PLX20 Portal System by Prolam for Residential Construction

Key benefits

- Timber Lintel and leg that can be cut to length to suit project.
- Fast and simple to assemble on site using standard tools.
- Trusses and frames can be connected directly to the portal using brackets, nails and screws.
- Portal provides bracing units to resist Wind and Earthquake loads (Tested to the P21 BRANZ test Methodology)
- The system has a ductility of 3.0 and is compatible for NZS3604 type internal construction.

The PLX20 Portal system is an innovative timber bracing system for NZS3604 style residential buildings where a bracing is required over internal large opening, such as a garage door or a window and there isn't much space to provide bracing using traditional braced wall systems.

The system has been developed to be flexible in length and height (cut to length on site), installed using traditional carpentry tools, and provide fixing with typical NZS3604 style connections rather than having to pack out a steel portal for fixing.

PLX20 Portal Elevation Drawing
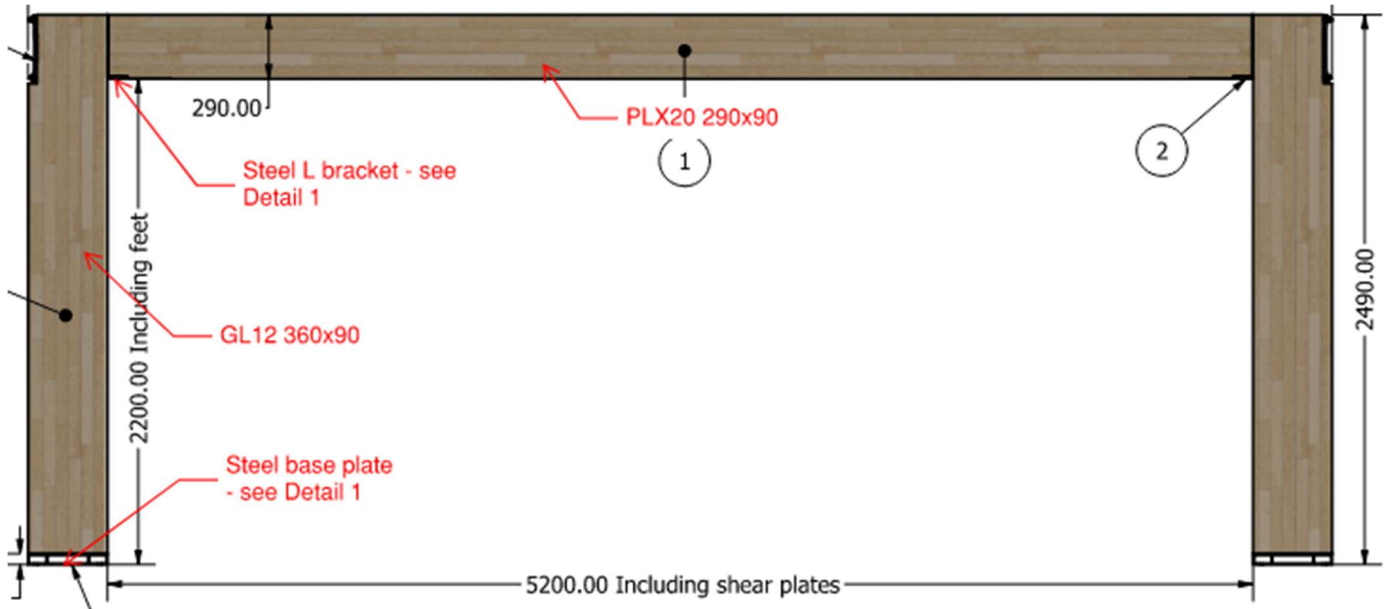
Specification

To Specify the PLX Portal Kit, use the naming convention below.

