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

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Street Number & Name:	**30 Percy Cameron Street**	**Job No.:**	**5-C3957.00**
AKA:		**By:**	**GSF**
Name of building:	**Squash Club**	**Date:**	**24/01/2020**
City:	**Avalon, Hutt City**	**Revision No.:**	**0**

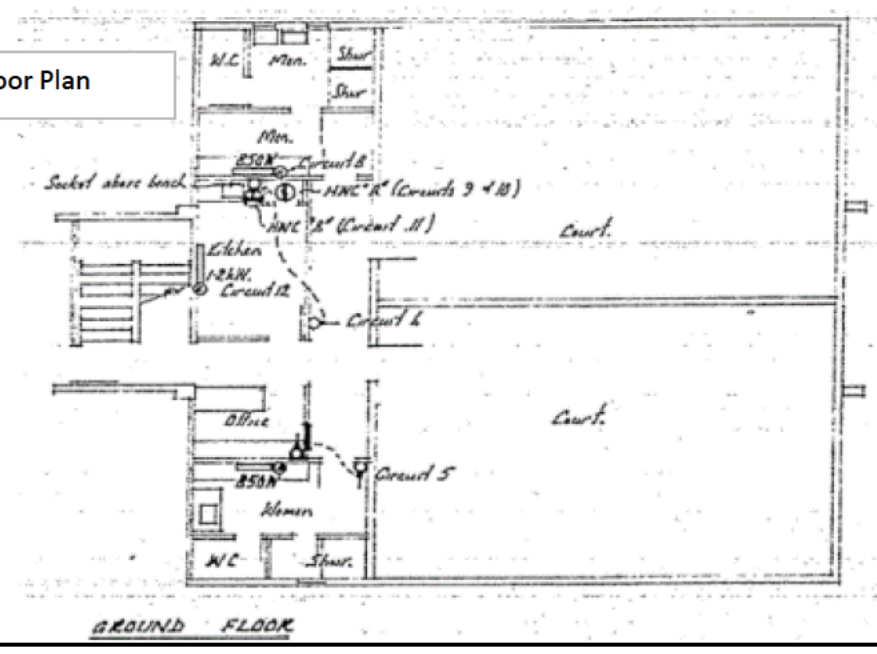
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

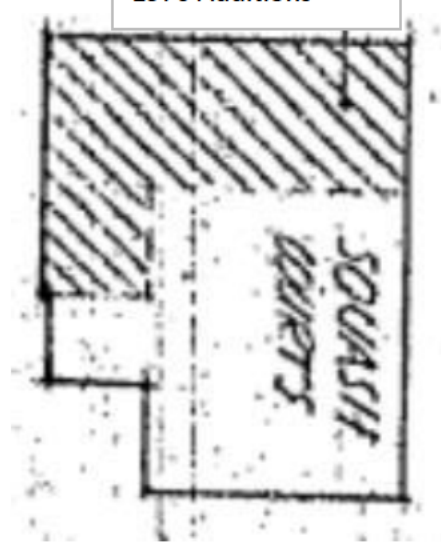
1.1 Photos (attach sufficient to describe building)

1.2 Sketches (plans etc, show items of interest)

1967 Floor Plan



1976 Additions



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

Structure: Concrete encased steel portal columns. and beams, tilt up precast panels with mesh reinforcement
Foundations: Concrete slab on grade with reinforced concrete ground beams and pads under columns
Roof: Lightweight cladding, 1 of 4 bays have steel cross bracing

Subsoil: D soft or deep soils - NZS1170.5:2004 Site Subsoil Classification of Lower Hutt
Construction Date: 1967, extended 1976/7 and 1983

1.4 Note information sources Tick as appropriate

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

Information Reviewed: Design drawings and specifications 1967, extended 1977 and 1983

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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:	Others	Others
Seismic Zone:	Zone A	Zone A
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)	**Not applicable**	**Not applicable**
d) Estimate Period, *T*		
Comment:		
h_n =	7	7 m
A_c =	1.00	1.00 m^2
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):	○	○
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.40
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:** 0.06	0.06
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 and Napier (1931-1935) where Factor D may be taken as 1.0, otherwise take as 1.0.	**Factor D:** 1.00	1.00
***(%NBS)* $_{nom}$ = AxBxCxD**	***(%NBS)* $_{nom}$** 6%	6%

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Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

If $T \leq 1.5$sec, 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: Hutt Valley-south of Taita Gorge — Refer right for user-defined locations

Z =	0.4	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	1.2	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.4	(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

Factor F: 2.50 | 2.50

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.)

