



**SpencerHolmes**

*engineers - surveyors - planners*

**STRUCTURAL DESIGN**

**FOR**

**EMERGENCY CENTRE**

**AT**

**POTAE AVE  
GISBORNE**

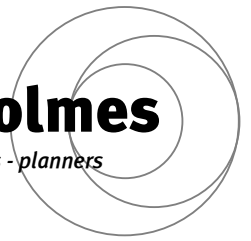
**FOR**

**GDC**

# Document Control

**SpencerHolmes**

engineers - surveyors - planners



Emergency Centre  
Potae Ave  
GISBORNE

---

Ref.	Rev.	Description	By	Date
210934B01	A		TDS	09-09-2022

## SECTION

**Part A: Producer Statement**

**Part B: Design Features Report**

**Part C: Structural Calculations**

## Appendices

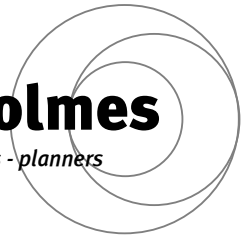
Site Investigation / Geotechnical Report

Action	Name	Signed	Date
Prepared by	<b>Thomas Smith</b> Associate BE, CPEng, CMEngNZ, IntPE(NZ)		09-09-2022
On behalf of	<b>Spencer Holmes Limited</b>		

**Part A:    Producer Statement**

## **Part B: Design Features Report**

# Design Features Report



## Emergency Centre Potae Ave GISBORNE

### 1 GENERAL

Spencer Holmes Limited has been commissioned by Gisborne District Council to undertake structural engineering design services for the proposed Emergency Centre located at Potae Ave, Gisborne.

#### 1.1 Building Description

The proposed building is a single level building. The primary structure consists of timber trusses supported on timber framed walls lined with sheet bracing. Plywood RAB on the exterior and GIB on the interior. The foundations consist of the raised timber subfloor on shallow timber piles and anchor piles, with a ground beam around the perimeter and through the centre of the building in both directions.

#### 1.2 Objective

This Design Features Report (DFR) is a detailed document defining the design criteria for the primary structure of this domestic dwelling, generally designed in accordance with B1/AS1 (NZS3604:2011) by the architect, with elements of specific engineering design (SED) as indicated below;

Acceptable Solutions (B1/AS)	Specific Engineering Design (B1/ VM1 and VM4)
<input type="checkbox"/> Site Inspections and Investigations	<input checked="" type="checkbox"/> Geotechnical Engineering Report
<input checked="" type="checkbox"/> Foundations	<input checked="" type="checkbox"/> SED of Foundations
<input checked="" type="checkbox"/> Beams/Lintels	<input type="checkbox"/> SED of Beams/Lintels/Framing/Walls
<input checked="" type="checkbox"/> Bracing	<input checked="" type="checkbox"/> SED of Bracing

#### 1.3 Scope

The structural engineering scope of the project is in accordance with the Design Brief and Conditions of Engagement. In general terms, the scope of work being undertaken by Spencer Holmes Limited is as follows;

- Design of the structure that is beyond the scope of NZS 3604, being specific design elements of the foundations, gravity support, and bracing,
- Specification of NZS 3604 bracing elements (walls)
- Annotation of NZS 3604 primary structure (studs, rafters, joists, lintels, beams, bearers, foundations) in order to aid architect in developing their plans.
- Detailing of the structural elements described above.

#### 1.4 Design Standards

The following design standards are applicable to specific engineering design aspects of the building:

Acceptable Solutions (B1/AS)	Verification Methods (B1/VM1 and VM4)
<input checked="" type="checkbox"/> Loads: AS/NZS 1170	<input checked="" type="checkbox"/> Loads: NZS 1170
<input checked="" type="checkbox"/> Timber: NZS 3604	<input checked="" type="checkbox"/> Concrete: NZS 3101
<input type="checkbox"/> Blockwork: NZS 4229	<input type="checkbox"/> Steel: NZS 3404
<input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Timber: NZS 3603
<input type="checkbox"/> Other:	<input type="checkbox"/> Blockwork: NZS 4230

## 2 DESIGN LOADS

### 2.1 General

The design actions for this building are in accordance with AS/NZS 1170;

Importance Level = 4 (Including SLS2 requirements)

Design Working Life = 50 years

The ultimate limit state loads are to IL4 due to the proposed function of the structure as an emergency centre.

### 2.2 Gravity Loads

The table below summarizes the typical material weights used for design.

Timber	Steel	Concrete	Soil
5.1 kN/m <sup>3</sup>	78.5 kN/m <sup>3</sup>	23.5 kN/m <sup>3</sup>	19.0 kN/m <sup>3</sup>

The table below summarizes the typical vertical gravity loads used for design.

Usage	Dead	Live
Roofs	0.40 kPa	0.25 kPa
Internal Floors	0.50 kPa	3.00 kPa
Walls	0.40 kPa	-

### 2.3 Wind Loads

The site is located on the in a “High” Wind Zone.

“High” is a non-specific wind zone specified in accordance with NZS 3604, with equivalent unfactored wind speeds and pressures for specific engineering design as follows;

Ultimate Limit State			Serviceability Limit State		
Direction of Approach	Speed (m/s)	Pressure (kPa)	Direction of Approach	Speed (m/s)	Pressure (kPa)
All	44.0	1.16	All	37.0	0.82

### 2.4 Snow and Ice Loads

Snow and ice are not significant loads for this building Region: N1, < 400m

### 2.5 Seismic Loads

The seismic loads on this building have been determined by the following method;

NZS 1170.5:2004

Period, T<sub>1</sub> = 0.4 s (Single level timber framed building)

Site Subsoil Class = D (Soft or Deep)

Hazard Factor, Z = 0.36 (Gisborne)

Ductility, μ = 3.5 (Sheet Bracing)

## 3

#### 4 SERVICEABILITY CRITERIA

Particular elements are designed to the recommended serviceability deflection limits of AS/NZS 1170.0:2002, Table C1.

