

**The economic cost of suicide and suicide behaviour in the
Queensland Construction Industry**

A report conducted for Mates in Construction

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Executive summary

Background

Suicidal behaviour has gained recognition worldwide as a significant public health problem. In Australia, suicide is the leading cause of death for males aged 25-44 years and females aged 25-34 years. A death by suicide has ripple effects, impacting the lives of any number of individuals who inevitably suffer intense and conflicted emotional distress in response to a death of this kind. Given most suicides occur within people of working age, it is surprising that very little research has been conducted into the cost of suicide in the work-place or on the potential impact of work-place suicide prevention strategies.

Aim

The aim of the current study is to examine trends in, and costs of, suicide and suicide behaviour in the Queensland Construction Industry.

Method

Suicide data were obtained from the National Coronial Information System for the period 2001-2012. Occupational information was coded according to Australian standards with Construction Industry workers falling into three major groups: technicians and trades worker; machine operators; and, drivers and labourers. The analysis used a costing methodology endorsed by the National Occupational Health and Safety Commission and used in a recent Safe Work Australia report. Costs were derived for the year 2012 using an incidence based approach with future costs discounted to 2012 dollars.

Results

Over the period 2001-2012 there were a total of 506 fatalities by suicide in the Queensland Construction Industry, or an average of 42 fatalities per year. The average age of each suicide fatality over this time period was 36.7 years. In 2012 there were 36 fatalities by suicide among male Queensland Construction Industry workers. Using the World Health Organisation statistics on self-harm and suicide behaviour together with Safe Work Australia categories of severity, it is estimated that there were 92 self-harm attempts resulting in full incapacity and 448 self-harm attempts resulting in a short absence from work. Multiplying these numbers with

average cost per incident, results in an estimate of the cost of suicide and suicide behaviour in the Queensland Construction Industry at \$345 million in 2012, with 98% (\$338 million) of this cost borne by the Government.

Discussion

In undertaking this analysis a range of data, assumptions and methods were used. The focus has been on the human cost of suicide and suicide behaviour to the construction Industry. It has not considered the wider implications to the Industry in terms of damage to property, loss of company image or the considerable investment the Industry makes complying with work health and safety regulations. The results provide a conservative assessment of the cost associated with suicide and suicide behaviour in the Queensland Construction Industry. Given the significant cost of this largely preventable problem, more effort needs to be devoted to addressing mental health in the Construction Industry.

Introduction

Suicidal behaviour has gained recognition worldwide as a significant public health problem. In Australia, suicide is a leading cause of death with 2,522 deaths (aged over 15 years) in 2013 (1,885 male deaths and 637 female deaths), representing 1.5% of all deaths over the age of 15.¹ Most deaths by suicide are among people of working age with suicide being the leading cause of death for males aged 25-44 years and females aged 25-34 years.¹

A death by suicide has a flow-on effect, impacting the lives of any number of individuals – from family to friends, colleagues, clinicians, first responders, coronial staff, volunteers of bereavement support services and other associates – who inevitably suffer intense and conflicted emotional distress in response to a death of this kind.²⁻⁴ The combination of grief, guilt and remorse can remain for years and potentially, three to four generations can be bereaved.

To date, there has been limited research into the cost of suicide and suicidal behaviour to the construction industry. While being employed is associated with reduced risk of suicide overall, recent evidence suggests suicide rates are differentially distributed across industry and occupational groups. A recent review by Milner et al (2013) on suicide by occupation found a stepwise gradient in risk, with the lowest skilled occupations being at greater risk of suicide than the highest skill-level group.⁵ In a separate analysis using data from the National Coronial Information System (NCIS), Milner et al (2014) confirmed that this gradient also applies within the Construction Industry.⁶

The aim of the current study is to examine trends in, and costs of, suicide and suicide behaviour in the Queensland (QLD) Construction Industry.

Methods

Rates of suicide and suicide behaviour in the Construction Industry

Suicide data were obtained from the NCIS for the period 2001-2012. NCIS is a national internet based data storage and retrieval system for Australian coronial cases, established in 2001.^{7,8} NCIS is utilised by coroners, government agencies and researchers for identifying cases for death investigation, research and to monitor

external causes of death in Australia.⁷ Only males were included in this study as there were very small numbers of female suicides in the QLD Construction Industry, with resulting issues of confidentiality.

