.394         132         21         6 <td></td> <td></td> <td></td> <td></td>				
8.387       116       14       carpet (4mm?)         8.377       117       4       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       122       9       carpet (4mm?)         8.384       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6          8.384       126       11          8.387       128       14          8.387       128       14          8.387       129       14          8.381       131       15          8.394       132       21          8.398       133       25          8.412       134       39          8.407       135       34          8.396       137				
8.377       117       4       carpet (4mm?)         8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       122       9       carpet (4mm?)         8.384       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6         8.384       126       11       sarpet (4mm?)         8.384       126       11       sarpet (4mm?)         8.387       128       14       sarpet (4mm?)         8.387       128       14       sarpet (4mm?)         8.387       129       14       sarpet (4mm?)         8.387       129       14       sarpet (4mm?)         8.388       131       15       sarpet (4mm?)         8.388       131       15       sarpet (4mm?)         8.398       133       25       sarpet (4mm?)         8.398       133       2				
8.381       118       8       carpet (4mm?)         8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.383       122       9       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       124       11       concrete         8.384       124       11       concrete         8.379       125       6				
8.382       119       9       carpet (4mm?)         8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6         8.384       126       11         8.391       127       18         8.387       128       14         8.388       131       15         8.388       131       15         8.394       132       21         8.387       129       14         8.387       130       18         8.398       133       25         8.412       134       39         8.407       135       34         8.379       136       6         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16				
8.383       120       10       carpet (4mm?)         8.383       121       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       6         8.384       126       11       concrete         8.387       128       14       6         8.388       131       15       18         8.388       131       15       18         8.388       131       15       18         8.391       130       18       18         8.393       132       21       14         8.394       132       21       14         8.398       133       25       14         8.398       133       25       15         8.412       134       39       14         8.379       136       6       14         8.396       137       23       14         8.398       138       25       14         8.399       140       16       16				
8.383       121       10       carpet (4mm?)         8.382       122       9       carpet (4mm?)         8.384       123       15       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6       11         8.384       126       11       concrete         8.391       127       18       14         8.387       128       14       14         8.387       129       14       14         8.381       131       15       15         8.384       132       21       14         8.383       131       15       15         8.394       132       21       14         8.398       133       25       15         8.412       134       39       14         8.396       137       23       14         8.396       137       23       13         8.397       139       24       16         8.389       140       16       16				
8.382       122       9       carpet (4mm?)         8.388       123       15       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6          8.384       126       11          8.387       128       14          8.387       128       14          8.387       129       14          8.387       129       14          8.387       130       18          8.388       131       15          8.394       132       21          8.398       133       25          8.412       134       39          8.407       135       34          8.396       137       23          8.398       138       25          8.397       139       24          8.389       140       16				
8.388       123       15       carpet (4mm?)         8.384       124       11       concrete         8.379       125       6         8.384       126       11         8.391       127       18         8.387       128       14         8.387       129       14         8.387       129       14         8.387       129       14         8.387       129       14         8.388       131       15         8.394       132       21         8.398       133       25         8.412       134       39         8.412       134       39         8.407       135       34         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16				
8.384       124       11       concrete         8.379       125       6         8.384       126       11         8.391       127       18         8.387       128       14         8.387       129       14         8.387       129       14         8.387       129       14         8.387       129       14         8.387       129       14         8.381       131       15         8.382       131       15         8.394       132       21         8.398       133       25         8.412       134       39         8.407       135       34         8.396       137       23         8.398       138       25         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				
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$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8.391	127	18	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8.387	128	14	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8.387	129	14	
8.394       132       21         8.398       133       25         8.412       134       39         8.407       135       34         8.379       136       6         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.391	130	18	
8.398       133       25         8.412       134       39         8.407       135       34         8.379       136       6         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.388	131	15	
8.412       134       39         8.407       135       34         8.379       136       6         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.394	132	21	
8.407       135       34         8.379       136       6         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.398	133	25	
8.379       136       6         8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.412	134	39	
8.396       137       23         8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.407	135	34	
8.398       138       25         8.397       139       24         8.389       140       16         8.389       141       16	8.379	136	6	
8.397       139       24         8.389       140       16         8.389       141       16	8.396	137	23	
8.389         140         16           8.389         141         16	8.398	138	25	
8.389 141 16	8.397	139	24	
	8.389	140	16	
	8.389	141	16	
192 bot stairs		192 bot stairs		
8.417 lino 44	8.417	lino	44	

Reduced		Difference from	
Level	Point	point 142	Notes
11.484	142	0	lino
			looks like 8mm carpet over 20mm particle board (total
11.486	143	2	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.484	144	0	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.486	145	2	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.476	146	-8	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.466	147	-18	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.451	148	-33	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.43	149	-54	28mm over the concrete?)
	-		looks like 8mm carpet over 20mm particle board (total
11.429	150	-55	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.454	151	-30	28mm over the concrete?)
	-		looks like 8mm carpet over 20mm particle board (total
11.469	152	-15	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.471	153	-13	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.454	154	-30	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.464	155	-20	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.449	156	-35	28mm over the concrete?)
			looks like 8mm carpet over 20mm particle board (total
11.472	157	-12	28mm over the concrete?)
