PO Box 13960, Armagh Street
ANZ Centre 267 High Street, Christchurch 8141, New Zealand
T: +64 3 366 3521 // **F:** +64 3 366 3188
E: info@beca.com // **www.beca.com**

Dunedin City Council
PO Box 5045
Dunedin
New Zealand

22 August 2017

Attention: Laura McElhone
CC: David Carpenter

Dear Laura

Initial Seismic Assessment Report - Sammy's Entertainment Venue

We have now completed an Initial Seismic Assessment (ISA) of the building at 65 Crawford Street, Dunedin using the Initial Evaluation Procedure (IEP) as described in Part B of the guidance document *The Seismic Assessment of Existing Buildings - Technical Guidelines for Engineering Assessments*, dated July 2017 (*Technical Guidelines*). The assessment was carried out after completing a site visit, an internal and external walk over visual non-intrusive inspection and a review of the available plan drawings.

1 Executive Summary

The building at 65 Crawford Street, known as Sammy's Entertainment Venue, formerly His Majesty's Theatre (hereafter referred to as Sammy's) is a large unreinforced masonry brick building constructed in 1897. Based on the IEP method, Sammy's has a potential seismic rating of 10-25%NBS (IL3). The building has been assessed on the basis that it is an Importance Level 3 (IL3) building in accordance with the New Zealand Loadings Standard, NZS1170, as it can accommodate crowds of greater than 300 people.

Sammy's corresponds to a Grade D/E building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is less than the minimum threshold for earthquake prone buildings (34% NBS) and less than the threshold for earthquake risk buildings (67% NBS). This could be regarded as exposing the occupants to a high to very high seismic risk.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's seismic rating. A more reliable result will be obtained from a Detailed Seismic Assessment (DSA). A DSA could find Critical Structural Weaknesses (CSWs) not identified from the IEP, or that a feature initially identified as a potential Critical Structural Weakness has been addressed in the design of the building.

Further investigation of the building structure is recommended to allow for a Detailed Seismic Assessment (DSA) to be undertaken.

2 Introduction

The Dunedin City Council requested Beca to prepare an Initial Seismic Assessment for the Sammy's Entertainment Venue, located at 65 Crawford Street, Dunedin, using the IEP procedure, while also providing background information on the Initial Evaluation Procedure and its limitations. This report has been prepared in response to this request.

3 Background to the IEP Process

The IEP procedure was developed in 2006 by the New Zealand Society for Earthquake Engineering (NZSEE) and updated in 2017 to reflect experience with its application and also as a result of experience from the Canterbury earthquakes of 2010/11. It is a tool to assign a percentage of New Building Standard (%NBS) rating and associated grade to a building as part of an Initial Seismic Assessment of existing buildings.

The IEP enables building owners and managers to review their building stock as part of an overall risk management process.

Characteristics and limitations of the IEP process include:

- An IEP assessment is primarily concerned with life safety. It does not consider the susceptibility of the building to damage and therefore to economic losses (i.e. not assessed for SLS limit state).
- It tends to be somewhat conservative identifying some buildings as earthquake prone, or having a lower %NBS seismic rating, while subsequent detailed investigation may indicate they are likely to perform better than anticipated. However, there will be exceptions, particularly when critical structural weaknesses (CSWs) are present that have not been recognised from the level of investigation employed.
- It can be undertaken with variable levels of available information (e.g.) exterior only inspection, structural drawings available or not, interior inspection, etc. The more information available the more representative the IEP result is likely to be. The IEP records information that has formed the basis of the assessment and consideration of this is important when determining the likely reliability of the result.
- It is an initial, first-stage review. Buildings, or specific issues within a building which the IEP process flags as being potentially problematic or as potential critical structural weaknesses, need further detailed investigation and evaluation. A Detailed Seismic Assessment (DSA) is recommended if the status of a building is critical to any decision making.
- The IEP assumes that the building has been designed and built in accordance with the building standard and good practice current at the time. In some instances, a building may include design features ahead of its time - leading to a potentially better than predicted performance. Conversely, some unidentified design or construction issues not picked up by the IEP process may result in the building performing not as well as predicted.
- It is a largely qualitative process, and should be undertaken or overseen by an experienced engineer. It involves considerable knowledge of the earthquake behaviour of buildings, and judgement as to key attributes and their effect on building performance. Consequently, it is possible that the %NBS derived for a building by independent experienced engineers may differ.
- An IEP may over-penalise some apparently critical features which could have been satisfactorily taken into account in the building's design.
- An IEP does not take into account the seismic performance of non-structural items such as ceiling, plant, services or glazing.

Experience to date is that the IEP is a useful tool to identify potential issues and expected overall performance of a building in an earthquake. However, the process and the associated %NBS and grade should be considered as indicative only. A more detailed investigation and analysis of the building will typically be required to provide a definitive assessment and come up with concept seismic improvement strategies.

The IEP has been based on a review of drawings and an inspection of both the interior and exterior of the building and can be considered to be a comprehensive assessment at the ISA level. The rating determined is less than 34%NBS and therefore, if ratified by the TA, the building should be considered as earthquake prone.

4 Basis for the Assessment

The information we have used for our IEP assessment includes:

- A review of plan drawings obtained from Dunedin City Council Property Files. We received the following drawings:
  - City Surveyors, Dunedin N.Z.: His Majesty's Theatre Crawford St (1907).

  - J. R. G. Hanlon & Partners: His Majesty's Theatre – Dunedin – Development For Use As A Licensed Restaurant Cabaret (1983).
- A site visual inspection conducted on 19 July 2017 of the building interior and exterior which confirmed the nature of the building and relationship to surrounding buildings. The inspection was limited to areas where safe ready access was available to:
  - Confirm the as-constructed buildings were consistent with the drawings and documentation.
  - Identify potential critical structural weaknesses, or irregularities able to be observed.
  - Identify, where possible, items of significant deterioration which might affect %NBS assessment.
- The assessment of the soils under the building have been based on information from the 2004 "Seismic Risk in the Otago Region" maps produced by Opus for the Otago Regional Council.

5 Building Description

Summary information about Sammy's is given in Table 1.

Table 1: Building Summary Information for Sammy's

Item	Details	Notes
Building Name	Sammy's Entertainment Venue	Formerly His Majesty's Theatre. Herein referred to as Sammy's.
Street Address	65 Crawford Street, Dunedin	
Building Area	Approx. gross total area of 1400m^2	Total building foot print of 36m x 25m (900m^2). Gallery area of 275m^2 and basement area under the stage of 220m^2.
Age	120 years old (built in 1897)	Known modifications in 1983 to internal layout. Various unknown alterations include removing the theatre seating and strengthening to some perimeter brick walls.
No. of Storeys / Basements	Single storey with mezzanine and basement under the stage.	
Occupancy / Use	Currently unoccupied.	Previously used as a music venue.
Gravity System	Lightweight metal sheeting on timber purlins spanning onto steel trusses (I-beam rafters and steel rod bottom chord and ties) onto unreinforced masonry brick walls.	Piers at truss locations and at regular intervals on rear wall behind stage.
Lateral Stability System	Solid unreinforced masonry brick perimeter walls.	No drawings of the construction details are available.
Foundation System	Assumed to be concrete strip footings with an unreinforced slab on grade floor.	
Other Notable Features	Existing strengthening work to building includes the addition of two lattice truss steel columns to the northwest elevation, and flat steel plate straps at eaves and roof level on both gable end walls.	
Construction Information	Floor plans from 1907 survey and 1983 internal layout modifications.	