Occupational information was coded according to the Australian and New Zealand Standard Classification of Occupations (ANZSCO) (up to the 6-digit level) and the Australian and New Zealand Standard Industrial Classifications (ANZSIC), Division E.⁹⁻¹² Those in the Construction Industry were identified as being involved in the construction or demolition of buildings and other structures.¹² Occupations coded as being in the Construction Industry fell into three major ANZSCO groups: technicians and trades workers (ANZSCO 3); machine operators and drivers (ANZSCO 7); and, labourers (ANZSCO 8).¹¹ For consistency with Milner et al (2013),¹⁰ cases in higher skilled occupations such as construction managers (ANZSCO 1) and architects were excluded as their skills were considered more relevant to other ANZSIC categories such as Division M Professional, Scientific and Technical Services. Further detail on occupational coding can be found in Appendix 1.

Levels of severity of work-related incidents

The Safe Work Australia report created five mutually exclusive categories of severity to define the level of severity. These categories were based on definitions from the National Dataset for Compensation and were developed using incident severity and duration of absence. Severity can range from minor incidents involving little or no absence from work to fatalities (Table 1).

Table 1: Safe Work Australia categories of severity

Category label	Severity	Category Definition
Short absence	Less than 5 days off work	A minor work-related injury or illness, involving less than 5 working days absence from normal duties, where the worker was able to return to full duties
Long absence	Five days or more off work and return to work on full duties	A minor work-related injury or illness, involving 5 or more working days and less than 6 months off work, where the worker was able to return to full duties
Partial incapacity	Five days or more off work and return to work on reduced duties or lower income	A work-related injury or illness which results in the worker returning to work more than 6 months after first leaving work
Full incapacity	Permanently incapacitated with no return to work	A work-related injury or disease, which results in the individual being permanently unable to return to work.
Fatality	Fatality	A work-related injury or disease, which results in death.

Source: Safe Work Australia, 2012¹³

The World Health Organisation estimates that between 20% - 30% of the workforce will suffer from serious a mental health problem and for every employee who dies by suicide, another 10-20 will make a suicide attempt (17% resulting in a permanent disability and 83% no disability).¹⁴ These statistics are supported by research in Australia.^{4,8,9} In this analysis, for every 15 suicide attempts there is one fatality, and from the 15 attempts, 3 (17%) are classified as full incapacity and 12 (83%) classified as short absence. Corresponding duration of absence (for use in calculation of production disturbance costs) are 0.2 weeks for short absence; and, 2.6 weeks for full incapacity and fatality.

Estimating cost of self-harm and suicide in the Queensland Construction Industry in 2012

In 1995, the Industry Commission developed a methodology to examine the direct and indirect cost of work-related incidents.¹⁵ The Industry Commission methodology was further refined based on the recommendations of independent reviews^{16,17} Further revisions were made to the methods in a 2004 report undertaken by the National Occupational Health and Safety Commission¹⁸ and a 2012 report by Safe Work Australia.¹³ This updated method is used in the current analysis to provide an estimate of the cost of self-harm and suicide in the QLD Construction Industry.

Although a full explanation of methods is available in the 2012 Safe Work Australia report,¹³ it is important to consider key issues. Both direct and indirect costs were considered for a range of economic agents (including employers, workers and the government) and by severity of injury. The average cost associated with each category were combined with estimates of suicide and self-harm incidents by QLD Construction Industry workers to produce an estimate of total costs. The classification structure for economic costs is based on six conceptual cost groups: production disturbance costs; human capital costs; medical costs; administrative costs; transfer costs; and, other costs (Table 2). A summary of the key parameters, assumptions and data sources for cost items is provided in Appendix 2.

Production disturbance costs

Production disturbance costs reflect short term impacts until production is returned to pre-incident levels and includes the value of lost production and staff turnover costs. Value of lost production is measured by combining average duration of absence (by severity category)¹³ with male average weekly earnings (AWE) for QLD.¹⁹ Cost of overtime reflects the proportion of overtime related to work-related injuries and wage of workers that would not be required if there were no injury. Overtime is valued by combining AWE with duration of absence (by severity category) and adjusting by 0.4.¹⁹ The cost of replacing existing staff affected by work-related incidents is equivalent to six weeks of AWE; and the cost of training new staff in the event of a full incapacity or fatality is equivalent to 2.5 weeks of AWE.¹⁹ Tax losses due to foregone income are valued using tax rate of 22%.²⁰

Human capital costs

This analysis uses the human capital approach to costing. Human capital costs consider the long run costs, such as loss of potential output, occurring after a restoration of pre-incident production levels.¹³ They are calculated as a residual between total human capital loss and deadweight loss to society from taxation redistributions.