PLX20 Portal Kit name:	Lintel length options:	Maximum cut back
PLX20 P6.0	6.0m	5.4m
PLX20 P5.4	5.4m	4.8m
PLX20 P4.8	4.8m	3.6m
PLX20 P3.6	3.6m	3.0m
PLX20 P3.0	3.0m	2.4m
PLX20 P2.4	2.4m	1.8m

Each Portal kit contains:

1 x PLX20 H1.2 290x90 Lintel (length to be nominated)

2x GL12 H1.2 360x90 prefabricated portal legs (3.0m long)

2 x Base plates

20 x VGS 9x160 Base plate screws

2 x L brackets

2 x 12mm curved backing plate

4 x M12 connector rods, belleville washers and nuts

4 x VGS 9x160 arrow head screws

4 x VGZ 7x200 uplift screws

4 x M12x160 concrete anchor screws (for NZS3604 concrete foundation connection, see Detail 2)

4 x M12 Galv threaded rod and 50x50x3mm (For NZS3604 timber subfloor connection, see Detail 2)

Compliance Statement

The PLX20 Portal System has been specifically designed and independently tested in New Zealand to provide a structural bracing solution for residential buildings within the scope of NZS3604. The PLX20 Portal System has been tested in accordance with the BRANZ P21 (2010) bracing test and evaluation procedure, which is cited by NZS3604, paragraph 8.3.1.2.

When the PLX20 Portal System is installed as per these installation details it will meet the requirements of the New Zealand Building Code with respect to:

Clause B1 Structure: Performance B1.3.1, B1.3.2 and B1.3.3 and B1.3.4

Clause B2 Durability: Performance B2.3.1 of not less than 50 years, internal use only.

Once the PLX20 Portal system has been installed and prior to lining, the Building Consent Authority can inspect the portal for installation in accordance with the installation instructions during pre lining inspections.

For use other than with NZS3604 type solutions, Specific Engineering design will be required.
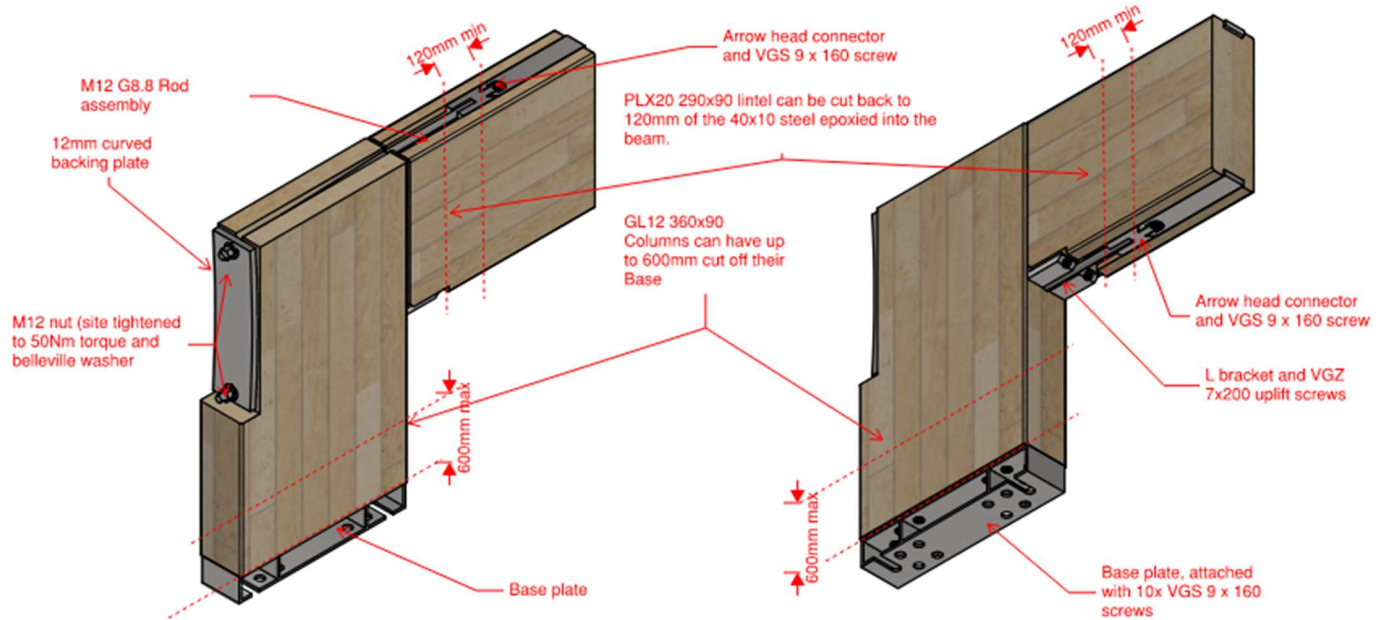
Structural Properties