5.1 Site Soil Parameters

A site subsoil class D, deep or soft soils (NZS1170.5) has been adopted for our assessment based on the 2004 "Ground Class Dunedin Area" map. The "Liquefaction & Settlement Susceptibility Dunedin Area" map indicates that the site is "Possibly Susceptible" to liquefaction. Both these maps have been produced by Opus for the Otago Regional Council. We have relied on this information in the absence of a site-specific geotechnical investigation. Geotechnical investigation could be undertaken to determine the actual site soil conditions.

Figure 1: Site Location Plan, Sammy's Entertainment Venue (DCC WebMap)

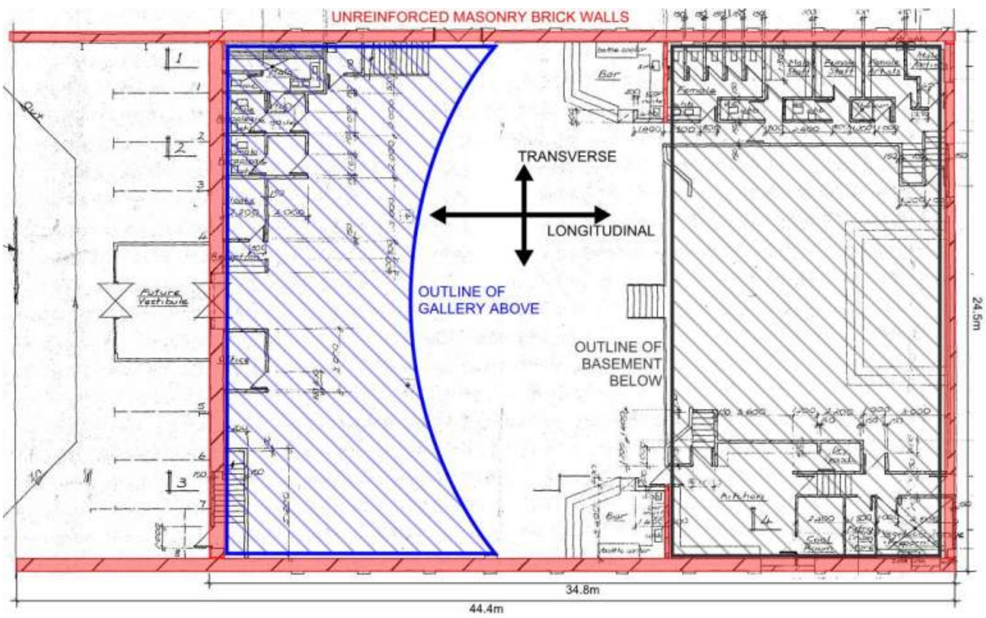


Figure 2: Key Elements in Building

6 IEP Assessment Results

Our IEP assessment of Sammy's indicates the building can achieve 37%NBS(IL3) in the longitudinal direction and 25%NBS (IL3) in the transverse direction. The IEP assessment of this building therefore indicates an overall potential seismic rating of 25%NBS(IL3), corresponding to a 'Grade D' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

The key assumptions made during our assessment are shown in the table below. Refer also to the attached IEP assessment.

Table 2: Sammy's IEP Assessment Results

IEP Item	Assumption	Justification
Date of Building Design	Pre-1935 Category	The building was originally constructed in 1897.
Soil Type	D – Deep or soft soils	The soil type is considered to be D based on the available geotechnical information from the Otago Regional Council.
Building Importance Level	3	The building is considered a structure that could contain people in crowds of greater than 300 people as defined in AS/NZS 1170.0.
Ductility of Structure	μ=1.50 (Longitudinal and Transverse)	The lateral load resisting system consists of unreinforced masonry brick walls. The likely failure mode is out-of-plane failure which has limited capacity beyond the yield displacement. As the walls appear to be in reasonably good condition we have assumed the maximum ductility allowed in the Technical Guidelines (refer table BA.2).
Plan Irregularity, Factor A	1.0 (Longitudinal and Transverse)	The load resisting system relies on the perimeter brick walls. As there are minimal penetrations and the weight of the building is predominately in the walls and roof, the eccentricity is minimal (≤ 0.3b).
Vertical Irregularity, Factor B	1.0	The building is single storey. The structure supporting the gallery area is gravity only and is not stiff enough to trigger a reduction due to vertical discontinuity (>0.1 total building stiffness contributed by discontinuous part).
Short Columns, Factor C	1.0	N/A.
Pounding, Factor D	1.0 (Longitudinal)	Faces Crawford and Vogel Streets at each end.
	0.7 (Transverse)	Adjacent buildings are built hard against the side walls of Sammy's with floors and roofs at intermediate points along the height of the walls. However Sammy's is a shear wall structure so the effect of pounding can be reduced from 0.4 to 0.7 as noted in the IEP spreadsheet.
Site Characteristics, Factor E	1.0	The Otago Regional Council mapping indicates the site could be susceptible to liquefaction. If the superstructure was more resilient liquefaction could potentially cause a life safety hazard, however due to the vulnerability of the walls to out-of-plane failure it is considered unlikely to be significant prior to building collapse.

IEP Item	Assumption	Justification
Factor F	1.0	No Critical Structural Weaknesses (CSW) or significant structural deterioration was noted that would penalise the building. The lack of seismic detailing typical in URM structures is already penalised in the building age section. While the building has been previously strengthened, we have no details of the work or the level of strengthening undertaken and therefore no allowance has been made for this.

For unreinforced masonry buildings built prior to 1935, the Technical Guidelines offer an additional method of assessing these buildings. This uses an attribute scoring method to assess the seismic capacity of the building and determines the %NBS rating directly from these attributes.

The key assumptions made during our assessment are shown in the table below:

Table 3: Sammy's IEP Assessment Results – Attribute Scoring Methodology

Item	Attribute Ranking	Justification
Structural Continuity	3 (Poor)	The building is constructed in unreinforced masonry brick. No concrete bond beams were noted.
Plan Regularity	0 (Excellent)	As noted for Factor A in Table 2, the building has minimal plan eccentricity.
Vertical Regularity	0 (Excellent)	As noted for Factor B in Table 2, the building has minimal vertical irregularity.
Diaphragm Shape	0 (Excellent)	No large wing walls which could disrupt the diaphragm (if one were present).
Condition of Structure	1 (Good)	Minimal deterioration of the structural elements were observed. Some minor loss of pointing was noted.
Cracking or Movement	0 (Not Evident)	No visible cracking or movement of the walls was observed.
Out of Plane Performance	3 (Poor)	Based on a wall height of 12.3m, the wall would need to be over 9 wythes thick to achieve a "Good" rating. We have assumed a wall thickness of 3 wythes for this assessment.
In Plane Performance	1 (Good)	Based on a A_p/A_w ratio of 18.7, for 132m of perimeter wall which is 3 wythes thick (assumed), and a total building area (A_p) of 815m².
Diaphragm Coverage	3 (No diaphragm)	No diaphragm was noted in the ceiling space during our site visit.
Diaphragm Shape	3 (No diaphragm)	No diaphragm was noted in the ceiling space during our site visit.
Diaphragm Openings	3 (No diaphragm)	No diaphragm was noted in the ceiling space during our site visit.
Engineered Connection from Roof to Walls	3 (No)	No engineered connection has been assumed to exist between the roof and the walls.