For full incapacity or fatality, human capital costs are measured by considering the value of potential future earnings from time of injury to retirement age (i.e., <65years)

assuming a discount profile and productivity loss. The discount profile considers the likely changes in the value of money over time by including the opportunity cost of saving (4.1%)²¹ and the rate of inflation (2.8%).²² A productivity factor of 1.6% is applied to reflect long term increases in AWE above the prevailing wage inflation rate.²³

NCIS data are used to identify the average age of suicide over the period 2001-2012 for construction workers used in this analysis (technicians / trades workers, machine operators / drivers, labourers). The average age of suicide is used as a proxy for the average age of a full incapacity case. For full incapacity, future earnings also include the average social welfare payments received since these contribute to post-injury income. These costs are borne by the government through the disability support pension – equivalent to \$816 per fortnight (in 2012 dollars).²⁴ The average life expectancy of a male in QLD was 80.1 years in 2012.²⁵ It is assumed that an incapacitated person will receive the disability support pension from time of incident until average age of death. Further, it is assumed the fully incapacitated and deceased never return to work and the full cost is borne by the government in terms of lost income and tax revenue. These assumptions are consistent with those used in the Safe Work Australia report.²⁵

Medical costs

Medical costs are expenses incurred by workers and the community through medical treatment. Average medical costs for three severity levels were obtained from Safe Work Australia: \$500 per short absence; \$13,375 per full incapacity case; and, \$2,930 per fatality.^{13,26} In all work-related incidents involving medical care, the employer covers the first \$500, employers contribute 15% of the difference (if any), with the government accounting for the remainder.

Administrative costs

Administrative costs included in this analysis are investigation costs, travel costs and funeral costs. Investigation costs consider the costs of investigating an incident and the administrative cost of collecting and reporting information on work-related incidents. Average investigation costs by severity are sourced from Safe Work Australia: \$28 per short absence; \$2,374 per full incapacity case; and \$2,840 per

fatality.^{13,26} It is assumed that government investigation costs would be equal to the cost borne by the employer. Travel costs represent expenses for travel to doctors, rehabilitation centres, solicitors etc, \$4 per short absence and \$730 per full incapacity case.^{13,26} For full incapacity cases, the government is assumed to match travel expenses 1–1 with the individual, in effect assuming a 50% travel concession for full incapacitated workers. Funeral costs are estimated at \$4,000 and borne entirely by the worker (family).^{13,26} It is acknowledged that funeral costs may be associated with all deaths, fatality by suicide brings these costs forward.

Other costs

Other costs included in this analysis are cost of carers and aids/modifications for full incapacity cases and the cost of postvention services for fatalities. Postvention is a psychological first aid, crisis intervention, and other support offered after a suicide to affected individuals or the work-place as a whole to alleviate possible negative effects of the event.³ The Department of Human Services value disability support for carers at \$3,203 per annum and support for aids and modifications at \$913 per annum.^{13,26} The total of these payments is discounted to present value terms.

A fatality by suicide has a flow-on effect, impacting the lives of any number of individuals, from family to friends, colleagues, clinicians, first responders, coronial staff, volunteers of bereavement support services and other associates, who inevitably suffer intense and conflicted emotional distress in response to a death of this kind. Research suggest that each fatality by suicide impacts directly on six to twenty people.² The economic cost associated with suicide bereavement has been estimated at \$14,058.²⁷ Evidence from an Industry source suggests that each fatality by suicide may be witnessed by on average three colleagues that would then require counselling and time off work as part of postvention care. These costs are estimated at \$10,000 per worker from time of incident to return to full duties. This assumption is consistent with other attempts to measure ripple effects of suicide. However, the assumption is conservative as it only considers the impact on workers and not families or friends.^{4,5,9}

Transfer costs

The redistribution of public sector resources to care for incapacitated person incurs deadweight costs on society - for every dollar of tax raised, about 28.75 cents is absorbed in the distortions induced and the administration of the tax system. In this analysis the deadweight loss is measured as the value of taxation receipts foregone, equivalent to 28.75 cents in every foregone tax dollar.²⁸

Incidence based approach to costing

Consistent with the Safe Work Australia report, the methodology used in this analysis is based on an incidence based approach. The incidence based approach allows a better estimate of the economic cost, since it allows the future costs for new cases to be followed over the expected lifetime of the case. This approach is known as the lifetime cost approach, and provides an indicator of the benefits of reducing work-related incidents. The costs that an injury imposes in future years are discounted to present values, i.e., constant 2012 dollars in this analysis. The lifetime cost approach assumes the levels and structures of current costs accurately reflect future costs.

