Guide for design engineers and building certifiers

Collaborate for a better future

ENGINEERS
AUSTRALIA

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Executive summary

The Building Confidence Report issued in February 2018 exposed construction industry problems and regulatory failures, acting as a catalyst for change. Key industry stakeholders, including federal and state governments, are implementing reforms to reorient professional behaviour toward delivering better buildings and more trustworthy outcomes for the public good. This has led to extensive consultation, new legislation and regulatory approaches.

Throughout this reform there has been a call for better collaboration.

This principle underpins the industry's foundations and defines its culture. However, a lack of guidance has contributed to speculation over the roles and responsibilities of design engineers and building certifiers. Changing commercial environments have also led to the redefinition of scopes within practitioner roles, which in the absence of guidance has contributed to gaps in responsibilities.

Engineers Australia wrote this guide to assist design engineers to understand where responsibility and liability sits when working with building certifiers. The guide also identifies where engineers can demonstrate better value in the profession by better supporting building certifiers in their work.

This guide takes an in-principle approach, laying out best practice in terms of communication, problem solving, record keeping and teamwork, which design engineers and building certifiers will find helpful.

It also lays out a framework designed to foster constructive collaboration between all parties based on a sound understanding of each parties' wants and needs, but also their risks and accountabilities.

We are very grateful to the Royal Institution of Chartered Surveyors for its input and useful insights in producing this guide. In particular we would like to thank Kingsley Lunt MRICS who has so generously shared his building certifying expertise.

The support provided to Engineers Australia by the committed volunteer community within our membership has once again been invaluable in the development of this practical guidance for selected roles in the profession.

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1. The role of design engineers and building certifiers

1.1. Design engineers

Engineers play an important role across the whole lifecycle of a project, including design and construction support, but also post construction during the operation, maintenance, refurbishment and disposal phases. Due to the diverse nature of engineering experience and roles, this guide focuses on the role of a design engineer, who helps prepare the design; supports construction activities through inspections; and assists during commissioning and hand-over stages. On a very high level, a design engineer could be engaged for the following activities during design and construction:

- Project briefing
- Feasibility and concept design
- Design development, including the production of design drawings and specifications
- Tender evaluation
- Construction support, e.g. design/review variations, respond to Requests for Information (RFIs)
- Site inspections
- Testing and commissioning
- Assistance with hand-over
- Third party peer review

For design engineers who are members of Engineers Australia, the organisation's Code of Ethics requires the member to[1]:

- Demonstrate integrity
- Practise competently
- Exercise leadership
- Promote sustainability

An Engineers Australia member found to have compromised community interests, such as health, safety, sustainability and wellbeing; when adjusting a design for the benefit of the builder alone, may be subject to disciplinary action due to a breach of professional conduct and by disciplinary regulations.

1 https://www.engineersaustralia.org.au/ethics

1.2. Building certifiers

Building certifiers, sometimes referred to in Australia as building surveyors, statutory building certifiers etc., perform the regulatory function of building control and enforcement. Building certifiers ensure buildings meet the minimum requirements set out in relevant legislation, codes and standards.

Federal and respective state and territory legislation sets the framework for which building certifiers perform their duties in each jurisdiction. These include confirming (or certifying) compliance with relevant legislation, including applicable parts of the National Construction Code (NCC), which incorporates both the Building Code of Australia (BCA) and the Plumbing Code of Australia (PCA)[2] at set intervals on the timeline of a building project. Most commonly this applies when:

a. Certifying or issuing an approval to allow commencement of construction works on completion of an approved design

b. Certifying or issuing an approval to allow occupation once the approved design has been constructed and commissioned and inspected by the various contributing design practitioners

The role of a building certifier requires a level of professionalism to act as a public official, including ethical standards similar to the RICS's Rules of Conduct held by all RICS Chartered Surveyors, which are:

Rule 1

Members and firms must be honest, act with integrity and comply with their professional obligations, including obligations to RICS.

Rule 2

Members and firms must maintain their professional competence and ensure that services are provided by competent individuals who have the necessary expertise.

Rule 3

Members and firms must provide good-quality and diligent service.

Rule 4

Members and firms must treat others with respect and encourage diversity and inclusion.