		Characteristic Strength (MPa)					Elastic Moduli (GPa)
		Bending f'b	Tension f't parallel to grain	Shear in beam f's	Compression f'c parallel to grain		MoE short duration
Beam	PLX20 290x90 300100	45	4.0	3.7	18.0		21.0
Column	GL12 360x90	25	12.5	3.7	29.0		11.5

Notes:

1. PLX20 is intended for use as a beam and not a tension or compression member.
2. PLX20 pre camber is L/800.
3. Bending strength and MoE have been determined from testing. Other properties are based on SG6 timber.
4. GL12 Columns have the properties of GL12 Glulam as per NZS AS1720.1.
5. Use phi factor of 0.8 for design.
6. Provisional K2/J2 factor of deflection = 1.5
7. Joint group = JD5.

Detail 1: Knee and Base Plate Connections

M12 G8.8 Rod assembly

12mm curved backing plate

M12 nut (site tightened to 50Nm torque and belleville washer

120mm min

Arrow head connector and VGS 9 x 160 screw

PLX20 290x90 lintel can be cut back to 120mm of the 40x10 steel epoxied into the beam.

GL12 360x90 Columns can have up to 600mm cut off their Base

600mm max

Base plate

120mm min

Arrow head connector and VGS 9 x 160 screw

L bracket and VGZ 7x200 uplift screws

600mm max

Base plate, attached with 10x VGS 9 x 160 screws

Span Tables for Roof loads

		Lintel supporting Trusses (40kg/m2 roof and ceiling)					
Wind Zone	Roof Width (m)	4	6	8	10	12	14
Low and Medium		6.5	6.0	5.6	5.3	5.1	5.0
High and Very High		5.5	5.1	4.8	4.6	4.4	4.2
Extra High		4.5	4.2	3.9	3.7	3.6	3.4

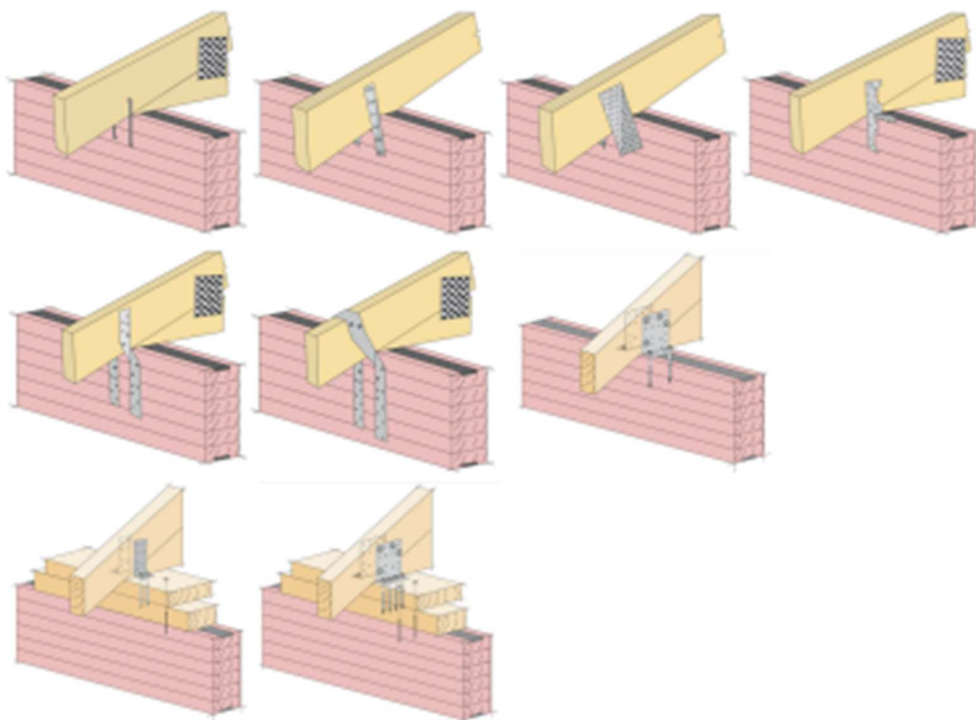|		Lintel supporting Girder Truss (40kg/m2 roof and ceiling)					
Wind Zone	Roof Width (m)	4	6	8	10	12	14
	Set Back (m)						
Low and Medium	2						
	3						
	4						
High and Very High	2						
	3						
	4						
Extra High	2						
	3						
	4						