A further assumption made in the Safe Work Australia report and, carried over to this report, is that the methodology is based on an *ex-post* approach in which costs are attributed to incidents after they occur and as a direct result of the incident. The nature of the compensation-based data, on which the Safe Work Australia report is based, lends itself to an *ex-post* estimation process. The current and future costs associated with each case can be assigned individually (since the number of cases and the nature of each case is known), and the total cost estimated by aggregating the cost of each case and/or cost component from the bottom-up.

Table 2: Economic cost borne by the employer, worker and government

Conceptual group	Cost item	Employer	Worker	Government
Production disturbance costs	Value of lost production	Overtime premium and value of wages paid while away from work	Zero	Zero
	Staff turnover costs	Staff turnover costs	Zero	Zero
Human capital costs	Net present value of lost earnings	Zero	Zero	Loss of income & welfare payments transferred to worker for loss of wage minus deadweight loss associated with tax revenue forgone
Medical costs	Medical and rehabilitation costs	Threshold medical payments	Gap payments	Medical payments not covered by employer or worker
Admin. costs	Investigation costs	Employer investigation costs	Zero	Costs of running the compensation system (including investigation claims)
	Travel costs	Zero	Out of pocket expenses	Compensation for travel costs
	Funeral costs	Zero	Out of pocket expenses	Zero
Other	Carers	Zero	Zero	Payments to carers
	Aids, equipment & modifications	Zero	Zero	Reimbursements for aids, equipment & modifications
	Postvention	Postvention	Zero	Postvention
Transfer costs	Deadweight costs of tax revenue foregone	Zero	Zero	Deadweight costs of tax revenue foregone

Results

Rates of suicide among QLD Construction Industry workers

The number of number of suicides deaths in the Queensland Construction Industry workers over the period 2001-2012 is provided in Table 3. Over the period 2001-2012 there were a total of 506 fatalities by suicide, or an average of 42 per year. These data show considerable variation in the number of deaths and average age of death each year. Over the entire period, the average age of each suicide fatality among QLD Construction Industry workers was 36.7 years.

Table 3: Number of suicide deaths and average age, QLD Construction Industry, 2001-2012

Year	Queensland	Average age
2001	39	36.4
2002	38	36.6
2003	36	38.4
2004	51	33.0
2005	41	33.6
2006	30	34.8
2007	49	36.4
2008	45	38.8
2009	43	40.2
2010	45	39.5
2011	53	36.5
2012	36	36.2

Average cost of suicide and suicide behaviour in the QLD Construction Industry in 2012

Table 4 provides an overview of the average cost associated with self-harm and suicide incidents in the QLD Construction Industry in 2012 dollars. Each incident involving a short-term absence is estimated to cost \$916 with the employer accounting for 69% (\$630) of this cost. Each self-harm attempt resulting in full incapacity is estimated to cost \$2.88 million with the government accounting for 98% (\$2.84 million) of this cost. Each suicide attempt resulting in a fatality is estimated to cost \$2.24 million with the government accounting for 97% (\$2.16 million) of this cost. The key cost driver in both full incapacity cases and a fatality is lost income (and taxes) and, for full incapacity only, the additional cost of welfare payments. Given the average age of suicide is 36.2 years in QLD in 2012, this equates to a loss of 28.8 years (65 years – 36.2 years) in potential productive employment.

Table 4: Average cost per work-related incident, 2012 dollars

	Employer	Worker	Government	Total
Short absence				
Production disturbance costs	\$102	\$0	\$254	\$356
Human capital costs	\$0	\$0	\$0	\$0
Medical costs	\$500	\$0	\$0	\$500
Administrative costs	\$28	\$4	\$28	\$60
Other	\$0	\$0	\$0	\$0
Transfer costs	\$0	\$0	\$0	\$0
Total	\$630	\$4	\$282	\$916
Full incapacity				
Production disturbance costs	\$37,519	\$0	\$3,302	\$40,821
Human capital costs	\$0	\$0	\$2,604,862	\$2,604,862
Medical costs	\$500	\$1,931	\$10,944	\$13,375
Administrative costs	\$3,302	\$934	\$2,739	\$6,974
Other	\$0	\$0	\$84,222	\$84,222
Transfer costs	\$0	\$0	\$130,664	\$130,664
Total	\$41,320	\$2,865	\$2,836,733	\$2,880,919
Fatality				
Production disturbance costs	\$37,519	\$0	\$3,302	\$40,821
Human capital costs	\$0	\$0	\$1,935,171	\$1,935,171
Medical costs	\$500	\$365	\$2,066	\$2,930
Administrative costs	\$3,798	\$4,569	\$2,870	\$11,236
Other	\$30,000	\$0	\$84,348	\$114,348
Transfer costs	\$0	\$0	\$130,664	\$130,664
Total	\$71,816	\$4,933	\$2,158,421	\$2,235,170