Rule 5

Members and firms must act in the public interest, take responsibility for their actions and act to prevent harm and maintain public confidence in the profession.

In the public or private sectors, building certifiers must uphold such standards when discharging their duties.

2 Whilst the NCC comprises of both the BCA and the PCA, Building Certifiers typically only work with and certify products in line with the BCA. The term BCA and BCA consultant is used through the rest of the document as these are common terms used by Building Certifier's when describing their work.

2. Interface between the roles

During the design and construction phases, building certifiers and design engineers typically have the following interactions.

2.1. Project briefing and concept development

The project brief and concept development are key steps in the design and construction process. While building certifiers are not always involved in this phase of the project, their inclusion is required when pursuing a performance-based design.

The Performance-Based Design Brief (PBDB) is a document developed in collaboration with key stakeholders as a proposed performance-based design and approval process. When complete, the PBDB will be the platform upon which the proposed design is constructed. Building certifier input to the PBDB can ensure the design process begins with a high degree of confidence. If the requirements of the PBDB are met, the proposed design is likely to be approved.

Typically, a PBDB should include:

- a summary of the proposal, for example:
    - building type and function
    - effective height
    - location of the building
- a description and explanation of the proposed solution
- the proposed assessment methodology
- nominated applicable performance requirement(s)
- agreed acceptance criteria
- required scope of supporting evidence
- the proposed format and content of the final report
- acknowledgement of participants and stakeholders

2.2. Design phase

2.2.1. Design review

To issue building approval certificates, building certifiers review design proposals and assess their compliance with relevant legislation, codes and standards, including the NCC. This may be at any time during the design phase from early in the project, such as early master planning and feasibility studies, through to design development. It can also be done at a later stage, in construction documentation. Building certifiers may issue an assessment report or letter of requirements to identify compliance related items and issue Requests for Information ('RFI') to designers where a design does not clearly demonstrate BCA compliance to what the building certifier deems an acceptable level.

BCA RFIs may be requested from design engineers for specific aspects of the design, for example, structural, services (e.g., mechanical, electrical, fire protection and hydraulics), or fire system design engineers. The request can include consideration of which parts of the BCA are required to be designed to by each respective party.

If a separate BCA consultant is engaged, the assessment report or letter of requirements from the person may extend to providing expert BCA design advice on how to alter the design to improve efficiencies. While the building certifier, responsible for issuing building approval certificates, may check design documentation for compliance they must not participate in the design process itself as this would represent a conflict of interest.

Where a design engineer needs guidance on compliance matters during a phase of design, they should not request advice from the building certifier on what to do. Instead, they should consider seeking advice on what information the building certifier will require to demonstrate compliance of the design engineer's proposal. This should allow the design engineer an opportunity to gain confidence in their chosen solution, without creating an unethical position for the building certifier.

2.2.2. Design certification and building approval

Through reviewing information, the building certifier confirms if a satisfactory level of documentation has been provided to demonstrate BCA compliance, or whether information remains outstanding or is unacceptable. This will include a review of the proposed documentation within the limitations of the expertise of the building certifier.

Part A5 of the BCA clarifies the forms of evidence needed to demonstrate that requirements are achieved. It is up to the building certifier however, to determine what they consider a reasonable level or amount of evidence to demonstrate BCA compliance.

Design engineers should obtain advice on what level or amount of evidence will be required for this approval process early in the design phase. This ensures expectations are established and to prevent the need to redevelop completed design records.

It is recognised building certifiers are not sufficiently qualified to check each and every technical detail of the multifarious design professions in the creation of a building's design. Therefore, suitable evidence to demonstrate BCA compliance includes specialist plans, reports and calculations. These can be accompanied by design certificates prepared and issued by appropriately qualified persons, such as design engineers, who depending on the jurisdiction, may need to be registered to provide such declarations. A building certifier, for example, is not expected to perform a robust review of complex structural design calculations and may seek design certification from the author of such documentation attesting BCA compliance. Conversely, the building certifier would typically scrutinise any proposed design methodology and acceptance criteria set by a fire safety engineer to a greater extent, as (depending on accreditation and experience) a building certifier would be expected to be conversant in such matters. In circumstances where the building certifier deems necessary (for example, due to the specialist nature of a design proposal), a third-party peer review may be requested to further clarify compliance.

