Industry Snapshot for Auckland: Construction and Engineering

May 2014 Technical Report 2014/016

Auckland Council
Te Kaunihera o Tāmaki Makaurau

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Industry Snapshot for Auckland: Construction and Engineering

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Executive Summary

Definition of the construction and engineering sector:

Building construction, heavy and civil engineering construction, construction services, and engineering services. The main outputs are new residential and non-residential buildings, alterations, land improvements and infrastructure.

Employment:

- The sector is a major employer: 43,980 employees, i.e. 6.8 per cent of Auckland's employment.
- Auckland's share of national employment for the sector (30%) is less than for all sectors (34%), and this relativity has been gradually worsening since 2000.
- Employment is recovering from the post 2008 crash, giving strong growth 2000-2013 (3.3% pa).
- Most growth 2000-2013 was engineering services (4.9% pa) and heavy and civil engineering (4.4% pa).

Businesses and self-employment:

- The sector provides a large share (12%) of Auckland's businesses, i.e. 19,495 businesses.
- More of the sector's employment is in small businesses (20%) than for other sectors (12%); less employment is in large businesses (24%) than for other sectors (36%).
- Most employment in Residential Building Construction (55%).is in very small businesses.
- Many of the sector's workers are not employees but instead self-employed. Self-employed comprise a third (34%) of total workers (64,239), much higher than for other sectors (12%).

Gross Domestic Product (GDP):

- The sector is a major economic contributor: $2.2 billion[1], i.e. 4.0 per cent of Auckland's GDP.
- The sector's GDP in 2012 is similar to the level in 2005, which is a fall in per capita terms.
- The sector's GDP growth 2001-2012 was 3.1% pa, the same as Auckland's total economy.

Productivity:

- The sector has lower labour productivity than Auckland's total economy.
- The gap appears to be widening over time.
- An on-going trend of lack of improvement at the national level goes back to at least 1986.

Workforce and skills:

- Construction workers are mostly male (93% in March 2006) and work full-time (92%).
- They are less skilled: fewer tertiary qualifications (13%) than Auckland's total economy (23%).
- There is a major shortfall of new medium skilled engineers: 3562 for 11,295 jobs (2004-2011).

[1] In $1995; direct contribution only, so not including indirect and induced effects

- A sectoral skill shortage may be looming: increases since 2012 in online (i.e. more skilled) jobs advertised relative to applications (SEEK SEI I), and in the sector's Skilled Vacancy Index.

Construction costs (national only, Producer Price Index, inputs):

- Input costs rose over time only slightly faster (+0.7% pa more) than the economy since 1994.
- The difference was 2004 to 2007 when construction (+25%) outstripped the economy (+12%).
- Construction Services costs rose from 2004 to 2007 even faster than other construction.
- From 2008-2013, construction costs rose similarly (2.6% pa) to the total economy (2.7% pa).

Gross fixed capital formation (GFCF, national only; includes infrastructure):

- Is huge ($24.2 billion pa, i.e. 11% of GDP) and highly volatile (2013 is the same as 2005)
- Strong uptrend: 2013 is much higher (+38%) than 2001 ($17.4 billion pa)
- Residential buildings comprise half the sector's GFCF (45%, i.e. $11 billion pa)
- Non-residential buildings (21%) and infrastructure (30%) also have significant shares

Building consents (national and by region; excludes most infrastructure):

- Auckland non-residential consent values have been fairly stable since 1996.
- Auckland residential consent values fell by two thirds 2004-2009 (starting pre-GFC), but have since doubled to near 1994-2001 levels; they are already at three quarters of their historic peak in 2002-2004.
- New Zealand residential consent numbers halved 2004-2009, but are now back to pre-boom (2001) levels.
- Auckland residential consent numbers fell by over two thirds from 2004 (12,500) to 2009 (3500). The upswing to 6300 in 2013 is still below the 1994-2007 levels, and is only half of the 2002-2004 historic peak.
- Canterbury is at a record high of 5800, but was already just below Auckland by 2007.
- Attached dwellings are more sensitive to the market: in 2013 a quarter of new Auckland dwellings consented were attached, up from a tenth in 2010 but well below the peak of 44 per cent in 2004.
- Large (100+) apartment blocks are particularly volatile, and have returned: after largely disappearing 2009-2012, they now provide half of new attached dwellings – but the absolute number is still well below 2002-2004.

Infrastructure (Auckland, value, forecast):

- Expenditure is high ($3.4 billion) and forecast to grow significantly ($4.9 billion by 2019/2020).
- Half of forecast infrastructure spending from 20012/13–2021/22 will be on roading (49%).
- The rest is mainly water, wastewater, stormwater, electricity and telecommunications networks.
- Council is the largest single infrastructure investor at $15.2 billion (37% of the total).
- These figures do not include the CBD Rail Loop (possibly $3.0 billion) due to uncertainty.

Table of Contents

1.0 Introduction 1

1.1 Role of the sector 1

1.2 Sector ANZSIC definition 1

1.3 Industry structure 2

2.0 Data sources 4

3.0 Employment 5

3.1 Employment by sub-sector 5

3.2 Sector employment trends relative to New Zealand 6

3.3 Employment trends by sub-sector 6

3.4 Residential and non-residential building construction employment 7

3.5 Heavy and civil engineering employment growth rates 9

3.6 Auckland share of New Zealand employment by sub-sector 9

4.0 Businesses and self-employment 12

4.1 Business size 12

4.2 Business numbers by sub-sector 12

4.3 Business size by sub-sector 13

4.4 Employment by business size by sub-sector 14

4.5 Zero employee businesses and self-employed by sub-sector 15

5.0 Gross Domestic Product (GDP) 17

5.1 Sector GDP growth over time 17

5.2 Sub-sector GDP and growth trends 18

5.3 Construction sub-sector latest GDP growth 20

6.0 Productivity 21

6.1 Productivity trends by sub-sector 21

6.2 Construction productivity national trends by factor 22

6.3 Productivity and volatility 23

7.0 Workforce and skills 24

7.1 Sector workforce composition 24

7.2 Employment growth by occupation 24

7.3 SEEK Employment Index 25

7.4 Skilled vacancy index 26
7.5 Job openings and qualification achievements 27
7.6 Skill shortages 28
8.0 Construction costs (national) 30
9.0 Gross Fixed Capital Formation (national) 31
9.1 New Zealand gross fixed capital formation trends 31
9.2 Gross fixed capital formation trends by category 32
10.0 Building consents 33
10.1 Value of new buildings and alterations by category 33
10.2 Residential building consent numbers by location 34
10.3 Attached and detached residential building consents 35
10.4 Attached residential consents by building size 36
11.0 Infrastructure 38
11.1 Infrastructure forecasts 38
12.0 Conclusion 40
13.0 Appendix 1: Sector definition 41
14.0 Appendix 2: Sector SWOT analysis 43
14.1 Overview 43
14.2 Strengths 43
14.3 Weaknesses 43
14.4 Threats 44
14.5 Opportunities 44

1.0 Introduction

This report is one of a series of Auckland Council industry snapshots. It provides a snapshot of the Auckland construction and engineering industry from data publicly available in early 2014. The report starts with an introduction followed by a review of selected data sources, then looks at the sector's employment, businesses and self-employment. Next it considers the sector's contribution to gross domestic product (GDP) and associated issues of productivity, the sector's workforce and skills, and construction cost trends. Lastly, indicators of the sector's outputs are looked at: gross fixed capital formation, building consents and infrastructure. The report concludes with a SWOT[2] analysis and some concluding remarks.

The construction and engineering industry comprises the section of the economy that is engaged in the preparation, clearing (including demolition) and development of land, and the construction, installation, alteration and repair of buildings, structures and infrastructure, plus related engineering design, architectural and surveying services.

1.1 Role of the sector

Construction activity represents a significant component of Auckland's economy in terms of both employment and gross domestic product. It is a major customer of numerous other sectors such as building products manufacturers and wholesalers, stimulating demand both directly and indirectly. Furthermore, it underpins the functioning of virtually every other sector of the economy, as it provides the buildings and infrastructure on which every other sector depends. At the national level, the majority (58%) of New Zealand's fixed capital is provided by its construction and engineering sector[3].

Investment in infrastructure is one of the major tools of government stimulus packages in the face economic slowdowns. The stimulus impacts of construction spending can be significant on any economy, particularly in the short term. However, those impacts mostly last only as long as the construction activity is in progress. This is because, in economic terms, construction activity is for the purpose of capital formation, which enables the future production of goods and services, but is not particularly productive in itself. It is how the infrastructure and capital goods are used that is important for long-term economic development.

The construction sector is also necessary for the provision of new housing, which is a key priority for Auckland over at least the next few years. Increasing the rate of new building depends critically on the ability of the construction sector to expand its residential building construction capacity extremely rapidly, but will also require the sector to provide additional land development and infrastructure to support this growth.

1.2 Sector ANZSIC definition

In terms of Statistics New Zealand's ANZSIC 2006 classification system, the construction and engineering sector (as defined by Auckland Council) includes all of the enterprises in Division E "Construction", namely the 2-digit sub-sectors E30 Building Construction, E31 Heavy and Civil Engineering Construction and E32 Construction Services; in addition, the engineering component ("Engineering Services") consists of the construction engineering related parts of M69 Professional, Scientific and Technical Services. Table 1 shows the 3-digit sub-sectors that are included in each of these 2-digit sub-sectors, and examples of the activities they undertake.

[2] Strengths, weaknesses, opportunities and threats

[3] Gross Fixed Capital Formation (GFCF) – see also Section 9

Table 1: Construction and engineering sub-sectors by ANZSIC code

2-digit sub-sector	3-digit	Sub-sector	Examples
E30 Building Construction	E301	Residential Building Construction	Building houses and flats
	E302	Non-Residential Building Construction	Building shops and offices
E31 Heavy and Civil Engineering Construction	E310	Heavy and Civil Engineering Construction	Building infrastructure e.g. roads, bridges, tunnels, pipes
E32 Construction Services	E321	Land Development and Site Preparation Services	Subdividing, clearance, earthworks
	E322	Building Structure Services	Concreting, bricklaying, roofing
	E323	Building Installation Services	Plumbing, electrical, HVAC
	E324	Building Completion Services	Plaster, paint, tiles, carpentry
	E329	Other Construction Services	Landscaping, cranes, reclad
M69 (partial) "Engineering Services"	M692 (partial)	Architectural, Engineering and Technical Services (partial)	Architecture, surveying, mapping, engineering design

Appendix 1 gives further information about the sector definition, including the 3-digit activities that are included in the sector, the 5-digit categories that they contain, and further examples of the products or services they are involved with.

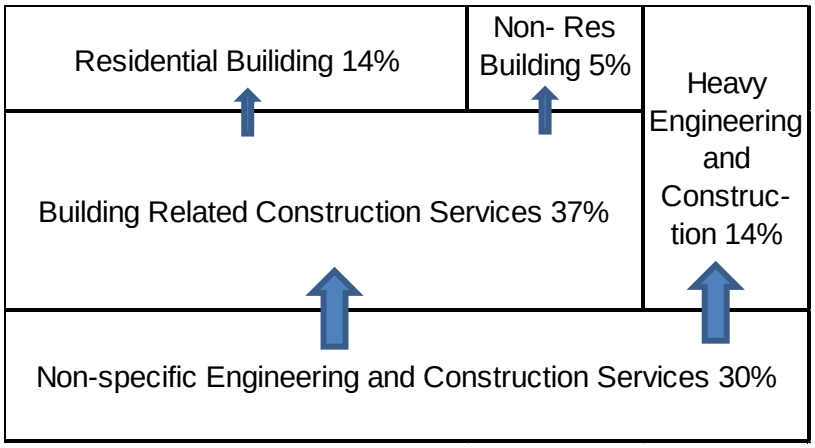
1.3 Industry structure

Companies in the construction and engineering sector are often too small or specialised to undertake all aspects of a project, so sub-contracting and multiple contractors are common. The resulting connections between the activities of the sub-sectors (at the ANZSIC 3-digit level) often include the following.

- Building Construction (E30) is typically divided into Residential Building Construction (E301) and Non-Residential Building Construction (E302), although the two can overlap.
- These building activities are supported directly by some of the components of Construction Services (E32), which we can refer to as "building related construction services", consisting of:
    - Building Structure Services (E322)
    - Building Installation Services (E323)
    - Building Completion Services (E324).
- Heavy and Civil Engineering Construction (E310) tends to be separate from the preceding sub-sectors, although it can act indirectly as an enabler
- Underpinning the entire sector, including all of the above sub-sectors, are "non-specific engineering and construction services" comprising Engineering Services (M692 – partial) and the land-related components of Construction Services (E32), namely:
    - Land Development and Site Preparation (E321)
    - Other Construction Services (E329)
    - Engineering Services (M692 - partial).

Figure 1, which is drawn to scale based on each group's share of the sector's 2012 workers[4], shows the main linkages between the major groupings mentioned above, with arrows indicating supporting services provided to other groupings within the sector. The groupings shown here follow the 2 and 3-digit ANZSIC 2006 sub-sectors: E30 Building Construction is split into E301 "Residential Building" and E302 "Non-residential Building", and E321 Land Preparation etc. and E329 Other Construction Services are removed from E32 Construction Services and grouped with M692 Engineering Services to form "non-specific engineering and construction services"; the remainder of E32 is renamed "building related construction services".

Figure 1: Construction and engineering industry structure



[4] including self-employed as well as employees (ECs)

2.0 Data sources

This report uses a range of data sources. Each source has its own merits. Where possible, the latest but most appropriate data source has been used. Each section or sub-section includes a footnote of the main data source(s) used. The following sources are of particular note.

Employment (ECs) and Geographic Business Units – This is taken from Statistics New Zealand's annual *Business Demography Survey* 2000 to 2013, using the latest (ANZSIC 2006) classification system. The survey is based on the Statistics New Zealand Longitudinal Business Frame (LBF) and gives an annual snapshot (as at February) of the structure and characteristics of New Zealand businesses. The series covers economically significant individual, private sector and public sector enterprises that are engaged in the production of goods and services in New Zealand.

The term "business" is here used to denote a geographic business unit (GU), as used in Statistics New Zealand's Business Demography data. It is defined as a separate operating unit engaged predominantly in one kind of economic activity from a single physical location (geography) or base.

Employment is based on employee counts ("ECs"); this is a head-count of all salary and wage earners in a GU, which includes both full and part time employees but not working proprietors.

Data is taken at the 5-digit level, which provides a perfect match to the sector definition used in this report. In some instances this report aggregates the sector data to a 3-digit level for presentation, in which case the 3-digit category M692 includes only those 5-digit components that are part of the sector.

Gross Domestic Product (GDP), employment (workers) and labour productivity per worker - These are taken from Infometrics' custom-provided Auckland regional and national GDP series 2001 to 2012, which is in $1995. The GDP and productivity estimates are based on Infometrics' estimates of employment (total workers), which tend to be higher than Business Demographics' ECs because Infometrics include self-employed/working proprietors as well as wage and salaried employees. This data, including total workers data, is not available for 2013 at the required level of detail to calculate for the "construction and engineering" sector.

Gross Fixed Capital Formation (GFCF) These are taken from Statistics New Zealand's system of national accounts, and are only available at the New Zealand level. GFCF measures the buildings and other construction that actually occurs. It is measured in current dollars, which can then be deflated by the Capital Goods Price Index to estimate changes in real activity over time.

Building Consents – These are taken from Statistics New Zealand's monthly data and are available at the regional level. They are generally strongly correlated to actual activity, but there are limitations, including the following.

- Not all building projects obtain a consent (although the vast majority of new buildings do).
- Not all consented projects actually proceed (although in Auckland historic data suggests that on average around nine out of ten do proceed).
- A building consent is valid for seven years, so physical activity in a given year may relate to consents issued in previous years. (Although the correlation lag averages around six months).
- Many infrastructure projects do not require or are not fully covered by a building consent.

3.0 Employment

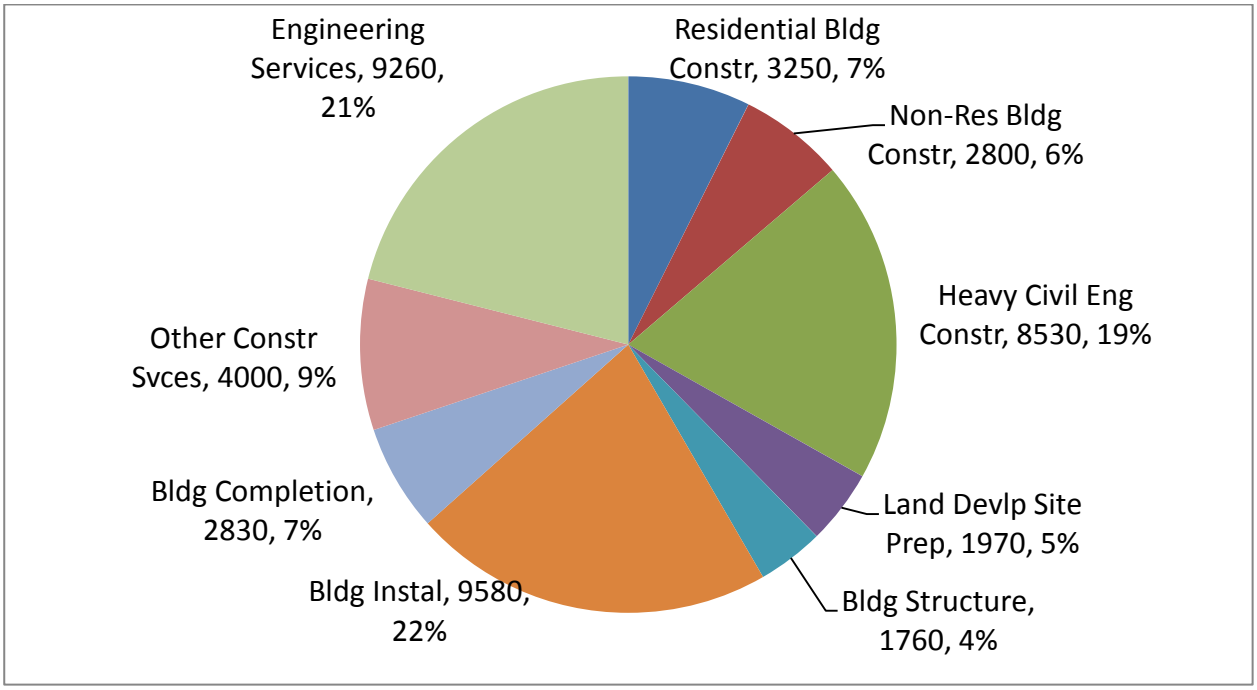
The Auckland construction and engineering sector employed 43,980 people in 2013, accounting for 6.8 per cent of total employment in Auckland. Auckland contributes 30 per cent of New Zealand's construction and engineering employment, which is slightly less than its share of total employment (34%)[5].

3.1 Employment by sub-sector

The different sub-sectors' contributions to construction and engineering's employee count (ECs) in Auckland in 2013, at the ANZSIC 3-digit level, are as follows (see Figure 2, which is at the ANZSIC 3-digit level, but follows the ANZSIC 2-digit structure).