Total cost of suicide and suicide behaviour in the QLD Construction Industry in 2012

In 2012 there were 36 fatalities by suicide among male QLD Construction Industry workers (skilled trades and machine operators/labourers). Using the World Health Organisation statistics on self-harm and suicide behaviour, suggests there were 92 self-harm attempts resulting in full incapacity and 448 self-harm attempts resulting in a short absence from work. Multiplying these numbers with average cost per incident (Table 4), suggest that the cost of suicide and suicide behaviour in the QLD Construction Industry is \$345 million in 2012 (Table 5). Ninety-eight percent (\$339 million) of this cost is borne by the Government.

Table 5: Cost of suicide and suicide behaviour among QLD Construction Industry workers, 2012

	Employer	Worker	Government	Total
Short absence				
Production disturbance costs	\$45,541	\$0	\$113,852	\$159,392
Human capital costs	\$0	\$0	\$0	\$0
Medical costs	\$224,100	\$0	\$0	\$224,100
Administrative costs	\$12,550	\$1,793	\$12,550	\$26,892
Other	\$0	\$0	\$0	\$0
Transfer costs	\$0	\$0	\$0	\$0
Sub-total	\$282,190	\$1,793	\$126,401	\$410,384
Full incapacity				
Production disturbance costs	\$3,444,222	\$0	\$303,147	\$3,747,369
Human capital costs	\$0	\$0	\$239,126,348	\$239,126,348
Medical costs	\$45,900	\$177,289	\$1,004,636	\$1,227,825
Administrative costs	\$303,094	\$85,702	\$251,440	\$640,236
Other	\$0	\$0	\$7,731,580	\$7,731,580
Transfer costs	\$0	\$0	\$11,994,961	\$11,994,961
Sub-total	\$3,793,215	\$262,991	\$260,412,112	\$264,468,319
Fatality				
Production disturbance costs	\$1,350,675	\$0	\$118,881	\$1,469,557
Human capital costs	\$0	\$0	\$69,666,151	\$69,666,151
Medical costs	\$18,000	\$13,122	\$74,358	\$105,480
Administrative costs	\$136,716	\$164,469	\$103,320	\$404,505
Other	\$1,080,000	\$0	\$3,036,528	\$4,116,528
Transfer costs	\$0	\$0	\$4,703,906	\$4,703,906
Sub-total	\$2,585,391	\$177,591	\$77,703,145	\$80,466,127
Total	\$6,660,797	\$442,374	\$338,241,659	\$345,344,830

Discussion

The purpose of this study has been to examine trends in suicide rates and quantify the economic cost of suicide and suicide behaviour among QLD CI workers.

In undertaking this analysis a range of data, assumptions and methods were used. The focus has been on the human cost of suicide and suicide behaviour to the Construction Industry. It has not considered the wider implications to the Industry in terms of damage to property, loss of company image or the considerable investment the Industry makes complying with work health and safety regulations.

The analysis relied on the best available evidence and used NCIS data to identify fatalities by suicide in the CI. Data were, however, available for males only.

Although males represent the majority of construction workers and have higher rates

of suicide than females, the results will, nevertheless, be an underestimate of the true cost of suicide and suicide behaviour. National standards were used to classify CI workers with a focus on technicians, tradesmen, machine operators, drivers and labourers. However, these standards are not perfect and when matched with NCIS, certain construction-related employees such as managers and/or other professionals were omitted.