While a building certifier may rely upon design certificates to a certain degree as evidence to demonstrate BCA compliance for specialist design content, they would be expected to undertake a reasonably robust review of the suitability of the author's competence and the attestation made. Not all jurisdictions currently register engineers. When a mandatory state-based registration scheme does not exist, it is common that professionals with industry-based accreditations such as National Engineering Register and/or Chartered status (e.g., Engineers Australia Chartered Professional Engineers) are considered as suitably qualified and experienced practitioners to sign certificates. This consideration may be at the building surveyor's discretion.

Once the building certifier is satisfied that all of the design documentation received for a project would achieve BCA compliance (if constructed in accordance with that documentation by suitably qualified and experienced persons), a building approval is issued to commence construction works.

2.2.3. Variation of roles under design and construct (D&C) projects

Procurement and delivery challenges associated with more traditional contracts have led to D&C procurement experiencing a rise in popularity, especially in the last two decades. Where D&C is the employed procurement method, a design engineer may be engaged at the beginning of the project and to progress the design for tender. Then they would be either novated to the builder to complete the design for construction or continue as the client's or owners' engineer (i.e., the reviewer). The building certifier may be engaged at any time during the design process, though they must ensure they are excluded from design decisions to maintain their impartiality as public officials. To ensure this impartiality some jurisdictions prohibit the direct engagement of a building certifier by a builder in a D&C project, meaning they must remain client side.

While a design engineer's appointment may transfer from the client to the builder during this procurement process, Engineers Australia members have an ethical responsibility to ensure decisions reflect a commitment to serve the community ahead of other personal or sectional interests.

2.3. Construction phase

2.3.1. Inspection regime

Depending on the jurisdiction, the building certifier will undertake a minimum number of inspections as mandated by legislation and/or to the degree necessary to confirm BCA compliance for certain aspects of the construction. An inspection report to document findings is produced. This is typically provided to necessary stakeholders and may contain RFIs to ensure compliance of construction aspects identified at the time of inspection. In some jurisdictions, a building certifier is also required to report some instances of non-compliance to the relevant authority for further consideration.

Design engineers may be engaged to perform site inspections in accordance with key inspection milestones to support a building certifier's own assessment and/or at the special request of a client.

2.3.2. Variations and defects

Where variations or defects arise, the building certifier will require an increased level of information to verify BCA compliance. In some cases, this may result in time delays to the construction phase, as design compliance is typically required to be certified prior to construction of variations. Similarly, design engineers who do not see original designs installed properly or substantially varied without their prior approval, may require further supporting documentation and/or adjustments before they are willing to support or endorse the construction to continue.

2.3.3. Occupation certification

Once works are finalised sufficiently to permit the intended final use of the area of works to commence, the building certifier is tasked with issuing a certificate to approve full or partial occupation and/or use of the building. This may occur at a different time than a contractor's practical completion date, which is generally a contractual milestone for the convenience of project delivery, rather than a regulatory milestone. This is because a building certifier's role is typically limited to ensuring a minimum level of BCA compliance and does not extend, for example, to concerns over the quality of finishes or particulars within the contractor and client's agreed contract. Nevertheless, a sufficient level of evidence must be provided to the building certifier for them to confirm the performed works demonstrate compliance with the approved design and any relevant legislative standards requirements (according to jurisdiction) they are responsible for, including the BCA.

Similarly to the design phase, a building certifier may rely on varying mediums of evidence, such as those documented in Part A5 of the BCA, typically combined with their own site findings to determine the executed works demonstrate compliance with the relevant statutory requirements. Design engineers who have taken part in the construction phase may be called upon to issue copies of site reports and completion or inspection certificates.

Once the building certifier is satisfied all of the as-built documentation received for a project satisfies the relevant requirements of the NCC and any other statutory requirements of the jurisdiction, an occupancy approval is issued. This certifies the constructed works are suitably compliant with the BCA and fit for occupation.

3. Risks and issues arising from collaboration

While collaboration between building certifiers and design engineers is essential for successful delivery of a building project, it may increase project risk and compromise the impartiality of the building certifier's decision making without effective mitigation. The following information summarises key areas of collaboration where such risk may arise. Suggested strategies to support collaborative processes are provided in the next section of this guide.

