



The Commercial Case for Steel Construction

Ask any developer or investor about the most important part of a building project, and they'll tell you it's the return on investment.

To bring the commercial case for steel construction to life, we've developed a model four-storey office building project based on Auckland and Christchurch construction and rental rates.

Our analysis over the past 6 years shows that, compared to alternative materials, developers and owners can procure a seismically resilient steel building solution with the additional commercial benefits of a faster build and earlier rental streams, without paying a cost premium.



The model project consists of a four-storey office building with a footprint of approximately 1,300m². Within this framework, we modelled three different construction options, representing the three most common building materials – steel, concrete and timber.

All three buildings were supported on 10-12m-long screw piles and each has a concrete slab. The costs for the foundation elements were included in the total structure cost estimates.

Option	Floor system	Framing	Lateral load-bearing system
1. Steel framing and metal deck slab flooring	130mm-thick slab, 60mm trapezoidal metal deck profile	Hot-rolled steel sections	Eccentrically braced frames in cross direction. Moment resisting frame in longitudinal direction
2. Timber-framed floor, in situ concrete topping, plywood shear walls	Potius panels and 65mm situ concrete topping	LVL sections	Plywood shear walls in both directions
3. Precast concrete flooring, concrete framing and shear walls	Double-tee flooring and in situ concrete topping	Concrete beams and columns	Moment frames in longitudinal direction, Concrete shear walls in transverse direction

Table 1: Model project – summary of construction options.

Competitive building costs

Investment in fabrication technology and workshops, and the modern approach of simple bolted connections, has improved productivity in New Zealand’s structural steel industry, resulting in lower costs. This is reflected in the competitive cost for structural steel solutions, as shown in table 2 below.

Option	Total estimated structural cost	
	Auckland	Christchurch
1. Steel	\$3.23m	\$2.65m
2. Timber	\$3.29m	\$2.84m
3. Concrete	\$3.44m	\$2.71m

Table 2: Model project – cost estimates for construction options, foundations and superstructure.

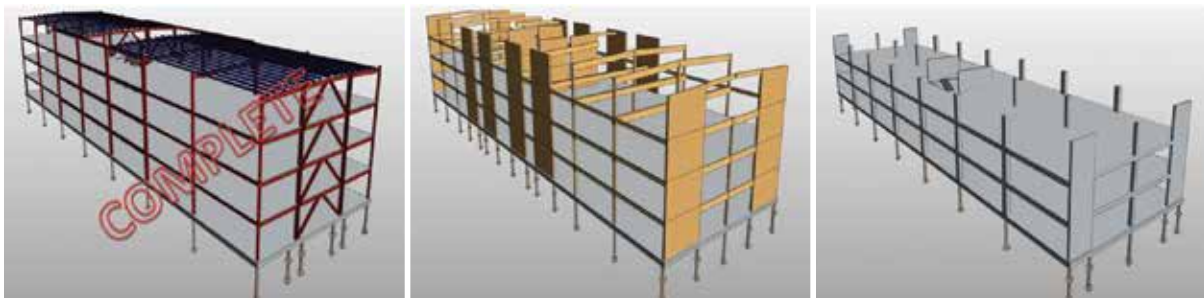


Prefabrication

One key attribute of steel construction which adds real value to building projects is that much of the work, particularly critical operations such as welding and painting, can be undertaken off site – and some of it in other cities.

Faster construction programmes

Our model project shows modern steel construction, featuring simple on-site bolted connections, results in faster overall construction programmes - steel is 25 and 75 days faster than timber and concrete respectively.



Steel Frame - Comflor
150 days

Timber Frame - Potius
Floor 175 days

Concrete Frame -
Double T Floor 225 days

Fig 1: Graphic representation of steel's superior construction speed.

Significant national capacity

90 fabricators nationwide collectively produce circa 100,000 tonnes of structural steel annually. This structural steel is turned into buildings and bridges through the industry's network of steel distributors, fabricators and erectors. SCNZ's recent quarterly fabricator forward-workload survey indicates there is significant spare industry capacity based on a current estimated total capacity of 120,000 tonnes per annum. The survey is available on the SCNZ website.