#### 5 SOIL CONDITIONS

##### 5.1 Site Soil Conditions and Bearing Pressure

Building Usage	Details
<input checked="" type="checkbox"/> Geotechnical Report	Initia Report (Aug 2022)

#### 6 DURABILITY

##### 6.1 Design Life for Durability

Foundations and Superstructure = 50 years  
 Non Structural / Cladding = By others

Note: The design of non -structural elements and cladding specification are by the Architects and/or Others and are not covered by this design features report.

##### 6.2 Exposure Zones

NZS 3604 = Exposure Zone D (High)

NZS 3101 = Exposure Classification B2 (Coastal Perimeter <500m inland)

##### 6.3 Durability Provisions

There is no effective verification method for B2 contained within the Building Code, however we can confirm that for the structural elements shown in our documentation;

- **B2 Acceptable Solution for Structural Timber**  
 NZS 3602 2003 Chemical preservation of round and sawn timber  
 NZS 3604 2011 Timber framed buildings  
 NZS 3640 Part 1:2003 Timber and wood-based products for use in building

Timber treatment is to be selected in accordance with Table 1A of B2/AS1. The timber treatment is to be specified by the Architects and/or others.

- **B2 Acceptable Solution for Structural Concrete**  
 NZS 3101 Part 1:2006 Concrete structures standards

Concrete covers have been selected in accordance with NZS 3101, Part 1, Section 3.

- **B2 Acceptable Solution for Structural Steel**  
 SNZ TS 3404:2018 Durability requirements for steel structures and components

Steel protection has been specified in accordance with SNZ TS 3404 Table 6.

## 7 MATERIALS SPECIFICATION

### 7.1 Reinforced Concrete

The following properties of concrete and reinforcing are applicable to the design:

Element	Concrete Strength	Typical Reinforcing
Foundations	25 MPa	Seismic 500E MA

### 7.2 Structural Timber

The following properties of structural timberwork are applicable to the design:

Element	Typical Grade	Special Grade
Roof Framing	SG8	-
Floor Framing	SG8	-
Beams / Lintels	SG8	-
Wall Studs	SG8	-
Bearers	-	Glulam GL12
Piles	SG8	-

## 8 PROPRIETARY SYSTEMS

The following proprietary structural systems included in the design of this building are:

- Proprietary Timber Roof Trusses
- Bracing Systems – GIB, Hardies, Ecoply
- Other: Refer architect.

All proprietary products are to meet the performance requirements of the manufacturer's specification. All proprietary products should be installed strictly as per the manufacturer's requirements unless noted otherwise. The engineer is to be informed and is to confirm the use of any propriety product that differs from what is shown on the plans or specification.

## 9 CONSTRUCTION SEQUENCE

**Note: The excavation must NOT extend beyond the boundary without permissions.**

The contractor shall have a construction methodology and an up to date programme prior to beginning works on-site.

## 10 DESIGN DOCUMENTATION

### 10.1 Analysis

Analysis has completed using a combination of hand calculation, excel spreadsheets, and 2D/3D analysis using Space-Gass computer software.

### 10.2 Documentation

Plans showing the structural elements overlaid on the Architectural drawings in Sketch Detail Format for inclusion, and to be read with, the architectural drawings. Detailing of the structural elements in Sketch Detail Format for inclusion, and to be read with, the architectural drawings.



## 11 CONSTRUCTION MONITORING

### 11.1 Purpose of Construction Monitoring

As stated by the IPENZ document “Construction Monitoring Services”;

*The primary responsibility for completing the contract works in accordance with the requirements of the plans and specifications is the constructor's. The involvement of the consultants is important during the construction phase to ensure that;*

- *The design is being correctly interpreted,*
- *The construction techniques are appropriate and do not reduce the effectiveness of the design and*
- *The work is completed generally in accordance with the plans and specifications.*

### 11.2 Construction Monitoring Level

The design is based on the verification of specific design B1/VM1 and VM4 aspects to the construction by a suitably qualified Chartered Professional Engineer in accordance with ACENZ/IPENZ level CM3.

*“Review, to an extent agreed with the client, random samples of important work procedures, materials of construction and components for compliance with the requirements of the plans and specifications and review important completed work prior to enclosure or on completion as appropriate. Be available to provide the constructor with technical interpretation of the plans and specifications.”*

*“Not indicated is the time input requirement at each review. The time on each occasion will increase with the increased size and complexity of the construction works and should be agreed with the consultant at the time of engagement. Frequency of construction monitoring is intended to be indicative of involvement with actual frequency dependent on the rate of progress of the works.”*

### 11.3 Inspections

We confirm that Spencer Holmes Limited been engaged to undertake construction monitoring to the recommended level above. The following inspections for specific design elements are required to meet this level:

- Pile inspection
- Ground beam pre-pour (reinforcement) inspection

Inspection of non-specific design structural elements to NZS 3604:2011 such as floor slabs/foundations, bracing, framing, and simple lintels generally undertaken by the Building Inspector for the Local Territorial Authority.

## **Part C: Structural Calculations**



## **Appendices**