3.1. Design phase

3.1.1. Design input and building certifier's conflict of interest

Building certifiers issuing building approvals act as public officials. They may communicate with the design team to advise on compliance requirements and their acceptance of design proposals. Although their code of conduct prevents them from providing design advice. This is different from the role of 'BCA consultants' who provide BCA related design advice. When a BCA consultant is not engaged during the design process, building certifiers may be pressed for design advice causing conflicts of interest or communication breakdown.

While design engineers may not act in an official role to the public, Engineers Australia members must remain aware of their ethical obligation to act in the public interest. The general public may not be able to identify or manage matters of their interest and are therefore reliant on experienced and professional engineers to protect and support them.

3.1.2. Reliance on design certificates

While Part A5 of the BCA recognises design certificates issued by appropriately qualified persons are a legitimate form of documentary evidence to demonstrate BCA compliance, some jurisdictions lack standardised templates for such certificates (and indeed building approvals themselves), leading to uncertainty and ambiguity. A certificate from an engineer may not necessarily mean all aspects of the engineering discipline have been certified as compliant by the engineer. For example, caveats and critical sub-design components (e.g., post-tensioning design, detailed façade design or exclusion of selected elements of a design) not covered by the design certificate author may limit the certificates' reliability. This may not be disclosed effectively or fully understood by a building certifier. When multiple sub-design elements exist, certifying the interfaces between the elements could be missed.

Engineers Australia considers any efforts by a design engineer to mislead a certifier through the preparation of a design certificate that conceals a non-compliance, or even an uncertainty in compliance, to be a breach of our Code of Ethics based on a lack of integrity. Design certificates should be trustworthy and transparent reflecting the professionalism of the author(s).

3.1.3. Lack of understanding of practitioners' credentials

General industry understanding and appreciation of credentials amongst design engineers and building certifiers needs to improve. Misunderstanding of what constitutes suitable and reliable engineering industry body accreditations and government registrations can cause confusion in some jurisdictions when there is a lack of state or territory guidance. Parties may therefore be overly reliant on others who may not have the level of expertise, experience or responsibility as anticipated.

Engineers Australia's National Engineering Register (NER) and chartership credentials are designed to provide industry-based endorsement of an engineer's competency. A recipient of these credentials can be held to account for their actions and any unacceptable professional behaviour.

3.2. Construction phase

3.2.1. Ambiguity around scope and accountability during mandatory inspections

In some jurisdictions, legislated mandatory inspections set minimum requirements for building certifiers to perform inspections. Depending on building complexity, due to the bespoke nature of building projects, the minimum inspections mandated to be performed by a building certifier may alone be insufficient to discharge the public good for every project.

Design engineers may not be mandated as the party to attend those inspections. While design engineers commonly include fees in their service proposals to perform inspections, clients may decline such contractual proposals.

Regardless of inspection frequency or overall number, similarly to the design phase, the building certifier will typically require the expertise of design engineers to give compliance assurances for complex, specialist parts of the construction where the building certifier lacks expertise.

3.2.2. Insufficient information sharing and record keeping

Although design engineers and building certifiers may report to the same client, there is no guarantee findings for the same client from the design engineer or building certifier will be effectively exchanged.

Even if design engineers and building certifiers are engaged to do construction stage inspections, their post inspection reports may not be shared between the two parties.

Engineers Australia encourages collaboration opportunities to be sought in these reporting processes. This reduces the risk to the public interest and complications that may arise due to contractual arrangements of these parties.

3.2.3. Delivery program

Variations and defects including the cost and time to remediate them, may lead to contractors feeling commercial pressure to withhold information from the building certifier and design engineer. This can have severely detrimental consequences to the quality of buildings.

The commercial pressure within a building project typically increases approaching completion, as this is often a key milestone or deadline for parties to work towards. Obtaining final payments and an increased pressure to commence occupation are examples of factors that see communication breakdown.

Time and commercial pressures must not compromise the ethical responsibilities of design engineers and building certifiers.