High-quality New Zealand product

Prefabrication also brings quality control advantages to building projects. It is much easier to produce quality workmanship in the controlled environment of a workshop rather than on site, where adverse weather can have an impact. It is also easier to undertake quality assurance work off site.

The structural steel industry has developed the Steel Fabrication Certification scheme (SFC) to ensure participating steel fabricators manufacture product of the highest quality. The SFC aims to provide procurers and specifiers with not only certainty of product quality, but that they are dealing with a fabricator who employs personnel and procedures that represent international best-practice.

Earlier rental returns

Importantly, the model project found steel’s speed advantage is maintained to the end of the contract – steel’s overall construction programme is 15 days faster than timber and 39 days faster than concrete. This allows construction equipment and personnel to be released sooner for other projects, and for building owners to have an earlier income stream through tenants taking earlier occupation of their premises.

To quantify this, rental income calculations have been made based on the model project and shown in table 3. The difference in construction programmes has been combined with the market rates applicable to Auckland and Christchurch buildings to show the loss of income associated with delayed occupation by the tenant.

When the structural cost and the overall construction programme are considered together, structural steel leads to an earlier return on investment compared with timber and concrete.

Option	Auckland			Christchurch		
	Estimated Structural Cost	Lost rental income	Structure cost plus lost rental return	Estimated Structural cost	Lost rental income	Structure cost plus lost rental return
Steel	\$3,230,364	\$0	\$3,230,364	\$2,615,637	\$0	\$2,615,637
Timber	\$3,288,928	\$166,455	\$3,455,383	\$2,843,232	\$130,613	\$2,973,845
Concrete	\$3,443,718	\$432,783	\$3,876,501	\$2,706,652	\$339,592	\$3,046,245

Table 3: Timber and concrete options are slower to offer a return on investment, representing a loss of income to the building owner. Cost of the structure, the construction programme and rental income calculations are based on the model four-storey project. To calculate the loss of income associated with delayed occupation by the tenant, the difference in construction programmes has been combined with the market rates applicable to Auckland and Christchurch buildings.

1. Rental rates based on commercial rental data published in Colliers International Reports: NZ Retail and NZ CBD Office Reports 2017 2. Net lettable area – office 1,170m² per floor 3. Net lettable area – retail 1,170m² 4. Average net office rental per annum (Prime): Auckland \$484/m²; Christchurch \$370/m² 5. Average net retail rental per annum (prime): Auckland \$1014/m²; Christchurch \$825/m² 6. Total rental income per annum: Auckland \$2.9m; Christchurch \$2.3m 7. Ratio of net lettable area to gross area of 0.9

As a general rule of thumb, steel options result in a 10-15% reduction in the construction programme for multi-level commercial building projects, compared to other materials.

Sustainability

Steel possesses very strong sustainability credentials, key of which is its recyclability: steel can be recycled and reused endlessly without compromising its properties. Worldwide, it is estimated that 90% of steel from demolition sites is returned to steel mills for recycling.

Carbon emissions are another important factor in measuring sustainable performance, and steel stacks up. A Ministry of Agriculture and Forestry commissioned report¹ demonstrated that, on a whole-of-life basis, steel's environmental performance compares favourably (<10% difference based on CO₂ equivalent) to other materials such as concrete and timber.

For more information about structural steel's sustainability credentials, visit www.sustainablesteel.org.nz

¹ Research report 2008-02, University of Canterbury: Environmental Impacts of Multi-storey Buildings Using Different Construction Materials.

About SCNZ

Steel Construction New Zealand (SCNZ) aims to advance the interests of New Zealand's diverse steel construction industry by promoting the benefits of steel solutions in commercial building and infrastructure projects. Members include manufacturers of structural steel and steel products, distributors, fabricators, designers, detailers, galvanisers, and paint and building supply companies.

SCNZ provides its members with technical advice on the latest in steel design trends and standards, networking opportunities, and a representative voice with key industry and government decision-makers.

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SCNZ would like to acknowledge the following parties for their contribution to the model project: Structural engineer, Aurecon; Architect, Architectus; Quantity surveyors, Barnes Beagley Doheer, Rawlinsons; Construction programming, Mainzeal

The Commercial Case for Steel Construction, second edition, published April 2016.
Disclaimer: Construction cost data is based on 2018 figures; rental property data is based on 2017 figures.