- Building construction, comprising Residential Building Construction (7%) and Non-Residential Building Construction (6%), accounts for only an eighth (13%) of the sector's ECs.
- To this must be added the building-related construction services sub-sectors, which together add a further third (33%), consisting of Building Structure (4%), Building Installation (22%) and Building Completion (7%).
- The resulting total of building construction, plus construction services directly related to building construction, is close to half the sector's ECs (46%).
- Heavy and Civil Engineering Construction (19%) is smaller but still significant.
- In addition, the non-specific engineering and construction services sub-sectors provide support (to varying degrees) to both residential and non-residential building and to Heavy and Civil Engineering Construction; these sub-sectors are Engineering Services (21%) and the construction services sub-sectors that are not specifically related to buildings, namely Land Development (5%) and Other Construction Services (9%); these constitute a third (35%) of the sector's ECs.

Figure 2: Auckland construction and engineering sector employment by sub-sector, 2013



[5]Except where otherwise stated, all data in this section is sourced from Statistics New Zealand, 2013. *Business Demographics*, which is as at February of each year.

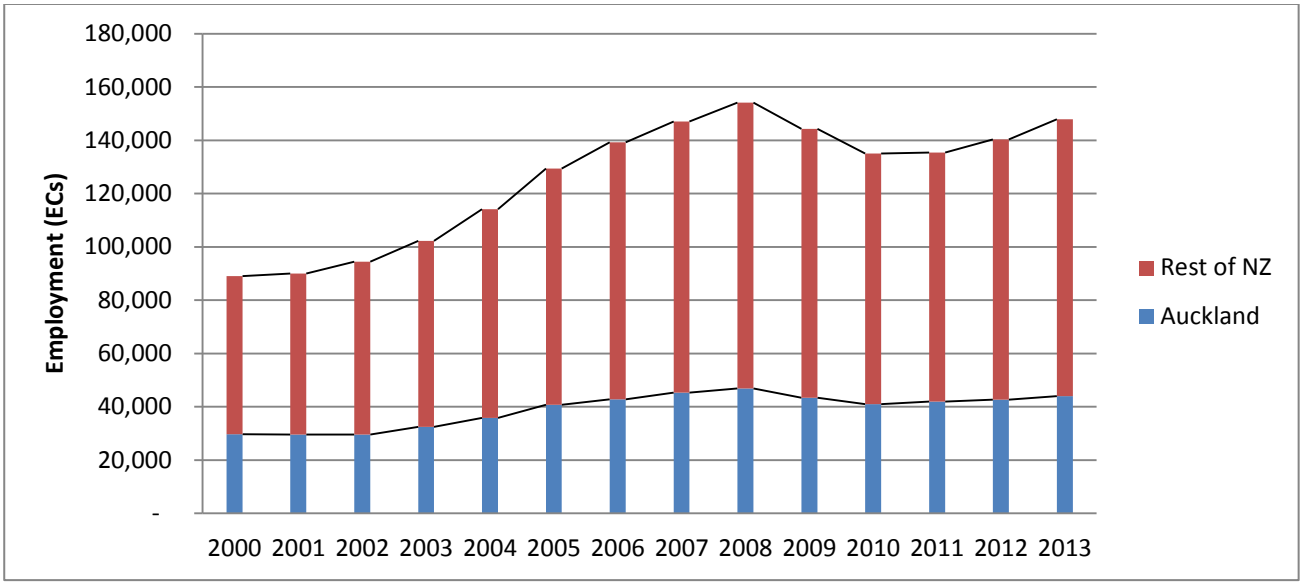
3.2 Sector employment trends relative to New Zealand

Between 2000 and 2013, employment in Auckland's construction and engineering sector grew by 48 per cent overall (an average of 3.3% pa, somewhat above the average of 1.9% pa for Auckland's total economy). However, the sector is highly volatile, with periods of boom and contraction. The Auckland sector grew strongly between 2000 and 2008 (+58%, averaging +5.9% pa), then fell sharply in 2009 and 2010 (-13%, averaging -6.5% pa) but partially recovered in 2011, 2012 and 2013 (+7%, averaging +2.3% pa).

Employment in the rest of New Zealand's construction and engineering sector grew even more strongly overall between 2000 and 2013 (+75% or +4.4% pa, significantly higher than the +1.4% pa average for the total economy), but with similar fluctuations. The sector in the rest of New Zealand had extremely rapid growth from 2000 to 2008 (+81%, averaging +7.7% pa), then fell nearly as sharply as Auckland in 2009 and 2010 (-12%, averaging -6.3% pa) and partially recovered in 2011, 2012 and 2013 (+11%, averaging +3.4% pa).

Auckland's less rapid overall growth from 2000 to 2013 is associated with a noticeable fall (-11%) in Auckland's share of the country's employment for the sector (from over 33% to under 30%). This relative downtrend began at the start of the period, even before the Christchurch earthquakes. In contrast, the rest of the Auckland economy had a slight increase in its share of the country's employment over the same period, from just below to just above 33%. (See Figure 3.)

Figure 3: Auckland and New Zealand construction and engineering sector employment, 2000 - 2013



3.3 Employment trends by sub-sector

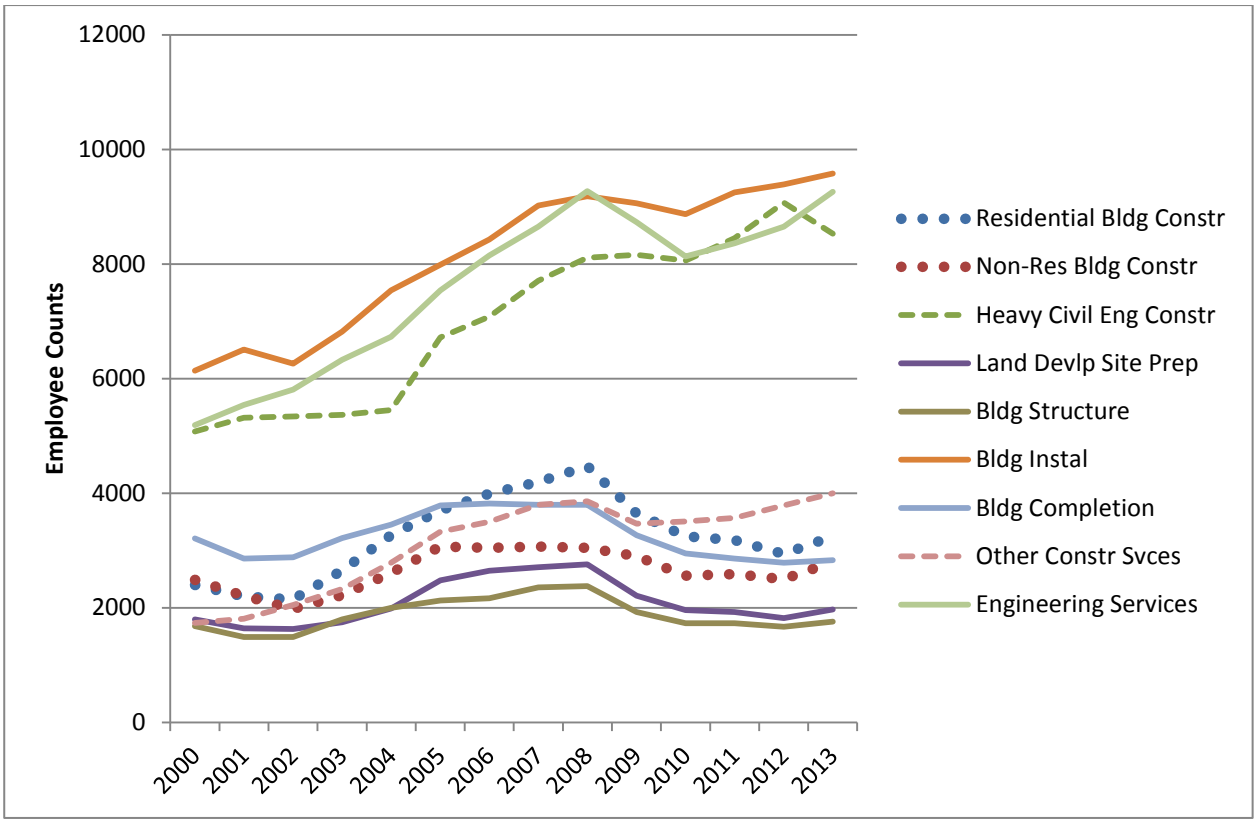
Between 2000 and 2013, employment (ECs) in Auckland's construction and engineering sector grew at varying rates for the different 3-digit sub-sectors. Most of the main sources of net new jobs were related to engineering rather than building, as follows (see also Figure 4):

- Engineering Services (+4070, averaging +4.9% pa)
- Heavy and Civil Engineering Construction (+3450, averaging +4.4% pa),
- Other Construction Services (supporting both building construction and engineering) grew by an even greater proportion, but from a lower base (+2260, averaging +7.2% pa)

In contrast, most of the building related sub-sectors (and land development) shrank from 2008 to 2013 by nearly as much as they had grown from 2000 to 2008, namely Non-Residential Building Construction, Building Structural Services, Building Installation Services and Building Completion Services (and Land Development and Site Preparation); the two exceptions were:

- Building Installation Services, which had strong growth to 2008, followed by only a small drop and then a relatively strong recovery, resulting in strong overall growth 2000 to 2013 (+3440, averaging +3.8% pa)
- Residential Building Construction, which grew by +2070 jobs (+8.1% pa) from 2000 to 2008, and still kept nearly half of them (+850) by 2013 (+2.6% pa 2000 to 2012).

Figure 4: Auckland construction and engineering sub-sectors employment, 2000 - 2013



3.4 Residential and non-residential building construction employment

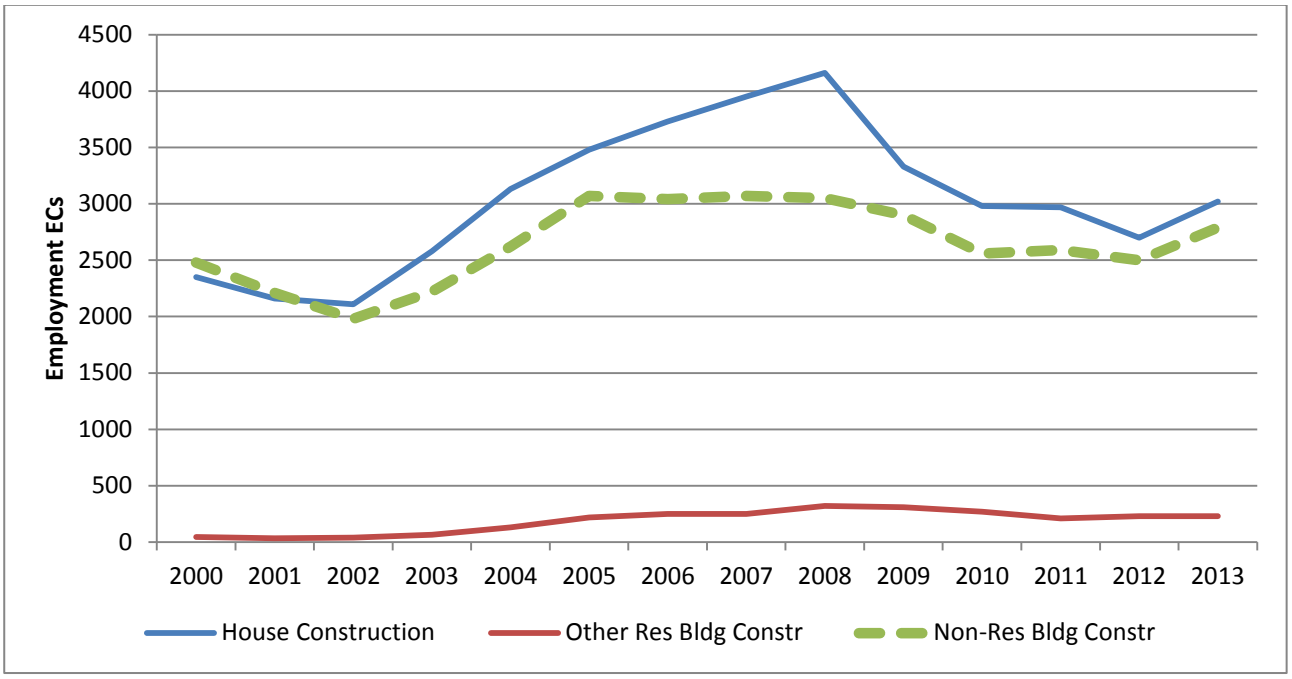
From 2000 to 2013 in Auckland, Residential Building Construction employment (ECs) has overtaken Non-Residential Building Construction. At the 5-digit level, overall net jobs growth in Residential Building Construction from 2000 to 2013 was mostly driven by "House Construction" (+1.9% pa); "Other Residential Building Construction" had a much higher growth rate (+13.4% pa), but from a tiny base and with even higher relative volatility. Also noticeable is that Non-Residential Building Construction[6] (0.9% pa) employment was less volatile: it missed the end part of the boom from 2005 to 2008, and the start of the bust from 2008 to 2009. (See Figure 5.)

However, the following limitations of the data should be noted.

[6] Not split further at the ANZSIC 5 digit level.

- Some builders are sole proprietors or other non-employee workers and so not captured in the official Statistics New Zealand Business Demographics measures of “employee count”; they tend to be more involved in residential than non-residential projects (see also section 4.5).
- Larger buildings, particularly non-residential and attached residential, also require more engineering, building and other construction services, so “building construction” employment is only part of that picture.

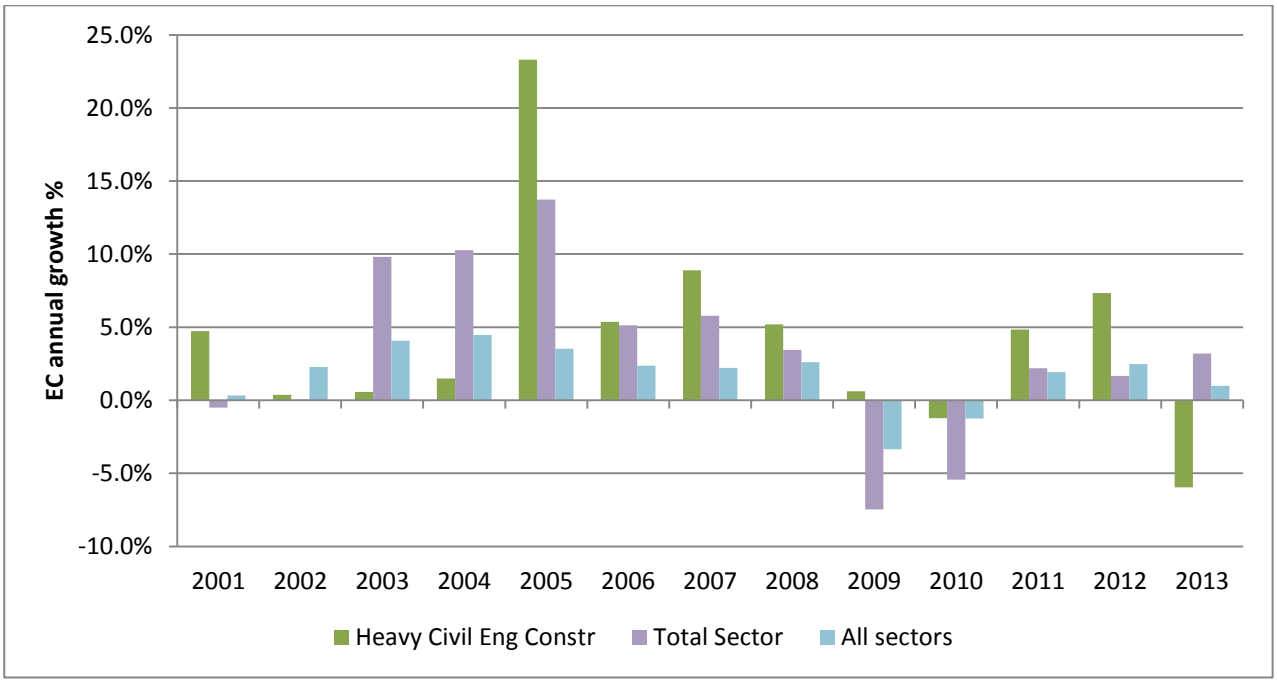
Figure 5: Auckland building construction employment by type, 2000 - 2013



3.5 Heavy and civil engineering employment growth rates

Heavy and Civil Engineering Construction employment (ECs) in Auckland missed the construction boom in 2003 and 2004, but made up for it in 2005 (+23%). From 2007 to 2012 the sub-sector grew faster than the rest of the sector; in particular, the sub-sector missed most of the sector decline in 2009 and 2010, and had stronger growth in 2011 and especially 2012 (+7% vs +2% for the sector). Similarly, Heavy and Civil Engineering Construction grew faster than the rest of the economy from 2005 to 2012. In 2013, however, Heavy and Civil Engineering Construction underwent a modest contraction (-6%) while the sector and the rest of the economy were growing (See Figure 6.)

Figure 6: Heavy and Civil Engineering Construction sub-sector employment growth rates, Auckland, 2001 – 2013



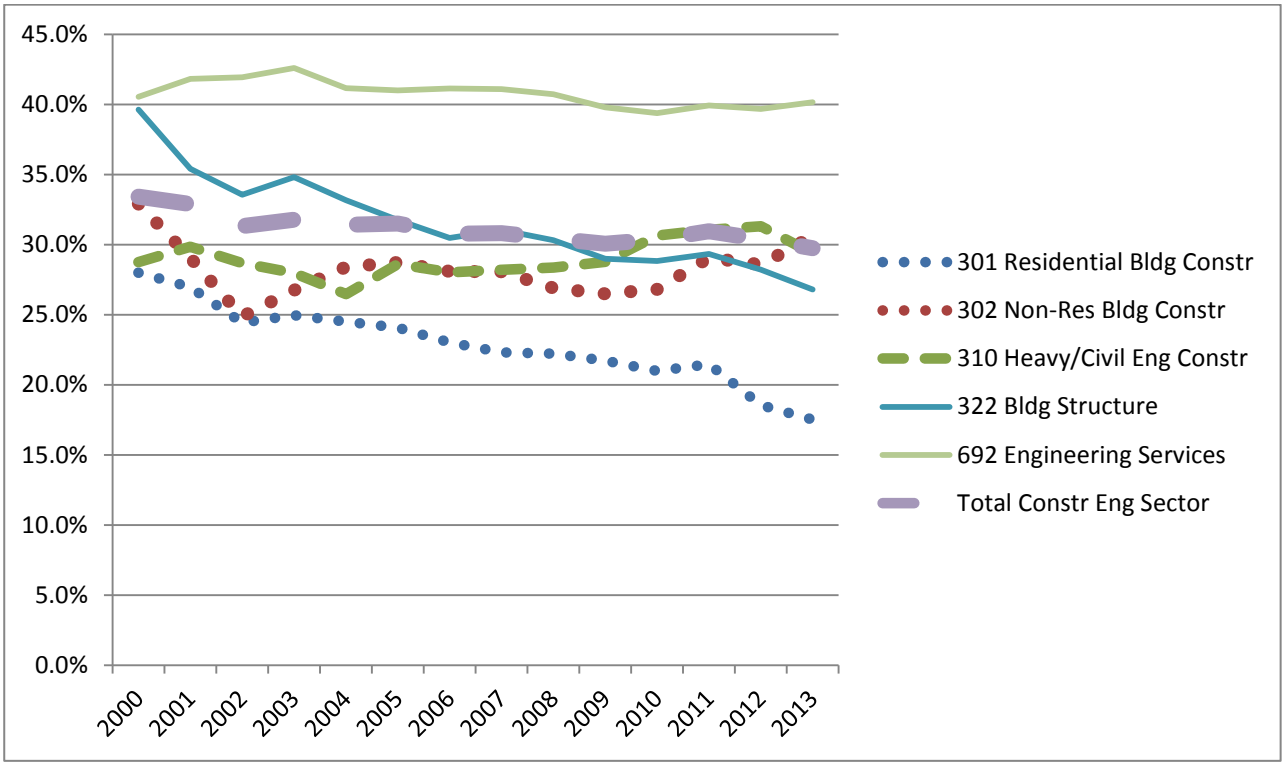
3.6 Auckland share of New Zealand employment by sub-sector

The Auckland share of New Zealand's employment (ECs) for the construction and engineering sector between 2000 and 2013 fell from 33 per cent to 30 per cent, which is below Auckland's share of the national workforce (34%). Most sub-sectors at the 3-digit level were similar to the sector; in contrast, the following sub-sectors differed significantly (see Figure 7):

- **Engineering Services (M692 - partial):** Auckland maintained its moderately high share of the nation's employment (40%), suggesting it remains a modest net service provider to the rest of the country
- **Residential Building Construction (E301):** Auckland's already mediocre share in 2000 (28%) plummeted to a record low by 2013 (17%)
- **Non-Residential Building Construction (E302):** Auckland's share had a modest fall overall, similar to the sector average but showing more volatility. There was a sharp drop from 2000 (33%) to 2002 (25%) followed by a rapid partial recovery to 2004 (29%), then a decline until 2008 but strong growth in 2011 and 2013
- **Building Structure Services (E322):** Auckland's share plummeted almost continuously from well above the sector average in 2000 (40%) to somewhat below it by 2013 (27%)

- **Heavy and Civil Engineering Construction (E310):** Auckland's share was below the sector average but relatively stable until 2008; then it underwent an uptrend and overtook the sector by 2012, but dropped back in 2013.