3.2.4. System interfacing and integration

When a construction project is nearing full completion, system testing and commissioning is at a critical stage. While it is common for parties to work on and be individually responsible for varying aspects or components of the construction (e.g., subcontractors), the integration of these aspects or components with others is required to be finalised prior to occupation. The responsibility to test the integration of each individual system, produced by numerous subcontractors, is often ill defined in contracts. Despite final commissioning of the integration of services being a vital part of BCA compliance, a building certifier may rely solely on certification from other parties to confirm this has been successfully achieved as opposed to first-hand witnessing. This issue is heightened where a design engineer has not been tasked with the role of being a third-party independent commissioning agent[3] or proof engineer[4].

3.2.5. Operation and maintenance manuals

It is necessary to provide end users with sufficient information on how to operate and occupy a building safely and efficiently. To ensure this, some jurisdictions legislate a building manual must be prepared to allow occupation. In many jurisdictions the content, responsibility to prepare, and responsibility to approve the information within such building manuals is not defined. Frequently done as a last-minute task, the quality and clarity of a building manual may be compromised, having detrimental effects on the operation, maintenance and occupation of a building.

3 The Independent Commissioning Agent provides support to the project team in conducting the commissioning of the system in order to ensure that the building functions in a safe and efficient manner

4 For more information on the role of proof engineer please see: http://engineersaustralia.org.au/sites/default/files/resources/Public%20Affairs/2020/Building%20confidence%20-%20supplement.pdf

4. Dealing with risk arising from collaboration

Honest, reliable, upfront and effective communication is a critical means of mitigating risk arising from collaboration between professions. This communication builds trust between project stakeholders.

To better collaborate, design engineers and building certifiers need to be encouraged to approach a project with a holistic mindset. They need to understand how their decisions could impact on other's work and the successes of the project. This level of collaboration requires good knowledge of other parities' roles and responsibilities and how different practitioners interact.

A holistic mindset is vital, regardless of contract particulars, the overarching accountability requires professional standards of practice by all parties. To drive down disputes and increase trust, parties must focus on their responsibility for the details of the services they provide but also the quality of the whole project.

4.1. Design phase

4.1.1. Clear expectations and role definition

It is in the interests of all parties to be clear on what information is required early in the design phase, to ensure roles and responsibilities are adequately defined. A building certifier may clarify what level of information is required and from who. Information requests should not include advice on how to amend documentation to achieve BCA compliance, as this represents a conflict in the building certifier's responsibility.

Design engineers are responsible for designing in accordance with the relevant requirements of their jurisdiction, including the BCA. If a design engineer is unclear on how to make a design solution BCA compliant, they are encouraged to collaborate with a BCA consultant (if appointed on the project), not the building certifier. If a BCA consultant is not appointed and design advice on BCA is necessary, the design engineer should advise their clients for the appointment of a BCA consultant.

Different jurisdictions have different requirements. For example, ACT allows a simple hand sketch to be provided by the building certifier on compliance related matters. This would most likely constitute a conflict of interest in NSW, potentially leading to disciplinary action by the state government.

Building certifiers should ensure they are well versed in the restrictions relating to design advice applicable in the jurisdiction they are practicing in. If in doubt, they should make prior consultation and seek guidance from the relevant governing authority if they perceive a conflict of interest may potentially occur prior to issuing any advice on design matters. It is the job of the designer to clearly explain the compliance of their design to the certifier and the job of the certifier to understand what the complete solution is before it is certified.

4.1.2. Competence assessment and reliance on design engineers

When determining a design engineer's competence for certification purpose, levels of experience and qualifications should be assessed in relation to the works performed. For example, a graduate mechanical design engineer with less than three years' experience is unlikely to be reasonably assumed to hold the level of experience and qualifications to be the lead designer and sign off for a smoke exhaust system for a hospital.

Where individuals do not have substantiative formal qualifications in their field of practice, third-party assessment such as Chartered engineering credentials might be considered by building certifiers to assess expertise and competence. Although these credentials alone are insufficient to demonstrate the necessary level of experience and qualifications to be the lead designer and sign off for a smoke exhaust system for a hospital. Relevant experience is therefore also important for the building certifiers to ensure the individuals not only have the academic competency in their field but have applied knowledge in relevant building classes.

Should a building certifier cast doubt or ask for further information on the suitability of a design engineer's experience or qualifications, a design engineer should remember it is the role of the building certifier to ensure they have undertaken a robust interrogation of the design proposals. Building certifiers are required to collate evidence to demonstrate this to ensure their role as a public official is appropriately performed. A building certifier can also rely on documentation of their enquiries as evidence they have performed a reasonable review opposed to prima facie acceptance of design certificates.