As highlighted in the Safe Work Australia study,¹³ economic costing is not an exact science. Cost estimates depend on the particular costing approaches used, the range of cost components that can be estimated, the quality of available data and the value of key parameters. Assumptions relating to the values of key parameters in this study have been chosen to be deliberately conservative. This study has closely followed the methodology adopted by Safe Work Australia which had been endorsed by the National Occupational Health and Safety Commission.¹³ However, certain methodological variations were required to suit this study and to add value to the Safe Work Australia report. For example, unlike the Safe Work Australia report, this analysis included postvention costs associated with suicide bereavement and counselling. Evidence suggest that postvention costs are significant to both the community and the industry and failure to include these costs would underestimate any cost estimate.^{3,27,29}

World Health Organisation guidance on the relationship between suicide and suicide behaviour has been used to identify the relationship between fatality by suicide, self-harm resulting in full incapacity and self-harm resulting in only a short absence from work.¹⁴ These relationships have also been supported by Suicide Prevention Australia²⁹ and evidence from the Australian National Survey of Mental Health and Wellbeing.³⁰ Data from the United States suggests that this relationship is closer to 25:1 (not 15:1 as used in this analysis). Where appropriate we have matched severity of injury using categories developed by Safe Work Australia using national compensation data.^{13,26} This analysis, however, used three out of the five possible categories excluding long absence and partial incapacity. Our assumption that the majority of self-harm cases return to work after a short absence may underestimate the true prevalence of self-harm incidents that belong in either of these other two

categories, hence underestimating the true cost of suicide behaviour to the Construction Industry.

Our costing methodology, consistent with the Safe Work Australia approach,¹³ adopts an incidence based approach. The incidence based approach is more appropriate for comparative economic analyses. The alternative prevalence based approach assesses the number of people within the system at a given point in time, regardless of when the injury occurred. Under this approach, costs are generally allocated in a top-down manner, where total expenditures for a given year are proportioned across the identified categories of injury or illness.³¹ While the prevalence approach to measuring total cases would provide the best estimate of total costs, since costs would be estimated over the total number of cases currently in the system at a given point during the reference year, it is difficult to obtain accurate prevalence data relating to occupational injury. Using inaccurate or incomplete prevalence data is likely to result in an underestimate of the number of cases and therefore produce an underestimate of total costs.¹³

In spite of these methodological challenges the results provide a conservative assessment of the cost associated with suicide and suicide behaviour in the QLD Construction Industry for the year 2012. Each incident involving a short-term absence is estimated to cost \$916; each self-harm attempt resulting in full incapacity is estimated to cost \$2.88 million; and each suicide resulting in a fatality is estimated to cost \$2.24 million. The average age of a suicide death in 2012 was 36.2 years, equating to a loss of 28.8 years in potential productive employment. Multiplying these estimates with the number of self-harm and suicide incidents results in a cost of \$345 million with 98% of this cost borne by the Government.

According to the World Health Organisation and Suicide Prevention Australia, suicide is mostly preventable, yet significant gaps exist in our understanding of the relationship between work and suicide thereby limiting prevention efforts.^{14,29} If employers were more aware of the economic consequences of the impact of mental disorders on their employees, the work-place could provide an ideal setting for mental health promotion and prevention.

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Appendix 1: Industry and occupational definitions

Industry definition

Source: ABS (2006). *Australian and New Zealand Standard Industrial Classification (ANZSIC)*.

Canberra: ABS.

The Construction Division (E) includes units mainly engaged in the construction of buildings and other structures, additions, alterations, reconstruction, installation, and maintenance and repairs of buildings and other structures.

Units engaged in demolition or wrecking of buildings and other structures, and clearing of building sites are included in Division E Construction. It also includes units engaged in blasting, test drilling, landfill, levelling, earthmoving, excavating, land drainage and other land preparation.

The industries within this division have been defined on the basis of their unique production processes. As with all industries, the production processes are distinguished by their use of specialised human resources and specialised physical capital. Construction activities are generally administered or managed at a relatively fixed place of business, but the actual construction work is performed at one or more different project sites.

This section contains the following subsection:

- Subdivision 30 Building Construction
- Subdivision 31 Heavy and Civil Engineering Construction
- Subdivision 32 Construction Services

Occupations we included in construction (per industry coding)

1. Building Construction (residential and non-residential building construction)
 - House construction, alteration or renovation
2. Heavy and Civil Engineering Construction, e.g:
 - Construction of roads, bridges, railway tracks, mine sites, dams, swimming pools
 - Structural steel construction workers 8217 (eg rigger, scaffolder)
 - Structural steel trades, e.g. metal fabricators, boiler makers, welders.
3. Construction Services
 - *Land development and site preparation, e.g:*
 - Earthmoving, excavating
 - *Building structure services, e.g:*
 - Concreting
 - Bricklaying
 - Roofing
 - Structural steel erection services eg metal storage tank or silo erection, reinforcing steel erection, welding, truss or joist work on construction projects
 - *Building installation services*
 - Plumbing services (including roof plumber)
 - Electrical services eg light, wiring and cable installation
 - Repair and maintenance of electrical wiring (note: repairing electrical appliances is not included in Construction Industry)
 - Air conditioning and heating services (e.g. air conditioning duct work installation)
 - Fire and security alarm installation services (e.g. fire alarm system, fire sprinkler, closed circuit video surveillance system installation, repair and maintenance of fire or security alarm systems)
 - Other building installation services (e.g. installing curtains, lifts, insulation material)
 - *Building completion services*
 - Plastering
 - Carpenter (eg wooden flooring installation, cabinet making - on site fabrication)
 - Tiling and carpeting eg floor sanding and polishing
 - Painting and decorating
 - Glazing
 - *Other construction services e.g. landscape construction services*