11.48	158	-4	lino
11.487	159	3	lino
11.482	160	-2	carpet
11.474	161	-10	carpet
11.472	162	-12	carpet
11.453	163	-31	
11.48	164	-4	carpet
11.479	165	-5	lino
11.465	166	-19	
11.467	167	-17	
11.459	168	-25	
11.386	169	-98	
11.408	170	-76	
11.388	171	-96	
11.385	172	-99	
11.411	173	-73	
11.396	174	-88	

r			
11.404	176	-80	
11.409	177	-75	
11.402	178	-82	
11.396	179	-88	
11.39	180	-94	
11.386	181	-98	
11.372	182	-112	
11.367	183	-117	
11.37	184	-114	
11.382	185	-102	
11.389	186	-95	
11.357	187	-127	
11.402	188	-82	
11.383	189	-101	
11.383	190	-101	
11.39	191	-94	



# Cuthberts Green Softball Complex

RLs - Top of first course of block Refer to PDF plan for Pt id locations

Pt id#	RL	Relative to point 1
1	8.557	0.000
2	8.551	-0.006
3	8.561	0.004
4	8.501	-0.056
5	8.482	-0.075
6	8.472	-0.085
7	8.465	-0.092
8	8.456	-0.101
9	8.473	-0.084
10	8.505	-0.052
11	8.519	-0.038
12	8.527	-0.030
13	8.512	-0.045
14	8.521	-0.036
15	8.554	-0.003
16	8.467	-0.090
17	8.488	-0.069
18	8.464	-0.093
19	8.482	-0.075
20	8.476	-0.081
21	8.480	-0.077
22	8.473	-0.084
23	8.471	-0.086
24	8.473	-0.084
25	8.479	-0.078
26	8.479	-0.078
27	8.475	-0.082
28	8.493	-0.064
29	8.500	-0.057
30	8.469	-0.088
31	8.501	-0.056
32	8.493	-0.064
33	8.484	-0.073
34	8.494	-0.063
35	8.521	-0.036
36	8.524	-0.033
37	8.520	-0.037
38	8.511	-0.046
39	8.498	-0.059
40	8.496	-0.061



# 15. Appendix 3 – CERA Summary Documents

SINCLAIR KNIGHT MERZ

Location	•				
Location	Building Name:	Cuthberts Green Softball Complex	]		Nick Calvert
	Building Address:	220 Pages Road	No:	Street CPEng No: Company:	242062 Sinclair Knight Merz
	Legal Description:		]	Company project number: Company phone number:	ZP01185 03 379 0135
	GPS south:	Degrees	Min	Sec Date of submission:	5-Feb
	GPS south. GPS east:			Inspection Date:	21/10/11, 2/11/11 and 01/02/2012
	Building Unique Identifier (CCC):		]	Revision: Is there a full report with this summary?	
<u> </u>					
Site					
	Site slope: Soil type:	flat silt	-	Max retaining height (m): Soil Profile (if available):	——————————————————————————————————————
Pr		D		If Ground improvement on site, describe:	
	Proximity to clifftop (m, if < 100m): Proximity to cliff base (m, if <100m):				
	roximity to can base (m,ir < room).			Approx site elevation (m):	
Building					
	No. of storeys above ground: Ground floor split?	2 no		single storey = 1 Ground floor elevation (Absolute) (m): Ground floor elevation above ground (m):	0.20
	Storeys below ground Foundation type:	strip footings		if Foundation type is other, describe:	
	Building height (m): Floor footprint area (approx):	8.20 500		height from ground to level of uppermost seismic mass (for IEP only) (m):	8.2
	Age of Building (years):	24	]	Date of design:	1976-1992
	Strengthening present?	20	1	If so, when (year)?	
			- -	And what load level (%g)?	
	Use (ground floor): Use (upper floors):	public		Brief strengthening description:	L]
	Use notes (if required): Importance level (to NZS1170.5):	IL2	1		
Gravity Structure					
	Gravity System:	load bearing walls	-		250UB portal, timber purlins, colorsteel
	Roof: Floors:	steel framed concrete flat slab	-	rafter type, purlin type and cladding slab thickness (mm)	cladding 150
		none other (note)		overall depth x width (mm x mm) typical dimensions (mm x mm)	N/A
		fully filled concrete masonry	1	*N/A	
Lateral load resisting struc	ture Lateral system along:		1	Note: Define along and across in note total length of wall at ground (m):	150
	Ductility assumed, µ:	1.00		detailed report! wall thickness (m):	0.19
	Period along: Total deflection (ULS) (mm):	0.30	0.00	I from parameters in sheet estimate or calculation? estimate or calculation?	estimated
maximum	interstorey deflection (ULS) (mm):	1	1	estimate or calculation?	estimated
	Lateral system across: Ductility assumed, µ:	fully filled CMU 1.00		note total length of wall at ground (m): wall thickness (m):	<u> </u>
	Period across: Total deflection (ULS) (mm):	0.30	0.01	from parameters in sheet estimate or calculation? estimate or calculation?	
maximum	interstorey deflection (ULS) (mm):	1	1	estimate or calculation?	
Separations:	north (mm):		٦ ٦	leave blank if not relevant	
	east (mm):				
	south (mm): west (mm):		1		
Non-structural elements	-		-		
	Stairs:	steel		describe supports	
	Wall cladding: Roof Cladding:	other heavy Metal			All structural walls 0.6mm colorsteel cladding
		steel frames plaster, fixed			
		Light electrical, few mech services	3		
Available documentation					
	Architectural Structural		7	original designer name/date original designer name/date	
	Mechanical Electrical	none		original designer name/date	
	Geotech report		J	original designer name/date original designer name/date	
Damage Site:	Site performance:		]	Describe damage:	
(refer DEE Table 4-2)		25-100m	]	notes (if applicable):	Estimated
		1:150 or more 5-10 m²/100m³		notes (if applicable): notes (if applicable):	Estimated
	Lateral Spread: Differential lateral spread:			notes (if applicable): notes (if applicable):	
	Ground cracks: Damage to area:	none apparent		notes (if applicable): notes (if applicable):	
Building:			-		· J
	Current Placard Status:	green	]		
					Damage of modesty walls is governing,
Along	Damage ratio:	96% Overall building stability not affected by		Describe how damage ratio arrived at:	
	Describe (summary):			mage _Ratio = $\frac{(\% NBS (before) - \% NBS (after))}{\% NBS (before)}$	
Across	Damage ratio:	0%		$mage \_Ratio = \frac{\% NBS (before)}{\% NBS (before)}$	
	Describe (summary):	Overall building stability not affected by damage			
Diaphragms	Damage?:	no	ו	Describe:	
					The stairs are a critical structural
					weakness because sway may cause stairs to disconnect from filor removing
CSWs:	Damage?:	yes	J	Describe:	
Pounding:	Damage?:	no		Describer	Adjacent Grandstand expected to have suitable separation
Non-structural:	Damage?:		1		Mionr non-structural damage
internationality and a state of the state of	Damage?:	,		L'escribe:	anon non-suuctural udilidge
Recommendations					
					EPB strengthening required but only relatively limited structural repairs
		significant structural and strengthening yes		Describe: Describe:	required.