Regardless of qualification and experience levels, there may be instances involving complex and/or innovative designs whereby a third-party peer review is appropriate. This would be requested by the building certifier or another member of the project team to provide quality assurance and reduce risk to the project.

4.1.3. Comprehensive vs specific design component certification

A design engineer's scope is defined by their contract of engagement. They may be responsible for components of a design discipline and not engaged on others. There may be instances, for example, where multiple design engineers are responsible for certain aspects of a single design discipline. The design engineer and building certifier should be aware of any limitations in a design engineer's scope. A design engineer should make these limitations clear when providing design certificates. A building certifier should consider whether this has any implications on their reliance on such design certificates, particularly, the integration of sub-design or associated components.

The value of design certificates issued by the original design engineers on a D&C project may be limited if they are raised against a design that will undergo modification through subsequent cost saving initiatives. For example, instead of certificates from original design engineers on 'for tender' documentation, a design certificate from the builder's design engineer who produces the 'for construction' design documents is more relevant to a building certifier, if used as evidence of the design's compliance and as part of the building approval process. Due to the lack of consistency with the level and details of documentation produced at tender stage and at the construction stage on a D&C project, certifiers need to be cautious and confirm with engineer/client the intent and level of details of the 'for tender' design.

Some jurisdictions are providing standardised terminology to describe the process. For example, the New Zealand Construction Industry Council has developed standard definitions. The guidelines cover the reasonable expectations for documentation and construction delivery at the different stages. The use of clear, standardised and universal terminology would assist the industry greatly in project management and would support clients in improving the quality of their expensive asset. The standard expectations have assisted the entire industry and improved building quality.

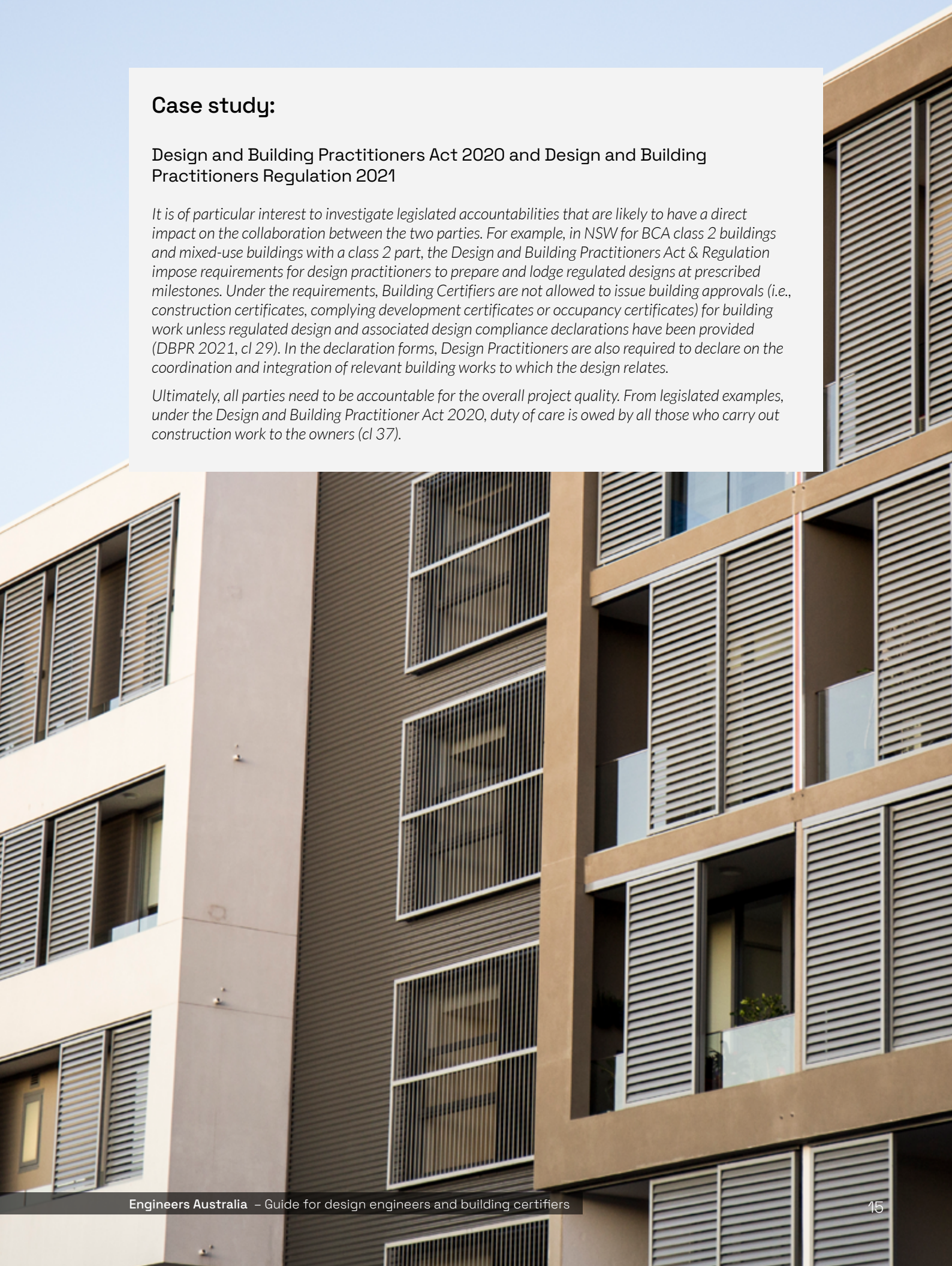
Design Guidelines - NZ Construction Industry Council (nzcic.co.nz)