Item	Attribute Ranking	Justification
Foundations	3 (Poor)	Typical foundations for URM buildings are concrete strip footings with the brick built directly on top. This provides no connectivity between the foundation and the wall.
Separation	3 (Inadequate)	The adjacent buildings are built hard against the side walls of the structure.
Total Attribute Score	**26**	

The total attribute score indicates an overall potential seismic rating of 12%NBS(IL3), corresponding to a ‘Grade E’ building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme.

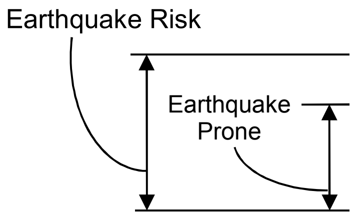
We have also done a high level calculation of the URM walls acting in out-of-plane bending. This was checked both with and without a roof diaphragm. The results were either 10%NBS(IL3) without a diaphragm at roof level or 25%NBS(IL3) with a roof diaphragm providing lateral support to the top of the wall.

Based on our assessment, Sammy’s has a potential seismic rating of between 10-25%NBS(IL3), which corresponds to a Grade D or E building.

7 IEP Grades and Relative Risk

Table 3 below taken from the NZSEE Guidelines provides the basis of a proposed grading system for existing buildings, as one way of interpreting the *%NBS* seismic rating.

Table 3: Building Grading System for Earthquake Risk



Building Grade	Percentage of New Building Standard (%NBS)	Approx. Risk Relative to a New Building	Life-Safety Risk Description
A+	>100	<1 times	Low risk
A	80 – 100	1 – 2 times	Low risk
B	67 – 79	2 – 5 times	Low risk
C	34 – 66	5 – 10 times	Medium risk
D	20 – 33	10 – 25 times	High risk
E	<20	more than 25 times	Very high risk

Sammy’s has been classified by the IEP as a Grade D/E building and is therefore considered to be a ***High to Very High Risk***.

The New Zealand Society for Earthquake Engineering (which provides authoritative advice to the legislation makers, and should be considered to represent the consensus view of New Zealand structural engineers) classifies a building achieving greater than 67%NBS as “Low Risk” and having “Acceptable (improvement may be desirable)” building structural performance. However, NZSEE classifies a building achieving less than 33%NBS as “High Risk” and having “Unacceptable (improvement required under the Act)” building structural performance.

8 Assessment of Egress Stairs and Building Parts

It is considered important recent learnings from the Christchurch Earthquake be incorporated into the initial assessment. In particular, concern has been raised around the poor performance of stairs and their supports, and also the risk presented by heavy building appendages next to public access ways, such as old masonry parapets, chimneys and canopies.

The gable end walls, particularly on the southeast elevation facing Vogel Street, could potentially collapse during a seismic event. While this is unlikely to cause a global collapse mechanism to form, it could present a significant hazard to people outside the structure.

The lightweight internal stairs observed in the building are unlikely to be vulnerable to building drift and so unlikely to collapse prior to a global collapse mechanism forming.

9 Seismic Restraint of Non – Structural Items

During an earthquake, the safety of people can be put at risk due to non-structural items falling on them. These items should be adequately seismically restrained, where possible, to the NZS 4129:2009 “The Seismic Performance of Engineering Systems in Buildings”.

An assessment has not been made of the bracing of the ceilings, in-ceiling ducting, services and plant. We have also not checked whether tall or heavy furniture has been seismically restrained or not. These issues are outside the scope of this initial assessment but could be the subject of another investigation.

10 Explanatory Notes

- This report has been prepared by Beca at the request of our Client and is exclusively for our Client’s use for the purpose for which it is intended in accordance with the agreed scope of work. Beca accepts no responsibility or liability to any third party for any loss or damage whatsoever arising out of the use of or reliance on this report by that party or any party other than our Client.
- Our inspection was limited to a high level visual examination of the buildings where safe and ready access existed at the time, and we have not undertaken any intrusive inspections or testing. This report is necessarily limited in that respect and does not address any matter that is not discoverable from such an inspection, including any damage or defect in inaccessible places and/or latent defects. Beca is not able to give any warranty or guarantee that all possible damage, defects, conditions or qualities have been identified. The work done by Beca and the advice given is therefore on a reasonable endeavours basis.
- The building assessment is necessarily reliant on the accuracy, currency and completeness of the information provided to us, including the structural drawings, and we have not sought to independently verify any of the information provided.
- The Initial Seismic Building Assessment is based on the Initial Evaluation Procedure (IEP) methodology as detailed in the New Zealand Society for Earthquake Engineering’s handbook “Assessment and Improvement of the Structural Performance of Buildings in Earthquake”. This procedure provides an assessment of the likely seismic rating of the building in comparison with a new building designed to the current code (100% New Building Standard (100%NBS)). Except to the extent that Beca expressly indicates in the report, no assessment has been made to determine whether or not the building complies with the building codes or other relevant codes, standards, guidelines, legislation, plans, etc.

- The focus of the assessment is seismic performance only. No gravity or wind load assessments have been undertaken.

11 Conclusions and Recommendations

Our ISA assessment for Sammy's Entertainment Venue, located at 65 Crawford Street, Dunedin, carried out using the IEP, indicates an overall score of 10-25%NBS(IL3), which corresponds to a Grade D/E building, as defined by the NZSEE grading scheme. This is below the threshold for Earthquake-Prone Buildings (34%NBS) and the threshold for Earthquake-Risk Buildings (67%*NBS*) as defined by the NZSEE guidelines.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's performance. A more reliable result will be obtained from a Detailed Seismic Assessment (DSA), however it is unlikely to change the grading of the building significantly from that obtained by the ISA. We would recommend that a strengthening scheme is developed for Sammy's, which would include assessing the building and providing remedial solutions to any deficiencies found.

We trust this letter and initial seismic assessment meets your current requirements. We would be pleased to discuss further with you any issues raised or if you would like clarification on any aspect of this letter.