					Building is an EPB but has no damage which would be expected to affect
	erim occupancy recommendations:	full occupancy	J		occupancy
	essed %NBS before: essed %NBS after:	56% 2%		%NBS from IEP below If IEP not used, please detail assessment methodology:	Quantitative
	essed %NBS before:	39%		%NBS from IEP below	
	essed %NBS after:	39%	]		

V1.11

Detailed Engineering Evaluation Summary Data			V1.11
Location Building Name	: Cuthberts Green Grandstand	Reviewer:	Nick Calvert
	Unit 220 Pages Road		242062 Sinclair Knight Merz
Legal Description		Company project number Company phone number	ZP01185
		Min Sec	
GPS south GPS east			5-Feb 21/10/11, 2/11/11 and 01/02/2012
Building Unique Identifier (CCC	):	Revision: Is there a full report with this summary?	
		······································	
Site Site slope	: flat	Max retaining height (m)	
Soil type Site Class (to NZS1170.5)	e: silt	Soil Profile (if available)	
Proximity to waterway (m, if <100m)	):	If Ground improvement on site, describe	
Proximity to clifftop (m, if < 100m) Proximity to cliff base (m,if <100m)		Approx site elevation (m):	
Building			
No. of storeys above ground Ground floor split		single storey = 1 Ground floor elevation (Absolute) (m) Ground floor elevation above ground (m)	0.20
Storeys below ground		if Foundation type is other, describe	
Building height (m)	): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m)	
Floor footprint area (approx) Age of Building (years)		Date of design:	2004-
Strengthening present	?no	If so, when (year)? And what load level (%g)?	
Use (ground floor)	public	Brief strengthening description	
Use (upper floors) Use notes (if required)			
Importance level (to NZS1170.5)			
Gravity Structure			
Gravity System: Roof	: load bearing walls f: concrete	slab thickness (mm)	150
Floors Beams	51		
Columns	31		4 m /*
	load bearing concrete	thickness (mm)	150
Lateral load resisting structure	: concrete shear wall	Note: Define along and across in note total length of wall at ground (m)	44
Ductility assumed, µ	.: 1.25	detailed report! wall thickness (m):	0.15
Period along Total deflection (ULS) (mm)		0.01 from parameters in sheet estimate or calculation? estimate or calculation?	
maximum interstorey deflection (ULS) (mm)		estimate or calculation?	
Lateral system across		note total length of wall at ground (m)	
Ductility assumed, μ Period across		0.01 from parameters in sheet estimate or calculation?	0.15 estimated
Total deflection (ULS) (mm) maximum interstorey deflection (ULS) (mm)		estimate or calculation? estimate or calculation?	
	۰ <u>ــــــــــــــــــــــــــــــــــــ</u>		estimated
Separations: north (mm)	1	leave blank if not relevant	
east (mm) south (mm)			
west (mm)			
Non-structural elements			
Stairs	precast, full flight	describe supports	Fixed to floor at first but no seperate landing supports
Wall cladding Roof Cladding	: other heavy		All structural walls
Glazing	31		
Ceilings Services(list)	s: light tiles ): Light electrical, few mech services		
Available documentation	16.0		Ales Desu Cassulting Limites
Architectura Structura	al full	original designer name/date	Alan Reay Consulting Limitec Alan Reay Consulting Limitec
Mechanica Electrica		original designer name/date original designer name/date	
Geotech repor		original designer name/date	
Damage Site: Site performance		Describe damage:	
(refer DEE Table 4-2) Settlement	r 25-100m	notes (if applicable)	Estimated
Differential settlement	t: 1:150 or more	notes (if applicable)	
Lateral Spread	1: 5-10 m²/100m³ 1: none apparent	notes (if applicable) notes (if applicable)	Estimated
Differential lateral spread Ground cracks	t: none apparent :: none apparent	notes (if applicable) notes (if applicable)	
	none apparent	notes (if applicable)	
Building:			
Current Placard Status			
Along Damage ratio	0% Overall building stability not affected by	Describe how damage ratio arrived at	
Describe (summary)		$Damage \_Ratio = \frac{(\% NBS (before) - \% NBS (after))}{\% NBS (before)}$	
Across Damage ratio		$Damage \_Ratio = \frac{1}{\% NBS(before)}$	
Describe (summary)	Overall building stability not affected by amage		
		Describe:	
CSWs: Damage?	: no	Describe:	
Pounding: Damage?		Dit	Adjacent Softball Complex expected to have suitable separation
Non-structural: Damage?	. Iyes	Describe:	Minor non-structural damage
Recommendations			
Level of repair/strengthening required	I: significant structural	Describe:	Relevelling will be significant
			Epoxy crack injection in a number of concrete elements and possible
Duilding Consent as suited.	yes	Describe: Describe:	relevelling
Building Consent required: Interim occupancy recommendations	: full occupancy		
Interim occupancy recommendations			
	80%	%NBS from IEP below If IEP not used, please detai assessment methodology	
Interim occupancy recommendations Along Assessed %NBS before: Assessed %NBS after: Across Assessed %NBS before:		%NBS from IEP below If IEP not used, please detai	
Interim occupancy recommendations Along Assessed %NBS before: Assessed %NBS after:	80%	%NBS from IEP below If IEP not used, please detai assessment methodology	

Location	Building Name	Cuthberts Green Groundsmans Shed	1	Reviewer	Nick Calvert
		Unit	No:	Street CPEng No:	242062
	Building Address Legal Description	220 Pages Road		Company: Company project number:	Sinclair Knight Merz ZP01185
	3			Company phone number:	
	GPS south	Degrees	Min	Sec Date of submission:	5-Feb
	GPS east:			Inspection Date: Revision:	21/10/11, 2/11/11 and 01/02/2012
	Building Unique Identifier (CCC)	[	]	Is there a full report with this summary?	