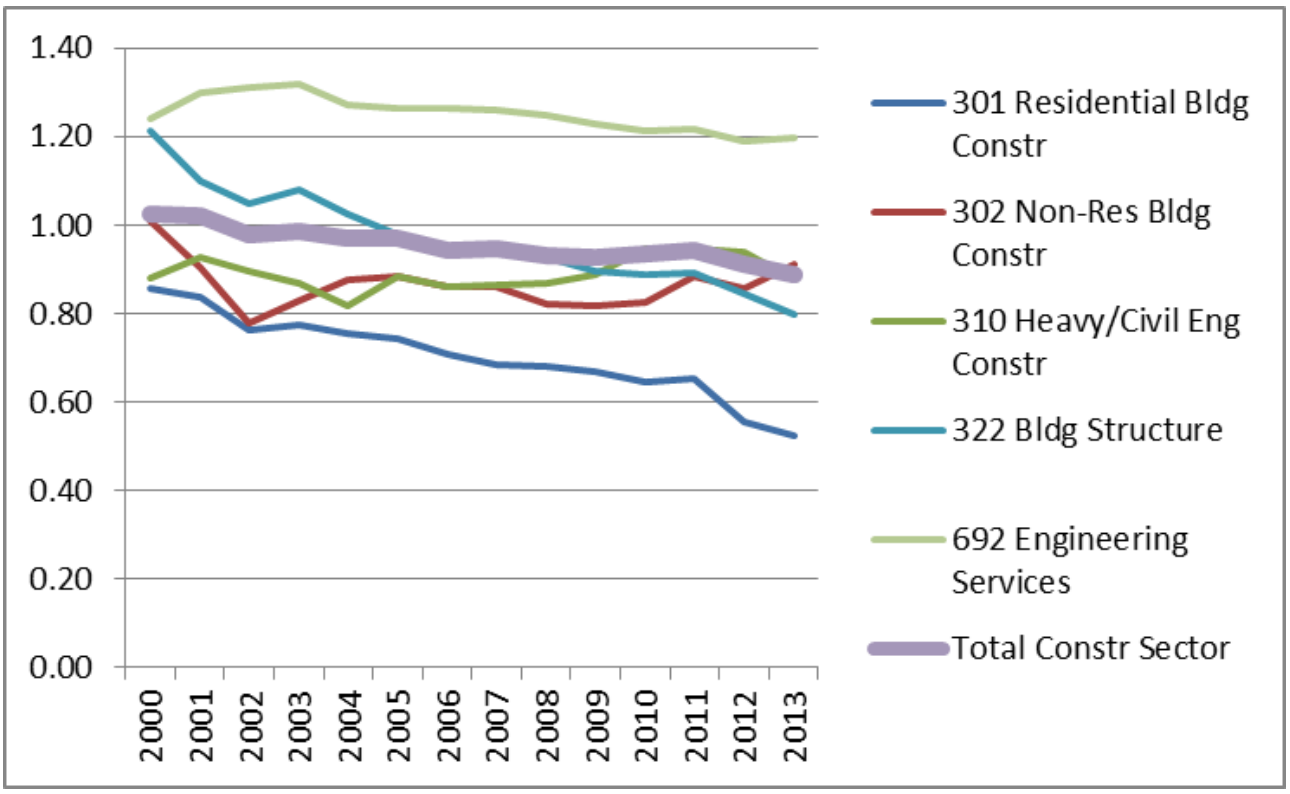
Figure 7: Auckland share of New Zealand employment by selected sub-sectors, 2000 – 2013



In order to compare a sector or sub-sector's performance to the rest of the regional economy, the Simple Location Quotient (SLQ) can be calculated. An SLQ above 1.0 indicates a relative concentration of the activity's employment in Auckland compared to the concentration of all other employment in Auckland. The construction and engineering sector has an unremarkable (but slowly weakening) SLQ (0.9), as do most sub-sectors apart from the following (see Figure 8):

- Engineering Services has a moderately high SLQ (1.2), suggesting a moderate concentration in Auckland which may be linked to the prevalence of larger companies in this sub-sector (see section 4.5 below); they may also be undertaking a greater proportion of Auckland's construction and engineering work (such as large buildings), at the expense of the rest of the sector; additionally, there might simply be more engineering-related projects (such as infrastructure) in Auckland.
- Residential Building Construction has an unusually low (and rapidly worsening) SLQ (0.5), even lower than Auckland's share of residential building consents; this could imply Auckland builders are more productive, but other reasons could include a greater proportion of the sub-sector being self-employed in Auckland, or more of the work being done by related sub-sectors such as Engineering Services.
- Building Structure Services' SLQ fell sharply from 2000 (1.2) to 2013 (0.8), not because it shrank but instead because it failed to match substantial growth in the rest of New Zealand throughout most of the period.

Figure 8: SLQs of selected construction and engineering sub-sectors, Auckland, 2000 – 2013



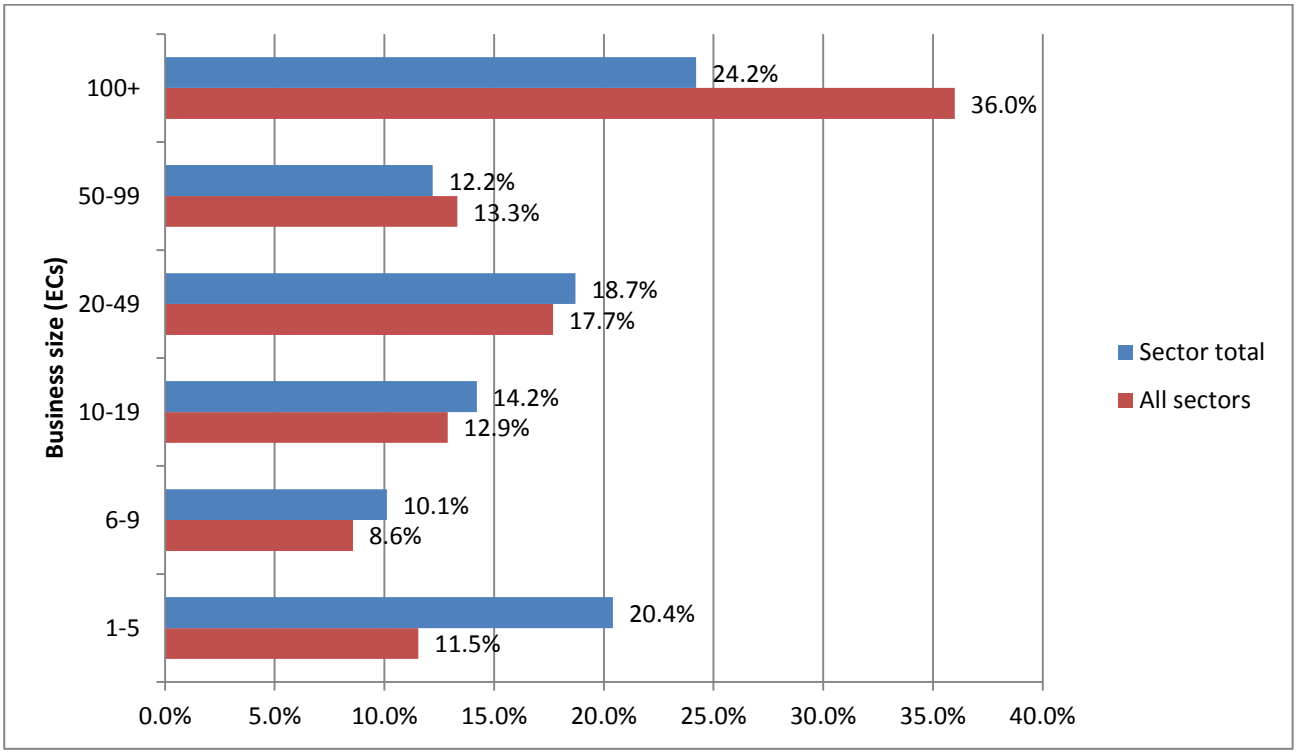
4.0 Businesses and self-employment

The construction and engineering sector has 19,495 businesses, which is 12 per cent of Auckland's total businesses. Many businesses (70%) have no employees (zero EC), but still have one or more self-employed or working proprietors. [7]

4.1 Business size

The proportion of employment provided by very small businesses (1 EC to 5 EC) is substantially higher for the construction and engineering sector (20%) than for the Auckland all-sector average (12%); conversely, the employment share for large businesses (100+ EC) is correspondingly lower (24% versus 36%). (See Figure 9.)

Figure 9: Employment share by business size, total sector, Auckland, 2013

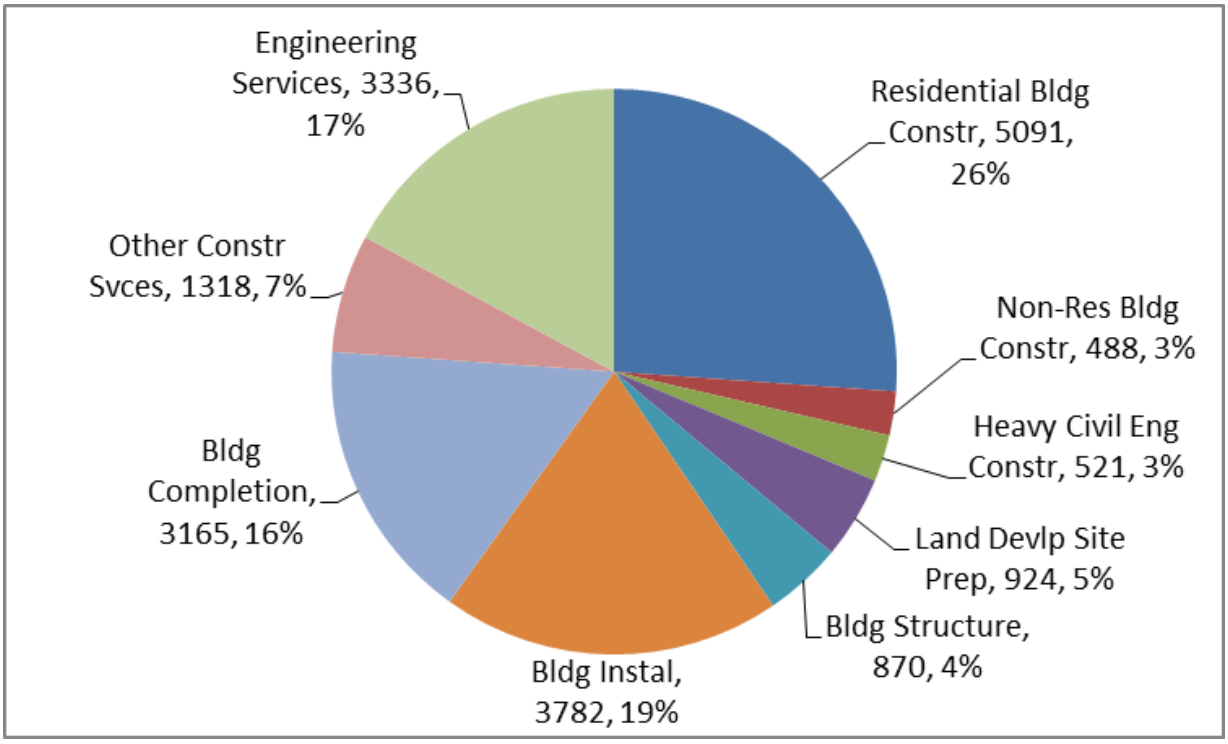


4.2 Business numbers by sub-sector

Most of the construction and engineering sector's businesses (61%) are involved in either Residential Building Construction (26%) or in Building Installation (19%) or Building Completion (16%); Residential Building Construction alone contributes a quarter (26%) of the sector's businesses. Engineering Services (17%) is also a substantial component. In contrast, Heavy and Civil Engineering Construction activity is concentrated in a relatively small number of (larger) businesses (3%). (See Figure 10.)

[7] Infometrics, 2013. *Annual Economic Report for Auckland 2012.* All other data in this section is sourced from Statistics New Zealand, 2013. *Business Demographics,* except where noted otherwise.

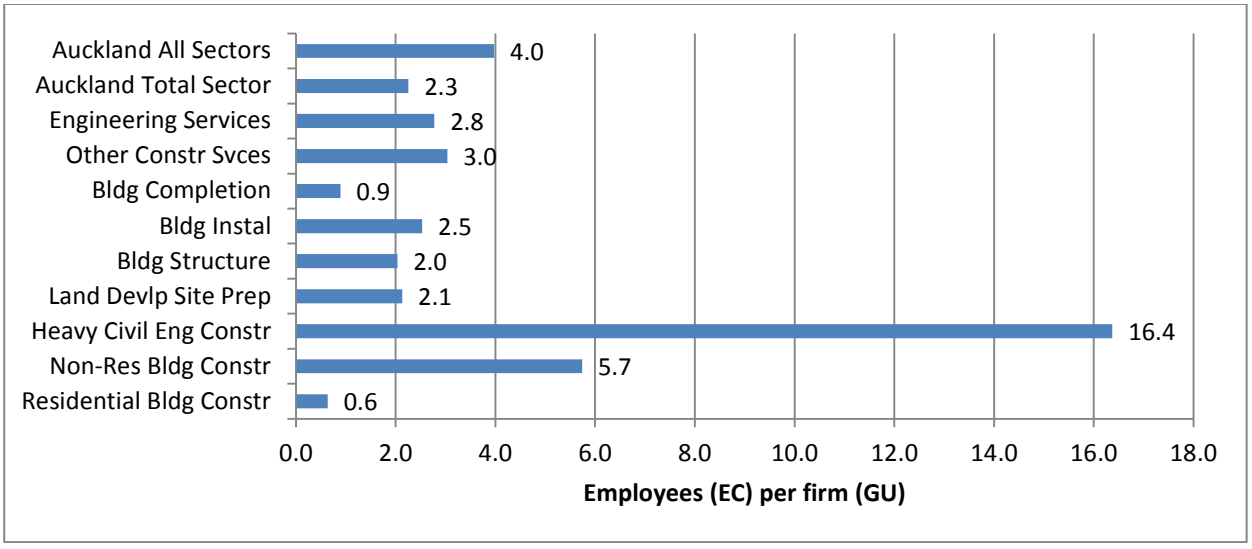
Figure 10: Business numbers by sub-sector, Auckland, 2013



4.3 Business size by sub-sector

The construction and engineering sector and most of its sub-sectors have smaller businesses (fewer employees (excluding self-employed) per geographic business unit: EC/GU) than most other sectors. In Auckland this ratio is 2.3 EC per GU for the construction and engineering sector, as compared to the Auckland all-sectors average of 4.0. (See also section 4.5 below for the effect of including self-employed workers, who are not included as part of "ECs"). Businesses in Residential Building Construction (0.6) and Building Completion (0.9) are particularly small, reflecting low entry barriers and a prevalence of self-employed (proprietors) rather than employees. Non-Residential Building Construction businesses tend to be larger (5.7), but the largest are in Heavy and Civil Engineering Construction (16.4), presumably reflecting the larger investment in equipment required and the greater size and scope of projects (See Figure 11.)

Figure 11: Business size by sub-sector, Auckland, 2013



4.4 Employment by business size by sub-sector

The sector has only 47 large business units (100+ EC), which is only 5.3% of the total Auckland economy's large businesses. Of these, over a third (18 business units) are in Heavy and Civil Engineering Construction and provide well over half (55%) of that sub-sector's employment (excluding self-employed). A further third of large businesses (15 business units) are in Engineering Services, coincidentally providing a third (35%) of that sub-sector's employment. Non-Residential Building Construction also has a moderate share of its employment (31%) from large businesses, but for all other sub-sectors the proportion is below 20 per cent. (See Figure 12.)

Conversely, the share of each sub-sector's employment generated by very small businesses (1-5 ECs) is extremely high for Residential Building Construction (55%) and Building Completion (48%). For Building Installation the share is lower (23%), but the sheer size of this sub-sector means it contributes the largest portion (25%) of the sector's very-small-business employment. (See Figure 13.)