Yours sincerely

Alex Kelly
Structural Engineer

on behalf of

Beca Ltd

Direct Dial: +64 3 367 2465
Email: alex.kelly@beca.com

Yours sincerely

Jonathan Barnett
Technical Director - Structural Engineering

on behalf of

Beca Ltd

Direct Dial: +64 3 951 2357
Email: jonathan.barnett@beca.com

Attachments:

- Sammy's Entertainment Venue - IEP
- Existing Drawings

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	**65 Crawford Street**	**Job No.:**	**5329140**
AKA:	**Sammy's; formerly His Majesty's Theatre**	**By:**	**ASK**
Name of building:	**Sammy's Entertainment Venue**	**Date:**	**22/08/2017**
City:	**Dunedin**	**Revision No.:**	**0**

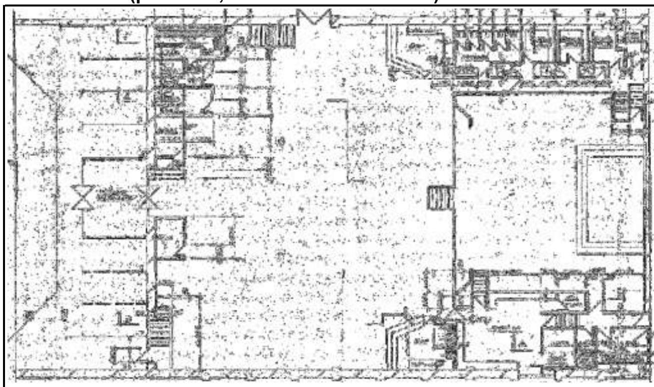
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

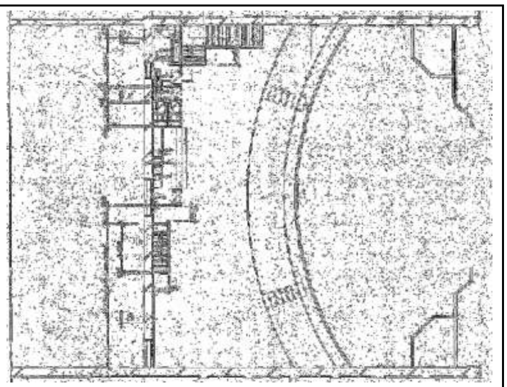
1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



Ground Floor Plan



Gallery Plan

NOTE: THERE ARE MORE SKETCHES ON PAGE 1a ATTACHED

1.3 List relevant features (Note: only 10 lines of text will print in this box. If further text required use Page 1a)

-Sammy's Entertainment Venue, formerly His Majesty's Theatre, was originally constructed in 1897.
-The roof consists of timber purlins spanning onto steel trusses, consisting of I-beam rafters and steel rod bottom chord and ties, spanning onto the perimeter brick walls.
-The perimeter walls are constructed of URM brick, which are an unknown number of wythes thick.
-Lateral loads will be resisted by the URM walls.
-Strengthening of unknown scope has been undertaken at an unknown time.
-Note drawings are floor plans only.

1.4 Note information sources

Tick as appropriate

Visual Inspection of Exterior	☑	**Specifications**	☐
Visual Inspection of Interior	☑	**Geotechnical Reports**	☐
Drawings (note type)	☑	**Other (list)**	☐

– City Surveyors, Dunedin N.Z.: His Majesty’s Theatre Crawford St (1907).
– J. R. G. Hanlon & Partners: His majesty’s Theatre – Dunedin – Development For Use As A Licensed Restaurant Cabaret (1983).

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

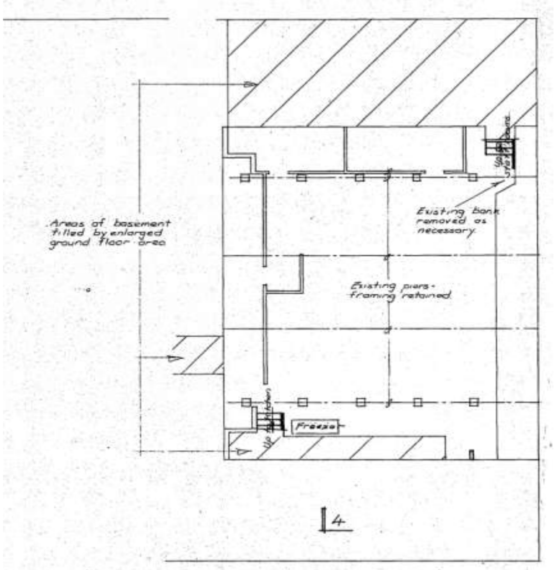
Page 1a

Street Number & Name:	**65 Crawford Street**	**Job No.:**	**5329140**
AKA:	**Sammy's; formerly His Majesty's Theatre**	**By:**	**ASK**
Name of building:	**Sammy's Entertainment Venue**	**Date:**	**22/08/2017**
City:	**Dunedin**	**Revision No.:**	**0**

Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:

Note: print this page separately



Basement Plan

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	65 Crawford Street	Job No.:	5329140
AKA:	Sammy's; formerly His Majesty's Theatre	By:	ASK
Name of building:	Sammy's Entertainment Venue	Date:	22/08/2017
City:	Dunedin	Revision No.:	0

Table IEP-2 Initial Evaluation Procedure Step 2

Step 2 - Determination of *(%NBS)* $_b$

(Baseline *(%NBS)* for particular building - refer Section B5)

2.1 Determine nominal *(%NBS)* = *(%NBS)* $_{nom}$

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	◉	◉
1935-1965	○	○
1965-1976	○	○
1976-1984	○	○
1984-1992	○	○
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	Public Buildings	Public Buildings
Seismic Zone:		
c) Soil Type		
From NZS1170.5:2004, Cl 3.1.3 :	D Soft Soil	D Soft Soil
From NZS4203:1992, Cl 4.6.2.2 : (for 1992 to 2004 and only if known)	Flexible	Flexible
d) Estimate Period, *T*		
h_n =	25	25 m
A_c =	1.00	1.00 m^2

Comment:

Conservative low end estimate of period for URM brick structures.

		Longitudinal	Transverse
Moment Resisting Concrete Frames:	$T = \max\{0.09h_n^{0.75}, 0.4\}$	○	○
Moment Resisting Steel Frames:	$T = \max\{0.14h_n^{0.75}, 0.4\}$	○	○
Eccentrically Braced Steel Frames:	$T = \max\{0.08h_n^{0.75}, 0.4\}$	○	○
All Other Frame Structures:	$T = \max\{0.06h_n^{0.75}, 0.4\}$	○	○
Concrete Shear Walls	$T = \max\{0.09h_n^{0.75}/A_c^{0.5}, 0.4\}$	○	○
Masonry Shear Walls:	$T \leq 0.4$sec	○	○
User Defined (input Period):		◉	◉
	T:	0.75	0.75

Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.