Site	Site slope:	flat	1	Max retaining height (m):	
	Soil type	silt		Soil Profile (if available):	
Pro	Site Class (to NZS1170.5) ximity to waterway (m, if <100m)	D		If Ground improvement on site, describe:	
	roximity to clifftop (m, if < 100m)				
Pro	oximity to cliff base (m,if <100m):		J	Approx site elevation (m):	
lo. u.e.					
Building	No. of storeys above ground	1	1	single storey = 1 Ground floor elevation (Absolute) (m):	
	Ground floor split? Storeys below ground			Ground floor elevation above ground (m):	
	Foundation type	strip footings		if Foundation type is other, describe:	
	Building height (m) Floor footprint area (approx)	2.40		height from ground to level of uppermost seismic mass (for IEP only) (m):	2.4
	Age of Building (years)		]	Date of design:	1976-1992
			_		
	Strengthening present	no	J	If so, when (year)? And what load level (%g)?	
	Use (ground floor):	other (specify)	]	Brief strengthening description:	
	Use (upper floors): Use notes (if required)				
1	Importance level (to NZS1170.5)		1		
Gravity Structure					
	Gravity System:	load bearing walls	1		Timber purlins and trusses, colorsteel
		timber framed		rafter type, purlin type and cladding	
	Floors: Beams:	timber		type	Trusses
	Columns				
	Walls:	fully filled concrete masonry	1	thickness (mm)	190
Lateral load resisting struct	<u>ure</u> Lateral system along	fully filled CMU	1	Nate: Define along and across innote total length of well at ground (m):	14.6
	Ductility assumed, µ	1.00		Note: Define along and across in note total length of wall at ground (m): detailed report! wall thickness (m):	0.19
	Period along Total deflection (ULS) (mm):	0.00	0.02	? from parameters in sheet estimate or calculation? estimate or calculation?	
maximum ir	nterstorey deflection (ULS) (mm)			estimate or calculation?	
	Lateral system across:	fully filled CMU	1	note total length of wall at ground (m):	12
	Ductility assumed, µ	1.00		wall thickness (m):	0.19
	Period across: Total deflection (ULS) (mm):	0.00	0.02	from parameters in sheet estimate or calculation? estimate or calculation?	estimated
maximum ir	nterstorey deflection (ULS) (mm)	5	]	estimate or calculation?	estimated
Separations:					
	north (mm): east (mm):			leave blank if not relevant	
	south (mm):				
	west (mm):		J		
Non-structural elements	Stoiro	r	1		
	Stairs: Wall cladding	other heavy		describe	Concrete Block
	Roof Cladding Glazing	Metal		describe	Coloursteel cladding
	Ceilings				
	Services(list):	None	J		
<b>.</b>					
Available documentation	Architectura	none	1	original designer name/date	
	Structura Mechanica			original designer name/date original designer name/date	
	Electrica	none		original designer name/date	
	Geotech report	none	l	original designer name/date	
Damage Site:	Site performance		1	Describe damage:	
(refer DEE Table 4-2)	Settlement				Estimated - no survey undertaken
	Differential settlement	none observed		notes (if applicable):	
	Liquefaction Lateral Spread	5-10 m²/100m³ none apparent		notes (if applicable): notes (if applicable):	Estimated
	Differential lateral spread Ground cracks:	none apparent		notes (if applicable): notes (if applicable):	
	Ground cracks: Damage to area:			notes (if applicable): notes (if applicable):	
Building:					
	Current Placard Status	green	]		
Along	Damage ratio:			Describe how damage ratio arrived at:	
		No damage observed			
Across	Damage ratio		Da	mage _Ratio = $\frac{(\% NBS (before) - \% NBS (after))}{\% NBS (1 - \%)}$	
	Describe (summary):	No damage observed	J	%NBS(before)	
Diaphragms	Damage?:	no		Describe:	
CSWs:	Damage?:	no		Describe:	
Pounding:	Damage?:			Describe:	
Non-structural:	Damage?:	no	J	Describe:	
Recommendations Level	l of repair/strengthening required	significant structural and strengthening	1	Describe:	
Buildi	ng Consent required: im occupancy recommendations	yes		Describe: Describe:	
	ssed %NBS before: ssed %NBS after:	33% 33%		%NBS from IEP below If IEP not used, please detail assessment methodology:	Quantitative
			1		
	ssed %NBS before: ssed %NBS after:	19% 19%		%NBS from IEP below	

ring Evaluation Summary I

Detailed Engineering Evaluation Summary Data			V1.11
Location	: Cuthberts Green Lighting Gantries	1	Reviewer: Nick Calvert
	Unit	No:	: Street CPEng No: 242062
Legal Description	s: 220 Pages Road		Company: Sinclair Knight Merz Company project number: ZP01185
	Degrees	Min	
GPS south GPS easi			Date of submission: 5-Feb Inspection Date: 21/10/11, 2/11/11 and 01/02/2012
Building Unique Identifier (CCC		1	Revision: A Is there a full report with this summary? yes
	1		
Site			
Site slope		]	Max retaining height (m):
Soil type Site Class (to NZS1170.5	): D		Soil Profile (if available):
Proximity to waterway (m, if <100m Proximity to clifftop (m, if < 100m			If Ground improvement on site, describe:
Proximity to cliff base (m,if <100m)	:	]	Approx site elevation (m):
Building			
No. of storeys above ground Ground floor split		]	single storey = 1 Ground floor elevation (Absolute) (m): Ground floor elevation above ground (m):
Storeys below groun	d bored cast-insitu concrete piles		if Foundation type is other, describe:
Building height (m	): 25.70		height from ground to level of uppermost seismic mass (for IEP only) (m): 25.7
Floor footprint area (approx Age of Building (years		1	Date of design: 1992-2004
		_	
Strengthening present		]	If so, when (year)? And what load level (%g)?