Figure 12: Employment by business size (ECs) by sub-sector, Auckland, 2013

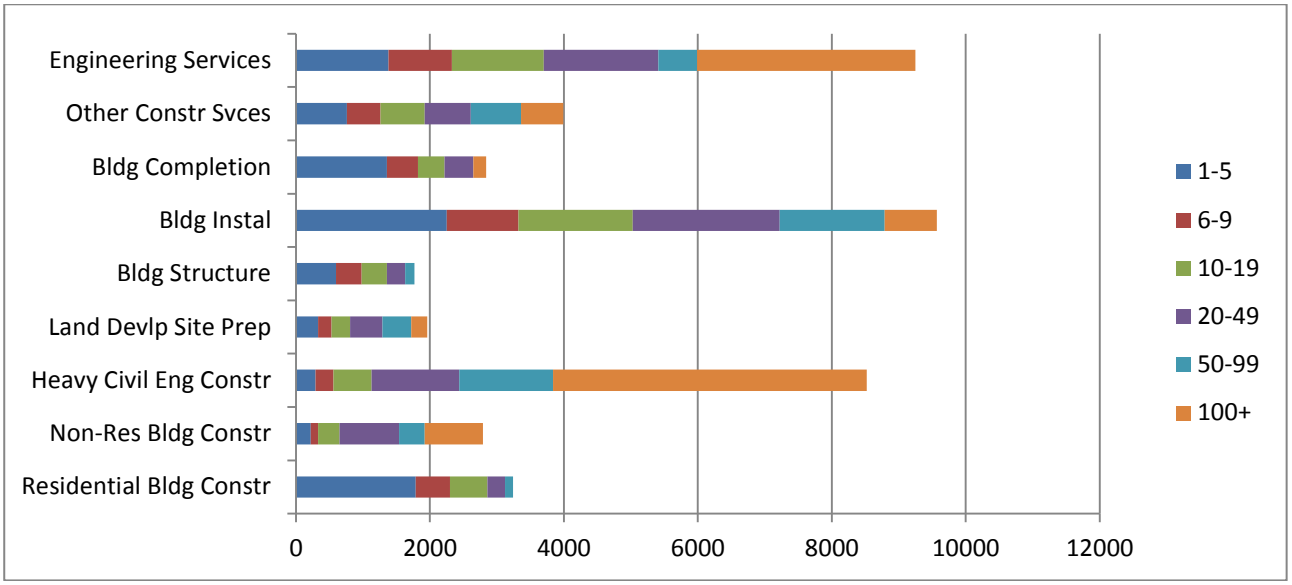
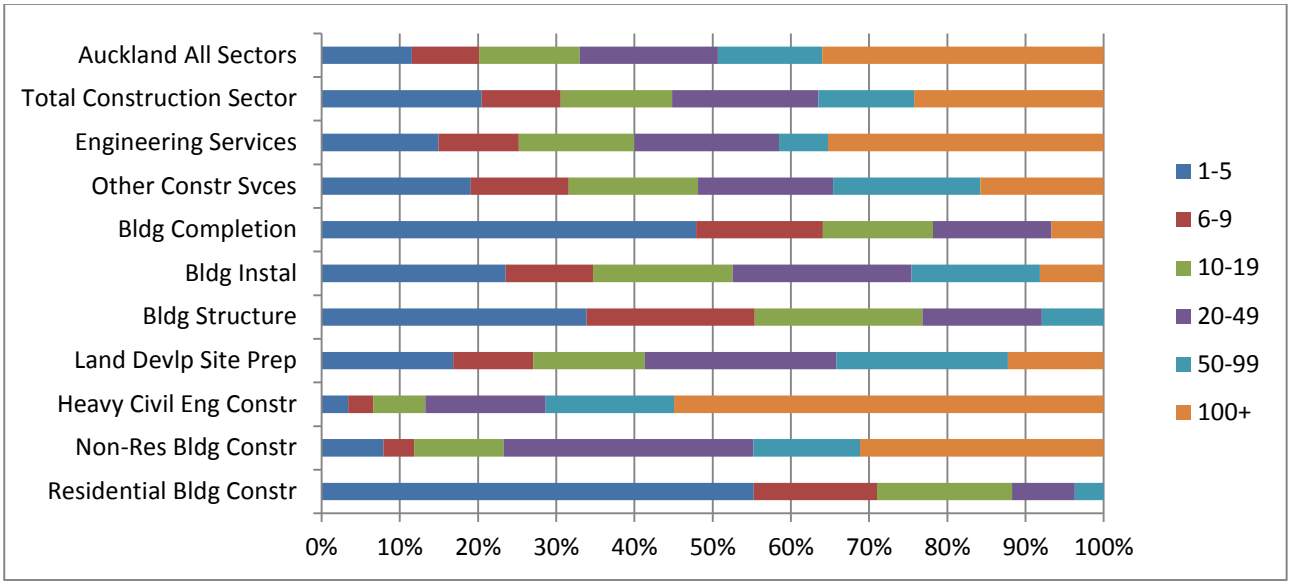


Figure 13: Employment share by business size (ECs) by sub-sector, Auckland, 2013



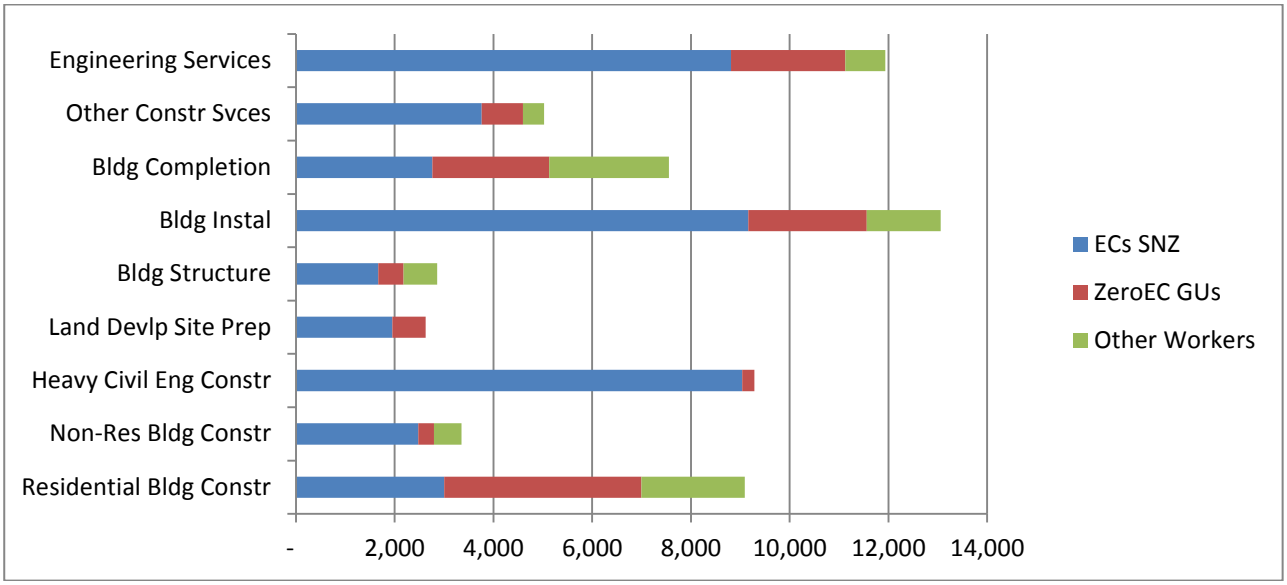
4.5 Zero employee businesses and self-employed by sub-sector

Many businesses have no employees (zero EC), but still have one or more self-employed working proprietors. The proportion of businesses that have no employees is similar for the sector (70%) to the rest of Auckland (67%). However, construction and engineering businesses tend to be smaller on average (2.3 employees) than the rest of Auckland (4.0), so the ratio of zero-employee businesses to measured employment for the sector (0.31:1) is nearly double that of the rest of Auckland (0.17:1).

In addition to self-employed working proprietors without employees, businesses with employees may also have one or more self-employed working proprietors, who are therefore also not captured in the official employee (EC) statistics. Overall, for construction and engineering in Auckland (2012), self-employed comprise a third (34%) of estimated total workers[8] (64,239 for 2012), which is much higher than the proportion for all sectors (12%).[9]

Some sub-sectors, notably Residential Building Construction and also Building Completion businesses, have very high numbers of self-employed workers relative to the number of employees; Building Installation and also Engineering Services (Design, Architecture and Surveying) have almost as many in absolute terms, but proportionally less relative to their higher numbers of employees. (See Figure 14).

Figure 14: Employees (ECs), zero-employee businesses and other self-employed workers by sub-sector, Auckland, 2012



The impact on employment shares of estimating total workers (including self-employed), rather than just measuring employees (ECs). is relatively minor for most sub-sectors. However, Residential Building Construction's share of "employment" doubles (to 14%) as does Building Completion Services (to 12%), while Heavy and Civil Engineering Construction's share falls by a third (to 14%). The sector's share of the total "employment" for all sectors also rises, by a third

[8] Including measured employees (ECs) plus estimates of working proprietors and other self-employed workers

[9] Source: Infometrics, 2013. *Annual Economic Report for Auckland 2012.*and Statistics New Zealand, 2013. *Business Demographics.* Note that total workers data is not available for 2013 at the required level of detail.

(from 6.6% to 8.8%). Similarly, average business size increases for the various sub-sectors in a comparable way; the sector in Auckland reaches 3.3 workers per GU, which is much closer to Auckland's all-sectors average of 4.5. (See Table 2)[10].

Table 2: Workers and Employees (ECs) distribution by sub-sector, Auckland, 2012

	Workers	Workers %	ECs	ECs %	Workers per GU	ECs per GU
Residential Building Construction	9,091	14.2%	2,940	6.9%	1.8	0.6
Non-Residential Building Construction	3,354	5.2%	2,500	5.9%	6.8	5.1
Heavy and Civil Engineering Construction	8,993	14.0%	9,070	21.3%	17.0	17.1
Land Development and Site Preparation Services	2,369	3.7%	1,820	4.3%	2.6	2.0
Building Structure Services	2,860	4.5%	1,670	3.9%	3.2	1.9
Building Installation Services	13,055	20.3%	9,390	22.0%	3.4	2.5
Building Completion Services	7,556	11.8%	2,790	6.5%	2.4	0.9
Other Construction Services	5,022	7.8%	3,790	8.9%	3.8	2.8
Engineering Services	11,939	18.6%	8,650	20.3%	3.6	2.6
Auckland Total Sector	**64,239**	**100.0%**	**42,620**	**100.0%**	**3.3**	**2.2**
Auckland All Sectors	**731,774**	**8.8%**	**644,160**	**6.6%**	**4.5**	**4.0**

Over time, the ratio of employees (ECs) to total workers in the construction and engineering sector has risen slightly, from 63% in 2001 to 66% in 2012, due to the number of self-employed having grown more slowly than the number of employees.

[10] Note that workers data for the sector is available only up to 2012, so 2012 EC data has been added for comparability.

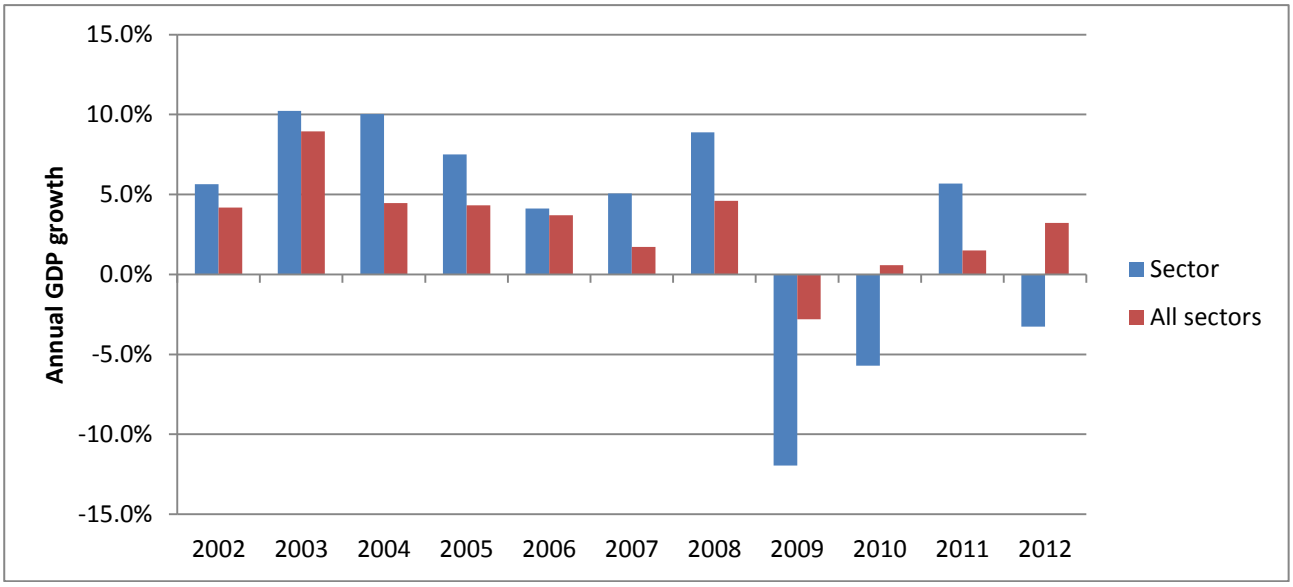
5.0 Gross Domestic Product (GDP)

Auckland's construction and engineering sector generated $2,225 million of direct Gross Domestic Product (GDP) in 2012 (in $1995), which is 4.0% per cent of Auckland's total GDP. The sector's GDP in 2012 was similar to the level in 2005, which is a fall in per capita terms due to population growth. It should be noted that the sector's high volatility, seasonality and high level of self-employment make it particularly difficult to estimate GDP. [11]

5.1 Sector GDP growth over time

Auckland's construction and engineering sector's real[12] annual GDP growth between 2001 and 2012 (March years) was an average of 3.1% pa, the same as the rest of Auckland's economy as a whole. However, this masks significant volatility over that period both within the sector and relative to the rest of the economy. On a (March) year by year basis, the sector's GDP grew even more strongly than the rest of the economy from 2002 until 2008, but then in 2009 and 2010 the sector was particularly hard hit by the GFC[13]. A strong rebound in 2011 was followed by a (smaller) fall in 2012 despite a strengthening in the rest of the economy. The sector's GDP in 2012 was similar to the level in 2005, which is a fall in per capita terms due to population growth. (See Figure 15).

Figure 15: Construction and engineering sector GDP growth rate, Auckland, 2002 – 2012



[11] All data in this section are sourced from Infometrics, 2013. *Annual Economic Report for Auckland 2012.* All data are in March years unless otherwise noted. Note that GDP data is not available for 2013 at the required level of detail to calculate for the "construction and engineering" sector.
[12] Net of inflation
[13] Global Financial Crisis

5.2 Sub-sector GDP and growth trends

Two thirds of Auckland's construction and engineering GDP is generated by three sub-sectors: Engineering Services (27%), Heavy and Civil Engineering Construction (22%) and Building Installation Services (21%). These three sub-sectors also generated the bulk of the sector's GDP growth between 2001 and 2012, especially Engineering Services (41%), which also grew faster (+5.4% pa).

The fastest growing sub-sector was Other Construction Services (+6.0% pa), but its share of the sector's growth was more modest (12%) due to its low base (7% of the sector's GDP by 2012).

Only minor proportions of the sector's GDP are provided directly by Residential Building Construction (5%) and Non-Residential Building Construction (5%), and their contributions to the sector's growth were minimal. (See Figure 16 and Table 3).

Figure 16: GDP by sub-sector, Auckland, 2001 - 2012

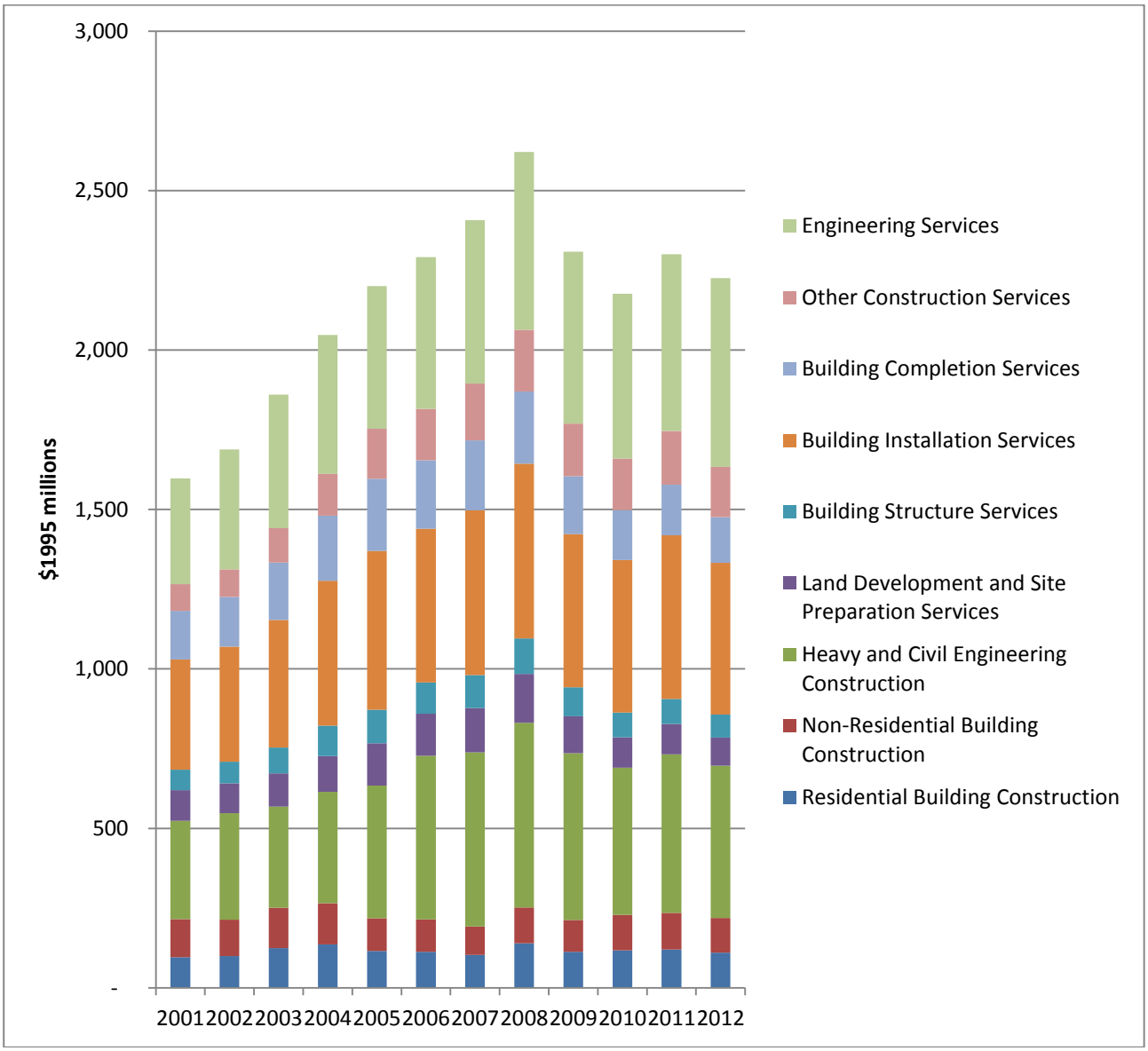


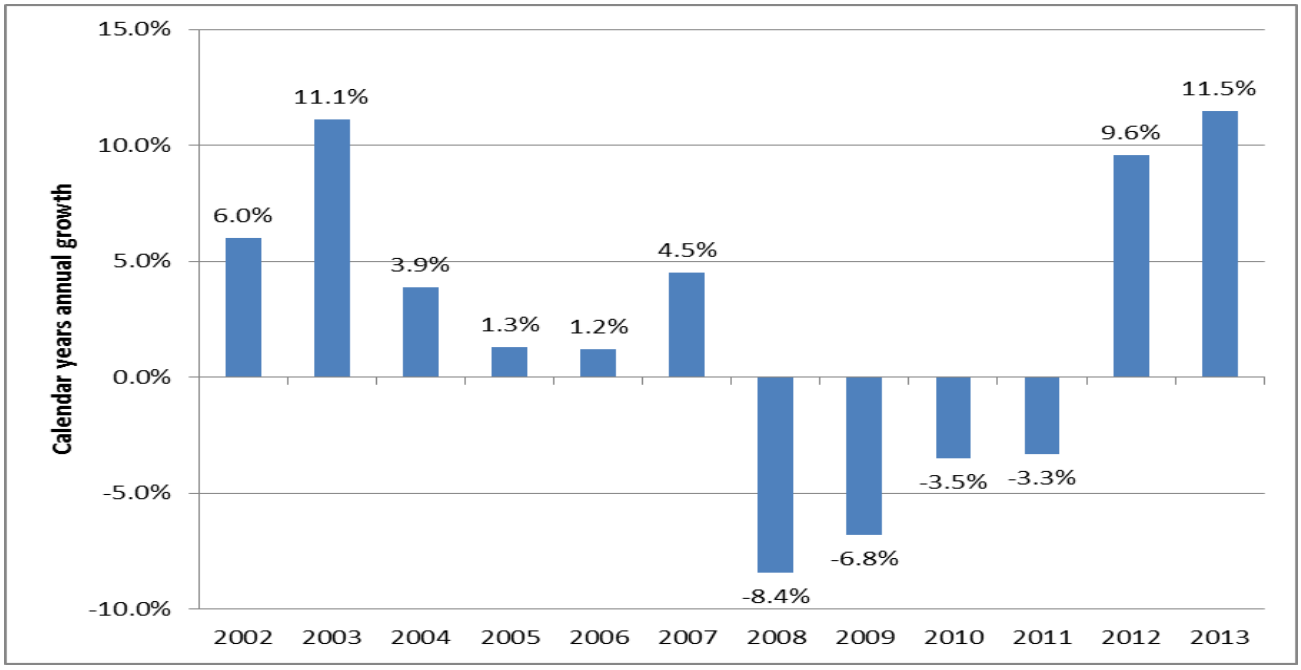
Table 3: GDP growth and distribution by sub-sector, Auckland, 2001 - 2012

	GDP in 2012 ($1995, millions)	Share of GDP in 2012 %	Growth 2001 - 2012 ($1995, millions)	Share of Growth %	Annual growth rate % pa
Residential Building Construction	110	5.0%	14	2.2%	1.2%
Non-Residential Building Construction	108	4.9%	- 11	-1.7%	-0.8%
Heavy and Civil Engineering Construction	478	21.5%	170	27.0%	4.1%
Land Development and Site Preparation Services	88	4.0%	- 8	-1.3%	-0.8%
Building Structure Services	72	3.3%	8	1.3%	1.1%
Building Installation Services	476	21.4%	130	20.7%	2.9%
Building Completion Services	143	6.4%	- 9	-1.4%	-0.5%
Other Construction Services	158	7.1%	75	11.9%	6.0%
Engineering Services	591	26.6%	259	41.3%	5.4%
Auckland Total Sector	**2,225**	**100.0%**	**628**	**100.0%**	**3.1%**
Auckland All Sectors	**55,468**	**n/a**	**15,780**	**n/a**	**3.1%**

5.3 Construction sub-sector latest GDP growth

High level GDP data is available for Auckland's construction sector (excluding engineering services) for 2013: it had strong GDP growth (calendar year-on-year) in 2013 (11.5%), and also 2012 (9.6%), which followed four consecutive calendar years of contraction from 2008 to 2011. (See Figure 17).