I = 1 | 1

b) Design Risk Factor, R_o

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

R_o = 1 | 1

c) Return Period Factor, R

(from NZS1170.0:2004 Building Importance Level) *Choose Importance Level*

	Longitudinal	Transverse
○ 1 ◉ 2 ○ 3 ○ 4		
R =	1.0	1.0

d) Factor G = IR_o/R

Factor G: 1.00 | 1.00

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:

Mesh reinforced precast concrete panels limit ductility to 1.25

μ = 1.25 | 1.25

b) Factor H

		Longitudinal	Transverse
		k_μ	k_μ
For pre 1976 (maximum of 2)	=	1.14	1.14
For 1976 onwards	=	1	1
	Factor H:	1.14	1.14

(where k_μ 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 ☐ ☐

S_p = 0.93 | 0.93

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

Factor I: 1.08 | 1.08

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)

19% | 19%

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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

Comment: Nil

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor B** 1.0

Comment: Nil

3.3 Short Columns

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor C** 1.0

Comment: Nil

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

Comment: Nil

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

Comment: Nil

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

Comment: None

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 2.5

Record rationale for choice of Factor F:

Comment: Concrete encased steel portal columns and reinforced concrete beams, tilt up precast panels with mesh reinforcement. 1 of 4 roof bays have steel cross bracing, lightweight timber mezzanine first floor, calculations of the long precast concrete panel undertaken.

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

PAR

Longitudinal **2.50**

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Name of building:	**Squash Club**	**Date:**	**24/01/2020**
City:	**Avalon, Hutt City**	**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

Comment: Nil

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor B** 1.0

Comment: Nil

3.3 Short Columns

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor C** 1.0

Comment: Nil

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: 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

Comment: Nil

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

Comment: Nil

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

Comment: None

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 2.50

Record rationale for choice of Factor F:

Comment: Concrete encased steel portal columns and reinforced concrete beams, tilt up precast panels with mesh reinforcement. 1 of 4 roof bays have steel cross bracing, lightweight timber mezzanine first floor, calculations of the long precast concrete panel undertaken.

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

PAR

Transverse **2.50**

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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)	19%	19%
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	2.50	2.50
4.3	**PAR x Baseline $(\%NBS)_b$**	45%	45%
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		45%

Step 5 - Is *%NBS* < 34? NO

Step 6 - Potentially Earthquake Risk (is *%NBS* < 67)? YES

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade C

Additional Comments (items of note affecting IEP based seismic rating)

Comment: Additional calculations on the capacity of the precast wall, long panel assessed >67%IL2

Relationship between Grade and *%NBS*:

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

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Table IEP-5 Initial Evaluation Procedure Step 8

Step 8 - Identification of potential Severe Structural Weaknesses (SSWs) 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

Potential Severe Structural Weaknesses (SSWs):

Note: Options that are greyed out are not applicable and need not be considered.

Occupancy not considered to be significant - no further consideration required

Risk not considered to be significant - no further consideration required

The following potential Severe Structural Weaknesses (SSWs) have been identified in the building that could result in significant risk to a significant number of occupants:

1. None identified
2. Weak or soft storey (except top storey)
3. Brittle columns and/or beam-column joints the deformations of which are not constrained by other structural elements
4. Flat slab buildings with lateral capacity reliant on low ductility slab-to-column connections
5. No identifiable connection between primary structure and diaphragms
6. Ledge and gap stairs