Use (ground floor Use (upper floors	: public		Brief strengthening description:
Use notes (if required Importance level (to NZS1170.5			
Gravity Structure			
Gravity System Roo		-	
Floors Beams			
	structural steel		typical dimensions (mm x mm) 640x640
Lateral load resisting structure		1	
Lateral system along	welded and bolted steel moment frame	]	Note: Define along and across in note typical bay length (m)
Ductility assumed, µ Period along	1.60	1.60	detailed report! 50 from parameters in sheet estimate or calculation?
Total deflection (ULS) (mm maximum interstorey deflection (ULS) (mm			estimate or calculation? estimated estimate or calculation? estimated
Lateral system across	: welded and bolted steel moment frame	1	note typical bay length (m)
Ductility assumed, μ Period across	.: 1.25	0.00	
Total deflection (ULS) (mm maximum interstorey deflection (ULS) (mm	: 15		estimate or calculation? estimated estimate or calculation? estimated
Separations:			
north (mm) east (mm)		]	leave blank if not relevant
south (mm)	:		
west (mm)		J	
Non-structural elements Stairs		]	
Wall cladding Roof Cladding	p		
Glazing			
Services(list		]	
Available documentation			
Architectura Structura		-	original designer name/date original designer name/date City Solutions
Mechanica Electrica			original designer name/date
Geotech report	tnone	]	original designer name/date
Damage			
Site: Site performance (refer DEE Table 4-2)			Describe damage:
	:: 25-100m t: 1:350-1:250		notes (if applicable): Estimated notes (if applicable): Verticality Issues
Liquefaction Lateral Spread	: 5-10 m²/100m³ I: none apparent		notes (if applicable): Estimated notes (if applicable):
Differential lateral spread	i: none apparent		notes (if applicable): notes (if applicable):
	none apparent	1	notes (if applicable):
Building: Current Placard Status	areen	1	
		J ]	Describe how damage ratio arrived at:
	No damage observed	1	· · · · · · · · · · · · · · · · · · ·
Across Damage ratio		Da	$amage \_Ratio = \frac{(\% NBS (before) - \% NBS (after))}{\% NBS (before)}$
	No damage observed	1	
Diaphragms Damage?		1	Describe:
CSWs: Damage?		1	Describe:
Pounding: Damage?		J	Describe:
Non-structural: Damage?	: <u>no</u>	]	Describe:
Recommendations			
Level of repair/strengthening required	I: minor structural		Relevelling required to remove verticality Describe: issues
Building Consent required: Interim occupancy recommendations	no		Describe: Describe:
Along Assessed %NBS before:	100%	1	%NBS from IEP below If IEP not used, please detail Quantitative
Assessed %NBS before. Assessed %NBS after:	100%	1	assessment methodology:
Across Assessed %NBS before: Assessed %NBS after:	100% 100%	]	%NBS from IEP below
Autocourt Artab alter.	100%		

Detailed Engineering Evaluation Summary Data			V1.11
Location	Cuthhada Casas Durauta	Daviaura	Niek Celuet
		No: Street CPEng No:	Nick Calvert 242062
Building Addres Legal Descriptio	s: 220 Pages Road n:	Company: Company project number:	Sinclair Knight Merz ZP01185
	Degrees	Company phone number: Min Sec	03 379 0135
GPS sout GPS eas	h:	Date of submission: Inspection Date:	5-Feb 21/10/11, 2/11/11 and 01/02/2012
		Revision:	A
Building Unique Identifier (CCC	): <u> </u>	Is there a full report with this summary?	yes
Site Site slop	e flat	Max retaining height (m):	
Soil typ	e: silt	Soil Profile (if available):	
Site Class (to NZS1170. Proximity to waterway (m, if <100n	):	If Ground improvement on site, describe:	
Proximity to clifftop (m, if < 100n Proximity to cliff base (m,if <100n		Approx site elevation (m):	
Building			
No. of storeys above groun Ground floor spl	t? no	single storey = 1 Ground floor elevation (Absolute) (m): Ground floor elevation above ground (m):	
Storeys below grou Foundation typ	e: bored cast-insitu concrete piles	if Foundation type is other, describe:	
Building height (n Floor footprint area (appro:		height from ground to level of uppermost seismic mass (for IEP only) (m):	2.5
Age of Building (year	9	Date of design:	1992-2004
Strengthening preser	t2[no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor Use (upper floor	): public	Brief strengthening description:	
Use notes (if required Importance level (to NZS1170.	(): (): IL2		
Gravity Structure			
	: frame system		SHS portals, EA purlins, zincalume
Ro		rafter type, purlin type and cladding	
	s: steel non-composite		Fully welded portal frames
Column Walls	s: structural steel	typical dimensions (mm x mm)	50 x 50
Lateral load resisting structure			
	g: welded and bolted steel moment frame 	Note: Define along and across in note typical bay length (m) detailed report!	