Figure 17: Construction sector GDP growth, Auckland, 2002 - 2013



6.0 Productivity

One of the simplest measures of productivity is output value added per worker, although more complex measures are also often used such as output per hour worked, output per unit of capital and multi-factor productivity[14].

Auckland's construction and engineering sector generates $34,637 of GDP per worker (in $1995), which is only half as much (46%) as the average for all sectors ($75,799)[15].

Low productivity in the construction sector (not including engineering services) has long been recognised as a problem at the national level. It constrains the sector's ability to pay higher wages and incomes, and also generates cost pressures for customers and down-stream users – which in the case of construction and engineering is much of the rest of the economy.

6.1 Productivity trends by sub-sector

Auckland's construction and engineering sub-sectors all have substantially lower labour productivity (GDP per worker[16]) than the rest of Auckland's economy; this has been the case for many years, but the gap appears to be widening over time, with the sector's productivity improving more slowly than the rest of the economy. Some sub-sectors have particularly low or high productivity, as follows (see Figure 18)[17].

- Lowest productivities are in Residential Building Construction and Building Completion. However, these two sub-sectors are characterised by numerous small businesses and self-employed participants, whose income and expenses are problematic to measure, so the GDP attributed may be an underestimate. In addition, productivity per hour worked could be relatively higher than productivity per worker, if they have a high proportion of part-time workers, but this seems unlikely as the construction sector as a whole has very few part-time workers.

- Productivity fell sharply in Non-Residential Building Construction after 2004, with increasing workers but falling GDP until 2007; subsequent flat GDP has been achieved with a reduced workforce, partially restoring lost productivity.

- Highest productivity is in Heavy and Civil Engineering Construction, although it has been very volatile due to labour responding by less than GDP to the pre-2006 boom and post-2008 crunch; presumably the sub-sector's labour force is more inelastic, specialised and difficult to recruit, and recent renewed recruitment (despite falling output) may be in anticipation of future growth.

- Productivity improvement over the period occurred in only one sub-sector, Engineering Services, which improved strongly between 2001 and 2003 and then again after 2009.

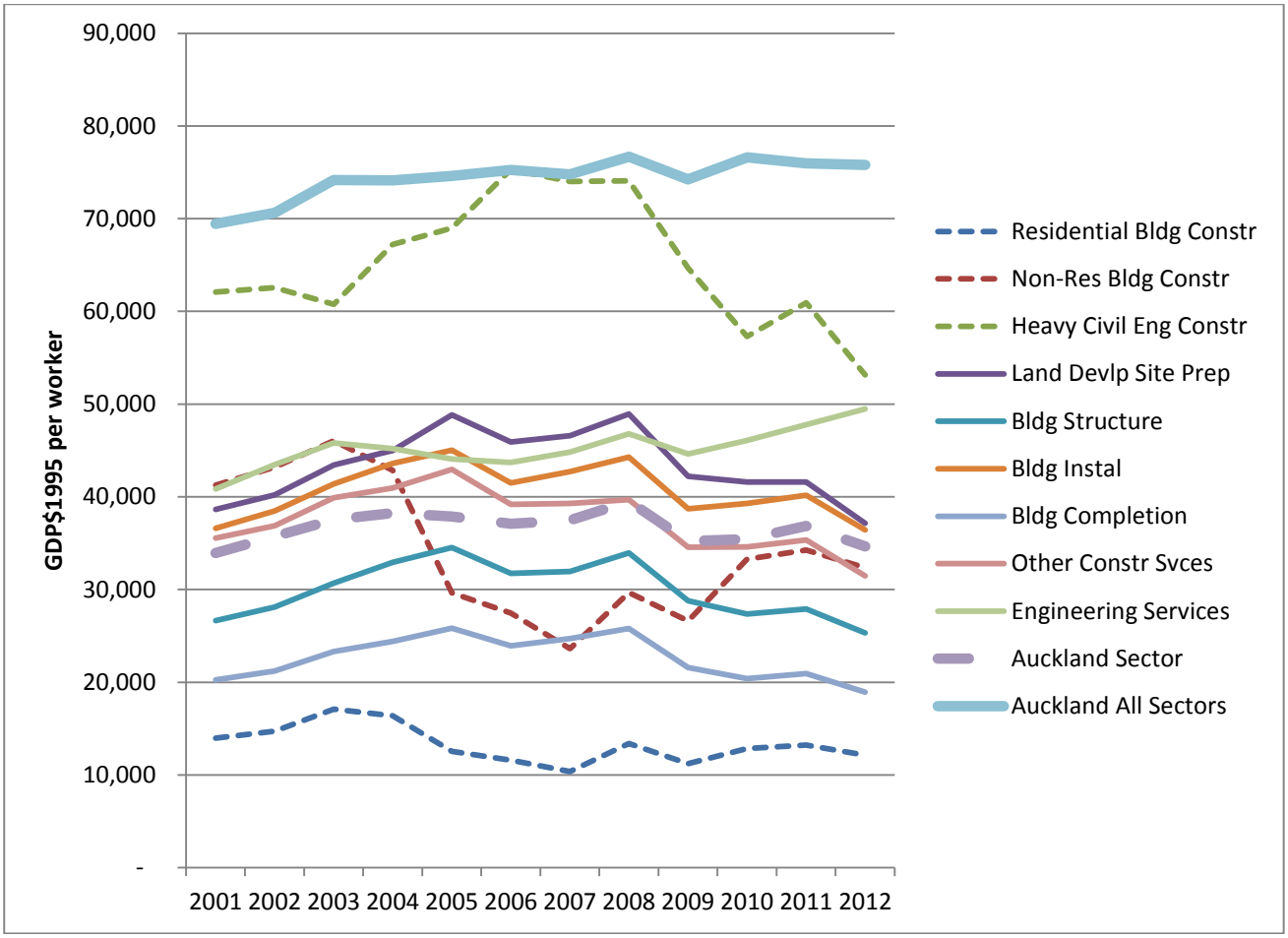
[14] Multi-factor productivity considers both labour and capital productivity together

[15] Source: Infometrics, 2013. *Annual Economic Report for Auckland 2012.* For year ended March 2012.

[16] Including self-employed; in the absence at the sub-sector level of the more usual "GDP per hour worked".

[17] Source: Infometrics, 2013. *Annual Economic Report for Auckland 2012.* For year ended March 2012.

Figure 18: GDP per worker by sub-sector, Auckland, 2001 - 2012



6.2 Construction productivity national trends by factor

The Auckland construction (but not engineering) sub-sectors' productivity shortcomings in the last decade are part of an on-going trend of lack of improvement at the national level going back to at least 1986. The New Zealand construction[18] sector's labour productivity (based on hours worked rather than number of workers) in 2011 was slightly higher than in 1986, but capital productivity was substantially lower, so overall ("multi-factor") productivity was lower. Major trends over time were as follows (see Figure 19) [19].

- Overall, labour productivity has been largely flat since 1990, and there was a major drop in capital productivity from 1986 to 1992 from which the industry never recovered.

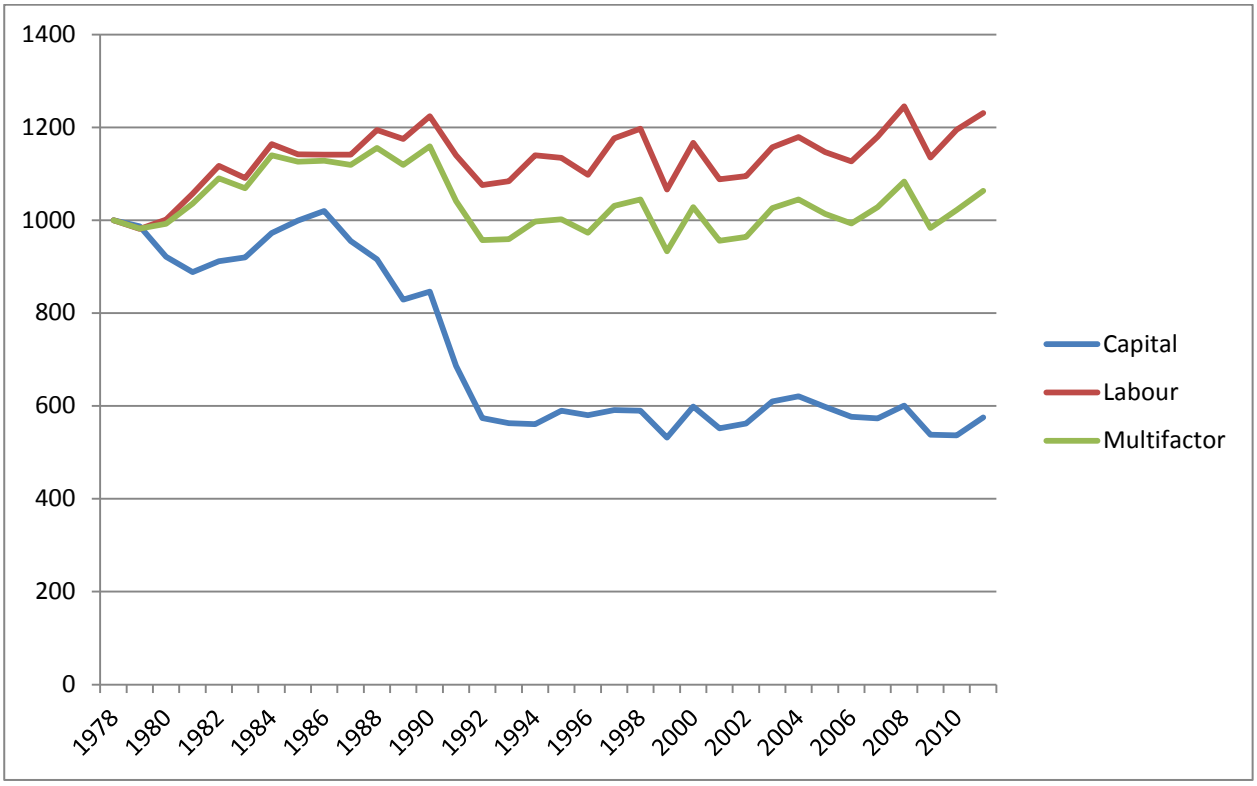
- From 1986 to 1990, a substantial drop in capital productivity was offset by a moderate improvement in labour productivity.

[18] So excluding Engineering Services.
[19] Source: Statistics New Zealand. *Industry productivity indexes 1978-2011* (March years)

- From 1990 to 1992 there was a major drop in capital productivity, and a substantial drop in labour productivity.

- Since 1992, a moderate overall improvement in labour productivity (0.7% pa) (especially from 2001 to 2008) has been diluted by persistent lack of sustained improvement in capital productivity (with a down-trend from 2004 to 2010), but with substantial fluctuations from year to year.

Figure 19: Construction sector productivity by factor, New Zealand, 1978 - 2011



Low and stagnant productivity in the construction sector is not unique to New Zealand. A recent paper concluded for the United States construction industry "that there are a number of structural problems within the industry that stand in the way of improved labour productivity at the total industry level and that these show no indication of improving over this time period."[20]

6.3 Productivity and volatility

The construction sector is characterised by high volatility in employment and GDP compared to other sectors. In times of economic upswing, the sector suffers from capacity constraints, while in downturns, a far greater share of jobs is shed than in other sectors[21]. The volatile cycles do not allow it to build and maintain capacity, or to plan more than a few years out. As a result, the construction sector is characterised by relatively high job turnover rates when compared to other sectors, which is presumably a key factor in the sector's productivity challenge.

[20] Teicholz, P, 2013. *Labor-Productivity Declines in the Construction Industry: Causes and Remedies (Another Look.* Downloaded from http://www.aecbytes.com/viewpoint/2013/issue_67.html

[21] Martin Jenkins, 2012. *Auckland Tourism, Events and Economic Development Ltd (ATEED) sector engagement framework.*

7.0 Workforce and skills

Auckland's construction sector's workers are nearly all male and most work full time; they tend to be less skilled than the average Auckland worker, and a skill shortage may be looming. Auckland's construction workers have a lower proportion with tertiary qualifications (13% in 2006) than the rest of Auckland's economy (23%); the proportion with no qualifications (20%) is higher than the average for all other occupations (14%)[22].

7.1 Sector workforce composition

As at March 2006[23], most Auckland construction workers (which excludes Engineering Services, but includes self-employed/working proprietors as well as waged and salaried employees) were male (93%) and worked full-time (92%). The number of hours worked in construction occupations was higher than that for the average total of all occupations, and the majority of construction workers (57%) worked between 40 and 49 hours per week. There was relatively less part time work in the construction industry compared to all other occupations.

In terms of ethnicity (as at the 2006 Census), Asian people were under-represented in Auckland's construction industry (10% in construction, yet 19% of Auckland's population). Conversely, New Zealand Europeans were correspondingly over-represented (65% in construction, yet they make up 56% of the region's population). Other ethnicities were largely represented proportionally to their share of the general population.

7.2 Employment growth by occupation

As at 2012[24] there were 15,699 Construction Trades Workers employed in Auckland and 5,722 Construction and Mining Labourers[25]. At the height of the recession from 2008 to 2010, Construction Trades Workers suffered a greater fall in employment (-5.2% pa) than any other occupation except Personal Assistants and Secretaries (-6.1% pa); Construction and Mining Labourers were also worse hit (-2.8% pa) than the total for all occupations (-1.1% pa).

The ratio of trades workers to labourers has steadily fallen from 2002 to 2012 (with an average difference in growth rates of between 2.4 and 3.7% pa), possibly indicating a fall in average skill levels in the construction workforce as the more skilled "trades" component is "diluted" by an increase in the less skilled "labourers" component. (See Table 4(a) and Table 4(b)).

[22] Data in this section sourced from Statistics New Zealand, *Census 2006,* except as otherwise noted

[23] Statistics New Zealand, *Census 2006,* the latest date for which detailed Census employment data is currently available

[24] Statistics New Zealand Household Labour Force Survey, cited in Allpress J., 2013. *The labour market and skills in Auckland.* Auckland Council technical report, TR2013/005

[25] Other construction and engineering occupations cannot be split out at the available level of detail.

Table 4(a): Employment by selected occupation (ANZSCO Level 2), Auckland, 2002 - 2012

	2002	2008	2010	2012
Construction Trades Workers	14,359	17,092	15,363	15,699
Construction and Mining Labourers	3,826	5,604	5,299	5,772
Total all occupations	585,236	706,286	691,190	731,829

Table 4(b): Employment growth by selected occupation, Auckland, 2002 - 2012

	2002-2008 Total	2002-2008 %pa	2008-2010 Total	2008-2010 %pa	2010-2012 Total	2010-2012 %pa
Construction Trades Workers	2,733	2.9%	-1,729	-5.2%	336	1.1%
Construction and Mining Labourers	1,778	6.6%	-305	-2.8%	472	4.4%
Growth rate difference Trades vs Labourers		3.7%		2.4%		3.3%
Total all occupations	121,051	3.2%	-15,097	-1.1%	40,639	2.9%

7.3 SEEK Employment Index

The SEEK Employment Index (SEI) measures the number of unique job advertisements posted on SEEK per job application received[26]. Being an online site, SEEK tends to reflect medium and high skilled jobs more than low skilled ones[27]. Custom data were obtained from SEEK that profile separately changes in the number of advertisements and applications in selected industries in the two years from November 2010 to the end of 2012. This analysis indexes both jobs and advertisements to November 2010 levels. For the vast majority of industries, the numbers of advertisements and applications moved closely together over time, indicating little to no change in the ratio of applications to advertisements. Similarly, the overall SEI trend for Auckland as a whole was relatively flat from 2010 onwards (having plummeted from 2008 until mid-2009 due to the GFC, and only partially recovered by 2010). Four industries did show some divergence, however, including construction.