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

Name

CPEng. No

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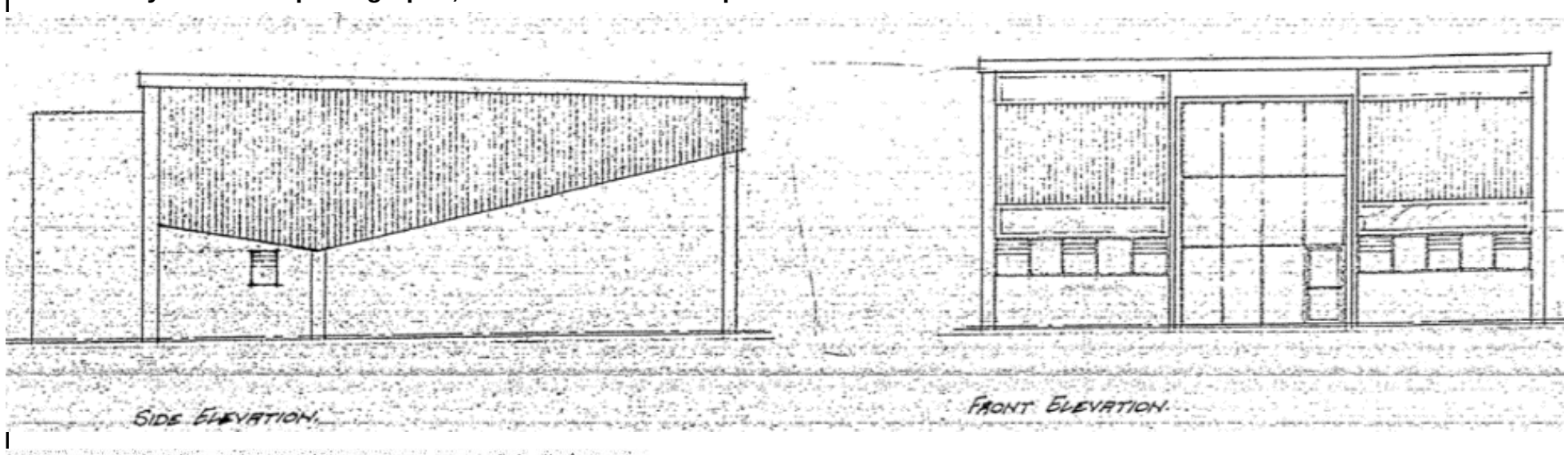