Case study:

Design and Building Practitioners Act 2020 and Design and Building Practitioners Regulation 2021

It is of particular interest to investigate legislated accountabilities that are likely to have a direct impact on the collaboration between the two parties. For example, in NSW for BCA class 2 buildings and mixed-use buildings with a class 2 part, the Design and Building Practitioners Act & Regulation impose requirements for design practitioners to prepare and lodge regulated designs at prescribed milestones. Under the requirements, Building Certifiers are not allowed to issue building approvals (i.e., construction certificates, complying development certificates or occupancy certificates) for building work unless regulated design and associated design compliance declarations have been provided (DBPR 2021, cl 29). In the declaration forms, Design Practitioners are also required to declare on the coordination and integration of relevant building works to which the design relates.

Ultimately, all parties need to be accountable for the overall project quality. From legislated examples, under the Design and Building Practitioner Act 2020, duty of care is owed by all those who carry out construction work to the owners (cl 37).



4.2. Construction phase

4.2.1. Site findings and instructions

When developing an inspection regime, a building certifier should allow a suitable amount of time to witness aspects of the construction to meet legislative duties. The certifier should consider their ethical standards and apply a risk-based approach to their proposed inspection regime. This should positively correlate inspection frequency and number with building complexity. All parties should be clear on what information is required early in the construction phase to ensure no critical inspection is missed.

Engineering input to the building certifier's decision-making process is vital, especially if the relevant engineer is only engaged by the client to perform very limited inspections. Should a building certifier be reliant on certain aspects of a design being sufficiently inspected by other parties (e.g., a structural engineer inspecting structural elements), the building certifier should be transparent about such reliance at the time of their engagement and instruction. Should a building certifier require additional inspections from other parties that are not engaged for these services, the building certifier should advise the client of such needs, so a suitable practitioner can be appointed to support the certification process. A clear understanding of whose responsibility it is to inspect which aspects should be universally accepted by the relevant stakeholders prior to construction commencing, ideally during the introductory briefing stage of the project. It is beneficial to keep written records of such expectations and what is expected to be provided in terms of documentary evidence. For example, building certifiers may issue lists of requested information to contractors that include engineering site reports and certifications by suitably qualified and experienced professionals to demonstrate construction compliance of inspected aspects of the project.

During inspections, as design engineers may not have the statutory power to stop work, they should communicate with building certifiers if they have significant concerns with the construction as soon as the problem has been identified.

4.2.2. The professional duties of those performing works on site

Given building certifiers and engineers spend a limited time and have a limited bearing on construction proceedings, both parties are reliant on persons responsible for undertaking the building works to undertake their work with due care and skill. The persons undertaking building work should be operating to the approved design and should divulge any information of site activities that building certifiers and design engineers may not be privy to or that may have a bearing on the compliance of the building works.