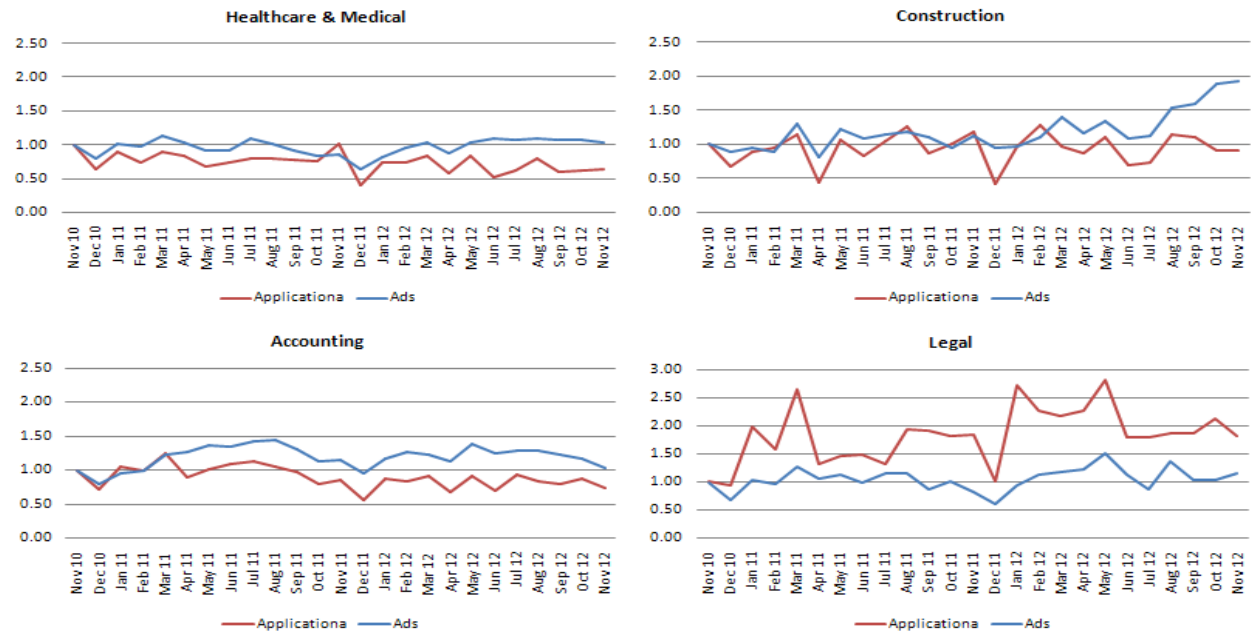
From mid-2012 onwards, construction showed a sharp increase in advertisements relative to applications, indicating that (implicit) competition amongst skilled workers was likely to have eased. All else being equal, an increase in advertisements without a commensurate increase in applications has two notable effects: it makes it easier for workers with the required skills in those industries to find work, and it makes it harder for employers to find appropriately skilled workers to fill their vacancies. Optimal economic functioning requires a balance between these two outcomes. While the figures above cannot tell us where that ideal balance is, the rapid and strong divergence

[26] SEEK is New Zealand's largest online job site, accounting for approximately 60% of all online ads posted.

[27] Allpress, 2013.

in construction SEI does provide a warning that this industry may face skills shortages in the future if this pattern continues. (See Figure 20).

Figure 20: Seek Employment Index components, selected sectors, Auckland, 2010 - 2012

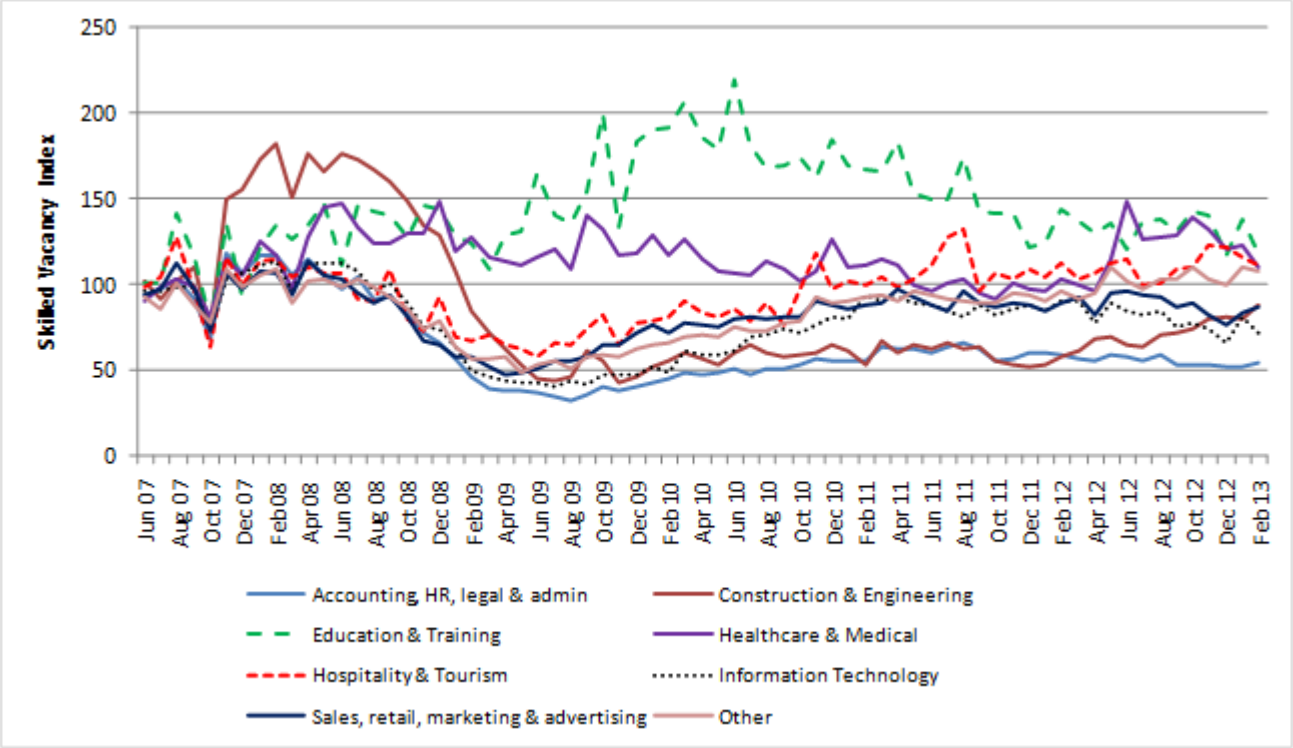


7.4 Skilled vacancy index

The Ministry of Business, Innovation and Employment (MBIE) produces Jobs Online, a report that includes the Skilled Vacancy Index (SVI), which tracks skilled vacancies posted on three major New Zealand job boards, SEEK, Trade Me Jobs and Herald Jobs. For the purposes of the SVI, skilled jobs are those defined as skill levels 1-3 in the Australia New Zealand Standard Classification of Occupations (ANZSCO) 2006. Skill level 3 is equivalent to a National Qualifications Framework Level 4 qualification, and therefore the SVI capture job vacancies for occupations that require a level 4 qualification or above.

The construction and engineering sector's SVI fluctuated more than other sectors: it had unusually strong growth in skilled vacancy levels in late 2007, then from mid-2008 its SVI fell unusually sharply to reach record lows by mid-2009 like most other sectors. From 2009 the construction and engineering sector languished like most other sectors, until 2012 when its SVI started to recover. (See Figure 21).

Figure 21: Jobs Online Skilled Vacancy Index, selected sectors, Auckland, 2007 - 2013



7.5 Job openings and qualification achievements

The ratio between qualifications achieved and job openings can be used to show relationships between the supply of skilled workers coming out of training and the demand from industry for those trainees. A high ratio may suggest oversupply, while a low ratio may suggest undersupply of trained workers. However, there is a tendency for this analysis to overestimate supply and to underestimate demand[28], so even a ratio of 1 or more may reflect an undersupply of trained workers.

Between 2004 and 2011, Auckland had only slightly more qualifications achieved relating to the construction industry (i.e. excluding engineering), than job openings requiring those qualifications[29]. The ratio of 1.1:1 was much lower than the average for all Auckland industries (1.7:1), and was the lowest of all the key industries listed in Auckland's Economic Development Strategy (which ranged from 1.3:1 to 2.0:1).

For Auckland in total, there was an oversupply of qualifications produced relative to job openings at all levels, especially for medium-high skilled (level 5-7 Diplomas (3.3:1)). However, in the two specifically construction and engineering related fields, overall there were an undersupply (Engineering and Related Technologies 0.7:1), and probable undersupply (Architecture and Building 1.0:1). (In fact, Engineering and Related Technologies had the worst undersupply of any field). These two fields had shortages of medium skilled qualifications in particular (namely NZQA level 4 certificates), with ratios of only 0.3:1 and 0.5:1, whereas the total of all fields at that level

[28] For example, some qualifications are obtained "on the job"; a firm may require existing staff to up skill without advertising a vacancy; some individuals have more than one qualification. Conversely, not all job openings are for graduates. There are also issues of lags: people qualifying now had to commence their training one or more years ago, when market conditions may have been quite different. For further explanation, see Appendix E of Allpress, 2013.
[29] Allpress, 2013

had a ratio suggesting a modest oversupply (1.5:1). An alternative interpretation would be that Architecture and Building graduates are over-qualified, with too many degrees and not enough level 4 certificates, while for Engineering and Related Technologies there is an absolute shortfall of medium skilled (level 4 certificates) being produced (3,562 for 11,295 jobs (0.32:1), a shortfall of at least 7,700), and probably also a shortfall of degrees. (See Table 5)[30].

Table 5: Job Openings and Qualification Achievements, Auckland, 2004-2011.

Field of study	Engineering and Related Technologies	Architecture and Building	Total
Qualifications produced			
Degrees	6,689	2,734	128,353
5-7 Diplomas	3,195	1,090	51,950
4 Certificates	3,562	2,286	48,851
Total	13,446	6,110	229,154
Job openings requiring qualification			
Degrees	6,626	1,362	88,880
5-7 Diplomas	2,307	711	15,583
4 Certificates	11,295	4,236	31,967
Total	20,227	6,309	136,430
Qualifications per opening			
Degrees	1.0	2.0	1.4
5-7 Diplomas	1.4	1.5	3.3
4 Certificates	0.3	0.5	1.5
Total	0.7	1.0	1.7

7.6 Skill shortages

According to a 2012 report[31], more than 35 per cent of workers in the construction sector leave secondary school with no qualifications; some of those subsequently obtain a qualification, but at any given time 25 per cent of the workers in the sector have no qualifications of any kind. Furthermore, those who do hold a qualification are much more likely to hold a level four qualification or below, rather than a higher level qualification. The Adult Literacy and Life Skills Survey conducted in 2006 revealed that a large proportion of workers in the sector have low literacy skills (48%) and low numeracy skills (52%). There are long-term skill shortages across a range of occupations within the sector, and a particular lack of people with strong management and leadership capability. (See also Appendix 2 for further details)

The report also found that New Zealand has less than half the number of engineering graduates per capita compared to the OECD average. In terms of degree holders, the requirement is for 1500 or 2000 graduates per year, up from the present 1230. In spite of the negative impact of the recession on the construction industry, many construction-related occupations appear on the New

[30] Source: Infometrics, Tertiary Education Commission and Statistics New Zealand.

[31] Martin Jenkins, 2012. *Auckland Tourism, Events and Economic Development Ltd (ATEED) sector engagement framework.*

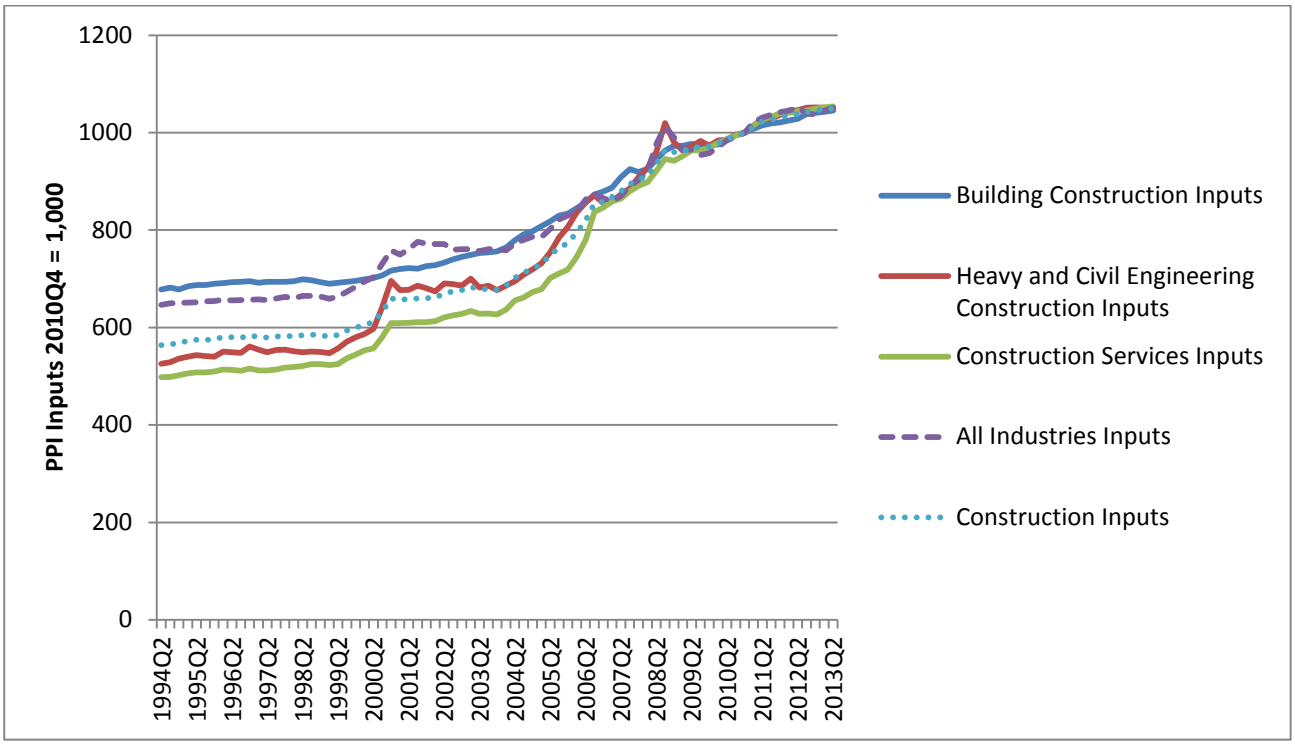
Zealand Immigration immediate and long-term skill-shortage lists. This is particularly the case for skilled occupations where workers are ageing. It is estimated that the slump in the construction industry has resulted in the largest net outflow of building-trades workers since 1980. The depletion of the skilled building workforce could undermine the ability of the construction industry to grow, which is a particular concern given looming increases in demand, particularly for residential construction.

8.0 Construction costs (national)

The cost of construction, as measured by Statistics New Zealand's quarterly Producer Price Index ("PPI") for inputs to the sector[32], has on average since 1994 risen slightly faster (+0.7% pa more) than the cost of other sectors, but with periods of faster and slower increases for the sector and its components, as follows. (See Figure 22). [33]

- The entire cost differential between construction and other sectors over the 1994 – 2013 period is accounted for by the thirteen quarters from March 2004 to March 2007, which had greater cost increases for construction (+25.2% total increase 2004-2007) than the rest of the economy (+12.2%).
- Apart from the 2004 to 2007 boom, construction input cost increases have on average matched the rest of the economy; the strong sector increase in 1999 and 2000 was part of an economy-wide input cost increase, and in 2008 -2013 construction costs rose by slightly less (2.6% per annum) than the total economy (2.7% pa).
- At the 2-digit sub-sector level, Building Construction costs over the long-term have largely matched the rest of the economy, and been less volatile; they have grown less rapidly than the rest of the construction sector.
- Heavy and Civil Engineering Construction costs rose even faster in 1999 and 2000 than the sector and the rest of the economy, and shared the sector boom in 2004-2007, but have increased broadly in line with both since 2008.
- Construction Services costs were the fastest growing component of the sector during the rapid-increase phase 2004-2007, but have increased in line with the rest of the sector since then.

Figure 22: PPI input cost indices by selected sub-sectors, New Zealand, 1994 - 2013



[32] Construction only, plus 2-digit sub-sectors; excludes Engineering Services (not available separately)

[33] All data in this section is sourced from Statistics New Zealand. *Quarterly producer price index*

9.0 Gross Fixed Capital Formation (national)

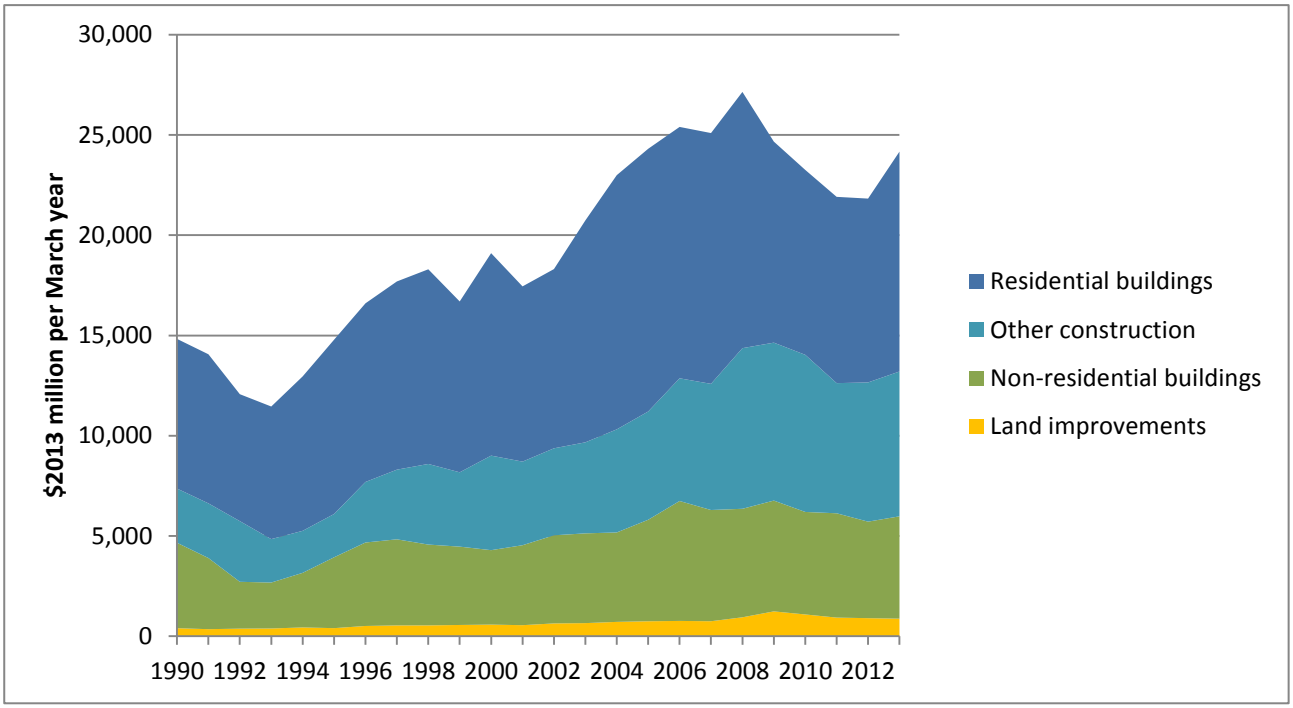
Gross fixed capital formation ("GFCF") is not available for Auckland alone; for New Zealand as a whole it was $24.2 billion in the 2013 March year for residential and non-residential buildings plus other construction and land improvements[34]. This is a tenth of New Zealand's total GDP. The split between the different categories of GFCF is indicative of the end users of the various construction and engineering sub-sectors.[35]

9.1 New Zealand gross fixed capital formation trends

The annual value of gross fixed capital formation (GFCF) in New Zealand in 2013 was higher for residential buildings ($11.0 billion) than for non-residential buildings ($5.1 billion), other construction ($7.2 billion) and land improvements ($0.9 billion). The combined annual total for these categories in 2013 was $24.2 billion, no higher than eight years earlier in 2005 ($24.3 billion) and still a tenth (11%) lower than the peak in 2008 ($27.1 billion in $2013[36]).

Looking at the longer term, however, there appears to be a strong up-trend: total GFCF in 2013 is over a third (38%%) higher than the pre-boom level in 2001 ($17.4 billion) and more than double the trough in 1993 ($11.5 billion). (See Figure 23).