Period alon	g: 0.30	0.28 from parameters in sheet estimate or calculation?	estimated
Total deflection (ULS) (mm maximum interstorey deflection (ULS) (mm		estimate or calculation? estimate or calculation?	estimated estimated
Lateral system acros	s: welded and bolted steel moment frame	note typical bay length (m)	
Ductility assumed, Period acros	ı: 1.25	0.00 estimate or calculation?	estimated
Total deflection (ULS) (mm maximum interstorey deflection (ULS) (mm	): 5	estimate or calculation? estimate or calculation?	estimated
			estimated
Separations: north (mm		leave blank if not relevant	
	):	leave blank if not relevant	
north (mm east (mm	): ):	leave blank if not relevant	
north (mr east (mr south (mr west (mr <u>Non-structural elements</u>	): 	leave blank if not relevant	
north (mm east (mm south (mm west (mm <u>Non-structural elements</u> Stair Wall claddin	):  :  :  :  :  :  :  :  :  :	describe	Perspex cladding
north (mm east (mm south (mm west (mm <u>Non-structural elements</u> Stair Wall claddin Roof Claddin Glazin Glazin	): 	describe	Perspex cladding Zincalume cladding
north (mm south (mm south (mm <u>south (mm west (mm <u>Non-structural elements</u> Stain Wall claddin Roof Claddin</u>	): 	describe	
north (mm east (mm south (mm west (mm <u>Non-structural elements</u> Stair Wall claddin Roof Claddin Glazin Ceiling	): 	describe	
North (mm east (mm south (mn west (mm Non-structural elements Stair Wall claddin Roof Claddin Glazin Ceiling Services(lis Services(lis	): : : : : : : : : : : : : :	describe describe	
North (mm east (mm south (mm west (mm Non-structural elements Vall claddin Roof Claddin Glazin Ceiling Services(lis Available documentation Architectu Structu	: 	describe describe original designer name/date original designer name/date	Zincalume cladding
North (mm east (mm south (mm west (mm Non-structural elements Vall claddin Roof Claddin Glazin Ceiling Services(lis Available documentation Architectu Mechanic Electric	: 	describe describe original designer name/date original designer name/date original designer name/date original designer name/date original designer name/date	Zincalume cladding
North (mm east (mm south (mm west (mm Non-structural elements Stait Wall claddin Roof Claddin Glazin Ceiling Services(lis Available documentation Architectur Structur Mechanic	: 	describe describe original designer name/date original designer name/date original designer name/date original designer name/date	Zincalume cladding
Available documentation Available documentation Damage	: 	describe describe original designer name/date original designer name/date original designer name/date original designer name/date	Zincalume cladding
Non-structural elements Non-structural elements Non-structural elements Vall claddin Roof Claddin Ceiling Services(lis Available documentation Architectur Electric Geotech repo	: 	describe describe original designer name/date original designer name/date original designer name/date original designer name/date original designer name/date	Zincalume cladding
Non-structural elements       Stail         Non-structural elements       Stail         Wall claddin       Roof Claddin         Glazin       Ceiling         Services(lis       Structural         Available documentation       Architectural         Structural       Electric         Geotech rept       Site         Damage       Site:         Site:       Site performance         (refer DEE Table 4-2)       Settlement	i	describe describe original designer name/date original designer name/date	Zincalume cladding
Non-structural elements       Stail         Non-structural elements       Stail         Wall claddin       Roof Claddin         Roof Claddin       Glazin         Ceiling       Services(lis         Available documentation       Architectur         Structur       Mechanic         Electric       Geotech report         Damage       Site;         Stite;       Site performance         (refer DEE Table 4-2)       Settlemen         Differential settlemen       Liquefactic	i:	describe describe original designer name/date original des	Zincalume cladding
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Algo details       Class Algo details       Clas Algo details       Clas Algo detail				
	Building Name	Cuthberts Green Canopy Unit		
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Display         Display <t< td=""><td>Legal Description</td><td></td><td>Company phone number:</td><td></td></t<>	Legal Description		Company phone number:	
	GPS south	Degrees		5-Feb
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Signed Bin         Signed Bin         Signed Bin           Signed Bin         Signed Bin         Signed Bin         Signed Bin           Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin           Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin         Signed Bin<	Building Unique Identifier (CCC)			
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Barlow         Barlow<		flat	Max retaining height (m):	
Piett by barting or a 10000         Piett by barting or a 100000         Piett by barting or a 10000         Piett by barting or a 100000         Piett by barting or a 100000	Soil type	silt	Soil Profile (if available):	
Product do that ber per vision         Auges de traduet mail           Billion         He di data de traduet per vision         Product per vision         Produet per vision         Product per vision<	Proximity to waterway (m, if <100m)		If Ground improvement on site, describe:	
Image: Description of the set of th			Approx site elevation (m):	
Image: set of the set of			, pprox one of ended (in).	
Image: set of the set of	Building			
All Section and the later in the l	No. of storeys above ground			
And Add Add Add Add Add Add Add Add Add A	Storeys below ground	1		
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Absolutions         Provide registers         Provide registers <td< td=""><td>Floor footprint area (approx)</td><td>140</td><td></td><td></td></td<>	Floor footprint area (approx)	140		
Art and All All All or Provided         Image: Art and All All All or Provided	Age of Building (years)	24	Date of design:	1976-1992
Art and All All All or Provided         Image: Art and All All All or Provided	Strengthening present	Ino	If so, when (year)?	
Line (Line Transmission)         Line (Line Transmission) <thline (line="" th="" transmission)<=""> <thline (lin<="" td=""><td></td><td></td><td>And what load level (%g)?</td><td></td></thline></thline>			And what load level (%g)?	