Notes:

Ground snow loads up to 1.5kPa.

Maximum uplift per knee connection is = 20kN (K1=1).

Please contact the Prolam Engineer for more information on Span Tables.

Truss and Rafter Fixing Options

Bracing Design

The PLX20 Portal System has been independently tested using the BRANZ P21 test metho   604 style residential buildings.

The PLX20 Portal System has a ductility of $\mu = 3.0$, making it compatible with plasterboard and plywood on timber frame type bracing systems.

The PLX20 Portal System can be used for both timber and concrete NZS3604 subfloors (refer to Detail 2).
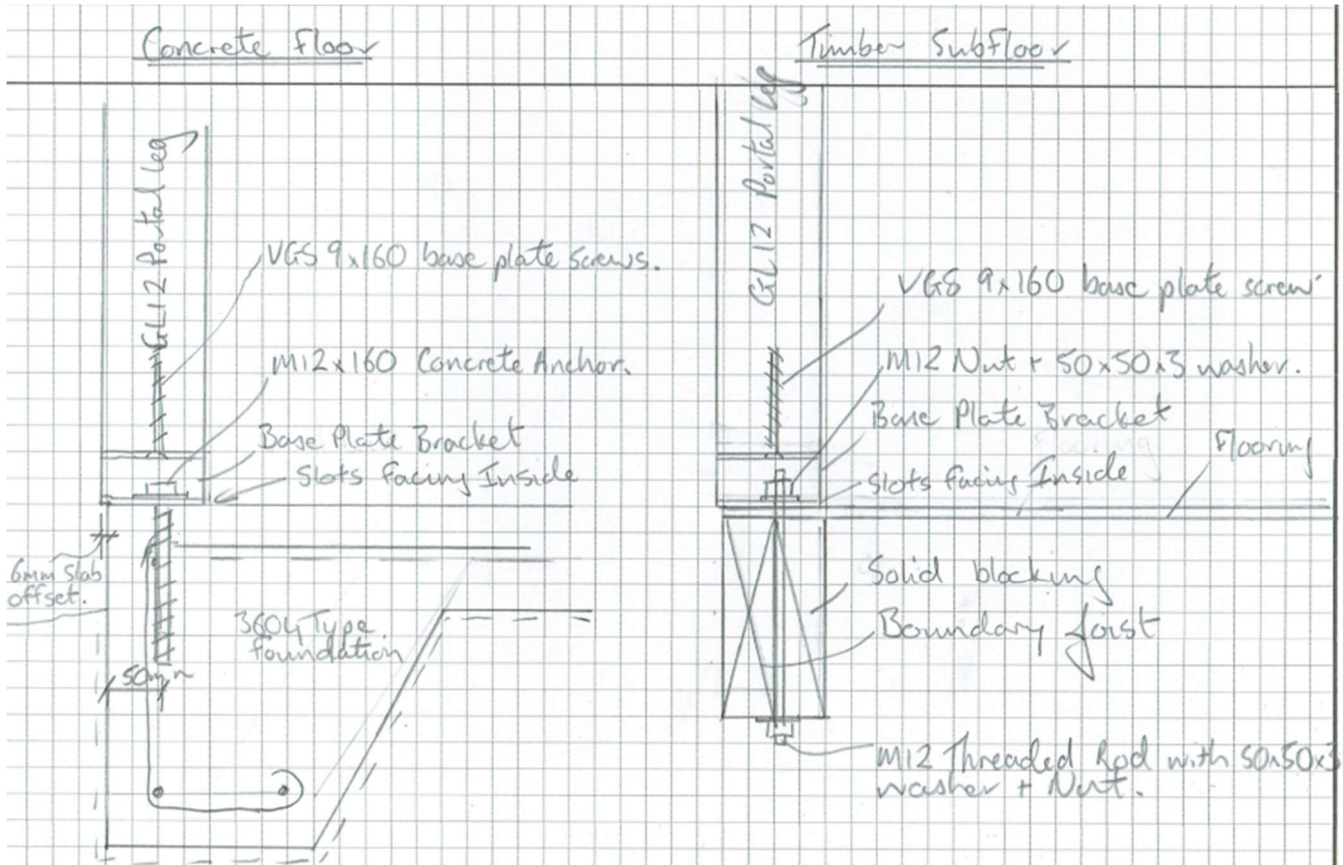
PLX20 Portal System Bracing Capacity - 5.2m Lintel Span		
Max Column Height (m)	Wind BUs	Earthquake BUs
2.55	163	196
2.70	154	185
3.00	147	176