- Brick paving
- Pool fencing
- *Construction machinery operator eg*
 - Crane driver (coded under Crane, Hoist and Lift Operators)
- *Other construction services (not elsewhere classified)*
 - Waterproofing of building (coded under Insulation and Home Improvement Installers)

Occupations excluded from construction

- Any level 1 (manager) occupations e.g. Construction manager (1331). We did not include these under construction, as their skills were considered general managerial skills not necessarily specific to construction.
- Architects and building consultancy services were not included in construction as their skills fit more into the professional group (Division M 692) Architectural, Engineering and Technical Services.
- Building operation jobs: e.g. facilities manager, building manager, Building operations manager, Building Services Coordinator
- Council workers
- Building materials suppliers
- Jobs in the manufacturing industry e.g. Fitters, Turners
- Jobs in Mining e.g. Driller, Miner 7122, mining labourers 821
- Boat or other vehicle builders
- Sand blasting or steam cleaning of building exteriors
- Landscaper (coded as Gardeners 3622)

Occupations in the following areas have been included in construction: (drawn from occupational groups 3, 7 and 8):

Source: ABS (2013). Australian and New Zealand Standard Classification of Occupations. Cat. No. 1220.0. CanbeRRRa: ABS.

Group 3: Trades and technicians

- This group comprises of skilled construction/plumbers/floor etc tradespersons
- Builders (without more information) have been coded as 3 Trades and technicians (Note: these people were originally coded in level 1 but were later recoded into the general level 3 category)
- Construction trades workers without more information - coded as 33
- Building and engineering technicians 312 (eg. site supervisor, foreman, estimator, building surveyor, leading hand, building scheduler, Vicroads works manager)
- Set builders (e.g., drama set)- code as carpenter 331212 (from ABS)
- Patio builder or patio installer– code as wall and floor tiler
- Brick cleaner / brick cutter – code as ABS Bricklayer (331111)
- Renderers – code as plasterer
- Building planner/designer – coded as Architectural Draftsperson 312111 as they may not be a qualified architect in professionals category.
- Linesman / electrical lineman have been included in construction as they are classified by ABS as an Electrical distribution trades worker, who prepare, install, repair, maintain and patrol electric power distribution networks. These task are part of Heavy and Civil Engineering Construction.

Foreman

- If no other information, code Foreman in ANZSCO 3. These occupations are usually in construction.
- A **construction foreman** is the worker or tradesman who is in charge of a construction crew. Normally the **foreman** is a construction worker with many years of experience in a particular trade who is charged with organizing the overall construction of a particular project. Typically the foreman is a person with specialist knowledge of a given trade who has moved into the position and is now focused on an overall management of all trades rather than any particular specialized group.

- Foremen are best understood as Project Managers who have come to that position after experience as a construction worker, as opposed to an individual who has followed a professional project management development program.
- Specifically, a foreman may train employees under his or her supervision, ensure appropriate use of equipment by employees, communicate progress on the project to a supervisor and maintain the employee schedule. Foremen may also arrange for materials to be at the construction site and evaluate plans for each construction job.

Roof related jobs

- Roof Tiler includes the following: - Roofer, roof builder, roof maintenance contractor, roof and gutter installer, roof renovator, roof repairer, roof restorer, roofing company, roofing contractor
- Roof carpenter - coded as carpenter 331212

Group 7: machinery operators and drivers

- Coded the following as earthmoving plant operators 7212:
 - Earthmoving Contractor
 - Proprietor earth moving co.
- Asphalt contractor and asphalter coded as Paving Plant Operator 721913
- Asphalt worker coded as Paving and Surfacing Labourer 821511 – “worker” in the title may suggest lower skilled job, we don’t know so code down.