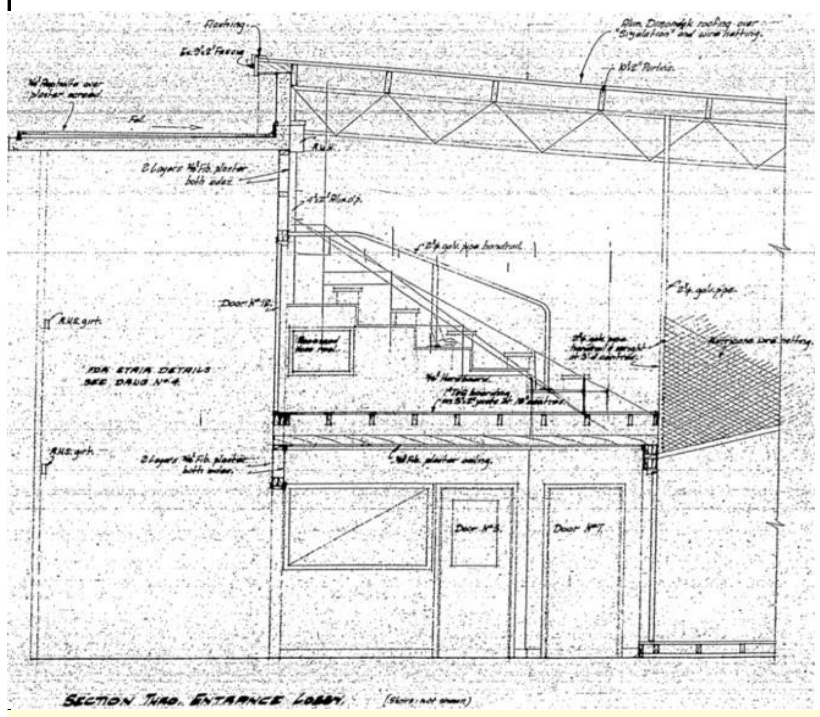
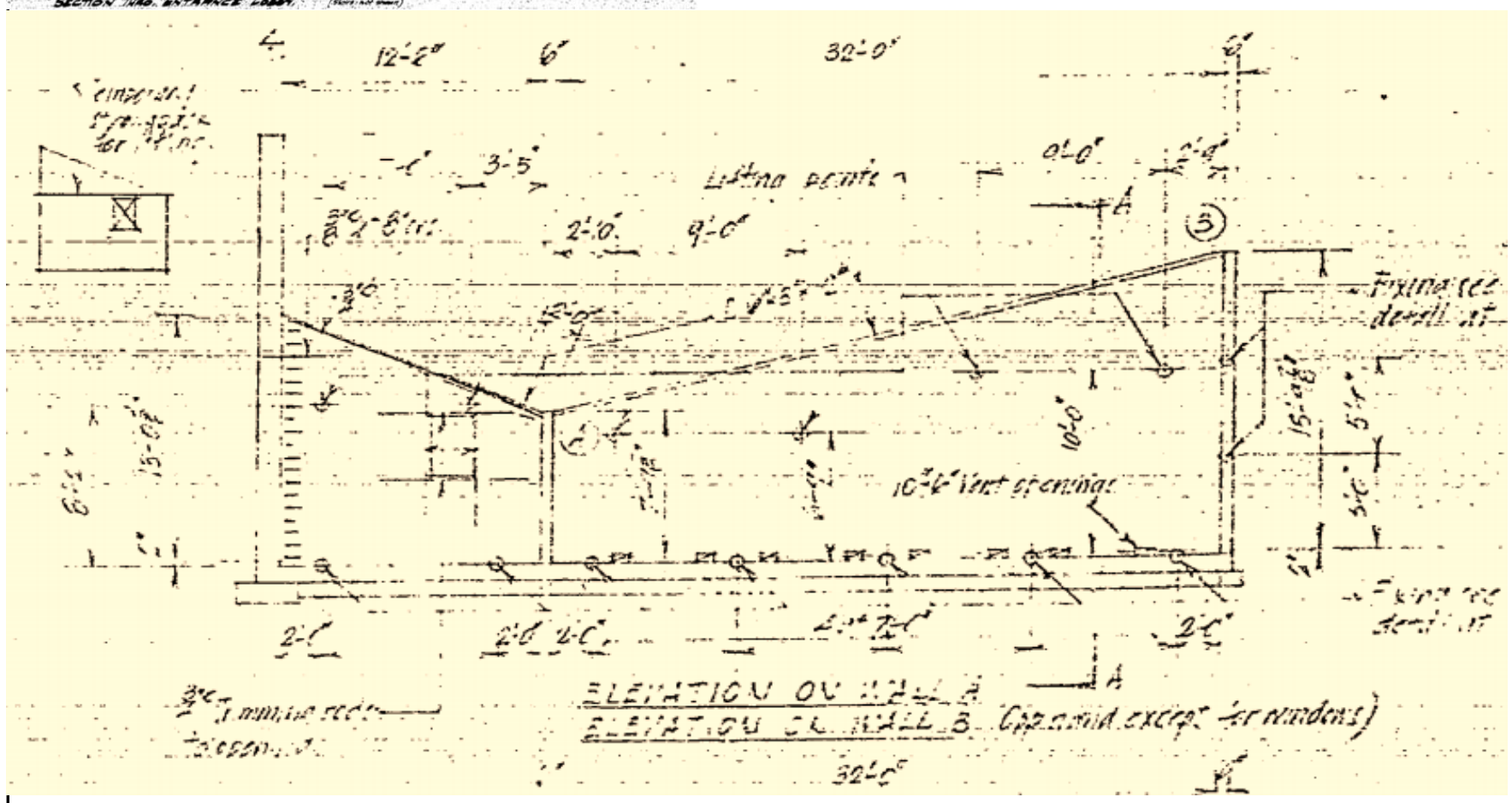
Name of building:	**Squash Club**	**Date:**	**24/01/2020**
City:	**Avalon, Hutt City**	**Revision No.:**	**0**

Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:







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1. Building Information	
Building Name/ Description	Fraser Park Squash Old Building
Street Address	30 Percy Cameron Drive, Avalon
Territorial Authority	Hutt City Council
No. of Storeys	1 with mezzanine level
Area of Typical Floor (approx.)	780 sqm
Year of Design (approx.)	1967 and 1976
NZ Standards designed to	NZSS 1900, Chapter 8: 1965 (1967 and 1976 structure)
Structural System including Foundations	**Structure:** Concrete encased steel portal columns and reinforced concrete beams, tilt up precast panels with mesh reinforcement. **Foundations:** Concrete slab on grade with reinforced concrete ground beams and pads under columns. **Roof:** Lightweight cladding, steel truss with 1 of 4 bays have steel cross braced
Does the building comprise a shared structural form or shares structural elements with any other adjacent titles?	No
Key features of ground profile and identified geohazards	Flat even ground profile, subsoil D.
Previous strengthening and/ or significant alteration	1976 alterations adding another squash court. The design details were produced by the same engineer and had the same details 1983 infill of ground floor, south east corner of the building, reinforced concrete masonry walls provide small improvement in performance
Heritage Issues/ Status	Nil
Other Relevant Information	Nil

2. Assessment Information	
Consulting Practice	WSP New Zealand Ltd
CPEng Responsible, including: • Name • CPEng number • A statement of suitable skills and experience in the seismic assessment of existing buildings[1]	[redacted]
Documentation reviewed, including: • date/ version of drawings/ calculations[2] • previous seismic assessments	1967 Architectural drawings 1 to 6 and Structural Drawings S1 to S4, proposed squash court for Taita Football club Fraser Park by McLaren, Maycroft & Co. 1967 Specifications and calculations (some poor quality). 1976 Structural Drawings, additions and alterations to Squash Court by McLaren, Maycroft & Co. 1982/3 extension drawings, no designer named
Geotechnical Report(s)	NA – assumed based on local knowledge refer to section 3
Date(s) Building Inspected and extent of inspection	11 December 2019
Description of any structural testing undertaken and results summary	None
Previous Assessment Reports	NA
Other Relevant Information	Nil

[1] This should include reference to the engineer's Practice Field being in Structural Engineering, and commentary on experience in seismic assessment and recent relevant training

[2] Or justification of assumptions if no drawings were able to be obtained

3. Summary of Engineering Assessment Methodology and Key Parameters Used	
Occupancy Type(s) and Importance Level	Importance Level 2
Site Subsoil Class	D assumed based on local knowledge and ***NZS1170.5:2004 Site Subsoil Classification of Lower Hutt*** http://nzsee.org.nz/db/2011/013.pdf
For an ISA:	
Summary of how Part B was applied, including: • Key parameters such as μ, S_p and F factors • Any supplementary specific calculations	Ductility – 1.25 precast tilt up concrete panels are the limiting structure in both directions Sp Factor – 0.93 F Factor – 2.5 (both directions) Concrete encased steel portal columns and reinforced concrete beams, tilt up precast panels with mesh reinforcement. 2 of 4 roof bays have steel cross bracing, lightweight timber mezzanine first floor. Calculations undertaken on the capacity of the long precast concrete walls, capacity of the panels >67%IL3
For a DSA:	
Summary of how Part C was applied, including: • the analysis methodology(s) used from C2 • other sections of Part C applied	NA
Other Relevant Information	NA

4. Assessment Outcomes		
Assessment Status (Draft or Final)	Final	
Assessed *%NBS* Rating	45%NBS IL2	
Seismic Grade and Relative Risk (from Table A3.1)	C - 5 – 10 times greater	
For an ISA:		
Describe the Potential Critical Structural Weaknesses	None identified	
Does the result reflect the building's expected behaviour, or is more information/ analysis required?	Yes – the ISA is sufficient	
If the results of this ISA are being used for earthquake prone decision purposes, and elements rating <34*%NBS* have been identified:	**Engineering Statement of Structural Weaknesses and Location** NA	***Mode of Failure and Physical Consequence* Statement(s)** NA
For a DSA:		
Comment on the nature of Secondary Structural and Non-structural elements/ parts identified and assessed		
Describe the Governing Critical Structural Weakness		
If the results of this DSA are being used for earthquake prone decision purposes, and elements rating <34*%NBS* have been identified (including Parts)[3]:	**Engineering Statement of Structural Weaknesses and Location**	***Mode of Failure and Physical Consequence* Statement(s)**
Recommendations (*optional for EPB purposes*)		

[3] If a building comprises a shared structural form or shares structural elements with other adjacent titles, information about the extent to which the low scoring elements affect, or do not affect the structure.