			Longitudinal	Transverse
e) Factor A:	Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	**Factor A:**	1.00	1.00
f) Factor B:	Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	**Factor B:**	0.04	0.04
g) Factor C:	For reinforced concrete buildings designed between 1976-84 Factor C = 1.2, otherwise take as 1.0.	**Factor C:**	1.00	1.00
h) Factor D:	For buildings designed prior to 1935 Factor D = 0.8 except for Wellington where Factor D may be taken as 1, otherwise take as 1.0.	**Factor D:**	0.80	0.80
(%NBS) $_{nom}$ **= AxBxCxD**		***(%NBS)*** $_{nom}$	3%	3%

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	**65 Crawford Street**	**Job No.:**	**5329140**
AKA:	**Sammy's; formerly His Majesty's Theatre**	**By:**	**ASK**
Name of building:	**Sammy's Entertainment Venue**	**Date:**	**22/08/2017**
City:	**Dunedin**	**Revision No.:**	**0**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

If *T* ≤ 1.5sec, Factor E = 1

			Longitudinal	Transverse
a) Near Fault Factor, *N(T,D)* (from NZS1170.5:2004, Cl 3.1.6)		**N(T,D):**	1	1
b) Factor E	= 1/N(T,D)	**Factor E:**	1.00	1.00

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Dunedin **Refer right for user-defined locations**

Z =	0.13	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.6	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.13	(from NZS1170.5:2004, Table 3.3)

b) Factor F

For pre 1992	=	$1/Z$
For 1992-2011	=	Z_{1992}/Z
For post 2011	=	Z_{2004}/Z

	Longitudinal	Transverse
Factor F:	7.69	7.69

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1.25	1.25

b) Design Risk Factor, R_o

(set to 1.0 if other than 1976-2004, or not known)

	Longitudinal	Transverse
R_o =	1	1

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level)

Choose Importance Level ○ 1 ○ 2 ● 3 ○ 4 | ○ 1 ○ 2 ● 3 ○ 4

	Longitudinal	Transverse
R =	1.3	1.3

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	0.96	0.96

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
URM brick walls in reasonably good condition - use maximum allowed ductility from guidelines.

	Longitudinal	Transverse
μ =	1.50	1.50

b) Factor H

		Longitudinal k_μ	Transverse k_μ
For pre 1976 (maximum of 2)	=	1.50	1.50
For 1976 onwards	=	1	1
Factor H:		1.50	1.50

(where kμ is NZS1170.5:2004 Inelastic Spectrum Scaling Factor, from accompanying Table 3.3)

2.6 Structural Performance Scaling Factor, Factor I

a) Structural Performance Factor, S_p

(from accompanying Figure 3.4)

Tick if light timber-framed construction in this direction ☐ ☐

	Longitudinal	Transverse
S_p =	0.85	0.85

b) Structural Performance Scaling Factor = $1/S_p$

	Longitudinal	Transverse
Factor I:	1.18	1.18

Note Factor B values for 1992 to 2004 have been multiplied by 0.67 to account for Sp in this period

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$
(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

	Longitudinal	Transverse
	37%	**37%**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	65 Crawford Street	Job No.:	5329140
AKA:	Sammy's; formerly His Majesty's Theatre	By:	ASK
Name of building:	Sammy's Entertainment Venue	Date:	22/08/2017
City:	Dunedin	Revision No.:	0

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs | **Effect on Structural Performance** **(Choose a value - Do not interpolate)** | **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* **Factor A** 1.0

The load resisting system relies on the perimeter brick walls. As there are minimal penetrations and the weight of the building is predominately in the walls and roof, the eccentricity is minimal (≤ 0.3b).

3.2 Vertical Irregularity

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* **Factor B** 1.0

The building is single storey. The structure supporting the gallery area is gravity only and is not stiff enough to trigger a reduction due to vertical discontinuity (>0.1 total building stiffness contributed by discontinuous part).

3.3 Short Columns

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* **Factor C** 1.0

N/A.

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

Note:
Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	☐ 1	☐ 1	☒ 1
Alignment of Floors not within 20% of Storey Height	☐ 0.4	☐ 0.7	☐ 0.8

Faces Crawford and Vogel Streets at each end.

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	☐ 0.4	☐ 0.7	☐ 1
Height Difference 2 to 4 Storeys	☐ 0.7	☐ 0.9	☐ 1
Height Difference < 2 Storeys	☐ 1	☐ 1	☒ 1

Faces Crawford and Vogel Streets at each end.

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* **Factor E** 1.0

If the superstructure was more resilient liquefaction could potentially cause a life safety hazard, however due to the vulnerability of the walls to out-of-plane failure it is considered unlikely to be significant prior to building collapse.

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*

For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.

Factor F 1.0

Record rationale for choice of Factor F:

No CSW or significant structural deterioration was noted that would penalise building. Lack of seismic detailing in URM structure already penalised in building age section. While the building has been previously strengthened, we have no details of the work or the level of strengthening undertaken and therefore no allowance has been made for this.

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**)

PAR
Longitudinal **1.00**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	65 Crawford Street	Job No.:	5329140
AKA:	Sammy's; formerly His Majesty's Theatre	By:	ASK
Name of building:	Sammy's Entertainment Venue	Date:	22/08/2017
City:	Dunedin	Revision No.:	0

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

b) Transverse Direction

Factors

potential CSWs | **Effect on Structural Performance** **(Choose a value - Do not interpolate)**

3.1 Plan Irregularity

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* — **Factor A** 1.0

The load resisting system relies on the perimeter brick walls. As there are minimal penetrations and the weight of the building is predominately in the walls and roof, the eccentricity is minimal (≤ 0.3b).

3.2 Vertical Irregularity

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* — **Factor B** 1.0

The building is single storey. The structure supporting the gallery area is gravity only and is not stiff enough to trigger a reduction due to vertical discontinuity (>0.1 total building stiffness contributed by discontinuous part).

3.3 Short Columns

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* — **Factor C** 1.0

N/A.

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

Note:
Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

Factor D1 For Transverse Direction: 0.7

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	☐ 1	☐ 1	☐ 1
Alignment of Floors not within 20% of Storey Height	☐ 0.4	☒ 0.7	☐ 0.8

Adjacent buildings hard against side walls, with floorsat intermediate points along height. Shear walls so can reduce to 0.7.

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	☐ 0.4	☐ 0.7	☐ 1
Height Difference 2 to 4 Storeys	☐ 0.7	☐ 0.9	☐ 1
Height Difference < 2 Storeys	☒ 1	☐ 1	☐ 1

Sammy's is single storey, adjacent buildings are three storey or less.

Factor D 0.7

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

Effect on Structural Performance ☐ *Severe* ☐ *Significant* ☒ *Insignificant* — **Factor E** 1.0

If the superstructure was more resilient liquefaction could potentially cause a life safety hazard, however due to the vulnerability of the walls to out-of-plane failure it is considered unlikely to be significant prior to building collapse.

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*

For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.

Factor F 1.00

Record rationale for choice of Factor F:

No CSW or significant structural deterioration was noted that would penalise building. Lack of seismic detailing in URM structure already penalised in building age section. While the building has been previously strengthened, we have no details of the work or the level of strengthening undertaken and therefore no allowance has been made for this.