Figure 23: Gross fixed capital formation by selected categories, New Zealand, 1990 - 2013



[34] So excluding non-construction related GFCF such as plant and machinery

[35] All data in this section is Source: Statistics New Zealand, 2013. *Gross fixed capital formation by asset type 1987-2013.*

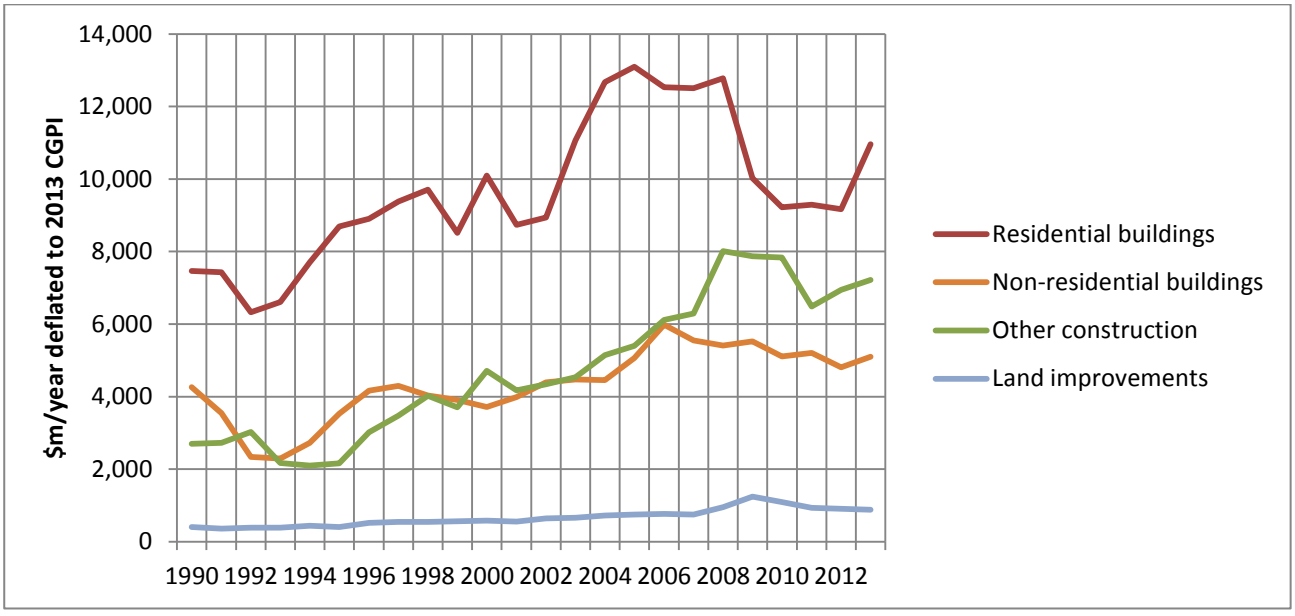
[36] GFGC for past years is here converted to $2013 using the Capital Goods Price Index (CGPI) for each category

9.2 Gross fixed capital formation trends by category

The (deflated) GFCF amounts of the various construction-related categories, and their shares of total construction-related GFCF (by dollar value), showed growth trends from 1990 to 2013 as follows. (See also Figure 24[37]).

- **Residential buildings** comprise half of the sector's GFCF (45% in 2013), but are extremely volatile. Their GFCF grew rapidly from 1994 to 1998, and again in 2003 and 2004, maintaining record high levels until the GFC in 2008, then dropped very sharply. Their share of the total rose from 1987 (37%) to 1995 (55%), but fell from 2004 (55%) to 2010 (40%). Their level and share rose very sharply in 2013.
- **Non-residential buildings** GFCF has had strong fluctuations, and the overall trend depends on the time period selected: a drop from 1990 to 1993, followed by an overall up-trend from 1993 to 2006 (especially 2004 to 2006), and a mild down-trend since then; alternatively, an overall uptrend (more than doubling) from 1993 to 2013; or looking instead at the longer period from 1990 to 2013, the overall increase was minimal (totalling only 20% in 23 years). However, their share of the sector is on a definite down-trend: it fell sharply from 1988 (42%) to 1992 (25%), and has been gradually declining further since then; they currently (2013) form less than a quarter (21%) of the sector.
- **Other construction** was broadly similar to non-residential buildings from 1993 to 2006, but had much stronger growth in 2008, and since then has stayed above its pre-GFC levels. Its share of the sector nearly halved from 1987 (24% share) to 1995 (14%), then rebounded by 2000 (23%). The share held fairly steady until 2008, since when it boomed even further to record highs, largely at the expense of residential buildings. Other construction now comprises nearly a third of the sector' GFCF (30%).
- **Land improvements** are only a twentieth (4%) of the total, and have been relatively flat since the end of the 2008-2009 up-tick.

Figure 24: Construction-related GFCF shares by category, New Zealand, 1990 - 2013



[37] Shares based on nominal expenditure each year; these differ slightly from the ratios of CGPI-deflated GFCF due to the different categories having had different rates of increase in their CGPI's.

10.0 Building consents

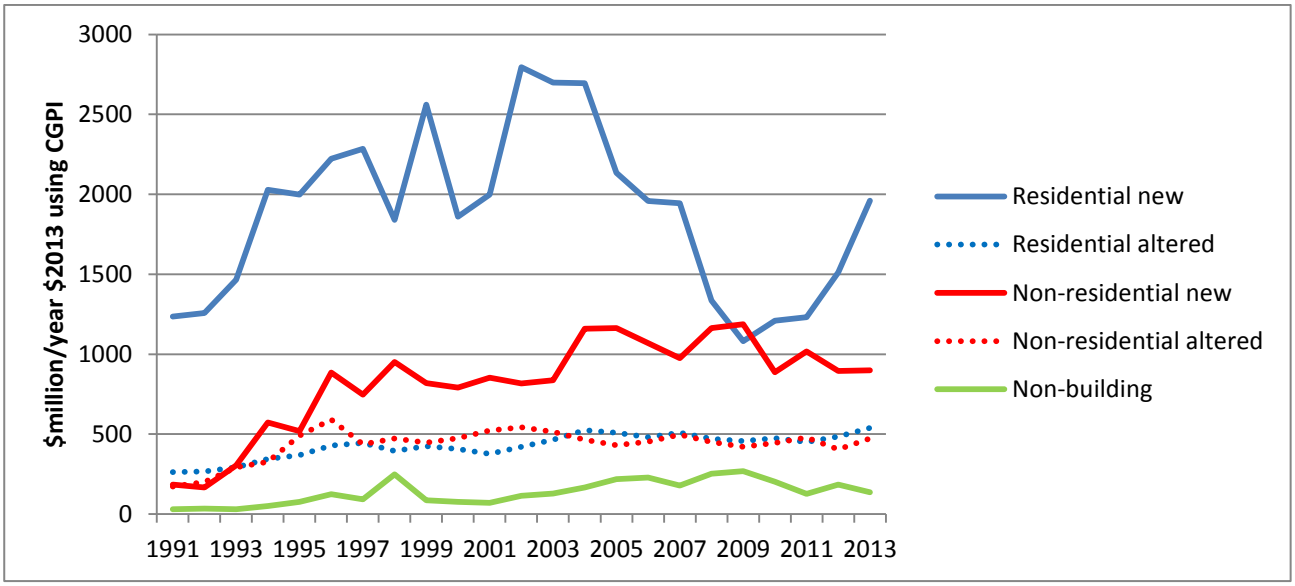
The total value of Auckland building consents of all types is currently $4.0 billion a year (y/e December 2013), which is slightly above the average for 1991 – 2013 ($3.7 billion in $2013). New dwellings comprise half the total ($2.0 billion), and have been recovering strongly from the record low of 2009 ($1.1 billion in $2013). [38]

10.1 Value of new buildings and alterations by category

The value of Auckland's consented construction on an annual basis (converted to $2013 using the CGPIs for each category) shows the following trends. (See Figure 25).

- **New residential** building consents on average represent half of all building consents, but with strong fluctuations: they showed a strong uptrend from 1991 ($1.2 billion) to a record peak in 2002 ($2.8 billion), then after 2004 (i.e. starting before the GFC) they fell sharply to a record low in 2009, followed by strong recovery in 2012 and 2013 (almost doubling) back to the long-term average ($1.9 billion 1991-2013).
- **New non-residential** consents have since 1996 typically been near the $1 billion level, half as much as residential consents but with less extreme fluctuations; in particular, they remained at peak levels in 2008 and 2009 and had a less severe fall in 2010, with no subsequent sharp recovery.
- **Alterations** have been reasonably stable since 1997 at around $0.5 billion a year for both residential and non-residential consents, which puts them at a fifth of all residential consents and a third of non-residential.
- **Non-building** consents are quite volatile but are relatively minor - generally well below ten per cent of the total consents; however, much non-building construction work is not subject to consents, and so its value is not captured here (but see section on heavy and civil engineering/infrastructure).

Figure 25: Building consent values by category, Auckland, 1991 - 2013



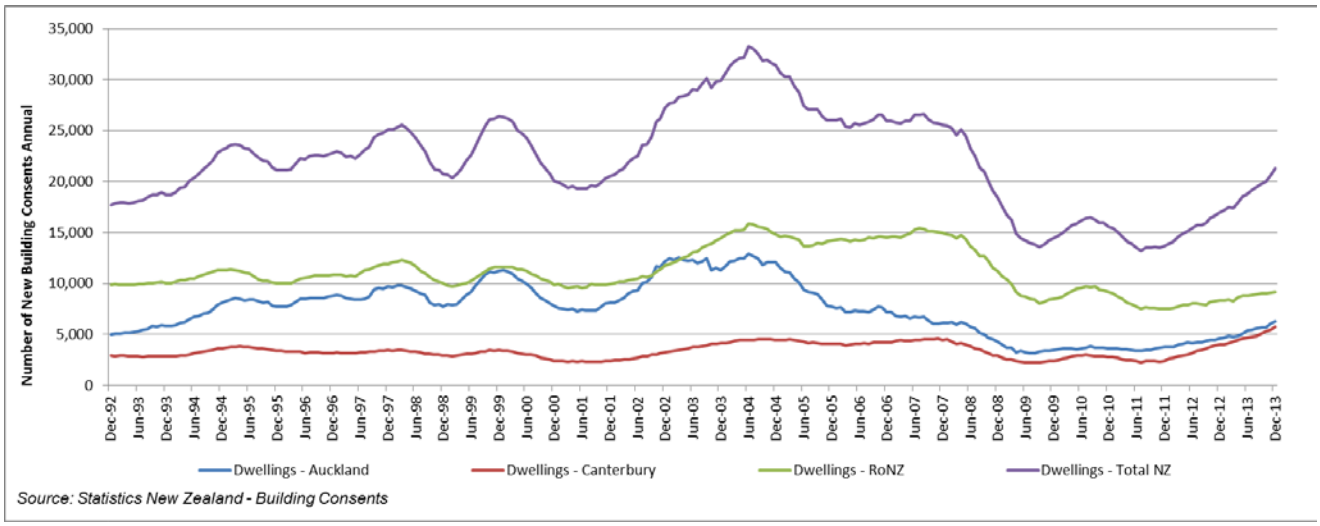
[38] All data in this section are Source: Statistics New Zealand

10.2 Residential building consent numbers by location

The number of new dwellings for which building consents were issued over the preceding 12 months for Auckland, Canterbury and the rest of New Zealand ("RoNZ") shows the following trends. (See Figure 26).

- From 1994 to 2002 the industry was cyclic with Auckland, Canterbury and the rest of New Zealand moving together; Auckland consent numbers were similar to the rest of New Zealand, more than double that of Canterbury.
- From 2003 to 2006 there was a boom and partial bust overall, although with only Auckland falling by 2005 to as low as 2001 trough levels; Canterbury and the rest of New Zealand had a net rise over the period.
- Then from 2006 to 2008 the industry was fairly flat, followed by another steep fall in 2008 and 2009 due to the GFC, to record low levels by the end of 2009.
- Since that crash there has been a bounce and now a modest recovery to pre-GFC levels for Canterbury (partly driven by earthquake related replacements) and (almost) Auckland, but the rest of New Zealand's recovery has been weaker, possibly reflecting lower population growth in the regions.
- The net result overall is that Canterbury is now at a record high of 5762 consents in the 12 months to December 2013, while Auckland (6309) and the rest of New Zealand (9229) are higher than Canterbury but have not yet recovered even to their trough levels of 2001, and are below their 1994-2007 levels.

Figure 26: Residential building consent numbers by location, 1992 - 2013



The growth in the different regions shows both similarities and differences, as follows.

- The Auckland residential (new dwelling) construction sector's strongest growth was over a 16 month period from 7,300 consents in the year ending September 2001 to 12,500 consents in the year ending January 2003 – a 70 per cent increase. This peak level of activity was sustained for three years, until March 2005.
- While Auckland was growing strongly (2001 to 2003), Christchurch and the rest of New Zealand were also growing, but much less strongly. After that, while Auckland maintained its

record high level of residential (dwelling) construction, Christchurch and the rest of New Zealand continued their modest growth rates.

- Christchurch's number of dwellings consented per year was well below Auckland's until 2004, when Auckland's rate began falling sharply and Christchurch's didn't; the gap had largely been closed by 2007 (well before the Christchurch earthquakes),
- Auckland and Christchurch new dwellings consented have moved largely in tandem since 2007. However, Auckland is growing from a higher base of existing dwellings, so its percentage growth rate of total dwelling stock has tended to be lower.

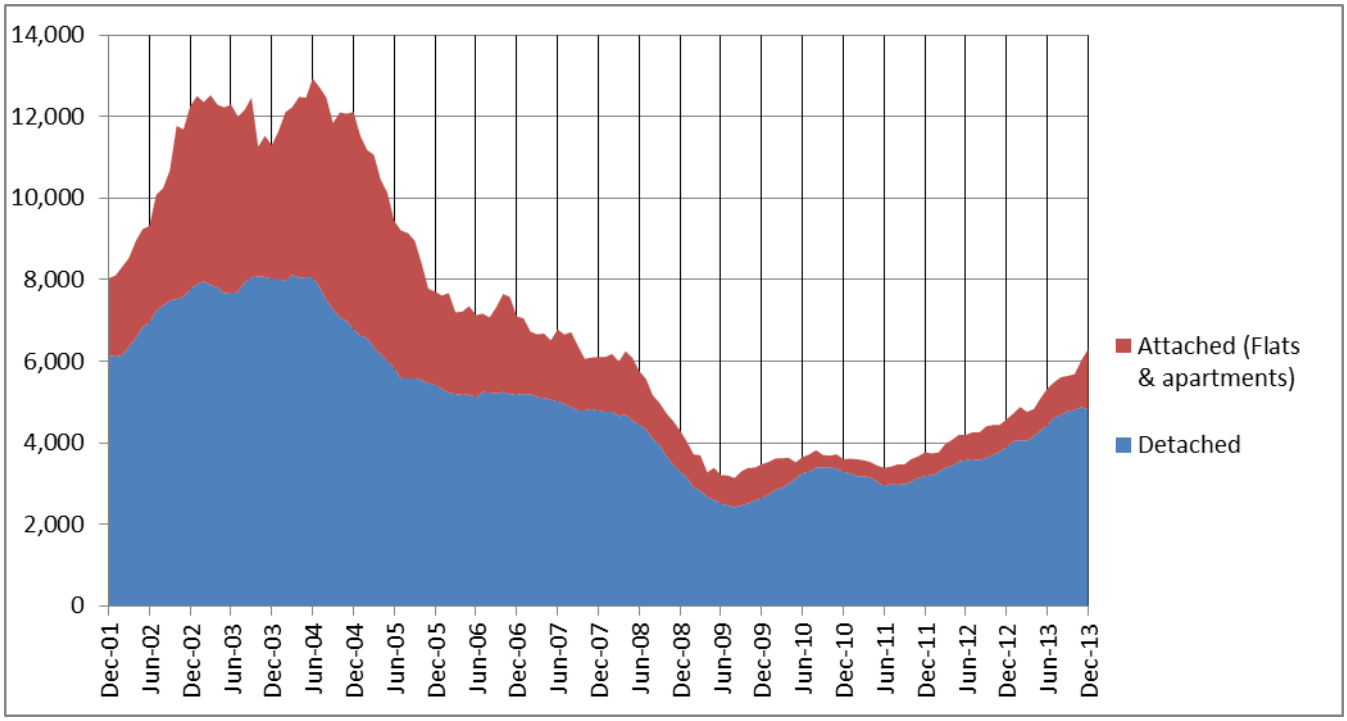
10.3 Attached and detached residential building consents

The number of attached compared to detached new dwellings for which building consents were issued in the preceding 12 months in Auckland shows the following trends. (See Figure 27).

- The huge growth in total dwellings consented from 2001 to 2002 was driven mainly by flats and apartments, which quadrupled; houses rose by less than 20 per cent. Consequently, attached dwellings' share of dwellings consented rose from a quarter (24%) in 2001, to over a third (37%) in 2002 and nearly half (44%) in 2004.
- The process then reversed with similar sharp declines in 2005, including a major drop in attached dwellings' share of the total (to 30%).
- This was followed by more gradual declines in 2006 and 2007, by which time attached dwellings comprised only a fifth (22%) of total dwellings consented.
- Attached dwellings then slipped even further in the wake of the global financial crisis, bottoming out at less than a tenth (8%) of the total in late 2010. (Although detached dwellings had an even greater fall in absolute numbers).
- Since then, attached dwellings have shown a strengthening recovery (1482 y/e December 2013), and now (y/e December 2013) constitute a quarter (24%) of the total; this is still below the overall average share from 2001 to 2013 (28%).

If new dwellings are undergoing a cyclic increase, then the experience of the previous boom might suggest a future increase in the proportion of attached dwellings. Reinforcing this trend, the proportion of dwellings being built in Auckland that are detached is anticipated to decline in future due to factors such as reductions in available sites, increasing land prices and the Proposed Auckland Plan enabling more intensive options.