Notes:

The Portal height is taken from floor level to top of column. For different columns heights the values above maybe interpolated.

The same bracing units apply to shorter lintel spans.

Detail 2. Concrete and Timber Floor Connections

Concrete Floor

GL12 Portal Leg
VGS 9x160 base plate screws.
M12x160 Concrete Anchor.
Base Plate Bracket - Slots Facing Inside
6mm slab offset.
50mm
360L Type Foundation

Timber Subfloor

GL12 Portal Leg
VGS 9x160 base plate screw
M12 Nut + 50x50x3 washer.
Base Plate Bracket - Slots Facing Inside
Flooring
Solid blocking
Boundary Joist
M12 Threaded Rod with 50x50x3 washer + Nut.

Construction Guidelines <mark>add photos</mark>

Construct the PLX20 Portal system in the following sequence.

1. Cut the lintel equally at each end to the desired length, to a maximum of 120mm from the lintel 40x10 steel.
2. Cut the portal legs (from the bottom of the column, not the top) to the desired length.
3. Install the base plate brackets using 10 VSG 9x160 screws per base plate, slot orientation towards the inside of the building to achieve 50mm hold down fastener edge distance.
4. Install the hold down bolts, using the 100x100x6mm washers. Leave these at least 6mm proud to allow the base plate bracket to be attached (see Detail 2).

Option 1.

5. Stand the portal legs up, brace, then tighten the hold down bolts.
6. In both portal legs, install the bottom M12 threaded rod assembly, through the 12mm backing plate (curved ends facing out) and using the Belleville washers between the nut and 12mm backing plate, and nail the L bracket on the lintel side of the portal leg into place.
7. Drop the PLX20 Lintel (pre camber facing up) into place.
8. Add the top M12 Threaded rod assembly.
9. Screw the top and bottom arrow head connectors into the PLX20 lintel using VGS 9x160 screws.

10. Tighten the M12 bolts to 50Nm Torque and flatten the Belleville washer and 12mm backing plate flat against the Column.
11. Add the VGZ 7 x 200 uplift screws @ 45degrees through the L bracket into the Lintel then into the leg.

Option 2. Starting from number 4.

1. Lay the portal legs and PLX lintel (pre camber facing up) in place on the ground in position.
2. In both portal legs, install the bottom M12 threaded rod assembly, through the 12mm backing plate (curved ends facing out) and using the Belleville washers between the nut and 12mm backing plate, and nail the L bracket on the beam side of the column into place.
3. Screw the top and bottom arrow head connectors into the PLX20 beam using VGS 9x160 screws.
4. Tighten the M12 bolts to 50Nm Torque and flatten the Belleville washer and 12mm backing plate flat against the portal leg.
5. Add the VGZ 7 x 200 uplift screws @ 45degrees through the L bracket into the lintel then into the portal leg.
6. Stand the entire portal into place, brace and tighten the hold down bolts.