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**)

PAR

Transverse **0.70**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	65 Crawford Street	Job No.:	5329140
AKA:	Sammy's; formerly His Majesty's Theatre	By:	ASK
Name of building:	Sammy's Entertainment Venue	Date:	22/08/2017
City:	Dunedin	Revision No.:	0

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

Step 4 - Percentage of New Building Standard *(%NBS)*

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	37%	37%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	1.00	0.70
4.3	**PAR x Baseline *(%NBS)*$_b$**	37%	25%
4.4	**Percentage New Building Standard *(%NBS)*** (Use lower of two values from Step 4.3)		25%

Step 5 - Potentially Earthquake Prone? (Mark as appropriate) — *%NBS* $\leq$ 34: **YES**

Step 6 - Potentially Earthquake Risk? (Mark as appropriate) — *%NBS* < 67: **YES**

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade: **D**

Additional Comments (items of note affecting IEP score)

Relationship between Grade and *%NBS* :

Grade:	A+	A	B	C	D	E
%NBS:	> 100	100 to 80	79 to 67	66 to 34	33 to 20	< 20

Initial Evaluation Procedure (IEP) Assessment - Completed for Dunedin City Council

Street Number & Name:	65 Crawford Street	Job No.:	5329140
AKA:	Sammy's; formerly His Majesty's Theatre	By:	ASK
Name of building:	Sammy's Entertainment Venue	Date:	22/08/2017
City:	Dunedin	Revision No.:	0

Table IEP-5 Initial Evaluation Procedure Step 8

Step 8 - Identification of potential Severe Critical Structural Weaknesses that could result in significant risk to a significant number of occupants

8.1	Number of storeys above ground level	2
8.2	Presence of heavy concrete floors and/or concrete roof? (Y/N)	N

Occupancy not considered to be significant - no further consideration required

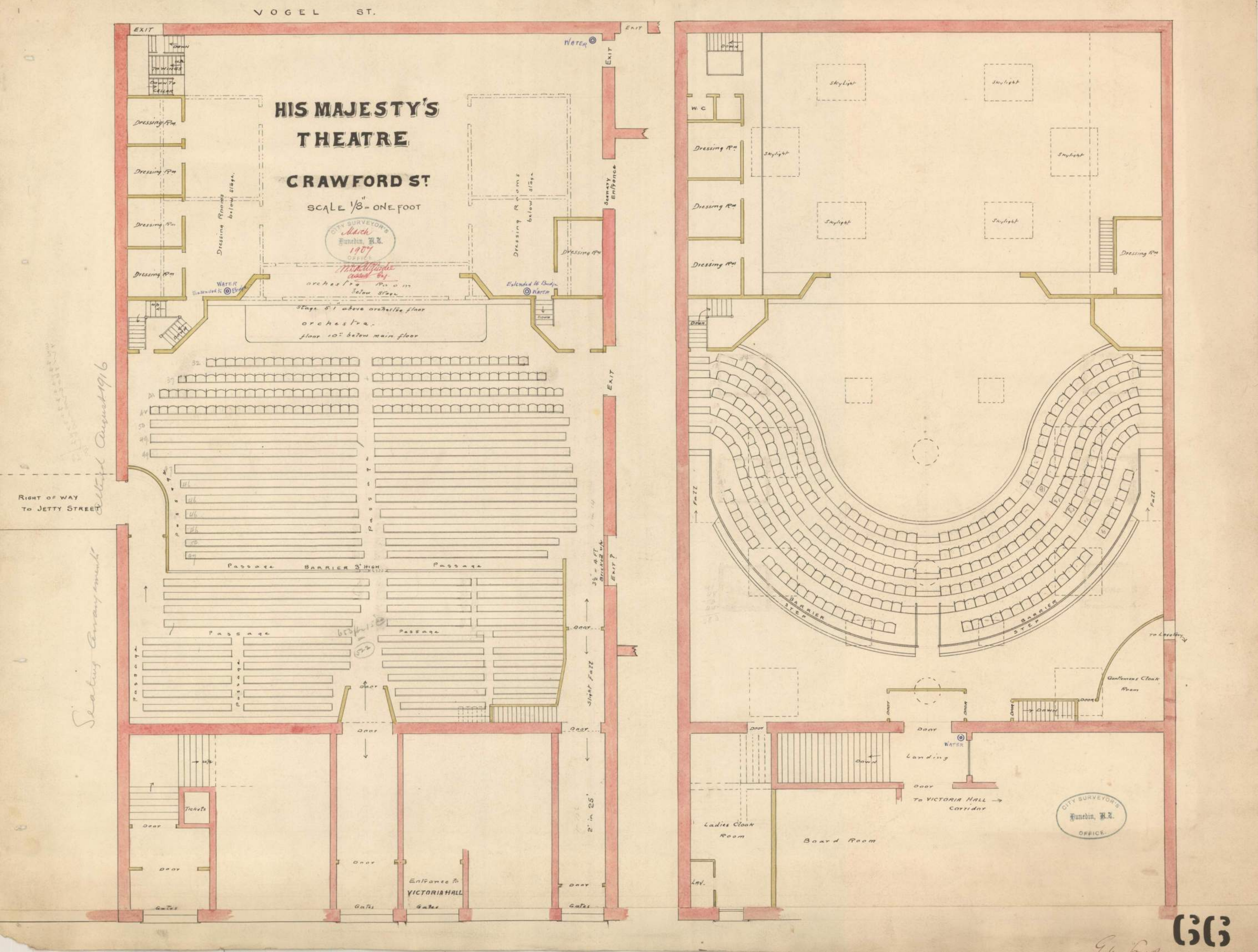
Risk not considered to be significant - no further consideration required

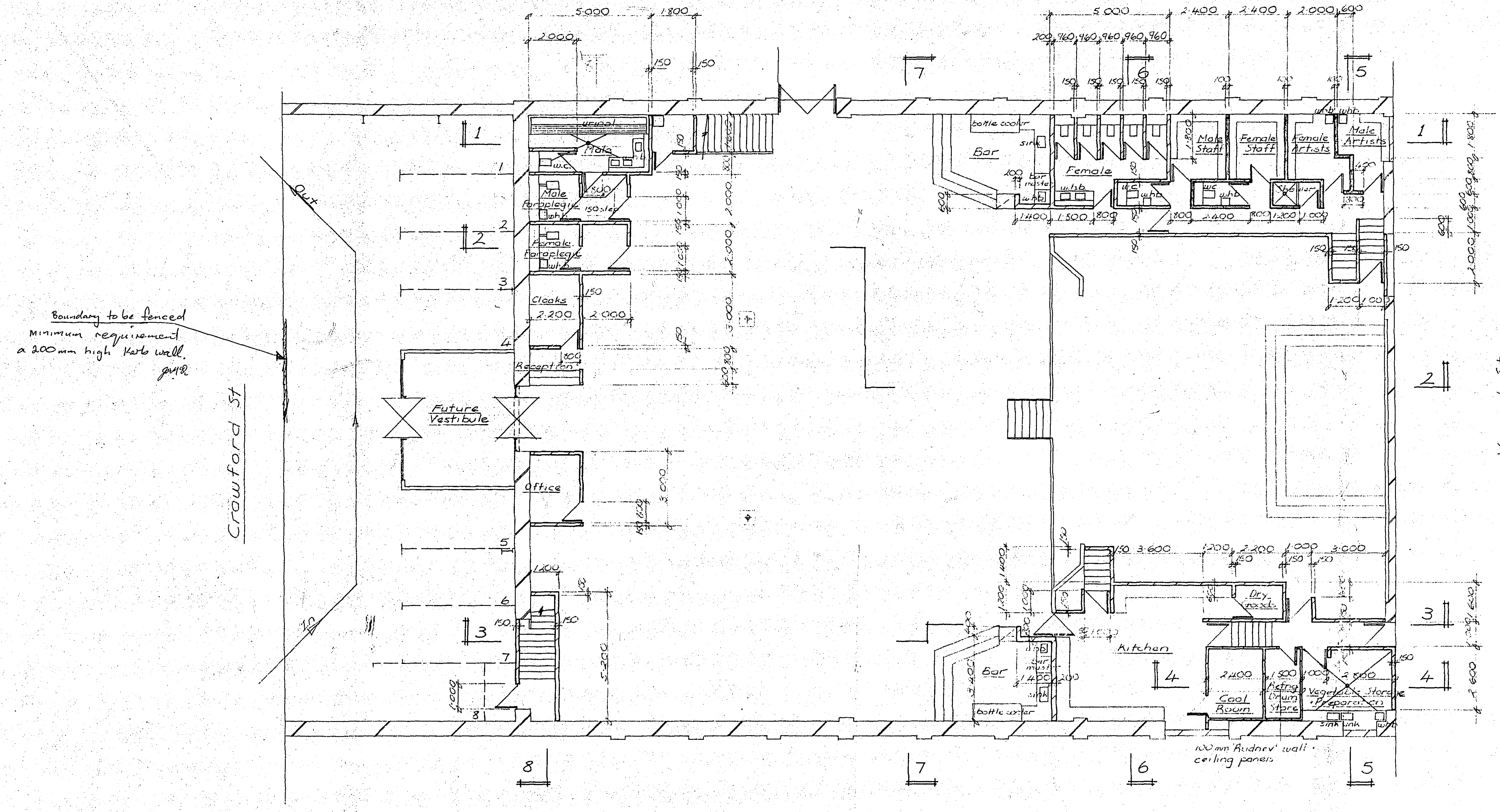
IEP Assessment Confirmed by [signature] **Signature**