Figure 27: New dwellings consented by building type, Auckland, 2001 - 2013

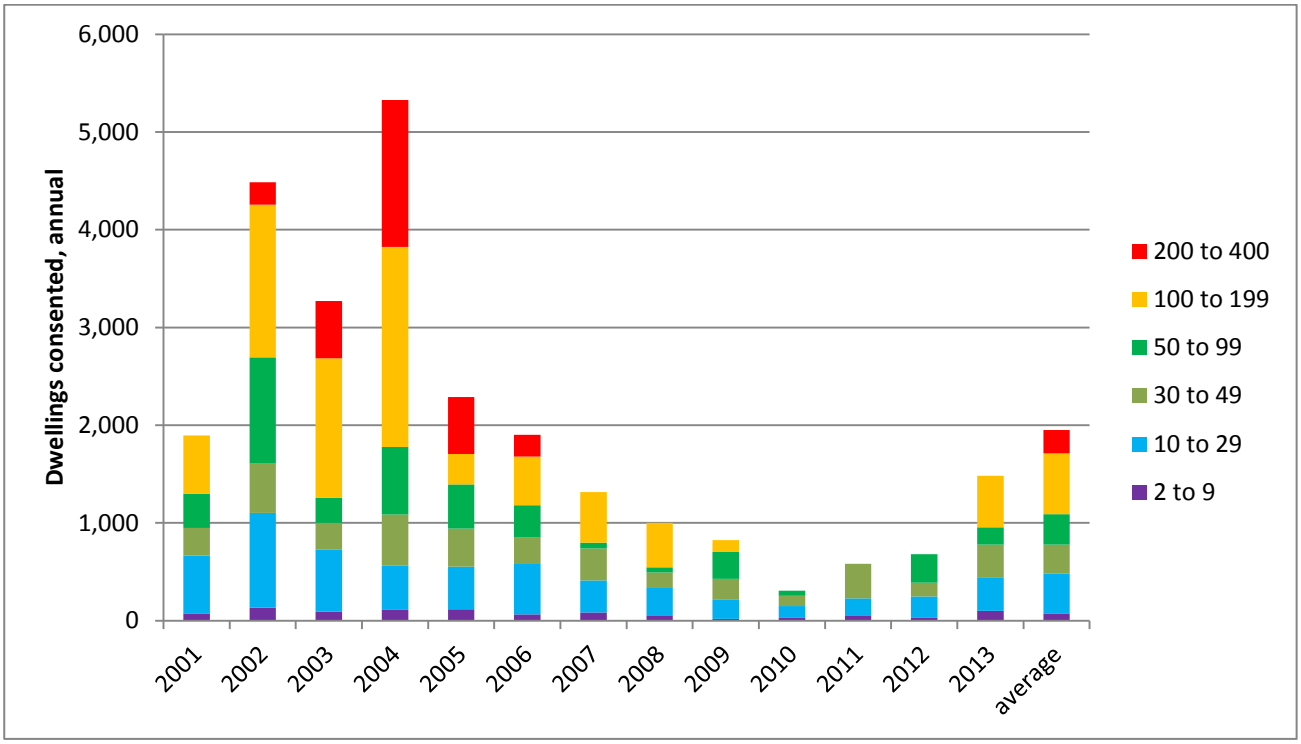


10.4 Attached residential consents by building size

The number of new dwellings for which building consents were issued for flats and apartments, shows different trends from 2001 to 2013 depending on the number of dwellings in the building, with larger blocks being more volatile than smaller blocks as follows. (See Figure 28).

- **Large blocks (100 to 199 dwellings, plus 200 to 400 dwellings)** had a major boom from 2002 to 2004, when they provided the vast majority of new flats and apartments. Their market collapsed in 2005, and disappeared entirely by 2010. In 2013 they began a recovery, and already (y/e December 2013) provide over a third (35%) of all new attached dwellings.
- **Larger intermediate sized blocks (30 to 49 dwellings, plus 50 to 99 dwellings)** have generally been less volatile than large blocks; from 2001 to 2013 on average they provided nearly a third (31%) of all new attached dwellings, although from 2009 to 2012 their share was over half (58%).
- **Smaller intermediate sized blocks (10 to 29 dwellings)** provide the highest share of detached dwellings (21% average) relative to the small size and narrow range of the category; their share fell to a tenth (9%) in 2004 during the boom, and peaked at two fifths (39%) in 2010 during the trough after the GFC, due to being less volatile than the larger blocks.
- **Small blocks (2 to 9 dwellings)** have always been relatively stable in terms of number of dwellings (and to a lesser extent, share of detached dwellings); they provide only a tiny proportion of total new attached dwellings, due to the small size and narrow range of the category.

Figure 28 Attached dwellings consented by building size, Auckland, 2001-2013



11.0 Infrastructure

The Heavy and Civil Engineering Construction sub-sector is primarily driven by infrastructure spending such as roading and utilities networks, which also generates demand for Engineering Services. Annual capital expenditure on infrastructure in Auckland is currently $3.36 billion (y/e June 2013).[39]

11.1 Infrastructure forecasts

Annual capital expenditure on infrastructure in Auckland is forecast to increase from $3.36 billion in 2012/13 to $4.14 billion in 2016/17, a total increase of $0.8 billion (23%) in four years. Main drivers of the increase are transport ("roading") (+$591m) and "three waters" (water supply, wastewater and stormwater) (+$323m); some categories fall slightly. By 2021/22 the forecast annual spend reaches $4.58 billion, giving a ten-year total of $40.8 billion. Note however that these figures (based on the 2011 Long-term Plan ("LTP")), do not include the CBD rail loop or infrastructure needs in the outer RUB (Rural Urban Boundary) areas, for which data will be developed in the forthcoming 2015 LTP and will increase the totals in the above categories.

Infrastructure investment currently constitutes a significant share of Auckland's GDP[40] (4.4%), and will drop only slightly (to 4.3%) over the ten years to 2021/22. Nationally, infrastructure is currently a higher share (5%) than for Auckland, but the ten year average is lower (4.1%). Consequently, over the ten years Auckland has a 38% share of national infrastructure investment, slightly higher than its share of national GDP and population, but lower than its expected share of the country's population growth, which is projected to be around 60 per cent[41].

The main components of future investment are the following. (See Figure 29).

- Half of Auckland's forecast infrastructure spending will be on "roading" (49%), a quarter (26%) on "three waters" (water supply, wastewater and stormwater), and most of the rest (21%) on electricity and telecommunications networks.
- The largest single item is Western Ring Route SH20 roading (Waterview): $1.4 billion from 2012 to 2018; AMETI roading projects are also substantial ($0.7 billion dollars).
- Council is the largest single infrastructure investor at $15.2 billion (37% of the total), largely comprising roading (23%) and three waters (14%). Watercare's spending (a council controlled entity), for the remainder of three waters, is also substantial (12%).

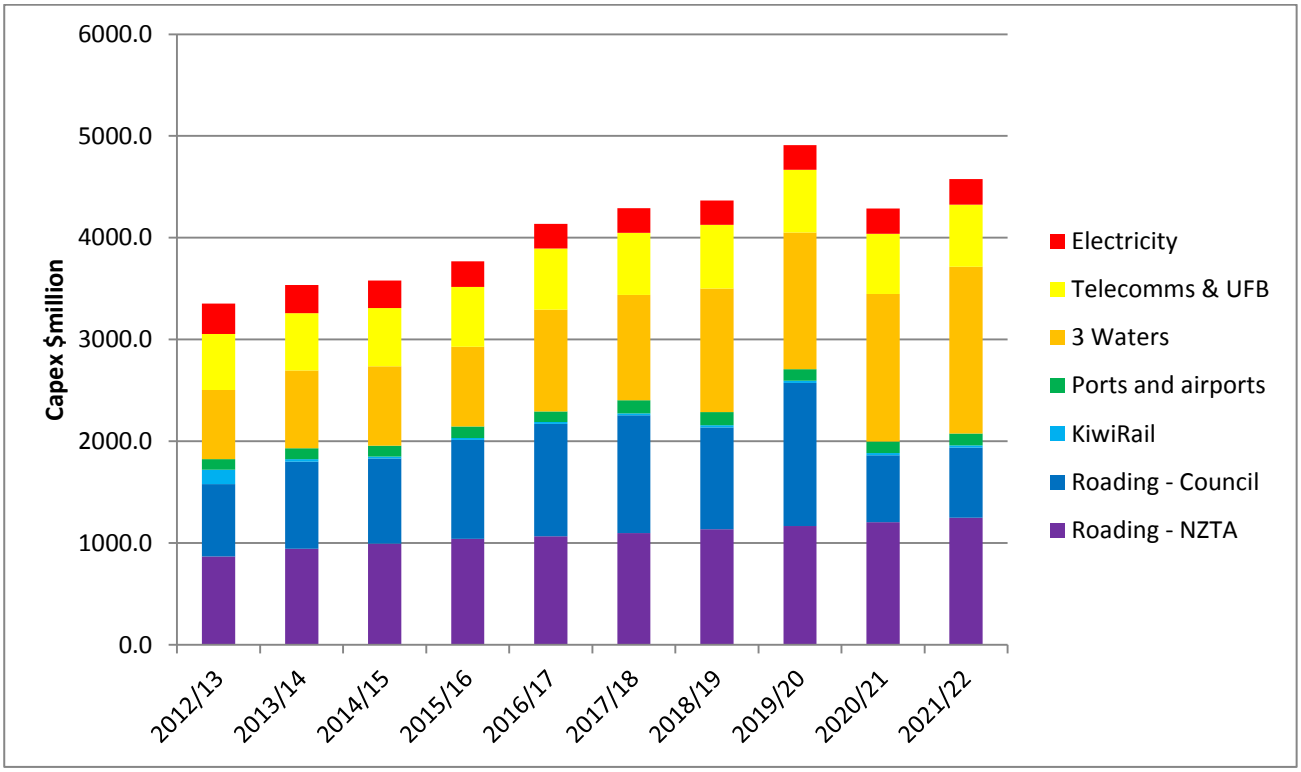
These figures do not include the CBD rail loop ($3.0 billion), due to uncertainty regarding the final specifications of the project; if included, it would constitute a fourteenth (7%) of total infrastructure spending over the period, and a much higher share in the years in which it occurred. Similarly, the proposed additional Waitemata Harbour crossing (SH1) could add from $3.9 billion (road bridge) to $6.9 billion (tunnels including rail) but is not yet confirmed; the northern busway extension ($0.8 billion) is also excluded, but is unlikely before 2021.

[39] All data in this section are Source: Infometrics, 2013. *Regional infrastructure survey 2013-2022.*

[40] But note that investment is a total expense including imports and other purchases as well as value added.

[41] Source: Statistics New Zealand, 2012. *Subnational Population Projections.*

Figure 29: Infrastructure capital expenditure by type, Auckland, y/e June 2013-2022



12.0 Conclusion

Auckland's construction and engineering sector is a major source of employment for the region, but with a disproportionate share in small businesses and self-employed. The sector makes a major economic contribution, but has long-standing productivity issues that show no sign of solution. The construction sector suffered a massive shock to capital productivity from 1986 to 1992, from which it has never even begun to recover, and labour productivity has only just managed to recover after 20 years. The sector's workforce is largely male and tends to be less qualified, but still requires some skills, and there are signs that a skill shortage may be looming as demand increases.

Input costs have tended to rise only slightly faster than the rest of the economy over the long-term, but there was a sharp rise during the 2004 – 2007 boom, which continues to put modest pressure on housing affordability. There is a strong likelihood that construction and engineering in Auckland is now suffering from competition for resources from Christchurch's rebuilding activities.

The sector faces extremely volatile demand, but in value terms (for GFCF) there is a strong underlying up-trend at the national level, especially for buildings. At the Auckland level, residential building consents are surging by value, and look to be at the mid-point of a cyclical upswing. Residential Building Construction already has more employees now than it did in 2001, as does the construction and engineering sector as a whole. However, numbers of dwellings consented are still below the levels achieved from 1994 to 2007, presumably due to an increase in the size and quality of dwellings coupled with the fall in Auckland's share of national activity after 2004. Large apartment block projects are particularly volatile and had disappeared altogether after the GFC, but are now re-emerging.

Looking ahead, expansion of the construction and engineering sector, especially apartments, will be crucial for achieving the Auckland Plan goals of greater access to affordable housing, as well as keeping up with pressures from anticipated growth arising from migration and natural increase. Not only are more dwellings required, but also more non-residential buildings such as shops, offices and factories for the growing population, as well as the accompanying infrastructure. Auckland's forecast infrastructure spending is significant, especially by Council and for roading and water.

In the medium term, Auckland's economy will need to devote more resources than ever to residential building construction, but there will be constraints on the extent to which this can draw on resources from other types of construction or other regions of the country.

13.0 Appendix 1: Sector definition

The construction and engineering sector is defined by Auckland Council as comprising all of the enterprises in Division E “Construction” in Statistics New Zealand’s ANZSIC 2006 classification system, namely Subdivisions E30 Building Construction, E31 Heavy and Civil Engineering Construction and E32 Construction Services, plus the construction and engineering related categories of Group M692 Architectural, Engineering and Technical Services.

Table A1 shows the 3-digit Groups **(in bold)** that are included in the sector, the 5-digit categories that they contain, and gives some examples of the products or services they are involved with.

The sector can only be defined to the 5-digit level, because that is as fine as ANZSIC can go, so some activities will be included that are not strictly construction related.

- In particular, the sector includes all of M69220, so captures some mining and oceanographic surveying and mapping services.
- The sector also includes Group M69230, because it contains consulting services for civil engineering, geo-technical and construction, but then it must also take in chemical, industrial and marine engineering.
- The sector excludes the remainder of M692 because they have no direct relation to construction, namely:
    - M69240 Other Specialised Design Services
    - M69250 Scientific Testing and Analysis Services.

Table A1 Construction and engineering sector definition by 3- and 5-digit sub-sectors

Code	ANZSIC 2006 sub-sector	ANZSIC code includes	ANZSIC code excludes
E301	**Residential Building Construction**		
E30110	House Construction	Garages, prefab assembly, alterations	Semi-detached, offsite prefabricating
E30190	Other Residential Building Construction	Flats, apartments, semis, retirement village units	Hotels, nurse-homes
E302	**Non-Residential Building Construction**		
E30200	Non-Residential Building Construction	Alterations, prefab assembly	offsite prefabricating
E310	**Heavy and Civil Engineering Construction**		
E31010	Road and Bridge Construction	At grade parking	Tunnels (E31090), specialists e.g. E322
E31090	Other Heavy and Civil Engineering Construction	Tunnels, cables, pipes	Specialists (E321, E322, E323, E324, E329)
E321	**Land Development and Site Preparation Services**		
E32110	Land Development and Subdivision	Excavation for servicing	Road sub-contractor
E32120	Site Preparation Services	Trenches, clearance, earthmove	Quarrying
E322	**Building Structure Services**		
E32210	Concreting Services	Foundations, footpaths, kerbs	Terrazzo, brick paving
E32220	Bricklaying Services	Stonework, concrete block	Brick paving (E32910)
E32230	Roofing Services	Painting, coating	Gutter, truss, insulation
E32240	Structural Steel Erection Services	Components for buildings, Bridges, towers, cranes	Construction of complete structures
E323	**Building Installation Services**		
E32310	Plumbing Services	Gas, drains, guttering	Drainage systems
E32320	Electrical Services	TV antenna, telecom cable	Transmission lines
E32330	Air Conditioning and Heating Services	Refrigeration, coolroom	Industrial furnaces
E32340	Fire and Security Alarm Installation Services	CCTV, sprinklers	monitoring
E32390	Other Building Installation Services	Insulation, lifts, curtains	n/a
E324	**Building Completion Services**		
E32410	Plastering and Ceiling Services	Cement rendering	n/a
E32420	Carpentry Services	Floors, trusses, cabinets	Offsite prefab
E32430	Tiling and Carpeting Services	Floor prep & coverings	Roof tiles, wood flooring
E32440	Painting and Decorating Services	Paint and wallpaper only	Roof painting or coating
E32450	Glazing Services	Window frames	Offsite prefab
E329	**Other Construction Services**		
E32910	Landscape Construction Services	Pave, fence, lawn, retaining wall, streetscape planting	Maintain garden or lawn, landscape design
E32920	Hire of Construction Machinery with Operator	Cranes	Earthmoving equipment
E32990	Other Construction Services n.e.c.	Scaffold, Metal wall cladding or waterproofing of buildings	n/a
M692	**Engineering Services (part of Architectural, Engineering and Technical Services)**		
M69210	Architectural Services	landscape design, town planning	Managing construction
M69220	Surveying and Mapping Services	Mining-, oceanographic-	Exploration for minerals
M69230	Engineering Design and Engineering Consulting Services	Civil-, chemical-, electrical-, industrial-, marine-, geo-tech-	Manufacturing, research, testing

14.0 Appendix 2: Sector SWOT analysis

The following SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) is taken from the Martin Jenkins 2012 report for ATEED[42]. The "construction and engineering sector" definition that they use is an exact match for this report's definition of the sector.

14.1 Overview

The major issues that appear to be impacting on the growth of the sub-sector in Auckland are:

- Volatility in demand which makes it difficult for businesses to build capability and capacity
- Low levels of foundation skills and poor labour productivity
- Low levels of engineering graduates and ongoing technical skill

The major opportunity for the sector appears to be based on increased domestic demand in Auckland and Christchurch.

14.2 Strengths

Capability in niche areas: New Zealand has strengths in one-off, customised and turn-key engineering project management and related services. Auckland has a small number of internationally competitive engineering businesses of reasonable scale.

14.3 Weaknesses

Recent low demand: Construction activity has been a notable area of weakness in the New Zealand economy over the last few years. The economic downturn has greatly affected residential building. The year ended July 2011 saw the lowest number of new dwelling consents lodged for any 12 consecutive months on record. Cautious spending, low [net] migration and increased household size have also reduced demand. There has been a decline in public investment and reduced office building has reduced demand from the non-residential market.

Productivity: The sector has low labour productivity and has seen a decline in labour productivity over the last 10 years, compared to small growth in most other sectors. However, the Building and Construction Productivity Partnership [a joint government and industry initiative] has been established to focus the industry on improving productivity in the sector over the next decade.

Skills: More than 35 per cent of workers in the sector leave secondary school with no qualifications, while 25 per cent of workers in the sector have no qualifications of any kind. Those who do hold a qualification are much more likely to hold a level four qualification or below, rather than a higher level qualification. The Adult Literacy and Life Skills Survey conducted in 2006 revealed that a large proportion of workers in the sector have low literacy skills (48 per cent) and low numeracy skills (52 per cent). There are long-term skill shortages across a range of occupations within the sector, and particular a lack of people with strong management and leadership capability.

Volatility: The construction sector is characterised by high volatility in employment and GDP compared to other sectors. In times of economic upswing, the sector suffers from capacity constraints, while in downturns, a far greater share of jobs is shed than in other sectors. The volatile cycles do not allow it to build and maintain capacity, or to plan more than a few years out. As a result, the construction sector is characterised by relatively high job turnover rates when compared to other sectors [which is presumably a key factor in the sector's productivity challenge].

[42] Martin Jenkins, 2012. *Auckland Tourism, Events and Economic Development Ltd (ATEED) sector engagement framework.*

14.4 Threats

Limits to offshore expansion: The construction sector is not quite yet global. It is difficult for construction companies to work or move offshore, due to different planning laws, building materials laws, and building regulations for different types of buildings [and also market preferences]. Project management for multiple locations and jurisdictions is difficult [and therefore tends to be specialised in each specific locality].

Skill shortages: New Zealand has less than half the number of engineering graduates than the OECD average. In terms of degree holders, the requirement [annual average] is for 1500 or 2000 graduates, up from the present 1230 graduates per year. In spite of the negative impact of the recession on the construction industry, many construction-related occupations appear on the New Zealand Immigration immediate and long-term skill-shortage lists. This is particularly the case for skilled occupations where workers are ageing. It is estimated that the slump in the construction industry has resulted in the largest net outflow of building-trades workers since 1980. The depletion of the skilled building workforce could undermine the ability of the construction industry to grow [which is a particular concern given looming increases in demand for residential construction in particular].

14.5 Opportunities

Domestic demand: There are significant demands facing the industry due to the Christchurch rebuild and Auckland infrastructure projects. There is increasing evidence that activity in the sector has turned and growth is expected. Investment in infrastructure remains a priority for the current government even with the move towards fiscal tightening.

It is estimated that there is around $7 billion in planned capital expenditure across the industry in Auckland over the next three years.

[In addition, subsequent to 2012 there has been increasing demand for residential and non-residential building development, as Auckland experiences ongoing strong natural increase from its young population, plus a large proportion of immigrants to New Zealand.]

Exports in niche areas: There is the potential to achieve increased value added and export activity from the high performing engineering design and engineering consulting services segment.

Find out more: phone 09 301 0101
email research@aucklandcouncil.govt.nz
or visit www.aucklandcouncil.govt.nz

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