DESIGN FEATURES REPORT

This template covers the standard engineering design features of a residential build. You may need to supplement this template with additional information depending on the scope of the project. While the template has been prepared with assistance from industry professionals, and reviewed by Engineering New Zealand staff, it is not intended to replace your professional engineering skill and judgment. Engineering New Zealand does not accept any liability in relation to the use of, or reliance on, this template.

These calculations pertain to a new two-storey house

at 123 Willowbank Drive, Townsville, Wellington 6037 and cover the following design aspects:

1. Bracing – a mixture of NZS3604:2011 and SED elements as shown in bracing plan
2. Beams, beam connections and posts as shown in gravity section
3. Foundation design – a waffle slab on a 500mm thick gravel raft has been specified for use as per Geotech report (appended)

Standards referenced

– Design loads to NZS1170.0, 1, 2, 5
– NZS3603:1993 Timber Design (Amendment 4)
– NZS3101:2006 Concrete Structure (Amendment 3)
– NZS3404:1997 Steel Structure Standard
– NZS3604:2011 Timber Framed Buildings

Wind loads

Wind zone = Medium (37m/s) to NZS3604:2011

Snow loads

N/A

Permanent actions (dead loads) and live loads

Dead loads

	Roof	Floor	External walls	Internal walls
Description	Lightweight cladding	Timber floor	Lightweight cladding	10mm plasterboard lining
Unit load	0.35kPa	0.4kPa	0.35kPa	0.25kPa

Live loads (Refer table 3.1 & 3.2 Part 1 AS/NZS 1170)

	Roof	Floor	Deck	Garage
Distributed load	0.25kPa	1.5kPa	2.0kPa	2.5kPa
Point load	1.4kN*	1.8kN	1.8kN	13.0kN

'*Denotes reductions allowable in specific cases

Barrier loads

Designed using requirements of clauses 3.6 and 3.8 of AS/NZS 1170.1 as modified by B1/VM1 (clauses 2.2.7 and 2.2.8) with imposed actions as specified in Table 3.3 of AS/NZS 1170.1.

Ductility and deflection

Light timber framed buildings per NZS 3604 have an assumed ductility of 3.5. The specifically designed PFC portal frame has been assigned a ductility of 1 in accordance with BRANZ Study Report SR337 (Liu 2015) to account for compatibility of mixed bracing units, see bracing calculations for loadings into portal frame. Deflections for SED bracing elements are set to a limit of 1% under ULS loads as per Liu (SR337, 2015).

Soil class and seismic coefficient

Figures in the table below are for a house being built in Wellington, with a near-fault factor of 1. The Z=0.46 for the NZS 3604 bracing element is the isoseismal for Zone 3 in NZS 3604 and Wellington is within this zone.

NZS 3604 bracing elements				SED bracing elements			
Soil class =	D	Z =	0.46	Soil class =	D	Z =	0.40
S_P =	0.7	T_1	<0.4s	S_P =	0.7	T_1	<0.4s
$C_d(T_1)$ =	0.4			$C_d(T_1)$ =	0.84		

Soil parameters

Ultimate Bearing Capacity = ρ_u = 300kPa

Design Bearing Strength = ρ_{bds} = 150kPa

Soil Type	Ø (degrees)	Density γ (kN/m^3)
Sandy gravel	30	20
Backfill	32	20

Liquefaction risk (select from dropdown) High

Foundations

Soil is sandy with layers of gravel and silty clays. There was a high risk of liquefaction to GWRC Web Maps, therefore a Geotech was engaged (report attached) and a waffle slab was specified to sit on a 500mm thick gravel raft.

Corrosion

External areas

	Timber	Structural Steel	Concrete	Masonry
Zone	D	E-M	B2	B2
Provision	All fixings type 304SS	TSZ200s Thermal Zinc Spray + Sealer	30MPa Concrete 45mm minimum cover to steel	Minimum 25MPa block fill with 60mm cover

Sheltered areas

	Timber	Structural Steel	Concrete	Masonry
Zone	B&C	D	B1	B1
Provision	Galvanised nails and fabricated brackets. all other fixing type 304SS	HDG600P7 Hot dip galvanising and paint	25 MPa concrete – 40mm minimum cover	Minimum 17.5MPa block fill with 50mm cover