John Heenan **Name**

111129 **CPEng. No**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the New Zealand Society for Earthquake Engineering document "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes, June 2006". This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*


VOGEL ST.
EXIT
HIS MAJESTY'S THEATRE
CRAWFORD ST.
SCALE 1/8" = ONE FOOT
CITY SURVEYOR'S OFFICE Dunedin, N.Z. March 1907
Dressing Rm
Dressing Rooms below stage
To Wings
Down to Cellar
WATER
Scenery Entrance
orchestra Room below stage
Stage 5'1" above orchestra floor
orchestra
floor 10" below main floor
Extended to Bridge
Passage
BARRIER 3' HIGH
RIGHT OF WAY TO JETTY STREET
Seating Arrangement altered August 1916
Slight Fall
2' in 25'
Door
Tickets
Gates
Entrance to VICTORIA HALL
Skylight
W.C.
Fall
BARRIER STEP
To Lavatory
Gentlemens Cloak Room
Down
Landing
TO VICTORIA HALL Corridor
Ladies Cloak Room
Board Room
Lav.
CITY SURVEYOR'S OFFICE Dunedin, N.Z.
66



Ground Floor Layout Plan (1:100)

SEE AMENDED PLANS
DATED MARCH 1983

DUNEDIN CITY CORPORATION
COPY OF APPROVED PLAN OR SPECIFICATION
TO BE RETAINED ON WORKS AND PRODUCED ON REQUEST OF BUILDING INSPECTOR.
DATE 7.4.83
R. E. Jennings CITY ENGINEER

CITY ENGINEER'S

Required level at Street Boundary Any entrance or fence shall ... level of 120 mm above top of Kerb
constructed to the same grade as the adjoining street.
Vehicle Crossing Fee / ~~Deposit~~ $256 for 3.0 m. Heavy Duty Crossing.
Special Conditions $100 Deposit for reinstatement.

J.M. McQueen For City Engineer Date 2/3/82
NOTE This endorsement overrules any levels or instructions shown on the plan

A separate application to the Drainage Board for plumbing and/or drainage work is required. Such work shall comply fully with the Plumbers, Gasfitters and Drainlayers Act 1976, Plumbers, Gasfitters and Drainlayers Regulations 1977, Drainage and Plumbing Regulations 1978, and the Board's By-laws.
~~Stormwater to be discharged to~~
SANITARY FITTINGS TO EXTENSION OF EXISTING FOUL DRAIN AND TO NEW FOUL DRAIN TO FOUL SEWER IN VOGEL ST.
MECHANICAL VENTILATION REQUIRED FROM WC & ISOLATION COMPARTMENTS – GREASE TRAP REQUIRED.
23.2.83

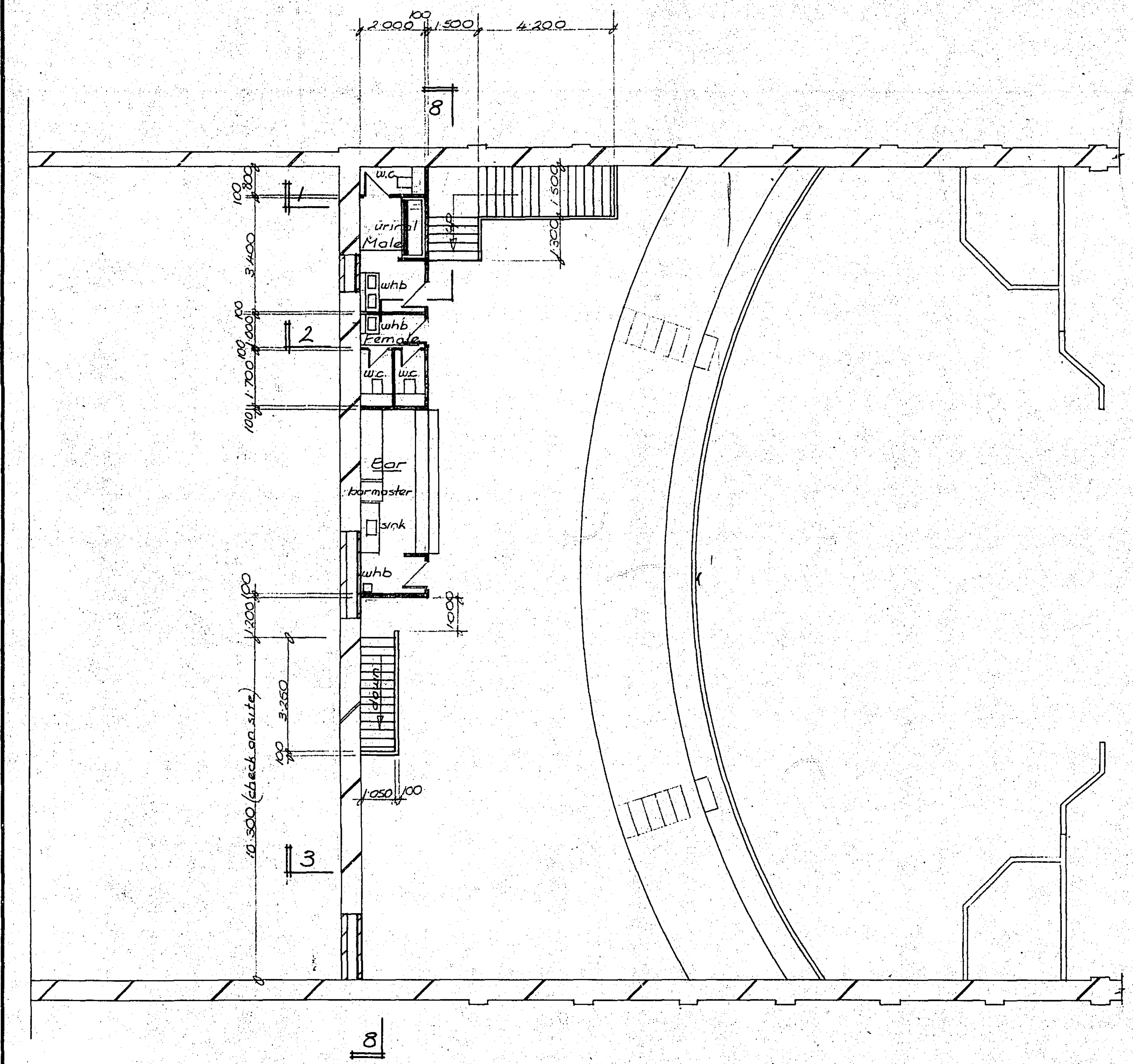
CITY HEALTH DEPARTMENT
Date Uplifted 12/3/83
Seen By [signature]
to 19/3/83
Subject to compliance with Food Hygiene & Related Regulations and MOH approval