Carly data ar         Carly da			Brief strengthening description:	
Construction         Construction<	Use notes (if required)			
Control         Control <t< td=""><td>Importance level (to NZS1170.5)</td><td>12</td><td></td><td></td></t<>	Importance level (to NZS1170.5)	12		
And Series         Ser		frame system		
Date         Date         Date         Date           Life Los a local regretation in the local section of the local secti				
Additional additionadditadditional additional additional additional addition		timber framed	rafter type, purlin type and cladding	plywood cladding
Line i verification i function         Interficient i function         Interficient i function           Line i verification         Interficient i function         Interficient i function         Interficient i function           Interficient i function         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Interficient i function         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Statistication         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Statistication         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Statistication         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Statistication         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Statistication         Interficient i function         Interficient i function         Interficient i function         Interficient i function           Statistication         Interficient i function         Interficient i function         Interficient i function         Interficient i fu	Beams			
Searcher         Construction			typical dimensions (mm x mm)	100 x 100
Searcher         Construction	Lateral load resisting structure			
Second maximum         Control	Lateral system along	welded and bolted steel moment frame		
Arailable documentation         Site profemance         Interfactor           Statution         Site profemance         Site profemance         Site profemance           Site profemance         Site profemance         Site profemance         Site proteprofemance				estimated
Arailable documentation              mode hypeical bay per gain (mode major location)             mode hypeical bay	Total deflection (ULS) (mm)	5	estimate or calculation?	
Available document interfactory defactor (113) (m)         0.00         semant and a multiple of the second of the	maximum interstorey deflection (ULS) (mm)		estimate or calculation?	estimated
Read at read at a read at read	Lateral system across	welded and bolted steel moment frame	note typical bay length (m)	
maximum interstory defection ULE (mm)			0.00 estimate or calculation?	estimated
Startistics				
Arraise       Current Pleased States green       Describe from diamage state striked strikes green         Arraise       Damage for the segment for the se				oounated
Set:       Set:       Protection:       Set:       Protection:       Set:       S		· · · · · · · · · · · · · · · · · · ·	leave blank if not relevant	
Non-situational elements         Sale status         substatus         substatu				
Available documentation       Siler of a provided in the construction of a provided in the constructio				
Well dakting Option Serviced list Serviced list Service				
Available documentation       Substrate       Improved         Available documentation       Architecture       Substrate       Original designer namedatal         Available documentation       Substrate       Original designer namedatal       Improved         Barrage       Substrate       Original designer namedatal       Improved         Site       Substrate       Original designer namedatal       Improved       Improve				
Arailable documentation         Arailable documentation           Arailable documentation         Original designer namedidate Structure in porte Structure	Roof Cladding		substrate	Plywood
Available documentation       Arstitestartar form       original designer name/data       original designer name/data         Mechanica form       Decrime inform       original designer name/data       original designer name/data         Damager       Electrical form       original designer name/data       original designer name/data         Damager       Site performance       original designer name/data       original designer name/data         Differential steation form       Differential steation form       original designer name/data       original designer name/data         Differential steation form       Differential steation form       Differential steation form       original designer name/data         Differential steation form       Differential steation form       Differential steation form       Differential steation form       original designer name/data         Differential steation form       Differential steation form       Differential steation form       original designer name/data         Differential steation form       Describe form apparent       Differential steation form       original designer name/data         Differential steation form       Describe form apparent       Differential steation form       original designer name/data         Differential steation form       Describe form apparent       Describe form       original designer name/data         Differential steat	Ceilings	fibrous plaster, fixed		
Architectural pone       original designer namediate         Structural pone       original designer namediate         Bellerich pone       original designer namediate         Commage       Site performance         Site       Site performance         Differential stelland stand       Describe damage         Differential stelland stand       Describe damage         Differential stelland spread       protection protection         Differential stelland spread       protection         Distructine (spread/stelland spread       protec	Services(list)	None		
Architectural pone Structural pone Biolitical pone Geotech report none       original designer namedata original designer namedata         Damage State (refer DEE Table 4-2)       Site performance:       Describe damage:         Differential statema forme upperturb       Differential statema forme apperent       Describe damage:         Differential statema forme upperturb       Differential statema pone formed order for pone damage to area forme apperent       Differential statema pone formed order for pone damage to area forme apperent         Differential statema formed order for pone damage to area forme apperent       Order for pone for pone damage to area forme apperent         Differential statema forme for pone damage to area forme apperent       Order for pone for pone damage to area forme apperent         Differential statema forme order for pone damage to area forme apperent       Describe how damage ratio arrived at motes (f applicable):         Differential statema forme order for pone damage to area forme apperent       Describe for pone for pone damage to area for pone damage order for pone damage to area for pone damage to area for pone damage for pone damage to arrived at motes (f applicable):         Differential statema for pone damage to area for pone damage or pone damage or pone				
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Bite       Describe from       original designer nameldate         Dimage       Sile       Sile performance       Describe damage         (refer DEE Table 4-2)       Selements       Describe damage       Describe damage         Differential selementa       Describe damage       Describe damage       Describe damage         Differential sterial spread       Describe damage       Describe damage       Describe damage         Differential sterial spread       Describe       Describe damage       Describe damage         Differential sterial spread       Describe       Describe damage       Describe       Descri				
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Site:       Site performance:       Describe damage:       motes (if applicable)         (refer DEE Table 4.2)       Settlement:       Setlement:       S	Gestech repor		original designer name/date	
Site:       Site performance:       Describe damage:       Image:         (refer DEE Table 4.2)       Sitement:       Sitement:       Sitement:       Sitement:       Differential sitemate:       Image:       <	Geotechnepor	none	original designer name/date original designer name/date	