Group 8: unskilled labourers

- Construction self-employed coded as 821
- Concrete Cutter – coded as Concreter 821211
- Marina Construction – coded as Structural Steel Construction Workers 8217 – included in construction group
- Building maintenance e.g. Handyman, Building Maintenance Supervisor, Building supervisor have been included in construction

Other coding notes

If occupation is non-specific and could fit into numerous skill level categories, code down. i.e., ‘construction’ – code down to at least as 821 (assume they are not a construction manager)

- Include ‘labourers’ (code as 8) and tradesman/tradesperson (code as 3) without further job information in the construction group.
- Code all contractors and sub-contractors in trade they are in, e.g. painting contractor coded as painter, contractor with Austin Cranes coded as crane operator
- Code the following as Bricklayers, Carpenters and Joiners 331:
 - Apprentice builder
 - Builder/painter
 - Builder/construction
 - Self-employed builder
 - Sub contractor builder
- Code Builder/carpenter as carpenter 331212
- Builder/carpenter’s labourer – coded as Builder’s Labourer 821111

Appendix 2: Summary of key parameters used in costing analysis

Item	Description	Source
Production disturbance costs (time off work / overtime)	Average weekly earnings (AWE) x average duration of absence (by severity category); AWE x average duration of absence x 0.4	ABS Cat. No. 6302 (Employee earnings - : males, by State and Territory); Safe work Australia report
Staff turnover costs	The cost of replacing existing staff affected by work-related incidents (26 weeks of AWE) and training of new staff (2.5 weeks of AWE)	ABS Cat. No. 6302 (Employee earnings - : males, by State and Territory); Safe work Australia report
Human capital costs	For full incapacity or fatality: loss of earnings from time of injury to retirement age (i.e., <65years), discount rate = 4.1%, inflation rate = 2.8%, productivity rate = 1.6%. For full incapacity, future earnings includes average social welfare payments received (since these contribute to post-injury income).	ABS Cat. No. 6302 (Employee earnings - : males, by State and Territory); Safe work Australia report, RBA cash rate (2008-2014), ABS CPI (2008-2014), Commonwealth Government Intergenerational Report
Loss of government revenue	For full incapacity or fatality, taxation and other revenue foregone when workers are unable to work due to work-related incidents	ABS Cat. No. 6302 (Employee earnings - : males, by State and Territory); Safe work Australia report; ATO estimates of effective taxation rate
Social welfare payments	Sickness and social welfare payments borne by the government for people with disabilities (disability support pension payments of \$816 per fortnight (in 2012 dollars) discounted to present value over the period between the incident and reduced life expectancy)	Department of Human Services (http://www.humanservices.gov.au/customer/services/centrelink/disability-support-pension)
Health and medical costs	Average medical costs from National dataset for compensation-based statistics	Safe Work Australia report
Administrative costs (legal costs)	Legal costs associated with a typical work-related incident	Safe Work Australia report
Administrative costs (investigation costs)	Investigation costs: As a proxy for the costs to firms, investigation and inspection costs reported in jurisdictional annual reports are assumed to match the cost to employers for these functions	Safe Work Australia report
Administrative costs (travel expenses)	Payments made for travel expenses to workers' compensation jurisdictions by claimants (as a proxy, assuming that compensation is adequate to cover these expenses).	Safe Work Australia report
Administrative costs (funeral expenses)	Average funeral costs are estimated at \$4,000.	Safe Work Australia report
Transfer costs	The redistribution of public sector resources to care for incapacitated person incurs deadweight costs on society - for every dollar of tax raised,	Access Economics 2009

	about 28.75 cents is absorbed in the distortions induced and the administration of the tax system)	
Other (carers)	For full incapacity, the additional cost of care (estimated applicable disability support pension payments of \$3,303 per annum, discounted to present value over the period between the incident and reduced life expectancy)	Department of Human Services http://www.humanservices.gov.au/customer/services/centrelink/carer-allowance
Other (aids, equipment and modifications)	For full incapacity cases only, the present value of future costs for aids and modifications (Estimated applicable disability support pension payments of \$933 per annum, discounted to present value over the period between the incident and reduced life expectancy).	Department of Human Service http://www.humanservices.gov.au/customer/services/centrelink/pension-supplement
Other (postvention)	Cost associated with bereavement for 6 family / friends - estimated at \$14,058 per person; employer cost associated with providing counselling and time off work for 3 colleagues who may have witnessed fatality - estimated at \$10,000 from time of incident to return to full duties	Multiplier effect for 6 people by Corso et al (2007), average social cost of bereavement by Comans et al (2013)