CITY PLANNING DEPARTMENT
Pursuant to the provisions of the District Scheme, these plans and specifications are approved, provided that no change shall be made to the details shown hereon, and contained in the specification attached hereto, and subject to
Approved by Sub Committee 15/6/82
17/2/83.
I2 – Ind. B. Signed [signature] for City Planning Officer

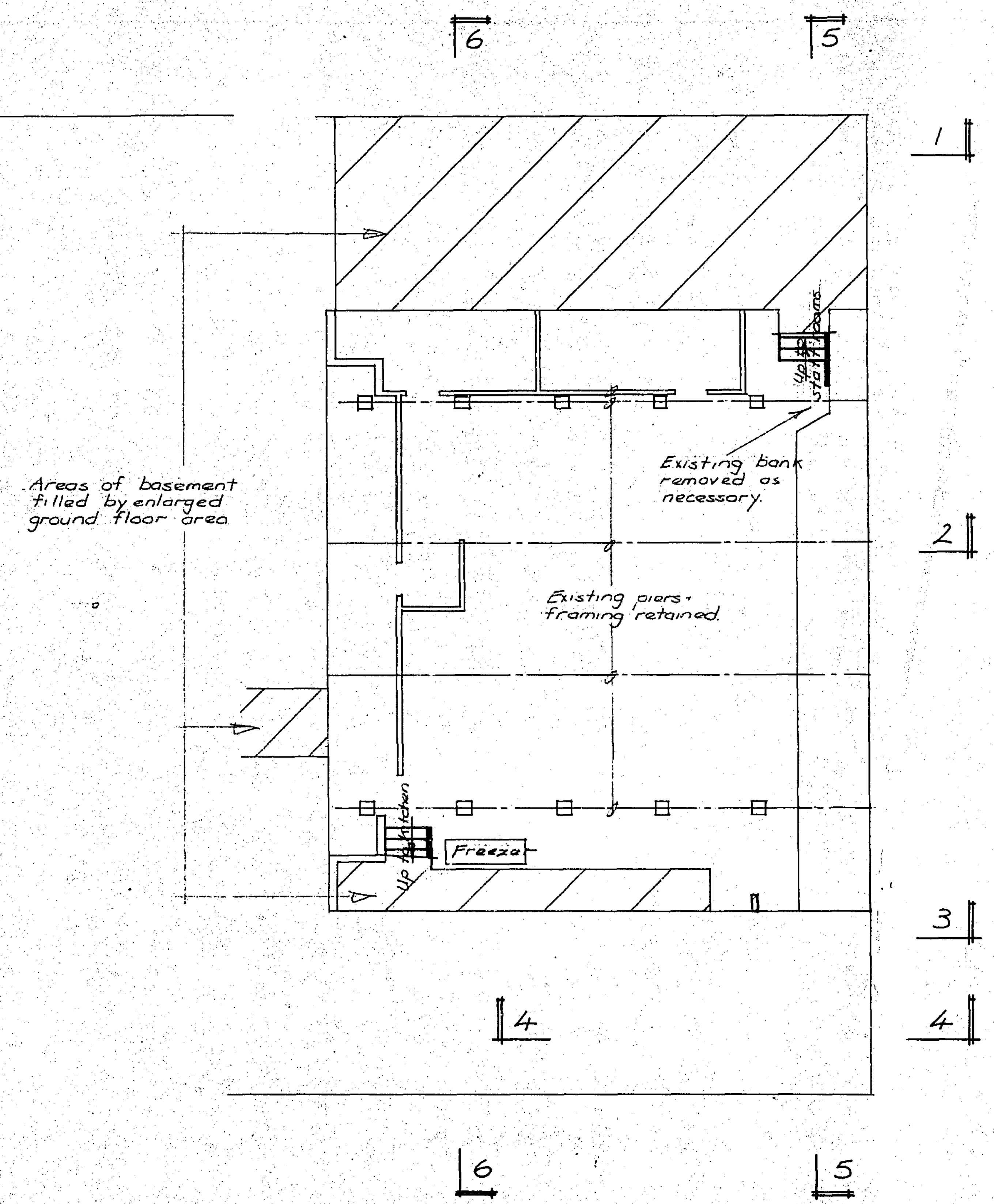
4607

J.R.G. HANLON & PARTNERS REGISTERED STRUCTURAL ENGINEERS 219 HIGH STREET DUNEDIN PHONE 777475	Structural Drawings must be read in conjunction with Architectural Drawings. This Drawing is Copyright and may not be reproduced wholly or in part without the permission of the Engineers.	HIS MAJESTY'S THEATRE - DUNEDIN Development For Use As A Licensed Restaurant - Cabaret	NO. DATE AMENDMENTS	SCALES	JOB NO.	SHEET NO. 1 of sheets	
				DRAWN	DATE		

16 FEB 1983



Gallery Layout Plan (1:100)



Basement Area Beneath Stage Layout Plan (1:100)

4607

J.R.G. HANLON & PARTNERS REGISTERED STRUCTURAL ENGINEERS 219 HIGH STREET DUNEDIN PHONE 777475		Structural Drawings must be read in conjunction with Architectural Drawings. This Drawing is Copyright and may not be reproduced wholly or in part without the permission of the Engineers.	HIS MAJESTY'S THEATRE - DUNEDIN Development For Use As A Licensed Restaurant Cabaret	NO.	DATE	AMENDMENTS	SCALES 1:100 DRAWN B Chisholm	JOB NO. 1856 DATE February 1983	SHEET NO. 2 of sheets

10 MAR 1983