4.2.3. Final documentation and information transfer to ensure safe building occupation

Building certifiers should be encouraged to keep records of the successful integration of a building's components and services. Obtaining individual installation certificates that deal with aspects of the construction in isolation may not be an appropriate way to confirm NCC compliance without documented evidence that the integration of systems has been successfully completed.

Prior to commencement of the services testing and commissioning stage of a project, a building certifier should make upfront enquiries and find out if an Independent Commissioning Agent has been engaged. If one has not been appointed, additional steps are necessary to ensure sufficient documentation is collated to demonstrate the successful integration of services testing and commissioning. The success of integration testing is yet another part of a building project that relies on the effective collaboration between design engineers and building certifiers. Written records should be kept of testing performed and may form part of the evidence required by a building certifier to endorse that a building is fit for occupation.

The prerequisites for commissioning are dependent upon the conditions of engagement and the building contracts and sub-contract details. For example, technical specifications and commissioning requirements for Public Private Partnership delivery contracts have far more detailed commissioning and integration requirements than D&C buildings, but are generally more complex (e.g., hospitals, prisons, schools, rather than apartments). The sheer volume of commissioning records is largely beyond the capability of a building certifier. It is the building contractor's responsibility to prepare, commission, record and present evidence for the building certifier in a structured process, aligned with the risk management procedures (as detailed in Section 4.2.4 below).

Ideally, each trade subcontractor would assemble a building manual for the design engineer's review prior to handing over to the building owners or their representatives. As the manuals are critical parts of hand-over required for the building to be operated efficiently and safely, there is a role to be played by both design engineers and building certifiers. At the time of writing, this role is not prescribed in most jurisdictions. So to demonstrate both design engineers and building certifiers have taken the health and safety of occupants into consideration, records of any input and enquiries in relation to the building manual should be kept as evidence of discharging one's duties in an ethical, responsible and professional manner.

4.2.4. Record keeping

A consistent theme throughout this guide is to remind parties of the importance of record keeping. It is important any services delivery is backed up by traceable decision making, with any limitations and expectations made clear to all relevant parties. Record keeping is not to be considered solely as evidence to resolve disputes. Clear documentation results in effective decision making, reasoned judgment, better collaboration and improved buildings.

A lack of records and baseline data can have significant consequences for building owners after they are permitted to occupy the completed building, particularly when the time comes to re-test and verify elements of safety in the building or where additional works must be integrated with the original design.

5. The holistic approach – deliver trustworthy outcomes

Building projects are intrinsically complex, engineered systems. There are multi-disciplinary design and construction elements, various clients' requirements and numerous stakeholders the project team needs to consider. Plus, the team is expected to deliver everything safely, on time, on budget and to a good quality. As projects are normally set up under separate contracts with different parties at different stages, the successful integration of all elements through effective collaboration remains a challenge.

The litigious nature of the construction industry foments a risk-averse culture. When practitioners are occupied with minimising their individual risk exposure, ambiguous instructions and definitions of responsibilities can lead to further disputes. Regardless of contract particulars, a professionals tortious liability requires a reasonable discharging of services by all parties. To drive down disputes and increase trust, parties must focus on their responsibility to the quality of the whole project.

Although different practitioners can be bound by different obligations, they all share a universal responsibility to identify problems early. They all have an obligation to minimise or if possible, mitigate rework, effectively communicate and be transparent when undertaking activities and delivering services. Only with all those objectives in mind can the end goal of constructing trustworthy buildings be realised.

A holistic appreciation of the end goal is therefore paramount to ensure the complete as-built system functions as designed. Design engineers and building certifiers need to be clear of their own roles and responsibilities and how each piece of the puzzle fits to ensure coordinated integration throughout a project lifecycle, from concept design to handover and beyond.

This is the only path to deliver trustworthy, quality, safe buildings that demonstrate the capability and performance of the construction industry.

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ENGINEERS AUSTRALIA

Engineers Australia

11 National Circuit, Barton ACT 2600
+61 6270 6555
policy@engineersaustralia.org.au

engineersaustralia.org.au