(refer DEE Table 4.2)       Settlement: 25-100m       notes (if applicable)       Settlement: 25-100m         Differential settlement: Done observed       notes (if applicable)       Settlement: 25-100m       notes (if applicable)         Lateral Spread: none apparent       Differential settlement: 100m apparent       notes (if applicable)       Settlement: 100m apparent         Differential settlement: Damage ratio:       Damage ratio:       notes (if applicable)       Settlement: 100m apparent         Damage ratio:       Damage ratio:       0%       Describe (summary): No damage observed       Notes (if applicable)         Along       Describe (summary): No damage observed       0%       Describe how damage ratio arrived at:       Damage ratio:         Diaphragms       Damage? Ion       Describe (summary): No damage observed       0%       Describe (summary): No damage observed       No         Non structural:       Damage? Ion       Describe (summary): No damage? Ion       Describe (summary): No damage? Ion       Describe [concocc       Describe [concocc         Non structural:       Damage? Ion       Describe [concocc       Describe [concocc       Describe [concocc         Non structural:       Damage? Ion       Describe [concocc       Describe [concocc       Describe [concocc         Non structural:       Damage? Ion       Describe [concocc       Describe [co		none	original designer name/date original designer name/date	
Differential settlement:       conserved       notes (if applicable):       immediation         Liquestication       Spread       notes (if applicable):       immediation         Differential lateral spread       forme apparent       notes (if applicable):       immediation         Differential statust spread       forme apparent       notes (if applicable):       immediation         Building:       Current Placard Statust:       green       notes (if applicable):       immediation         Along       Damage ratio:       0%       Describe how damage ratio arrived at:       immediation         Across       Damage ratio:       0%       Describe how damage ratio arrived at:       immediation         CSWs:       Damage?       immediation       Describe:       immediation         Pounding:       Damage?       Describe:       immediation         Non-structural:       Damage?       immediation       Describe:       immediation         Recommendations:       Level of repair/strengthening required:       forme       pescribe:       immediation         Along       Assessed %NBS before:       23%       %NBS from IEP below       If IEP not used, plesse detail_Quantitative       assessesment methoology:         Across       Assessed %NBS before:       100%       %NBS from	Damage	none	original designer name/date original designer name/date original designer name/date	
Liquefactions       5-10 m/100m²       notes (if applicable):       Estimated         Differential lateral spread: none apparent       notes (if applicable):       notes (if applicable):       notes (if applicable):         Building:       Current Placard Status [green       notes (if applicable):       notes (if applicable):       notes (if applicable):         Building:       Current Placard Status [green       notes (if applicable):       notes (if applicable):       notes (if applicable):         Along       Damage ratio:       0%       Describe (summary): No damage observed       Damage ratio:       0%         Across       Damage ratio:       0%       Damage ratio:       0%       Damage ratio:       0%         Diaphragms       Damage? no       Describe (summary): No damage observed       Damage?       Describe:	Damage Site: Site performance (refer DEE Table 4-2)		original designer name/date original designer name/date original designer name/date Describe damage:	Estimated - po survey undertaken
Differential laterial sprace       notes (if applicable):         Building:       Current Placard Status green         Along       Damage ratio         Describe (summary):       Not damage observed         Across       Damage ratio         Diaphragms       Damage? [no         Diaphragms       Damage? [no         Pounding:       Damage? [no         Non-structural:       Damage? [no         Recommendations       [notes         Building:       Level of repair/strengthening required:         Along       Assessed %NBS before:         Along       Assessed %NBS before:         Across       Assessed %NBS before:         Commendations:       23%         %NBS from IEP below       If IEP not used, please detal (Curnitative         Assessed %NBS before:       100%         %NBS from IEP below       If IEP not used, please detal (Curnitative	Damage Site: Site performance (refer DEE Table 4-2) Settlement Differential settlement	none none 25-100m none observed	original designer name/date original designer name/date original designer name/date Describe damage: notes (if applicable); notes (if applicable);	
Damage to area: hone apparent       notes (if applicable):         Building:       Current Placard Status [green         Along       Damage ratio:       0%         Describe (summary): No damage observed       0%         Across       Damage?: ho       Describe (summary): No damage observed         Diaphragms       Damage?: no       Describe (summary): No damage?: no         Pounding:       Damage?: no       Describe:         Non-structural:       Damage?: no       Describe:         Non-structural:       Damage?: no       Describe:         Recommendations:       Interim occupancy recommendations: full occupancy       MSS from IEP below         Along       Assessed %NBS before:       23%       %NBS from IEP below         Across       Assessed %NBS before:       100%       %NBS from IEP below	Damage Site: Site performance (refer DEE Table 4-2) Settlement Differential settlement Liquefaction	none 25-100m none observed 5-10 m <sup>2</sup> /100m <sup>3</sup>	original designer name/date original designer name/date original designer name/date Describe damage: notes (if applicable): notes (if applicable): notes (if applicable): notes (if applicable):	
Building:       Current Placard Status Green         Along       Damage ratio (summary); No damage observed         Across       Damage ratio; (summary); No damage observed         Diaphragms       Damage?; no         Diaphragms:       Damage?; no         Pounding:       Damage?; no         Non-structural:       Damage?; no         Recommendations:       Level of repair/strengthening required; none to commendations; full occupancy         Along       Assessed %NBS before:         Along       Assessed %NBS before:         Corress       Assessed %NBS before:         Corress       Assessed %NBS before:         Corress       Assessed %NBS before:         Corress       Assessed %NBS before:	Damage Site: Site performance (refer DEE Table 4-2) Settlement Differential settlement Liquefaction Lateral Spread Differential ateral spread	none none 25-100m none observed 5-10 m <sup>2</sup> /100m <sup>3</sup> none apparent none apparent	original designer name/date original designer name/date original designer name/date Describe damage: notes (if applicable): notes (if applicable):	
Current Placard Status:       green         Along       Damage ratio       0%         Describe (summary):       No damage observed       0%         Across       Damage ratio       0%         Diaphragms       Damage?       no         CSWs:       Damage?       Describe         Pounding:       Damage?       Describe         Non-structural:       Damage?       Describe         Non-structural:       Damage?       Describe         Along       Assessed %NBS before:       23%         Along       Assessed %NBS before:       23%         %NBS from IEP below       If IEP not used, please detail Quantitative assessment methodology.	Damage Site: Site performance (refer DEE Table 4-2) Settlement Differential settlement Liquefaction Lateral Spread Differential lateral spread Ground cracks	tone none 25-100m none observed 5-10 m²100m² none apparent none apparent none apparent	original designer name/date original designer name/date original designer name/date Describe damage: notes (if applicable): notes (if applicable):	
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